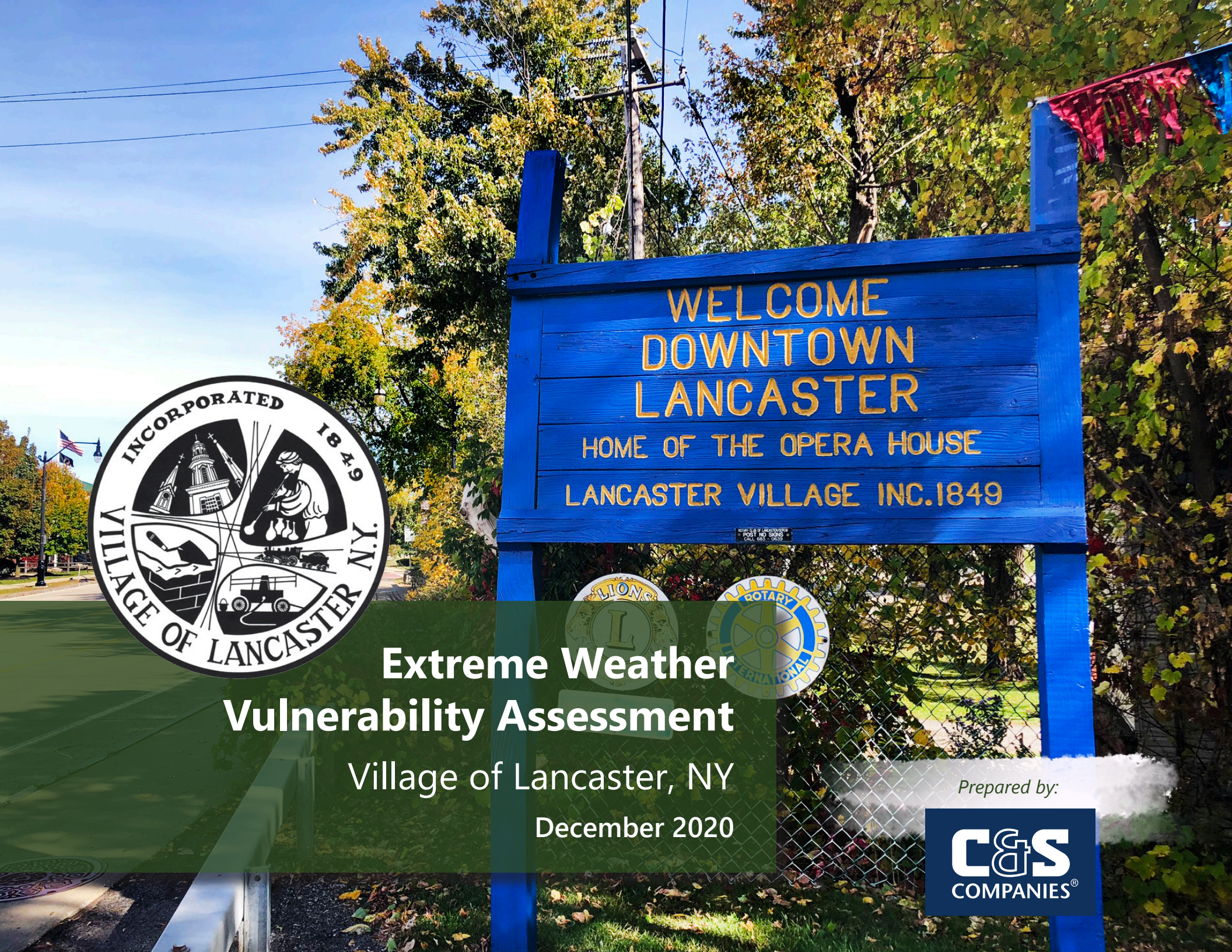

Extreme Weather Vulnerability Assessment

Village of Lancaster, NY

December 2020

Prepared by:

C&S COMPANIES®

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CONTENTS

INTRODUCTION

As communities all across the world grapple with the realities of climate change, the Village of Lancaster has begun taking definitive, proactive steps to protect its residents, businesses, and institutions from the worsening threat of extreme weather events. Climate change is a global phenomenon, and will have impacts of varying manifestation and degree in places the world over. As weather events of recent years have shown us, the Greater Northeast and Great Lakes region generally, and Western New York and the Village of Lancaster specifically, will not be spared these impacts, nor will our communities understand all potential impacts before they happen.

With this in mind, the Village initiated this study: the *Village of Lancaster Extreme Weather Vulnerability Assessment.* Conducted over the course of 2020, the purpose of this study is to assist the Village in analysis and preparation for climate change-related events to come. Specifically, this Assessment will inform the Village which assets are most critical and/or vulnerable to two types of extreme weather events: flooding and increased snowfall.

Incorporating a regional- and community-level review of available data; a scan of Village infrastructure and facilities; site reconnaissance; and the insight and expertise of Village officials, agency partners, and community members, this

study is a significant first step in identifying critical assets and potential hazards, as well as providing recommendations for hardening the Village against extreme weather events.

This study also represents a continuum of effort on the part of the Village toward their Climate Smart Communities pledge with the State of New York. This report and associated mapping will serve as further documentation in support of Section PE7 actions leading to Climate Smart Communities certification.

The following report represents the Village of Lancaster's assessment of two key extreme weather vulnerabilities, its vision for a more resilient future, and specific recommendations to advance that cause.

THE CHALLENGE

CLIMATE CHANGE

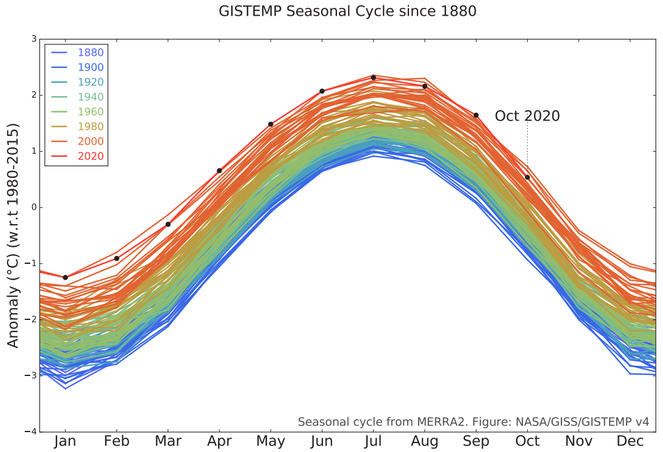
The threat of global warming and effects of climate change have become increasingly evident in recent years. The trends of the last half-century have quickened their pace, from increased wildfires, to melting glaciers, to greater frequency and severity of hurricanes and other major storms. Major scientific indicators illustrate the severity of the situation:*

- The global average temperature has risen by more than 2% since the late 1800s, demonstrating the impact of human activity since the dawn of the Industrial Revolution.
- Minimum ice cover in the Arctic is now declining by more than 13% per decade, significantly reducing the Arctic ice sheet's important cooling effect on the planet.
- Globally, the world's ice sheets are losing more than 428 billion metric tons of ice per year.
- Global average sea level has risen about 8 inches in the last century, and is now rising 3.3 millimeters per year.
- Carbon dioxide levels in the atmosphere have reached 415 parts per million, which is the highest global level in the last 650,000 years.

These indicators, among a large and growing body of evidence, point to global warming of huge magnitude, unprecedented in recent world history. Scientists continue to cite the many effects of global climate change, and with each passing year, what we see on the news continues to highlight the real-world impact on the natural world, people, and communities. More heat waves and droughts, more frequent and intense hurricanes, rising sea levels, and – perhaps most relevant to this assessment – significant changes in precipitation patterns.

** Data source: US National Aeronautic and Space Administration (NASA)*

So, the earth's average temperature has increased about 2 degrees Fahrenheit during the 20th century. What's the big deal? Two degrees may sound like a small amount, but it's an unusual event in our planet's recent history. Earth's climate record, preserved in tree rings, ice cores, and coral reefs, shows that the global average temperature is stable over long periods of time. Furthermore, small changes in temperature correspond to enormous changes in the environment. For example, at the end of the last ice age, when the Northeast United States was covered by more than 3,000 feet of ice, average temperatures were only 5 to 9 degrees cooler than today.



EXTREME WEATHER

Climate and weather are two distinct things. Climate is about big-picture, long-term averages and trends, and considers the major patterns of overall conditions over time. Weather is what you experience outside at any given moment in time. In the discussion about climate change, people sometimes conflate these two concepts, and will suggest that, for example, because we might experience a really cold winter day, global warming isn't happening. This is a false assertion.

Even as climate change and its impacts continue to increase across the globe, we will still have cold days in the winter, mild days in the spring and fall, and hot (or sometimes cool) days in the summer. Some conditions we have come to expect as normal will persist; however, the effects of climate change will occasionally – and with increasing regularity – translate to weather, which may be surprising and, at times, extreme in nature.

The unprecedented nature of these changes in global climate means that human systems – infrastructure, buildings, transportation, and technology – have not yet had to adjust and adapt to such significant and rapid upheaval in weather patterns. Extreme weather events are already increasing in frequency. We can all think of such events over the course of recent years. How did those events affect your community? What stresses were experienced and needed to be overcome?

Climate scientists expect significant changes in precipitation patterns across the globe. In its *NYS 2100 Commission Report**, New York State has specifically cited both changing precipitation and extreme weather events as two of the most serious threats of climate change in the years ahead. Among the specific impacts mentioned are increased precipitation – particularly during non-summer months – and sustained heavy downpours causing localized flash flooding and erosion. Low-lying and urban areas are even more susceptible to these weather events, due to greater area of impervious surfaces.

In its *ClimAID Report**, the New York State Energy Research and Development Authority (NYSERDA) also highlights the threat of increased precipitation, including increased frequency and intensity of heavy downpours, heavy winds, and flash flooding.

This report also specifically mentions increased snowfall as a threat posed by climate change-induced weather events. Annual ice cover on the Great Lakes has decreased 71% since 1973. A warming climate is likely to mean less freezing on the Great Lakes, which will mean greater moisture availability to dry winter winds crossing the region and picking up more moisture. As a region frequently subject to lake-effect snow, this may translate to larger and/or more frequent lake-effect snow events for Western New York, including the Village of Lancaster.

*https://www.governor.ny.gov/sites/governor.ny.gov/files/archive/assets/documents/NYS2100.pdf

*https://www.nyserda.ny.gov/About/Publications/Research%20and%20Development%20Technical%20Reports/Environmental%20Research%20and%20Development%20Technical%20Reports/Response%20to%20Climate%20Change%20in%20New%20York

THE CONTEXT—VILLAGE OF LANCASTER OVERVIEW

As we think through these challenging issues, one can imagine global climate change, weather, and localized weather events and impacts on a continuum. We know climate change is real, ongoing, and increasing in speed and severity. We know this phenomenon will lead to greater volatility and intensity in weather patterns and events; therefore, it becomes imperative that communities everywhere consider what can be done to make themselves stronger and more resilient to these impacts. This includes the Village of Lancaster, New York.

Incorporated in 1849, the Village has a land area of 2.7 square miles and a population of approximately 10,300 residents. It is situated in north-central Erie County and is bisected by two rail lines, New York State Route 20 and Cayuga Creek. Formerly named Cayuga Creek, the Village of Lancaster has a history tied to the creek itself. The community was originally established around a grist mill, and the current street grid, transportation network, land use pattern, and infrastructure alignment are all related to and have been influenced by the creek.

Due to its historical and contemporary significance to the Village, Cayuga Creek is the primary focal point around which this study examines key extreme weather challenges.

PROJECT DESCRIPTION

In early 2020, the Village of Lancaster engaged a dedicated group of public officials, experts, and volunteers to spearhead this effort to conduct an Extreme Weather Vulnerability Assessment. For this effort, the Village engaged the C&S Companies to help determine which assets are most critical and/or vulnerable to two types of extreme weather events: flooding and increased snowfall.

The following is an outline of the scope of this project:

STAKEHOLDER COORDINATION

- Stakeholders included representatives from the Department of Public Works, Office of Emergency Management, and county and state departments of transportation.
- *Meeting 1: Project Kickoff*—Solicited input from Village regarding specific locations or "hot spots" that are known to experience hazard events. Identified facilities and transportation infrastructure critical to the Village operations.
- *Meeting 2: Plan for Future*—Assisted Village officials and staff with the drafting of a vision statement, future goals, and policy outlines for implementation based on the results of these vulnerability assessments.

DISCOVERY PHASE

The discovery or inventory phase focused on the efficient assembly and organization of relevant information.

- Gathered and reviewed existing community plans
- Obtained existing GIS mapping from the NYS Clearing House and other municipal, county, regional, state, and federal mappers, including:
  - Hydrography (streams, rivers, waterbodies)
  - State and federal wetlands
  - 100-year flood plains
  - Archeological sensitive areas
  - Critical habitat areas
  - Publically owned parks and recreation areas
  - Village boundary
  - Village facilities
  - Storm system infrastructure
  - Transportation assets (roads, bridges, railroads, and sidewalks)
  - NYSDOT functional class
  - NYS traffic data

IDENTIFICATION OF HAZARDS

Potential natural hazards were based on existing hazard mitigation plans and regional climate models, including NYSERDA's ClimAID Climate Risk Information:

- Conducted flood risk assessment and mapping from the following:
  - River flooding
  - Ice jams
  - Storm system surcharges
  - Local poor drainage areas
  - High ground water levels
- Conducted snow/ice risk assessment
  - Identified areas of potential risk from snow and ice loading
  - Identified known areas of sidewalk and road icing
  - Identified existing known area of blowing snow

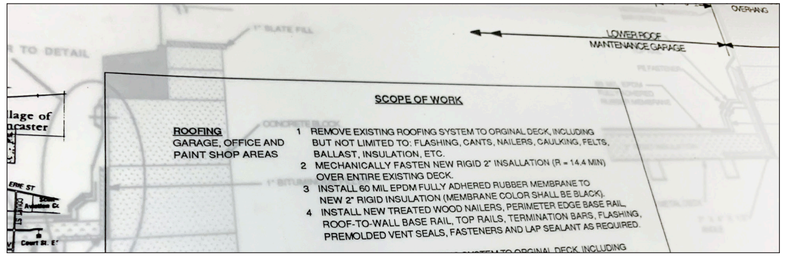
ASSET VULNERABILITIES ASSESSMENTS

- Up to four facilities, including the Lancaster Municipal Building, assessed regarding their vulnerability to flooding and snow loads. Facility assessments are of observed conditions identified without destructive or intrusive means and include interaction with facilities' staff who maintain the buildings. Existing available record plans reviewed to assess snow/ice load capacity of roof systems.
- Visual assessments of existing transportation infrastructure conditions observed without destructive or intrusive means. Interaction with transportation agencies took place through the stakeholder engagement process and follow-up conference calls as needed. Existing available record plans were reviewed to:
  - Identify features of bridge structures that could contribute to upstream flooding or ice jams
  - Assess bridge vulnerability to hydraulic flow during flood events
  - Assess capacity of storm water management systems to accommodate flow during flood events
  - Assess the ability of Cayuga Creek to safely convey surface water through the Village during its response to weather events
- Transportation and facility vulnerability has been added to the GIS database. A code of red, yellow, and green has been used to score the assets as high, moderate, or low vulnerability to either flooding or snow/ice load hazards. Scoring is based on how critical the asset is to Village operations and transportation and its exposure and sensitivity (how severe the potential impact is) to hazards.

RECOMMENDATIONS AND DELIVERABLES

- Identification of hazard mitigation strategies for critical Village assets that are identified as being most vulnerable to flooding or snow and ice risks. Strategies include:
  - Planning and policy
  - Capital projects
    - Physical or structural improvements
    - Natural resource protection improvements
  - Services and programs
    - Communication and Education
    - Operations and Maintenance
- *Extreme Weather Vulnerability Assessment report*—A draft final report compiling the inventory, hazard extents, vulnerability analysis, and mitigating actions will summarize the entire effort and include all GIS graphics, methodologies, and findings. The report documents where there may be need for additional study/mitigation. Following receipt of a consolidated set of comments from the Village and Stakeholders, a final report was prepared and issued. Final deliverables include electronic and hard copies of the assessment report.
- Mapping of Village environmental features, potential hazards, transportation infrastructure, and facility assets. All GIS files submitted for future use and updating as information becomes available or actions are implemented.

This project ran approximately from April to December of 2020.



VISION STATEMENT

As part of the assessment process, the Village of Lancaster's Advisory Committee drafted a Vision Statement. This statement is primarily meant to guide this project – the Extreme Weather Vulnerability Assessment; however, the Village is encouraged to take this Vision Statement and use it to generate meaningful community dialogue, which may lead to a new, more holistic Vision Statement for the Village and its efforts to make the community stronger and more resilient to potential shocks.
In creation of the Vision Statement, the project Advisory Committee discussed relevant definitions of resilience. The dictionary definition is: The capacity to recover quickly from difficulties; toughness.

Additional discussion considered a broader definition of resilience in a community context. Online resources pointed us toward the following:

COMMUNITY RESILIENCE

Community resilience is the sustained ability of a community to use available resources (energy, communication, transportation, food, etc.) to respond to, withstand, and recover from adverse situations (e.g. economic collapse to global catastrophic risks). This allows for the adaptation and growth of a community after disaster strikes. Communities that are resilient are able to minimize any disaster, making the return to normal life as effortless as possible. By implementing a community resilience plan, a community can come together and overcome any disaster while rebuilding physically and economically.

This definition, and the associated discussion with the Village's project Advisory Committee, led to the establishment of the following Vision Statement for this project:

VISION STATEMENT

The overall goal of the project is to prepare the Village of Lancaster to handle the impact of ever-increasing flooding and snow events and provide the Village with the tools to take action and implement future policies and safeguards to protect our natural resources, residents, and other local assets. The Village of Lancaster recognizes the future impact of climate change and this project will position the village to be ready for expected increases in precipitation, both in frequency and intensity, while minimizing future risk, damage, and cost.

CLIMATE SMART COMMUNITIES (CSC) CERTIFICATION

This Extreme Weather Vulnerability Assessment is intended to support the Village's efforts to advance progress toward CSC certification.

Namely, this report represents completion of tasks related to CSC Section PE7 – Climate Vulnerability Assessment.

Section PE7 outlines the following intent:

To increase local climate resilience, local governments must understand where to target their staff and funding resources. Climate change will not affect all community assets, systems, operations, or community members equally, so performing a comprehensive assessment of local vulnerabilities and risks related to climate change provides an opportunity to effectively identify and thereby address key threats to community resilience in a cost-effective and efficient manner. The Climate Smart Communities (CSC) program recommends that local governments complete a vulnerability assessment as one of the first and most foundational steps in developing an effective strategy for adapting to climate change at the local level.

This report addresses the following topics related to climate hazards:

- Flooding
- More extreme weather
- Relevant studies of climate change projections

CSC PROGRAM BACKGROUND

The program began in 2009 as an interagency initiative of New York State. The CSC program is jointly sponsored by the following six New York State agencies: Department of Environmental Conservation (DEC), Energy Research and Development Authority (NYSERDA), Department of Public Service, Department of State, Department of Transportation, Department of Health, and the Power Authority (NYPA). DEC acts as the main administrator of the program.

The initial focus in 2009 was on encouraging local governments to commit to act on climate change by passing a resolution containing the 10-point CSC pledge. Announced in 2014, the certification program represents the next step in the evolution of the program; it provides specific guidance on how communities can implement actions toward the CSC pledge. To be designated a certified Climate Smart Community, a municipality must go beyond the CSC pledge by completing and documenting a suite of actions that mitigate and adapt to climate change at the local level.

The goals of the CSC certification program are to engage and educate local governments in New York State, provide a robust framework to guide their climate action efforts, and recognize their achievements as they make progress.

The structure of the certification program is based on the CSC pledge elements that were developed in 2009. Participation in the program is voluntary. The program is designed to encourage ongoing implementation of actions that reduce greenhouse gas emission and help communities adapt to the effects of climate change.

- Review of state and regional studies, including *Responding to Climate Change in New York State* (2011 and 2014) and the *NYS 2100 Commission Report* (2012)
- Review of local studies
- Review of relevant national studies
- Identification of potential impacts to the following assets and systems:
  - Municipal facilities and buildings including critical facilities (e.g., schools, hospitals, fire and police departments)
  - Transportation infrastructure and systems
  - Stormwater infrastructure
  - Emergency response systems

- Identification and assessment of vulnerabilities of each asset or system (exposure, sensitivity, and adaptive capacity)
- Prioritization of vulnerable assets and systems
- Prioritization of assets based on their exposure and sensitivity to the effects of climate hazards and their adaptive capacity
- Development of report on vulnerability assessment findings

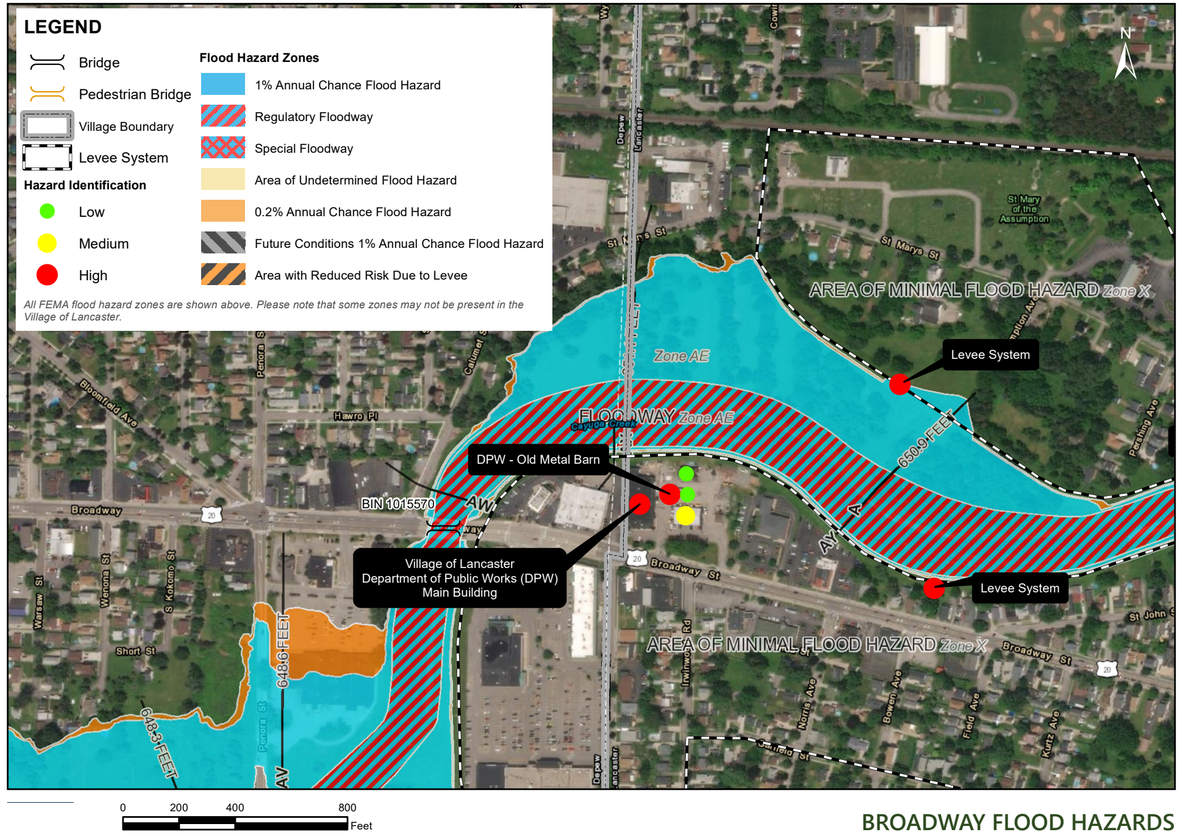
As a vulnerability assessment for two to three climate hazards, this study should earn the Village of Lancaster at least six points toward CSC certification.

Following the completion and adoption of this study by the Village of Lancaster, a copy may be submitted to the New York State CSC contact. All CSC action documentation is available for public viewing after an action is approved. Action submittals should not include any information or documents that are not intended to be viewed by the public.

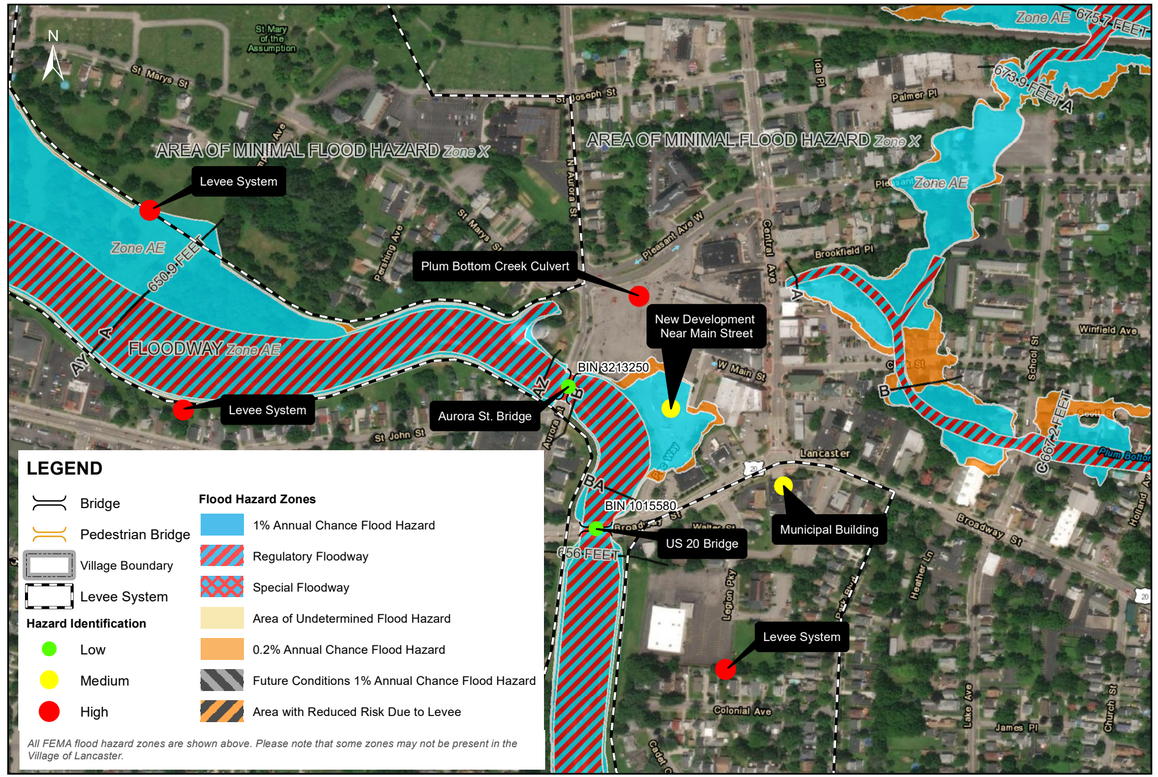
* https://climatesmart.ny.gov/about/background/

MAPPING & DATA REVIEW

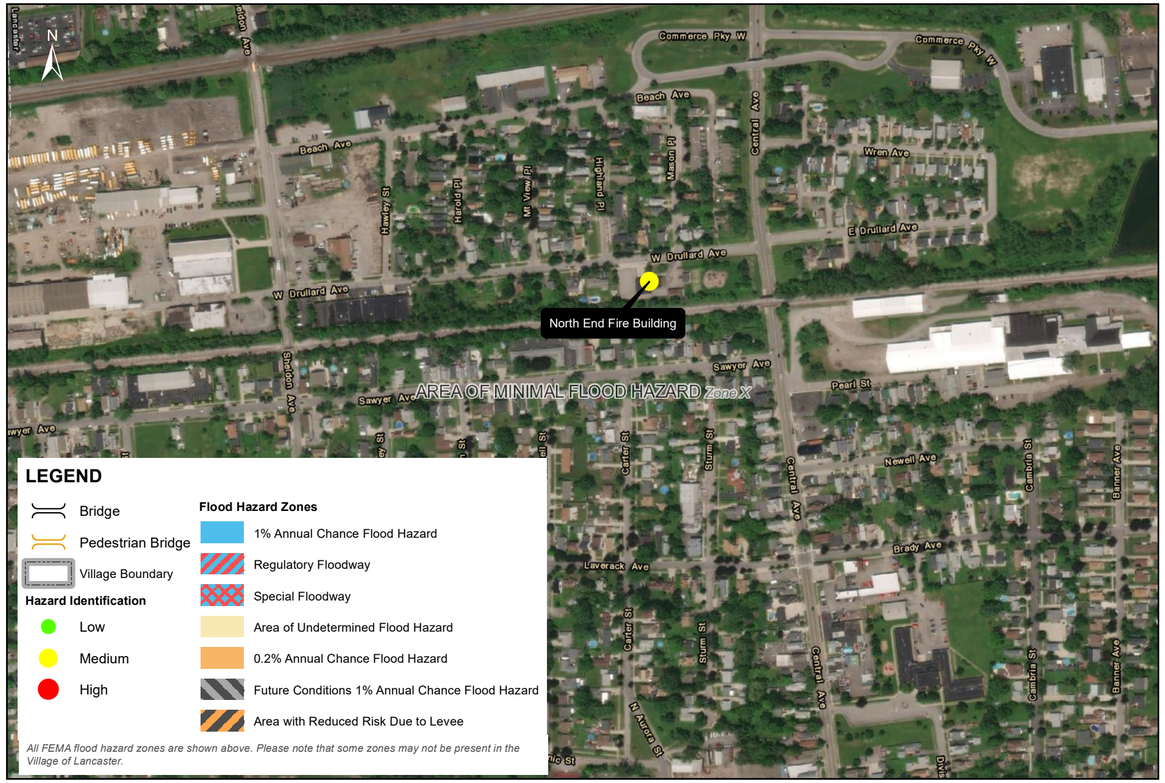
VILLAGE OF LANCASTER FLOOD HAZARDS



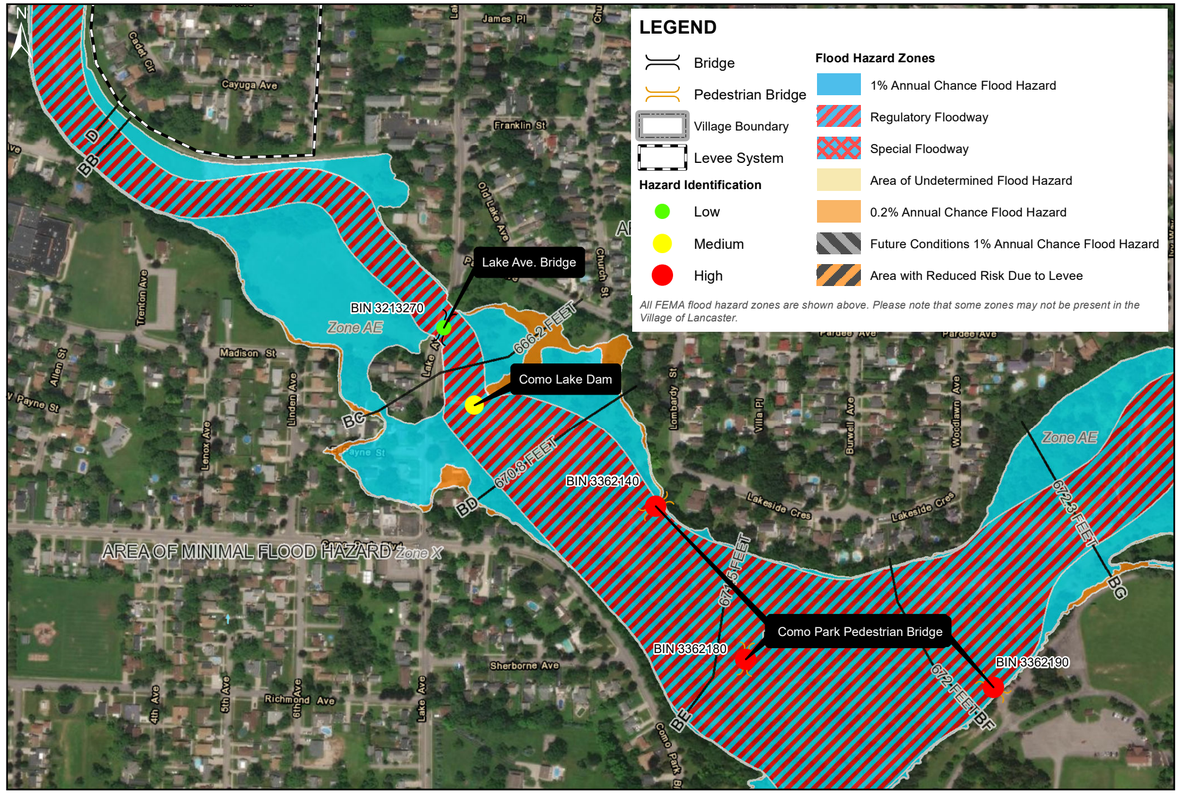
BROADWAY FLOOD HAZARDS



NORTH AURORA STREET FLOOD HAZARDS



NORTH END FIRE STATION FLOOD HAZARDS



COMO LAKE PARK FLOOD HAZARDS

HAZARD IDENTIFICATION & VULNERABILITY ASSESSMENT

In addition to the mapping and spatial data review conducted as part of this Assessment, further information and data was shared within the project team. A project site visit was also conducted on October 14, 2020 to ascertain conditions on the ground to further identify hazards and assess vulnerability. During this visit, the project team split into two groups. One group focused on bridges and other infrastructure, visiting locations along Cayuga Creek and nearby bridges and culverts. The other group focused on municipal facilities and visited the Village of Lancaster Municipal Building, the North End Fire Station, and the Village Public Works Department facility.

The following is an outline of data, notes, and key next steps related to:

- Bridge Infrastructure
- Cayuga Creek
- Municipal Facilities

BRIDGE INFRASTRUCTURE

The bridges within the Village of Lancaster were reviewed through a combination of desktop research on the existing conditions and structure types as well as a site visit that was performed. The purpose of the bridge assessment was threefold:

- Determine how the bridges may contribute to flooding problems in the Village.
- Determine bridge vulnerabilities to flooding based on condition, geometry, or design.
- Identify any improvements that could either reduce flooding in the Village or better protect the structures from flood impacts.

Research of the NYSDOT Bridge Data Information System (BDIS) revealed that there are six bridges within the Village limits that cross Cayuga Creek. A brief summary of each bridge is included in the table below. The bridges are listed in order, working upstream to downstream within the Village (generally east to west). We should note that none of the bridges within the Village are owned and maintained by the Village. Thus, any recommended improvements or monitoring program would need to be coordinated with the Town of Lancaster, Erie County, or NYSDOT.

BIN	Carried	Crossed	Owner	Description
3362190	Trail	Cayuga Creek	Erie County	Three pedestrian bridges in Como Park. Each bridge is a very slender truss-type design, built above grade to provide as much hydraulic clearance as possible.
3362180	Trail	Cayuga Creek	Erie County	
3362140	Trail	Cayuga Creek	Erie County	
3213270	Lake Avenue	Cayuga Creek	Town of Lancaster	2-span concrete box beam bridge, with a center pier, just downstream of the dam
1015580	US 20	Cayuga Creek	NYSDOT	Single-span multi-girder
3213250	Aurora Street	Cayuga Creek	Town of Lancaster	2-span steel multi-girder with center pier

Two other bridges that were outside of the Village limits were also studied, as they were noted to contribute to the flooding conditions within the Village. These two bridges are listed below.

BIN	Carried	Crossed	Owner	Description
3326870	Bowen Road	Cayuga Creek	Erie County	2-span steel multi-girder, major constriction in floodplain
1015570	US 20	Cayuga Creek	NYSDOT	Single-span multi-girder

As part of the bridge assessment, it was noted that there was a somewhat recent dredging project along the creek within the Village that seems to have helped mitigate the flooding problems. Most of the dredging occurred near the lighthouse and dam area. Minimal dredging was needed in the stretch of the creek that flows through the Village, since the streambed is shale. The dredging occurred within the last three to five years.

BRIDGE GEOMETRY ON FLOODING

Based on the data research, discussions with Village personnel, and the site visit, it was determined that flooding in the Village is more a result of ice jams than large rainfall events or backwater effects. A main source of the ice jams is outside of the Village limits at the Bowen Road Bridge. The Bowen Road Bridge is a significant constriction in the wide floodplain, thus leading to the ice jam problem. Ice jams occur at the bridge somewhat regularly, and when the ice breaks free, it progresses downstream, catching at other tight spots within the Village, notably at the Lake Avenue Bridge and near the lighthouse. The problem extends all the way to the second Broadway Bridge (US 20) that is west of the Village limits. Ice jams occur regularly, with this condition happening as recently as this past spring.

The three pedestrian bridges carrying the Como Lake Park trails across Cayuga Creek all present constrictions within the floodway. They are each slender trusses that were built above grade to provide as much hydraulic clearance as possible; however, even with the raised profiles, the clearances above the creek are much lower than the adjacent roadway bridges at Bowen Road and Lake Avenue.

The Lake Avenue Bridge is located just downstream of the dam. It is a two-span concrete box beam bridge with a center pier. Based on the conditions noted during the site visit, the bridge appears to have adequate hydraulic clearance and matches well with adjacent stream geometry.

The Broadway Bridge (US 20) is single span multi-girder bridge. It was built with plenty of height above the streambed, but the length does not span the full width between the flood control levees. This causes a constriction in the floodway. Similarly, the Aurora Street Bridge also has plenty of height above the streambed, but this two-span steel multi-girder bridge is much shorter than the adjacent floodplain, also causing a constriction. Debris was noted as being caught on the pier during the site visit, and a very large tree was seen downstream of the bridge.

BRIDGE VULNERABILITY TO FLOODING

The bridges within the study limits have varying degrees of vulnerability to scour and hydraulic concerns. The Bowen Road Bridge is noted to be a significant constriction within the floodway. The low clearance, short length relative to the floodplain, and center pier make this very susceptible to ice jams, as has been the case throughout the years. The foundations are listed as being spread footings on rock, which is a design that is relatively resistant to scour; however, ice jams can cause quite a large hydraulic force on a structure, and the resulting high velocities tend to cause scour.

The three pedestrian bridges in Como Lake Park do appear to be vulnerable to flooding. With the apparent ice jam conditions upstream at Bowen Road, and the subsequent breaking free of the ice once it gets under that bridge, the ice issue then passes on to these bridges. As pedestrian bridges, their design is very slight, and their clearance above Cayuga Creek is significantly lower than the adjacent roadway bridges. The foundations for these bridges is unknown, and the BIN 3362190, the furthest east bridge, has two slender stone built-up piers, making it highly susceptible to catching debris and ice, as well as scour issues.

The vulnerability of the Lake Avenue Bridge to hydraulic conditions is fairly low. The width and height of the hydraulic opening appear to match well with the adjacent floodway, but the center pier does cause a constriction and could make this bridge susceptible to catching debris.

The remaining three bridges within the limits of study all appear to have similar susceptibility to hydraulic and scour effects. Both Broadway bridges and the Aurora Street Bridge have plenty of height over the streambed, but do not span the entire width between the flood control levees, making them constrictions. All three bridges have spread footings founded on rock, so scour vulnerability is reduced. As indicated above though, ice jams have been noted at the downstream Broadway Bridge, and the large tree seen downstream of the Aurora Street bridge does show that the creek has the capacity to carry large debris downstream, causing some concern for the pier at Aurora Street.

BRIDGE INFRASTRUCTURE RECOMMENDATIONS

It should be noted that the vulnerabilities mentioned above seem to be minor in nature. These bridges are all at least 20 years old, with the pedestrian bridges being over 50 years old, and there have been no real signs of significant scour. As noted previously, any proposed improvements/ modifications to the structures will need to be coordinated with the specific bridge owners, as the Village of Lancaster does not own or maintain the eight bridges in the area that impact flooding in the Village. In light of that, as a long-term recommendation, when the bridges are replaced the geometry should match the adjacent stream channel. In terms of short-term recommendations, we offer the following:

- Coordinate with Erie County to develop a monitoring program for the pedestrian bridges. Since they are pedestrian bridges, they do not get inspected as part of the NYSDOT biennial bridge inspection program. A periodic check of hydraulic conditions would be prudent.
- Begin tracking the ice dam events. This would include dates, severity, photos, and notation of any changes to the structural hydraulic conditions after the event is over. This will at least allow the Village to track any continued changes over time.

PLUM BOTTOM CREEK CULVERT

An additional subject of the structure evaluation is the culvert that carries Plum Bottom Creek through the village. The culvert generally runs from just east of Central Avenue to just west of Aurora Street, for a length of approximately 860 feet. The culvert has varying configurations along the length of the structure, but primarily consists of a large, corrugated metal pipe-arch. Village personnel indicated the culvert is in poor condition. There have been several specific sinkholes above the culvert in recent years, and it was noted that the bottom of the CMP pipe has all but rusted out.

PLUM BOTTOM RECOMMENDATIONS

Given the condition of the bottom of the CMP pipe, at least a major repair of the culvert is necessary. This could include slip-lining the entire culvert with a section that maintains the hydraulic characteristics while adequately strengthening the pipe. This work would fit well within a 100%-state-funded program called *CulvertNY*. This funding comes out on a regular basis and is granted based on funding applications received from local owners throughout the state. To improve the chances for obtaining funds, a well-thought-out application prepared by someone familiar with the rating criteria is helpful. We recommend the Village work with C&S on this endeavor to make sure the best possible application can be prepared for the next announced round of funding.

CAYUGA CREEK

Cayuga Creek was examined during the site visit on October 14, 2020. Based on the current regulatory conditions, the Village of Lancaster is reasonably well-protected from the typically analyzed flood events in Cayuga Creek. Both the 100-year (1%) flood event and the 500-year flood event are contained in the banks of Cayuga Creek with the following exceptions:

- ***Como Lake Dam***—At the Como Lake dam, flood water can be pushed out of the stream banks and into residential areas. This flooding has the potential to effect a relatively small number of homes and disrupt transportation along Lake Avenue. It would be reasonable to expect that modifications to the Como Lake dam might substantially reduce the impacts of this flooding. The details of these potential benefits were not studied as part of this work.
- ***New Development Area Near Main Street—*** Current regulatory information indicates that during high-flow events in Cayuga Creek, the area currently being developed near Main Street is likely to flood. Visual observations during the site visit confirmed this potential. To the extent practicable, this new development should be planned and designed accordingly.

The current regulatory conditions regarding Cayuga Creek are expected to change in the near future. The Village of Lancaster is protected from flood events in Cayuga Creek by a substantial system of levees. These levees form elevated rings around hundreds of properties, which are intended to hold back elevated flood waters. For

FEMA to recognize levees on their regulatory maps, these levees are required to be certified by licensed engineers. Somewhat recently, the certification requirements for levees changed. Where levees are no longer certified, regulatory floodplain mapping will be redrawn.

According to a notation on the FEMA regulatory maps (see image), at least some of the levees in the Village of Lancaster are not expected to be recertified based on the updated requirements. It is expected that FEMA's maps will be redrawn in such a manner that the existing levees are ignored in the calculations. It should be noted that the actual level of protection provided by these levees has not changed with this lapse in certification. It is FEMA's policy, where levees are not certified, to prepare flood mapping calculations as if those levees have been entirely removed. The result of FEMA's remapping will likely be that a considerable number of properties will be added to the regulatory floodplain. The effect will be that most financial lenders will require flood insurance to be carried by holders of federally-backed mortgages inside the regulatory floodplain.

CAYUGA CREEK RECOMMENDATIONS

If the Village of Lancaster has not already done so, the recertification of the levee system should be considered. The certification of levees is generally accomplished through a documentation of their construction, width, and elevation.

Based on discussions with Village municipal staff, small, localized flooding of storm sewers has not been a major concern in the village.

ATTENTION: The levee, dike, or other structure that impacts flood hazards inside this boundary has not been shown to comply with Section 65.10 of the NFIP Regulations. As such, this FIRM panel will be revised at a later date to update the flood hazard information associated with this structure.

The flood hazard data inside this boundary on the FIRM panel has been republished from the previous effective (historic) FIRM for this area, after being converted from NGVD 29 to NAVD 88.

MUNICIPAL FACILITIES

Three municipal facilities were reviewed during the project site visit. The purpose of the site assessments were as follows:

- Determine if there are any existing building drawings/documentation available to document load carrying capacity design.
- Determine if there are any existing conditions or visible deficiencies that could impact the snow load carrying capacity of the roof structures.
- Discuss concerns with Village municipal staff.

MUNICIPAL BUILDING

The municipal building was constructed in 1940+/-. Original building drawings were not available, but we did find drawings for a roof replacement project in 2007. The majority of the roof framing was not easily accessible due to the presence of ceilings. The roof elevation was accessible via a stairway. The roofing appears to be in fair condition, although one drain is plugged and allowing water to build up. This drain should be cleared to allow for flow.

NORTH END FIRE BUILDING

The North End Fire Building was constructed in 1968+/-. Original building drawings and drawings from a 2007 roof replacement project were available. The majority of the high bay roof framing could be viewed from below and appeared in fair condition. The roof elevations were accessible via a ladder provided by the Fire Department. The roofing appears to be in fair condition.

DEPARTMENT OF PUBLIC WORKS FACILITY

There are five buildings at the DPW facility:

- ***Main Building***—The Main Building was constructed in 1964+/-. Original building drawings were not available. The majority of the high bay roof framing was not easily accessible due to the presence of ceilings. The majority of the low bay roof framing could be viewed from below and appeared in fair condition. The roof elevations were accessible via a ladder. The existing roofing is in poor condition and is scheduled to be replaced ASAP.
- ***Steel Barn***—The Steel Barn was constructed in 1990+/-. Original building drawings were not available. The roof framing could be viewed from below and appeared in fair condition. The roofing condition is unknown, since it was not accessible; however, the roof insulation is damaged, which may indicate roof leaks. These potential leaks should be monitored to ensure there is no water penetration into the building.
- ***Salt Barn***—The Salt Barn was constructed in 2008. Original building drawings were available. The majority of the high bay roof framing could be viewed from below and appeared in fair condition. The roofing was not accessible, but appeared to be in fair condition from a distanced view.

- ***Pole Barn***—The Pole Barn was constructed in 2019. Original building drawings were not available. The majority of the high bay roof framing could be viewed from below and appeared in good condition. The roofing was not accessible, but appeared to be in good condition from a distance view.
- ***Old Metal Barn***—The Old Metal Barn construction date is unknown. Original building drawings were not available. The roof framing could be viewed from below and appeared in fair condition. It seems that several of the "knee" braces that were on the original roof trusses have been removed. This could limit the snow load carrying capacity of the roof trusses and lead to structural damage. The roofing appears to be in good condition from a distance view.

CONSOLIDATED FINAL CONCLUSIONS & RECOMMENDATIONS

BRIDGE INFRASTRUCTURE

- Coordinate with Erie County to develop a monitoring program for the pedestrian bridges over Cayuga Creek. Since they are pedestrian bridges, they do not get inspected as part of the NYSDOT biennial bridge inspection program. A periodic check of hydraulic conditions would be prudent.

CAYUGA CREEK

- Begin tracking the ice dam events in Cayuga Creek. This would include dates, severity, photos, and notation of any changes to the structural hydraulic conditions after the event is over. This will at least allow the Village to track any continued changes over time.
- Given the condition of the bottom of the Plum Bottom Creek CMP pipe, at least a major repair of the culvert is necessary. This could include slip-lining the entire culvert with a section that maintains the hydraulic characteristics while adequately strengthening the pipe. This work would fit well within a 100%-state-funded program called CulvertNY. This funding comes out on a regular basis and is granted based on funding applications received from local owners throughout the state. To improve the chances for obtaining funds, a well-thought-out application prepared by someone familiar with the rating criteria is helpful. We recommend the Village work with C&S on this endeavor to make sure the best possible application can be prepared for the next announced round of funding.
- Explore modifications to the Como Lake dam, which might substantially reduce the risk and impacts of flooding.
- Current regulatory information indicates that during high-flow events in Cayuga Creek, the area currently being developed near Main Street is likely to flood. Visual observations during the site visit confirmed this potential. To the extent practicable, this new development area should be planned and designed accordingly, minimizing potential flood risk.
- A main focus of the site visit was the protective levee along Cayuga Creek. The recertification of the levee system should be considered, if the Village of Lancaster has not already done so. The certification of levees is generally accomplished through a documentation of their construction, width, and elevation. The Village should work with the New York State DEC, the US Army Corps of Engineers, FEMA, and other relevant regulatory agencies to recertify the levee system and discuss potential measures to reinforce or otherwise modify the levee system to minimize flood risk.

MUNICIPAL FACILITIES

- Roof drains on the Municipal Building should be regularly checked for blockages and cleared accordingly to avoid water pooling.
- Some rust and minor corrosion was witnessed on the main entrance middle steel beam at the North End Fire Station. This should be inspected more closely and addressed accordingly.
- The DPW Facility Main Building should have degraded roof sections repaired and/or replaced as soon as possible.
- The DPW Facility Steel Barn roof insulation is damaged, which may indicate roof leaks. These potential leaks should be monitored to ensure there is no water penetration into the building.
- At the DPW Facility, the Old Metal Barn appears to have had several of the "knee" braces from the original roof trusses removed. This could limit the snow load carrying capacity of the roof trusses and lead to structural damage. We suggest a detailed analysis and review by a licensed structural engineer to determine if modifications are required.
- In our brief visual assessments of Village facilities, we did not find evidence of significant structural deficiencies or conditions that indicate susceptibility to extreme weather events like heavy snow loading; however, the Village should consider an in-depth, detailed evaluation of municipal structures in the future to ascertain any potential risks, since this was not included in the scope of this report.

GENERAL

- The Village should continue to work with the State of New York toward Climate Smart Communities certification. The Village should be proud of its progress and leadership to date, and the continued pursuit of this certification will further galvanize the community and mark the Village as a forward-thinking, progressive place to live, work and visit.
- The Village should continue to coordinate with Erie County on its efforts related to climate resilience planning and emergency preparedness. This relationship is already strong, and mutual benefit may be achieved from the well-linked, collective efforts of Village and County officials, volunteers, and community members.
- The Village should adopt a Green Infrastructure policy or manual in order to reduce the flow of stormwater into Cayuga Creek. Green Infrastructure is any infrastructure designed specifically to provide enhanced ecosystem services, namely the reduction of stormwater runoff into local pipes, culverts, conveyances, and ultimately, waterways. By integrating this type of design into various improvements in the Village, the community will minimize the stress to the stormwater system and mitigate flooding events in local waterways, thus reducing risk from extreme weather. The Village should strive to adopt Green Infrastructure best practices in all local infrastructure projects, to the greatest extent possible.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