Village and Town of Potsdam Climate Vulnerability Assessment

April, 2020

Table of Contents

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Terms and Definitions

Asset: A resource that a town/village has access to that will aid in the protection from the effects of climate change.

FEMA: Federal Emergency Management Agency

Hazard: A physical process or event that can harm human health, livelihoods, or natural resources.

HP200: This refers to the Clarkson Honors Program's Sophomore group for the 2018 - 2019 academic year. The class of 45 honors students focused on the CSC program for Potsdam for the academic year. The climate risk assessment group of eight students from this class collected data for and updated information for the three climate hazards included in this report.

Potsdam - There is a Town of Potsdam that includes the Village of Potsdam and the majority of the Village of Norwood.

Risk: A situation or event that causes an exposure to danger.

Vulnerability: Refers to the degree to which people or the things they value are susceptible to, or are unable to cope with, the adverse impacts of climate change.

Executive Summary

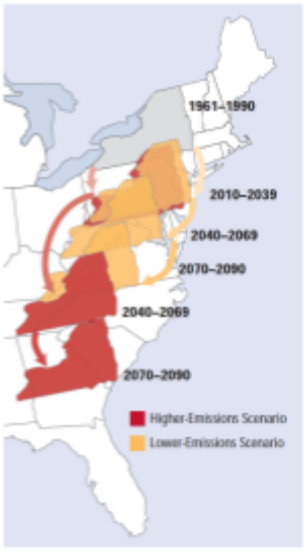


Figure 1. Shows the relative position of New York State as the climate warms from 1990 - 2090

Climate change is affecting every part of our world. Between 1970 and 2007 annual temperatures across New York State have warmed almost 2 degrees Fahrenheit, winter temperatures have warmed nearly 5 degrees Fahrenheit, and each year there are about two more days above 90 degrees Fahrenheit. The Northeast is the fastest-warming region in the lower 48 states. As seen in the picture, the climate in 2100 of New York will resemble that of the current Southeast[1].

In order to prepare for this changing climate, Potsdam created this climate vulnerability assessment to determine how the Town and Village can protect against the most significant climate hazards. The 2013 Federal Emergency Management Association (FEMA) report created using Hazards New York (HAZNY) for the Village of Potsdam exceeds the five year limit for submission to the Climate Smart Community program. To remedy this situation, Town and Village representatives to the Potsdam Climate Smart Communities (CSC) task force worked with students from

[1] Powers, Susan. 2018. "Changing Climate in New York." Presentation presented at the Climate Smart Communities Workshop, Potsdam, NY.

the HP200 class at Clarkson University to help Potsdam investigate our present climate hazards. This updated climate vulnerability assessment was created using the previous FEMA report as well as updates by a subgroup of the Clarkson class concerning flooding, ice storm, and wind storm risk, the three most severe climate hazards that Potsdam faces.

Flooding poses a threat to the Potsdam residents and economy. $340 million worth of edifices in Potsdam are in danger from flooding with 27% of Potsdam's structure value within the hazard zone. Wind storms have caused major damage to property with wind speeds reaching 100MPH[2] . In 2012 Potsdam experienced a damaging microburst with extensive damage to residential, commercial, and institutional property. More data is needed for predictions of timing and risk mitigation for microbursts in Upstate New York. Finally, ice storms are considered the most hazardous and economically devastating climate event facing Potsdam. The Ice Storm of 1998 caused over $4 million worth of property damage. This event, as described in the Potsdam-made documentary, *Resilience,* is why Potsdam is particularly attuned to climate hazards in the North Country[3]. All three hazards will be discussed in depth concerning physical and economic damages.

This document also outlines Potsdam's climate and economic profile. The Village and Town of Potsdam's assets and ability to address these climate hazards are discussed at the conclusion of this paper.

[2] "National Oceanic and Atmospheric Administration." National Oceanic and Atmospheric Administration. Accessed January 22, 2020. https://www.noaa.gov/.

[3] Films, Cold Border. Vimeo, January 15, 2020. https://vimeo.com/214484022.

Introduction

The purpose of this Climate Risk Assessment is to identify which extreme weather events will most severely impact the Town and Village of Potsdam in the future.

A task force was created consisting of members of the community after both the Village and Town Boards passed resolutions to work towards becoming a Climate Smart Community. The Resiliency sub-committee of this task force took on the formulation of this document in conjunction with the HP200 class and Clarkson's Institute for a Sustainable Environment.

Background

Climate change is already affecting ecosystem functioning, human health, food security, water supply, transportation, and energy and these changes are expected to become increasingly disruptive. Climate change has had numerous effects in Potsdam and the North Country. Heavy rainfall events are becoming more frequent across the Northeast. Rainfall is expected to become more intense and periods of heavy rainfall are expected to become more frequent. The temperature changes associated with climate change affect the water cycle and ecosystems which in turn affect agriculture, social systems, and human health. Changes in the timing of the seasons will change growing seasons, start to threaten small farms, and affect crop yield. Increasing days above freezing mean less snow, affecting a large portion of Northern New York's winter businesses.

The forests will be seeing significant changes, one being the loss of hemlock trees due to hemlock woolly adelgid, an invasive species that is spreading due to warming temperatures. Human health in our region is at risk due to extreme heat, air quality changes, increase in pollen and allergens, and northward spread of diseases such as Lyme disease.

Studies provide evidence that climate change has contributed to the expanded range of ticks, increasing the potential risk of Lyme disease. The life cycle and prevalence of deer ticks are strongly influenced by temperature. Shorter winters could extend the period when ticks are active each year, increasing the time that humans could be exposed to Lyme disease.[4]

There are many examples of how climate change is affecting the North Country. The focus of this report is to show our vulnerability in regards to flooding, wind storms, and severe winter storms. There is urgency in assessing our vulnerability and forming an action plan for preparedness and resiliency.

[4] Powers, Susan. 2018. "Changing Climate in New York." Presentation presented at the Climate Smart Communities Workshop, Potsdam, NY.

Methodology

On May 9, 2013, the St. Lawrence County Office of Emergency Management conducted a hazard analysis using the automated program, HAZNY (Hazards New York). HAZNY was developed by the American Red Cross and the New York State Office of Emergency Management.

HAZNY is an automated interactive spreadsheet that asks specific questions about potential hazards in a community and records and evaluates the responses to those questions. HAZNY also includes historical and expert data on selected hazards. HAZNY is designed specifically for group, rather than individual use. St. Lawrence County assembled a group of 34 local officials to consider and discuss the questions and issues raised by the HAZNY program. Representatives from the NYS Office of Emergency Management facilitated the meeting and recorded the results. The group analyzed 25 hazards potentially affecting St. Lawrence County.[5]

HAZNY was used to create a FEMA report in 2013 by Fred Hanss from the Village of Potsdam's Planning and Development Office. This assessment ranked different events according to the hazard they pose to St. Lawrence County. However, this document could not be submitted to Climate Smart Communities for points because the guidelines require risk assessments to be dated a maximum of five years prior to submission in order to fulfill pledge element 7-1. The 2013 Risk Assessment exceeded this five-year gap, making it invalid for submission.[6]

A class at Clarkson University was created to assist Potsdam in becoming a Climate Smart Community. The Clarkson University Sophomore Honors Project class took on this task during the 2018-2019 academic year. The class group for Climate Risk Assessment consisted of Maria Isabel Alexander, Alisha Arshad, Robert Brockway, Caleb DeLaBruere, Henry Klee, Brianna Larose, Erich Stoltzfus, and Bridget Wangler. The group focused on the top three most relevant storm events in St. Lawrence county. They updated the flooding, ice, and windstorm microburst assessments from the HAZNY report.

Using the information gathered by the Clarkson Honors Class, the previous FEMA report, and several committee representatives from both the Village and the Town of Potsdam, this updated vulnerability report was created. An intern at Clarkson's Institute for a Sustainable Environment used the class report and FEMA report to create an earlier draft of this document.

Climate Profile

This section provides an overview of Potsdam's past, current, and projected climate in terms of temperature and precipitation, both rain and snowfall. Information from this section serves as a

[5] Hanss, Fred. 2013. "Village of Potsdam FEMA Hazard Risk Assessment." NYS Office of Emergency Management.

[6] "Clarkson University Honors Program Sophomore Project: Making Potsdam A Climate Smart Community." 2019. Clarkson University.

baseline to better understand the impacts that climate change has on societal, economic, and physical systems of Potsdam.

Temperature

We have experienced a dramatic change in annual mean temperature since 1880 as shown in Figure 2. We report Canton, NY weather trends for which more historic weather data are available; the scant ten miles between towns makes these data representative of historic Potsdam weather conditions. Change in monthly annual mean temperature over the 138 year dataset is 0.17 degrees per decade (0.21ºC/decade winter and 0.11ºC/decade summer). These data indicate that climate change is significantly affecting the North Country.

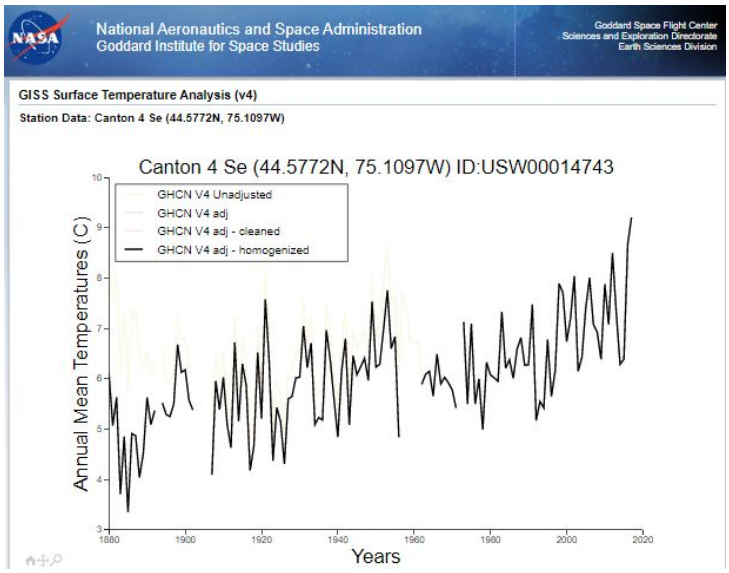
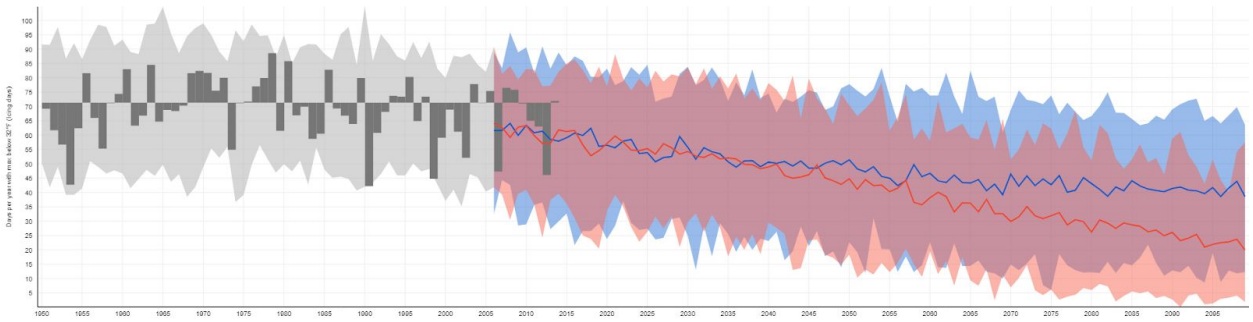


Figure 2: Annual Mean Temperature Increase since 1880 in Canton, NY[7]. Note high variability over decades with a century-long increase in temperature.

Number of days below freezing have also been decreasing in the northeast and are projected to further decrease as shown in Figure 3. Winters are getting milder and conditions are getting warmer.



[7] "Data.GISS: GISS Surface Temperature Analysis: Station Data." NASA. NASA. Accessed January 20, 2020. https://data.giss.nasa.gov/gistemp/station_data_v3/.

Figure 3. Number of days per year below freezing since 1950 with projections to future based on a range of model results. Gray bars for historical data are relative to the 1961-1990 average. Data and graph from https://toolkit.climate.gov/regions/northeast

Massena, NY, located approximately 20 miles north of Potsdam has experienced an average seasonal temperature increase as well. Figure 4 shows linear curve fits for average seasonal temperatures in Massena dating since 1950.

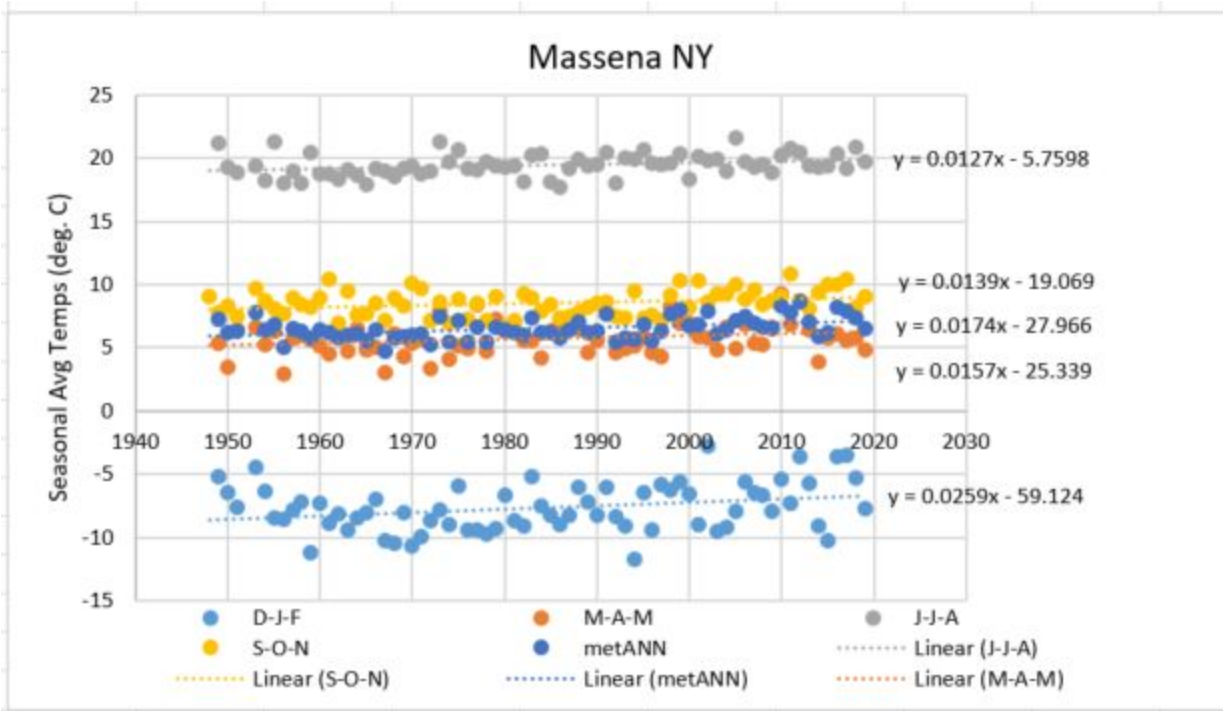


Figure 4: Seasonal Average Temperature Change in Massena, NY from Mid 1940 - 2019

According to the data, winter (bottom data in blue, Dec-Feb) is warming at a rate of 0.26 degrees celsius every ten years (°C/decade), which is substantially faster than other seasons. Spring (orange, Mar-May) is warming at a rate of 0.16°C/decade. Summer (top in gray, June-Aug) is warming at a rate of 0.13°C/decade. Fall (yellow, Sept- Nov) is warming at a rate of 0.14°C/decade. The overall annual warming rate is 0.17°C/decade.

Precipitation

Winter storms are an increasing cause of concern for Potsdam as the winter season has become more severe. Therefore, consideration must be given to the changes in precipitation for the region. Rainfall is becoming more variable across the North Country and throughout the northeast. Snowfall used to be more consistent and accumulate, and total precipitation arrives in fewer more severe storms. There are more thaws than the area historically experienced.

Precipitation and snowfall data from the National Weather Service's weather.gov website[8] show a snapshot in time which demonstrates the increasing variability in weather that our region experiences.

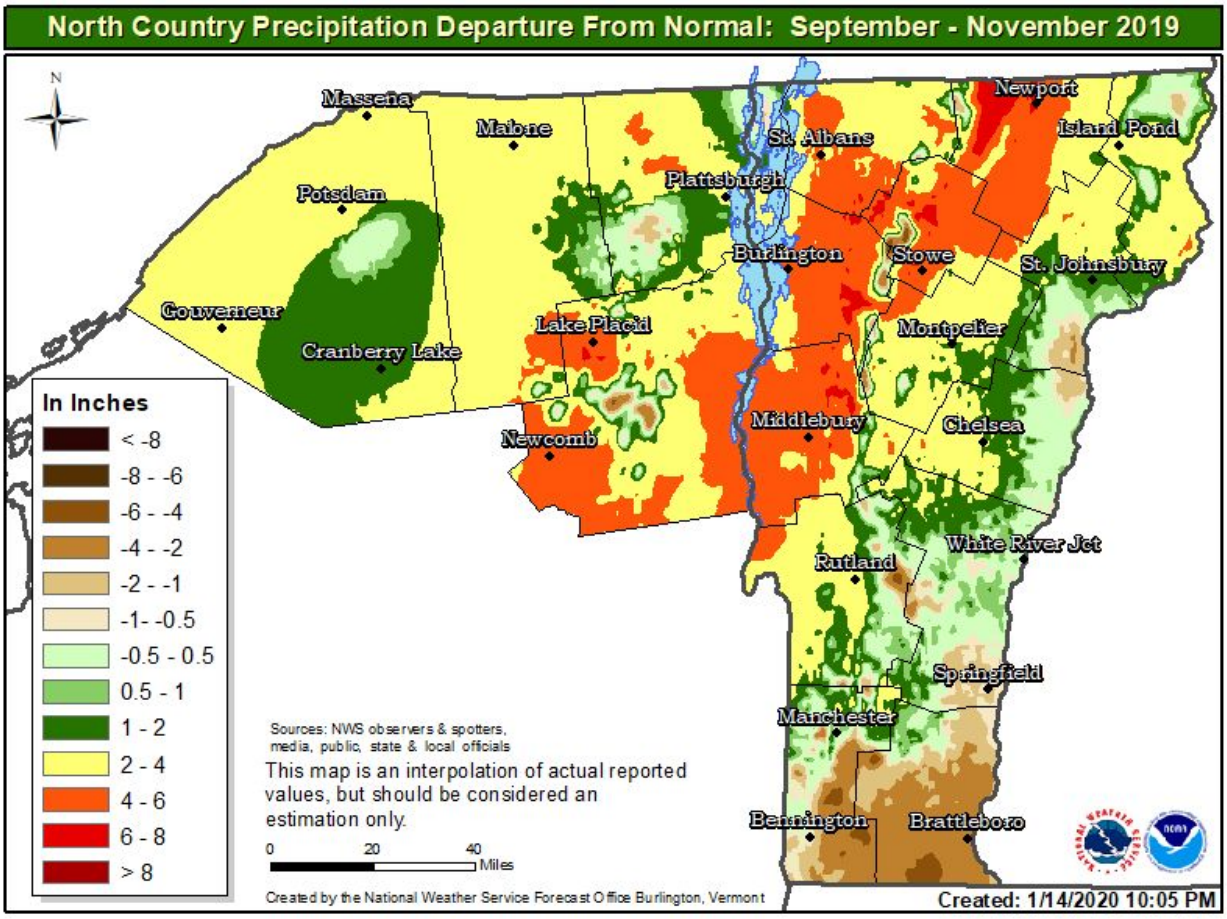


Figure 5: Rainfall Departure from Normal in the North Country from fall 2019(Sept - Nov)[9].This depicts climate variabilities in fall 2019 compared to the 30 year average from 1981-2010 averages.

Potsdam, located in the upper left corner of Figure 5, received 2-4 more inches of fall rain during September - November 2019 than it did in the past three decades. Annual deviations in precipitation from the 3 decade norm similarly depict greater variability as shown in Figure 6.

[8] "1981-2010 U.S. Climate Normals." National Climatic Data Center. Accessed January 20, 2020. https://www.ncdc.noaa.gov/data-access/land-based-station-data/land-based-datasets/climate-normals/1981-2010-normals-data.
[9] US Department of Commerce, and Noaa. "Local Climate Data and Plots." Local Climate Data and Plots. NOAA's National Weather Service, January 18, 2020. https://www.weather.gov/btv/climate.

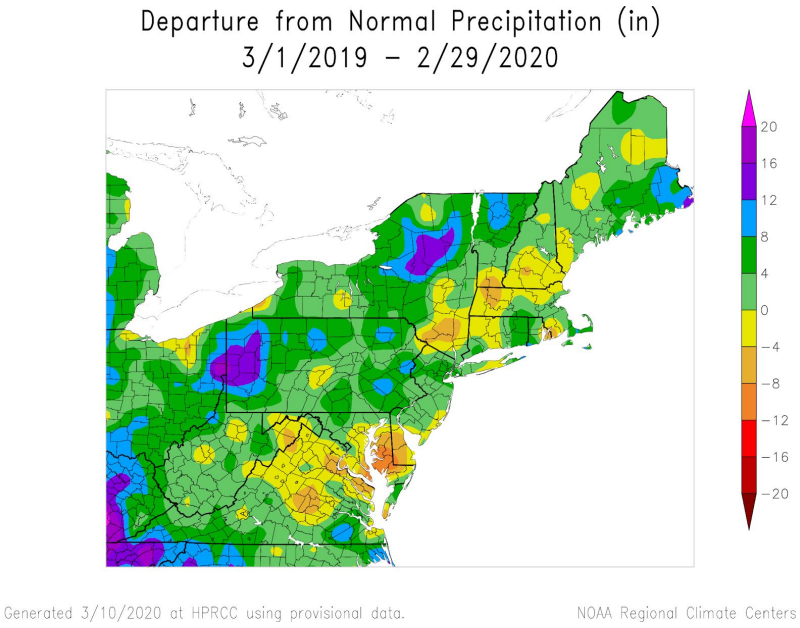


Figure 6. Deviation in annual precipitation of the last calendar year (March 2019 - Feb 2020) from the 1981-2010 mean, which indicates much of the Adirondack Park very much wetter (8-16”/yr) than historical, Potsdam less so, and some areas dryer than 30 yr historical average. Accessed from https://hprcc.unl.edu/products/maps/acis/nrcc/Last12mPDeptNRCC.png

Seasonal volatility and regional uncertainty are depicted in Figure 7 which maps % departure from early snowfall (Sept-Nov 2019) relative to 30 year average snowfall for that period. Potsdam, in the dark green section, received 12 - 24 more inches from September - November 2019 than the norm, which is >250% above normal for that period.

Figure 7: Snowfall Percent of Normal in the North Country from September - November 2019. This is a comparison of historic average snowfall to 2019.

More anecdotally, as we are completing this report in early March of 2020 we should be covered with snow here in Potsdam. An unseasonable series of days in the high 30's and low 40's at the end of February and beginning of March have melted nearly half of our snowpack and the grass is becoming visible.

Economic Profile

According to the United States Census Bureau, the Town of Potsdam had an estimated population of 15,322 in 2018, 9.2% of which are children. Approximately 18.2% of the population of Potsdam is considered to be in poverty[10]. This is 6.4% higher than the national average. St. Lawrence County is the seventh most impoverished county in New York with more than 29% of children living below the poverty line[11]. Low income families and communities often

[10] "U.S. Census Bureau QuickFacts: Potsdam Town, St. Lawrence County, New York." Census Bureau QuickFacts. Accessed January 22, 2020. https://www.census.gov/quickfacts/fact/table/potsdamtownstlawrencecountynewyork/PST040219.
[11] "Poverty a Problem in St. Lawrence County; 29% of Kids Live below Poverty Line." NorthCountryNow. Accessed January 27, 2020. https://northcountrynow.com/business/poverty-problem-st-lawrence-county-29-kids-live-below-povert-line-0257011.

do not have the resources to “shelter in place” or to evacuate the region during a climate emergency.

As discussed in the literature, resilience is the ability to rebound from a disruption in a system as shown in Figure 8.

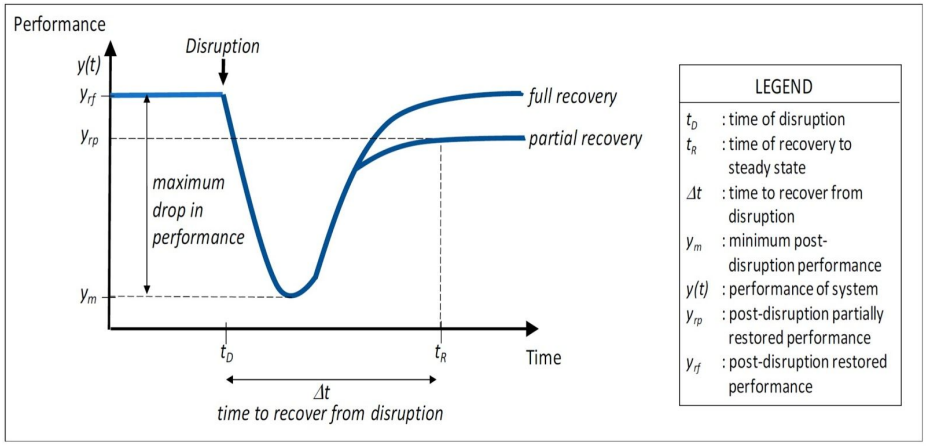


Figure 8. General form of reliance curve for resilience defined as rebound.[12]

Generally, the deeper the disruption the longer it will take to recover. This kind of disruption and rebound can be characterized for many measures of performance, including economic performance. For the Northern NY area, this is particularly acute as the above statistics indicate that wealth reserves are relatively low. Further, as evidenced in past climate events, businesses across the area ceased their operations for an extended period as they recover from infrastructure damages. During these periods of time, while needing to make substantial financial outlays for repairs, they are also without an income stream. Additionally, workers are furloughed throughout, resulting in a lack of personal income to address home or personal damages as a result of these weather or other climatic events.

As a case study, the Ice Storm of 1998 is highly illustrative of this effect. During this event, businesses were recovering from the damages for several months. The storms took out power lines and caused damage to telephone poles, roads, and other infrastructure. With the loss of power, businesses had a difficult time running at their maximum when there was often no other power source available. Furthermore, the response to the power outages and damages was often slow, causing a delay in restoration of the power and ultimately more damage across the Town of Potsdam. Physical and infrastructure storm damage was only part of the story however, as these storms caused other types of damage beyond the initial impact of the storm. For instance, short term and long term economic prosperity of the affected businesses was also

[12] Mansi, Azad M., Erwin, Dan, Sievers, Michael, “Constructing Models for Systems Resilience: Challenges, Concepts, and Formal Methods”, Systems, 24 January 2020

damaged considerably. This impact is easily demonstrated through the loss of wages and income when businesses cannot operate.

When considering the loss of wages in the area, Figure 9 shows specific sectors that are more vulnerable. For the hospital and ambulance care services, there are more safety measures in place to prevent disruptions during an emergency, which means a much higher retention in jobs within these fields. This is also true for the public sector, since occupations such as highway maintenance workers and police officers will be on call during a climate event to maintain safety within the affected zones. Again, using the Ice Storm of 1998 as an illustrative example of the total economic impact within the Town and Village of Potsdam from such an event, the following diagram shows the loss of wages from that particular climatic event.

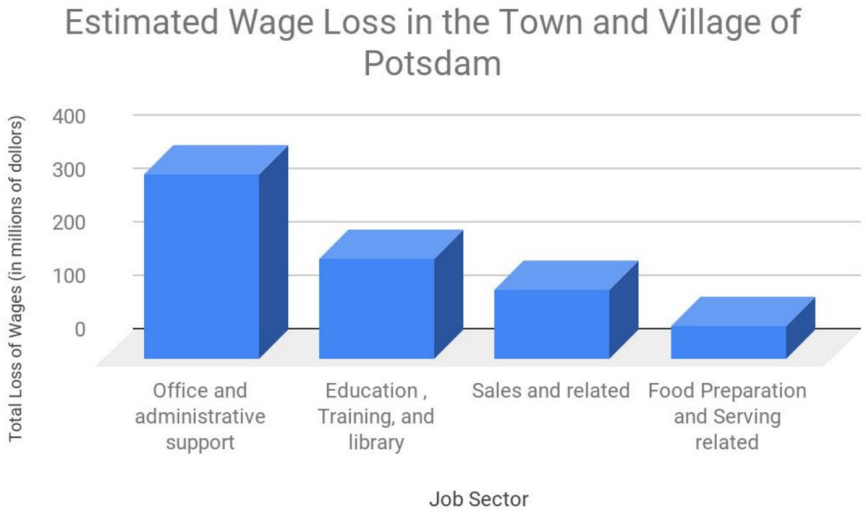


Figure 9: Total Economic Impact Graph from Storm of 1998 (2019 Dollars)

This figure demonstrates the wage impact from the storm of 1998 divided into different job sectors. What is demonstrable is that in wage loss alone, over $650M was lost during the period of disruption and recovery in the local area. When compared with the $3.3M in property damage,[13] wage loss had an even more devastating effect on the local economy, resulting in an even slower recovery for many local residents.

Recently, various climate events have affected the area around the Town of Potsdam. As these events increase in frequency, the corresponding potential for losses, both in physical damage as well as economic challenges, will also increase, having a distinct detrimental effect on the local economy. As indicated in a recent study by the National Institute for Building Science,

[13] "NCDC: Eastern U.S. Flooding and Ice Storm". noaa.gov. Retrieved March 14, 2015.

investments in increasing the resilience of infrastructure and buildings, has a multiplicative savings effect and enables better economic rebound in the future.[14]

2013 FEMA Hazards

The 2013 FEMA group analyzed 25 hazards potentially affecting St. Lawrence County. HAZNY rated each hazard based on the Group's assessment and assigned a numerical value. These values are shown below. These hazard rankings will be updated in 2020.[15]

321 to 400 HIGH HAZARD
241 to 320 MODERATELY HIGH HAZARD
161 to 240 MODERATELY LOW HAZARD
44 to 160 LOW HAZARD

Table 1.

Hazard	Rating	Hazard	Rating
Hazmat (in transit)	315	**Dam Failure**	268
Fire	313	**Tornado**	252
Infestation	312	**Wildfire**	250
Severe Storm	312	**Ice Storm**	249
Utility Failure	308	**Earthquake**	246
Trans Accident	305	**Epidemic**	239
Structural Collapse	294	**Explosion**	235
Winter Storm (severe)	293	**Terrorism**	231
Water Supply Contamination	282	**Civil Unrest**	188
Flood	278	**Blight**	176
Oil Spill	278	**Drought**	152
Hazmat (fixed site)	273	**Mine Collapse**	151
Ice Jam	272		

There were no hazards rated as High.

The hazards rated as moderately high are: **Hazardous Materials (In Transit), Fire, Infestation, Severe Storm, Utility Failure, Transportation Accident, Structural Collapse, Winter Storm (Severe),**

[14] Multihazard Mitigation Council (2018). Natural Hazard Mitigation Saves: 2018 Interim Report. Principal Investigator Porter, K.; co-Principal Investigators Scawthorn, C.; Huyck, C.; Investigators: Eguchi, R., Hu, Z.; Reeder, A; Schneider, P., Director, MMC. National Institute of Building Sciences, Washington, D.C. www.nibs.org

[15] Denner, Matthew. Nov. 5. Phone Call.

Water Supply Contamination, Flood, Oil Spill, Hazardous Materials (Fixed Site), Ice Jam, Dam Failure, Tornado, Wildfire, Ice Storm, and **Earthquake.**

Risk Assessment for Potsdam

This vulnerability study focuses on three specific climate hazards using information gathered from the 2013 FEMA report and the data analyzed by the Clarkson University Honors Program Climate Risk Assessment group. These are (along with their subgroups and rank as determined by the 2013 FEMA report):

Flooding
- Riverine flooding - moderately low hazard
- Stormwater flooding - moderately high hazard

Microbursts
- Wind storm/Micro-burst storm - moderately high hazard

Severe Winter Storm
- Ice Storm - moderately high hazard
- Snowstorm - moderately high hazard

Flooding

The Village faces two distinct flood hazards: riverine flooding and stormwater flooding. Both types of flooding have been encountered since 2010.

In 1996, the Federal Emergency Management Agency conducted a flood study and developed Flood Insurance Rate Maps for the Village. Special flood hazard areas were identified along the Raquette River shoreline and along a channelized stream that crosses Castle Drive and the grounds of Potsdam Central High School before joining with the cross-town canal drainage system. In the spring of 2010, the Raquette River experienced a flood that was thought to be at or higher than the 100 year base flood elevation after nearly a month of soaking rains capped off by 3 inches of rainfall in a 24 hour period. A later engineering report estimated that this was only a 25 year storm event. Parklands, downtown commercial properties, an associated levee, and several single family residential homes experienced high flood waters. No long-term property damage was sustained. The Village's water plant, sewer treatment plant, and DPW facility are all situated in areas within or immediately adjacent to Special Flood Hazard Areas.

The Village's cross-town drain is a channelized stream that drains the eastern side of the Village as well as several thousand acres of land located in the Town of Potsdam outside the Village limits. The cross-town drain is a roughly century-old enclosed stormwater canal that carries stormwater through the Village to a discharge culvert on the Raquette River. It is no longer adequately removing water from Potsdam. This infrastructure is old, poorly designed, and failing. The increased precipitation in our region from climate change further exacerbates the

system. As a result, areas not immediately impacted by flood waters might be impacted by water back flowing into the Village's stormwater system. This occurred in 2010.

Furthermore, with a general increasing number of freeze thaw cycles, we are at an increased risk to suffer flooding from ice jams in the Raquette River and/or its tributaries. Ice jams will cause the surrounding land to flood. Our neighbors in the Village of Canton experienced an ice jam in the spring of 2018 along the Grass River which runs parallel to the Raquette.

Canal Profile

The Crosstown Canal was built in the early 1900's and serves a drainage area of approximately 800 acres, divided into six sub-watersheds. It is a stormwater system beginning in two locations on the Potsdam Central School property. From there it continues below grade along Broad Street, Waverly Avenue, Pleasant Street, Market Street, and Canal Street. It discharges into the Raquette River as seen in Figure 10.

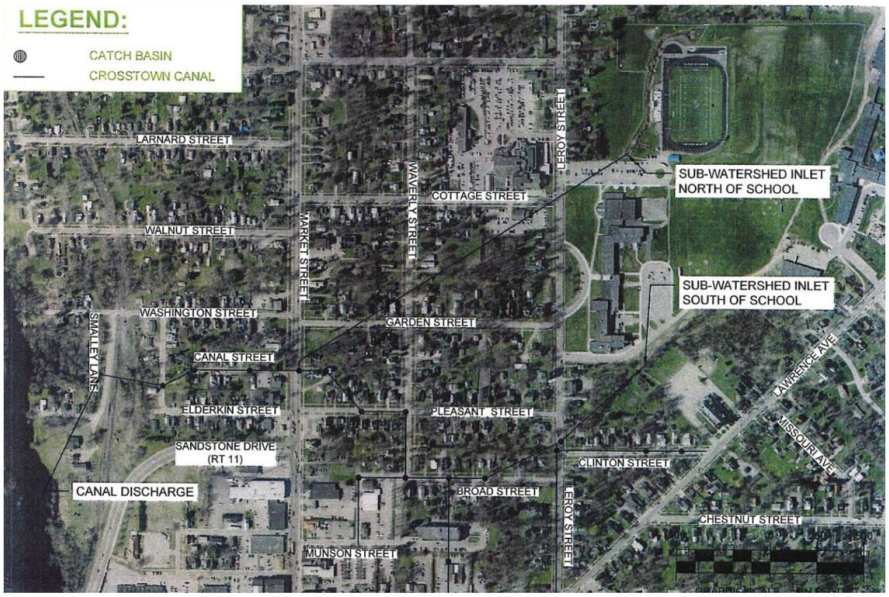


Figure 10: Outline of Crosstown Canal System

Due to the age, structural degradation, dimensional limitations, and increased storm intensity, the Crosstown Canal can no longer reliably convey stormwater through the Village of Potsdam as originally designed. Because of more frequent and intense rain events, certain areas in the village are prone to increased flood risk. **The canal is not adequately sized to convey the amount of stormwater from events greater than or equal in intensity of a 10-year storm.** With a recent failure of a section of the canal roof, the need to upgrade the stormwater management system of the village and town is increasingly high.

During severe storm events the cross-town drain can be overloaded by stormwater flows and the discharge culvert can be submerged by the Raquette River resulting in a backwater condition that exacerbates stormwater flooding. The engineering report prepared by EDR

Consulting Engineers, LLC also found that the existing cross-town drain is inadequate to meet 50 or 100 year storm events, particularly if the discharge culvert on the river is submerged. This document from EDR will be submitted to the CSC portal as a supporting document to this vulnerability assessment. To further exacerbate the situation several large fields have had tiling installed recently. These fields now drain quickly into the canal where they used to retain and slowly release stormwater. Potential solutions include rehabilitation of the cross town drain and the construction of upstream stormwater detention ponds in sub-watersheds 5 and 6 (see Figure 2 of the supporting document prepared by EDR). Without these or similar changes to our storm-water management Potsdam will remain very vulnerable to flooding as precipitation rates continue to increase and the integrity of the canal and surrounding land use continue to degrade.

The area affected by flooding includes: Lawrence Ave., Clinton Street, Leroy Street, Broad Street, Pleasant Street, Garden Street, Munson Street, Waverly Street, Market Street, Elderkin, Canal, and Washington Street.

In order to remedy the issues resulting from the canal's dated design and structural degradation, the following options have been presented to handle the increasing amount of stormwater of recent years:

1. Stormwater Storage Area - As pictured in figures 3, 4, and 5 of EDR Engineer's report on the condition of the canal, installing multiple stormwater buffers would allow the system currently in place to properly manage more stormwater without requiring widening of the canal. This will be the most cost effective way to increase the management capacity.
2. Crosstown Canal Replacement - To avoid having to use extra land in order to install the stormwater storage areas, rebuilding and increasing the diameter of the canal will be suitable for managing the stormwater increase, however, this would be an incredibly expensive and disruptive task to the Town and Village.
3. No Action - If no action is taken, the Crosstown Canal will remain a threat to public health and safety.

While removal of stormwater is a main concern, another is the hazard presented by the failing structure of the canal. To address this the following have been recommended:

1. Roof Replacement and Reinforcement - Currently, the roof of the Crosstown Canal is the largest threat to the public. Since it is built under streets with pedestrian and truck traffic, the risk of catastrophic failure is increasingly high. The sides and floor of the canal are in acceptable condition but the roof is continually deteriorating. The roof, sides, and floor should all be reinforced. This is the least expensive and least intrusive method of preventing complete structural failure, although it will require the most future maintenance.

2. Crosstown Canal Replacement - Replacing the canal completely would solve both the stormwater overflow issues as well as the structural issues but is incredibly expensive and intrusive.
3. No Action - If no action is taken, the Crosstown Canal will remain a threat to public health and safety.

The Crosstown Canal in its current state remains a liability for the Village of Potsdam and a major danger in the case of a flooding storm event. It has been recommended that the Village and Town of Potsdam strongly consider installing stormwater storage areas and that the Village replace the roof of the canal. This project will cost approximately $15,400,000, but will help protect and improve the lives of Potsdam residents. (EDR Engineers Report on Crosstown Canal)

The area affected by flooding includes: Lawrence Ave., Clinton Street, Leroy Street, Broad Street, Pleasant Street, Garden Street, Munson Street, Waverly Street, Market Street, Elderkin, Canal, and Washington Street.

What will be affected by the hazard event?

Task A. Determine the proportion of buildings, the value of buildings, and the population in your community or state that are located in hazard areas.

Table 2.

Hazard: Flood

Type of Structure (Occupancy Class)	Number of Structures			Value of Structures			Number of People		
	# in Community or State	# in Hazard Area	% inHazard Area	$ in Community or State	$ in Hazard Area	% in Hazard Area	#in Community or State	# In Hazard area	% in Hazard area
Residential	2,543	120	5%	744.7 M	351.4 M	5%	9,688	444	4.6%
Commercial	146	4	3%	633.4 M	18.4 M	3%	0	0	0
Industrial	0	0	0	0	0	0	0	0	0
Agricultural	0	0	0	0	0	0	0	0	0
Religious/ Non-Profit	14	2	14%	30.4 M	4.3 M	14%	0	0	0
Government	6	1	17%	13 M	2.2 M	17%	0	0	0
Education	3	0	0%	3.3 B	3 B	0	0	0	0
Utilities	3	3	100%	8.7 M	16 M	100%	0	0	0
Total	2,715	130	5%	1.50 B	383.97 M	27%	9,688	444	4.6%

Updated Asset Inventory - Flooding

Task B. Determine whether (and where) you want to collect additional inventory data.

1. Do you know where your greatest damages may occur in your hazard area? Yes

2. Do you know whether your critical facilities will be operational after a hazard event? No
3. Is there enough data to determine which assets are subject to the greatest potential damages? Yes
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? Yes
5. Is there enough data to determine whether certain areas of historic, environmental, political, or cultural significance are vulnerable to potential hazards? Yes
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes
7. Is additional data needed to justify the expenditure of community or state funds for mitigation initiatives? No

This table (Table 2) contains the total assessed value of structures and number of people in Potsdam and compares that to the same data categories within the floodplain. In terms of 2019 USD, nearly $390 million worth of edifices in Potsdam are in danger, and 27% of Potsdam's structural value is within the hazard zone. Additionally, 4.6% of the population of Potsdam resides within the floodplain. Several assumptions were used to create this table. First, to verify the value of structures in Potsdam, the HP200 Climate Risk Assessment group spoke with village officials. To update the data, the group calculated what the current value of the structures would be in 2019 dollars instead of 2013 dollars based on changes in the Consumer Price Index (CPI). The second assumption made was that the number of people residing in the hazard area would not change dramatically as the population of Potsdam increases. Assuming this, the HP200 group updated the population of Potsdam, kept the number in the hazard area constant, and recalculated the increased value of structures. The old value for the percentage of people in the hazard area was 4.7%, so there is no statistical significance in a 0.1% change in population in the hazard area.

Microbursts

As defined by the US Department of Commerce & NOAA, "A microburst is a localized column of sinking air (downdraft) within a thunderstorm and is usually less than or equal to 2.5 miles in diameter. Microbursts can cause extensive damage at the surface, and in some instances, can be life-threatening. There are two primary types of microbursts: wet microbursts and dry microbursts. Wet microbursts are accompanied by significant precipitation and are common in the Southeast during the summer months." By definition microbursts are hard to predict.

Wind speeds are one of the major issues with Microburst storm events because maximum wind speeds can reach 100 MPH[16]. The most recent well-noted microburst event in Potsdam occurred in 2012 when the town suffered devastating damages through the center of the village as can be seen in Figure 11. This storm caused major damage to local businesses. Optimally, as more data and information is collected on microburst events, predictions can be generated about when microbursts will happen in Upstate New York so that residents can plan accordingly for which times of the year they are at the highest risk.

[16] US Department of Commerce - NOAA

Figure 11 : Damage from the 2012 Microburst Storm

In 2012 Potsdam experienced a damaging microburst. The residential, commercial, and institutional property damage related to the straight line storm was extensive.

Hazard: Microbursts

Table 3

Type of Structure (Occupancy Class)	Number of Structures			Value of Structures			Number of People		
	# in Community or State	# in Hazard Area	% inHazard Area	$ in Community or State	$ in Hazard Area	% in Hazard Area	#in Community or State	# In Hazard area	% in Hazard area
Residential	2,543	2,543	100%	686.6 M	686.6 M	100%	9,428	9,428	100%
Commercial	146	146	100%	584 M	584 M	100%	0	0	0
Industrial	0	0	0	0	0	0	0	0	0
Agricultural	0	0	0	0	0	0	0	0	0
Religious/ Non-Profit	14	14	100%	28 M	28 M	100%	0	0	0
Government	6	6	100%	12 M	12 M	100%	0	0	0
Education	3	3	100%	3 B	3 B	100%	0	0	0
Utilities	6	6	100%	16 M	16 M	100%	0	0	0
Total	2,718	2,718	100%	4.33 B	4.33 B	100%	9,428	9,428	100%

2013 FEMA Microbursts

Task B. Determine whether (and where) you want to collect additional inventory data.cture

1. Do you know where your greatest damages may occur in your hazard area? No
2. Do you know whether your critical facilities will be operational after a hazard event? No
3. Is there enough data to determine which assets are subject to the greatest potential damages? No
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? No
5. Is there enough data to determine whether certain areas of historic, environmental, political, or cultural significance are vulnerable to potential hazards? No
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes
7. Is additional data needed to justify the expenditure of community or state funds for mitigation initiatives? Yes

This table (Table 3) contains the total assessed value of structures and number of people in Potsdam and compares that to the same data categories within the microburst area. In terms of 2019 USD, over $4 billion worth of edifices in Potsdam are in danger, and 100% of Potsdam's structural value is within the hazard zone. Additionally, 100% of the population of Potsdam resides within the likely microburst area. Several assumptions were used to create this table. First, to verify the value of structures in Potsdam, the HP200 Climate Risk Assessment group spoke with village officials. To update the data, the group calculated what the current value of the structures would be in 2019 dollars instead of 2013 dollars based on changes in the Consumer Price Index (CPI). The second assumption made was that the number of people residing in the hazard area would not change dramatically as the population of Potsdam increases. Assuming this, the HP200 group updated the population of Potsdam, kept the number in the hazard area constant, and recalculated the increased value of structures.

Severe Storm - Winter

Winter storms can be severe in northern New York State. In 1998, the northeastern U.S. and the Canadian Provinces of Ontario and Quebec lost electrical and telecommunications services due to a severe ice storm. Many areas of St. Lawrence County were without electricity or telephone service for as long as 28 days in mid-winter. Within the Village, water and sanitary sewer services were able to continue on generator power, however, many Village and Town households were without a supplemental heat source for the duration of the storm (a high pressure system brought night time temperatures well below -20° F after the storm). There was a documentary published in 2017 by Cold Border Films about the impact this ice storm had on Potsdam. The documentary is titled "Resilience" and it is based on Dr. Stephen Farina's book, *The Grid and the Village*. The 30-minute documentary can be seen at the following link: https://vimeo.com/214484022. Winter storms, including both ice storms and blizzards, can tax the community's ability to respond and meet the needs of its residents for heat, food, and water.

Researchers at Clarkson University, National Grid, General Electric, and Nova Energy Specialists conducted a resilient microgrid planning and design project. This project was completed in 2019. The project concluded that a resilient underground microgrid serving critical loads in Potsdam would cost $20 million dollars. National Grid conducted a willingness to pay survey of the electric power consumers who would have been connected to this microgrid, and determined that, while there was a willingness to pay for resilient electric power, it was not sufficient to meet the price tag of the proposed microgrid.

There remains a need to provide electric power for critical services in Potsdam, in the event of a long term outage of the bulk power supply. While some of these needs are met by existing backup generation, an overall planning study is needed to determine the adequacy of current generation, and the need for additional assets. Where needs exist, the development of a cost effective plan needs to be developed to address these needs.

The FEMA analysis undertaken in 2013 determined that the structures and people that would be affected would be the same as in Table 3, but the answers to the follow-up questions are as follows:

Task B. Determine whether (and where) you want to collect additional inventory data.

1. Do you know where your greatest damages may occur in your hazard area? Yes
2. Do you know whether your critical facilities will be operational after a hazard event? Yes
3. Is there enough data to determine which assets are subject to the greatest potential damages? No
4. Is there enough data to determine whether significant elements of the community are vulnerable to potential hazards? No
5. Is there enough data to determine whether certain areas of historic, environmental, political, or cultural significance are vulnerable to potential hazards? No
6. Is there concern about a particular hazard because of its severity, repetitiveness, or likelihood of occurrence? Yes
7. Is additional data needed to justify the expenditure of community or state funds for mitigation initiatives? Yes

Economic Impacts of Storms

Economic impacts can result from property damage or from loss of power to properties. Both can occur during any severe weather event.

To try to understand economic impact better, flood, ice storm, and strong wind events were analyzed in this section within three different time frames. The first two time periods use data from past storm events, while the third time period is a future projection that provides cost and frequency predictions for these storm events. Figure 12 demonstrates the property damage costs associated with each of the three weather events that were analyzed for this project. These property damages were analyzed in St. Lawrence County by the National Oceanic and Atmospheric Administration (NOAA). The first time phase (1995-2005) was chosen as a baseline set of data. This date range was chosen because the source used to collect data (NOAA) was not able to display data before 1995. A note has been made in Figure 12 that reflects the fact that wind storm data collection only began in 2001.

The second data range analyzes the same weather events from 2006-2018. It contains the same content as the data in the first date range. This range of data was crucial in analyzing the trend in the data so that future projections could be obtained.

Lastly, the third data set was a projection for what the estimated severity and frequency would be for the three major weather events analyzed. The methodology for calculating the cost and frequency of each event varied. These methodologies will be further analyzed in the projection section of the report. In order to make comparisons between time periods easier, all property damage values in the three date ranges have been adjusted to 2019 dollars. An inflation calculator[17] was used to determine these property damage values.

[17] Staff, US Inflation Calculator. “US Inflation Calculator.” US Inflation Calculator, January 14, 2020. https://www.usinflationcalculator.com/.

				Years Analyzed	1995-2005				
Event Name	Frequency	Property Damage (Not Adjusted for Inflation)	Per Event Cost (Non Inflation)	Property Damage (Adjusted for 2019)*	Per Event Cost (Adjusted for 2019	Average Cost Per Year (2019 Dollars)	Range of Event Occurrence	No. of Years Analyzed**	No. of Events Per Year (Estimate)
Flood	6	$ 217,000.00	$ 36,166.67	$ 345,032.65	$ 57,505.44	$ 31,366.60	1/19/1996 - 7/18/2004	11	0.55
Ice Storm	1	$ 3,000,000.00	$ 3,000,000.00	$ 4,652,319.02	$ 4,652,319.02	$ 422,938.09	1/6/1998	11	0.09
Strong Wind	6	$ 23,000.00	$ 3,833.33	$ 30,728.42	$ 5,121.40	$ 6,145.68	5/27/2001 - 11/16/2005	5	1.20

				Years Analyzed	2006-2018				
Event Name	Frequency	Property Damage (Not Adjusted for Inflation)	Per Event Cost (Non Inflation)	Property Damage (Adjusted for 2019)*	Per Event Cost (Adjusted for 2019	Average Cost Per Year (2019 Dollars)	Range of Event Occurence	No. of Years Analyzed	No. of Events Per Year (Estimate)
Flood	8	$ 5,452,000.00	$ 681,500.00	$ 5,802,094.54	$ 725,261.82	$ 446,314.96	1/18/2006 - 4/15/2014	13	0.62
Ice Storm	3	$ 1,900,000.00	$ 633,333.33	$ 2,062,438.69	$ 687,479.56	$ 158,649.13	1/12/2012 - 12/21/2013	13	0.23
Strong Wind	14	$ 243,000.00	$ 17,357.14	$ 277,597.76	$ 19,828.41	$ 21,353.67	1/18/2006 - 1/10/2017	13	1.08

				Projected Years Analyzed	2019-2029			
Event Name	Frequency	Property Damage ($2019 Dollars)	Per Event Cost (Adjusted for 2019)	Per Event Cost Method of Estir	Average Cost Per Year (Adjusted for 2019)	No. of Years Affected	No. of Events Per Year (Estimate)***	No. of Events Per Year Method of Estimation
Flood	7.59	$ 10,573,008.09	$ 1,393,018.19	Linear Increase	$ 126,638.02	11	0.69	Linear Increase
Ice Storm	4.07	$ 10,866,490.12	$ 2,669,899.29	Average between two periods	$ 242,718.12	11	0.37	Linear Increase
Strong Wind	12.54	$ 433,074.16	$ 34,535.42	Linear Increase	$ 39,370.38	11	1.14	Averaging between two past periods

Note: These are Extremely rough estimates calculated by NOAA, original values have NOT been adjusted for inflation

*: Each storm was analyzed and an inflation calculator was used to estiamte what the cost in 2019 would be for the storms that occurred Inflation Calculator Source: https://www.usinflationcalculator.com/

**: Wind Storm data was collected starting in 2001, so the year analyzed had to start at 2001 in order to report accurate data ranges

***: Estimates on the Number of Events Per Year were calculated using a linear estimation method for Flood and Ice Events. The Strong Wind Projection Estimate was calculated using the Average between the No. of Events in the 1995-2005 and 2006-2018 data

Table 4: Storm Property Damage and Frequency Records & Projections

Table 4 depicts the Property Damage Cost and Frequency of each event over three different time periods. The last column, labeled No. of Events Per Year (Estimate), is what was used to project all property damage cost and frequency values for the projected time period of 2019-2029.

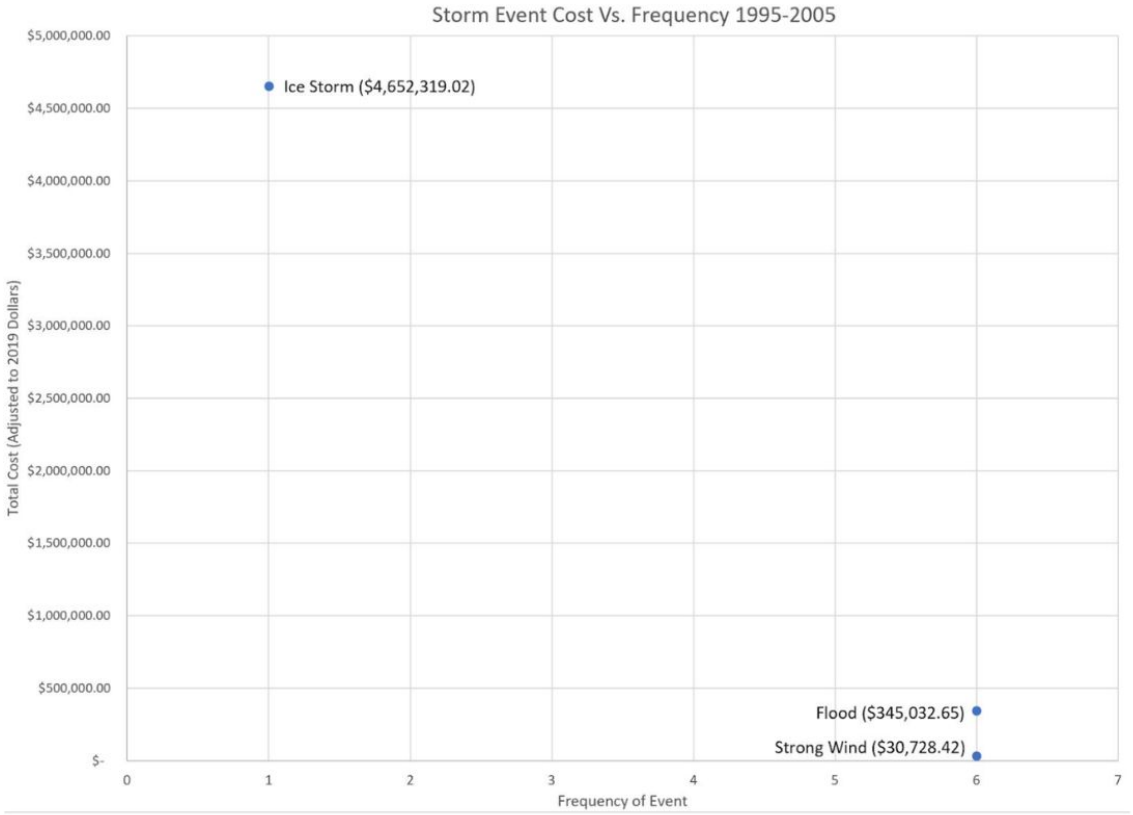


Figure 11: 1995-2005 Storm Events

Note on Graph Interpretation: *The costs of the events represent the total cost of all the storms combined over this time period. For example, the six flood events that happened from 1995 to 2005 produced a total damage of $345,032.65.*

The Ice Storm of 1998 was responsible for the most property damage ($4,652,319.02) during the first time period. There was only one major ice storm recorded during this period. Since 2001 there have been six strong wind storms totaling in property damage costs of $30,728.42. In addition to this there were six flood events. The total property damage of these events combined was $345,032.65. This data set acts as the first part of building the projection data set for these storm events. Figure 11 analyzes storm event cost and frequency between the years 2006 and 2018.

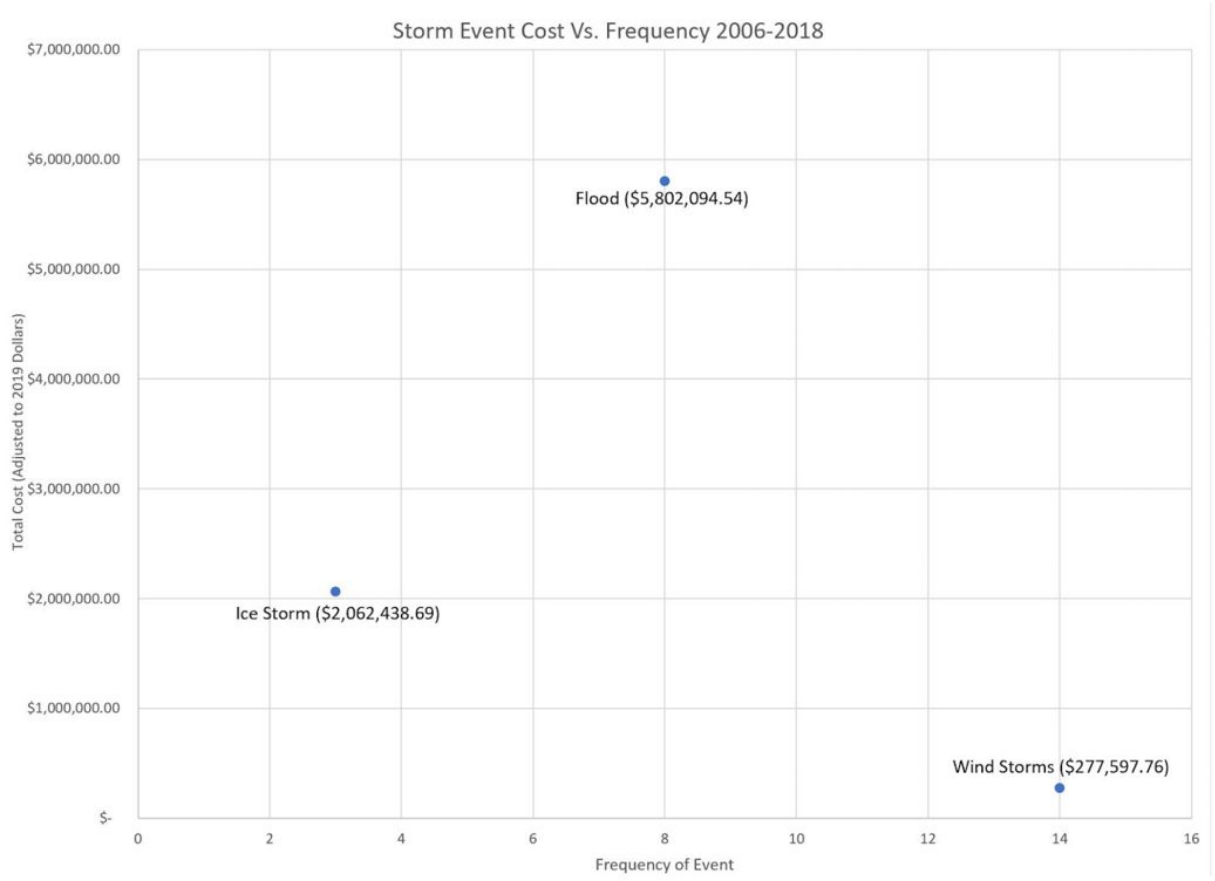


Figure 12: 2006-2018 Storm Events

In Figure 12, flood events were responsible for producing the most property damage in St. Lawrence County

Between the years 2006 and 2018, flooding produced the most damage of the three climate hazards. Flooding damage produced costs of $5,802,094.54, while ice storms produced costs of $2,062,438.69 and wind storms costs of $277,597.76. When comparing the frequency of all three events to the previous time period, all frequency values have increased respectively compared to the values in Figure 13. This illustrates how these storms over the selected time period are becoming a larger threat to St. Lawrence County.

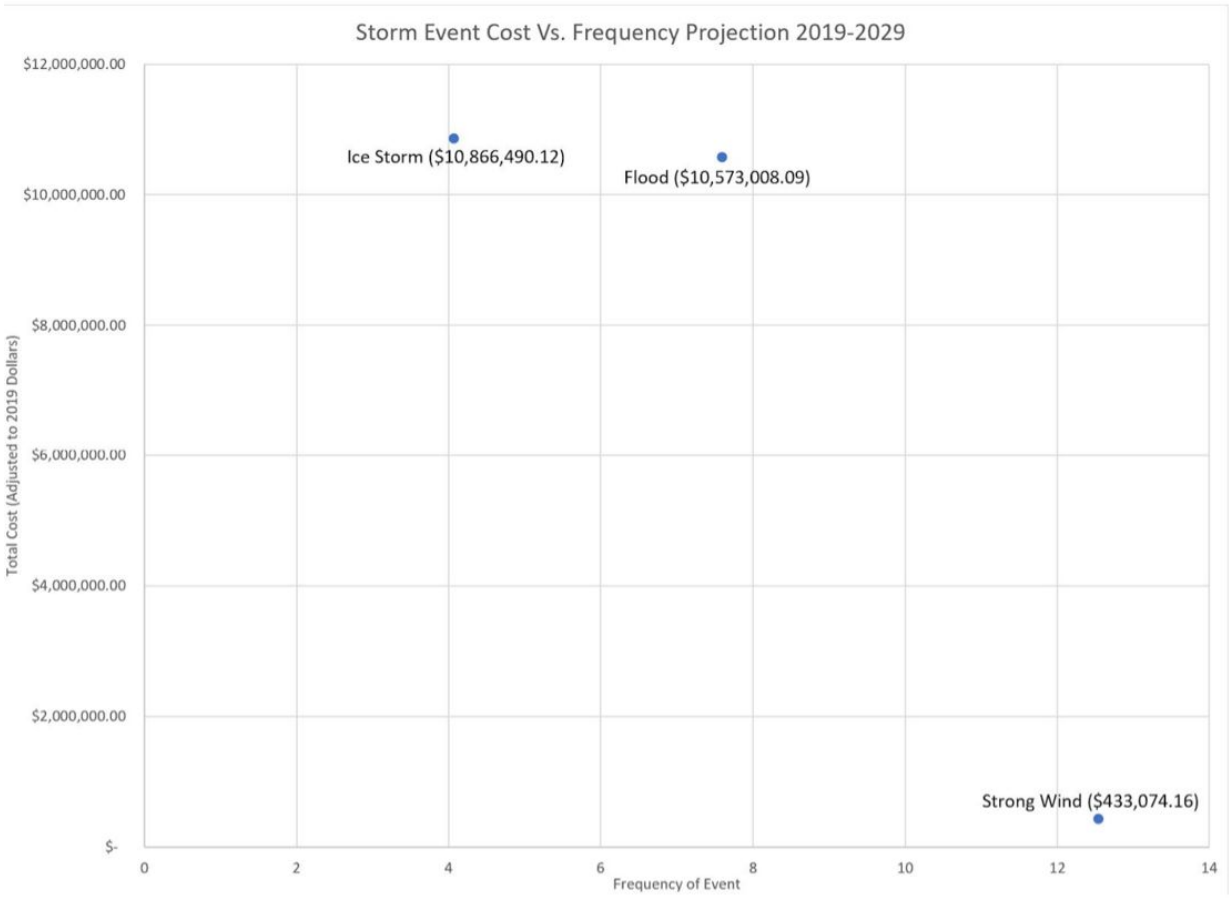


Figure 13: 2019-2029 Storm Events

Figure 13 outlines what the future severity and frequency of these storms are from 2019 to 2029

Using data from the first two date ranges, Figure 15 projects the property damage cost and frequency of each significant weather event.

First, looking at the ice storm events, a projection of 0.37 ice storms per year was calculated. This value was obtained by doing a linear regression of the number of events per year (estimated). From 1995-2005, it was determined that 0.09 ice storms occurred each year. In the next date range, it was determined that ice storm events had increased to 0.23 events per year. The increase from 1995-2005 to 2006-2018 was 0.14 ice storm events. Using this information, we added the 0.14 event increase to the 0.23 event value from 2006-2018 to obtain the estimate of 0.37 ice storms per year. While it is not possible to have 0.37 of an ice storm, it should be noted that the number of ice storms expected in the 2019-2029 time frame will increase. While the storm frequency for ice storms was determined to be a linear increase, the total cost of ice storms was found to be an average between the per event cost of ice storms between 1995-2005 and 2006-2018. The per event cost of the ice storms between 1995 and 2005 was $4,652,319.02. The per event cost of the ice storms between 2006 and 2018 was $687,479.56. It is difficult to predict the damage cost of ice storms going forward. The ice storm

of ‘98 looks like an outlier in this respect and it likely skews our data. Due to this being an extremely large difference in per event costs, an average cost of $2,669,899.29 was used for the 2019-2029 projection. We chose not to use a linear regression.

For the flood events, a linear regression was the chosen method to project how many flood events would occur from 2019-2029. The calculations in Figure 12 show that 0.55 flood events per year happened during the first time period analyzed, and 0.62 flood events happened per year during the second time period. This yields an estimated annual flood event estimate of 0.69 events per year from 2019-2029. Given that it is an eleven year period that is being analyzed, this 0.69 value will be multiplied by eleven to obtain 7.59. Based on the projections calculated, the expectation is that between seven and eight flood events will affect St. Lawrence County between 2019-2029. This is approximately an 11.3% increase compared to the date range of 2006-2018. Linear regression was also used to estimate the total cost of the flood events. The per event cost of a flood event from 1995 to 2005 was $57,505, and the per event cost was $725,262 from 2006-2018. Based on the data obtained from 2006-2018, there is reason to believe that flooding will not only become more frequent, but also become more damaging and costly to those affected by it. For this reason, a per event cost of $1,393,018 was a reasonable cost estimation.

Strong wind storms are defined by NOAA as having sustained winds over 30 knots (approximately 34.5 miles) per hour. In order to determine a future projection for wind storm events, the average estimated number of events per year from the two past time periods was taken. Numerically, the estimated 1.20 wind storms per year from 1995-2005 was averaged with the 1.08 wind storms per year from 2006-2018 for an average future projection of 1.14 wind storms per year from 2019-2029. Given that NOAA did not begin collecting data for strong wind storms until 2001, it was deemed that a linear regression for frequency was not the appropriate estimation method for this storm event. For this reason, an averaging technique was used to project future wind storm frequency.

In regards to wind storm cost, a linear trend was the appropriate method to use given the data obtained from 1995-2018. From 1995-2005, the per event cost was $5,121, and $19,828 from 2006-2018. Using linear regression, the model predicts that each strong wind storm will produce $34,535 in damages during the projected time frame.

Conclusion

Potsdam is at risk of multiple climate hazards caused by climate change. The most significant three hazards are flooding, ice storms, and microbursts. Past climate disasters have demonstrated how detrimental a climate event can be, such as the ice storm of ‘98 that left a lasting imprint on the people of Potsdam. Looking to the future, these climate hazards are increasing in strength and frequency making it imperative that the Town and Village of Potsdam be prepared.

In this report we have demonstrated that the climate is changing in our region at a greater rate than average. We have outlined our major vulnerabilities and highlighted them through three major events. In 1998 we experienced an ice storm that left many people in our region without electricity for 2-3 weeks. In 2010 the Raquette River swelled and flooded causing significant property damage. The event brought the Potsdam community's focus to the inadequacy of our cross-town canal. In 2012 a microburst tore through downtown Potsdam damaging many houses and businesses.

Looking at historical insurance claims for all three of these hazards has informed how expensive these hazards will become in the future. Carrying out this vulnerability report has been an informative exercise for our community. The Potsdam Climate Smart Community Task Force created a resiliency sub-committee to develop and submit this report. The subcommittee believes that the top two infrastructure needs that Potsdam has in this context are an update to the cross-town canal (including water retention upstream), and a microgrid with a backup energy supply to allow for continuity of operations for our community during the inevitable case of a natural disaster.

Appendix A: Asset Identification Checklist

This sheet was filled out by Fred Hanss (Village of Potsdam Planning Office) in 2013 as part of the HAZNY program and then updated in 2019 for the purposes of this report. These are common municipality assets that can prove useful during an emergency. An “X” signifies that the Village of Potsdam has this asset. Items that are italicized are under the jurisdiction of the town.

	Local, state and federal government offices within jurisdiction			Other (bloodmobiles, mobile health clinics)
X	Village Civic Center		X	Tunnels /Bridges Maple St. - 2 bridges Raquette River Sandstoner Dr. - I bridge Raquette River Rail bridge Raquette River *6 Bridges in Town outside Village*
X	*Town Office Building*			**Energy, water and related utility systems**
X	*Town Justice Court Building*		X	Electricity production, transmission, and distribution system components . East/West Hydros
X	U.S. Post Office			Oil/gas storage shipment facilities
	Military Installations including Reserve and National Guard component installations			Power plant fuel distribution, delivery and storage
X	Clarkson University Army ROTC		X	Telecommunications facilities • Verizon communications tower • Wireless transmission antennae
X	Clarkson University Army ROTC Supply Depot		X	Wastewater treatment plant *(Town - Unionville Plant)*
X	Clarkson University Air Force ROTC		X	Water supply/purification/distribution systems *(Town - Unionville)*
	Emergency Services			Telecommunications and information systems
X	Back-up Facilities *Town has back-up power at Town Office and Garage*			Cable TV facilities
X	Communications Center Police, Fire , Rescue, SUNY Police		X	Cellular network facilities
X	Emergency Operations Center, Village Office		X	Critical Cable Routes • DANC Fiber Optic Cable • SLJC Fiber Optic Cable
X	Fire/EMS Facilities		X	Major Rights-of-Way • U.S. Highway 11 • S.H. 56 and 11B
X	Law Enforcement Facilities • Village Police Department • SUNY Potsdam Police Dept.		X	Newspaper offices and production /distribution facilities
	Politically or Symbolically Significant Sites		X	Radio Stations
	Embassies, consulates			Satellite base stations
	Landmarks, monuments		X	Telephone trucking and switching systems
	Political party and special interest group offices			Television broadcast stations
X	Religious sites 12 Christian churches *(2 others in Town)* Jewish temple Muslim mosque			**Health care system components**
	Transportation infrastructure components		X	Emergency medical center
X	Airports Potsdam Damon Field Airport			Family planning clinics

X	Bus station ● Adirondack Trails ● SLC Commuter Service			Health Department offices
	Ferry Terminals		X	Radiological material and medical waste transportation, storage and disposal
	Interstate Highways		X	Research facilities, laboratories
X	Oil /gas pipelines Underground natural gas		X	Walk-in clinics
X	*Railheads/rail yards*			**Financial services infrastructure and institutions**
	Seaports/river ports			Armored car services
	Truck terminals ● LTI Transportation ● UPS		X	Banks and credit unions 8 banks/credit unions
	Agricultural facilities			**Recreational facilities**
	Chemical distribution storage and application sites		X	Auditoriums
	Crop spraying services			Casinos
X	*Farms and ranches*		X	Concert Halls/Pavilions
X	*Food processing, storage, distribution facilities*		X	Parks
	Commercial/manufacturing/industrial facilities			Restaurants/clubs frequented by potential target populations
X	Apartment buildings ● 9 complexes ● *Town also has 9 apartment clusters*		X	Sports arenas/stadiums
X	Business /corporate centers		X	Theaters
	Chemical plants/Sec. 302			**Public Private Institutions**
	Factories		X	Academic Institutions ● Potsdam Central School District ● Clarkson University ● SUNY Potsdam
	Fuel production, distribution, and storage facilities			Cultural centers
X	Hotels and convention centers		X	Libraries
X	*Industrial plants (Potter's Industries, Sheehan Asphalt Plant, Paper Mill)*		X	Museum
X	Malls and shopping centers ● 4 malls ● *Walmart, plaza across from Walmart*		X	Research facilities, laboratories
	Raw material production, distribution and storage facilities			Events and Attractions
X	Research facilities, laboratories ● Center for Advanced Materials Processing /Clarkson University ● Peyton Hall ● SUNY Potsdam		X	Festivals and celebrations
X	Shipping, warehousing, transfer and logistical centers - UPS		X	Open Air Markets
	Mobile Assets		X	Parades
X	Aviation and marine units Air Methods Air Ambulance			Rallies, demonstrations and marches
	Mobile emergency operations centers/command centers		X	Religious services
X	Portable telecommunications equipment			Scenic tours
	Red Cross Emergency Response Vehicles, Salvation Army mobile			Theme parks

	canteens			

Appendix B: Capability Assessment Worksheet for the Village

Jurisdiction: Village of Potsdam

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Please indicate which of the following your jurisdiction has in place.

Plans	Yes/No Year	Does this plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan	Yes 2013	See narrative
Capital Improvements Plan	No	
Economic Development Plan	Yes 2013	See narrative
Local Emergency Operations Plan	No	
Continuity of Operations Plan	No	
Transportation Plan	No	
Stormwater Management Plan	No	
Community Wildfire Protection Plan	No	
Other special plans (e.g.,	No	

brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)		

Building Code, Permitting, and Inspections	Yes/No	Are codes adequately enforced?
Building Code	Yes	Version/Year: NYS Uniform Fire Prevention & Building Code - 2010
Building Code Effectiveness Grading Schedule (BCEGS) score	Yes	Score: Class 5 - 1 & 2 Family Homes Class 5 - Commercial & Industrial Buildings
Fire department ISO rating	Yes	Rating: Class 5
Site plan review requirements	Yes	See attached narrative
Land Use Planning and Ordinances	**Yes/No**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning ordinance	Yes	`See narrative
Subdivision ordinance	Yes	See narrative
Floodplain ordinance	Yes	See narrative
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	No	
Flood insurance rate maps	Yes	See narrative
Acquisition of land for open space and public recreation uses	Yes	
Other		

How can these capabilities be expanded and improved to reduce risk?
See narrative

Administrative and Technical

Identify whether your community has the following administrative and technical capabilities. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level of government that can provide technical assistance, indicate so in your comments.

Administration	Yes/No	Describe capability Is coordination effective?
Planning Commission	Yes	See narrative
Mitigation Planning Committee	No	
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	See narrative
Mutual aid agreements	Yes	See narrative
Staff	**Yes/No FT/PT**	**Is staff adequate to enforce regulations? Is staff trained on hazards and mitigation**
Chief Building Official	Yes FT	See narrative
Floodplain Administrator	Yes PT	See narrative
Emergency Manager	No	
Community Planner	Yes FT	See narrative
Civil Engineer	No	

GIS Coordinator	Yes PT	See narrative
Other		

Technical	Yes/No	Describe Capability Has capability been used to assess/mitigate risk in the past?
Warning systems/services (reverse 911, outdoor warning signals)	Yes	Paper Reverse 911 Directory (phone book) Fire Whistle
Hazard data and information	Yes	Paper and Online Data/Information
Grant writing	Yes	See narrative
Hazus analysis	No	
Other		

How can these capabilities be expanded and improved to reduce risk?
See narrative

Administrative and Technical

Identify whether your community has the following administrative and technical capabilities. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level of government that can provide technical assistance, indicate so in your comments.

Administration	Yes/No	Describe capability Is coordination effective?
Planning Commission	Yes	See narrative
Mitigation Planning Committee	No	
Maintenance programs to reduce risk (e.g., tree	Yes	See narrative

trimming, clearing drainage systems)		
Mutual aid agreements	Yes	See narrative
Staff	Yes/No FT/PT	Is staff adequate to enforce regulations? Is staff trained on hazards and mitigation
Chief Building Official	Yes FT	See narrative
Floodplain Administrator	Yes PT	See narrative
Emergency Manager	No	
Community Planner	Yes FT	See narrative
Civil Engineer	No	
GIS Coordinator	Yes PT	See narrative
Other		

Technical	Yes/No	Describe Capability Has capability been used to assess/mitigate risk in the past?
Warning systems/services (reverse 911, outdoor warning signals)	Yes	Paper Reverse 911 Directory (phone book) Fire Whistle
Hazard data and information	Yes	Paper and Online Data/Information
Grant writing	Yes	See narrative
Hazus analysis	No	
Other		

How can these capabilities be expanded and improved to reduce risk?
See narrative

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	Access/Eligibility (Yes/No)	Has the funding resource been used in the past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	Yes	Various DEC funded programs have accessed in the past and may be available
Authority to levy taxes for specific purposes	No	
Fees for water, sewer, gas, or electric services	Yes	The Village assesses fees for water and waste water services
Impact fees for new development	No	
Stormwater utility fee	No	
Incur debt through general obligation bonds and/or special tax bonds	Yes	Potential for use
Incur debt through private activities	No	
Community Development Block Grant	Yes	The CDBG Program has been used for housing rehab. Future mitigation possible.
Other federal funding programs	Yes	Funding though the USDA Rural Development FEMA or EPA
State funding programs	Yes	DEC or Environmental Facilities Corp. Programs.
Other		

How can these capabilities be expanded and improved to reduce risk?

Education and Outreach

Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local Citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Volunteer Fire Dept. and Red Cross may be able to assist with mitigation
Ongoing public education or information program (e.g., responsible water use, fire safety, household preparedness, environmental education)	No	
Natural disaster or safety related school programs	No	
StormReady certification	No	
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues	No	
Other	No	

How can these capabilities be expanded and improved to reduce risk?
Education and training would be of assistance. Development of a local Memorandum of Understanding to develop risks/hazards.

Planning and Regulatory

Comprehensive /Master Plan

The Village of Potsdam developed its 2012-2022 Comprehensive Plan through a community-based planning effort. A final draft was adopted in January 2013. The plan can be read or downloaded from the Village's website: < www.vi.potsdam.ny.us >.

Economic Development Plan

The Village's 2012-2022 Comprehensive Plan has a number of recommendations to guide economic development over the next decade.

Building Code, Permitting and Inspections

Site Plan Review Requirements - The Village's site plan review law can be found in the Village Code §180-32; the code can be viewed or downloaded from the Village's website. Site plan review is under the purview of the Village's Planning Board with technical support for the Director of Planning and Development and the Code Enforcement Officer. Given NYS' requirement for continuing education of volunteers on planning and zoning boards of appeal, the level of skill and professionalism has developed over the last five years making enforcement more than adequate.

Land Use Planning and Ordinances

Zoning Ordinance - The Village Board of Trustees has adopted planning and zoning laws that are found in the Village Code at §180. As noted above, the Village Code is available for review or may be downloaded from the Village website. A copy of the Village's 2013 Zoning Map is attached hereto. Please note that those areas of the Village along the Raquette River that are flood prone are largely zoned as a Natural Conservation District. The highest and best use of these flood prone areas of the Village is for parks and open space. The Village has purchased or received nearly 16 acres of waterfront parklands in addition to parklands owned by SUNY Potsdam and Clarkson University.

Flood Insurance Rate Maps - The Village of Potsdam is a covered jurisdiction in the National Flood Insurance Program. Village floodplain development regulations are administered through the Village Code Enforcement Office. Housing development and rehabilitation projects funded through NYS or the federal governments are subject to state and federal floodplain development regulations and reviews are incorporated in State Environmental Quality Review Act and National Environmental Policy Act reviews

Administrative and Technical

Planning Commission

The Planning Board and Zoning Board of Appeals are tasked with the administration of §180 of the Village Code. The boards are Village resident volunteers. NYS law requires that members of

Planning Boards and Zoning Board of Appeals receive at least four hours of annual continuing education on planning and zoning topics. This training is available on-line as well as at workshops and seminars conducted in St. Lawrence County. Members of the Village Planning Board and the Zoning Board of Appeals are skilled and professional and there is adequate coordination between the two bodies.

Maintenance Programs - The Village undertakes maintenance and upkeep of infrastructure to the best of ability and its financial capacity. Maintenance activities are focused on the water supply and distribution system, the wastewater collection and treatment system, stormwater collection and discharge facilities, maintenance of civic buildings, roadways, sidewalks, traffic control devices, signage and the Village's urban forest. These activities are often undertaken with shared manpower and equipment provided by the Town of Potsdam and County of St. Lawrence.

Mutual Aid Agreements -The Potsdam Fire Department has effective mutual aid agreements with surrounding fire departments; the Village police have similar arrangements with the St. Lawrence County Sheriff and the NYS Police.

Chief Building Official - Village Code Enforcement staff is adequate to effectively enforce State building codes and Village planning and zoning laws. Staff are trained on hazard mitigation as this pertains to the fire prevention and building code and incorporates such reviews in the issuance of building permits/certificates of occupancy.

Community Planner - The Village has a planner on staff that has an expertise in environmental review, especially as it pertains to planning and zoning law. The Village planner is called on to assist in planning for hazard mitigation and disaster recovery. The Village planner regularly coordinates reviews and related activities with the St. Lawrence County Planning Office.

GIS Coordinator - The Village administrator and the Planning and Development Office's administrative assistant are skilled at mapping using the Village's in-house GIS system. The Superintendent of Public Works collects infrastructure data that he inputs in the system. Village employees regularly coordinate efforts with the St. Lawrence County Planning Office.

Grant Writing - The Village Planner is typically tasked with grant writing for a wide range of projects including: economic development, housing rehabilitation, infrastructure, downtown and historic preservation and urban forestry.

How Can Capabilities Be Expanded and Improved to Reduce Risk?

Potsdam should develop an emergency preparedness plan that addresses, at a minimum , the hazards outlined in Form 3a. The plan should include a local emergency operations plan that identifies:

1. Local organizations that can assist in the event of a man-made or natural disaster or emergency (Village and SUNY Potsdam Police Departments , Sheriff and State Police; Potsdam Fire Department and mutual aid departments; state and county emergency services offices, the Red Cross, representatives of utilities such as Brookfield Renewable Energy and National Grid, NYSDOT, CSX (Now Canadian National Railway Co.), etc.).
2. The principal parties who will be responsible for managing the preparations or response to an emergency or disaster.
3. Where the Village will locate its emergency operations centers and the human and material resources needed to operate such a facility.
4. The physical assets and infrastructure available to the Village to respond to a disaster (communications systems, vehicles, equipment, power generation equipment) their location and condition.
5. Village staff people that may play a role in the community's response to an emergency should be identified and receive the training necessary to assist in preparing for or in responding to an emergency or disaster.

Appendix C: Capability Assessment Worksheet for the Town

Jurisdiction: Town of Potsdam

Local mitigation capabilities are existing authorities, policies, programs, and resources that reduce hazard impacts or that could be used to implement hazard mitigation activities. Please complete the tables and questions in the worksheet as completely as possible. Complete one worksheet for each jurisdiction.

Planning and Regulatory

Planning and regulatory capabilities are the plans, policies, codes, and ordinances that prevent and reduce the impacts of hazards. Please indicate which of the following your jurisdiction has in place.

Plans	Yes/No Year	Does this plan address hazards? Does the plan identify projects to include in the mitigation strategy? Can the plan be used to implement mitigation actions?
Comprehensive/Master Plan	Yes 2020	Will be approved by Town in 2020
Capital Improvements Plan	No	

Economic Development Plan	No	
Local Emergency Operations Plan	No	
Continuity of Operations Plan	No	
Transportation Plan	No	
Stormwater Management Plan	No	
Community Wildfire Protection Plan	No	
Other special plans (e.g., brownfields redevelopment, disaster recovery, coastal zone management, climate change adaptation)	No	

Building Code, Permitting, and Inspections	Yes/No	Are codes adequately enforced?
Building Code	Yes	Version/Year: NYS Uniform Fire Prevention & Building Code - 2015
Building Code Effectiveness Grading Schedule (BCEGS) score	Yes	Score: Class 5 - 1 & 2 Family Homes Class 4 - Commercial & Industrial Buildings (2016)
Fire department ISO rating	Yes	Rating: Class 5
Site plan review requirements	Yes	
Land Use Planning and Ordinances	**Yes/No**	**Is the ordinance an effective measure for reducing hazard impacts? Is the ordinance adequately administered and enforced?**
Zoning ordinance	Yes	
Subdivision ordinance	Yes	
Floodplain ordinance	Yes	
Natural hazard specific ordinance (stormwater, steep slope, wildfire)	No	
Flood insurance rate maps	Yes	

Acquisition of land for open space and public recreation uses	No	
Other		

How can these capabilities be expanded and improved to reduce risk?
See narrative

Administrative and Technical

Identify whether your community has the following administrative and technical capabilities. These include staff and their skills and tools that can be used for mitigation planning and to implement specific mitigation actions. For smaller jurisdictions without local staff resources, if there are public resources at the next higher level of government that can provide technical assistance, indicate so in your comments.

Administration	Yes/No	Describe capability Is coordination effective?
Planning Commission	No	
Mitigation Planning Committee	No	
Maintenance programs to reduce risk (e.g., tree trimming, clearing drainage systems)	Yes	See narrative
Mutual aid agreements	Yes	With 2 villages, county, and state
Staff	**Yes/No FT/PT**	**Is staff adequate to enforce regulations? Is staff trained on hazards and mitigation**
Chief Building Official	No	
Floodplain Administrator	No	
Emergency Manager	No	

Community Planner	No	
Civil Engineer	No	
GIS Coordinator	Yes	Highway Superintendent works with GIS
Other		

Technical	Yes/No	Describe Capability Has capability been used to assess/mitigate risk in the past?
Warning systems/services (reverse 911, outdoor warning signals)	No	
Hazard data and information	Yes	Hazard Response Plan
Grant writing	No	
Hazus analysis	No	
Other		

How can these capabilities be expanded and improved to reduce risk?
See narrative

Financial

Identify whether your jurisdiction has access to or is eligible to use the following funding resources for hazard mitigation.

Funding Resource	Access/Eligibility (Yes/No)	Has the funding resource been used in the past and for what type of activities? Could the resource be used to fund future mitigation actions?
Capital improvements project funding	No	
Authority to levy taxes for specific purposes	No	

Fees for water, sewer, gas, or electric services	Yes	The Town assesses fees for water and waste water services, and lighting services in those districts
Impact fees for new development	No	
Stormwater utility fee	No	
Incur debt through general obligation bonds and/or special tax bonds	Yes	Potential for use
Incur debt through private activities	No	
Community Development Block Grant	Yes	The CDBG Program has been used for housing rehab. Future mitigation possible.
Other federal funding programs	Yes	
State funding programs	Yes	DEC or Environmental Facilities Corp. Programs.
Other		

How can these capabilities be expanded and improved to reduce risk?

Education and Outreach

Identify education and outreach programs and methods already in place that could be used to implement mitigation activities and communicate hazard-related information.

Program/Organization	Yes/No	Describe program/organization and how relates to disaster resilience and mitigation. Could the program/organization help implement future mitigation activities?
Local Citizen groups or non-profit organizations focused on environmental protection, emergency preparedness, access and functional needs populations, etc.	Yes	Volunteer Fire Dept. and Red Cross may be able to assist with mitigation
Ongoing public education or information program (e.g., responsible water use, fire safety,	No	

household preparedness, environmental education)		
Natural disaster or safety related school programs	No	
StormReady certification	No	
Firewise Communities certification	No	
Public-private partnership initiatives addressing disaster-related issues	No	
Other	No	

How can these capabilities be expanded and improved to reduce risk?
Education and training would be of assistance. Development of a local Memorandum of Understanding to develop risks/hazards.

Planning and Regulatory

Comprehensive /Master Plan -The Town of Potsdam is currently working on a Comprehensive Plan. Adoption is expected in 2020.

Building Code, Permitting and Inspections

Site Plan Review Requirements - The Town's site plan review law can be found in Town Code §110-13.1; the code can be viewed or downloaded from the Town's website. Site plan review is under the purview of the Town's Planning Board with technical support from the Code Enforcement Officer. Given NYS' requirement for continuing education of volunteers on planning and zoning boards of appeal, the level of skill and professionalism has developed over the last five years making enforcement more than adequate.

Land Use Planning and Ordinances

Zoning Ordinance - The Town Board has adopted planning and zoning laws that are found in the Town Code at §110. A copy of the Town's Zoning Map can be found on the Town's website.

Flood Insurance Rate Maps - The Town of Potsdam is a covered jurisdiction in the National Flood Insurance Program. Floodplain development regulations are administered through the Code Enforcement Office. Housing development and rehabilitation projects funded through NYS or the federal governments are subject to state and federal floodplain development regulations and reviews are incorporated in State Environmental Quality Review Act and National Environmental Policy Act reviews

Administrative and Technical

Planning Commission - The Planning Board and Zoning Board of Appeals are tasked with the administration of §110 of the Town Code. These boards are comprised of Town resident volunteers. NYS law requires that members of Planning Boards and Zoning Board of Appeals receive at least four hours of annual continuing education on planning and zoning topics. This training is available on-line as well as at workshops and seminars conducted in St. Lawrence County.

Maintenance Programs - The Town undertakes maintenance and upkeep of infrastructure to the best of ability and its financial capacity.

Mutual Aid Agreements -The Potsdam Fire Department has effective mutual aid agreements with surrounding fire departments.

How Can Capabilities Be Expanded and Improved to Reduce Risk?

The Town and Village of Potsdam should develop an emergency preparedness plan that addresses, at a minimum , the hazards outlined in Form 3a. The plan should include a local emergency operations plan as outlined above in the Village narrative.

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