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Climate Adaptation Plan



TOWN OF PELHAM

September 16th 2019



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AGEND

- Changing Climate and Extreme Weather
- Local Impacts and Future Projections
- Actions to Address Climate Change
- Pelham's Corporate Climate Change Adaptation Plan
- Supporting Documentation
- Niagara Adapts



Changing Climate and Extreme Weather

Climate vs Weather

Climate: The average atmospheric conditions of a specific place over a long period of time (usually 30 years)

Weather: The atmospheric conditions of a specific place over a short period of time (usually 24 hours)

Climate Change is this process in which both direct and indirect human activity alter the average temperature and weather patterns in a particular place. Climate change is currently occurring throughout the world, which is a result of global warming.



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Changing Climate and Extreme Weather

Climate Adaptation:

“Managing the unavoidable” or “reducing damages that can’t be avoided”

- Any initiative or action that reduces the vulnerability of social, ecological, physical and economic systems to changing climate conditions, while also exploiting the beneficial opportunities.
- According to a study conducted by the National Roundtable on the Environment and Economy, costs associated with climate change will increase from \$5 billion per year to \$43 billion by the 2050’s
 - ✓ This includes greater health costs due to degraded air quality, economic losses from the frequency of invasive species and flooding from intense rain storms



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Local Impacts and Future Projections

Current Impacts in Niagara

- Heat waves of 3 or more consecutive days
- More frequent episodes of rain and less snow during winter seasons
- Increase of thunderstorms with heavy rain, strong winds and hailstorm-like conditions
- Increase in average numbers of freeze-thaw cycles

Future Projections according to the Intergovernmental Panel on Climate Change (IPCC)

- Increase in average annual temperature of 3-4°C
- A 20% decrease in summer rainfall by the 2050's
- Increase in disease and pest outbreaks (i.e. West Nile virus and Lyme disease)



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Pelham's Weather Modeling Projections

	Climate Variable	1976-2005	2021-2050 Projection	2100 Projection	
Temperature (°C)	Average/Yr	9°C	12°C	15°C	←
	Spring	7°C	8.8°C	10.7°C	
	Summer	20.5°C	22.6°C	24.8°C	
	Fall	10.8°C	13°C	15°C	
	Winter	-3.1°C	-0.8°C	1.5°C	
Extremes (°C)	Heat (max)	33°C	36°C	39°C	←
	Cold (min)	-20°C	-13°C	-8°C	
	Days/Yr +30°C	8	43	93	
Indices	Cooling Degree Days (CDD)	321	667	1192	←
	Heating Degree Days (HDD)	3399	2667	2022	
	Freeze-Free Days (>0°C)	3658	4489	5520	
Precipitation (mm)	Total Annual	884 mm	1046 mm	983 mm	←
	Average Spring	224 mm	247 mm	260 mm	
	Average Summer	221 mm	224 mm	222 mm	
	Average Fall	239 mm	246 mm	246 mm	
	Average Winter	208 mm	230 mm	246 mm	
Extreme Precipitation (mm)	Average Annual # of Wet Days (>10mm) / Yr	7 days/yr	9 days/yr	9 days/yr	←
	Average Annual # of Wet Days (>20mm) / Yr	7 days/yr	9 days/yr	9 days/yr	
	Maximum Precipitation On a Single Day / Yr	38 mm	40 mm	40 mm	
Frost (days)	Frost-Free Season (days)	168 days	207 days	229 days	←
	Date of Last Spring Frost	April 21	April 12	April 3	
	Date of First Fall Frost	Oct 29	Nov 8	Nov 21	
	Average Annual # of Ice Days (below 0°C)	48 days/yr	26 days/yr	6 days/yr	
Tropical Nights	Average Annual # of Tropical Nights (>18°C)	27 days/yr	64 days/yr	106 days/yr	←
	Average Annual # of Tropical Nights (>20°C)	10 days/yr	40 days/yr	85 days/yr	
	Average Annual # of Tropical Nights (>22°C)	1 days/yr	18 days/yr	60 days/yr	



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Impacts in Pelham

AGRICULTURE

- ↑ in invasive weed species and other weed-related pests (i.e. Gypsy Moth, Emerald Ash Borer, Dog-Strangling Vine, etc.)
- ↑ in energy consumption and costs due to cooling requirements for greenhouse operators
- Damage to crops due to heavy down pours & drastic winds

ECOSYSTEMS

- Depleting ecosystem services (i.e. provisioning, regulating, supporting & cultural services)
- Threats to woodlands due to ↓ rainfall and ↑ heat, creating high vulnerability to forest fires
- Stress to urban ecosystems; difficulty to maintain or expand urban tree canopy

INFRASTRUCTURE

- ↑ in intense rainfalls on impermeable surfaces, causing likelihood of overland floods and contaminated water. Pollutants from the road, lawn & garden chemicals, animal feces are likely to be released into a nearby stream or lake
- ↑ in strong winds, damaging Town-owned infrastructure (i.e. Pelham Arches)
- ↑ freeze thaw cycles, deteriorating concrete in roads

ELECTRICITY DEMAND, SUPPLY AND DISTRIBUTION

- ↑ demand for energy, leading to potential blackouts and/or brownouts
- Shift in distribution of electricity – intense storms can shut down electrical lines and discontinue services for long periods of time

TOURISM AND RECREATION

- Tourism is likely to have many **opportunities**, such as warmer weather, resulting with prolonged tourist seasons
- HOWEVER, much of the tourist industry in Niagara relies heavily on natural processes, which have adversely been affected by extreme weather

HUMAN HEALTH AND WELL BEING

- Heat stress and ↓ in air quality
- Disease outbreaks (i.e. West Nile virus and Lyme disease)
- More foodborne illnesses

ECONOMY

- ↑ in energy costs and consumption
- ↑ in insurance fees
- Downtime for businesses that are affected by power outages and/or floods
- ↑ in emergency response costs (i.e. police, fire and paramedic)
- In 2009 a tornado in Vaughn left \$730,000 worth of damages for the municipality, without including the \$88 million to both businesses and home owners



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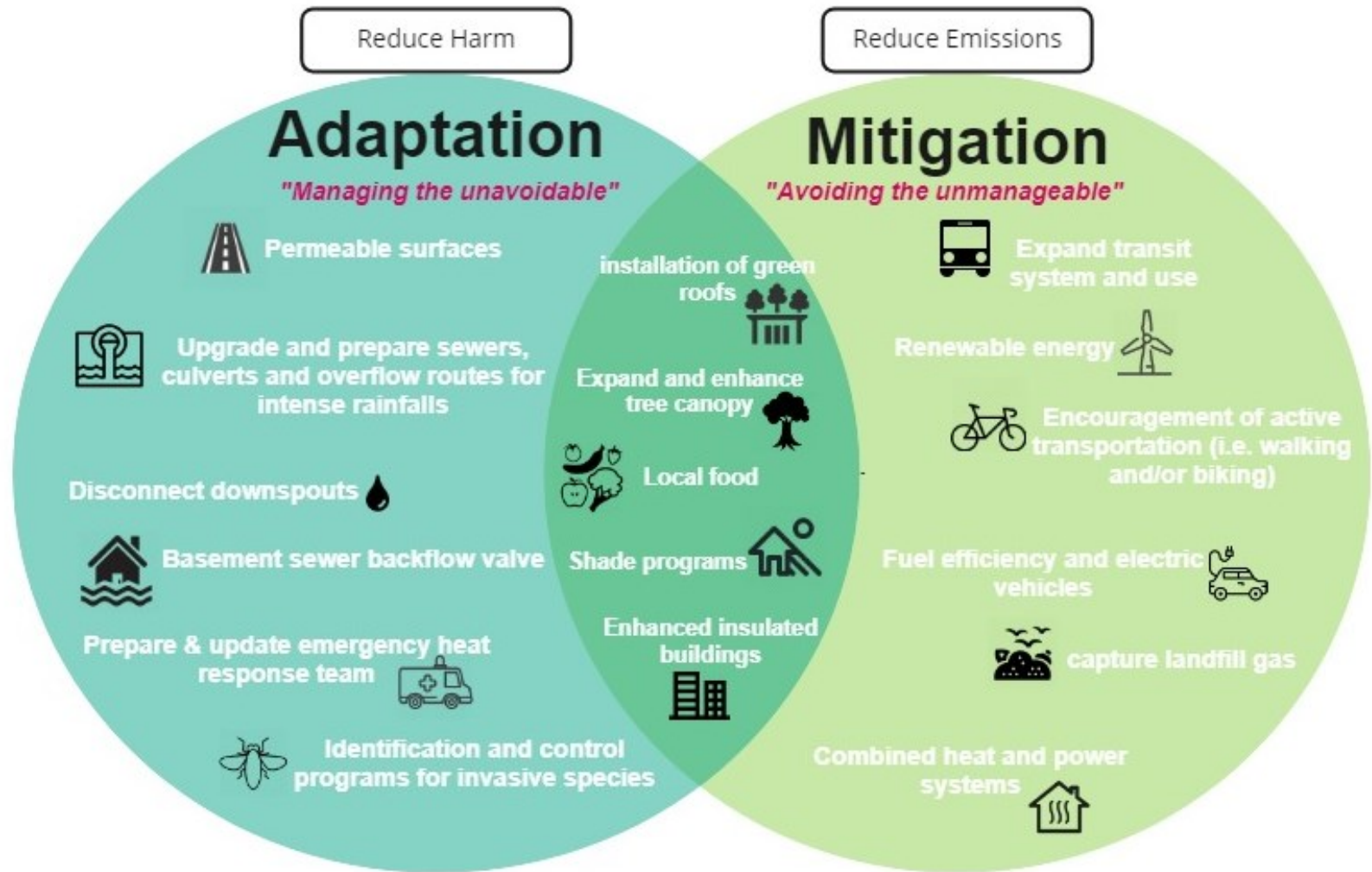
Impacts in 2019

- Windstorm – February 2019
 - Pelham Arches were destroyed due to southwest winds with frequent gusts of 100 to 110 km/h
 - \$110,000 to replace
- Gypsy Moth Infestation – May 2019
 - \$77,000 to spray only selected areas



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Actions to Address Climate Change



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Pelham's Climate Adaptation Plan

Purpose

- The purpose of the Corporate Climate Change Adaptation Plan is to increase the adaptive capacity and resiliency of the Town of Pelham's assets and services to current and future climate impacts, and to integrate climate change adaptation practices into day-to-day operations.

Outcome

- Staff will have sufficient knowledge on;
 - ✓ Climate change preparation,
 - ✓ Protection of property and;
 - ✓ A stronger understanding on the lifecycle, costs and conditions of the Town's current assets – an essential piece of knowledge for the Town's Asset Management Plan
 - ✓ The recommendations of this plan will also align with the corresponding elements within the Town's Engineering Design Manual, with a particular emphasis on storm water management and mitigation.

Scope

- The scope of this project is limited to the Town of Pelham and will recognize the adaptive capacities and resiliencies for Town-related operations and facilities.
 - ✓ It will integrate the activities and data drawn from Brock University's Niagara Adapts partnership

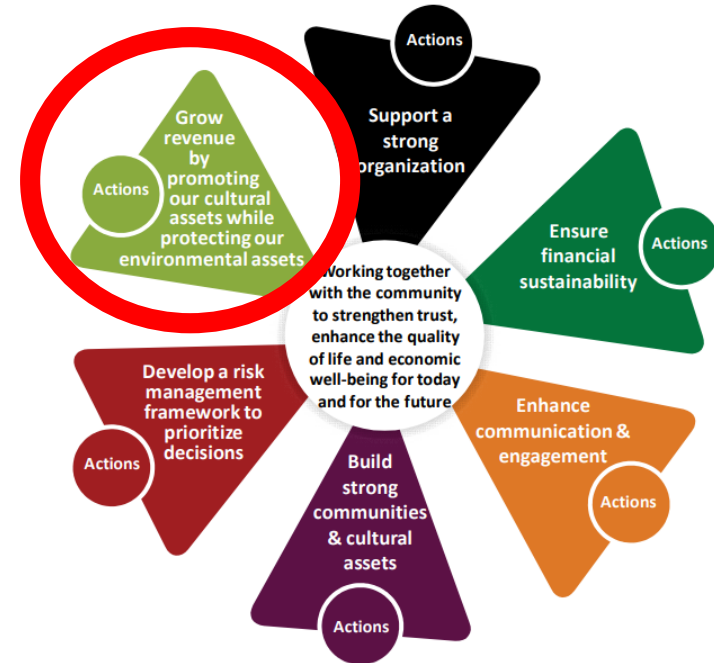


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Supporting Documentation

Town of Pelham Strategic Plan 2019-2022

- Amongst the six main priorities stated in the Town's most recent strategic plan (2019), one states that;
 - ✓ The Town wishes to “grow revenue through the promotion of [their] cultural assets while protecting [their] environmental assets”
- To accomplish this priority, actions listed in the plan indicate that
 - ✓ The Town will “introduce best practices related to climate change and for the protection and preservation of environmental assets” as well as
 - ✓ “Educate and create community awareness in regards to [the] importance of environmental assets and climate change impacts”



Supporting Documentation

Pelham's Official Plan

- Indirectly mentions the need to understand the natural environment in order to manage climate risks. Components of the plan include the commitment to
 - ✓ “Maintain, enhance or restore ecosystem health and integrity”
 - ✓ “Protect natural resources” and
 - ✓ “Ensure that all infrastructure including sanitary sewers, water distribution and storm water management facilities, public services facilities, and roads meet the needs of present and future residents and businesses”

Pelham's Strategic Plans – 2011; 2014; 2015; 2016; 2017; 2019

- Preceding priorities mentioned in the Town's former strategic plans also support the development of a climate adaptation plan indirectly. Priorities such as
 - ✓ “Continu[ing] [to] develop sustainability programs for Town infrastructure (2011)
 - ✓ Protecting natural systems while maintaining the rural landscape (2014; 2015) and
 - ✓ “Determin[ing] the implications of severe storm events” (2015; 2016; 2017)evidently show that as a municipal government, it's the Town's responsibility to anticipate the severity of environmental patterns and extreme weather and to reduce the damages that cannot be avoided



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Supporting Documentation

“Adopt-A-Road Program” (S701-11) and “Adopt-A-Trail Program” (S701-12)

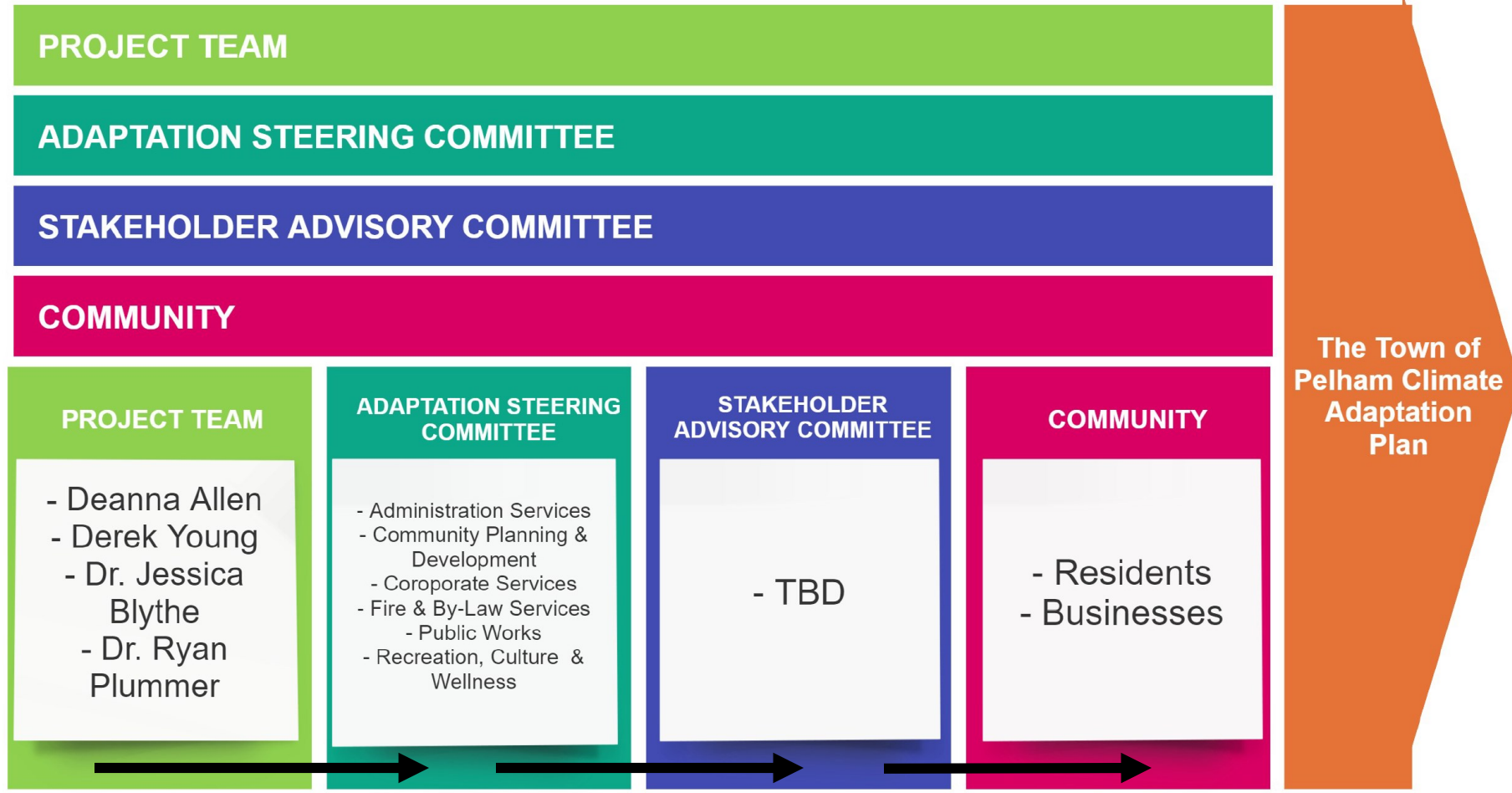
- Demonstrates commitment to creating a cleaner environment and more beautiful road, trail or park system within Pelham by
 - ✓ Adopting a section of land and periodically keeping it clean of litter and debris

“Tree Management Policy” (S802-01)

- Demonstrates commitment to strive for not net loss of trees on urban boulevards, and where practical and viable, in parks and rural areas
 - ✓ Every effort shall be made to increase tree planting and greening in the Town, barring conditions related to invasive pests or diseases
 - ✓ Strive to plant native species, while still increasing the species diversity of trees and avoiding monoculture plantings



Climate Adaptation Plan



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NIAGARA ADAPTS¹



Environmental Sustainability
Research Centre

Niagara Adapts Involvement with the Plan

- Brock will provide support in climate change analysis, risk and opportunity assessment, as well as the preparation and evaluation of an adaptation plan through interactive workshops and online learning platforms.
 - Other municipalities that are involved;
 - ✓ City of St. Catharines
 - ✓ Niagara Falls
 - ✓ Town of Grimsby
 - ✓ Town of Lincoln
 - ✓ Niagara-on-the-Lake
 - ✓ Welland

Upcoming Events

- Workshop 2 – Climate Change Impacts Analysis – August 16th 2019
 - Review the available climate change data for each municipality, downscaling, climate projections, and scope potential impacts



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Meetings

Community Involvement

- Ongoing community engagement
- Method: online and in-person surveys, workshops, community booths, etc.

Senior Management Team (SMT) and Council

- Update SMT and Council on a quarterly basis
- Method: provide updates, discuss obstacles, request feedback



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Proposed Timeline



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