CITY OF KAMLOOPS

Extreme Heat Response Plan

May 9, 2024

CITY OF KAMLOOPS

Canada's Tournament Capital

Canada's Tournament Capital

PREPARED FOR:

CITY OF KAMLOOPS
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1.0 INTRODUCTION

Following the 2021 heat dome that affected BC, the City of Kamloops decided to develop and implement an extreme heat response plan to build on and/or modify its existing response activities to heat warnings and extreme heat emergencies. The majority of existing activities are detailed on the City of Kamloops Heat Response webpage[1]. These activities include an indoor cooling centre, information about outdoor cooling sites, guides for neighbour health checks, and transportation. Community Services Officers also perform heat checks and hand out water, while several social agencies provide cool spaces.

The City of Kamloops Extreme Heat Response Plan provides direction on adapting response activities to new research and best practices used in other jurisdictions as well as how to effectively respond to heat warnings and extreme heat events in ways that meet Kamloops residents' needs. This plan supports previous work done by the City of Kamloops, particularly the Community Climate Action Plan, and adds a heat awareness lens to a number of key issues and guides the city towards a healthier urban environment.

The importance of planning for increased heat cannot be understated. According to a recent report by the University of Waterloo's Intact Centre on Climate Adaptation, Kamloops is projected to be one of the most exposed BC communities to extreme heat in the future (2051–2080).[2] The projections done for the closest metropolitan area—Kelowna—show that the average number of very hot days (over 30°C) is projected to increase from 23[3] to between 48 and 62, while the average length of heat waves is expected to increase from 6 days to between 8.5 and 11.2. The potential for extreme heat events, such as the 2021 heat dome, has grown enormously due to climate change.[4]

During the 2021 heat dome, 17 Kamloops residents died due to the effects of heat. Future extreme heat events will inevitably also pose a danger to residents, and their impacts need to be mitigated using a number of strategies.

Cities and their residents are in a difficult position to cope with and mitigate the impacts of extended heat waves and extreme heat events. The built environment creates urban heat islands, which attract, hold onto, and radiate heat into the environment and block the release of heat at night. Air conditioners expelling hot air into the environment, vehicle emissions, dark roofs, and the lack of vegetation and water bodies all contribute to higher daytime temperatures in developed areas than in rural areas, while nighttime temperatures take much longer to go down, making it harder to cool the urban environment and living spaces. Urban heat islands can be between 10°C and 15°C hotter than rural areas.[2]

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1 City of Kamloops, Heat Response. https://www.kamloops.ca/public-safety/emergency-preparedness/heat-response

2 University of Waterloo, Intact Centre on Climate Adaptation. Irreversible Extreme Heat: Protecting Canadians and Communities from a Lethal Future. April 2022. https://www.intactcentreclimateadaptation.ca/irreversible-extreme-heat-protecting-canadians-and-communities-from-a-lethal-future/

3 For period of recent history (1976–2005).

4 Canadian Climate Institute. The Case for Adapting to Extreme Heat: Costs of the 2021 B.C. heat wave. June 2023. https://climateinstitute.ca/wp-content/uploads/2023/06/The-case-for-adapting-to-extreme-heat-costs-of-the-BC-heat-wave.pdf

During a heat wave and even more so during an extreme heat event, an urban area that previously seemed harmless to human health (e.g. a parking lot or an unshaded bus stop) becomes unsafe. Unshaded sidewalks in busy commercial areas can become nearly unusable during periods of intense heat. Kamloops is at a point in its growth and development where pressure to densify, trees and vegetation removal, increased vehicle traffic, and air conditioners will increasingly contribute to the urban heat island effect.

During the 2021 heat dome, most heat-related deaths occurred inside the home.[5] Our housing has historically been built to protect us from the cold, not the heat. Homes heat up during the day and hold on to that heat well into the evening. Without mechanical cooling, most homes will be hotter than outdoor temperatures at night and hold heat even after the heat wave ends.[6] This makes uncooled homes a dangerous place to be for many people during extreme heat events.

With the current climate reality and a more extreme future in mind, the City's Extreme Heat Response Plan leverages the latest research on community heat response to establish an ambitious but realistic response to extreme heat events. It puts forward a series of implementation actions to apply preventative measures and reduce Kamloops' urban heat island effect. The plan emphasizes the need for collaboration between all sectors of society: the municipality, provincial and federal agencies, community partners (private, non-profit, and other government bodies), and the public. The City's Extreme Heat Response Plan recognizes that the safety of all Kamloops residents during extreme heat is best promoted by working together to protect our neighbours, family, and friends.

1.1 Plan Purpose

The Extreme Heat Response Plan has the following purpose:

- Reduce mortalities and negative health impacts during prolonged heat or extreme heat emergencies through strategic interventions
- Plan well-informed and feasible heat impact mitigation and long-term adaptation strategies to reduce the negative impacts of the built environment and make Kamloops a safer place for residents to use and experience during hot weather
- Serve as a general reference should staff changeover interrupt operational flow

1.2 How to Use the City's Extreme Heat Response Plan

The City's Extreme Heat Response Plan functions alongside any existing City of Kamloops emergency response plans but specifically provides greater detail on heat response. This plan guides the City of Kamloops throughout its response to level 1 heat warnings and level 2 extreme heat emergencies, with an established strategy based on the BC Heat Alert Response System. It also outlines roles and responsibilities, provides direction for communication, and provides recommendations on evaluation and long-term adaptation to heat.

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[5] BC Coroners Service. *Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021.* https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/death-review-panel/extreme_heat_death_review_panel_report.pdf

[6] Kelly MacDonald and Tanya Osborne, Healthy Community Development, Interior Health. Presentation: *Health Impacts of Heat: Community Adaptation & Resilience*. March 8, 2023.

The City's Extreme Heat Response Plan is intended to be used in the following ways:

- Contextual information from Sections 1, 2, and 3 is to be used as needed by staff and City Council to inform decision making and any future changes to strategy or response actions.
- The roles of City departments and external organizations in Section 5.2 provide clarity for all involved.
- The City's Heat Alert Response System protocol is to be used primarily by the Emergency Preparedness Manager and by all other relevant departments as a reference for response actions during different levels of heat warning.
- The implementation plan is provided for all relevant departments to discuss internally at least annually to advance key strategies.

Figure 1.1 shows how the City's Extreme Heat Response Plan is organized and its key components.

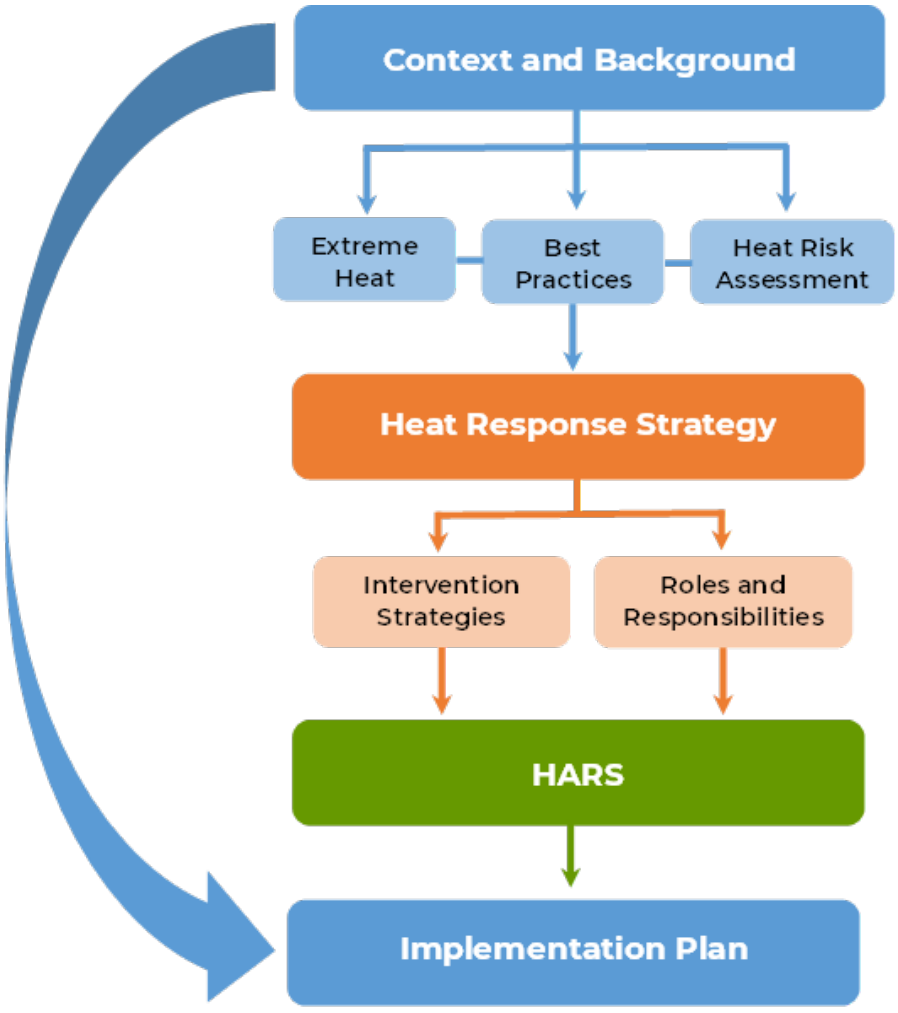

Figure 1.1: Extreme Heat Response Plan Organization

1.3 Extreme Heat Events

Extreme heat occurs when a high-pressure system traps warm air in a specific area for several days, resulting in increasing temperatures and little relief at night, particularly in urban areas.[7] Globally, extreme heat events have increased in frequency and duration over the past few years due to rising temperatures caused by climate change. Climate change modelling predicts that by 2050, days with temperatures above 30°C will occur four times as frequently as current rates.[8]

Global warming is occurring in Canada twice as fast as the global rate, leaving us more vulnerable to extreme heat events.[9] BC is projected to experience extreme heat with temperatures similar to the 2021 heat dome more frequently, and by 2050, they could occur 3 out of every 10 years. While communities like Kamloops are known to be summer hot spots, increases in global temperatures and extreme heat events will result in these communities experiencing dangerous temperatures regularly.

1.3.1 Classifying Heat: Heat Warnings and Extreme Heat Emergencies

Following the 2021 heat dome, the BC Health Effects of Anomalous Temperatures Coordinating Committee established two different warning levels for heat. The first is the heat warning and the second, which is also referred to as an extreme heat event in the Extreme Heat Response Plan, is an extreme heat emergency. A heat warning is classified as temperatures above 35°C during the day and 18°C at night for two or more consecutive days.[10] An extreme heat emergency is declared when heat warning criteria have been met for a minimum of three days with substantial increases in temperature daily.

This kind of heat is unsafe outdoors, even for short periods, particularly in the direct sun, and accumulates in urban environments and in homes, creating extremely unsafe living environments for those without adequate air conditioning or other mechanical air cooling, which is made worse for those with certain medical conditions or other vulnerabilities.[5] During an extreme heat event, typical interventions in homes with no air conditioning (e.g. fans, window coverings, and opening windows at night) are generally insufficient. For many, this leads to home temperatures that are too high for them to rest safely at night. Further descriptions of the impacts of extreme heat on people's health is found in Section 2.2.

1.3.2 About the BC Heat Alert Response System Framework

The 2021 heat dome resulted in 17 heat-related deaths in Kamloops, 84 across the Interior Health region, and 619 across BC[5] as well as a 55% increase in calls to emergency services.[11] To minimize mortality, injury, and illness, the two heat warning levels established by the BC Health Effects of

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7 Government of British Columbia. (2022). BC Provincial Heat Alert and Response System (BC HARS): 2022.

8 BC Centre for Disease Control. (2017). Municipal Heat Response Planning in British Columbia, Canada.

9 University of Waterloo (2022). Irreversible Extreme Heat: Protecting Canadians and Communities from a Lethal Future.

10 Environment Canada. Criteria for public weather alerts. https://www.canada.ca/en/environment-climate-change/services/types-weather-forecasts-use/public/criteria-alerts.html#heat

11 CBC News (2021). 911 dispatch service warned paramedic staffing created 'significant' public safety risk ahead of heat wave. https://www.cbc.ca/news/canada/british-columbia/bc-heat-dome-911-dispatch-emails-foi-1.6231100

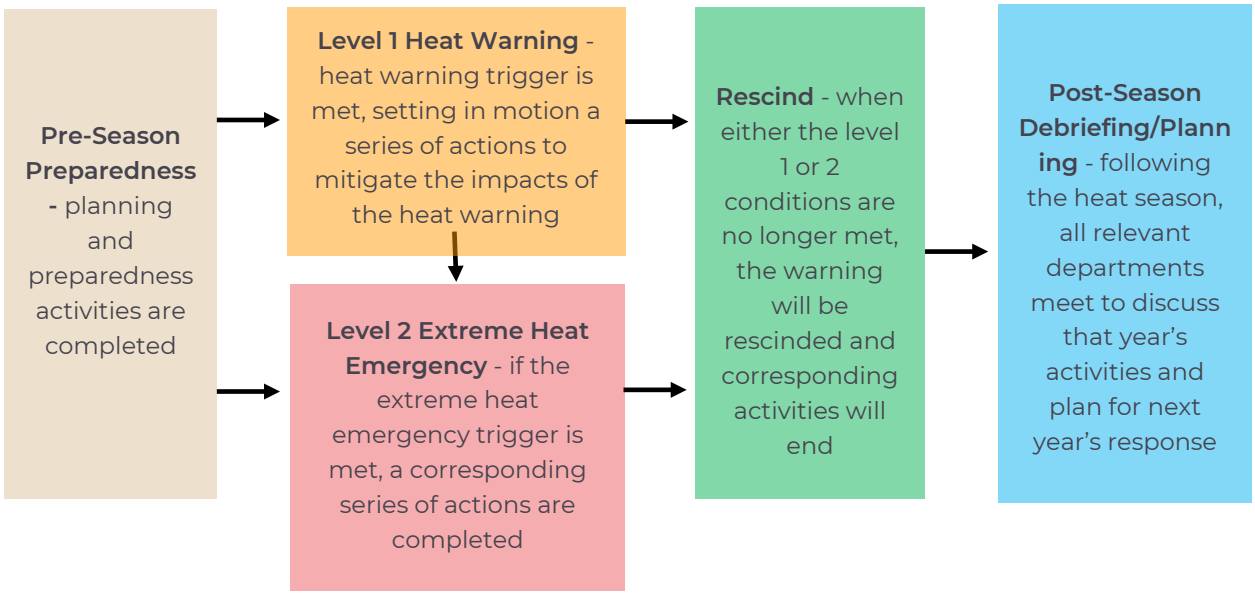
Anomalous Temperatures Coordinating Committee form the basis of a response protocol to be used by different levels of government throughout BC.

The two heat warning levels and their specific criteria are outlined in Table 1.1.

Table 1.1: BC Heat Alert Response System Triggers for Kamloops[12]

Type of Alert	Heat Warning	Extreme Heat Emergency
Criteria	35°C daytime high, 18°C nighttime low for at least two days	Heat warning criteria have been met and forecast indicates that the daily highs will increase day-over-day for three or more consecutive days
Public Health Risk	Moderate (5% increase in mortality)	Very high (20% or more increase in mortality)
Descriptor	Very hot	Dangerously hot
Historic Frequency	One to three per summer season	One to two per decade

These triggers form the basis of the City's Heat Alert Response System protocol, which includes the following stages:



More details regarding the City of Kamloops' Heat Alert Response System can be found in Section 5.3.

[12] Adapted from Table 1 in Heat Response Planning for Southern Interior B.C. Communities: A TOOLKIT. https://www.interiorhealth.ca/sites/default/files/PDFS/heat-alert-response-planning-toolkit.pdf

2.0 EXTREME HEAT IMPACTS

Extreme heat impacts Kamloops residents' environment and health, with some residents being more vulnerable to heat due to their housing or socio-economic status.

2.1 Impacts of Heat on the Built Environment

The built environment refers to a human-made environment—the materials, buildings, landscaping, transportation, green spaces, and other infrastructure that make up a city. During extreme heat events, vulnerability to health impacts varies due to urban environment characteristics and housing type.

2.1.1 Urban Environments

The built environment can worsen conditions during an extreme heat event. Urban areas can be the most dangerous places to be during an extreme heat event because of the urban heat island effect. Urban heat islands occur because high-density buildings and pavement trap heat in cities.[13] Due to the urban heat island effect, urban areas can experience daytime surface temperatures between 10°C and 15°C hotter than surrounding rural areas.[2]

The urban heat island effect and heat impacts are inconsistent across urban areas. Some neighbourhoods are more vulnerable due to greater pavement surface area, higher density, and fewer trees and green spaces.[14] These vulnerable areas are often lower-income neighbourhoods with residents who are less likely to have access to adequate mechanical cooling (usually air conditioning). Heat responses should prioritize targeting the most vulnerable neighbourhoods.

Extreme heat can be mitigated by undertaking built environment interventions, including the following:[14]

- Maximizing green space
- Increasing tree canopies
- Creating cool, green oases in as many public spaces as possible
- Using light-coloured building materials to reduce the urban heat island effect
- Targeting interventions in the most vulnerable neighbourhoods

Some of the innovative built environment interventions taken by cities all over the world are detailed in Section 4.2.

2.1.2 Housing

Extreme heat also has diverse impacts on different types of houses. This is important to consider because people are most vulnerable to heat waves inside buildings where temperatures cannot be regulated effectively. The BC Coroners Report found that 98% of the heat-related deaths during the

[13] Climate Atlas of Canada. Urban Heat Island Effect. https://climateatlas.ca/urban-heat-island-effect

[14] Cities Today. (August 2021). Four strategies to transform public spaces for extreme heat. https://cities-today.com/industry/four-strategies-to-transform-public-spaces-for-extreme-heat/

2021 heat dome occurred inside private residences[15]. Various factors make houses trap heat inside or cool down. Some of the features that help keep houses cool include the following:[16]

- Adequate, working air conditioning
- Low-lying homes (e.g., single storey)
- Basements
- Surrounding tree cover and external shading
- Light-coloured roofs and surfaces
- Suitable vegetation growing on the outside walls or roof
- Adequate window blinds and/or protective film

The fewer protections a home has, the more at risk occupants are. Apartment buildings, particularly rental apartments with little to no air conditioning or ventilation, typically have fewer protections from heat if they are higher-storey units, not close to vegetation or shade (or worse, right beside a parking lot that radiates heat), lack sufficient window shading, or share walls with other units that are also experiencing higher temperatures. This is nearly a perfect storm of factors which increase heat for occupants. These buildings are also most often found in denser urban areas which collect, store, and radiate heat with darks roofs, siding, concrete, and asphalt. The report *Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in BC in Summer 2021* released by the BC Coroners Service finds a clear connection between higher mortality outcomes, housing, and socio-economic status.

2.2 Health Impacts

According to the report *Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in BC in Summer 2021*, extreme heat events are Canada's leading weather-related cause of death. Extreme heat events are dangerous as they can worsen pre-existing health conditions and cause heat illness, which ranges from dehydration to life-threatening heat stroke.

Figure 2.2 describes types of heat illness as well as signs and symptoms to be aware of. [17]

[15] BC Coroners Service. *Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021.* https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/death-review-panel/extreme_heat_death_review_panel_report.pdf

[16] De Zeen (2022). Ten principles for designing cool spaces for hot weather. https://www.dezeen.com/2022/07/26/heatwave-cool-homes-smith-mordak/

[17] National Collaborating Centre for Environmental Health. (June 2022). Preventing injuries and deaths during extreme heat events, Environmental Health Seminar Series.

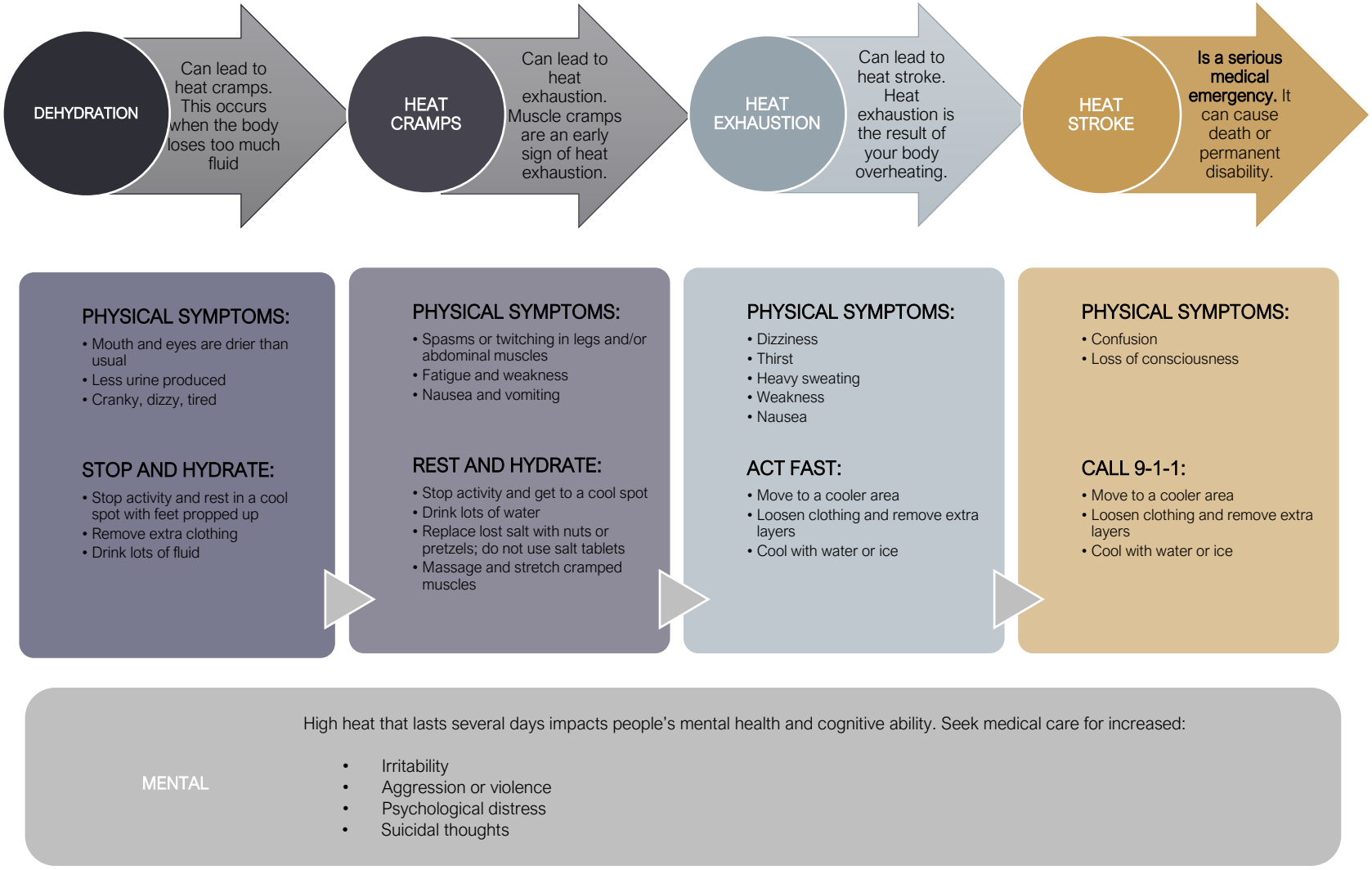


Figure 2.1 Heat Illness Types

The impact of extreme heat on pre-existing health conditions can persist for days after the extreme heat event due to heat-induced stress or a person staying in hot temperatures for prolonged periods[18]. Heat can also indirectly impact health as it can place stress on infrastructure, economic systems, and ecosystems.

BC's 2021 heat dome showed us just how deadly extreme heat events can be. There were at least 619 heat-related deaths in the province during the heat dome.

Figure 2.2 shows the expected, adjusted, and excess mortality rates in BC in summer 2021. The adjusted number of deaths and estimated excess mortality jumped sharply during the week of the 2021 heat dome.

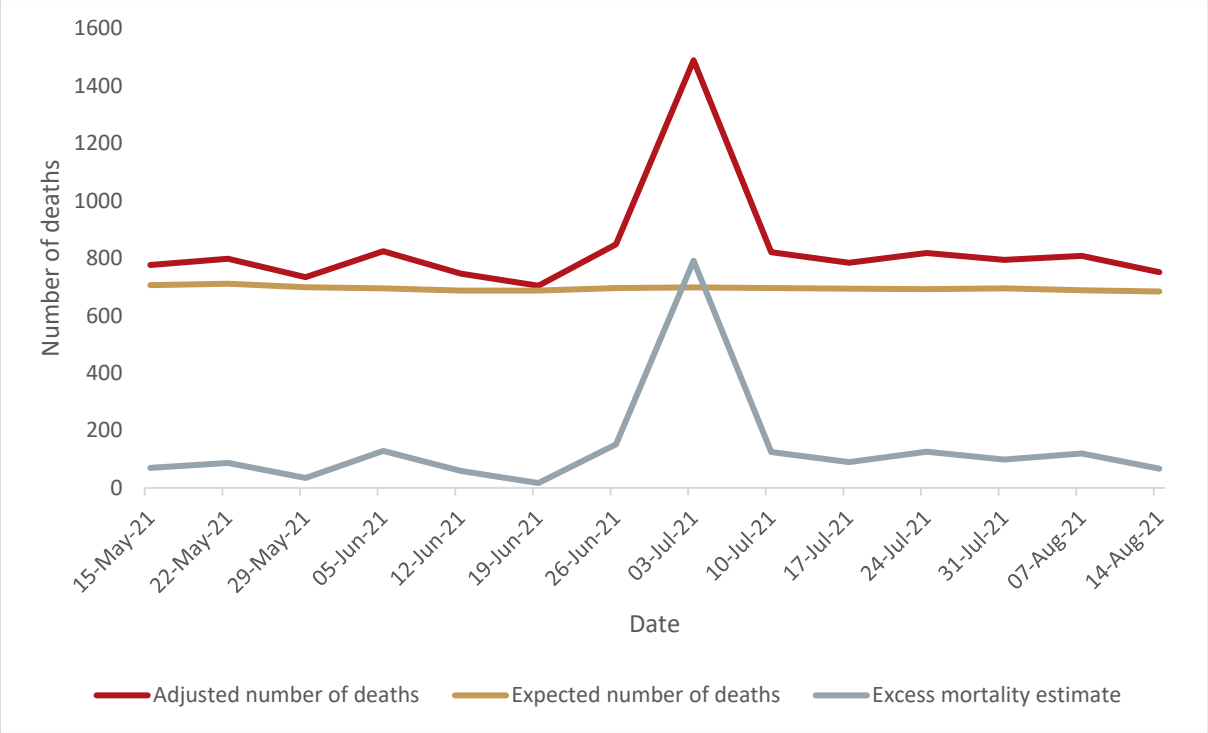


Figure 2.2 Adjusted, Expected, and Excess Mortality Rates in BC in Summer 2021[19]

2.3 Vulnerable Populations

It is important to consider subpopulations that are more vulnerable to extreme heat. Out of the 619 heat-related deaths during BC's 2021 heat dome, 90% were adults aged 60 or older. Additionally, 98% of those deaths occurred indoors in homes without adequate cooling and ventilation and where occupants tended to be more socially isolated.[20] People with substance use disorders (some drugs can also worsen the impacts of heat or impair decision-making ability), people with chronic illnesses, and people with mental health challenges tend not to cope well with extreme heat conditions.

[18] Interior Health. (June 2023). Heat response planning for southern Interior B.C. communities: A toolkit

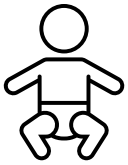
[19] Statistics Canada. (2023). Provisional weekly estimates of the number of deaths, expected number of deaths and excess mortality. https://www150.statcan.gc.ca/t1/tbl1/en/tv.action?pid=1310078401

[20] Interior Health. (2023). Heat Response Planning for Southern Interior B.C. Communities: A Toolkit.

Figure 2.3 outlines the populations most vulnerable to adverse outcomes and mortality as a result of extreme heat.

Social Isolation
Those who live alone or are socially isolated may have limited access to heat-health information and services.

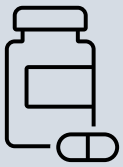
Older Adults
Older adults have a higher chance of physiological characteristics that can increase vulnerability to heat, such as mobility challenges and social isolation.



Infants and Young Children
Infants and young children are physiologically more vulnerable to heat and completely dependent on caregivers.

Pregnant People
Maternal and fetal health outcomes may be adversely impacted, such as by causing pre-term births and lower birth weights.

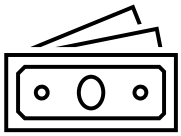
No Air Conditioning
Individuals or households with a lack of access to heat relief or choosing not to use it during heat events.



Chronic Illnesses
Those with chronic illnesses, such as schizophrenia, kidney disease, and heart disease, who may need medications that increase heat-health risks, those who depend on a caregiver are more vulnerable to heat impacts.

Substance Use Disorders
Individuals who use alcohol or drugs can have their ability to regulate heat impacted.

Mental Health Disorders
Certain psychiatric medications can increase heat-health risks and certain disorders may be worsened by heat waves.



Low Income
There may be financial concerns associated with running an air conditioner or accessing other cooling options.

Outdoor Physical Activity
Individuals who work or are active outdoors are at a higher risk of heat illness due to greater environmental exposure and physical strain.

Type and Location of Place of Work and/or Residence
Those who work in locations with high exposure, those who live on higher residential floors without air conditioning, or those who live in an urban heat island without air conditioning are all at greater risk to health impacts of heat.

Figure 2.3: Heat Vulnerable Populations

3.0 HEAT RISK ASSESSMENT

Within an urban area, features like asphalt, concrete structures, and concentrated networks of buildings and paved roads trap and hold heat, contributing to the urban heat island effect. Across Kamloops, the urban heat island effect is not experienced equally by all residents or is distributed evenly throughout the city.

Throughout Kamloops, individuals can encounter different levels of heat within their own neighbourhood as well as between neighbourhoods as they move between residential, commercial, and public spaces. This difference in heat experience stems from the interplay between geography, socio-economic factors, and features in the built environment and has real-world implications on individuals' daily lives and health outcomes.

As heat is experienced differently from person to person and neighbourhood to neighbourhood, a heat risk assessment was completed to develop a nuanced understanding of people and places within the City that are vulnerable to extreme heat. The assessment consisted of two exercises:

- Heat vulnerability mapping
- Community and staff engagement

Heat vulnerability mapping was developed by the City's GIS department using datasets developed by the Université Laval, [21] which are based largely on the Statistics Canada 2021 census and the Canada Mortgage and Housing Corporation housing information. The vulnerability analysis goes beyond temperature data to provide a picture of where the residents are truly most vulnerable to heat and not just where temperatures are higher. For instance, the Downtown and North Shore neighbourhoods as well as part of Valleyview emerge as disadvantaged neighbourhoods where socio-economic, demographic, and built-environment factors interact to disproportionately place individuals at greater health risk during extreme heat events.

Engagement was crucial in developing a community-level understanding of patterns revealed in the vulnerability mapping. These engagement conversations supported and built a narrative around observable trends. Community and City staff insights were used to understand the challenges individuals, service providers, and systems face in responding to extreme heat events. These conversations helped lay the foundation for the recommendations outlined throughout the Extreme Heat Response Plan.

Findings from these two exercises are summarized in Sections 3.1 and 3.2.

3.1 Heat Vulnerability Mapping

The City of Kamloops has developed a series of heat vulnerability maps based on 2021 census and Canada Mortgage and Housing Corporation data from the Université Laval. These maps rely on a range of factors

[21] The University of Laval developed four indices for Census Metropolitan Areas (CMAs) across Canada to assess vulnerability and exposure to extreme heat waves. The four indices are the Sensitivity Index, Coping Capacity Index, Vulnerability Index, and Exposure Index. Data from these indices was accessed to develop the heat vulnerability maps included in this report. https://pressroom.ulaval.ca/2023/05/02/new-interactive-map-showing-the-vulnerability-of-canadians-to-extreme-heat-waves-a:67ae7a03-1ec7-4f5d-9ddb-410556aad7a5

(geography, built environment features, socio-economics, and demographic data) to display how locations throughout Kamloops are equipped differently to respond to extreme heat events. These maps construct a narrative of the heat-related challenges throughout Kamloops.

The following list summarizes the maps included in Kamloops' heat vulnerability mapping:

- **Response Map** - contains City of Kamloops data sets (e.g. tree canopy, housing age, paved area) that inform heat response planning
- **Urban Heat Island Map** - identifies areas that have a higher temperature relative to vegetated areas with permeable surfaces (unpaved or covered with a building)
- **Coping Capacity Map** - identifies areas where people have access to resources and services that offer heat relief
- **Sensitivity Map** - identifies areas with populations sensitive to heat due to socio-economic and demographic indicators
- **Exposure Map** - identifies areas where landscape and built environment components interact to put people at greater exposure to heat
- **Vulnerability Map** - identifies areas where people are more vulnerable to heat based on coping capacity and sensitivity

The following profiles summarize key trends that emerge from each mapping set:

3.1.1 Heat Response Maps

Numerous factors inform heat response planning. This map includes over two dozen layers illustrating the location of services, public spaces, semi-private places, landscaping, and cooling resources. This mapping can be used to identify features that may mitigate individual experiences of extreme heat and highlight areas where services/features/landscaping are needed. This mapping can also be used in conjunction with the Coping Capacity Map to illustrate how the presence of certain services and their location can help offer heat relief, especially to vulnerable demographics.

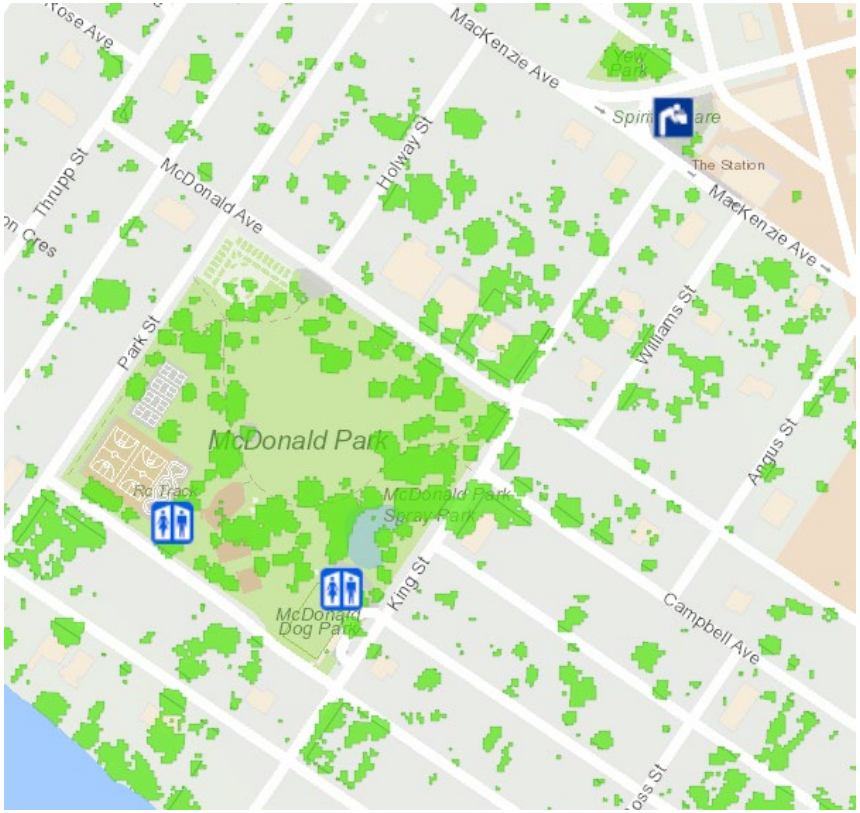


Figure 3.1: Cooling Features Available in McDonald Park

Tree canopy, public washroom, and water fountain layers were included in the map illustrated in Figure 3.1. These features demonstrate where individuals can easily access cooling during a heat event. The wide canopy provided by park trees, splash pad, and public washrooms make McDonald Park a significant neighbourhood cooling zone. However, this could be an area to increase drinking water infrastructure to offset experiences during heat events and increase the park's capacity to offer relief during hot weather.

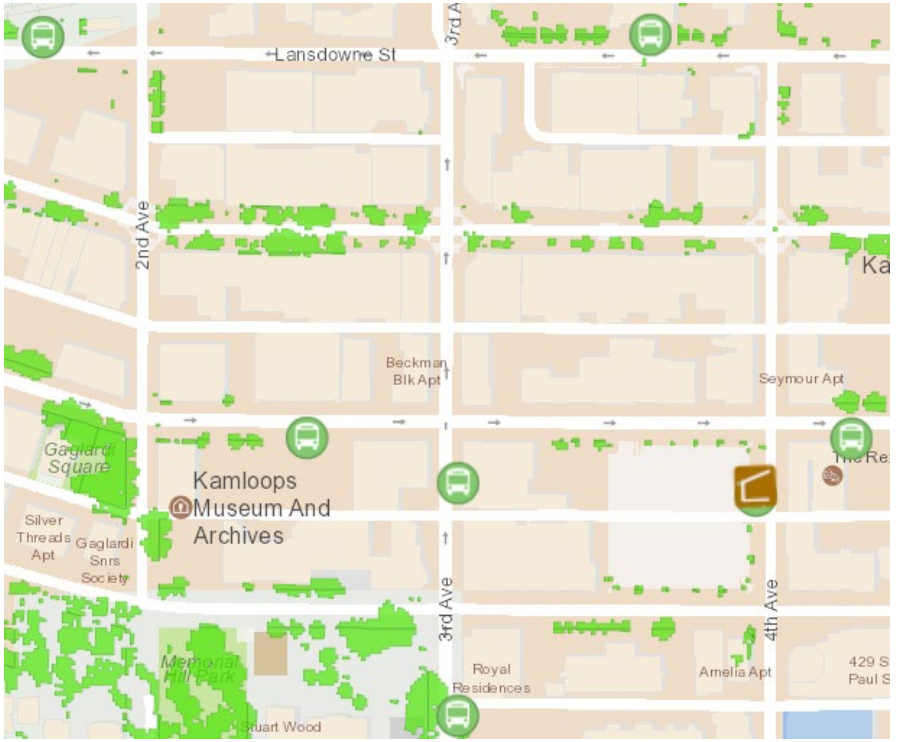


Figure 3.2: Tree Canopy and Paved Areas Between 4th Avenue and 2nd Avenue in Downtown Kamloops

Asphalt and concrete play a role in people's daily heat experiences. The features included in Figure 3.2 reveal how the downtown core is primarily a heavily paved area. Lansdowne Street, Seymour Street, 4th Avenue, and 2nd Avenue are sparsely treed, leaving pedestrians exposed. The bus stops (green bus icon) and tree canopy layers displayed on the map demonstrate how some stops do not coincide with any shaded areas, highlighting opportunities to improve transit users' experiences. There is currently only one transit shelter in the area (brown square icon), although there are plans to increase the number of shelters across the city.

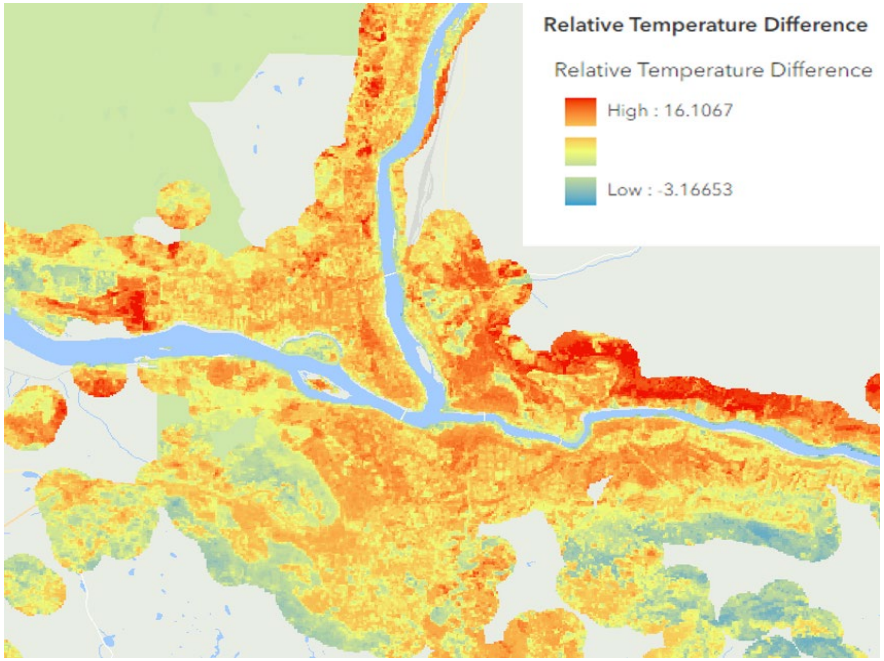


Figure 3.3: Map of Urban Heat Islands for the City of Kamloops

Urban heat islands raise the urban environment several degrees above surrounding vegetated areas and retain more heat throughout the night. Factors known to influence the creation of urban heat islands include the absence of vegetation, paved surfaces, distance from water bodies, and densely built-up areas. [22]

As seen in Figure 3.3, areas on the north shore of the South Thompson River are hotter, likely due to aspect and sun exposure. Downtown, parts of Sahali, Valleyview, Brocklehurst, and the North Shore are also visibly hotter, likely due to their location in the valley basin and dense network of buildings and paving. An example of the cooling effect of vegetation is McArthur Island, which experiences lower temperatures than the surrounding North Shore neighbourhood.

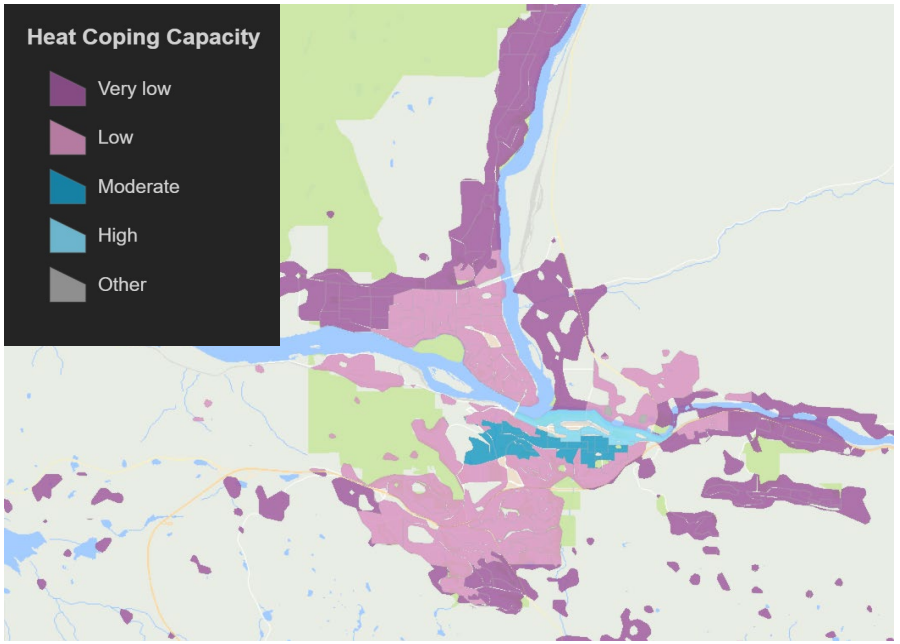


Figure 3.4: Map of Coping Capacity for the City of Kamloops

Figure 3.4 identifies the level to which different areas of the city are equipped to cope with heat events due to proximity to spaces and access to services that offer heat relief. Examples include commercial and public buildings with air conditioning (grocery stores, libraries, shopping centres), green vegetation (parks and trails), and access to water (pools, splash pads, riverbanks).

The downtown core and portions of Sahali emerge as places with moderate coping capacity, which reflects the presence of commercial businesses and

[22] https://climate.mit.edu/explainers/urban-heat-islands

institutions in these locations. However, not all of these spaces are free to access, which means there is still a financial barrier for people seeking heat relief.

Areas with low coping capacity include the Brocklehurst, Aberdeen, Sahali, Valleyview, and Dallas neighbourhoods. These neighbourhoods are primarily residential, with few services and public spaces (other than parks) interspersed with housing. These neighbourhoods also tend to have newer housing (relative to the North Shore and Downtown) with air conditioning, which may mitigate their lack of proximity to spaces and access to services that offer heat relief.

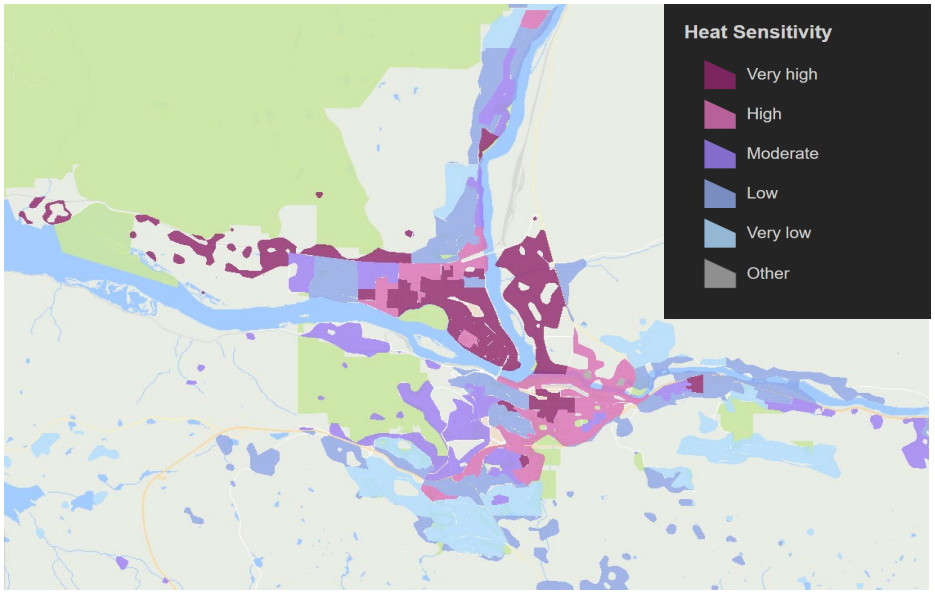


Figure 3.5: Map of Sensitivity for the City of Kamloops

Figure 3.5 shows areas of the city where different socio-economic and demographic factors interact to make specific populations more or less vulnerable to adverse health outcomes during heat events. Factors like housing type, age, household makeup, and household age influence the severity of how a heat event is experienced. Individuals living alone and people living in older apartment buildings with no access to air conditioning will fare worse than people living in households with air conditioning or who have people to check in on them.

The Sensitivity Map demonstrates how generally wealthier neighbourhoods are less sensitive to heat than lower-income neighbourhoods in Kamloops (e.g. Aberdeen has a very low heat sensitivity compared to Downtown, parts of Valleyview, or the North Shore).

Engagement shared how lower-income households often live in low-income or subsidized housing options located Downtown or on the North Shore. These options are usually older apartment buildings that may not have air conditioning and hold more heat than a single detached home. This pattern could explain factors leading to specific neighbourhoods being more sensitive to heat than others in Kamloops.

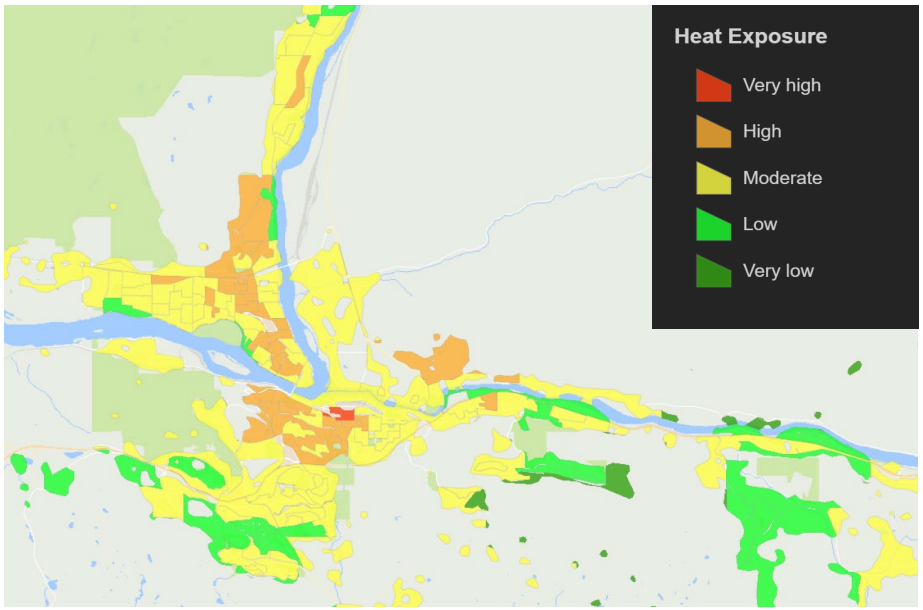


Figure 3.6: Map of Heat Exposure for the City of Kamloops

The heat exposure map displayed in Figure 3.6 shows areas of the city where people are more exposed to heat.

Elements that affect exposure include proximity to water, altitude, the presence of vegetation, and geography. In general, areas with more impermeable surfaces (paved areas where water cannot infiltrate into the

ground and provide a cooling function) and less vegetation have higher heat exposure. Vegetation plays an important role in cooling localized environments as it releases moisture into the air through evapotranspiration.

Figure 3.6 reveals that areas within the city with higher heat exposure are concentrated in the valley bottom and inland on the North Shore. The confluence of the North and South Thompson has a cooling effect on the city. Areas close to the riverbanks have lower exposures to heat than inland locations. Areas with higher altitude and more vegetation, such as the Aberdeen and Juniper Ridge neighbourhoods, have less heat exposure than other areas in Kamloops that are lower in the Valley and have less vegetation (i.e., North Shore and Downtown).

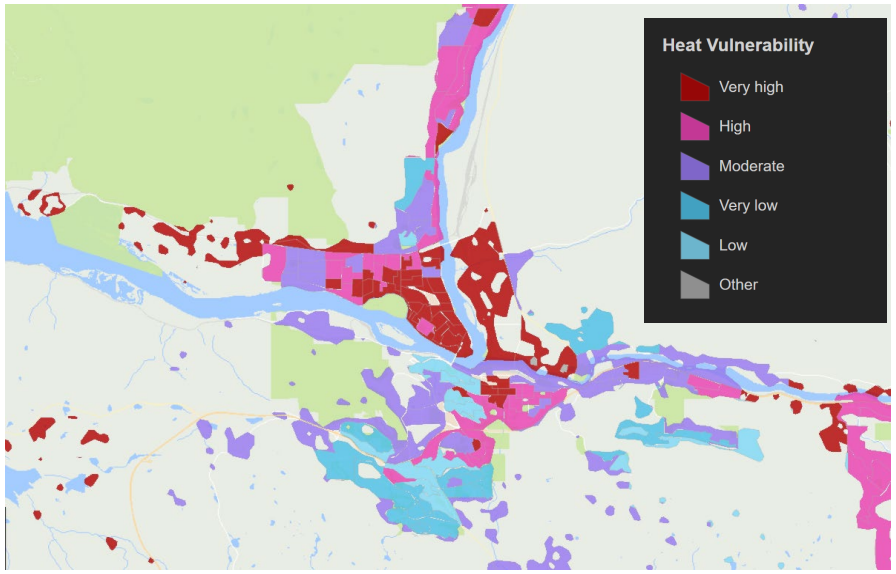


Figure 3.7: Map of Heat Vulnerability for the City of Kamloops

The Heat Vulnerability Map displayed in Figure 3.7 combines data from the coping capacity dataset and sensitivity dataset to identify locations where people are vulnerable to heat effects stemming from socio-economic, housing, and demographic factors and have limited access to spaces or services that offer heat relief.

The Vulnerability Map shows the importance of socio-economics and housing in predicting individuals' ability to cope with heat compared to their access to heat-relief services. The neighbourhoods with the greatest coping capacity (access to services and cool spaces) are Downtown, the North Shore, and Sahali/Southgate areas. However, as Figure 3.7 shows, these neighbourhoods remain some of the most vulnerable places in our community due to socio-economic factors such as education, income, and housing.

What Do Maps Tell Us About the Disparity of Extreme Heat Impacts?

The areas identified through mapping analysis where vulnerability is greatest are also often where exposure is higher. Lower-rent apartment buildings tend to be in denser urban areas with more paved surfaces. Many people living in these areas rely more on active transportation or the bus to get around, further exposing them to the impacts of heat. Low socio-economic neighbourhoods often have lower quality housing, less access to air conditioning and other cooling systems, and less treed space. These factors keep homes and neighbourhoods hot, worsening health outcomes during heat events. [23]

The reality of life for people living in these intensely hot urban areas and buildings is in stark contrast to that experienced by wealthier residents in neighbourhoods with larger yards, gardens, and treed boulevards, where most residences are air-conditioned single-family homes. In responding to extreme heat, it is important to keep these very different experiences in mind to provide support principally where it is really needed and to the people who need it.

[23] https://climateinstitute.ca/wp-content/uploads/2023/06/The-case-for-adapting-to-extreme-heat-costs-of-the-BC-heat-wave.pdf

3.2 Community and Staff Engagement

Community and staff engagement occurred throughout fall 2023 and consisted of one-on-one phone calls, in-person conversations, and virtual group discussions. The purpose of the engagement was to better understand the actions being taken by the community and the City to respond to heat events and discuss opportunities to improve the efficiency and effectiveness of response efforts going forward. City staff were also engaged in a discussion of the heat vulnerability mapping to ground truth the results of the mapping analysis.

The engagement occurred among key community interest groups and City of Kamloops staff. The following list summarizes the seven engagement groups:

- City of Kamloops staff
    - Climate and Sustainability
    - Emergency Program
    - Social and Community Development
    - Recreation, Health, and Wellness
    - Communications and Engagement
    - Traffic and Transportation
    - Community Services
- Service providers and providers specializing in Indigenous service delivery
- Public health representatives
- Food policy and food action organizations
- Climate and environment researchers
- Ecological conservation groups
- Business organizations

Engaging a broad audience of active interest groups and staff resulted in identifying key challenges faced by residents throughout the city and some potential opportunities for action upon which the Heat Response Strategy is based, along with the best practices review. The matrix of challenges and opportunities can be found in Appendix A.

4.0 BEST PRACTICES REVIEW

To incorporate best practices for effective heat response, a review of innovative response strategies from communities nationally and internationally was conducted. A complete summary of best practices can be found in Appendix A.

4.1 Short-Term Heat Response Strategies

Cities like Phoenix, Arizona, and Montreal, Quebec, were studied to determine effective and efficient emergency heat response efforts. As the first municipality in the United States to establish a publicly funded heat response office, Phoenix has paved the way for heat response planning. They provide diverse avenues of communication during the heat season, including outreach, mailing, and websites to share information on heat safety tips and how to access resources. Phoenix has a dedicated program targeting heat response outreach to underserved communities.[24] The City also implemented the Cool Callers Outreach program, which involves a list of heat-vulnerable individuals that volunteers and staff members call to check up on regularly throughout the summer.

Montreal first developed a heat response plan in 2004 due to the increasing heat-related mortality. Their heat response involves communication through several different types of media, distribution of printed informative materials, and check-in calls with identified vulnerable individuals.[25] A key partner is the Montreal Public Health Department, whose health care workers are instrumental in identifying vulnerable people and distributing information.

4.2 Long-Term Mitigation Strategies

Communities worldwide are developing innovative long-term mitigation strategies to reduce the urban heat island effect and mitigate health risks and heat-related mortality.

Vegetated and permeable surfaces - Increasing vegetated and permeable surfaces reduces the urban heat island effect. Many communities have built sponge gardens, which are green spaces in low-lying areas of the city.[26] During heavy rain, water flows soak into the sponge gardens, sometimes forming small ponds. The water retention helps cool the area while also preventing flash flooding by holding some of the rainwater that would otherwise enter the stormwater system. Sloped gardens are another strategy that helps collect and retain water more effectively than flat gardens and planter beds.[27]

Street revitalization - Street revitalization projects create many benefits, encouraging active transportation, social connection, and placemaking alongside cooling infrastructure. Québec City, Québec, undertook a street revitalization project on Anna Street, which was chosen due to its heat

[24] City of Phoenix. Office of Heat Response & Mitigation. https://www.phoenix.gov/heat
[25] Price et al. (2018) The Montreal heat response plan: evaluation of its implementation towards healthcare professionals and vulnerable populations. https://doi.org/10.17269/s41997-018-0020-2
[26] CBC News. (2023). 'Sponge cities': An absorbing idea in the face of climate change. https://www.cbc.ca/news/climate/sponge-cities-montreal-canada-china-1.7013728
[27] Halifax Regional Municipality. Spring Garden Road Enhancements. https://www.shapeyourcityhalifax.ca/spring-garden-road-enhancements

exposure, low socio-economic status of residents, and needed infrastructure upgrades.[28] The project replaced on-street parking with trees and planting bays, increasing the tree canopy, and reducing asphalt surface coverage. Similarly, Halifax, Nova Scotia, redesigned Spring Garden Road with wider sidewalks, trees, benches, and sloped rain gardens.[27] The design aimed to reduce the urban heat island effect, make the street more pedestrian and transit-user friendly, and create spaces for social connection.

Cool networks - Communities are reducing the urban heat island effect by planning and implementing strategies in evenly distributed networks throughout the city. After mapping determined a tree canopy disparity in lower-income neighbourhoods, Vancouver, British Columbia, designed street tree cooling networks and planted trees in priority neighbourhoods in a connected design that allows pedestrians to traverse the city completely under a tree canopy.[28] Paris, France, took a similar approach in a pilot project by creating "cool islands" in public schoolyards.[29] Schoolyards were chosen as ideal sites because they are distributed evenly throughout the city, with every Parisian living within a 250 m radius of a public school.

Economic incentives – Toronto, Ontario, is using economic incentives to encourage developers to build light-coloured and vegetated roofs that reduce the urban heat island effect.[30] Another subsidy program in Toronto incentivizes landowners to plant more trees on private land.[31]

Innovative ideas – Communities are testing new and innovative approaches to heat mitigation. For example, Los Angeles, California, installed solar reflective coatings on roads, playgrounds, and parking lots to prevent heat absorption and the urban heat island effect.[32] The City of Flint, Michigan, installed temperature sensors at bus stops across the city that continually upload temperatures to a website.[33] Transit users can access live temperature data to help them plan and stay safe from the heat.

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[28] Health Canada. (2020). Reducing urban heat islands to protect health in Canada. https://www.canada.ca/en/services/health/publications/healthy-living/reducing-urban-heat-islands-protect-health-canada.html
[29] Urban Innovative Actions. (2020). Paris is creating an OASIS in the heart of its neighbourhoods and why more cities should follow. https://www.uia-initiative.eu/en/news/paris-creating-oasis-heart-its-neighbourhoods-and-why-more-cities-should-follow
[30] City of Toronto. Eco-Roof Incentive Program. https://www.toronto.ca/services-payments/water-environment/environmental-grants-incentives/green-your-roof/
[31] City of Toronto. Urban Forestry Grants & Incentives. https://www.toronto.ca/services-payments/water-environment/environmental-grants-incentives/urban-forestry-grants-and-incentives/
[32] Forbes. (2023). How Reflective Coatings Are Cooling Down One Los Angeles Neighbourhood. https://www.forbes.com/sites/jamiehailstone/2023/07/11/how-reflective-coatings-are-cooling-down-one-los-angeles-neighbourhood/?sh=6dc2dd7d324d
[33] University of Michigan-Flint. (2022). UM-Flint research team establishes citywide weather sensor network. https://news.umflint.edu/2022/08/17/um-flint-research-team-establishes-citywide-weather-sensor-network/

5.0 HEAT RESPONSE STRATEGY

To reduce the impacts of extreme heat on communities, the Province created the two-tiered BC Heat Alert Response System and encouraged communities to incorporate this into their extreme heat planning. As such, the City of Kamloops is structuring its strategies around the BC Heat Alert Response System to align with official temperature triggers and warning criteria.

5.1 Intervention Strategies

Heat response requires a range of strategies to safeguard the community's most vulnerable and isolated populations. Communications need to be creative and leverage a number of networks, check-ins with vulnerable individuals need to be encouraged, and cool spaces need to be available indoors and outdoors across the city, particularly in more heat-vulnerable areas (see Section 3.0). The City's primary role is expanding the use of existing City-run cool spaces, convening partners, and coordinating heat response with various community partner organizations.

5.1.1 Cool Spaces

Increasingly intense heat waves and the 2021 heat dome have pushed local governments in BC to intervene in various ways. Cooling centres have been a key strategy for providing residents with heat relief province wide. The primary purpose of cooling centres is to provide community members whose living conditions are too hot a place to cool down as a life-saving strategy. The effectiveness continues to be debatable; however, research shows that cooling centres are only effective if people stay for a prolonged period and, ideally, overnight.[34] The populations they tend to work best for are the unhoused who stay at the cooling centres longer, thereby cooling down their core temperatures more effectively.

For most segments of the population, there are a number of challenges that limit the use and impact of cooling centres. Research undertaken by the Center for Disease Control's National Center for Environmental Health identifies factors for why cooling centres are generally not well used, particularly by those who in greatest need:

- Cooling centres tend to be used more by lower-risk individuals.
- Generally, people are not keen to alter their behaviour during a heat wave. When they visit a cool space, it is usually a private space like a mall.
- Many people do not see themselves as vulnerable to heat or see cooling centres being for other people.
- People are hesitant to visit cooling centres because they are unable to complete their tasks (chores, shopping, work) while at a cooling centre and/or they perceive that there is nothing to do there.

The Sandman Centre was previously Kamloops' only indoor cooling centre. According to City of Kamloops staff involved in cooling centre operations, attendance at the Sandman Centre cooling centre location has generally been low, except for the smaller area operated by community partner

[34] Kelly MacDonald, Community Health Facilitator, Interior Health.

agencies for unhoused people specifically. The need proved to be high for this specific group. The lack of uptake by the general population could partly be due to accessibility. The Sandman Centre is located a 10-minute walk from the Lansdowne Transit Exchange and a 5-minute walk from Seymour Street, where southbound buses travel into Downtown. Lansdowne Street and 3rd Avenue have very little tree canopy, making it a very hot walk from there or the transit exchange to Sandman Centre during a level 1 heat warning and unsafe during level 2 extreme heat emergency.

A further challenge noted by extreme heat guidance provided by the Government of Canada is that cooling centres only temporarily cool people down and do not remove all excess heat from the body. When people go back into the heat, their body's core temperature quickly increases again, negating the benefits realized in the cool space.[35] This has led BC public health leaders to generally see cooling centres as one element of a suite of interventions rather than the primary solution.

While the model of a centralized cooling centre in Kamloops does not seem to be providing a convincing impact on the whole community, alternative strategies could be more effective. A heat relief network used in both Maricopa County, Arizona, and the Toronto provides a useful example. In 2022, Toronto decided to abandon its strategy of official cooling centres in favour of a heat relief network model that had been in place before the COVID-19 pandemic. The Toronto Heat Relief Network is a collection of more than 400 private and public locations identified on a public, interactive map. Hours of operation are extended for many of the city-run facilities.[36]

Similarly, Maricopa County engaged a network of non-profit and faith-based organizations to establish facilities offering hydration stations, refuge locations, and water donation sites. In addition to providing greater diversity in cool spaces, this also activated a large network of people who were better positioned to spread information about the cool spaces to people who needed the information more.[37]

Proposed Cool Spaces Strategy

Based on the current cooling centre strategy's lack of effectiveness and research into alternative models, a new cool spaces strategy will be used to reach more people and increase the frequency of cool space use.

Key priorities for the City's Cool Spaces Strategy include:

- Reduced geographic/physical barriers to accessing cool spaces
- Diversified locations of cool spaces throughout the city with higher concentrations in areas with greater vulnerability and higher exposure

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[35] *It's getting hot in here! – Protecting the most vulnerable from indoor heat.* Government of Canada. https://science.gc.ca/site/science/en/blogs/science-health/its-getting-hot-here-protecting-most-vulnerable-indoor-heat

[36] City of Toronto Heat Relief Strategy. https://www.toronto.ca/wp-content/uploads/2023/05/8f1c-Heat-Relief-Strategy-2023finalAODA.pdf

[37] *The Use of Cooling Centers to Prevent Heat-Related Illness: Summary of Evidence and Strategies for Implementation*. Centre for Disease Control. https://www.cdc.gov/climateandhealth/docs/UseOfCoolingCenters.pdf

The City of Kamloops has an opportunity to put its organizational capacity, networks, and existing facilities to use while also providing better extreme heat interventions to community members. Kamloops has a strong non-profit and community group sector that could be leveraged to participate in this new strategy. The new Cool Spaces Strategy would have the following characteristics:

- Unhoused populations are provided cooling spaces by social agencies with whom have pre-existing relationships.
- Existing outdoor and indoor cool spaces operated by the City are leveraged where hours can be extended and fees reduced or eliminated to minimize barriers to entry. The most important spaces are water parks and outdoor and indoor pools.
- The Kamloops Heat Relief Network of non-profit (e.g. social agencies, social clubs, faith-based organizations) and for-profit organizations (e.g. malls, grocery stores) is activated to provide varying levels of short-term relief to the general public by creating places of refuge with places to sit and bottles of water/fountains/filling stations in areas that already see high traffic or in areas where few cooling options exist.
- For-profit organizations' cool spaces are marketed towards the general population, while social agencies' cool spaces are targeted at unhoused individuals.
- The Kamloops Heat Relief Network is engaged strategically depending on the level of heat alert. For example, level 1 would activate the Core Network of organizations and level 2 would activate the Extended Network. Organizations could change their involvement from year to year, depending on the success of the option in the previous year or the availability of volunteers.
- The City plays a key role in convening groups, identifying roles from year to year and accessing resources to purchase water bottles and other required materials.
- Information about the network is maintained and updated annually on the existing interactive City of Kamloops map. General information and a few key locations in different neighbourhoods is included in print materials.
- Signage is provided to all participants in the form of a poster and/or sandwich board.

Transitioning to the Cool Spaces Strategy

A hybrid approach is proposed to transition into implementing the Cool Spaces Strategy. In summer 2024, the City of Kamloops should opt for a hybrid approach that provides a centralized cooling centre and begins to develop a decentralized network of cool spaces (as outlined in the Cool Spaces Strategy). This will allow a preliminary stage for the Cool Spaces Strategy while still providing a central cooling centre individuals can rely on for cooling needs.

As described in the City's Heat Alert Response System in Appendix B, a central cooling centre such as the Sandman Centre will be activated along with Core Network members of the Kamloops Heat Relief Network at the level 1 heat warning stage, which is activated when forecasted temperatures reach daily maximums of 35°C and nightly lows above 18°C for two consecutive days. If the heat warning progresses to a level 2 extreme heat emergency, when there is certainty that temperatures will increase substantially each day for three or more consecutive days, the extended network members of the Kamloops Heat Relief Network will be activated to provide additional cooling spaces. A central

cooling centre such as the Sandman Centre should also be activated during level 2 extreme heat emergencies to ensure cooling needs are met. The end-of-season debriefing should reflect on the effectiveness and reach of the Kamloops Heat Relief Network and Cool Spaces Strategy. If the strategy meets the City's cooling needs, the central cooling centre can be demobilized in future years in favour of the Kamloops Heat Relief Network and Cool Spaces Strategy.

5.1.2 Outdoor Cool Spaces

Misting stations and temporary water fountains in high pedestrian traffic areas are proposed to decrease the health risks associated with using commercial areas during heat events. The use of water fountain attachments to fire hydrants should be explored. Vancouver has incorporated these into its heat response strategy.[38] Misters have been found to have an immediate and positive impact on people's body temperature. These should be used strategically in areas with more pedestrian traffic, such as the downtown and Tranquille corridors, in other commercial areas, or at bus exchanges. There is potential for business improvement associations to take a leading role in this in their respective areas.

5.1.3 Diverse Communications

In all stages of heat response, communications will be vital for keeping community members informed and safe. As usual, the City will send communications through its website and social media platforms. However, some residents do not have consistent access to a smartphone or computer. Access to traditional media is frequently an issue for those without cable TV or a vehicle to listen to the radio. Individuals most disconnected from conventional information sources tend to be most likely to be informed about heat response and the City's Heat Response Strategy. Appendix D, Communications Information, summarizes the modes of distribution and types of materials to use during the distinct Heat Alert Response System stages.

To reach as many community members as possible, the following strategies are recommended to distribute information throughout the city:

- Distribute printed and digital materials to community partner organizations (the Kamloops Heat Relief Network's Core Network and Extended Network members).
- Distribute printed and digital materials to neighbourhood associations and Block Watches to enable them to perform check-ins and leave door hangers.
- Continue to use the Voyent Alert! app to inform the public of Heat Alert Response System activation and associated actions such as the opening and deactivation of cooling centres.
- Leverage the RCMP, Kamloops Fire Rescue, Customer Care and Patrol (CAP) Teams, and Community Services Officers to provide information verbally and through printed materials to residents about heat risk and the City's heat response.
- Print and distribute posters on community poster boards and as ads in buses, including pamphlets as rider guide inserts.

[38] City of Vancouver. Water fountains, handwashing and misting stations. https://vancouver.ca/home-property-development/water-fountains.aspx

- Share with housing providers and landlords to post in shared/common spaces or leave door hangers.
- Engage BC Transit, who already post web and email alerts for transit advisories, to include formal advisories and local messaging prior to and during extreme heat events. BC Transit can also expand its basic communications to include heat-specific safety information.

The Kamloops Heat Relief Network members can have a significant role in distributing information to their online and in-person communities. The following are groups that could be invited to take on a role in information distribution:

- Social organizations
- School District No. 73
- Neighbourhood associations
- Faith-based communities
- Pharmacists
- Centre for Seniors Information Society
- Thompson Region Division of Family Practice
- Kamloops Facebook groups with significant membership
- Property management companies and strata associations
- Business improvement associations

5.1.4 Connections and Check-Ins

Research following the 2021 heat dome in BC showed that socially isolated people were at higher risk of heat-related mortality.[39] Many people are so isolated that even diversifying communications may prove insufficient. These individuals have little to no contact with public or private agencies that can help them to make appropriate decisions to prepare for or cope with extreme heat. For these individuals, social connection and specific strategies are recommended as an intervention for heat response.[40]

The following strategies would be feasible for the City to implement by leveraging community partners. While the City may initially organize this program, it should be led by community organizations and/or neighbourhood associations.

Neighbourhood door to door check-ins - Neighbourhood associations, Block Watch groups, strata associations, and property managers would be provided with information and print materials (particularly door hangers) to distribute to neighbours, tenants, and homeowners. Neighbours would do a quick check with residents at the door to make sure it is not too hot inside and that occupants are not experiencing heat stress. They would also help troubleshoot if the home is too hot and leave

[39] BC Coroners Service. *Extreme Heat and Human Mortality: A Review of Heat-Related Deaths in B.C. in Summer 2021.* https://www2.gov.bc.ca/assets/gov/birth-adoption-death-marriage-and-divorce/deaths/coroners-service/death-review-panel/extreme_heat_death_review_panel_report.pdf

[40] Kafeety, A. et al.. *Social connection as a public health adaptation to extreme heat events.* Canadian Journal of Public Health. March 16, 2020.

print materials. If the individual meets criteria for heat exhaustion or there are other serious concerns, an ambulance could be called.

Leverage existing contacts - RCMP, Kamloops Fire Rescue, Community Service Officers, and the Community Care and Patrol (CAP) Team can be leveraged to make heat assessments and provide informational materials to individuals they come into contact with through their everyday responsibilities. These teams could also hand out water. Thompson Rivers University Student Services could reach out to the student body, and Kamloops Immigrant Services to provide translation services for connections and check-ins.

Identify new networks - Connect with pharmacists and the Thompson Region Division of Family Practice to include in information distribution to reach individuals with health concerns or medications that make them more vulnerable to the health impacts of heat.

5.2 Roles and Responsibilities

The following City of Kamloops departments and external organizations and agencies are responsible for undertaking actions included in the City's Heat Alert Response System.

5.2.1 External

Environment and Climate Change Canada

Environment and Climate Change Canada is the main source of publicly available information on climate and weather data and research and is the official source of heat alert trigger information. Environment and Climate Change Canada has established criteria for heat triggers and continuously monitors the weather. They provide alerts to the Ministry of Emergency Management and Climate Readiness and local governments, including pre-heat warnings before the heat alert.

Government of British Columbia

The Government of British Columbia will collaborate with local governments to create a holistic response to heat emergencies. The BC Health Effects of Anomalous Temperatures Coordinating Committee will provide communities with established recommended actions and standardized language and messaging in collaboration with the Ministry of Health and the BC Centre for Disease Control.

Ministry of Emergency Management and Climate Readiness

The Ministry of Emergency Management and Climate Readiness will issue heat advisories and alerts on its website and notify the Emergency Preparedness Manager during an emergency. The Ministry of Emergency Management and Climate Readiness may also provide funds for heat response in an extreme heat emergency.

Interior Health

Interior Health will support the City's heat response and adaptation planning activities. Interior Health can provide public health advice and collaborate with communities to develop and inform extreme

heat communications and actions.[41] Interior Health's role can include reviewing public health messaging for community heat response communications, communicating information regarding extreme heat on its website and social media, issuing public service announcements during extreme heat events, and supporting community heat management planning and implementation.

Community Partners

Community partners will take on various roles and responsibilities included in the City's Heat Alert Response System, such as the Kamloops Heat Relief Network. The Extreme Heat Response Plan has not identified specific partners because the organizations involved are anticipated to change over time. A sign-up sheet for community partners is included as Appendix C.

5.2.2 Internal

Emergency Program

The City's Emergency Program plays a key role in the City's heat response actions. It is also responsible for organizing and mobilizing other key departments. The City's Emergency Program will initiate pre-season discussions among internal and external bodies, purchase equipment and materials needed for heat response activities, trigger the City's Heat Alert Response System protocols, organize the distribution of resources during extreme heat events, and lead post-season debriefing of the heat response plan and its implementation.

Community Planning

Community Planning would be involved by integrating key recommendations in the implementation plan (Section 6.0) into land use policies and regulations and streetscape and landscape guidelines. Community Planning will also participate in pre-season and post-season discussions and debriefing.

Communications and Community Engagement

Communications and Community Engagement has a supportive role overall in emergency response procedures. They will work as directed by other departments as a support/conduit for information during a Heat Alert Response System activation. They will take information provided by a leading department to create and manage the distribution of communication materials to the public, including online, radio, and print materials. Communications and Community Engagement will be responsible, as directed by others, for updating the public on the heat alert level, directions for accessing resources, and heat health information. Communications and Community Engagement is responsible for sending out Voyent Alert! Messaging when cooling centres open and close. Communications and Community Engagement will also participate in pre-season and post-season discussions and debriefing.

[41] Interior Health: Heat Response Planning for Southern Interior BC Communities: A Toolkit. June 2023. Pg. 28

Recreation, Health, and Wellness

Recreation, Health, and Wellness is responsible for coordinating the Cool Spaces Strategy and will extend hours for City facilities' public access to cool spaces. Recreation, Health, and Wellness will also participate in pre-season planning and post-season debriefing.

Parks and Civic Facilities

Parks and Civic Facilities will play a key role in heat response by ensuring public water fountains are functioning at the beginning of each heat season and deploying portable water stations and misting stations. Parks and Civic Facilities will also be involved in implementing some implementation actions (e.g. tree canopy). Parks and Civic Facilities will support other departments in the planning and implementation of the Extreme Heat Response Plan each year, including post-season debriefing.

Kamloops Fire Rescue

Kamloops Fire Rescue is responsible for coordinating emergency response with the City's Emergency Program before and during the heat season. Kamloops Fire Rescue will incorporate heat into any relevant checks or contacts during heat alerts. They will also participate in pre-season planning and post-season debriefing.

Community Services

Community Services will play a key role in organizing resources like water bottles and printed materials to be distributed to the public. Community Services will also organize and perform check-ins with vulnerable people for heat stress. In extreme heat emergencies, Community Services will activate check-ins by Block Watch groups. Community Services will participate in pre-season planning and post-season debriefing.

Climate and Sustainability

Climate and Sustainability will support heat response efforts and lead an internal meeting with relevant departments to discuss long-term adaptation projects and strategies for the following year and incorporate a heat lens into already planned projects.

RCMP Municipal Support Services

RCMP Municipal Support Services is responsible for coordinating with the Fire Chief and the City's Emergency Program in their role of emergency response. RCMP Municipal Support Services will incorporate heat into any relevant checks or contacts during heat alerts. They will also participate in pre-season planning and post-season debriefing.

Social and Community Development

Social and Community Development is responsible for leading coordination with external social agencies before and throughout the heat season. During the pre-season, Social and Community Development will meet with social agencies and community partners to discuss potential roles and supports and plan for the coming year's heat response. During heat warnings, Social and Community Development will be responsible for activating the Cool Spaces Strategy in partnership with Recreation, Health and Wellness and distributing resources to them. In extreme heat emergencies,

Social and Community Development will continue to manage the Cool Spaces Strategy and activate check-ins by neighbourhood associations. Social and Community Development will also participate in pre-season and post-season discussions about reflecting on and improving the heat response plan.

Traffic and Transportation

Traffic and Transportation will play a supportive role to other departments before and throughout the heat season. They will also participate in pre-season planning and post-season debriefing.

Streets and Environmental Services

Streets and Environmental Services will support the set-up and take-down of any temporary cooling infrastructure, such as misting stations. They will also participate in pre-season and post-season discussions about reflecting on and improving the heat response plan.

5.3 Heat Alert Response System

The City of Kamloops Heat Alert Response System is a multi-level plan that establishes a series of actions the City will undertake to respond to heat warnings and extreme heat events. The Heat Alert Response System involves educating the public about the health risks of extreme heat, mobilizing City departments and other key players in a coordinated action plan, and distributing resources to Kamloops residents. The Heat Alert Response System should be reassessed annually.

Specific actions associated with each phase of the City's Heat Alert Response System can be found in Appendix B.

Table 5.1 outlines the City's Heat Alert Response System.

Table 5.1: Heat Alert Response System

Heat Alert Response System			
Phase	**Description**	Trigger	Summary of Key Actions
Pre-Season Preparedness	The goal of this level is to prepare for the heat season and prepare public communications.	Emergency Program initiates internal discussions about this year's response.	• Internal meetings • Identify Kamloops Heat Relief Network partners • External meetings with Kamloops Heat Relief Network • Update communications materials
Level 1 Heat Warning	The goal of this level is to indicate that a prolonged period of heat is expected and to	Environment and Climate Change Canada will communicate the potential for a heat	• Release key communications materials

Heat Alert Response System			
Phase	**Description**	Trigger	Summary of Key Actions
	implement communications and support services	warning in advance of issuing special weather statement. Direct communications through the Ministry of Emergency Management and Climate Readiness. A heat warning alert will be issued when the daily maximum temperature reaches 35°C and the nightly low stays above 18°C for two consecutive days.	• Activate the central city-run cooling centre (2024) • Activate Core Network and Cool Spaces Strategy
Level 2 Extreme Heat Emergency	The goal of this level is to notify the community and interest groups to expect extremely hot weather, to implement regular health and condition check-ins, to encourage community to check in on family and friends, to increase service support, and to facilitate cooling centres.	Environment and Climate Change Canada issues an extreme heat emergency alert when heat warning criteria has been met and there is certainty that temperatures will increase substantially each day for three or more consecutive days. Direct communications through the Ministry of Emergency Management and Climate Readiness.	• Activate Extended Network and Cool Spaces Strategy
Rescind	The goal of rescinding is to notify the community that the heat alert is no longer active.	Environment and Climate Change Canada reviews the status of the alert and issues public confirmation of the ending. Direct communications through the Ministry of Emergency Management and Climate Readiness.	• Send out communications internally and externally to cancel activities

Heat Alert Response System			
Phase	**Description**	Trigger	Summary of Key Actions
Post-Season Debriefing/Planning	The purpose of this phase is to bring together the key people responsible for implementing the City's plan during hot weather and review what went well, what was effective, and which actions were ineffective so the City can plan better for the following year.	Emergency Program organizes internal meeting in October each year.	• Meet to discuss that season's strategies and discuss changes for following year • Develop Intervention Strategy Plans

6.0 IMPLEMENTATION PLAN

The implementation plan includes Heat Response actions that require implementation to undertake the strategies outlined in the City's Extreme Heat Response Plan. It also includes long-term adaptation initiatives meant to mitigate the heat impacts of the built environment.

6.1 Heat Response Strategy Implementation

The following implementation items are related to the City's Heat Response Strategy described in Section 5.0, including the City's Heat Alert Response System activities. An Intervention Strategy Plan template is included as Appendix E to assist in planning individual strategies and an implementation table for heat response and long-term adaption strategies is included as Appendix F.

Heat Response	
Purpose	**Reduce Mortality Among Community Members During and Immediately Following Heat Events**
Objective 1	**Improve response interventions to reduce the acute impact of heat warnings and extreme heat emergencies**
Strategies	1.1 Develop temporary water fountains and misting stations to be installed in high heat and high pedestrian traffic areas. - Use Extreme Heat Response Plan mapping to identify potential areas for future installation of permanent (seasonal) water fountains. - Purchase misting stations and water fountains (if required) and identify department or community partner to take responsibility for stations.
	1.2 Create a network of community partners to collaboratively implement heat response. - Create an initial list of contacts and host a virtual or in-person meeting to discuss the Cool Spaces Strategy and information distribution. - Use the Network Response Sign-Up Sheet found in Appendix C to create and maintain a directory of contacts.
	1.3 Explore establishing a check-in call service (such as that referenced in Section 4.1) powered by volunteers for future years, including which department or organization would have responsibility for such a service and who would volunteer to make the regular calls.
	1.4 Establish a list of facilities that are suitable to include in the Cool Spaces Strategy, including, but not limited to, water parks, pools, and cool indoor spaces.

Heat Response	
Purpose	**Reduce Mortality Among Community Members During and Immediately Following Heat Events**
Objective 2	**Improve collaborative information collection and sharing about at-risk individuals**
Strategies	2.1 Explore information sharing between Interior Health and first responders on Interior Health's strategies and how they will be supporting their patients.
	2.2 Explore the best way for RCMP and Kamloops Fire Rescue to collect and share information about the location and identity of at-risk individuals.
Objective 3	**Increase community knowledge of heat exposure and ability to adapt to extreme temperatures**
Strategies	3.1 Collaborate with health authorities on content and maintaining updated resources for community distribution. Consider establishing a working group to guide the development of materials.
	3.2 Produce the following hard copy materials to reach a wider public: - Door hangers for RCMP and Kamloops Fire Rescue to leave at higher-risk homes and for property managers to distribute in buildings - Advertisement for bus ads - Pamphlet for distribution through community partners, Community Services Officers, and CAP Team and at City facilities
	3.3 Update communications materials to reflect the new Intervention Strategies and any future revisions to them.
	3.4 Update the Heat Response page on the City's website to reflect updated components of the City's Heat Response Strategy.
	3.5 In 2024, promote the new strategy through social media and other free media (e.g. radio interview, news articles) to mitigate misunderstandings and complaints from the general public.
Objectives 4	Engage with Tk̓emlúps te Secwépemc
Strategies	4.1 Emergency Preparedness Manager to engage with the equivalent Tk̓emlúps te Secwépemc department through regional emergency planning calls.
	4.2 Consider engaging with Tk̓emlúps te Secwépemc on matters of communications materials and strategies to reach people.

6.2 Long-Term Adaptation Implementation

The following implementation items are related to long-term mitigation measures that would likely require a capital budget or grant funding or to be included in larger infrastructure projects as these move forward. This list of objectives and strategies should be reviewed as part of the City's Heat Alert Response System post-season debriefing/planning. A more extensive table specifically for these planning sessions is included as Appendix F.

LONG-TERM ADAPTATION	
Purpose	**Reduce Relative Temperatures and Exposure in Urban Areas**
Objective 1	**Increase permeable areas on private and public property**
Strategies	1.1 Explore a strategy to increase permeable area requirements in design guidelines for new development.
	1.2 Explore incentives program for developers to adopt permeable materials in place of asphalt or concrete (e.g. stormwater design flexibility, reduction of required parking areas) along with other green infrastructure technologies.
	1.3 For new City projects, reduce impermeable area where possible and incorporate alternative permeable materials where feasible.
	1.4 Increase the use of rain garden design for drainage and landscaping in development/redevelopment projects to reduce water use in irrigation and increasing permeable areas.
	1.5 Explore the developments of parklets in urban areas with either permanent or temporary vegetation and/or shading as a refuge for pedestrians.
Objective 2	**Increase tree canopy strategically and equitably through City projects and public programs**
Strategies	2.1 Review and explore ways to strengthen tree protections in the City's Tree Protection Bylaw.
	2.2 Incorporate an equity and heat lens into tree planting plans and new park locations (i.e. where to plant additional trees to increase tree canopy generally).
	2.3 Prioritize shade, evapotranspiration rates, and drought hardiness when choosing tree species in planting plans, including considering species selection and need for assisted migration.
	2.4 Explore how to increase tree planting requirements in design guidelines for new developments and provide additional guidance around surrounding permeable area required and species based on exposure and other environmental or location factors.
	2.5 Explore optimal and feasible ways to increase tree requirements in any new parking lot development and require that south and west exposure be incorporated into planting plans.
	2.6 Continue with Tree Coupon Program and expand it if feasible.

LONG-TERM ADAPTATION	
Purpose	**Reduce Relative Temperatures and Exposure in Urban Areas**
	2.7 Explore a cedar hedge replacement program where incentives and guidance are provided for water-wise alternatives are promoted to align with FireSmart guidelines.
	2.8 Plant trees strategically to provide shade for users at sports fields, dog parks, playgrounds, sitting areas in parks, and water parks.
	2.9 Strategically plant roadways or pathways to create shaded corridors from neighbourhoods to transit hubs, commercial areas, and other key destinations.
Objective 3	**Improve the active transportation network to generally decrease vehicle traffic which contributes to Urban Heat Islands**
Strategies	3.1 Ensure active transportation routes are shaded where feasible.
	3.2 Explore permeable and/or light-coloured materials for pathways.
	3.3 Prioritize roadway tree planting in areas with higher pedestrian/active transportation traffic where dedicated pathway development is unfeasible in the medium term.
	3.4 Continue efforts to support active transportation as vehicle traffic increases temperatures.
Objective 4	**Leverage private and public partners for long-term adaptation strategies**
Strategies	4.1 Explore the creation of an incentive or cost-share program to encourage parking lot owners to increase tree canopy.
	4.2 Provide incentives for existing developments to remove asphalt or concrete where feasible to be replaced with either permeable surfaces and/or water-wise landscaping/tree plantings.
	4.3 Provide incentives or cost-share programs for existing commercial and residential building owners to install a cool roof or paint their roof white.
	4.4 Encourage commercial property owners to install benches in shaded areas to allow customers to rest while shopping.
	4.5 Engage the School District No. 73 (Kamloops-Thompson) Board of Education and staff in discussions to increase shade at schools for students and to potentially use school grounds as outdoor refuge during a heat event.
	4.6 Engage in outreach to encourage garden centres to stock and promote planting of heat-tolerant plant varieties to support xeriscaping.
Objective 5	**Incorporate a heat lens into planning and regulations**
Strategies	5.1 Follow heat-conscious urbanization guidelines, such as the Healthy Built Environment Linkages Toolkit[42]. To be considered in updates to the

[42] Healthy Built Environment Linkages Toolkit, May 2018. Provincial Health Services Authority. http://www.bccdc.ca/pop-public-health/Documents/HBE_linkages_toolkit_2018.pdf

LONG-TERM ADAPTATION	
Purpose	**Reduce Relative Temperatures and Exposure in Urban Areas**
	Zoning Bylaw, Official Community Plan, and Development permit area guidelines.
	5.2 Use the Heat Response interactive mapping online[43] to inform planning and equity considerations around vulnerability and exposure to heat, tree canopy, and urban heat island areas.
	5.3 Explore feasibility of incorporating a requirement for cool, green, or painted white roofs to be used on all future multi-unit residential and commercial developments in development permit guidelines
Objective 6	**Increase the safety of transit users during hot weather**
Strategies	6.1 Ensure shade is considered in identifying bus stop locations.
	6.2 Plant trees or install shade shelters at exposed, higher-use stops.
	6.3 Explore the feasibility of installing temperature gauges at bus stops that users can view online (see Flint, Michigan, case study in Appendix A).
	6.4 Explore bus shelter designs that reflect the heat (e.g. light-coloured materials) or with green roofs for future bus shelter development plans.
Objective 7	**Increase knowledge of adaptation approaches for residents**
Strategies	7.1 Develop or aid in the distribution of information about reducing heat in the home (e.g. awnings or window film) and using vegetation to reduce solar heat gain in the home.
Objective 8	**Incorporate heat adaptation into the City's emissions target planning**
Strategies	8.1 Research the contribution of long-term adaptation measures on advancing emissions reduction targets to support: - Business cases for larger projects - Prioritization of key projects
Objective 9	**Promote collaboration across City departments to encourage mitigation through diverse projects**
Strategies	9.1 Encourage an understanding of heat risks and effective mitigation measures (heat lens) throughout departments and leadership.
	9.2 Leverage the Climate and Sustainability department to seek infrastructure and planning solutions that include climate change adaptation and heat mitigation.

[43] City of Kamloops, Heat Response Planning. https://kamloops.maps.arcgis.com/apps/instant/portfolio/index.html?appid=9f52a462eb1a4fb6bce46cd99465ceca

7.0 RESOURCES

For further information, the following resources can be consulted:

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Canada's Tournament Capital

APPENDIX A

Best Practices Review and Engagement-Based Challenges and Opportunities

1.0 BEST PRACTICES REVIEW

To better understand effective extreme heat response, a best practices review was undertaken. Communities' response strategies from around the world were reviewed. This section summarizes the main conclusions of the research.

1.1 City Spotlight Examples

Phoenix, Arizona, US

As one of the hottest major cities in North America, Phoenix has paved the way for heat response planning. Phoenix is a desert city that experiences very dry heat with low relative humidity. Phoenix was the first municipality in the US to establish a publicly funded heat response office in 2021.[1]

Phoenix provides the following short term heat response services:[2]

- ***Cool Callers Outreach***: Heat vulnerable residents of Phoenix can sign up to a list compiled by Cool Callers Outreach. Volunteers and staff members call everyone on the list at regular intervals throughout the summer to check up on them. They can provide heat safety information and guidance on using City and regional resources related to home cooling and heat safety.
- ***We're Cool Relief Outreach:*** This program was launched in 2017 as a combined effort by multiple City departments. Volunteers go to public spaces in Phoenix to engage community members by providing maps to cooling and hydration stations, distributing health related summer safety information, and helping connect residents to other public services. We're Cool Relief Outreach focuses on underserved communities, transit locations, and parks and trailheads.
- ***Take a Hike Do it Right:*** This program provides regular information and updates on hiking safety and heat related safety through a mailing list system.
- ***Emergency Utility Assistance:*** Emergency Utility Assistance is a relief fund that helps Phoenix residents pay for rent and utilities. This program is particularly important during the summer months to help residents cool their homes.
- ***Pools and Splashpads:*** This informational site contains information on the location and accessibility of pools and splashpads in the city where residents can cool off.

As a long-term adaptation to increase heat resiliency, the City of Phoenix pursues tree planting and increasing urban shade coverage. [2]

- ***City of Phoenix Tree and Shade Master Plan***: This is a roadmap to creating a healthier and more livable and prosperous desert city by planting trees and increasing the shade canopy to cover 25% of the city by 2030.

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[1] City of Phoenix (2021). Heat Expert to Lead City's New Heat Response & Mitigation Office. https://www.phoenix.gov/newsroom/city-manager/2060

[2] City of Phoenix. Office of Heat Response & Mitigation. https://www.phoenix.gov/heat

- ***Phoenix Urban Forest:*** This is an informational resource created by Arizona State University and the forestry team to demonstrate the financial, environmental, and social benefits of planting the right urban trees. The resource shows that the benefits greatly outweigh the cost of tree planting and maintenance. A cost-benefit analysis on desert trees considered benefits (energy savings, stormwater runoff reduction, air pollutant uptake, property value, air conditioning savings, rainfall interception, water quality, atmospheric carbon dioxide reduction) and costs (planting, removal, pruning, and other tree care/maintenance costs), assuming a 40-year analysis, $75 cost per tree, and 60% tree survival rate. The study found that the benefits greatly outweighed the costs, with a $2.23 return per $1.00 investment per tree.[3]

- ***Tree Donation Portal:*** The portal provides an easy way for residents and businesses to make donations to help fund tree planting and shade creation initiatives. Donations can be made to plant trees in neighbourhoods, streetscapes and sidewalks, and public parks.

- **Cooling Ordinance:** Phoenix City Code has a Cooling Ordinance section that requires landlords to provide reasonable and working cooling to rental housing units, such as an air conditioning system that cools to 82°F (27°C)or below or an EVAP cooler that cools to 86°F (30°C) or below.[2]

Montreal, Quebec, Canada

Montreal is experienced in responding to extreme heat events. While Montreal and Kamloops experience similar summer and winter temperatures, Montreal has greater precipitation and humidity levels than Kamloops.

The City of Montreal developed the Montreal Heat Response Plan (MHRP) in 2004 due to the increasing frequency of heat-related mortality on a global scale. The MHRP is a 5-stage heat response system that is designed to emphasize both preventative mitigation and emergency response measures.[4]

The MHRP has been evaluated and modified to improve effectiveness. Modifications have included changing messaging strategies and resource distribution tactics in order to reach the most heat vulnerable groups. In the summer of 2010, a devastating heat wave caused 106 heat-related deaths in Montreal over the course of 5 days, with 32 of the deaths (30%) observed in people with mental illness. After this disaster, the MHRP was revised to emphasize caring for those disproportionately impacted by heat. Vulnerable subpopulations include people with mental illness, those who are socially isolated, the elderly, and those with cognitive disabilities.[5]

The City of Montreal has also implemented built environment interventions to reduce the Urban Heat Island effect. The 2015 ILEAU (Interventions Locales en Environnement et Aménagement Urbain)

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[3] E. Gregory McPherson & James R. Simpson, Paula J. Peper & Scott E. Maco (2004). Desert Southwest Community Tree Guide: Benefits, Costs & Strategic Planning. Arizona State Land Department Natural Resources Division, Urban & Community Forestry Section & Arizona Community Tree Council, Inc.

[4] Price et al. (2018) The Montreal heat response plan: evaluation of its implementation towards healthcare professionals and vulnerable populations. https://doi.org/10.17269/s41997-018-0020-2

[5] Price, et al., 2018. The Montreal heat response plan: evaluation of its implementation towards healthcare professionals and vulnerable populations. https://www.ncbi.nlm.nih.gov/pmc/articles/PMC6964487/

initiative designed a connected network of green spaces in eastern Montreal, naturally cooling the city and promoting active transportation.[6] The City worked with local universities to create maps that helped identify priority areas for planting more trees and greenery.

MONTREAL HEAT RESPONSE PLAN 5 STAGE SYSTEM

Stage 1: Normal

- Updating of the list of rooms with air conditioning
- Maintenance of ventilation systems and generators in case of power outage
- Purchase and installation of ventilators and air conditioners in rooms and hallways

Stage 2: Seasonal Watch

- Communication through different media: television, radio, pamphlets, posters, local newspapers, messages on closed circuit television monitors (e.g. in the subway), intranet in healthcare institutions, information meetings, etc.
- Distribution of information pamphlets produced by Montreal Public Health Department to homecare patients during home visits
- Training sessions and reminders to personnel of preventive measures to put in place and signs of heat-related illness
- Transmission of the heat response plan to the healthcare workers
- Identification and prioritization of vulnerable clientele
- Updating the list of available personnel during the summer season to perform check-up telephone calls to the vulnerable population

Stage 3: Active Watch

- Transmission in the healthcare network of information from Montreal Public Health concerning levels of the plan that must be implemented
- Intensification of surveillance of signs and symptoms of heat-related illness in healthcare institution
- During home visits, surveillance of signs and symptoms of heat-related illness and reminder of preventive measures to patients; distribution of water bottles
- Closing of windows in the daytime; re-opening in the evening
- Air conditioning of common areas and opening of these areas during the day, evening, and night for patients in institutions

[6] https://www.canada.ca/en/services/health/publications/healthy-living/reducing-urban-heat-islands-protect-health-canada.html#a3.1

MONTREAL HEAT RESPONSE PLAN 5 STAGE SYSTEM (CONTINUED . . .)

Stage 4: Alert

- Conference calls with partners in the healthcare or municipal network and implementation of recommendations given by the Montreal Public Health Department
- Dialogue and feedback with partners to discuss implementation of actions
- Implementation of the MHRP in each institution
- Frequent visits to homecare patients
- In institutions, frequent visits to housed patients
- Distribution of water, refreshments, lighter meals
- Several actions put in place for employees: water distribution, cooling necklaces, common areas with AC, etc.
- Monitoring of temperature in work areas, especially in warmer environments (e.g. kitchen, laundry room)
- Frequent work breaks for workers in hot, non-air conditioned environments

Stage 5: Intervention

- Transfer of patients to common areas with AC
- Transfer of vulnerable homecare patients to AC shelters
    - Planning of transport to the shelter
    - Care for clientele at the shelter
- Daily contact by telephone or home visits to homecare patients. Registry of calls and compilation of questionnaires for home evaluation.

1.2 Long-Term Mitigation Strategies

This section details some examples of long-term mitigation strategies for heat response, including cooling laws and built environment intervention.

Built Environment Intervention and Urban Heat Islands

Urban heat islands are known to worsen heat vulnerability in cities. A key long-term heat response strategy is to reduce the urban heat island effect by making changes to the built environment. The following list provides examples of innovative strategies undertaken by cities to reduce the effect.

- **Québec City Greening Anna Street pilot project**[7] – From 2013-2015, the City of Québec undertook a pilot project to reduce the urban heat island effect on Anna Street, a heat vulnerable street due to its lack of greenery and low socioeconomic status of residents. The greening project was completed concurrently with a major infrastructure upgrade, which reduced construction costs and disruption to the neighbourhood. By removing on-street parking spaces and adding new trees and planting bays, Anna Street's tree canopy was increased from 3% to 12%, and asphalt surface reserved for cars was decreased by 6%. Next, Québec City developed a Complete Streets Plan in 2019, that guided revitalization of streets by making them active, green, and winter safe. Increasing the tree canopy on these streets worked to reduce the UHI effect and increase active transportation. Simultaneously, Québec City is implementing the Tree Vision 2015-2025, which aims to increase the urban tree canopy. Québec City now has an average canopy index of 32% inside the city.

- **Vancouver Street Tree Cooling Networks**[7] – Vancouver's 2014 Urban Forest Strategy revealed a tree canopy disparity in the city. Maps that identified concentration of key heat vulnerable populations, including the unhoused population and seniors living alone, were overlaid with maps of surface temperatures and tree canopy cover. They discovered that areas of the city with high concentrations of key heat vulnerable populations were characterized by high surface temperatures and low tree canopy cover. This prompted the City of Vancouver to design Vancouver's Street Tree Cooling Networks, planting trees in priority neighbourhoods identified by the overlaying maps exercise.
- **Sponge Cities**[8] – Sponge cities is an urban design concept originating from China that incorporates green spaces into low-lying areas of the city. In heavy rain, water will flow into these green spaces and soak into the green areas, sometimes forming small ponds. This prevents flash flooding, as it doesn't overwhelm the stormwater system. It is also a natural watering system to keep green spaces nourished. Sponge city initiatives can be found all over the world, including China, Germany, and Canada.

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7 Health Canada. (2020). Reducing urban heat islands to protect health in Canada. https://www.canada.ca/en/services/health/publications/healthy-living/reducing-urban-heat-islands-protect-health-canada.html

8 CBC News. (2023). 'Sponge cities': An absorbing idea in the face of climate change. https://www.cbc.ca/news/climate/sponge-cities-montreal-canada-china-1.7013728

Figure 1.1: Sponge Park in Montreal[8]

- **Los Angeles' Solar Reflective Pavement Coatings**[9] – Los Angeles is cooling their neighbourhoods by installing solar reflective coatings onto hardscape surfaces like roads, playgrounds, basketball courts, and parking lots. The reflective coating reduces the urban heat island effect, resulting in reduced ambient air and surface temperatures. During extreme heat events, the areas of the city with reflective coating had an even greater average reduction in temperatures. Next, Los Angeles wants to add reflective rooftop materials to reduce the effect even further.
- **Paris' OASIS**[10] – The City of Paris is leading a pilot project creating "cool islands" on 10 public schoolyards. Public schoolyards were chosen as ideal sites for green, tree canopied oases because they are accessible to the public after school hours and evenly spatially distributed throughout the city, with every Parisian living within a 250-metre radius from a public school.

[9] Forbes. (2023). How Reflective Coatings Are Cooling Down One Los Angeles Neighbourhood. https://www.forbes.com/sites/jamiehailstone/2023/07/11/how-reflective-coatings-are-cooling-down-one-los-angeles-neighbourhood/?sh=6dc2dd7d324d

[10] Urban Innovative Actions. (2020). Paris is creating an OASIS in the heart of its neighbourhoods and why more cities should follow. https://www.uia-initiative.eu/en/news/paris-creating-oasis-heart-its-neighbourhoods-and-why-more-cities-should-follow

This initiative would reduce the UHI effect and make access to green space more equitable by providing an oasis in every neighbourhood in Paris.

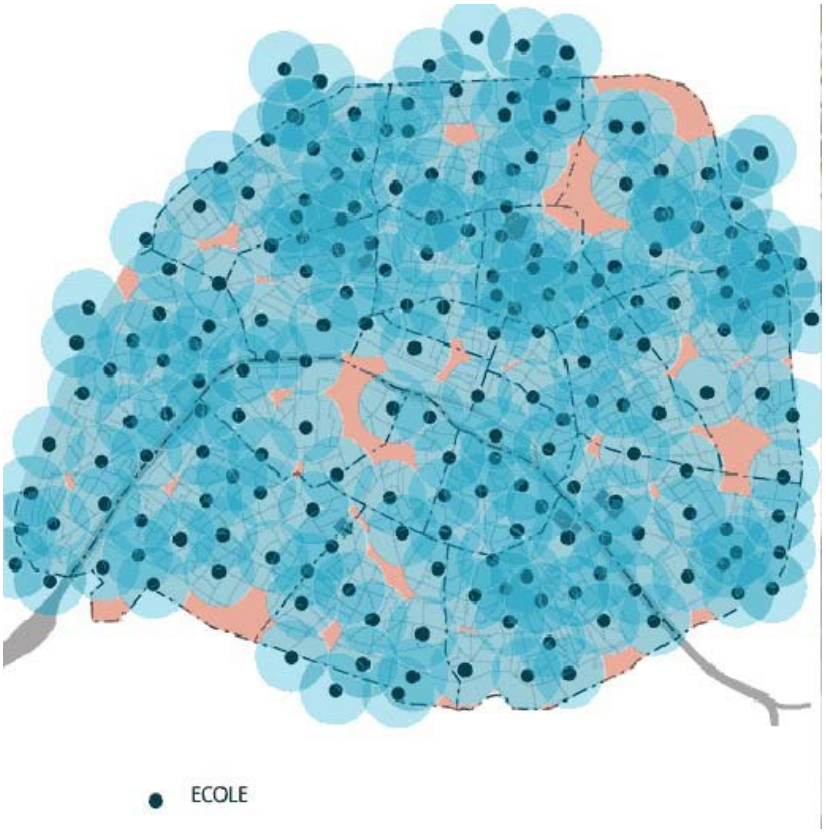

Figure 1.2: Distribution of schools in the City of Paris

- **Flint, Michigan's Weather Sensor Network**[11] – The City of Flint is installing temperature sensors at bus stops across the city. Bus stops were chosen as sensor sites to create an evenly distributed weather sensor network and collect temperature and humidity data from different parts of the city with the same micro-environment, a bus stop. The sensors being deployed are prioritizing socioeconomically disadvantaged neighbourhoods. The continually updated data is available online so bus users can see the current heat conditions at all locations. The sensors are built to shine lights if an extreme heat event is occurring to warn people at the bus stop. The sensors are also used to generate heat mapping for higher level analysis.
- **Halifax's Imagine Spring Garden Road**[12] - Halifax is in the final stages of a major redesign of Spring Garden Road, a busy shopping street and major public transit corridor. The redevelopment of the street involved widening sidewalks, installing planters and trees, adding new bus shelters, repairing benches, and improving infrastructure. The project aims

[11] University of Michigan-Flint. (2022). UM-Flint research team establishes citywide weather sensor network. https://news.umflint.edu/2022/08/17/um-flint-research-team-establishes-citywide-weather-sensor-network/

[12] Halifax Regional Municipality. Spring Garden Road Enhancements. https://www.shapeyourcityhalifax.ca/spring-garden-road-enhancements

to make the street more pedestrian and transit user friendly and incorporate heat adaptations into the built environment. The redesign reduced linear planting beds and instead favoured sloped rain gardens that collect water. Similar to sponge parks, sloped rain gardens prevent flash flooding by reducing the amount of water entering the stormwater system. The garden stays nourished naturally, and the presence of water cools the surrounding area.

- **Toronto's Incentive Programs**
  - The City of Toronto is using monetary incentives to address extreme heat mitigation. The **Eco-Roof Incentive Program** offers subsidies to support the installation of green, vegetated roofs and cool, light-coloured roofs.[13] The program awards $100/m^2 installed of green roofing, up to a maximum of $100,000, and $2-5/m^2 installed of cool roofing depending on the type, up to a maximum of $50,000. By incentivizing private owners and developers to install more eco-roofs, the wider community benefits from reduced urban heat island effect, reduced greenhouse gas emissions, and improved air quality.
  - The City of Toronto is also increasing their tree canopy by incentivizing private landowners to plant more trees. The City offers various **Urban Forestry Grants and Incentives** that give away free trees, subsidize tree planting services, and provide grants to be used for tree planting on private land.[14]

[13] City of Toronto. Eco-Roof Incentive Program. https://www.toronto.ca/services-payments/water-environment/environmental-grants-incentives/green-your-roof/

[14] City of Toronto. Urban Forestry Grants & Incentives. https://www.toronto.ca/services-payments/water-environment/environmental-grants-incentives/urban-forestry-grants-and-incentives/

2.0 ENGAGEMENT-BASED CHALLENGES & OPPORTUNITIES

Community conversations were invaluable in assessing the success of heat response actions taken by the City in the past. Reviewing the key successes and lessons-learned with local partners and staff supported the identification of high-level challenges and opportunities for united action. Many organizations recognized that a coordinated approach would be key to maximizing the impact of limited budgets. Key insight gathered in these conversations is summarized in Table 2.1 below.

Table 2.1: Key Themes and Opportunities for Action From Community & Staff Engagement

Challenge	Opportunity for Action
Use of cooling centres – Community groups of interest and staff observed that not all vulnerable groups are equally accessing cooling centres. Numbers are very low among everyone with the exception of the unhoused population.	• Continue promoting public / quasi-public spaces like grocery stores, libraries, and malls as multi-functional stops where people can cool down. These spaces are also more evenly distributed throughout the community. • Continue to work with service providers to provide cooling centres for unhoused people.
How to reach isolated individuals – Isolated individuals were identified as being especially vulnerable during heat events and includes people who do not use/have technology, and people living in housing ill-equipped for hot weather (e.g., no air conditioning, poor ventilation) without adequate transportation or check-in networks.	• Create check-in network. Suggestions varied on the form this could take, but included check-in lists that people could register for. • In-person, neighbourhood-level check-ins were seen as a key action.[15]
Transportation – Vulnerable populations often face additional mobility challenges and may not have access to vehicles, relying instead on public transportation (which may not go where people need to go during the right hours), taxis (relatively expensive and not an option for everyone), and HandyDart (not suitable for heat events as booking often occurs 2-3 days in advance).	• Extend transit services to TteS on weekdays and introduce weekend service and HandyDart access. • Examine existing routes for areas where there is vulnerable housing and lower levels of access to transportation. • Continue to allow pre-boarding during periods of extreme heat. • Offer free ridership during extreme heat and cold events on transit with additional cooling options at exchanges. Use Umo system to provide flexible passes during extreme heat events.

[15] City has plans underway to develop a Neighbourhood Emergency Preparedness Program that would work with neighbourhood associations and / or block watches to identify vulnerable people and register them on a centralized list so they could be checked-in on during extreme heat events

Challenge	Opportunity for Action

Awareness of risk – Interest groups repeatedly shared concerns that people have a misperception of who is most vulnerable to heat effects. Often people who are unhoused are assumed to be most vulnerable, and while vulnerable, they are often well-connected to support and service networks. Individuals who are at risk may not recognize their vulnerability, including people with advanced age and underlying health conditions.	• Information from the Province and Interior Health exists but could be more widely broadcast. Need to consider a combination of outlets:
	  • Partnering with physicians, pharmacists
	  • Use of social media
	  • Hard copy options (Activity Guide, posts on central community boards like Northills Centre)
	  • Asking social service partners to share information with their clients

Water purchase and storage – There are common items that many service organizations provide (e.g., water bottles for heat relief, sleeping bags in winter). Organizations are limited by how much they can purchase and store (generally smaller quantities).	• Centralized water storage / distribution was largely supported by service providers. The City should continue to purchase resources in bulk to provide to CSOs and community outreach partners. The City can expand this initiative by transporting goods to a distribution centre that service providers can access, provided they have access to emergency funding.
Different needs by different vulnerable populations – Conversations identified two distinct vulnerable populations, each with differing needs: 1) people who are unhoused and 2) the elderly and those with underlying health conditions. Observations were shared that these groups often do not feel comfortable sharing the same space (e.g. a universal cooling centre), have different needs, and require different outreach strategies.	• Different client demographics feel more comfortable when they can access services separately (e.g., providing separate cooling options for seniors and people who are unhoused). • There is a benefit in having multiple service locations — many people on the North Shore will not go Downtown to access services and vice versa (or cannot due to transportation barriers).[16]
Siloed information and actions – A need was identified to better coordinate the work of City, RCMP, firefighters, social workers, building inspectors, etc. to improve heat response and create efficiencies.	• Develop vulnerabilities list to identify housing at risk (and connect landlords and landowners with senior government funding opportunities for air conditioning and / or energy efficiency improvements). • Continue to host roundtable to engage with key organizations to reach vulnerable people.
Need resources to be available during high heat times – The City generally operates on an 8:00 am to 5:00 pm timeline which means services are often not	• Plan more activities for evenings / have community centres open later so people have options to escape the heat.

16 Conversations with staff revealed that the 2023 heat response, which created different spaces within a cooling centre for vulnerable groups was well-received and made people more comfortable. However, the use of space by individuals who are not unhoused was quite low indicating additional response techniques should be considered.

Challenge	Opportunity for Action
accessible later in the day or at night when there is still heat.	• Ensure there are cooling centres and/or spaces in all geographies of the city and/or have a shuttle.
Long-term resiliency – Several conversations raised a concern for long-term infrastructure investment to plan for climate change, recognizing that extreme heat events will only become more common.	• Sprinklers, modifications to hydrants to provide temporary misting stations, public washrooms. • Increase tree cover (near bus stops, pedestrian and active transportation routes, and social housing), and use of green infrastructure. Prioritize this in low-income neighbourhoods. • Implement measures to reduce heat island effects, bolster resiliency of electricity grid, and find alternative sources of water to offset drought conditions. • Consider strategies to mitigate impacts of wildfire smoke, particularly periods of sustained air-quality advisories.

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APPENDIX B

Heat Alert Response System

LEGEND: CITY OF KAMLOOPS DEPARTMENT ACRONYMS	
C	Communications
CS	Community Services
CP	Community Planning
C&S	Climate & Sustainability
EP	Emergency Program
FR	Fire Rescue
MSS	Municipal Support Services/RCMP
PCF	Parks and Civic Facilities
RHW	Recreation, Health and Wellness
SCD	Social and Community Development
T	Transportation
SES	Streets and Environmental Services

PRE-SEASON PREPAREDNESS		
Timeline	**Task Checklist**	**Departments**
January	• EP to engage in meeting with all organizations and departments involved in emergency response in regards to freshet. Initial discussions of heat response.	EP, FR, EMCR
February	• EP to initiate internal meeting around Intervention Strategies	EP, SCD, C&S
	• Intervention Strategy Plans reviewed by respective departments following development during Post-season Debrief/Planning (see Appendix B for template)	Relevant departments
	• Presentation to Council	EP
March	• Emergency response and fire department early meeting for long range forecast for drought and wildfire	EP, FR, EMCR
	• Emergency Program directs Communications on which materials will need updating and how.	EP
	• Communications updates materials, creates new materials as needed, and requests review from Interior Health Population Health Department on text as well as updated list of new resources.	C
May	• Meeting with social agencies to discuss potential roles and supports that can be provided and any City support (e.g., water bottle storage) • Virtual or online meeting with all Cool Spaces Strategy network participants to discuss the coming year's response. Reach out to any potential participants before the meeting as required. • Communications updates list of contacts for information distribution through emails and Facebook groups. • Outreach to Heat Relief Network members with updated resources and materials	SCD
June	• Pre-season communications materials released as directed by Emergency Program	EP, C
	• Final internal coordination meeting about plan activities	EP, C, SCD, RHW, PCF, T, SES
	• List of capital/materials to be purchased once Task # available	EP

LEVEL 1: HEAT WARNING		
Timeline	**Task Checklist**	**Departments**
Level 1: Heat Warning is activated when forecasted temperatures reach daily maximum of 35°C and nightly lows above 18°C for two consecutive days.	• Trigger HARS protocol • Request task # from EMCR	EP
	• Communication to all relevant department managers on City phone account by text to activate all relevant HARS actions. Follow up with non-responses within 24 hours.	EP to contact C, CS, RHW, SCD social agencies, PCF, FR
	• Print door hangers and pamphlets as needed with heat response information for RCMP, Fire Department and network of community partners as directed by Emergency Program • Engage with media partners to provide information about the City's response	EP, C

	• Enact Cool Spaces Strategy
	  ○ Reach out to Core Network to share information about emergency, any additional resources
	  ○ Organize resources needed by Core Network organizations (e.g., water, information, print materials handouts)
	  ○ Distribute sandwich boards or similar marker for participating organizations
		SCD, RHW

	• Release information about Cool Spaces Strategy locations, any other actions by agencies (in 2024, this would include a central, City-run cooling centre)	C
	• Extend hours for City facilities forming part of the Cool Spaces Strategy which provide relief from the heat, such as pools and spray parks	RHW
	• Purchase water bottles and any other material needs • Internal department meeting to strategize activities, resource distribution, and check ins with vulnerable people for heat stress	CS
	• Incorporate heat into any relevant checks or contacts	FR/MSS

LEVEL 2: EXTREME HEAT ALERT		
Timeline	**Task Checklist**	**Departments**
Level 2: Extreme Heat Alert is activated when Heat Warning criteria has been met and there is certainty that temperatures will increase substantially each day for three or more consecutive days.	• Communication to all relevant department managers on City phone account by text to activate all relevant HARS actions. Follow up with non-responses within 24 hours.	EP
	• At request of EP, issue messaging on social media, City of Kamloops website, and Voyent Alert app • Print door hangers and pamphlets with heat response information for RCMP, Fire Department, and network of community partners • Print posters for transit service and community poster boards • Organize radio ads	C
	• Set up misting stations and temporary water fountains	EP, SES

	• Enact Cool Spaces Strategy
	  ○ Reach out to Extended Network to share information about emergency, any additional resources
	  ○ Organize resources needed by Extended Network organizations (e.g., water, information, hardcopy handouts)
	• Distribute sandwich boards or similar marker for participating organizations
		SCD, RHW, C

	• Activate check-ins by Block Watch groups/neighbourhood associations	SCD
	• Extend hours for City facilities forming part of the Cool Spaces Strategy which provide relief from the heat, such as pools and spray parks	RHW
	• Organize resources needed by network organizations (e.g., water, information)	EP
	• Initiate check-ins with heat vulnerable people for heat stress	CS
	• Assess needs for potable water and air conditioning systems in the community and public buildings.	EP
	• Purchase additional water bottles and any other material needs	CS

RESCIND		
Timeline	**Task Checklist**	**Departments**
Rescind is activated when Environment Canada reviews the tatus of the Alert and issues public confirmation of the ending.	• Activate rescind messaging through social media and City of Kamloops website.	C
	• Deactivate Cool Spaces Strategy by reaching out to Core and/or Extended Network • Deactivate cooling centre. ○ Send Voyent Alert announcing deactivation of cooling centre.	EP
	• Undertake any community recovery efforts needed and communicate with community organizations and departments about their recovery	EP
	• Consider lessons learned and recommendations for improving the plan.	EP

POST-SEASON DEBRIEF/PLANNING		
Timeline	**Task Checklist**	**Departments**
October	• Organize internal meeting	EP
	• List of recommendations developed for changes to the Heat Response Plan and next year's response	EP
	• Internal meeting with relevant departments to discuss long-term adaptation project for following year and incorporation of heat lens into already planned projects. Include any budget required in budget planning.	C&S
	• Development of Intervention Strategy Plans	Relevant departments
	• Identify feasible long-term implementation strategies. Incorporate the Heat Response interactive mapping to inform decision-making.	C&S, relevant departments

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APPENDIX C

Kamloops Heat Relief Network Sign-Up Sheet

Heat Relief Network Response Sign-Up Form

Name of Organization	Name of Representative	Contact Information	Core or Extended Network	Target Population	Response Activities						
					Distribute bottled water (y)	Distribute Information (y)	Open Cool Area (outdoor/indoor) (y)	Health/Well-being Check ins (y)	Preparedness (y)	Supporting Clients in Accessing Supports (e.g., AC subsidy) (y)	Other (Please explain)

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APPENDIX D

Communications Information

Communications Information

TYPES OF MATERIALS						
	Educational About Heat	**Preparing for Heat in our Homes**	**Check-in Guide**	**About City Intervention Strategies**	**Heat Risk Level**	**Check-in Sign up Info**
Pre-season Preparedness						
Social media		✓				✓
Website		✓				✓
Emails to community partners	✓		✓	✓		✓
Level 1 Heat Warning						
Social media	✓	✓		✓	✓	✓
Website	✓	✓		✓	✓	✓
Door hangers & pamphlets	✓			✓		✓
Emails to community partners	✓		✓	✓	✓	✓
Level 2 Extreme Heat Emergency						
Social media	✓	✓		✓	✓	✓
Website	✓	✓		✓	✓	✓
Door hangers & pamphlets	✓			✓		✓
Emails to community partners	✓		✓	✓	✓	✓
Text and Coordination for Radio Ad	✓		✓	✓	✓	
Poster for bus	✓			✓	✓	
Poster for community distribution	✓			✓	✓	✓

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APPENDIX E

Intervention Strategy Plan Template

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Intervention Strategy Plan **YEAR**

Strategy Name:			
Department/Position Responsible:			
When to enact:	☐ Pre-season Preparedness	☐Heat Level 1	☐Heat Level 2
Description:			
Materials Required:			
Approximate Budget:			
Staff Resources Required:			
Next Steps:			

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APPENDIX F

IMPLEMENTATION WORKSHEETS

Heat Response							
		2024					
Purpose	**Reduce Mortality Among Community Members During and Immediately Following Heat Events**	**Implement? (Y/N)**	**Level of Success in Previous Years**	**Proposed Changes**	**Staff Resources Required**	**Financial Resources Required**	**Department/Position Responsible**
Objective 1	**Improve response interventions to reduce the acute impact of heat warnings and extreme heat emergencies**						
Strategies	1.1 Develop temporary water fountains and misting stations to be installed in high heat and high pedestrian traffic areas - Use EHRP mapping to identify potential areas for future installation of permanent (seasonal) water fountains - Purchase misting stations and water fountains (if required) and identify department or community partner to take responsibility for stations						
	1.2 Create a network of community partners to collaboratively implement heat response - Create an initial list of contacts and host a virtual or in-person meeting to discuss the Cool Spaces Strategy and information distribution. Use the Network Response Sign Up sheet found in Appendix C to create and maintain a directory of contacts						
	1.3 Explore establishing a Check-in Call Service (such as that referenced in Section 4.1) powered by volunteers for future years, including which department or organization would have responsibility for such a service and who would volunteer to make the regular calls.						
	1.4 Establish a list of facilities that are suitable to include in the Cool Spaces Strategy, including but not limited to spray parks, pools, cool indoor spaces						
Objective 2	**Improve collaborative information collection and sharing about at-risk individuals**						
Strategies	2.1 Explore information sharing between Interior Health and first responders on Interior Health's strategies and how they will be supporting their patients						
	2.2 Explore the best way for RCMP and Kamloops Fire Rescue to collect and share information about the location and identity of at-risk individuals						
Objective 3	**Increase community members' knowledge of heat exposure and ability to adapt to extreme temperatures**						
Strategies	3.1 Collaborate with health authorities on content and maintaining updated resources for community distribution. Consider establishing a working group to guide the development of materials						
	3.2 Produce hardcopy materials to reach a wider public - Door hangers for RCMP and Fire Rescue to leave at higher risk homes and for property managers to distribute in buildings - Advertisement for bus ads - Pamphlet for distribution through community partners, at City facilities, through CSOs, CAP Team						
	3.3 Update communications materials to reflect the new Intervention Strategies and any future revisions to them						
	3.4 Update City Heat Response webpage to reflect updated components of Heat Response Strategy						
	3.5 In early 2024 promote the new strategy through social media and other free media (e.g., radio interview, news articles) to mitigate misunderstandings and complaints from the general public						
Objective 4	**Engage with Tk̓emlúps te Secwépemc**						
Strategies	4.1 Emergency Program to engage with Tk̓emlúps te Secwépemc equivalent department through regional emergency planning calls						
	4.2 Consider engaging with Tk̓emlúps te Secwépemc on matters of communications materials and strategies to reach people						

LONG-TERM ADAPTATION					
Purpose	**Reduce Relative Temperatures and Exposure in Urban Areas**	**Priority Level (L, M, H)**	**Proposed Year of Implementation**	**Available Funding**	**Department/Position Responsible**
Objective 1	**Increase permeable areas on private and public property**				
Strategies	1.1 Explore strategy to increase permeable area requirements in design guidelines for new development				
	1.2 Explore incentives program for developers to adopt permeable materials in place of asphalt or concrete (e.g., stormwater design flexibility, reduction of required parking areas) along with other green infrastructure technologies				
	1.3 For new city projects, reduce impermeable area where possible, and incorporate alternative permeable materials where feasible				
	1.4 Increase the use of rain garden design for drainage and landscaping in development/redevelopment projects to reduce water use in irrigation and increasing permeable areas				
	1.5 Explore the developments of parklets in urban areas with either permanent or temporary vegetation and/or shading as a refuge for pedestrians				
Objective 2	**Increase tree canopy strategically and equitably through City projects and public programs**				
Strategies	2.1 Review and explore ways to strengthen tree protections in the City's tree protection bylaw.				
	2.2 Incorporate an equity and heat lens into tree planting plans and new park locations (i.e., where to plant additional trees to increase tree canopy generally)				
	2.3 Prioritize shade, evapotranspiration rates, and drought hardiness when choosing tree species in planting plans, including considering species selection and need for assisted migration				
	2.4 Explore how to increase tree planting requirements in design guidelines for new developments and provide additional guidance around surrounding permeable area required and species based on exposure and other environmental or location factors				
	2.5 Explore optimal and feasible ways to increase tree requirements in any new parking lot development and require that south and west exposure be incorporated into planting plans				
	2.6 Continue with Tree Coupon Program, expand if feasible				
	2.7 Explore a cedar hedge replacement program where incentives and guidance is provided for water-wise alternatives are promoted to align with FireSmart guidelines				
	2.8 Plant trees strategically to provide shade for users at sports fields, dog parks, playgrounds, sitting areas in parks, and spray parks				
	2.9 Strategically plant roadways or pathways to create shaded corridors from neighbourhoods to transit hubs, commercial areas, and other key destinations				
Objective 3	**Improve the active transportation network to generally decrease vehicle traffic which contributes to Urban Heat Islands**				
Strategies	3.1 Ensure active transportation routes are shaded where feasible				
	3.2 Explore permeable and/or light-coloured materials for pathways				

LONG-TERM ADAPTATION					
Purpose	**Reduce Relative Temperatures and Exposure in Urban Areas**	**Priority Level (L, M, H)**	**Proposed Year of Implementation**	**Available Funding**	**Department/Position Responsible**
	3.3 Prioritize roadway tree planting in areas with higher pedestrian/active transportation traffic where dedicated pathway development is unfeasible in the medium term				
	3.4 Continue efforts to support active transportation as vehicle traffic increases temperatures				
Objective 4	**Leverage private and public partners for long-term adaptation strategies**				
Strategies	4.1 Explore the creation of an incentive or cost share program to encourage parking lot owners to increase tree canopy				
	4.2 Provide incentives for existing developments to remove asphalt or concrete where feasible to be replaced with either permeable surfaces and/or water-wise landscaping/tree plantings				
	4.3 Provide incentives or cost-share programs for existing commercial and residential building owners to install a cool roof or paint their roof white				
	4.4 Encourage commercial property owners to install benches in shaded areas to allow customers to rest while shopping				
	4.5 Engage the School District 73 School Board and staff in discussions to increase shade at schools for students and to potentially use school grounds as outdoor refuge during a heat event				
	4.6 Engage in outreach to encourage garden centres to stock and promote planting of heat-tolerant plant varieties to support xeriscaping				
Objective 5	**Incorporate a heat lens into planning and regulations**				
Strategies	5.1 Follow heat-conscious urbanization guidelines such as Healthy Built Environments Linkages Toolkit . To be considered in updates to: - Zoning Bylaws - Official Community Plan - Development Permit Area Guidelines				
	5.2 Use the Heat Response interactive mapping online[2] to inform planning and equity considerations around vulnerability and exposure to heat, tree canopy, and urban heat island areas				
	5.3 Explore feasibility of incorporating a requirement for cool, green, or painted white roofs to be used on all future multi-unit residential and commercial developments in Development Permit guidelines				
Objective 6	**Increase the safety of transit users during hot weather**				
Strategies	6.1 Ensure shade is considered in identifying bus stop locations,				
	6.2 Plant trees or install shade shelters at higher-use, exposed stops				
	6.3 Explore the feasibility of installing temperature gauges at bus stops that users can view online (see Flint, Michigan case study in Section 4.2)				
	6.4 Explore bus shelter designs which reflect the heat (e.g., light-coloured materials) or with green roofs for future bus shelter development plans				
Objective 7	**Increase knowledge of adaptation approaches for residents**				

LONG-TERM ADAPTATION					
Purpose	**Reduce Relative Temperatures and Exposure in Urban Areas**	**Priority Level (L, M, H)**	**Proposed Year of Implementation**	**Available Funding**	**Department/Position Responsible**
Strategies	7.1 Develop or aid in the distribution of information about reducing heat in the home with awnings or window film for example, and using vegetation to reduce solar heat gain in the home				
Objective 8	**Incorporate heat adaptation into the City's emissions target planning**				
Strategies	8.1 Research the contribution of long-term adaptation measures on advancing emissions reduction targets in order to support: -Business cases for larger projects -Prioritization of key projects				
Objective 9	**Promote collaboration across City departments to encourage mitigation through diverse projects**				
Strategies	9.1 Encourage an understanding of heat risks and effective mitigation measures (heat lens) throughout departments and leadership				
	9.2 Leverage the Climate and Sustainability department to seek infrastructure and planning solutions which include climate change adaptation and heat mitigation				