



Unflood Ontario

FLOODING IN OSHAWA



Unflood Ontario

ABOUT US

Unflood Ontario. Together, Naturally.

Our name is our mission: reduce flooding through natural infrastructure.

A project of Community Foundations around Lake Ontario, we build public demand for Natural Infrastructure and promote its many benefits.

Learn about solutions, engage with your community, and take action.

Join us.

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1. INTRODUCTION

The harm caused by flooding goes beyond just dealing with water in the basement. People's valued possessions are ruined. Their insurance costs go up. Their anxiety levels spike every time the weather forecast calls for heavy rains. They worry about increased property taxes to deal with the damage done to public infrastructure like washed out roads. And their life is at risk. The fact is flooding harms us all.

Unfortunately, things will only get worse as climate change brings us more severe weather events including more frequent and heavier rainfall to cities across Southern Ontario.

Canadians are becoming increasingly apprehensive about how climate change will affect them and their communities. Unfortunately, with each passing year and rise in temperature, the effects of climate change on Canada's cities and towns are becoming ever more apparent.

One of the main concerns for Canadian municipalities in regards to climate change is flooding. This is due to the increasing precipitation and the intensity of that precipitation.

For the City of Oshawa, residential overland flooding is a major concern for residents and businesses alike. Over the last five years, Oshawa has received record rainfalls, resulting in several severe occurrences of flooding, with 2019 having a record number of flood messages warnings issued by the Central Lake Ontario Conservation Authority (CLOCA), many due to Lake Ontario shoreline flooding.

In this report, we outline the new reality of flooding in Oshawa. We summarize the work done to model flood threats by the Conservation Authority and make recommendations on how the City of Oshawa can work to prepare for and mitigate flooding. It identifies who is at risk and what people and governments can do to reduce this risk.



2. FLOODING IN OSHAWA

In southern Ontario, climate change means not just warmer weather but more precipitation and less snow and more rain. As well, the amount of rain falling during a severe rainfall is increasing: more rain per hour. That means that the occurrence of “100-year floods” are becoming more frequent.

As the frequency of severe floods increases, the risk to homes situated in flood-prone areas rises as well. While the possibility of a 100-year flood is alarming enough, an additional problem lies in the fact that many people are not aware their home sits on a flood-prone area and the potential threats they are facing.

The Conservation Authority monitors and reports on risky and unsafe water level conditions: CLOCA issues special messages warnings when conditions start to become unsafe, up until there is flooding occurring.

CLOCA categorizes its flood warning system as follows:

NORMAL

No flood conditions exist.

WATERSHED CONDITIONS STATEMENT - WATER SAFETY

High flows, unsafe banks, melting ice or other factors that could be dangerous for recreational users such as anglers, canoeists, hikers, children, pets, etc. Flooding is not expected.

WATERSHED CONDITIONS STATEMENT - FLOOD OUTLOOK

Early notice of the potential for flooding based on weather forecasts calling for heavy rains, snow melt, high winds or other conditions that could result in high runoff or ice jams, lakeshore flooding or erosion.



FLOOD WATCH

Flooding is possible in specific watercourses or municipalities. Municipalities, emergency services and individual landowners in flood-prone areas should prepare.

FLOOD WARNING

Flooding is imminent or already occurring in specific watercourses or municipalities. Municipalities and individuals should take action to deal with flood conditions. This may include road closures and evacuations.

Table 1 summarizes the various flood messages warnings issued by the Conservation Authority over the last few years. Perhaps not surprisingly given climate change, the number of warnings have risen substantially over that time period.

Table 1: Precipitation and Flood Events in Oshawa and Durham Region¹

Year	Annual Precipitation in Oshawa, Ontario	CLOCA flood communications
2016	647 mm (25 in)	6 Watershed Conditions Statements; No severe flooding events
2017	943 mm (37 in)	7 Watershed Conditions Statements; 4 Flood Watch; 4 Flood Warning ²
2018	836 mm (33 in)	14 Watershed Conditions Statements; No severe flooding events
2019	867 mm (34 in)	14 Watershed Conditions Statements; 5 Flood Watches; 3 Flood Warnings ³



Lucy Benham is a senior water resources engineer at Central Lake Ontario Conservation Authority (CLOCA). She is involved in monitoring water levels around the City of Oshawa. In an interview published in the Durham College Chronicle, she says: "The recurrence of an event that previously would occur once in 100 years or have a one per-cent chance of taking place in any given year may go up."⁴

In 2017, CLOCA published a report that ranked flood prone lands within CLOCA's jurisdiction by low, medium or high risk. "By identifying our flood damage centers, we pinpoint where possible future improvements can be made."⁵

CLOCA monitors extreme conditions including rain forecast. Benham says they are constantly looking at how the future forecasts will affect conditions on the ground.

"If we feel that there's a potential for flooding, we send out messages," she says. "Those messages go to the media, to our municipal partners, the region of Durham, emergency services, police services, and schools as well. It's just trying to give some early warning of possible flooding."⁶

"The City of Oshawa [incorporates] floodplain maps into zoning as well as the official plan," says Patricia Lowe, director of community engagement at CLOCA.⁷

Benham says one of the best ways homeowners can get informed is by contacting their office about the property when they are purchasing it. CLOCA can provide them with a map outlining the relevant flood lines. The service is free.

"We are working towards getting the flood lines online and available but have some concerns with how that information is interpreted," she says. "If someone comes here and obtains the map, we can talk to them and explain what that means and how to apply it to their property."⁸



3. FLOOD DAMAGE CENTERS

"Flood Damage Centers" are areas where the Conservation Authority has identified a significant risk of potential for damage to property and human life in the event of a severe flood. Specifically, CLOCA defines Flood Damage Centers as:

"An area consisting of residential, commercial and/or institutional development that is adjacent to a creek and prone to flooding that endangers the safety and welfare of people, or threatens to damage public and/or private property. These Centres are determined using the floodplain mapping developed by CLOCA for each of its watersheds."⁹

Flood-vulnerable areas are modelled using estimations from previous severe weather events, namely Hurricane Hazel and the event of a "100-year flood." The level of risk within a flood damage centre is calculated using three variables:

1. Flood Damage Center (FDC) Vulnerability
2. Flood Event Likelihood
3. Impact

Impact is calculated considering four variables: social, economic, business, and environmental.



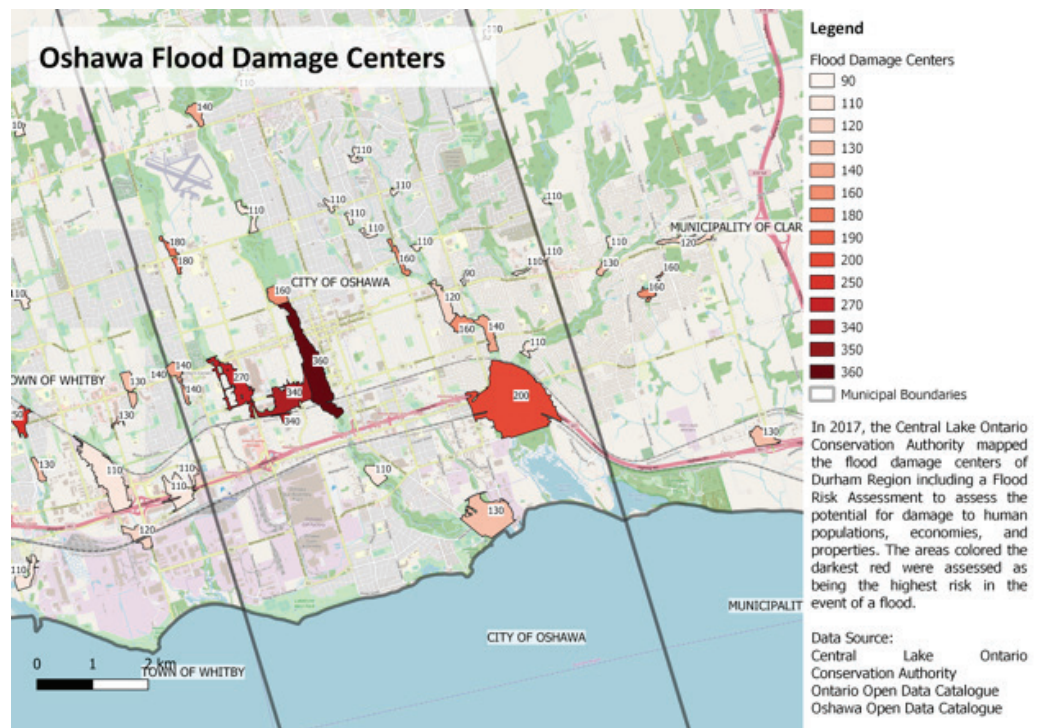
Using these metrics, a Flood Risk Score is calculated. In this context, a score of 90 indicates low risk, whereas a score of 360 indicates a very high risk. Scores are calculated in such a way that concern for public safety is prioritized.

According to the Conservation Authority,

“An FDC’s vulnerability was assessed by determining how susceptible structures/ properties are to damage during a regulatory flood, and whether public safety may be at risk.”¹⁰

Oshawa’s watersheds are modelled using Hurricane Hazel as the standard for a “regulatory flood” in order to take into account the potential risks. FDCs do not necessarily represent areas where severe flooding has already occurred, rather they are a tool used to prepare for and mitigate flooding in high potential damage areas.

Map 1: Flood Damage Centers in Oshawa¹¹

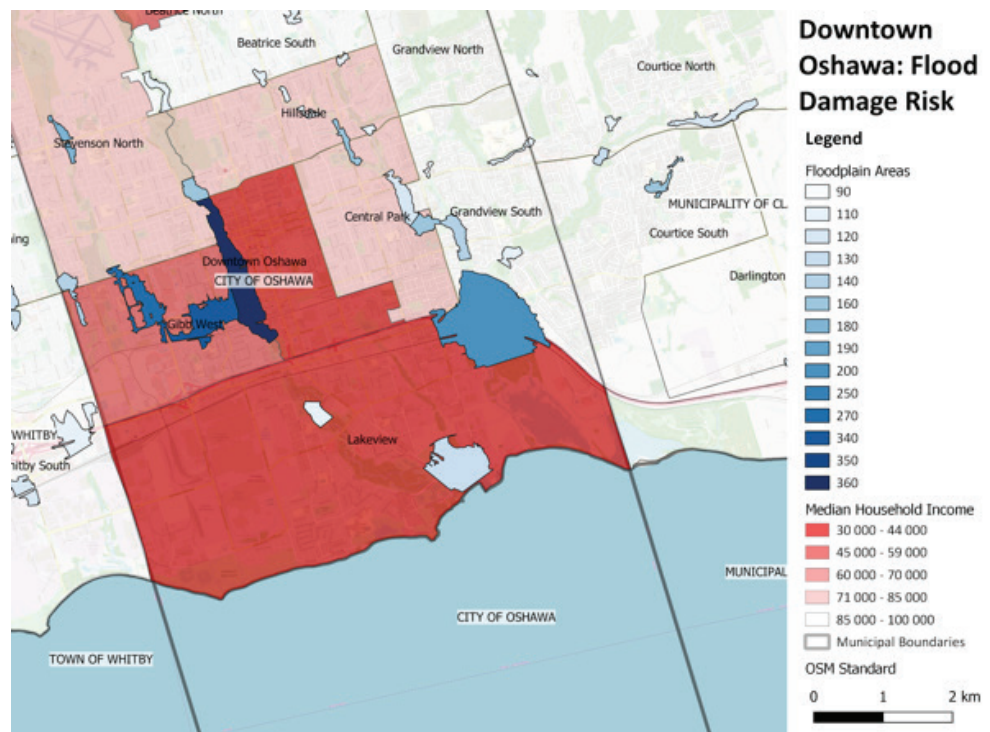




Map 1 shows Flood Damage Centers and the associated Flood Risk Scores in Oshawa. The areas of the map that are the darkest red represent the highest risk of damage to both human life and property. However, it is important to consider that even though the flood damage risk may be calculated as lower for one area, that does not necessarily mean that that area would not be damaged in a severe flood.

The Flood Damage Centers mapped by CLOCA reveal a number of alarming features. Not only are these Centers engulfing large residential areas, there is also a risk of flooding for a number of public amenities and roadways, including around Highway 401.

Map 2: Flood Damage Centers¹² and Median Household Income¹³





Map 2 shows some of CLOCA's Flood Damage Centers and each neighbourhood's median household income. CLOCA's Flood Risk calculations consider socioeconomic status, which is why the FDC in Downtown Oshawa is rated as one of the highest risk areas in all of Durham region. Within this area lies an elementary school, a mall, numerous houses, and a walk-in clinic, increasing the socio-economic damage during a flood.

As well, the neighbourhoods in southern and downtown Oshawa feature some of the highest rates of poverty in all of Durham Region.¹⁴ In other words, the most economically vulnerable face some of the highest flood risk, which calls for special attention by the City and the Region.

The costs to deal with flooding are widespread. For example, the costs to municipalities to respond to flooding and its aftermath are significant: estimated to be in the hundreds of millions.¹⁵ Indeed, by some estimates, Canadian municipalities will need to invest \$5.3 billion annually to mitigate the worst impacts of climate change, much of that due to flood risks.¹⁶



4. A GREAT TOOL TO REDUCE THE HARM CAUSED BY FLOODING

Traditionally, municipalities rely on stormwater systems (big underground pipes and gullies) to carry rainwater away from the properties and buildings we use (e.g. our homes, businesses, schools, places of worship, public buildings). Unfortunately, most municipal stormwater systems are not designed for the new reality of more severe rainstorms caused by climate change. In the case of Oshawa, this is made worse by the three “walls” (the CP line, the 401 and the CN line). Each creates a barrier which makes it more difficult for water in rivers and streams to drain into the lake.

Moreover, urban areas have been largely paved over such that roads, parking lots, and other impermeable surfaces dominate the landscapes of our towns and cities. An impermeable surface is simply one that does not allow water to pass through, instead these surfaces direct the storm-water and wastewater flows into municipal storm-water systems.

Expanding the stormwater system (installing bigger underground pipes) is really expensive, disruptive and takes a very long time.

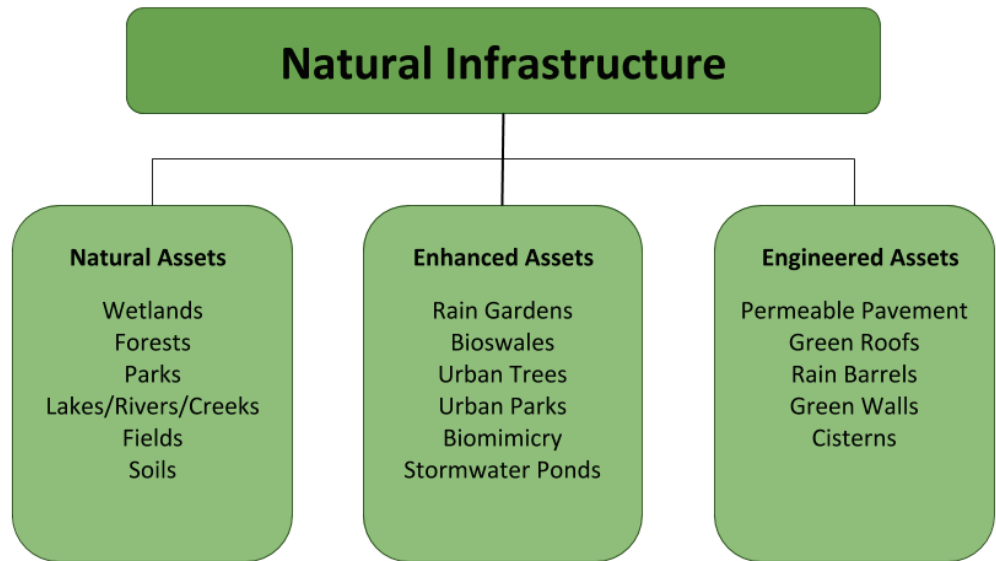
But there is another way to reduce the harm caused by flooding that can keep these costs down and have a number of co-benefits: let more rainwater seep into the ground and therefore reduce the strain put on the stormwater system.

The simplest way of doing this is by replacing hard surfaces (e.g. concrete or asphalt) with permeable surfaces that let water naturally soak into the ground. This is called “depaving” and is done in municipalities across the world. An even more effective tool used by municipalities is installing natural infrastructure, effectively replacing hard surfaces with plants that soak up water.



Then, when it rains on an area such as a wetland, park, or conservation area, the water is predominantly reabsorbed into the ground whereby it is filtered via the aforementioned natural processes.

Green Infrastructure is a strategy that incorporates both natural and engineered solutions to emulate the process done by natural surfaces, but in an urban area.



Source: Advancing and Integrating Municipal Natural Asset Management through Asset Management Planning in Ontario https://mnai.ca/media/2020/01/MNAI_MNAPOntario.pdf

Oshawa’s Official Plan has already recognized the important role natural infrastructure can play in stormwater management. Now it’s time to start using that tool regularly to reduce the harm done by flooding to people in Oshawa.



Oshawa's Natural Assets Pilot Project

The Oshawa Creek, while located in a floodplain, also represents a great opportunity for the City to integrate natural assets and optimize them for “best practices” stormwater management. Rehabilitating the riparian zones of watersheds is key to managing flooding in these areas, as well as the surrounding urban areas.

The City of Oshawa has started a pilot project on Oshawa Creek to begin using “natural assets” to manage urban flooding.

“Recognizing the ecosystem services values of natural areas, the City of Oshawa is working with the Municipal Natural Assets Initiative (MNAI) in partnership with the University of Toronto (U of T), CLOCA, and Oshawa’s Teaching City, to explore methodologies for valuing and accounting for natural assets in Oshawa’s financial planning and asset management programs.

As part of this pilot project the City will be applying natural asset principals on a portion of the highly urbanized Oshawa Creek. By working with MNAI and partners, the City hopes to apply practical strategies to value the services of the creek corridor and to further recognize the important services that our creek corridors play as part of our municipal infrastructure while also identifying gaps in knowledge and processes for implementation.”¹⁷

The Natural Asset’s Pilot Project is an excellent example of how municipalities such as Oshawa can begin to install natural infrastructure to help prevent flooding.



5. RECOMMENDATIONS

Flooding is a complex issue and approaching it takes a multi-pronged approach. One of the most common effects of flooding is residential basement flooding, which costs homeowners an average of \$43,000 when it occurs.¹⁸

Preventing, mitigating, and dealing with flooding requires that municipalities and residents become proactive and prepared by making sure their homes are flood ready.

5.1. WHAT HOMEOWNERS CAN DO TO REDUCE THE HARM CAUSED BY FLOODING

To assist its residents, the City of Oshawa, as well as Durham Region, have prepared educational tools to address flooding.¹⁹ These include things like disconnecting downspouts, installing back flow preventers and sealing basement windows.

As well, the Conservation Authority has been promoting the use of Low Impact Development on all new development applications with the goal of retaining rainfall on the sites and reducing runoff.²⁰ For sites located in Ecologically Significant Recharge Areas or High Volume Recharge Areas, CLOCA requires that the pre-development infiltration rate be matched through the use of infiltration systems – in other words, imitate the natural absorption of rainfall.

Also important for residents across Durham Region and beyond are the tools developed by the *Intact Center for Climate Adaptation* at the University of Waterloo. These tools help homeowners to be prepared in the event of a flood. [The Home Flood Protection Program](#) is a flood risk reduction and education program that provides homeowners with several key ways they can prevent and mitigate basement flooding.

This includes a useful online assessment tool, the [Home Flood Protection Check-up](#), to assess the current risk of flooding to their homes, and to receive a confidential report on what to do around their house to reduce the effects of flooding. This will include things like sump pumps, back-flow preventers, and window well covers.



5.2. WHAT GOVERNMENTS CAN DO TO REDUCE THE HARM CAUSED BY FLOODING

The Region of Durham recently declared climate change as an emergency situation.²¹ In January of 2020, Regional Council passed a detailed resolution to reduce climate change emissions and to prepare for future climate challenges. The resolution states that climate change should be treated as high priorities in all budget and policy decisions.²²

This is a good start. Now, the City of Oshawa in concert with the Region and the Province, should look to *Green Infrastructure* to provide relief from both residential basement flooding and urban overland flooding, and should implement a variety of different natural infrastructure policies, tools and investments.

The City has already recognized the many benefits of natural infrastructure in its Official Plan. To help realize these benefits, it should:

- offer free compost and gravel to people wanting to install a rain garden;
- include in property tax bills a notice to those properties that are located in a flood plain or FDCs
- provide information to residents via their tax bill on ways to install natural infrastructure on their property;
- ensure City Staff have the resources they require so that all types of development, including the Urban Growth Area, Residential, Commercial Centers, Corridors, and Planned Commercial Strips, utilize natural infrastructure to the maximum extent possible; and
- work with Durham Region and the Conservation Authorities to implement the natural infrastructure recommendations in the Durham Community Climate Adaptation Plan, including “developing and implementing Storm Water Management (SWM) Fee and Credit program establishing a stormwater fee.”



ENDNOTES

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