Municipal Assistance for FEMA's Community Rating System

September 2019

CIRCA
Connecticut Institute for Resilience and Climate Adaptation

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Sponsored by a grant from the Connecticut Institute for Resilience and Climate Adaptation (CIRCA). CIRCA is a partnership between the University of Connecticut and the State of Connecticut Department of Energy and Environmental Protection. More information can be found at: www.circa.uconn.edu

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The Connecticut Institute for Resilience and Climate Adaptation (CIRCA) is a partnership between the University of Connecticut and the State of Connecticut Department of Energy and Environmental Protection. CIRCA's mission is to increase the resilience and sustainability of vulnerable communities along Connecticut's coast and inland waterways to the growing impacts of climate change on the natural, built, and human environment.

More information about CIRCA can be found at circa.uconn.edu.

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Executive Summary

Floods cause millions of dollars of damage to homes and businesses in the United States each year. The Federal Emergency Management Agency (FEMA) administers the National Flood Insurance Program (NFIP) to provide flood insurance within communities that adopt and enforce floodplain regulations. The Community Rating System (CRS) encourages and rewards community efforts beyond simply regulating the construction of new buildings to minimum national standards within floodplains.

The FEMA CRS program is a voluntary program which incentivizes above and beyond floodplain management in the form of flood insurance premium discounts. Under the CRS, the flood insurance premiums of a community's residents and businesses are discounted to reflect the community's work to reduce flood damage to existing buildings, manage development in areas not mapped by the NFIP, protect new buildings beyond the minimum NFIP protection level, preserve and/or restore natural functions of floodplains, help insurance agents obtain flood data, and help people obtain flood insurance. CRS discounts on flood insurance premiums range from 5% up to 45% depending on the community's commitment to specific outreach, planning, flood protection, and emergency response activities. The discounts provide an incentive for communities to implement new flood protection activities that can help save lives and property when a flood occurs.

The CRS uses a class rating system that is similar to fire insurance rating to determine flood insurance premium reductions for residents. Communities are assigned to a class based on the total number of credit points earned, and the discount on flood insurance premiums is based on CRS Class. Class 1 requires the most credit points (4,500) and results in the largest premium reduction (45%). If a community earns as little as 500 points, it is in Class 9 and property owners receive a 5% discount on insurance premiums. A community can receive points under four main categories: Public Information, Mapping and Regulation, Flood Damage Reduction, and Flood Preparedness. Communities are classified in accordance with their level of activity within each category.

As flood insurance premiums increase, so has interest in the FEMA Community Rating System (CRS) program. Many state and local communities have come together to produce resources for towns and cities to utilize, such as written technical resources and planning services, to assist municipalities.

In response to the rising interest in the CRS program, and in order to address the gap that exists between regional services and the needs of specific municipalities, the Connecticut Institute for Resilience and Climate Adaption (CIRCA) allocated funding to support communities with CRS entry and CRS class advancement. The CRS participation has important co-benefits that are aligned with resilience such as public education and outreach, emergency services, and stringent review of development proposals. This is another reason that CRS participation is important to CIRCA.

As a result of this funding opportunity, several municipalities were assisted to varying degrees. CIRCA partnered with Connecticut Department of Energy and Environmental Protection (DEEP) flood management program to advise Milone & MacBroom regarding which municipalities could receive assistance. Some communities were interested in pursuing points for a select number of activities, while others requested more in-depth assistance for several CRS activities. The towns of Guilford, Newtown and Stratford received assistance with either open space mapping, outreach activities, or preparation of documentation for CRS entry. These three communities received assistance as an individual community on only a small number of activities in order to help boost their current CRS rating.

The City of Norwich sought to enter the CRS program and ultimately requested assistance with 14 CRS activities. Many of these activities required straightforward tasks, such as regulatory reviews and documentation preparation, while other activities required map and plan development.

The communities of the Lower Connecticut River Council of Governments (RiverCOG) were assisted in a different manner. Open space mapping was completed for the region using the prescribed CRS methodology with the goal of identifying how many points could be available for any one of the 18 NFIP jurisdictions if it elected to join the CRS program. This information will be used by CT DEEP to demonstrate that the presence of open space will help achieve points.

Overall, the participating communities were able to work toward increased CRS points and advance their CRS rating or enter the program, which will ultimately reap the benefit of lower flood insurance premiums community wide while realizing the co-benefits that are aligned with resilience.

Specific Assistance Provided

RiverCOG Municipalities

Open space mapping, activity 420 for CRS, was conducted for all 17 municipalities plus the Borough of Fenwick, resulting in 18 sets of open space maps. RiverCOG was selected for this pilot project based on discussions between DEEP and RiverCOG planners in 2018. Furthermore, the scope of work in the request for proposals (RFP) for this contract indicated that efforts may include "provide technical assistance for… one to two communities in the RiverCOG region who would benefit from open space mapping and associated CRS program credits."

The open space mapping was conducted by utilizing the most current municipal parcel data, along with available GIS data relating to open and conserved space. These GIS layers included The Nature Conservancy lands and community open space data, along with special flood hazard area layers. The parcels designated open space or conserved were then identified to calculate a final open space acreage for each community.

The final product for this CRS activity was 18 sets of preliminary draft maps that were submitted to each municipality, and the Borough, for review. Mapping was further organized using ArcGIS Online in order to streamline review of the individual parcels, and the information associated with each. Once reviewed, the communities can then choose to proceed with submission for credit under this activity or look to conduct a more detailed open space analysis to then submit for an increased amount of points. This open space analysis is easily transferable to other communities throughout the state. The data used to conduct the analysis is available, to some extent, for all towns. The Nature Conservancy layer is statewide, and a majority of towns maintain GIS land data. These generated maps can then be compared to municipal Plan of Conservation and Development (POCD) maps, which help identify open space areas.

As noted above, DEEP is interested in how open space can contribute to overall CRS scores for a given community. The following is an estimate of the points that could be available to each RiverCOG community:

Community	SFHA acres	Potential Open Space Acres	Potential Open Space Points	Potential CRS Class from Open Space Only
Chester	324.65	324.54	522.14	9
Clinton	1263.66	903.21	636.63	9
Cromwell	1578.74	597.47	463.46	10
Deep River	136.06	129.43	272.84	10
Durham	1240.52	1227.03	1364.51	8
East Haddam	446.61	444.36	425.94	10
East Hampton	243.75	243.06	491.31	10
Essex	159.96	159.53	302.85	10
Fenwick	114.38	112.61	261.87	10
Haddam	552.40	541.85	530.49	9
Killingworth	529.77	528.77	737.28	9
Lyme	962.65	960.29	871.28	9
Middlefield	329.18	326.19	1052.20	8
Middletown	484.04	451.71	337.16	10
Old Lyme	1190.75	1161.32	654.13	9
Old Saybrook	907.04	882.12	612.70	9
Portland	938.89	931.79	606.48	9
Westbrook	242.47	239.44	256.07	10

The approach for open space mapping was written for future use and is appended to this report as Attachment 1.

- *Direct Outcomes:*
    - *ArcGIS Online digital open space mapping for municipalities to check or verify*
    - *PDF copies of open space mapping*
    - *Availability of points under Activity 420*
- *Products for Other Communities:*
    - *Open space mapping process*
    - *ArcGIS Online platform for viewing open space mapping*
- *Products for DEEP:*
    - *Examples of municipalities that can obtain points by possessing, setting aside, or managing open space*

Stratford, CT

The town of Stratford was offered assistance through the subject contract because it was in the process of entering the CRS program. The timing of the contract was aligned with the Town's final steps in the application process. Based on the remaining needs identified through the application process, the town of Stratford sought assistance with three CRS activities: 320, Map Information Service; 420, Open Space Mapping; and 330, Outreach Activities.

The 320 activity Map Information Service required the development of a number of maps which depicted flood relevant information. The maps included basic and advanced Flood Insurance Rate Map (FIRM) information, flood depth, historical flooding, special flood hazards, and flooding problems that are not expressed on a FIRM, such as roads that frequently flood. The town received six maps that can be used to provide residents with flood information.

As requested by the town, assistance was also provided on CRS activity 330, outreach materials. The final product was an informational brochure that the town could distribute before and during a flood. The brochure includes information such as the primary source of flooding, actions to take before and during a flood, and useful resources.

The open space mapping, CRS activity 420, was conducted in a similar fashion to that of the RiverCOG municipalities. By using The Nature Conservancy data, municipal open space and conservation layers, and POCD maps, the final acreage of open space in the SFHA was calculated. As a result, the town received an open space map and calculation table that indicates how much open space is in the SFHA.

These three activities can be done relatively easily for other communities throughout the state. The informational maps were developed using public GIS data and reports such as the town Hazard Mitigation Plan. Open space mapping was also done with readily available data. This data may need to be requested from the town, however, typically land ownership is often maintained in an electronic database. Lastly, the flooding informational brochure can also be

distributed to communities across the state. While some information in the brochure is specific to the Town of Stratford, much of the information can be disturbed state-wide, and that which is specific can be edited to represent specific needs or concerns for that community.

- *Direct Outcomes:*
    - *Various maps and related points under Activity 320*
    - *Brochure and related Points under Activity 330*
    - *Open space mapping and related points under Activity 420*
- *Products for Other Communities:*
    - *Flood information brochure that can be used in other communities*
    - *Open space mapping process*

Guilford, CT

All communities in Connecticut are eligible to receive credit under activity 630 as a result of the State's Dam Safety Program, however, the Town of Guilford neglected to request these points when it entered the program several years ago. Therefore, the Town accepted assistance with preparing documentation for additional points. This technical assistance was considered consistent with the subject contract because it was offered to advance the Town's class in the CRS program.

This included identifying the high potential hazard dams (class C), and the significant hazard potential dams (class B), providing descriptions on the failure threat, and developing a dam failure inundation map. To do this, data on the two Class C and two Class B dams was collected from the State Dam Programs public files. Current information on each dam was collected and compiled to describe each dam and the potential threat if each were to fail. The dam failure inundation map was developed by utilizing a Connecticut Department of Energy and Environmental Protection (DEEP) GIS layer in which failure inundation areas were calculated for most high and significant hazard dams across the state.

While not every municipality or community may be concerned with potential failure of a Class C or B dam, those that are, can likely compile information necessary to obtain points for 630 State Dam Safety Program (SDS) in the CRS.

- *Direct Outcomes:*
    - *Dam-related documentation and availability of points under Activity 630*
- *Products for Other Communities:*
    - *Process for presenting dam information*

Newtown, CT

Most communities in Connecticut are eligible to receive credit under activity 420 as a result of the presence of open space, however, the Town of Newtown may have neglected to request these points when it entered the program many years ago. Therefore, the Town of Newtown accepted assistance with CRS activity 420. This technical assistance was considered consistent

with the subject contract because it was offered to advance the Town's class in the CRS program.

Like that of the RiverCOG communities, and others that requested assistance with open space, a map was developed to show those parcels that are designated open space and located in the SFHA and will not be developed in the future.

The town received a map and excel table, like communities that previously received open space assistance. This documentation allows for the community to receive the necessary foundational points that would allow them to obtain higher points for space that also provides natural functions.

- *Direct Outcomes:*
    - *Open space mapping and related points available under Activity 420*
- *Products for Other Communities:*
    - *Open space mapping process*

Southeastern Connecticut Communities

Southeastern Connecticut Council of Governments (SCCOG) administered a grant within 2018 to assist its member communities with entry into the CRS program or improvement of CRS class. Four municipalities submitted letters of interest to join the program (Norwich, Groton Town, Waterford, and Colchester) while three expressed interest in improving their classes (Stonington Town, Stonington Borough, and East Lyme). Materials were prepared for all participating seven communities during the course of the grant held by SCCOG, but sufficient time was not available to help with the very detailed tasks necessary to prepare for the "verification visit" and the later stages of the application process.

Because the City of Norwich was the only one of the four "new" communities that FEMA provided with the opportunity to enter the CRS program in 2019, the City of Norwich requested assistance on numerous CRS activities. Overall, the City received assistance with 14 activities:

310: Elevation Certificates	440: Flood Data Maintenance
320: Map Information Service	450: Stormwater Management
330: Outreach Projects	Repetitive Loss Requirements
340: Hazard Disclosure	510: Floodplain Management Planning
350: Flood Protection Information	520: Acquisition and Relocation
420: Open Space Preservation	610: Flood Warning and Response
430: Higher Regulatory Standards	630: Dams

Some activities required minimal assistance, while others required an increased level of effort. Activities 310, 340, 350, 440, 510, and 520 required document compilation and the completion of forms. Activity 320, like that which was done for Stratford, was comprised of compiling various GIS data layers to develop maps that could be utilized to provide information to city

residents. An outreach activity for 330 (a flood information brochure) was developed previously as a template for Stratford and was further tailored to the specific flooding concerns of Norwich. Activities 350 and 430 required documentation review, such as zoning regulations, to identify regulations currently in place that are either more stringent than the NFIP requirements, or those that pertain to stormwater management.

Staff met with the City of Norwich to identify which activities needed additional materials for the verification visit. Activity 520, property acquisition and relocation, required the location of deeds and acquisition records along with assembly of documentation.

The Flood Warning and Response Plan, activity 610, was developed under the SCCOG grant, however, the plan required edits and further development which was addressed under the CIRCA grant. Maps, city information, and supporting documents were outdated, or required further development.

As part of the further development of activity 630, the plan was edited using updated emergency action plans, and a tabletop drill exercise was developed and conducted. The tabletop drill involved staff from the City of Norwich, Norwich Public Utilities, and staff from medical facility located in a dam inundation zone. The drill tested the Emergency Action Plans for a city owned dam, and a dam owned by Norwich Public Utilities.

The open space mapping was also developed under the SCCOG grant, however, in order to ensure accuracy, the maps were revisited and reviewed for any discrepancies or inaccuracies that may had not been previously identified. The open space was recalculated to provide the city with a more accurate figure of current open space in the SFHA.

- *Direct Outcomes:*
    - *Documentation for numerous CRS activities*
    - *Verification visit of September 4, 2019*
    - *"30-day letter" from ISO dated September 4, 2019 with only minimal follow-up needed*
- *Notable Actions:*
    - *Norwich is first community in Connecticut to request points for Activity 520*
    - *Norwich is one of only three communities in Connecticut to request points for Activity 610*
    - *Norwich is first community in Connecticut to request enhanced points for Activity 630*
- *Products for Other Communities:*
    - *Flood information brochure that can be used in other communities*
    - *Various letters and logs/checklists that can be used as templates*
    - *Flood warning and response plan and after-action report that can be used as templates*
    - *Dam failure tabletop exercise and after-action report that can be used as templates*

Other Communities

During the course of the project, several municipalities were periodically contacted to offer CRS services. Darien, Norwalk, and Old Lyme were not ready for assistance during the timeframe of the contract. Likewise, the towns that participated in the southeastern Connecticut effort (Groton Town, Waterford, and Colchester) were not able to participate in the subject grant because FEMA has not yet moved forward with the application process for those communities.

Conclusion

Most of the activities pursued by each municipality under this grant are applicable to other communities throughout the state. Many of the regulations, programs, and actions that receive points in the CRS are already being implemented by communities and need to be documented for point recognition.

As a result of this collaboration, multiple transferable products have been developed. This includes the outreach materials for flooding and dams, including the flood brochures developed for Stratford and Norwich, and the informational dam flyer developed for Norwich. Also, the GIS workflow compiled for the RiverCOG open space mapping can be utilized for open space mapping in other communities. This workflow includes steps developed by The National Oceanic and Atmospheric Administration (NOAA) Office for Coastal Management, and a collection of resources used by Milone & MacBroom to complete the mapping.

The Flood Warning and Response Plan under Activity 610 and the Dam Documentation under Activity 630 can also be used as templates for other communities. These two plans include extensive development and document preparation; however, the process and product will be relatively similar for other communities. While flooding concerns, warning and response, and dam threats vary between municipalities, the overall framework of these plans can be mirrored to acquire points in the 610 and 630 activities.

As part of activity 630, Dam Documentation, a tabletop drill was developed to exercise the dam failure Emergency Action Plans (EAPs). This exercise, which included City and utility company staff, was successful in identifying the warning and response actions in the EAP and brought attention to those areas that may need improving. This exercise can also be used as a template for other communities when developing and executing a similar tabletop.

While assisting these communities, many important points came to light. While conducting open space mapping, GIS data must be evaluated for accuracy, duplications in parcels, and ensuring the most up to date assessor information. Inaccurate or dated data could result in a loss of potential points due to incorrect information regarding open space parcels.

Overall, many municipalities can earn points under a number of these activities. Some of the activities require documentation, as the community is likely already doing certain functions, or has regulations in place. Other activities that require increased effort are attainable with the proper guidance and development. The process of entering or advancing in the CRS can be

challenging, however, it is important to note that with the appropriate assistance, a community can be successful in entering or advancing within the CRS program.

Appendix A

GIS Workflow

MILONE & MACBROOM

CRS GIS Workflow Summary

Community	aSFHA*	OSP Acres (total)	Potential OSP points**	Class
Chester	901.27	324.54	522.14	9
Clinton	2057.17	903.21	636.63	9
Cromwell	1869.28	597.47	463.46	10
Deep River	687.84	129.43	272.84	10
Durham	1303.91	1227.03	1364.51	8
East Haddam	1512.69	444.36	425.94	10
East Hampton	717.32	243.06	491.31	10
Essex	763.79	159.53	302.85	10
Fenwick	623.56	112.61	261.87	10
Haddam	1481.05	541.85	530.49	9
Killingworth	1039.93	528.77	737.28	9
Lyme	1598.13	960.29	871.28	9
Middlefield	449.51	326.19	1052.2	8
Middletown	1942.64	451.71	337.16	10
Old Lyme	2574.28	1161.32	654.13	9
Old Saybrook	2087.63	882.12	612.7	9
Portland	2227.76	931.79	606.48	9
Westbrook	1355.86	239.44	256.07	10

*aSFHA is the Special Flood Hazard area acreage with waterbodies over 10 acres and federal lands not shown
**OSP points calculated on individual parcels and aggregated

Workflow

The National Oceanic and Atmospheric Administration (NOAA) Office for Coastal Management provides a GIS workflow guide *How to Map Open Space Preservation for Community Rating System Credit.*[i] There are 7 basic steps to the entire process, this summary will cover the first 4 steps:

1. Calculate the community's special flood hazard area
2. Identify lands that may qualify for open space preservation credit
3. Exclude areas that do not qualify for open space credit
4. Calculate the possible credit for the community's preserved open space

1. Calculate the community's special flood hazard area

Using a floodplain GIS data set provided by FEMA through their Map Service Center, features designated as Special Flood Hazard Area (SFHA) that were within the boundary of the RiverCOG member towns were exported.
The SFHA was then split by a town boundary file. Using US Census Designated Place geography, the boundary of the Borough of Fenwick was also split. The resulting file was called *RiverCOG_aSFHA_by_Community*. For the purposes of CRS, waterbodies over 10 acres and federal lands were omitted from this file as they can not be considered "open space" for CRS Activity 420[ii]. With these areas omitted the area acreage of the SFHA area for each community was calculated and is shown in the table above under column aSFHA.

2. Identify lands that may qualify for open space preservation credit

NOTE: In some towns, supporting documentation used in this project may be out of date or not comprehensive. Parcels that have been identified as having easements but do not have the easement area identified are included and the open space acreages calculated as if the easement covered the entire portion of the parcel in the flood plain. These parcels will need careful review by town staff.

RiverCOG provided Milone & MacBroom Inc (MMI) with a contiguous parcel data set for the region. Parcels were clipped by *RiverCOG_aSFHA_by_Community* and exported to a file called *RiverCOG_aSFHA_Parcels*. In this file a field was created called MMI_OS to track whether a parcel might be considered open space. All waterbodies and road right of ways were removed.

MMI collected open space maps, Plans of Conservation and Development and other documentation from town websites within the region (see Data Sources table for a list of sources). MMI also referenced town-provided GIS websites and online assessor databases. MMI also used a dataset provided by The Nature Conservancy[iii]. In 2015 The Nature Conservancy published a GIS dataset of all the land nationwide that they hold a legal interest in. Also included in this dataset are the features from Connecticut's Protected Open Space Mapping (POSM) project, available on the website of the CT Department of Energy and Environmental Protection (DEEP).[iv]

Staff then reviewed all available source data and where it was deemed appropriate, entered a "1" in the column called MMI_OS. After extensive research and review, all parcels considered potentially available for open space credit were exported to a new file called RiverCOG_Eligible_OSP_Parcels.

3. Exclude areas that do not qualify for open space credit

Once staff identified potential open space parcels, any impervious surfaces such as buildings or pavement were erased. This was accomplished by using an impervious surface data set provided by CT DEEP and a building footprint dataset provided by the Office of Policy and Management's Open Data website.[v]

4. Calculate the possible credit for the community's preserved open space

In the RiverCOG_Eligible_OSP_Parcels dataset, two fields were created. The first field is called OSP_ac, and the acreage of all the remaining areas of potential open space were calculated. Any piece of land that was less than .01 of an acre was removed per FEMA guidelines outlined in the GIS workbook.
The second field is called Potential_OSP_Pts. Going by one community at a time, the acreage of open space was divided by the total area of that community's Special Flood Hazard Area (summarized from *RiverCOG_aSFHA_by_Community)* and then multiplied by 1450 per GIS workbook guidelines. Those totals are in the table above.

Then the total acreage of potential open space and the potential number of points were calculated per community and also entered into the table above.

Town Review

It is now necessary for the RiverCOG member towns to engage in reviewing the identified open space lands. Open space land that is creditable under CRS are public lands that include state & local parks, and easements kept as open space. The GIS workbook states that these lands can also include "forest preserves, publicly owned beaches or natural areas, school playing fields, cemeteries, and floodplain easements dedicated to the community by developers".
Private lands may also qualify for open space credit, however documentation of protection will need to be provided. *National Flood Insurance Program Community Rating System Coordinator's Manual* (2017) section 422.a.3.b states that this documentation can consist of a letter stating that the owner will keep the parcel open.

If there are local regulations that prevent the construction of new buildings or filling in floodways & flood plains, those areas may also be calculated as further open space credit. Any deed restriction that prohibits development of an open space parcel may also earn additional open space credit if certain criteria are met and the deeds are provided as documentation.

It is requested that each town review the PDF provided or go online and visit the interactive mapping application created for this project[vi]. Each town may view the parcels or portions that intersect the SFHA that have been identified as potentially creditable open space. They are colored green on the map. The remaining parcels that intersect the flood plain are also shown, in case there is a parcel that was overlooked as open space. It is requested that each town review their community and create a list of any correction that needs to be made, whether a parcel has been incorrectly identified as open space or should be classified as open space. It is asked that each town provide the address, parcel id and reason why that property should or should not be considered open space. These lists can be sent to Victoria Brudz at vbrudz@mminc.com or Meghan McGaffin at mmcgaffin@mminc.com.

Moving Forward

It will be up to each community to pursue entry into the Community Rating System program. Any community that wishes to join must also, at minimum, be prepared to meet the requirements of section

310 Elevation Certificates in the *Coordinator's Manual*. Pursuing credit points under section 420 Open Space Preservation will be greatly facilitated by the data provided and reviewed through this project.

Data Sources:

Community	**Local Data Source**
Chester	GIS Data from Draft Plan of Conservation and Development update (2018)
Clinton	Open Space Plan, Plan of Conservation & Development (2015)
Cromwell	Existing land Use, Plan of Conservation & Development (2007)
Deep River	Protected Open Space Map, Plan of Conservation & Development (2015)
Durham	Open Space, Plan of Conservation & Development (2016)
East Haddam	GIS Data from Draft Plan of Conservation and Development update (2018)
East Hampton	Protected Open Space, Plan of Conservation & Development (2016)
Essex	Development Priority Areas, Plan of Conservation & Development (2015)
Fenwick	Open Space, Town of Old Saybrook Land Use Dept (2018)
Haddam	Open Space & Recreation Resources, Plan of Conservation & Development (2017)
Killingworth	Open Space Map, Plan of Conservation & Development (2018)
Lyme	Lyme Open Space Map (2015)
Middlefield	Proposed Land Use, Plan of Conservation & Development (2017)
Middletown	Existing City Open Space, Plan of Conservation & Development (2007)
Old Lyme	town GIS website
Old Saybrook	Open Space, Town of Old Saybrook Land Use Dept (2018)
Portland	Open Space, Plan of Conservation & Development (2016)
Westbrook	Existing Land Use Map (2008)

Community	**Town Website**
Chester	http://chesterct.org/
Clinton	http://clintonct.org/
Cromwell	http://www.cromwellct.com/
Deep River	http://www.deepriverct.com/Pages/index
Durham	http://www.townofdurhamct.org/
East Haddam	http://www.easthaddam.org/
East Hampton	http://www.easthamptonct.gov/Pages/index
Essex	http://www.essexct.gov/
Fenwick	http://www.oldsaybrookct.org/Pages/index
Haddam	http://www.haddam.org/
Killingworth	http://www.townofkillingworth.com/

Lyme	http://townlyme.org/
Middlefield	http://www.middlefieldct.org/
Middletown	http://www.cityofmiddletown.com/
Old Lyme	http://www.oldlyme-ct.gov/Pages/index
Old Saybrook	http://www.oldsaybrookct.org/Pages/index
Portland	http://www.portlandct.org/
Westbrook	http://www.westbrookct.us/

Community	**Assessor property card**
Chester	http://www.propertyrecordcards.com/SearchMaster.aspx?towncode=026
Clinton	http://gis.vgsi.com/clintonct/
Cromwell	on GIS Site
Deep River	http://gis.vgsi.com/deepriverct/
Durham	http://durham.univers-clt.com/
East Haddam	http://gis.vgsi.com/easthaddamct/
East Hampton	http://gis.vgsi.com/EastHamptonCT/
Essex	http://gis.vgsi.com/essexct/
Fenwick	http://gis.vgsi.com/oldsaybrookct/
Haddam	http://gis.vgsi.com/haddamct/
Killingworth	http://www.propertyrecordcards.com/SearchMaster.aspx?towncode=070
Lyme	Not Available
Middlefield	http://gis.vgsi.com/MiddlefieldCT/
Middletown	http://gis.vgsi.com/MiddletownCT/
Old Lyme	http://gis.vgsi.com/oldlymect/
Old Saybrook	http://gis.vgsi.com/oldsaybrookct/
Portland	http://portland.ias-clt.com/parcel.list.php
Westbrook	http://gis.vgsi.com/westbrookct/

Community	**Town GIS**
Chester	http://www.mainstreetmaps.com/ct/chester/public.asp
Clinton	http://hosting.tighebond.com/clintonct_public/
Cromwell	https://cromwellct.mapgeo.io
Deep River	NA
Durham	https://www.axisgis.com/DURHAMCT/
East Haddam	NA
East Hampton	http://hosting.tighebond.com/EastHamptonCT_public/
Essex	https://essexct.mapgeo.io/

Fenwick	https://oldsaybrookct.mapgeo.io
Haddam	http://www.citysquared.com/#/app/map/HaddamTownCT
Killingworth	http://hosting.tighebond.com/killingworth/
Lyme	NA
Middlefield	NA
Middletown	http://gis.cityofmiddletown.com/middletownct/
Old Lyme	https://oldlymect.mapgeo.io
Old Saybrook	https://oldsaybrookct.mapgeo.io
Portland	NA
Westbrook	https://westbrookct.mapgeo.io

[i] https://coast.noaa.gov/data/digitalcoast/pdf/crs-gis-workflow.pdf
[ii] https://www.fema.gov/media-library-data/1493905477815-d794671adeed5beab6a6304d8ba0b207/633300_2017_CRS_Coordinators_Manual_508.pdf
[iii] http://maps.tnc.org/gis_data.html
[iv] https://www.ct.gov/deep/cwp/view.asp?a=2698&q=322898&deepNav_GID=1707#Property
[v] http://geodata-ctmaps.opendata.arcgis.com/
[vi] https://mminc.maps.arcgis.com/apps/webappviewer/index.html?id=0bdd7cd1af80484b938bea92c7ddfba3

Appendix B

Flood Information Brochure

Flood Insurance

The National Flood Insurance Program (NFIP) provides Norwich property owners, businesses, and renters with insurance options depending on their risk.

In a flood zone? If you own property in the Special Flood Hazard Area (SFHA) you are required to purchase flood insurance if the mortgage is from a federal lender. ***Renters and business owners can also purchase flood insurance.***

Not in a flood zone? While you are not required to carry flood insurance, property owners and renters should ask their agent if they are eligible for a Preferred Risk Policy.

More than 20% of flood insurance claims are filed by people outside of the SFHA

Resources

Visit **www.floodsmart.gov** to assess your flood risk, find an insurance agent, or to view flood maps. Call **1-800-427-2417** for more information

—

Visit the NFIP website for resources and answers to common questions

https://www.fema.gov/national-flood-insurance-program

—

The National Weather Service provides tips and resources for flood safety

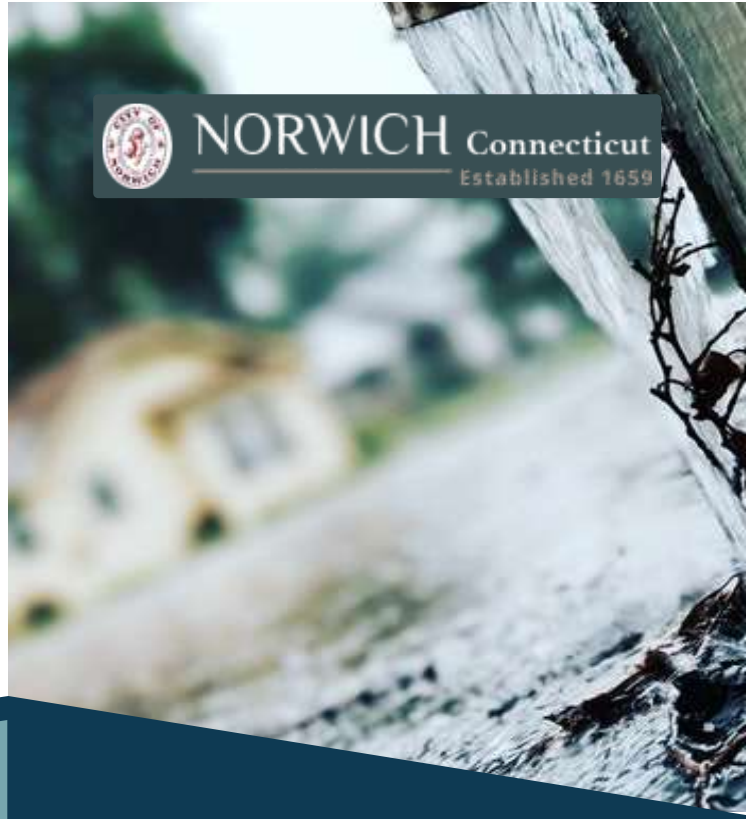
www.weather.gov/safety/flood

—

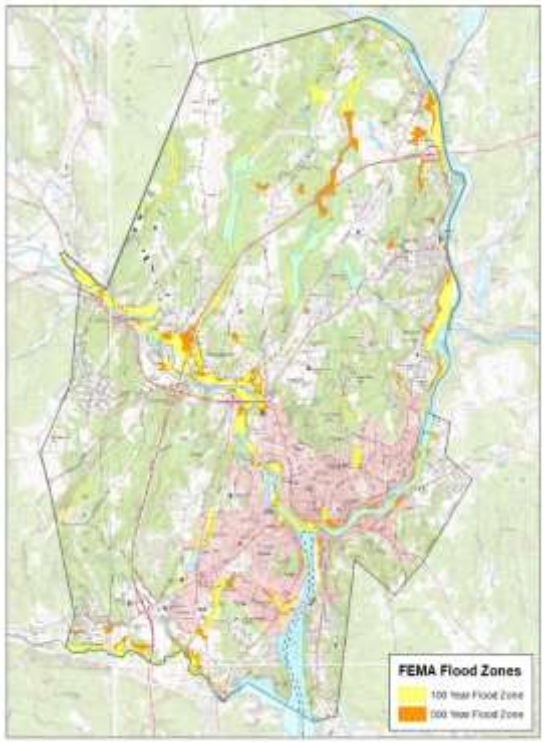
The Otis Library has a number of publications about floods and flood insurance. Ask for help at the desk.

—

Did you know that Norwich is a ***StormReady*** community? Learn more at **www.norwichct.org/190/Emergency-Management**



Flood Information



WHERE ARE THE RISK AREAS?

- The yellow and orange areas on the map above show areas with highest flood risk. Flood risk maps can be viewed on the City of Norwich web site.
- As of 2018, Connecticut has 37,322 active flood insurance policies.
- Norwich has 266 active flood insurance policies with a combined coverage of $43 million. A total of 208 flood losses have been paid in Norwich.
- Areas of Norwich downstream of dams may have additional risks associated with dams. These generally occur in some of the yellow and orange areas above. Contact the City to learn about specific locations.

Before a Flood

Build Smart

- **Builders should obtain appropriate permits** and comply with flood requirements and regulations.
- **Elevate your home** or business to the required level to reduce flood damage.

Know Your Flood or Dam Hazard Risks

- **Understand** Flood Insurance Rate Maps; Sea Level Rise; and Sea, Lake, and Overland Surges from Hurricanes (SLOSH) maps. **https://msc.fema.gov/portal/home**
- **Learn** if your property is in a flood zone or downstream of a dam.

Protect What Matters

- Purchase flood insurance for your home or business, or contents insurance if you rent.
- Contact the Norwich Emergency Management Department to learn if you live downstream of a dam.
- Develop an evacuation plan and identify a safe meeting place in case an evacuation due to potential flood or dam failure.
- Prepare a safety kit with a radio, flashlights, blankets, drinking water, canned food, and a first aid kit.

During a Flood

Safety at Home or on the Road

- **Stay away from flooded areas** or areas with rapid water flow. Never attempt to cross a flowing stream.
- **Never drive through floodwaters**. Roads may be damaged or moving water could cause your vehicle to float away.
- **Stay away from downed power lines and electrical wires.** Electrocution is the number two killer in a flood. If your home is flooded, turn off your electricity.
- **Listen and watch for messages** from the Norwich emergency management staff.
- Get to **higher ground** if a flood occurs, and avoid low lying, flood-prone areas.
- Do not allow children to play near flood water, streams or ditches. Hidden dangers may lie beneath the water.

6 inches of moving water can knock an adult off his or her feet

12 inches can carry a small car

18 to 24 inches *can carry away trucks, vans, or SUVs*

How do floods occur?

Flooding in Norwich can come from many places. Snowmelt runoff combined with heavy rains can often cause spring floods. Flash floods can develop rapidly as a result of heavy rainfall that the ground cannot absorb. Riverine flooding may occur due to river levels rising from heavy rains and runoff, or in tidally influenced areas such as the Thames River.

Appendix C

Dam Flyer

Norwich, Connecticut
Dam Information & Safety

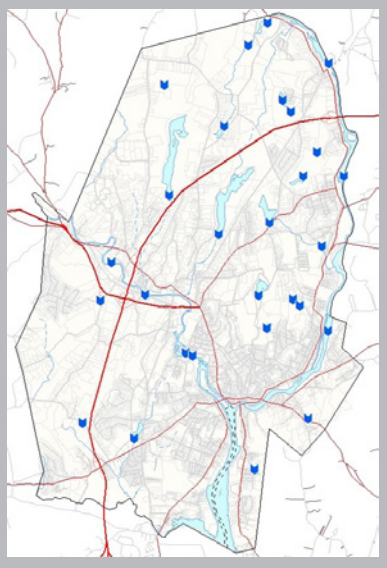
Although unlikely, if a dam were to fail, some neighborhoods in Norwich could flood

There are 28 dams in the City of Norwich;12 of them are classified as a significant or high hazard

Contact the City Emergency Management Department for more Information

The City of Norwich and Norwich Public Utilities both maintain Emergency Action Plans (EAPs) for the high hazard dams they own and maintain. These EAPs include steps on alerting residents in the event of a potential dam failure.

If a dam were to fail, residents and businesses would receive a call from Norwich Emergency Management with event details and evacuation information.



How can you be prepared for a dam failure?

Learn whether your home or business is located in one of the 7 mapped inundation areas

Sign up to receive emergency alerts from the City at **www.ctalert.gov**

Always follow evacuation instructions - it's for your safety!

For More Info Visit https://www.norwichct.org/190/Emergency-Management

Appendix D

Dam Failure Tabletop Drill Slides

Spaulding Pond Dam & Fairview Dam

TABLETOP DRILL EXERCISE

AUGUST 27, 2019

Welcome

Todays exercise has been designed to ensure that the Spaulding Pond Dam and Fairview Dam EAPs are designed to respond to a potential dam failure. A scenario has been developed to prompt discussion on responses and actions that should be taken to address the events that are occurring as the scenario progresses. There are several goals this exercise is expected to meet.

Goals

1. Confirm roles and responsibilities of involved parties
2. Identify any gaps in emergency response communication
3. Develop recommendations to improve the EAPs
4. Facilitate the entry of the City into the CRS program

Housekeeping

We are trying to simulate a real-life event so…

- there will be no break, please use the restroom, grab coffee etc. as you need
- we will not review the EAPs – if this were real, there would be no time for review!

Introductions

In the event of a real-life situation with potential dam failure, several parties would be involved in response efforts. It is important to know which municipal staff, state agencies, or private stakeholders need to be contacted during an event.

Exercise Parameters

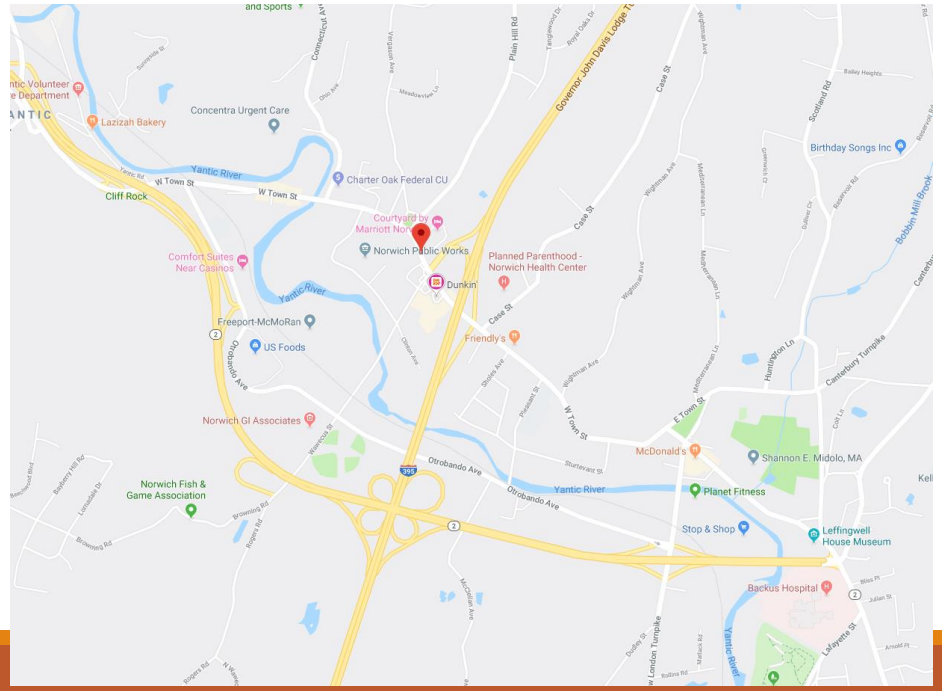
- Provide realistic time and personnel estimates
- Responses and actions should be based on current procedures and guidelines
- Blue text = Pertinent Fairview Dam Information
- Red Text = Pertinent Spaulding Pond Dam Information

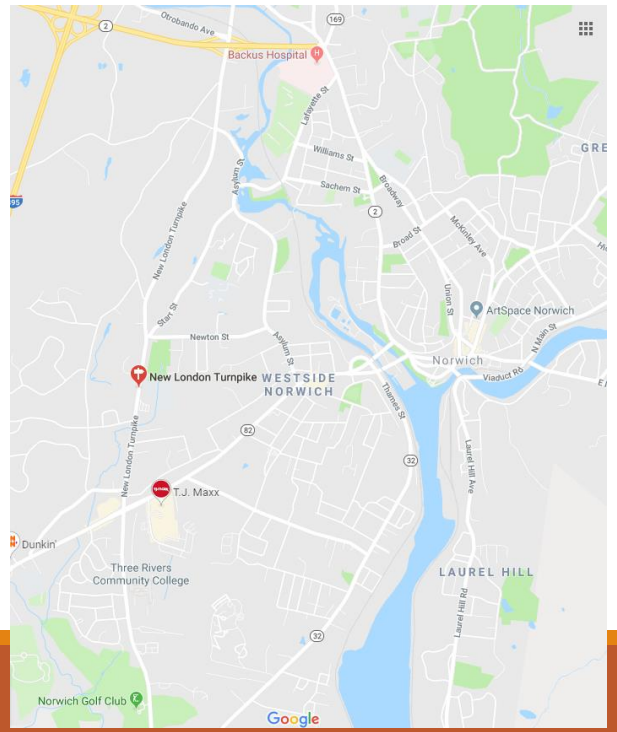
Scenario

A flood warning has also been issued by the National Weather Service (NWS) late evening/early morning.

Scenario

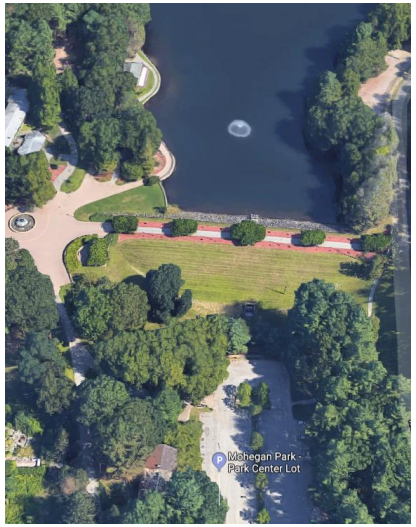
A large nor'easter has brought along winds and heavy rain and has been consistent since 3 am; like the Storm experienced September 26, 2018. By 9 am, residents have reported areas of localized flooding on West Town Street and New London Turnpike on the City's social media pages. The Yantic has also been experiencing unusually high flows from recent rain, with USGS gauge heights around 11 feet.





Does anything need to be done?
If so, who is responsible?

- Does NPU or the City monitor flood warnings?
- Does the City monitor social media pages?
- What procedures are in place if a warning is issued?
- What is the procedure if the City Engineer or the NPU Integrity Manager cannot be reached?



Interjection #1

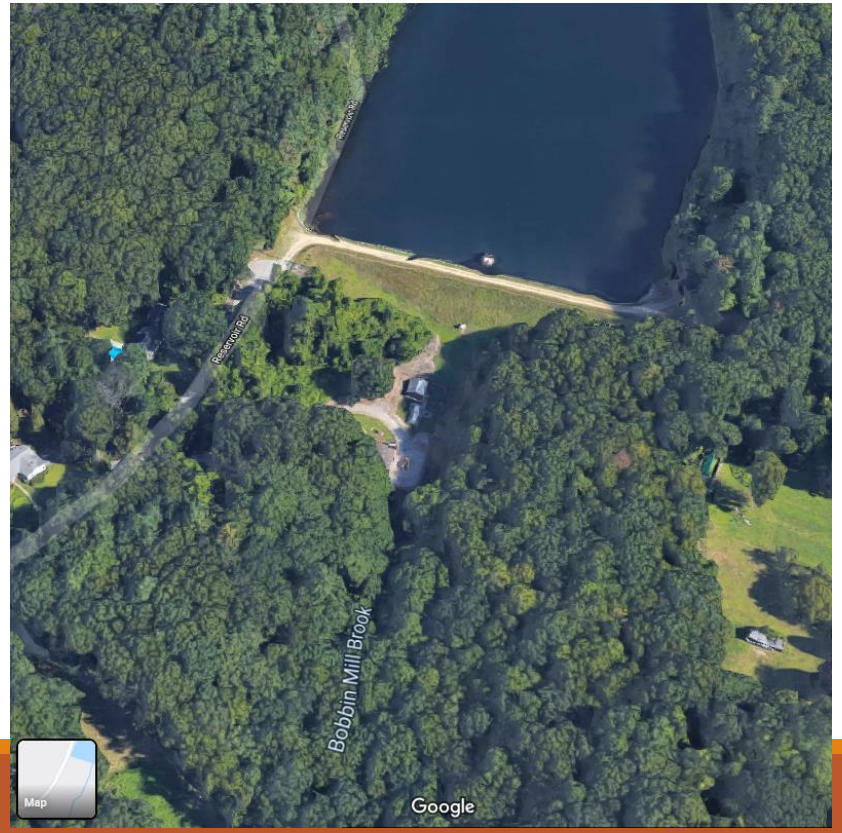
A City employee has arrived at the dog pound for morning rounds and reports flooding in the grassy area adjacent to the water fountain, with the gauge reading almost 246 ft.

Does anything need to be done?
If so, who is responsible?

- Was a warning triggered?
- Is anyone responsible for evacuating the park if necessary?
- Who maintains a list of contacts for potential evacuation notification?

Interjection #2

NPU staff arrive at the Fairview Dam and report a water level of 249.6 ft (2.5 ft from crest of dam), with low flow through the spillway.



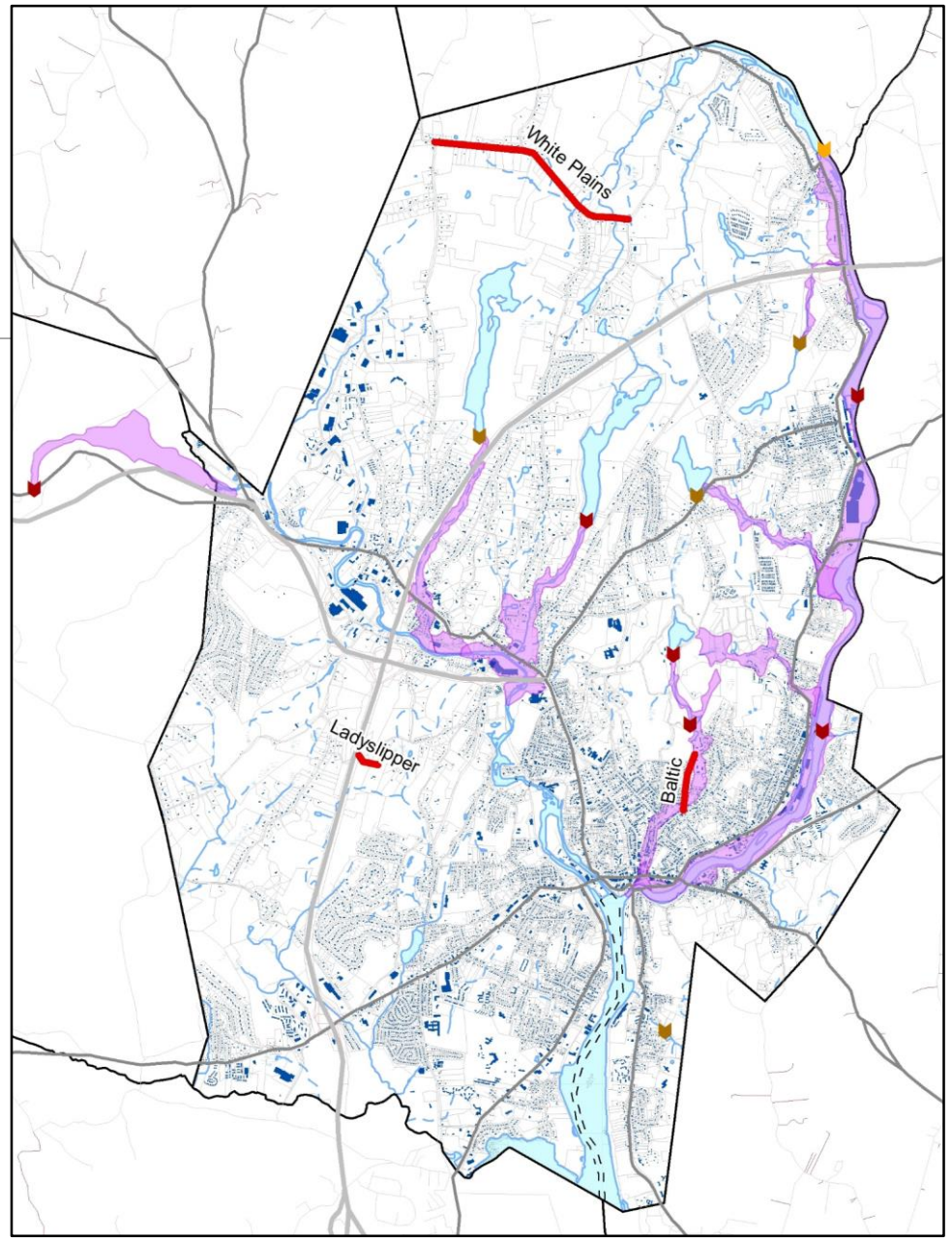
Does anything need to be done?
If so, who is responsible?

- How often should monitored parameters be recorded/reported?
- Should the field be calling in, or is the response coordinator responsible for checking in?

Scenario

Heavy winds have resulted in downed tree limbs. Some of which have also brought down power lines throughout the city including White Plains Road, Lady Slipper Lane, and Baltic Street.

Local weather stations are reporting 1.5 inches of rain since 8:30 this morning.



Does anything need to be done?
If so, who is responsible?

- How will this impact the city's emergency response and public works resources?

Interjection #3

Someone arrives at Spaulding Pond Dam for inspection and finds debris at both spillways, and cloudy water flowing from the embankment into the parking lot. Water levels at this inspection are recorded at 249.7 ft (2.2 ft. below dam crest)

Does anything need to be done?
If so, who is responsible?

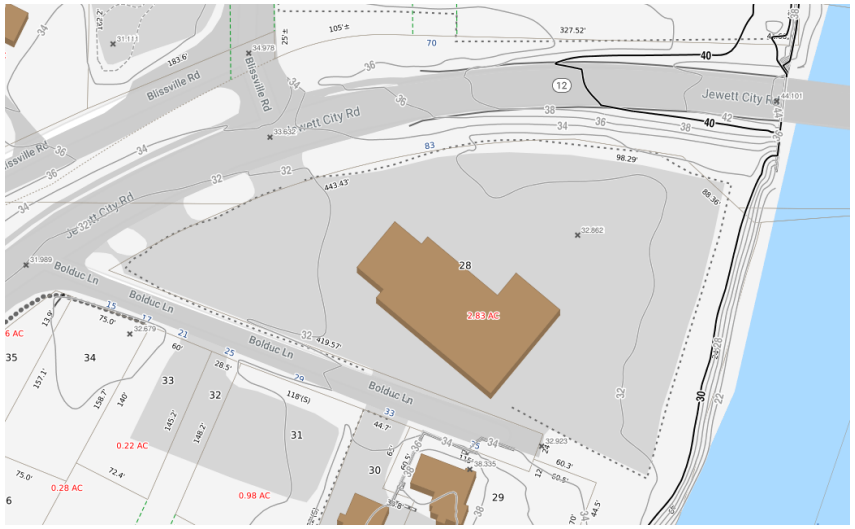
- Should debris be cleared? If so, how?
- How should the embankment be addressed?

Interjection #4

At around 11:45, NPU field personnel report water levels have risen to 1.0 ft below crest of dam. Heavy amounts of vegetation and debris that has built up over time is not allowing the spillway to flow at maximum capacity.

Does anything need to be done?
If so, who is responsible?

- Should the debris be cleared?
- Is there equipment or materials that may assist for potential debris clearing?



Interjection #5

Fire dispatch has received a call from 83 Jewett City Road, First Student Inc., because of flooding. It was reported that catch basins are clogged with debris and their site is flooding as a result of heavy runoff from Jewett City Road. There is concern the continued heavy rain could impact access, resulting in delayed afternoon pickups.

Does anything need to be done?
If so, who is responsible?

- Who would get involved in this situation?
- How does this affect city emergency response and public works resources?
- How long might response efforts take?
- Does this problem affect students in the inundation areas?

Interjection #6

Yantic Fire Station has shifted operations from city-wide emergency response to site cleanup, as the property is now flooding, and they are concerned about access to the station.

Does anything need to be done?
If so, who is responsible?

- Can Yantic Fire Company be responsive in the Fairview Inundation area during this flood?
- Could another fire company help with calls?

Interjection #7

In early afternoon, the rain begins to let up.

Fairview water levels have receded to about 1.9 feet below dam crest.

Spaulding Pond water levels were last reported at about 15 inches below dam crest. Water is also close to overtopping Mohegan Park Road.

Does anything need to be done?
If so, who is responsible?

- Any consideration for nearby utilities?
- What are procedures for Fairview? For Spaulding Pond?

Termination

Neither dam has failed, however, Spaulding Pond Dam may have come very close.

- What are the triggers for the end of an event?
- What are the procedures?

Lessons Learned

- Can anything in the EAPs be updated?
- Can any lines of communication be strengthened?
- What other lessons were learned?