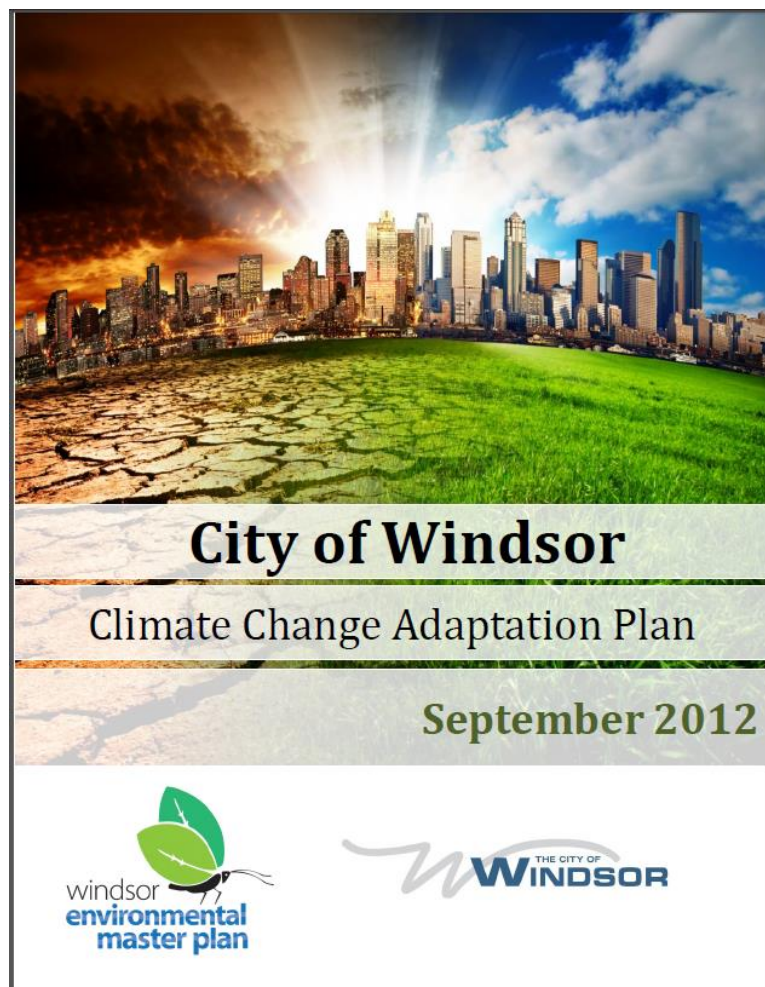


City of Windsor: Implementing Resilience Actions

Karina Richters
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Climate Change Adaptation 2012



Summary:

- 22 Adaptation Actions
- Focused on Extreme Precipitation/Heat
- By 2018 – 18 of 22 Actions underway or completed

Continual Improvement of the Climate Change Plan:

1. Incorporate climate change adaptation into city policies and high level plans
2. Create internal mechanisms to 'ask the climate question' for new major infrastructure projects
3. Monitor climate change, evaluate the effectiveness of adaptation strategies and adjust as needed
4. Use best available science to analyze how the climate is changing locally and how this may impact the community.
5. Routinely review the City of Windsor's vulnerability to climate change.
6. Continuously conduct risk assessments to identify priority impacts requiring adaptation actions.
7. Engage the public, business and stakeholder groups.

Room for Improvement:

- Community Involvement
- Indicators/Measurements
- Other Impacts

Tornado, Flooding and more...Oh my!



City of Windsor offers cooling centre during heat wave



The announcement comes after the Windsor-Essex County Health Unit issued an extended heat warning.

CBC News - Posted: Jul 02, 2020 9:22 PM ET | Last Updated: July 2



The atrium of the Windsor International Aquatic and Training Centre at 401 Pitt St W will act as the temporary cooling centre. (CBC File Photo)



Windsor-bound Highway 3 reopened after heat damage repairs

A section of Highway 3 in Essex County was closed Sunday

CBC News - Posted: Jul 02, 2018 11:35 AM ET | Last Updated: July 2



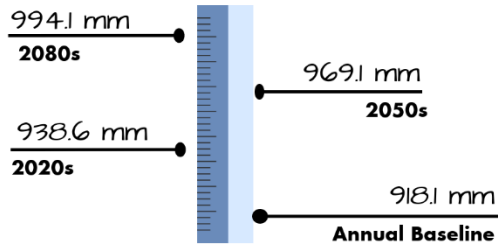
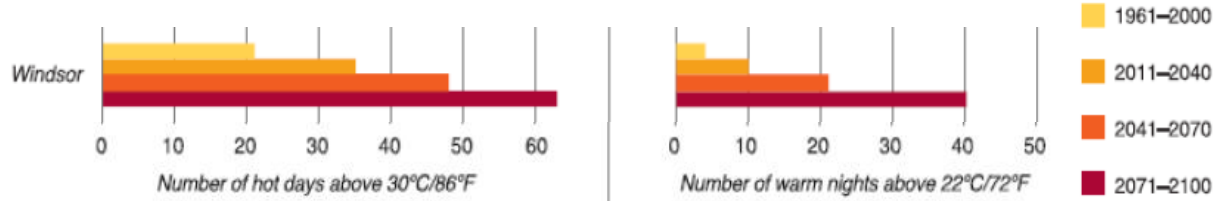
The asphalt on Windsor-bound Highway 3 was repaired by Monday morning. (Collin Côté-Paulette/CBC)



Windsor's Changing Climate



WARMER

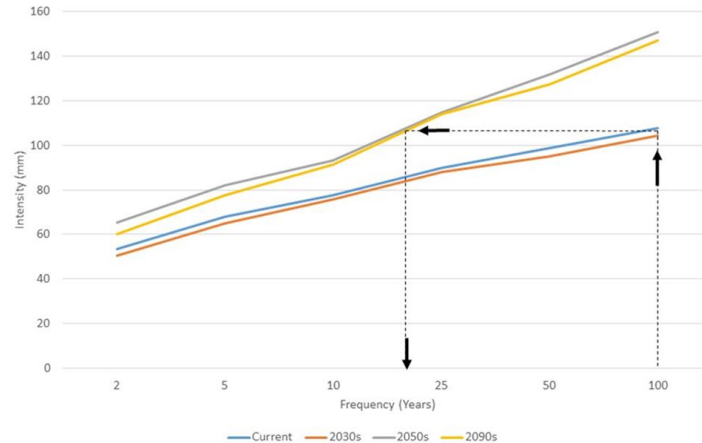


ANNUAL MEAN PRECIPITATION

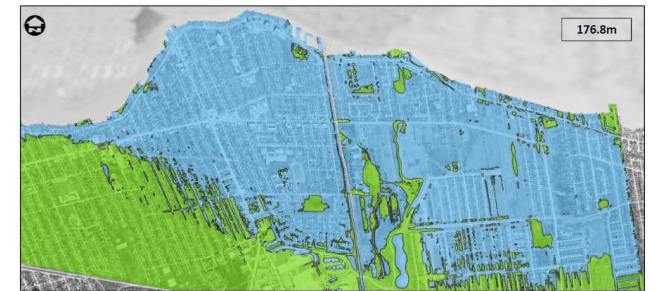
Annual precipitation is expected to increase. Winter and Spring are projected to get significantly wetter, with a slight decline in the Summer.

WETTER

Current and Future IDF projections
24-Hour



A 1-in-100 year storm today is projected to be 1:20 year storm by mid-century.



WILDER



City Response Costs since 2016



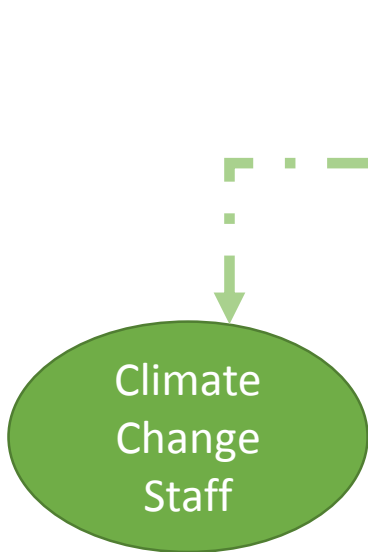
Events	Total Response Costs
2016 Tornado	\$101,109
2016 Flood	\$285,674
2017 Severe Winds	\$ 70,546
2017 Flood	\$1,690,086
2018 Wind Storm	\$338, 510
2019/2020 High Water Levels	\$649,882
Total	\$3,135,807

\$235M+ Insured Losses within the Community!

Cost to reconstruct City owned Marina	\$4,225,000
Emergency Repairs to Peche Island Shoreline	\$2,500,000



Adaptation Planning Consultation



Corporate

- | | |
|-------------------|-----------------|
| Recreation | Fire |
| Pollution Control | Planning |
| Finance | Parks/Forestry |
| Communications | I.T. |
| Facilities | Operations |
| HR | Building |
| By-Law Enf. | Engineering |
| Asset Planning | Transit Windsor |
| Transportation | Community Devel |

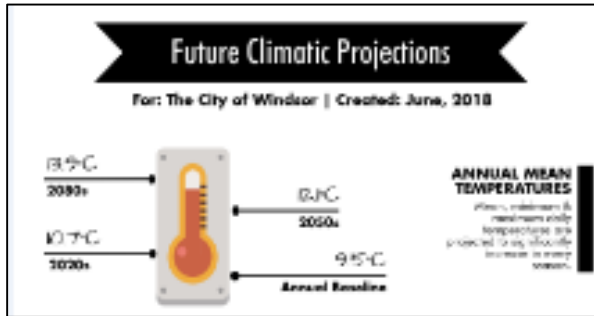
Community Task Force

- | | |
|-------------------|------------------|
| ERCA | Health Unit |
| First Nations | University |
| County of Essex | Port Authority |
| College | Comm. Housing |
| Immigration Part. | School Boards |
| DRCC | Downtown Mission |
| Naturalists | CEA |
| Local Hospitals | ENWIN |
| Red Cross | Enbridge |
| Tourism W/E | |

Development of Degrees of Change was facilitated by the City’s participation in ICLEI Canada’s Adaptation Changemakers project. Financial assistance from the Government of Canada and FCM.



Meetings – Everyone Involved!!!



Meeting #1: Climate Science



Meeting #2: Identifying Impacts



Meeting #3: Vulnerability



Meeting #4: Risk Assessment

- Adaptation Action**
- ✓ Climate Change Adaptation Plan (2012)
 - ✓ Rediscover Our Parks the City's Parks and Outdoor Recreation Master Plan (2015)
 - ✓ Integrated climate change planning into Asset Management
 - ✓ Health Unit Partnership to monitor for West Nile and Lyme Disease

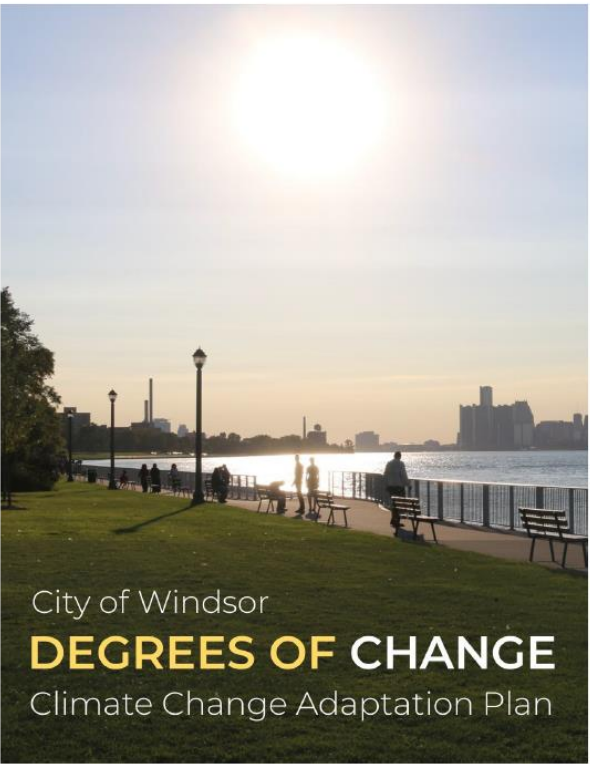
Meeting #5: Brainstorming Adaptation Action



Meeting #6: Reviewing Draft Plan

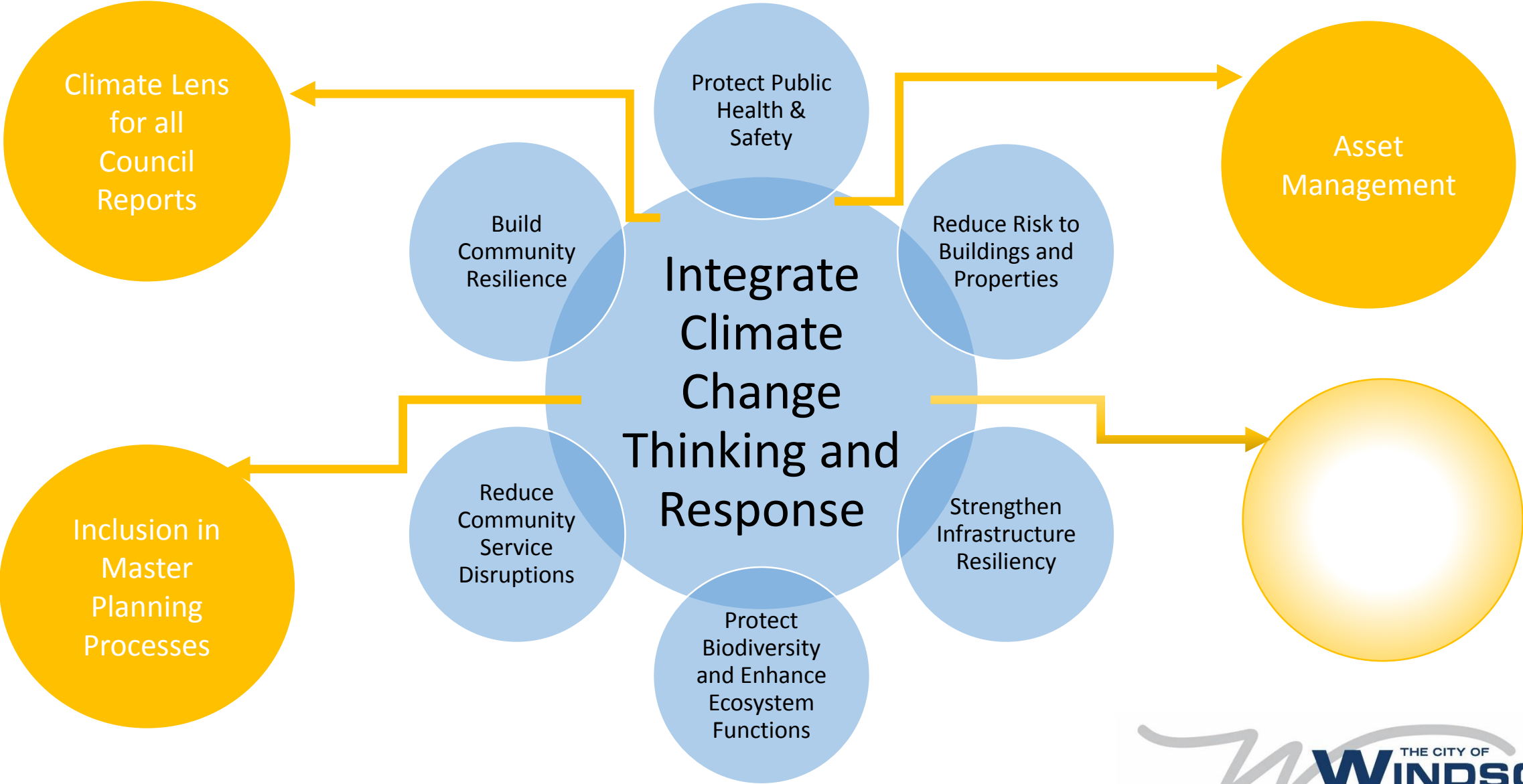


Windsor's 2020 Adaptation Plan

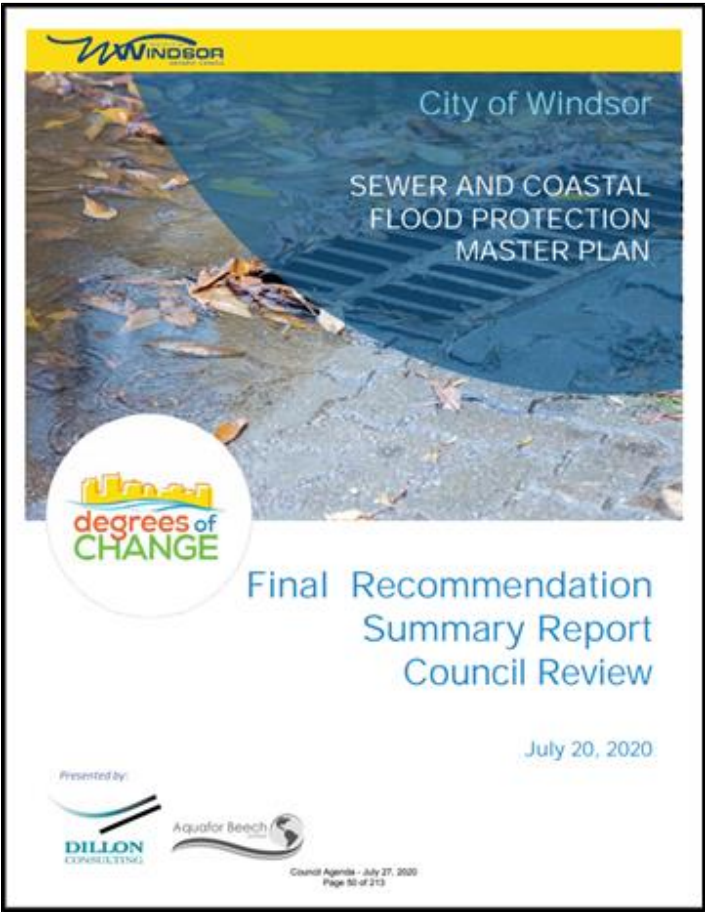


More extreme weather events increasing the health and safety risk to the community	An increase in extreme precipitation leading to basement flooding	Increasing intense storms impacting tree canopy through stress and damage	An increase in extreme heat causing health issues
An increase in extreme weather causing a diversion of resources	Increasing summer temperatures will cause a decrease in air quality	Increasing temperature increases risk for vector borne disease and new infectious disease	Increasing winter precipitation leading to an increase in risk of ice conditions
An increase in water levels leading to overland flooding of the Detroit River/Lake St. Clair	Increasing intensity of storms leading to damage to infrastructure, power outages, safety and additional clean up costs	An increase in extreme precipitation leading to an overwhelming of City infrastructure	Increase in winter and spring temperatures leading to quicker thawing and snowmelt contributing to overland flooding
An increase in annual temperatures can increase plant pests, disease and invasive species	An increase in rainfall and temperature causing an increase in algae growth	An increase in summer temperatures increasing energy demand	An increase in winter temperatures will reduce the length of time outdoor ice rinks can operate
Increase in extreme hot days leading to infrastructure wear and tear		Increase in extreme hot days and summer drought causing stress on landscaping and park lands	Increasing precipitation leading to closure of recreational amenities

Objectives and Supporting Mechanisms



Sewer and Coastal Flood Protection Master Plan



**\$4.9 Billion
Implementation Plan**

Historical 311 calls to Report Flooding

Year	# of Flooding Calls
2010	2,320
2011	660
2012	32
2013	217
2014	911
2015	
2016	2,850
2017	5,982
2018	676
2019	264
2020	530

Number of Flood Messages issued by ERCA

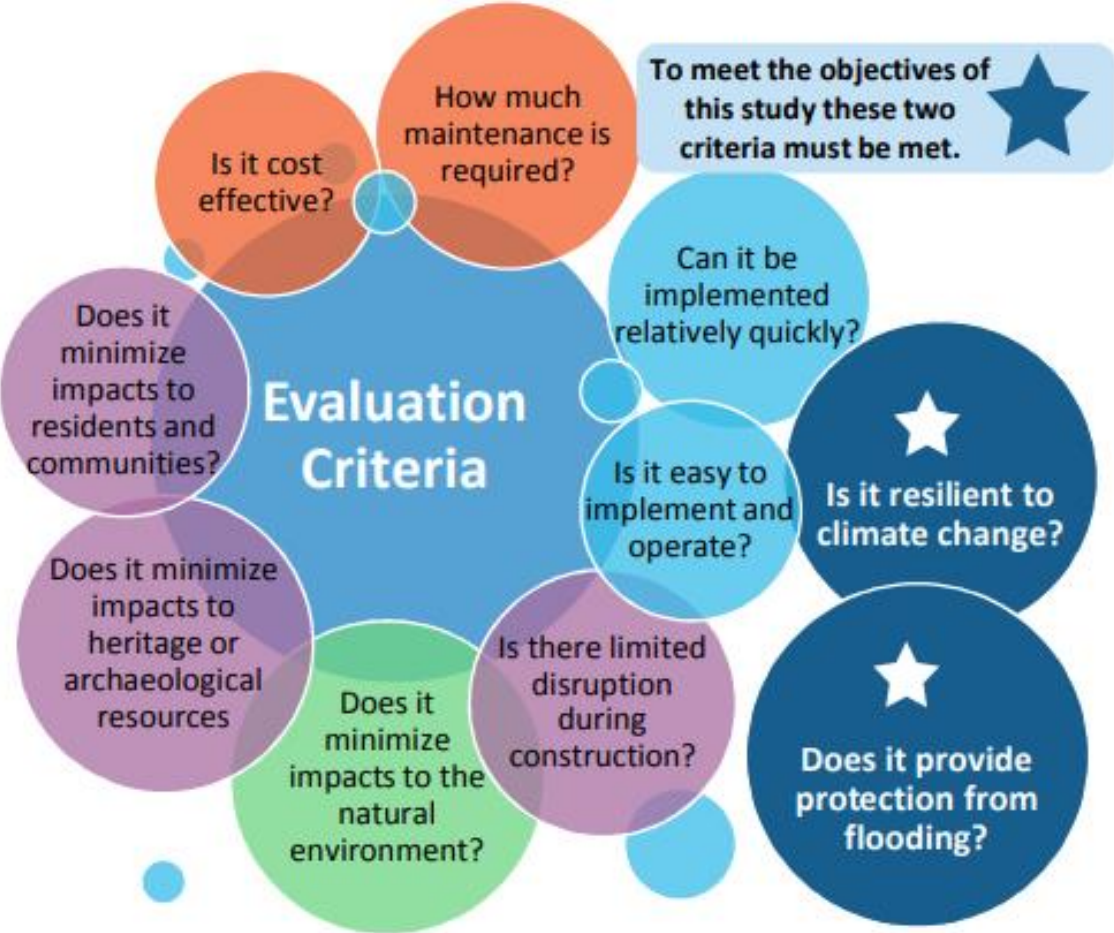
	2016	2017	2018	2019
Watershed Conditions Statements – provide flood outlook (an early notice of potential for flooding based on heavy rain, snow melt, etc. and water safety information.	2	17	17	13
Flood Watches – there is potential for flooding	7	15	21	23 (189 days)
Flood Warnings – flooding is imminent or already occurring	2	5	13	11



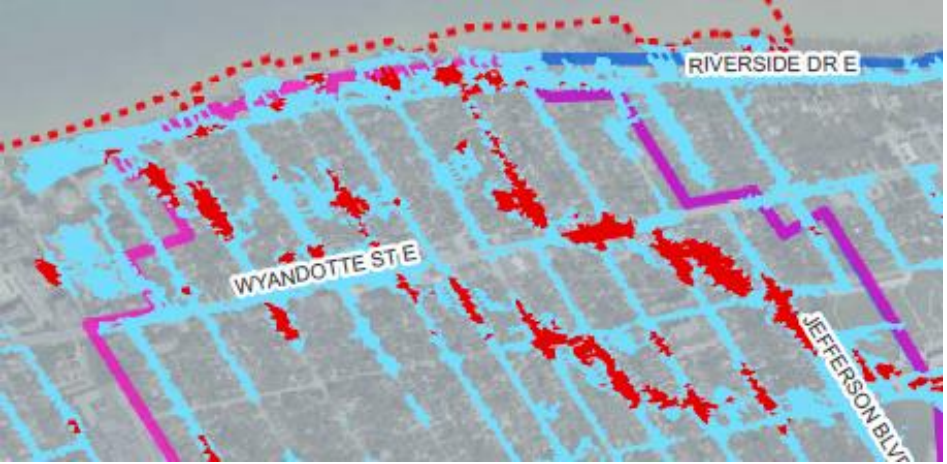
Sewer Master Plan – Evaluation of Alternative Solutions



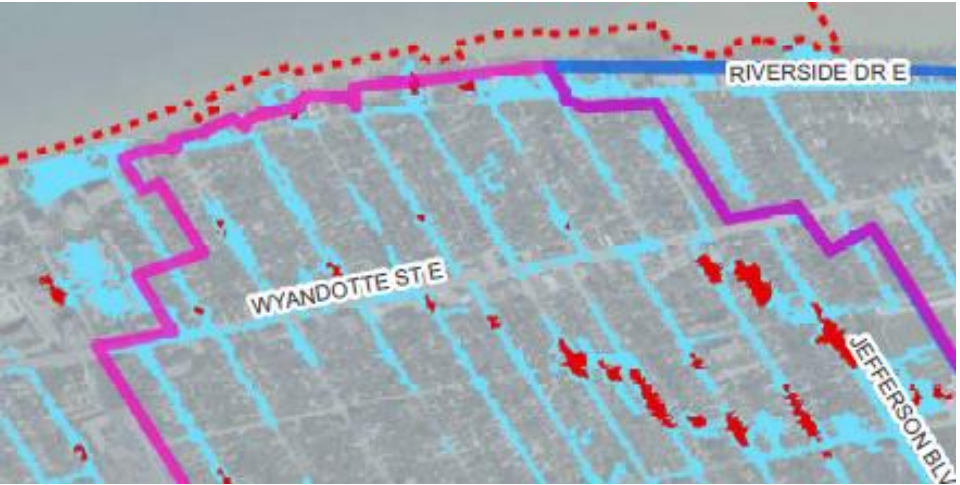
Evaluation of Alternative Solutions



Climate Change Storm before improvements



Climate Change Storm after improvements




Private Properties: Basement Flooding Subsidy Program

100% up to \$2,800 per Home:

- Backwater valve
- Sump pump with sump pump overflow and disconnect floor drains
- Dye testing/camera

	2012	2013	2014	2015	2016	2017	2018	2019
# of Applications Received	576	443	579	437	1158	5100	2200	1605
# of Subsidy Payments Issued	380	289	403	299	781	2121	535	694



Basement
Flooding
Protection
Subsidy
Program

2020

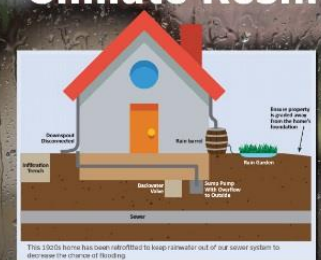
To assist homeowners, on May 3, 2011 Windsor City Council approved a Basement Flooding Protection Subsidy Program (BFSP). The BFSP is a program to assist homeowners by way of a financial subsidy to install a sump pump and/or back-water valve (flood protection devices). For further information about this program and how to apply, please read the enclosed information.

Program Information and Application

Also: Free Downspout Disconnection Program

Private Properties: Climate Resilient Home

Creating a Climate Resilient Home



Climate Change is the biggest threat to our quality of life. It is caused by an increase in greenhouse gas emissions. The average temperature has increased by approximately 1°C since 1950, and it is projected to increase by 2.5°C to 3.7°C by 2050. This increase in temperature will lead to more frequent and severe weather events, such as droughts, heat waves, and heavy rain. The City of Windsor is committed to reducing greenhouse gas emissions and is encouraging residents to take steps to reduce their carbon footprint. One of the most effective ways to do this is by creating a climate resilient home.

Projected Climate Change Impacts by 2050 in Windsor:

Increase in annual temperatures	2.5°C to 3.7°C
Increase in annual total precipitation	4 to 5.6 in
Extreme rainfall events	10% per decade until 2050

The best source from Environment & Climate Change Canada and other sources shows temperature rise: 2.6°C to 3.7°C

This 1200sq home has been retrofitted to keep rainwater out of our sewer system to decrease the chance of flooding.

For more information, please visit www.cityofwindsor.ca

Backflow Sanitary Valve & Sump Pump With Overflow


Backwater Valves

Backwater sanitary valves (also known as "check valves" or "backwater valves"), are mechanical devices that are designed to allow the flow of water in one direction only away from your home. Used on a sanitary sewer, they can decrease the risk of sewage backup if installed properly and maintained appropriately.




Sump Pumps

Water from around the foundation of a home drains to a sump tank. A pump is then used to pump this water into the sewer, or outside or storm. Discharging the extra water to the outside keeps it out of the sewer reducing the risk of flooding being sent seaward.



For more information, please visit www.cityofwindsor.ca

Urban Forestry Benefits of Trees



Social

- Urban forestry suggests improved mental and physical health including:
 - Reducing stress;
 - Improved quality of life.

Economic

- Trees properly placed around buildings can reduce air conditioning needs by 30% and can save 20-30% in energy costs for heating.
- Mature trees increase usability of homes.
- Landscaping, especially trees, can increase property values by as much as 30%.

Environmental

- Trees reduce air pollution by filtering out airborne pollutants;
- Trees reduce stormwater pollution;
- Trees reduce the impact of the urban heat island effect: Large trees for example can reduce ambient temperatures by 3°C;
- Trees reduce the amount of stormwater entering sewers.

Source: Ontario Urban Forest Council, TD Economics

For more information, please visit www.cityofwindsor.ca

Downspout Disconnection & Rain Barrels

How to Disconnect Your Downspout



Connected downspouts on your house direct rainwater into your outdoor drainage system. If the water in your sewer lines causes them to back up, resulting in basement flooding. Disconnecting downspouts from your foundation drains and channeling rainwater into your lawn, garden or rain barrel reduces the amount of rainwater entering our sewer system during storms.

Disconnected downspouts must be directed away from your home or a neighbouring property. Do not direct rainwater onto concrete or asphalt surfaces because in the winter this water can freeze and result in a slip and fall hazard.

The City of Windsor provides free downspout disconnection services. Call 311 for more information and to book an appointment.

Rain barrels can be installed on a disconnected downspout. The rainwater can then be used to water gardens, cover your driveway or other uses.

For more information, please visit www.cityofwindsor.ca

Stormwater Solutions Rain Garden

What is a Rain Garden?

A rain garden is a shallow depression in your yard that collects and absorbs rainwater from your roof, driveway, or sidewalk. It is a natural way to manage stormwater and reduce the amount of rainwater that enters the sewer system. Rain gardens are also a beautiful addition to your yard.



How to Create a Rain Garden

- Select a Site
- Design and Prepare
- Dig and Plant

For more information, please visit www.cityofwindsor.ca

Stormwater Solutions Infiltration Trenches



What is an infiltration trench?

Infiltration trenches are one of a number of different low impact development (LID) techniques. LID is a comprehensive stormwater management strategy that helps decrease the chance of flooding and stormwater pollution by keeping rainwater out of our sewer system.

Rainwater from this house's roof and from the storm drain is directed toward the infiltration trench. The infiltration trench provides the water time to infiltrate into the ground keeping the stormwater out of the combined sewer.

Benefits:

- Reduces runoff to the combined sewer reducing the risk of the sewer overflowing;
- Reduces the chance of combined sewer overflows (because pollution to the street is less).

For more information, please visit www.cityofwindsor.ca

Private Properties: Public Education



YouTube: Wastewater: Where Does it go?



DURING RECENT SEWER MAINTENANCE, CITY OF WINDSOR CREWS FOUND:

- Fat, Oil & Grease (FOG)
- Wipes
- Other: _____

in a sewer in your area.

Sewer lines clogged with a build up of wipes, personal care products, and FOG contribute to sewer backups. Human waste and toilet paper are the only materials that should be flushed down the toilet.

The City of Windsor needs everyone to do their part to help maintain the sewer system to prevent costly excess repairs and maintenance and reduce the risk of basement flooding.

Did you know? The City is responsible for the maintenance of over 1,700 km of sewer lines.

How to properly dispose of
All wipes, paper towels must be placed in the garbage for disposal. Only Toilet paper can be flushed in the toilet.

TOILETS ARE NOT GARBAGE

DO NOT FLUSH
Even if they say flushable - they don't!

Diapers Wipes Medicine Paper Towels

HOW TO DISPOSE OF FATS, OILS AND GREASE (FOG)?

Residential FOG occurs as a result of cooking/preparing food in our kitchens.

Pour cooled FOG into a container. Store in your fridge or freezer until full or ready for disposal. Put full cups into the garbage or take to the Household Hazardous Waste Depot.

FOG cups are available at most City community centres and libraries. But any container can be used (example an old coffee take out cup or empty bottle).

your turn
Make a Difference

THE CITY OF WINDSOR
ONTARIO, CANADA

For more information, visit www.citywindsor.ca and search Flushable wipes and Your Turn FOG Cups

To learn more about the City of Windsor's sewer system search "Waste Water Where Does it Go" on YouTube.

IMPORTANT INFORMATION FOR YOUR HOUSEHOLD

Recent sewer upgrades on your street include the use of Low Impact Development (LID) features. These features help to manage stormwater runoff as part of green infrastructure, and they mimic natural processes by increasing infiltration and evaporation and reducing runoff volumes and flow rates.

Examples of LID practices include increased perviousness, downspout disconnection, rainwater harvesting, grassed swales, green roofs, bioswales and exfiltration trenches (as shown below). Other benefits of LID practices include filtration of pollutants, improves downstream surface water quality, and reduces water-related infrastructure damage.

LID features are connected to your stormwater system located on your street. The City of Windsor is asking that you help maintain the efficiency of the system by following these simple instructions.

DO YOUR PART TO PROTECT OUR INFRASTRUCTURE:

JUST RAIN DOWN THE DRAIN

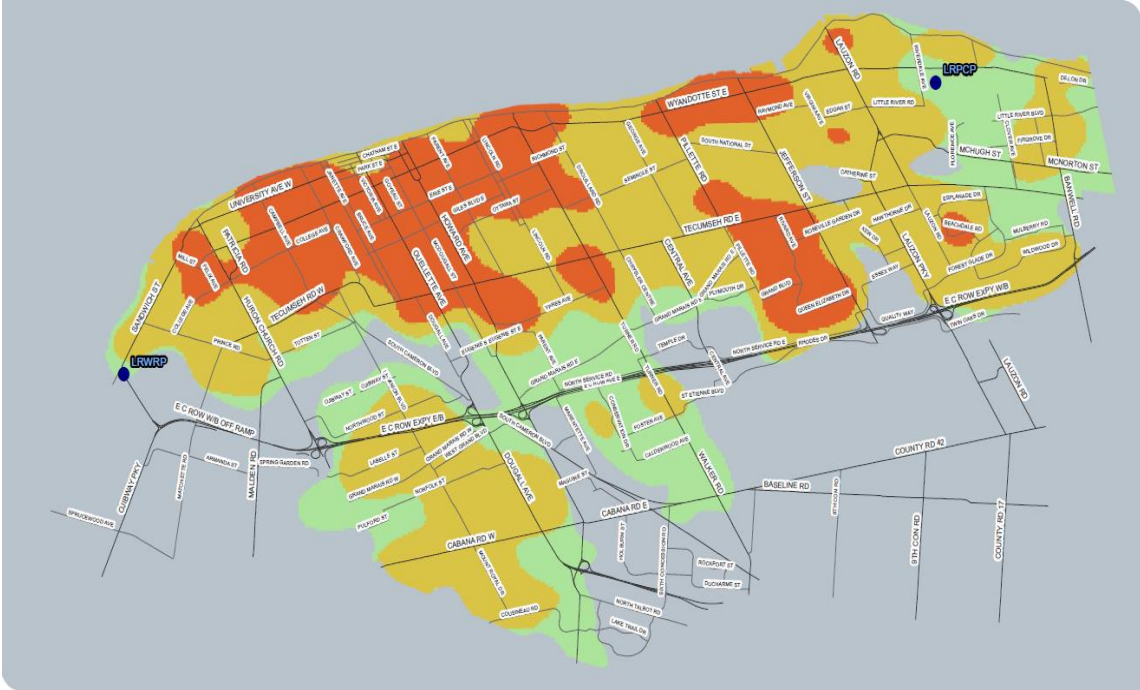
Only rainwater should be going down the catch basin. Removing items from the curb and gutter in front of your home can help prevent clogging of the system. Please ensure:

- Leaves are bagged for yard waste pickup
- Litter is picked up and disposed of properly (recycling or garbage)
- Grass and leaves are not pushed onto the road

For more information, visit www.citywindsor.ca and search Low Impact Development

THE CITY OF WINDSOR
ONTARIO, CANADA

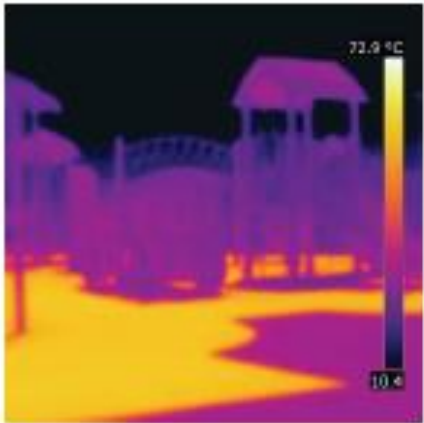
The Cost of Doing Nothing



Impact Basement Flooding Due to Extreme Precipitation	
Current (2050 Future) Storm Intensity	Future Possible Cost
1:5 (1:3)	\$ 961,652,000
1:25 (1:8)	\$ 2,377,212,000
1:100 (1:20)	\$ 2,937,158,000
Impact of High Water Levels	
Water level (m)	
176	\$ 171,183,000
176.5	\$ 302,161,000
176.8	\$ 339,270,000



Investigating Parks for Thermal Comfort (Extreme Heat)



Site Conditions	Temperature °C (°F)
Naturalized areas beside water, medium shade	22.8 (73)
Vegetation beside water, no shade	40.0 (104)
West asphalt sidewalk, no shade	45.6 (114)
Sand underneath play structure, no shade	45.5 (114)
Dark rubber mat under play structure, no shade	71.6 (161)

Temperature: 22 °C (71.6 °F), Winds 12 km/hr,
humidity 67%, Sunny, no cloud cover

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



Susan Blanchard

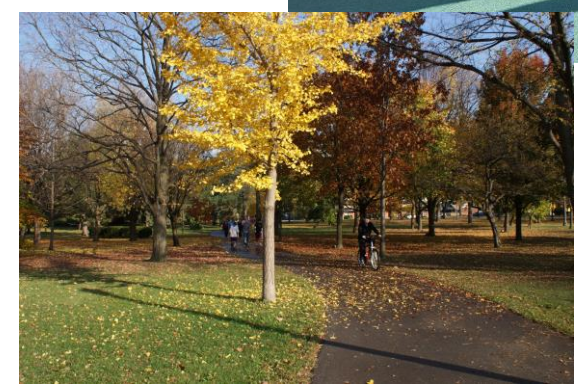
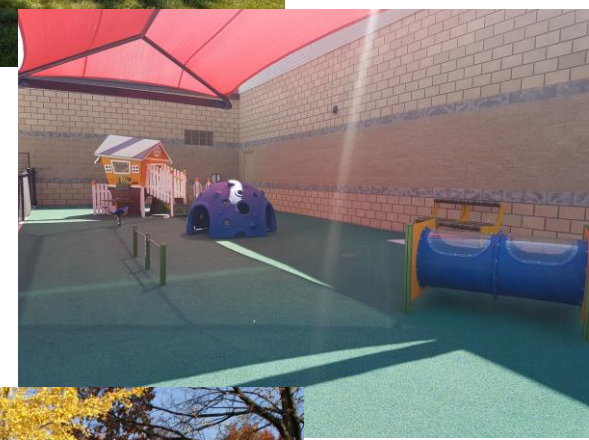
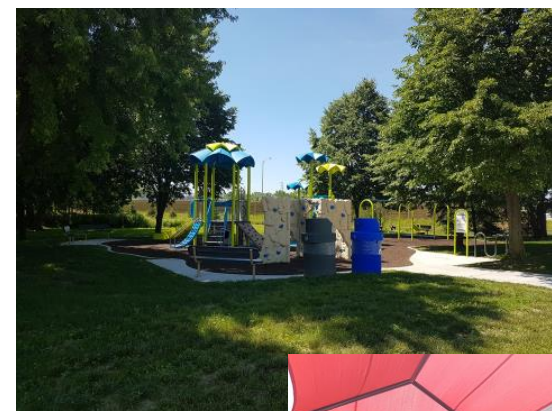
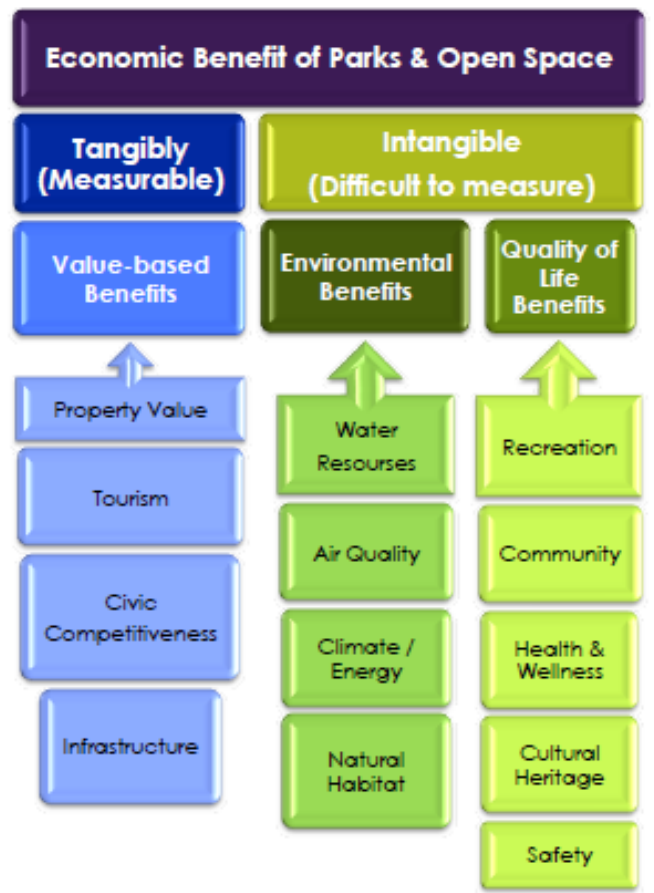
Report Prepared for the City of Windsor

August 2013



Climate Change and City Parks

Parks Master Plan



Green Infrastructure





Questions?

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www.windsorenvironmentalmasterplan.ca

