Climate Change Risk Section

Guidance Document

In response to the City of Windsor's declaration of a Climate Change Emergency (CR570/2019), City Council is requesting administration to begin considering Climate Change risk (mitigation and adaptation) under the Risk Section of City Council report (CR187/2020).

This guidance document has been developed to assist staff with addressing Climate Change risks within the Risk Section of Council report.

When addressing climate change, staff should be aware that there are two components to addressing climate change risks: *GHG mitigation* (measures the anticipated GHG emissions impact of a project), and *climate change adaptation* (employs a risk management approach to anticipate, prevent, withstand, respond to, and recover and adapt from climate change related disruptions or impacts).

ADAPTATION = managing the unavoidable

MITIGATION = avoiding the unmanageable

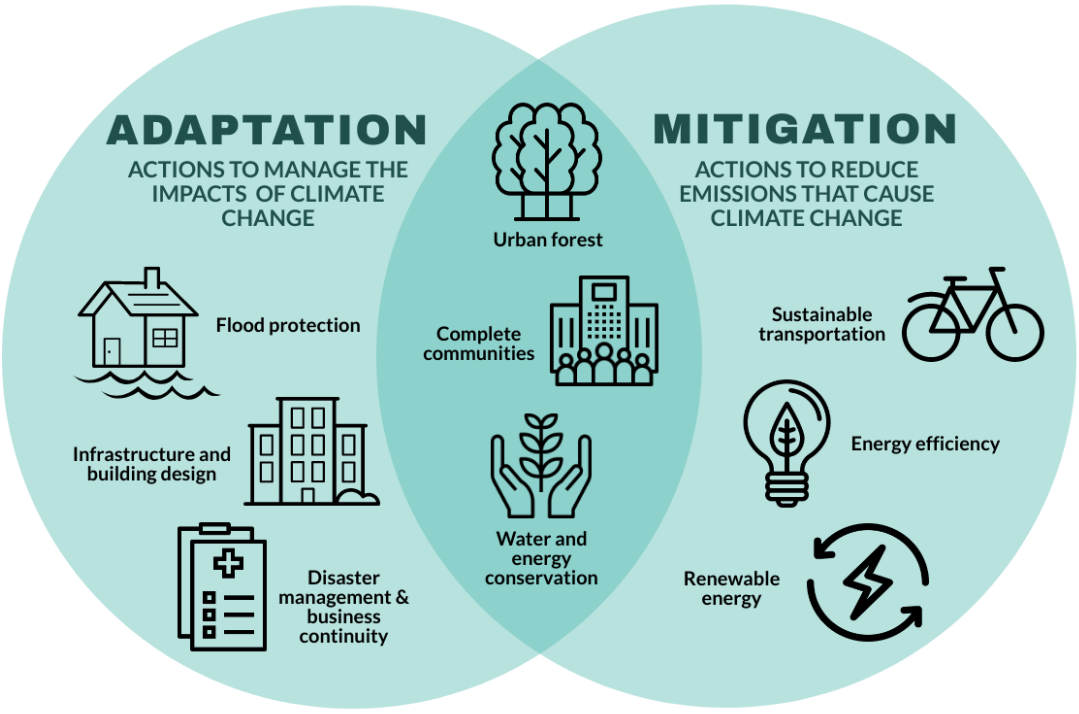


Figure 1: Examples of Actions to address Climate Change Adaptation and Mitigation

Definitions:

Climate Change: A change of climate which is attributed directly or indirectly to human activity that alters the composition of the global atmosphere and which is, in addition to natural climate variability, observed over comparable time periods.

Climate Change adaptation: Adjustments in ecological, social, or economic systems in response to actual or expected climatic stimuli and their effects or impacts. It refers to processes, practices, and structures to moderate potential damages or to benefit from opportunities associated with climate change. Adaptation measures work to reduce the negative impacts of climate change, while taking advantage of potential new opportunities.

Climate Change mitigation: The reduction, removal, or avoidance of GHG emissions from a specific project. This can be achieved through the promotion of policy, regulatory and project-based measures that contribute to the stabilization or reduction of greenhouse gas concentrations in the atmosphere.

Greenhouse Gas (GHG) Emissions: Greenhouse gases include carbon dioxide (CO2), methane, nitrous oxide and ozone, all of which contribute to climate change. These gases are produced through the burning of fossil fuels (hydrocarbons), such as oil and natural gas.

Climate Change Mitigation

In 2017, City Council approved the Community Energy Plan and Corporate Climate Action Plan (CR426/2017) along with associated greenhouse gas emission reduction targets.

Community Targets:

1. Reduce per capita energy use by 40 % from 2014 baseline by 2041; and
2. Reduce per capita GHG emissions by 40 % from 2014 baseline by 2041.

Corporate Targets

1. Reduce primary energy use by 11 % by 2030 and 25 % from 2014 baseline by 2041; and
2. Reduce GHG emissions by 20 % by 2030 and 40 % from the 2014 baseline by 2041.

These ambitious and transformative targets support global efforts to keep global temperature increases within 1.5°C. These targets will not be easily achieved and a concerted effort across the Corporation will be required to meet these targets.

The following questions were developed to assist the author in responding to the impacts on Corporate and Community greenhouse gas emissions.

1. Will this project result in the production of greenhouse gas emissions?

   Greenhouse gas emissions will occur from the use of fossil fuels, including natural gas, gasoline, diesel and to a lesser extent grid-supplied electricity.

   - ☐ Yes
   - ☐ No

If no, this section is not applicable to your project, please proceed to the Climate Change Adaptation Section to proceed.

If yes,

2. Does the recommendation in the Council report increase or decrease the amount of energy and emissions used by the Corporation or in the Community?
   - ☐ Decrease/stay the same (go to 2a)
   - ☐ Increase (go to 2b)

Table 1: Examples of projects that will increase or decrease GHG emissions

Projects that will lead to an increase in emissions	**Projects that will lead to an decrease in emissions**
Fuel switching – switching from grid-supplied electricity to fossil fuel energy (ex. generating electricity by burning of natural gas)	Fuel switching – switching from a fossil fuel (natural gas, gasoline) to grid-supplied electricity (ex. conversion to electric vehicles)
Construction of new buildings	Energy efficiency projects (ex. lighting retrofits, building insulation)
	Renewable energy projects (ex. solar)

2a. Under the climate change mitigation heading, provide a description of how the project is expected to reduce emissions, and provide an estimate of the GHG emission reduction potential if possible.

2b. Under the climate change mitigation heading, provide an overview of measures that will be taken to reduce the overall impact on GHG emissions and energy. Where possible, provide an estimate of the increase in GHG emissions expected.

The following is a list of examples of actions that can be taken to mitigate impacts on energy and GHG emissions:

- Energy/GHG Emissions will be included in the RFP, Design/Build contract etc.
- Enhanced building design standards (LEED, Passive house, Net Zero development, etc.)
- Inclusion of renewable energy
- High efficiency equipment (ex. Energy Star Equipment)

Provided below are examples identifying the climate change mitigation risks.

Example 1:

Climate Change mitigation:

The project is proposed to be designed and built to Passive House standards, as such it is expected to produce 33 % less greenhouse gas emissions over a standard build.

Bicycle, Mobility Scooters E-bike Shelter and Charging – This development has an external covered storage area for bicycles, mobility scooters and e-bikes with charging capability. This also encourages bicycle transportation.

Electric Vehicle Charging Stations: This development will have 4 electric vehicle charging stations

Climate Change Adaptation

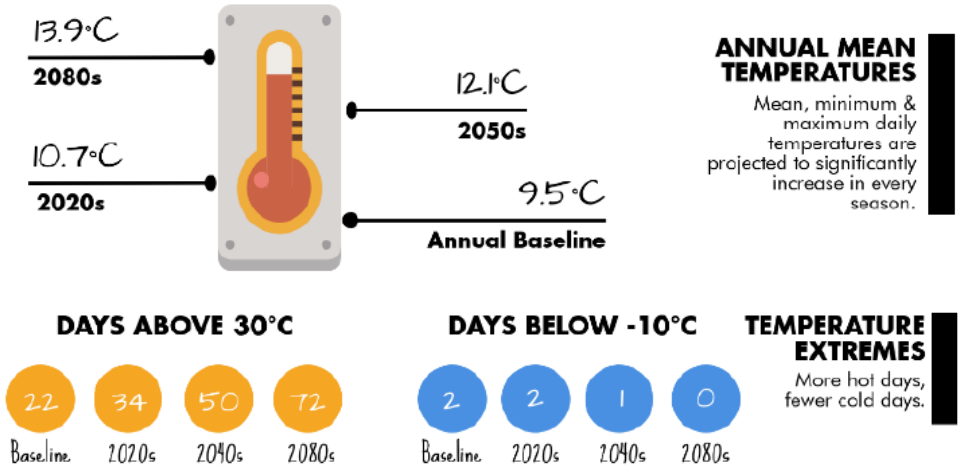
In 2020, City Council approved the Degrees of Change, Climate Change Adaptation Plan to prepare for our climate future by creating a resilient city to the effects of a changing climate by minimizing risks to our community through the advancement of sustainable policies, infrastructure investment and public education.

The City of Windsor has already experienced a number of impacts from a changing climate including: more 'hot days'; intense precipitation events leading to flooding; an increase risk of vector borne diseases (ex. West Nile, Lyme disease); and high Detroit River levels, to name a few.

Identifying and addressing climate change risks early in a project will provide opportunities to build a more resilient City or at a minimum minimize actions that could exacerbate future conditions.

Tip: While reviewing the climate projections, consider the life of your project to build understanding of the risks posed over the projects life cycle.

Table 2: Windsor's Climate Projections Summary

<table>
<tr>
<td>Temperature</td>
<td>


Average annual temperature increasing by up to 4.4°C by the 2080s;
Average number of days above 30°C will more than double by the 2050s and more than triple by the 2080s.
Map A (Appendix A) illustrates the Urban Heat Island for the City of Windsor

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<td>Precipitation</td>
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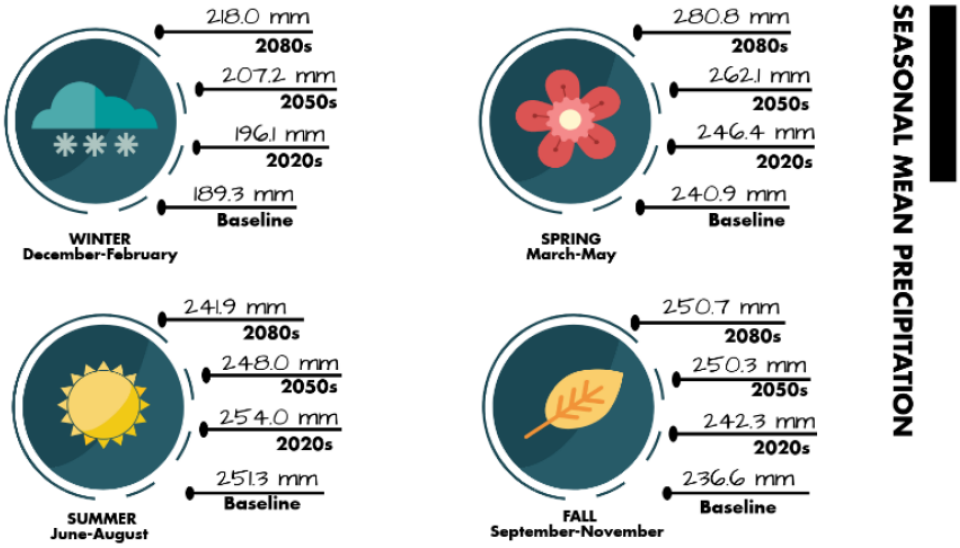

Average precipitation expected to increase, particularly in winter and spring;

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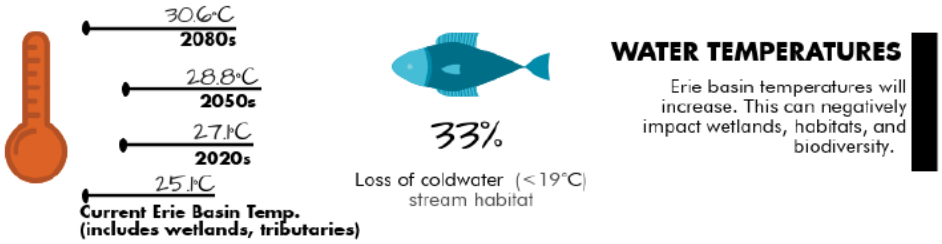
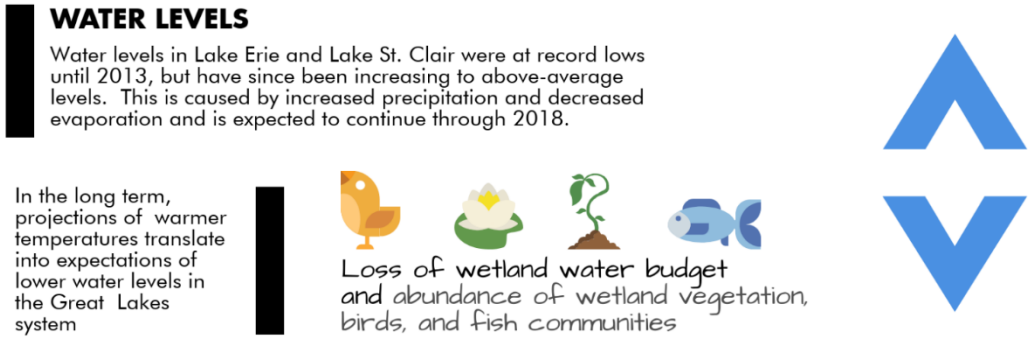
	• Summer may eventually see a slight decrease in precipitation, coupled with increasingly warm seasonal temperatures.
Extreme precipitation	 • More intense precipitation events are expected to occur more frequently; • 25% increase in 10-year storms; • 40% increase in 100-year storms (Windsor has already experienced two in the last three years); • On average, more rain is expected to fall (in mm/h) during periods of precipitation. • *Map B (Appendix A) shows areas at higher risk for basement flooding under various extreme precipitation events.*
Water temperature	 • Temperature of Erie basin (includes wetlands and tributaries) continues to increase.
Water levels	 • Water levels have been above average since 2013; • In 2019 the Detroit River reached a high water level of 176.08 meters; • The current 1:100 Year Instantaneous Water Level is 176.5 meters; • In the near climate future water levels are expected to continue to be high;

	• In the distant climate future, water levels are projected to decrease in Great Lakes partially due to warmer temperatures (i.e. more evaporation) and changing precipitation patterns. • *Map C (Appendix A) shows areas at higher risk for overland flooding at various Detroit River/Lake St. Clair high water levels*

3. After reviewing Windsor's climate change projections, can the project/policy be negatively affected by today's climate or Windsor future climate?
    - ☐ Yes (continue to question 4)
    - ☐ No (jump to question 7)

Note: when considering this question, the project scope should not be limited to a specific asset but include considerations for the Community (example, thermal comfort of users).

4. If yes, which climate parameter is of concern?
    - ☐ Temperature
        - Annual Temperatures
        - Days below -10°C
        - Days above 30°C
    - ☐ Precipitation
        - Annual precipitation
        - Seasonal precipitation
        - Extreme precipitation
    - ☐ Surface Water Levels
    - ☐ Water temperatures

Note: The supporting maps provided in Appendix A, outline geographical areas of higher risk for various climate parameters. However, other factors may be relevant to consider, for example vulnerable communities.

5. If the climate condition occurred during the project/policy life cycle would there be unintended consequences on social factors (public health & safety, displacement of people, loss of livelihood, cultural aspects), economic factors (property damage, local economy and growth, community livability, public administration) or environment (air, water, soil and vegetation, ecosystem function).

    If yes, which consequences are of concern:

6. Does the project/policy/council recommendation take into account the climate hazards and identified consequences?

   If yes, under the climate change adaptation heading, identify the considerations given to climate impacts and what actions have been taken to reduce risk and negative consequences.

   In no, provide an explanation as to why the risk may be minimal and no further action is required. Examples can include that the climate condition is unlikely to occur, there are other mitigating actions occurring to reduce the risk, etc.

7. If you noted, under question 3, that the project will not be affected by today's climate or Windsor future climate, is there an opportunity for the project/policy/council recommendation to improve resiliency to a changing climate.

Provided below are examples identifying the climate change adaptation risks.

Example 1:

Climate Change adaptation:

Thermal Resiliency: Buildings designed to passive house standards provide enhanced thermal protections that minimize heat gain (summer) and heat loss (winter). In the event of a disruption caused by climate events or otherwise, homes with Passive House standard building envelopes maintain safe indoor temperatures for significantly longer than even code-compliant new buildings, lasting over six days before indoor temperatures fell below 40°F when the outside average air temperature was -10 F.

Homes vary widely in their ability to maintain comfort during these events. Passive House buildings with more insulation, better airtightness, and better windows can outlast the cold, making it possible for people to comfortably "shelter in place" until power is returned. Improving our homes to withstand extreme weather events is an essential strategy for climate change adaptation (while providing lower utility bills and other benefits)

High Surface Water levels: This property lays to the west of the Little River channel. To reduce risk from overland flow in the event of the Little River reaching its 1:100 year water surface elevation, the building floor elevations will be at least 0.3m higher than the 1:100 year water surface elevation.

Extreme Precipitation Events: Storm water modelling of the site was completed for various intensity storms including the Urban Stress Test (Climate Change Storm). The final site design includes consideration for overland flow routes towards the Little River, under the Climate Change Storm, to minimize impacts on the property and neighbouring sites. To minimize the risk from sanitary sewer back-ups, backflow preventers will be installed.

Additional Supports for Authors

If you need additional supports, please feel free to reach out to the Environmental Sustainability and Climate Change Team for guidance.

Meraal Yared Sustainability Coordinator myared@citywindsor.ca 519-253-7111 x 3290 (General guidance)	Kyle Bassett Community Energy Plan Administrator kbassett@citywindsor.ca 519-253-7111 x 3224 (Climate Change mitigation lead)	Karina Richters Supervisor, Environmental Sustainability and Climate Change krichters@citywindsor.ca 519-253-7111 x 3226 (Climate Change adaptation lead)

This guidance document will further be refined based on feedback from report authors, as the intent of the Environmental Sustainability and Climate Change Office is to make this section as easy to complete as possible, while addressing Climate Change risks. We appreciate any feedback from your areas.

References

All Climate Change Master Plans can be found on the City of Windsor website:

Climate Change Mitigation Plans

Community Energy Master Plan (2017)

Corporate Climate Change Action Plan (2017)

Corporate Energy Management Plan (2019)

Climate Change Adaptation Plans

Degrees of Change, Climate Change Adaptation Plan (2020)

Climate Change Adaptation Plan (2012)

Related Climate Change Adaptation Studies

Climate Change Impacts in Windsor – A Technical Document (2020)

Temperature Related Studies

Urban Heat Island Effect in Windsor, ON: An Assessment of Vulnerability and Mitigation Strategies (2012)

Improving Thermal Comfort in Windsor, ON; Assessing Urban Parks and Playgrounds (2013)

High Water Level Studies

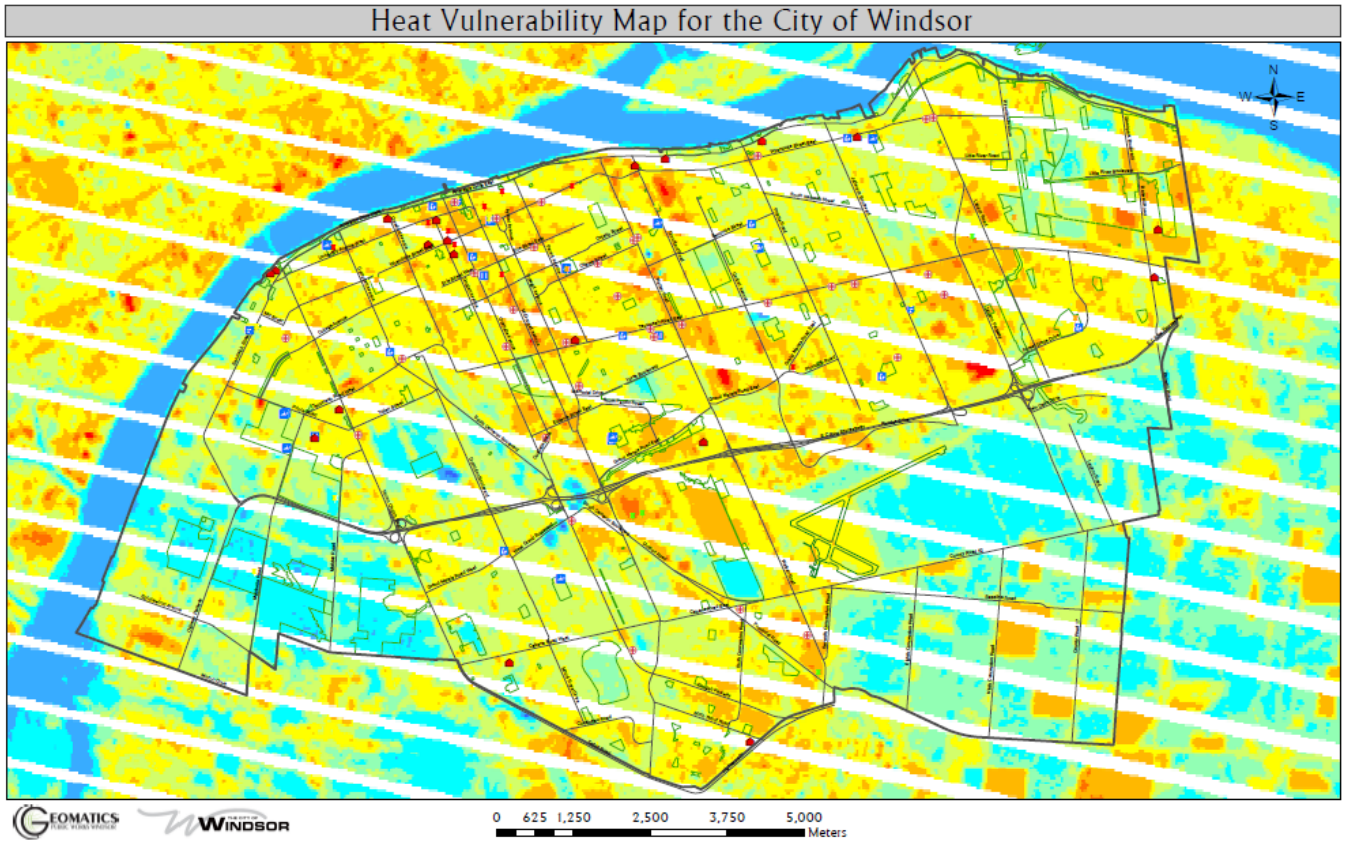
East Riverside Flood Risk Assessment (2019)

Precipitation Events

Sewer Master Plan is under development, details are provided on weatheringthestorm.ca

Appendix A
Supporting Maps

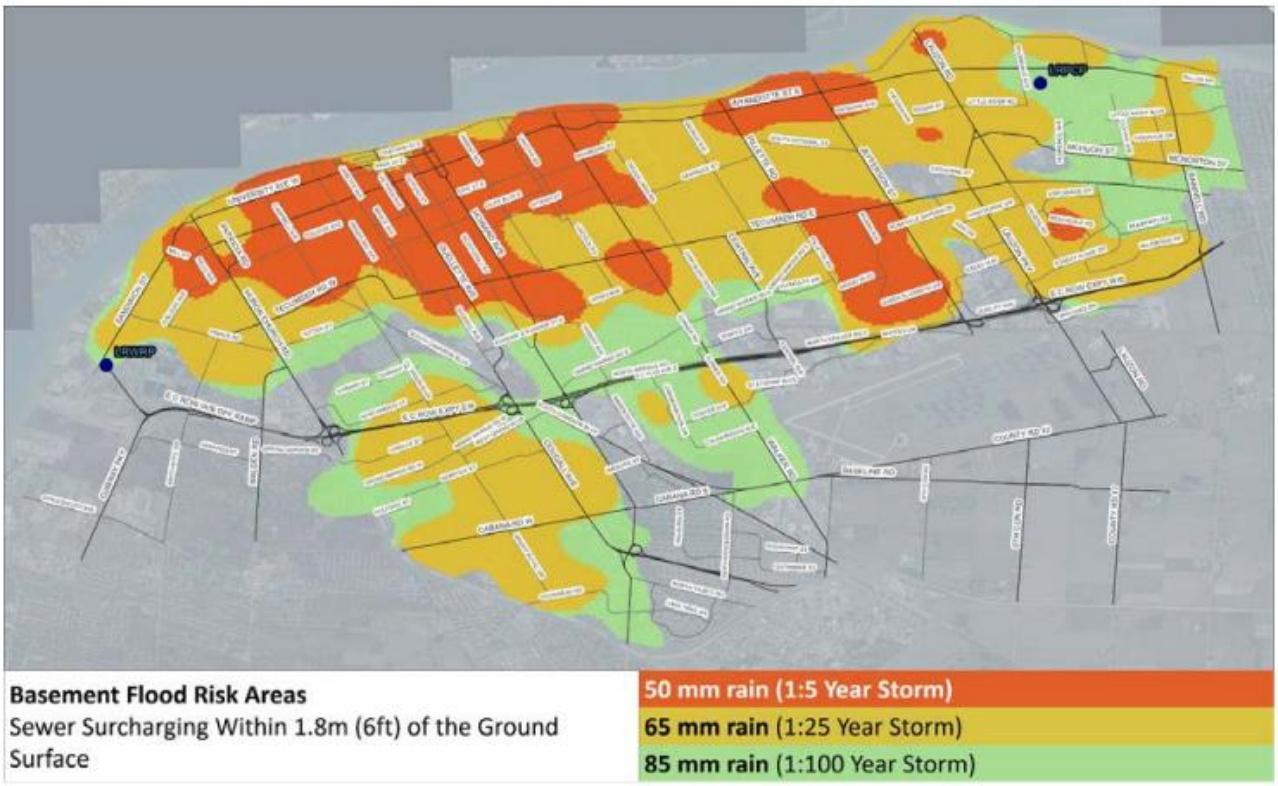
Map A: Urban Heat Island Map



Source: [Urban Heat Island Effect in Windsor, ON: An Assessment of Vulnerability and Mitigation Strategies] (2012)

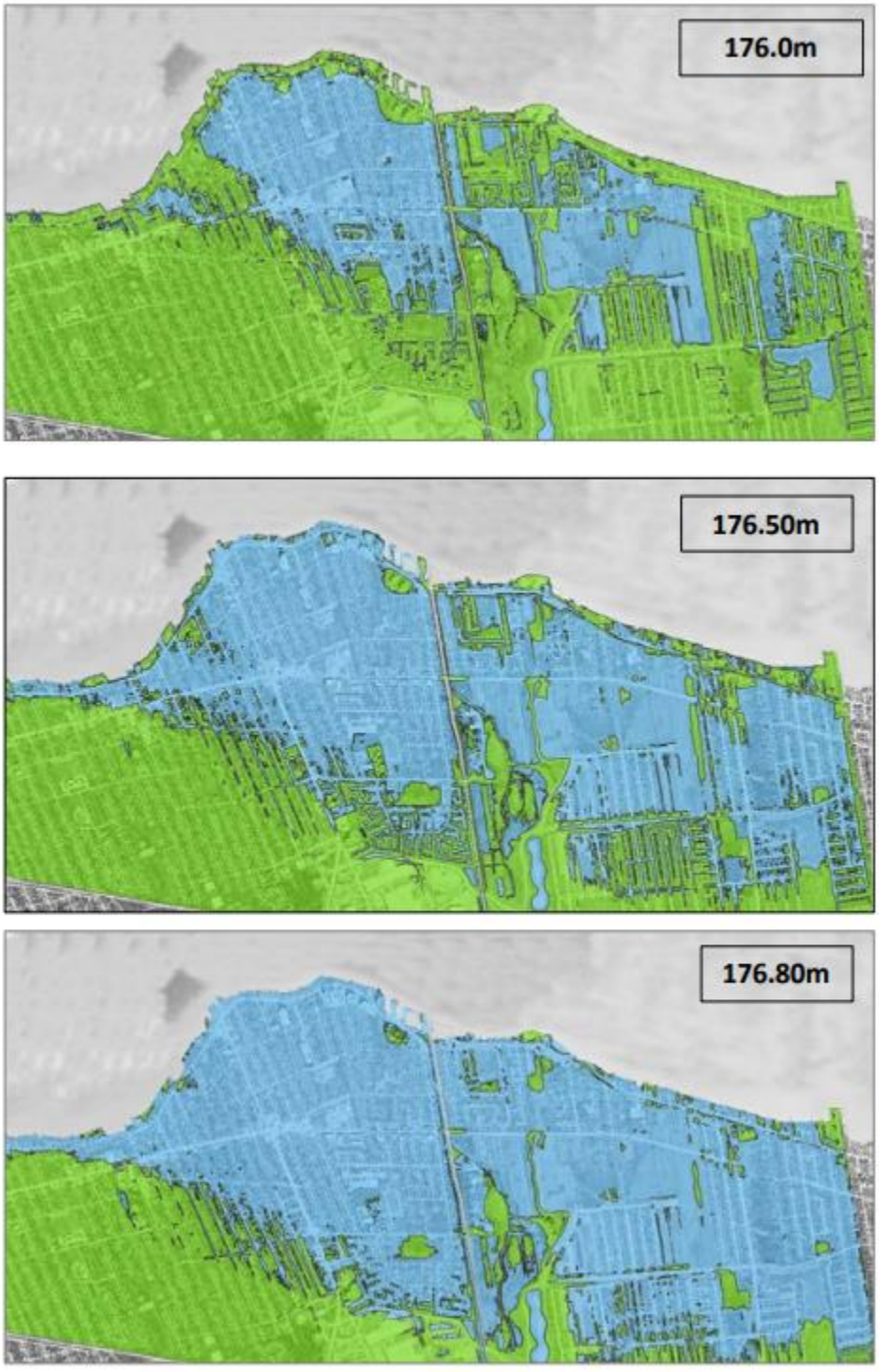
Note: red represents higher surface temperatures, while the blue areas represent cooler surface temperatures.

Map B: Basement Flood Risk Areas under Extreme Precipitation Events



Source: Sewer Master Plan Public Information Panels (2020)

Map C: High Detroit River/Lake St. Clair Levels



Source: Sewer Master Plan Public Information Panels (2020)