Village of Afton Strategic Plan

Task 7: Feasibility and Planning Study for Waterfront Revitalization

Created by: GeoEco Design

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TABLE OF CONTENTS

1. EXECUTIVE SUMMARY

The objectives of the waterfront revitalization study were to address waterfront park development, flood mitigation, water quality, and wetland restoration, by mitigating flooding in the areas that have historically and are predicted to be affected by flooding. Maps illustrating the Study Area and the core area of the Village of Afton are included in this document (**Figs. 1 & 2**). The scope of work included:

1. An analysis of the various past flood events
2. An analysis of the various flood mitigation options that would promote the goals of the study
3. Cost/benefit analysis associated with implementing the various mitigation options

2. RECOMMENDATION

The study identified five potential options, four of which can be used in collaboration to radically reduce flooding within the Village of Afton.

1. Status Quo – do nothing
2. Watershed management / Best Management Practices (BMPs)
3. Relocation of flood prone structures within village
4. Hard-path solutions
5. Soft-path solutions

Options three and four will have the greatest impact on flooding with option four addressing the regional impact of the culvert under the I-88 connector. Option two would cause the least environmental damage while also including the community as a part of the solution. Option five would be a positive addition to any of the above listed options.

3. BACKGROUND

It is commonly accepted among scientists, government agencies and the general public that global climate change has produced extreme weather events such as flooding, hurricanes and radical temperature fluctuations (IPCC, 2015). The Village of Afton, NY has experienced recurrent flooding issues due to their close proximity to the Susquehanna River. This watershed-scale problem is common for many cities, rural and urban communities alike, where natural landscapes (i.e., floodplains) have been encroached upon and converted to artificial surfaces for human habitation (Cech, 2010). As of 2017, 42% of properties within the Village of Afton are considered at risk for flooding with a combined value of over $13.7 million dollars. In a recent statement by the New York Energy Research and Development Authority (NYSERDA), climate projections show that the extreme weather conditions of the recent past may only be an introduction to the climate of the future. NYSERDA's projections show increased

rainfall levels for the region, which will lead to amplified flooding along the Susquehanna River (Horton et. al. 2014).

The Village of Afton lies along the main channel of the upper portion of the Susquehanna River in the Southern Tier of New York (**Figs. 1 & 2**). The Susquehanna River is the sixteenth largest river in the United States and is the largest river in the US that flows into the Atlantic Ocean. The Susquehanna River and its hundreds of tributaries drain 27,510 square miles, an area nearly the size of South Carolina, spread over parts of the states of New York, Pennsylvania, and Maryland. The river meanders 444 miles from its origin at Otsego Lake near Cooperstown, N.Y., until it empties into the Chesapeake Bay at Havre de Grace, MD. The Susquehanna contributes roughly one-half of the freshwater flow to the Chesapeake Bay (**Fig. 3**). This area has a rich settlement history with community originating back to the late 1700's (Shaker et al., 2012). In the Northeast US, many forested areas have decreased in size and become increasingly fragmented due to human development.

According to Chris Duffy, a civil and environmental engineering professor at Penn State, in a 2009 interview with *The Sentinel*, the Susquehanna is one of the most flood prone rivers in America. The flooding phenomenon has been well known for centuries, and early settlers referred to the Susquehanna River as "a mile wide and a foot deep." Although this folk-saying likely refers to the Susquehanna's lower segments, the sentiment reveals the geological forces impacting the River, which make it exceptionally likely to flood. The main stem of the Susquehanna has flooded 15 times since 1810, and even the Native Americans who once lived in the area spoke of the River's flood frequency (SRBC, 2017).

The recorded history of flooding on the Susquehanna River began roughly 200 years ago. Residents of the Village have experienced more than ten floods since 1810. With major floods occurring in: 1810, 1865, 1889, 1894, 1935, 1936, 1946, 1955, 1964, 1972, 1975, 1996, 2004, 2006, and 2011 (SRBC, 2017). In September 2011, the second largest flood in the history of Afton occurred. This stimulated a change for the Village. In response, Village residents created the Flood Mitigation Committee chaired by April Leggett. This process led to a search for scientific expertise, Afton's Flood Mitigation Committee contacted Dr. Richard Ross Shaker, assistant professor at Binghamton University, State University of New York. Over the course of two years, Dr. Shaker collected remote and in situ data and resources from varied sources including: geographic information systems (GIS), remote sensing (RS), Village of Afton, Chenango County, New York State, and Federal Emergency Management Agency (FEMA).

In the course of Dr. Shaker's research he found flooding issues in Afton to be influenced by global, regional, and local climate; as well as geographical, and hydrological phenomena.

3.1 Globally

Atmospheric greenhouse gasses continue to increase, resulting in the warmest decade in Earth's recorded history (Seneviratne et al., 2014). These increased temperatures melt glaciers, ice sheets, and expand oceans, which exacerbate sea level rise (Dutton et al., 2015). Warming and expanding tropical ocean waters are increasing the range, magnitude and related disasters of hurricanes (Webster et al., 2005). The macroscale impacts of climate change are well recognized in the Southern Tier, experts and research groups have warned that the "Susquehanna River basin will flood with increasing frequency" (NYSERDA, 2013). In correspondence with the Afton Village Justice, Dr. Shaker received a memo from the Kopernik Observatory and Science Center dated 19 July 2013; NYSERDA) has projected that by 2080 regional temperatures are expected to rise by 4.5. to 8.5 degrees Fahrenheit and precipitation increases by more than 10% (Horton et. al. 2014). Lastly, the Susquehanna River basin runs mostly north-south, which is ideal for tropical storms and hurricanes to fill the basin as those storms move away from their origin, the Gulf of Mexico.

3.2 Regionally

The Village of Afton sits at the upper sub-watersheds of the Susquehanna River basin in New York's Southern Tier (**Fig. 4**). Its landscapes are characterized by small but relatively steep mountains associated with the Allegheny Plateau as well as by a temperate-continental climate, which has average annual precipitation of 41.5 inches (USGS). The total drainage area for the Village of Afton is 1,720 square miles, reaching past the communities of West Winfield, Richfield Springs, and Cherry Valley. As of 2006 data, the Village of Afton's watershed was dominated by forest land cover (56%), followed by agricultural lands (30%), and then urban (5%); wetlands and rangeland occupy roughly 4% each (Shaker et al., 2012). When investigating the River's substrate from the Village of Afton up to the communities of West Winfield, Richfield Springs, and Cherry Valley, most samples rendered exposed bedrock or shallow cobble, sand, and silt then bedrock. With minimal substrate roughness, precipitation events cause flash flooding especially under previous saturation. Locations across the Upper Susquehanna River have shown to reach flood stage within a 24-hour period with soils close to their saturation point. When investigating the spatial distribution of the top five major storm/precipitation events associated with past flooding for Afton, peak precipitation areas did not occur within its upstream watershed suggesting that past flooding events could have rendered more significant flooding. Based on digital elevation model (DEM) and air photograph maps (**Figs. 5 & 6**), created by Dr. Shaker and locally validated, the Village of Afton's watershed is characterized by *meanders*, *cutoffs, meander scars*, and *backswam*ps. These *backswamps* and local wetlands are due to the Susquehanna's meandering movement within the floodplain, creation of oxbow lakes at cutoff points, and transition to wetlands through geological-time. Geological evidence suggests that the flow of the ancient Susquehanna River predates the formation of the Appalachian Mountains over 300 million years ago; implicating the River to be one of the oldest in the world dating back to the Paleozoic Era (543 to 248 million years ago) (Lizlovs, 2009).

In the Village of Afton alone there is evidence supporting three different "main channels" the Susquehanna River has traversed.

Lastly, regionally there has been increased flooding due to the infill of wetlands and land cover change associated with the Interstate 88 (I-88) corridor between Binghamton and Schenectady. I-88 was assigned in 1968 and was not completed until 1989. Ironically, due to its early designation, most of I-88's sub-sections were likely not required to complete Environmental Impact Assessments (EIAs), which came with the National Environmental Policy Act of 1969 becoming United States environmental law on January 1, 1970 (NEPA, 1970). NEPA's purpose is:

> ''To declare a national policy which will encourage productive and enjoyable harmony between man and his [sic.] environment; to promote efforts which will prevent or eliminate damage to the environment and biosphere and stimulate the health and welfare of man; to enrich the understanding of the ecological systems and natural resources important to the Nation; and to establish a Council on Environmental Quality." (NEPA, 1970)

EIA, commonly defined by the International Association for Impact Assessment (IAIA, 1999), is designated as:

> ''The process of identifying, predicting, evaluating, and mitigating the biophysical, social, and other relevant effects of development proposals prior to major decisions being taken and commitments made."

3.3 Locally

Investigating the local flooding issues for the Village of Afton, first the physical hydrological features were recorded. The average width of the Susquehanna River channel was recorded to be an average of 278 ft. wide at average *stage height* (water depth) of 4 ft. deep. Averages were calculated using the *reach* of the Susquehanna River, centered at the Village of Afton; a river or stream *reach* is most commonly calculated as the product of 35 times the width of the stream (Simonovic, 2012). In the Village of Afton's case, the Susquehanna River *reach* is equal to 2,975 ft. Regarding discharge, the nearest gauging station (USGS 01502632) at Bainbridge, NY. In accordance with the US Geological Survey at Bainbridge, NY, flood-related stages for "Action," "Minor," "Moderate," and "Major" are 13', 15', 20' and 22', respectively. Albeit, it is important to note that "Flood Stage" is listed at 15' or at the "Minor" stage listing. The two greatest flood stages for the Bainbridge gauging station were recorded on 6/29/2006 (27.05 ft) and 9/8/2011 (22.10 ft), with the record being maintained at 27 feet. Regarding discharge, the average discharge over the last decade is one *thousand cubic feet per second* (kcfs). In accordance with the US Geological Survey at Bainbridge, NY, flood-related stages for "Action," "Minor," "Moderate," and "Major" are 18, 22, 34 and 39 kcfs, respectively. The two greatest flood discharges for the Bainbridge gauging

station were recoded on 6/29/2006 (58.7 kcfs) and 9/8/2011 (48.3 kcfs), with the record being maintained at 58.7 kcfs.

The Village of Afton's land cover is primarily low-density developments and zoned residential, with small proportions designated as agricultural and parks (**Figs. 7 & 8**). After the 2011 flood, 108 homes claimed damages due to flooding, 20 of those were restricted and four were deemed unsafe. One property was bought by the Village and shall remain forever green with the intention of creating a Riverfront Park in its place. According to local survey results, close to half of Village residents are concerned about flooding. Only about 10% of residents have flood insurance while around 1/3rd of the Village is at risk for flooding. According to the same survey results, 80% of respondents do not want to move the portions of the Village that are at highest risk for flooding, however close to 60% of residents do not want things to remain the same. 32% of respondents said they would be willing to relocate if their home is in the natural floodplain. 36% of respondents said they would be willing to relocate for a buyout or a buyout and relocation to improved housing while 31% of respondents said they are not willing to relocate.

By investigating the alluvial deposits, with the floodplain centered north-south at the Village of Afton bridge, a west-east transect of alluvial material spans an astounding one-mile width. From the alluvial deposit investigation, and assessing soils and land cover data, it is apparent that the connector between the Village and I-88 also infilled a portion of the floodplain and wetlands, which previously absorbed Susquehanna River overflows. The I-88 connector to the Village of Afton was previously acknowledged by the Flood Mitigation Committee as a magnifying cause for local upstream flooding. After field observations, GIS work, and consulting resources from independent government agencies (FEMA, NCRS, USDA), it was validated that the I-88 connector is serving as an impoundment during flooding events. The I-88 connector acts similar to a levy or earthen dam with only a two-foot diameter culvert to drain the hydric soils of the wetland it bisected. Corroborating the uneven flooding impacts of the I-88 connector to the Village of Afton, work from two independent federal agencies confirm that flood stage (water level) on the upstream (north) side of the connector is higher than the downstream (south) side.

The U.S. Department of Agriculture (USDA) Natural Resources Conservation Service (NRCS) was contacted previous to Dr. Shaker's involvement in the flood assessment in Afton. High-water marks were placed by local residents during the 2011 flood. Next, a NRCS surveyor/engineer (L. Lockrel, 2012; **Appendix S1**) measured those two locations (setting the culvert as the survey baseline) using standard surveying equipment. According to those measurements, the inlet (north) high-water mark was set at 112.3 ft. with the outlet (south) set at 108.3 ft., a four-foot difference was recorded and accepted. This 4-foot difference further supports the direct cause and effect of how the I-88 connector exacerbates the flooding problem for the Village of Afton. Overlaying the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM)

flood zones from 2006 within a GIS, Dr. Shaker calculated the high-water mark to be 8.9 feet above the 100-year flood level. Second, historic and current FEMA FIRM maps (**Appendices S2 & S3**), with the current FEMA zones updated after the 2006 flood. Both the 1992 and 2010 FEMA maps independently acknowledged at a three-foot minimum difference in *flood stage* elevation when comparing the upstream (north) side (972 ft. above sea-level) of the connector with the downstream (south) side (969 ft.).

GeoEco Design created new flood inundation maps (**Figs. 9-13**) to assess flood-loss property values and visualize the specific property parcels at risk of being flooded in the Village. Based on the 2017 cadastral data obtained from Chenango County's Department of Planning and Development and Tax Map office, 472 properties within the Village of Afton total $39,451,102 in value. Of the Village's 472 parcels, 139 (42%) were deemed at-risk to future flooding and totaled $13,708,112 worth of unsafe tax assets (**Appendix S4**). Geographically, four distinct Village flood districts were created and designated as North, South, East, and West for the purpose of this study (**Fig. 13**). The at-risk property values summed to $3.74, $2.88, $4.37, and $2.71 million across the four designated districts North, South, East, and West, respectively. The district northeast and upstream of the I-88 connector (East) proved to be the most monetarily at-risk to flooding. Lastly, while some of the flooding is a result of backflow due to the small sized culvert under the I-88 connector, the majority of future flooding will continue to increase in frequency and intensity due to large-scale changes in global climate.

4. CURRENT WATER RESOURCES AND RIVER ACCESS

4.1 Water Quality

The Federal Clean Water Act (1972) has a goal of restoring and maintaining the chemical, physical, and biological integrity of the Nation's waters. The Act also defined pollution as any human activity that degrades a water body's integrity (Shaker et al., 2017), and required all states to assess and report on the quality of waters within their borders. It also requires states to identify impaired waters where designated uses are not supported. The Village of Afton sits on an *impaired* segment of the Susquehanna River (**Fig. 14**). *Impaired* is a designation given by the New York State Department of Environmental Conservation (DEC), and identifies those waters that do not support appropriate uses and that may require development of a Total Maximum Daily Load (TMDL; NYDEC, 2016). The section of the Susquehanna River that runs through Afton is designated as a Class B(T) due to mercury loading from atmospheric deposition. This section of the Susquehanna River is not included in the 2016 section 303(d) list because the assessment of TMDL was deemed necessary at this location (NYDEC, 2016). Fish consumption in this portion of the Susquehanna River is impaired (**Fig. 15**) due to mercury contamination (USDOH 2016).

Drinking water in the Village comes from a groundwater well with water drawn from a single 133-foot deep drilled well and six springs located off NYS Route 41 on a protected 100-acre parcel of land owned by the Village. The water is mixed and treated at the Spring Water Treatment Plant. After being treated it is stored in steel tanks. As required from state regulations the water is routinely tested. There is an annual drinking water quality report that documents all contaminant violations and their likely sources. For 2015 and 2016 (**Appendices S5 & S6**), there were no drinking water violations recorded for the Village. According to a study by the USGS (Reddy et. al. 2012), Radon-222 was detected in every well sampled in the upper Susquehanna watershed. All of the wells tested ranged between 22-1140pCi/L with the median activity being 600pCi/L. While the Village of Afton does have radiological testing conducted (**Appendix S7**), it does not appear that the Village of Afton tests for radon-222 so current levels are unknown. The Village does test for Radon-228 and Radon-226, both were not detected in the last report, however we do not know the sampling methodologies used for this and based on geologic conditions and local results from the USGS, we feel further testing should be conducted to ensure the safety of drinking water within the Village. Radon testing is heavily dependent on many environmental variables. Considering that every well the USGS has tested resulted in a positive Radon detection, it seems suspect that the well in Afton would have undetectable levels of Radon.

4.2 Waterfront Park Development

The Village obtained a property on its southern border on the eastern bank of the Susquehanna River. This is where Mayor Sally Muller would like to create a waterfront park (**Fig. 16**). One design-option for this parcel would be a *demonstration park* where people could come and see firsthand green and natural solutions for flooding and stormwater management. This would be a positive move towards remediating local flooding, educating the public, as well as being a potential tourist attraction in the Southern Tier. To have a greater impact on remediating flooding, with the creation of a waterfront park, land acquisition along the entirety of the Susquehanna River, especially upstream from the Village of Afton is important. The potential to connect rural communities as well as alleviate flooding risks in the Southern Tier is grand. For flood risk to decrease for all upper Susquehanna River communities, flood mitigation plans similar to those taking place in Sydney and the Village of Afton would need to be replicated and connected across the watershed. However, confined to the local scope of this project, land acquisition for nature-based solutions for flood mitigation is an important way to offer some protection to the Village of Afton and communities downstream. Besides local, county, and state government-owned properties within the Village (**Fig. 17**), privately owned flood-prone properties should also be considered for BMPs implementation and other landscape-based flood mitigation strategies. (Further explanations and examples of nature-based solutions can be seen in (**Appendix S8**).

Options for nature based solutions include:

1. Restoring the natural floodplain
2. Building a flood friendly culvert
3. Raingardens

4. Floodwater detention and retention basins
5. Bioswales

4.3 Public Access to the River and Water Related Activities

The Village of Afton is home to one public boat launch, which is listed as a NY Department of Environmental Conservation (DEC) Boat Launch and Fishing Public Access Area. This area has not been well utilized and is somewhat unknown to Village residents. The DEC lists this area as having space for 12 cars and trailers. This area is in need of enhancement as it has been under utilized and not properly kept up. There is a large sandbar blocking the boat launch that may need to be removed if the boat launch is to function properly.

Fish consumption from the Susquehanna River and associated tributaries is severely limited due to high mercury levels. Any size walleye and all other fish are listed as 'do not eat' by women under 50 and children under 15 years old by the NY Department of Health. Walleye greater than 22" are ok to eat up to 1 meal/month while Walleye less than 22" are ok to eat up to 4 meals/month (NYSDOH).

The proposed waterfront park in the above section will also have the potential to increase public access to the River.

5. FLOOD RISK MITIGATION OPTIONS, COSTS AND BENEFITS

The following options are presented to give the Village the freedom to choose how to proceed concerning flooding and the continued damage to property within the Village. Each option is presented with social costs and benefits. Selected key organizations are also listed to offer options for collaboration.

1. Status Quo – do nothing
   - Cost
     - Continued and worsening flooding
     - Damage to properties
     - Potential loss of life
     - Continued decrease in Village amenities and economic stability
   - Benefit
     - No direct monetary cost
   - Key collaborative organizations

2. Watershed Management / Best Management Practices - Increase and restore wetlands, create bioretention ponds, rain gardens, tree plantings, rain barrels.
   - Cost

        - Some of these options would require acquisition of land by the Village to increase wetlands along the Susquehanna River.
        - Monetary cost would be negotiable by Village governance and the property owner.
        - Other options here would require property owner investment or coordination with programs such as 'save the rain' and other community action organizations.

    - Benefit
        - Studies (USEPA, 2018) have showed that wetlands can hold anywhere from 5-60% of floodwaters dispersing them slowly while also filtering many pollutants and sediments out of the water.
        - Less flood damage and increased water quality.
        - Increased biodiversity leading to a more sustainable environment.
        - Community and remaining property values increase

    - Key collaborative organizations:
        - Upper Susquehanna Coalition
        - Susquehanna River Basin Commission
        - Save the Rain
        - Southern Tier East
        - Cornell Cooperative Extension
        - Southern Tier Regional Development
        - The Wetland Trust
        - NY DEC
        - US EPA

3. Relocation of flood prone properties within village
    - Cost
        - Buyout of at risk properties
            - Investigate offset costs of "hard-path solutions" from the Army Corps of Engineers. As with examples such as Soldiers Grove, WI (FEMA, 2007), could these funds be transferred to the "soft-path solution" of relocating the flood-prone properties of the village?
            - FEMA, HUD, Village, property owners – all have a stake in buyout options

    - Benefit
        - Village could require new buildings to have specific energy standards such as LEED certified buildings, solar or other green technologies built into new buildings, etc.

        - Radically reduce the risk of flooding
        - Enhance economic stability
        - Create an energy efficient, resilient and sustainable Village
        - Potential to increase tourism
    - Key Collaborative Organizations:
        - FEMA
        - HUD
        - Village of Afton Government
        - NYSERDA

4. Hard-path solutions (Gleick, 2003) – culvert enlargement, convert culvert and connector into a flood control structure, large scale dam and lake project, levees, dykes, dredging, bank stabilization, river channelization.
    - Cost
        - These options would cause extensive environmental damage and would need Environmental assessment.
        - Estimated monetary and environmental cost here would be high
    - Benefit
        - Possible alleviation of flood risk, however due to the risk associated with global climate change, the long-term benefit here is more difficult to ascertain.
    - Key collaborative Organizations
        - New York State Department of Transportation
        - US Army corps of Engineers
        - NY State Empire State Development
        - NY State Department of Health
        - NY State Environmental Facilities Corporation

5. Soft-path solutions (Gleick, 2003) – early warning, text messages, phone call, flood alert solutions, websites, alarm systems such as the Susquehanna Flood Forecast and Warning System
    - Cost
        - Lowest monetary cost.
        - Does not alleviate most flood damage to properties
    - Benefit
        - Early warnings help prevent loss of lives
        - Can lessen property damage
    - Key collaborative organizations:

- Upper Susquehanna Coalition
- Susquehanna River Basin Commission
- Village of Afton Government

6. FLOOD RISK MITIGATION RECOMMENDATIONS

*****This section will be filled in after input from the community meeting is assessed.**

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8. LIST OF FIGURES

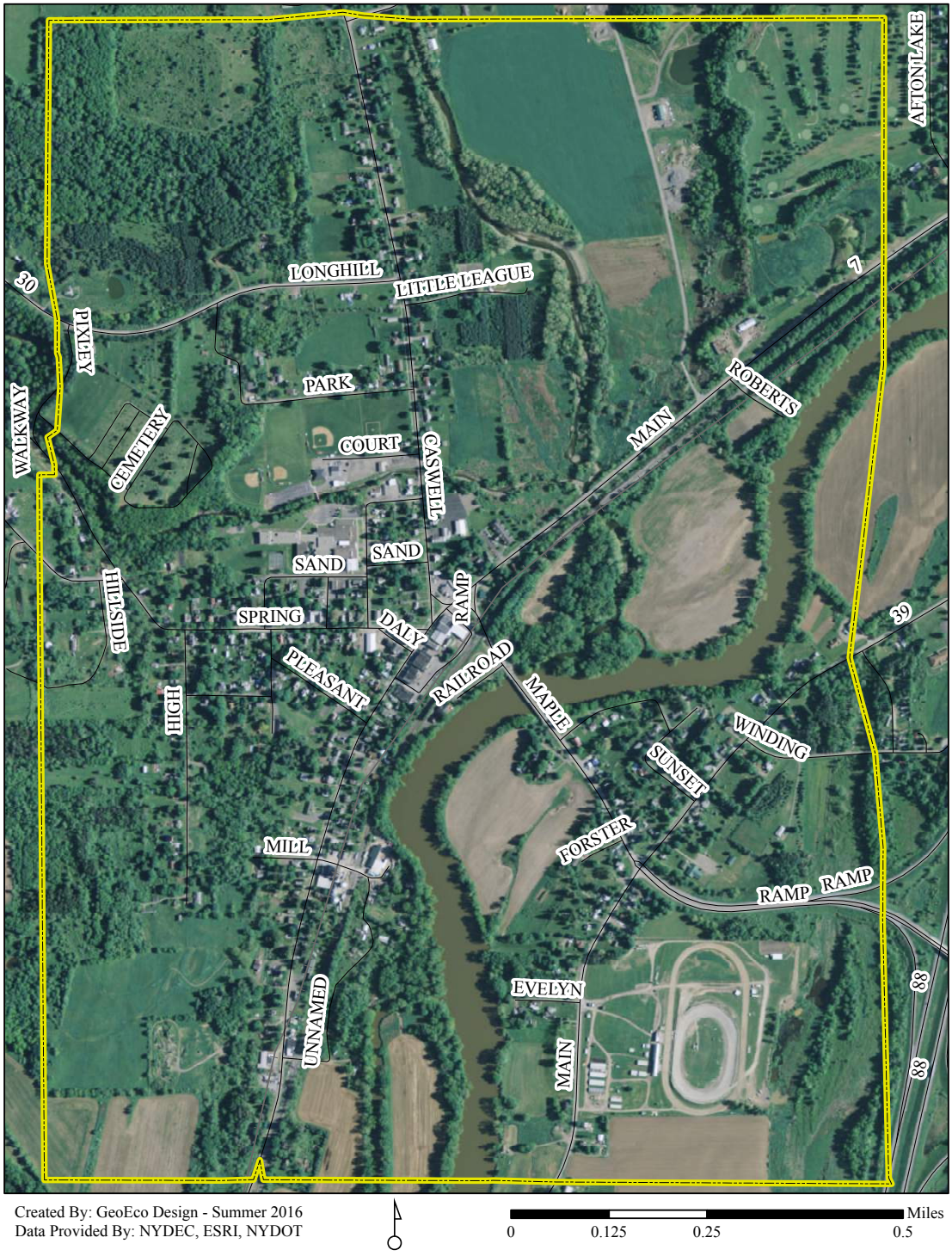


Figure 1. Study area map of the Village of Afton.

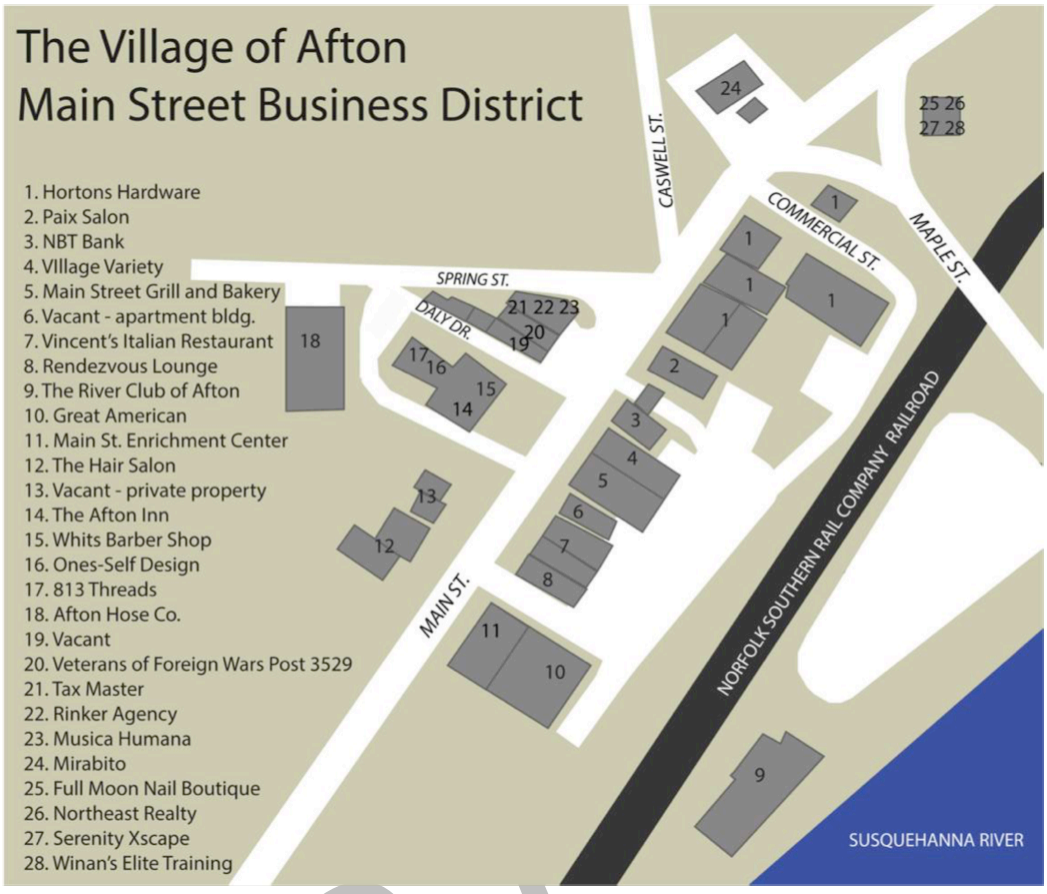


Figure 2. Map of the Village of Afton's central business district (CBD). Businesses correspond to those present during the socioeconomic survey conducted for this study.

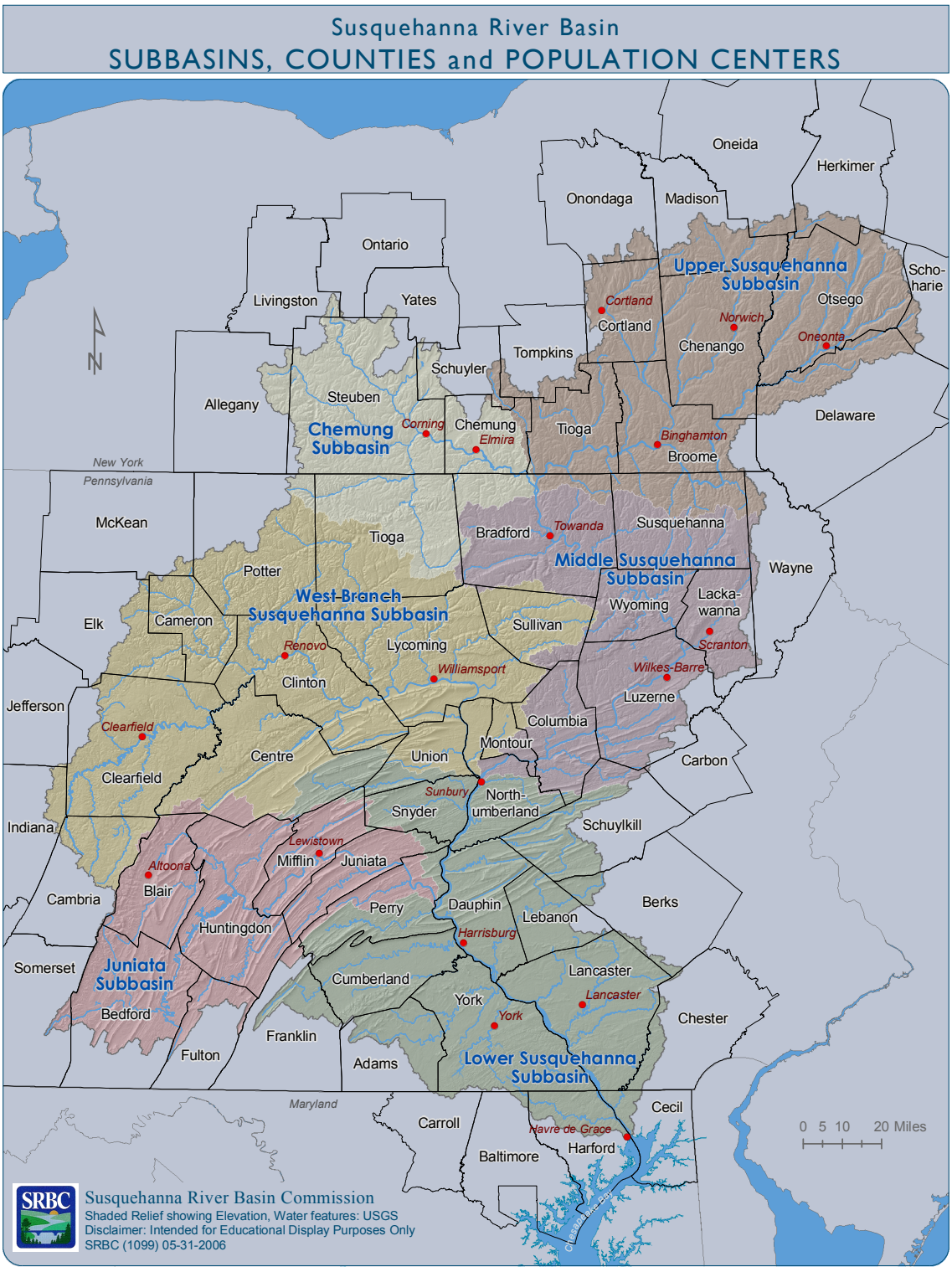


Figure 3. Map of the Susquehanna River watershed from it headwaters in New York State to its outlet in the Chesapeake Bay.

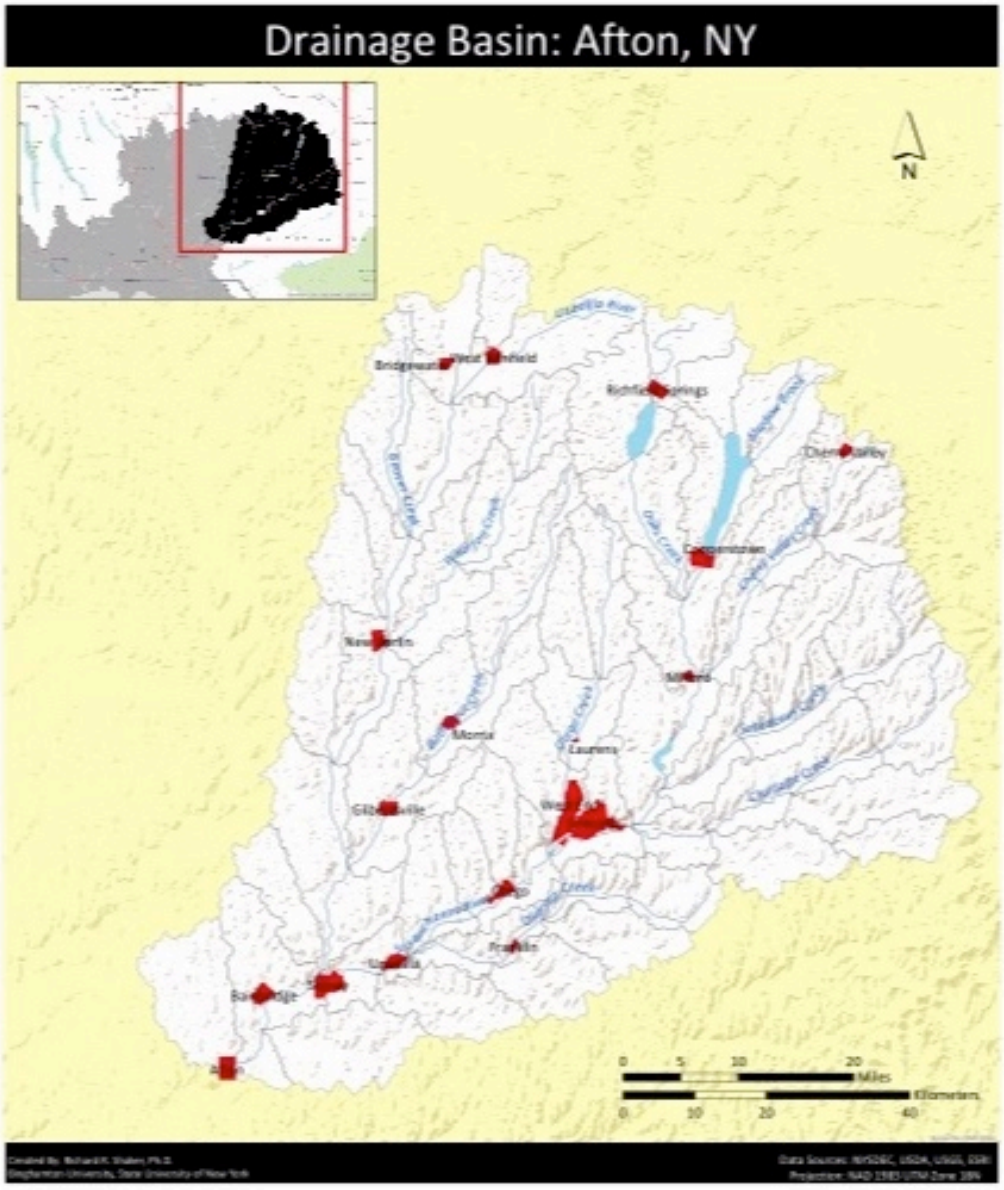


Figure 4. Map illustrating the Village of Afton's drainage basin within the headwaters of the Susquehanna River.

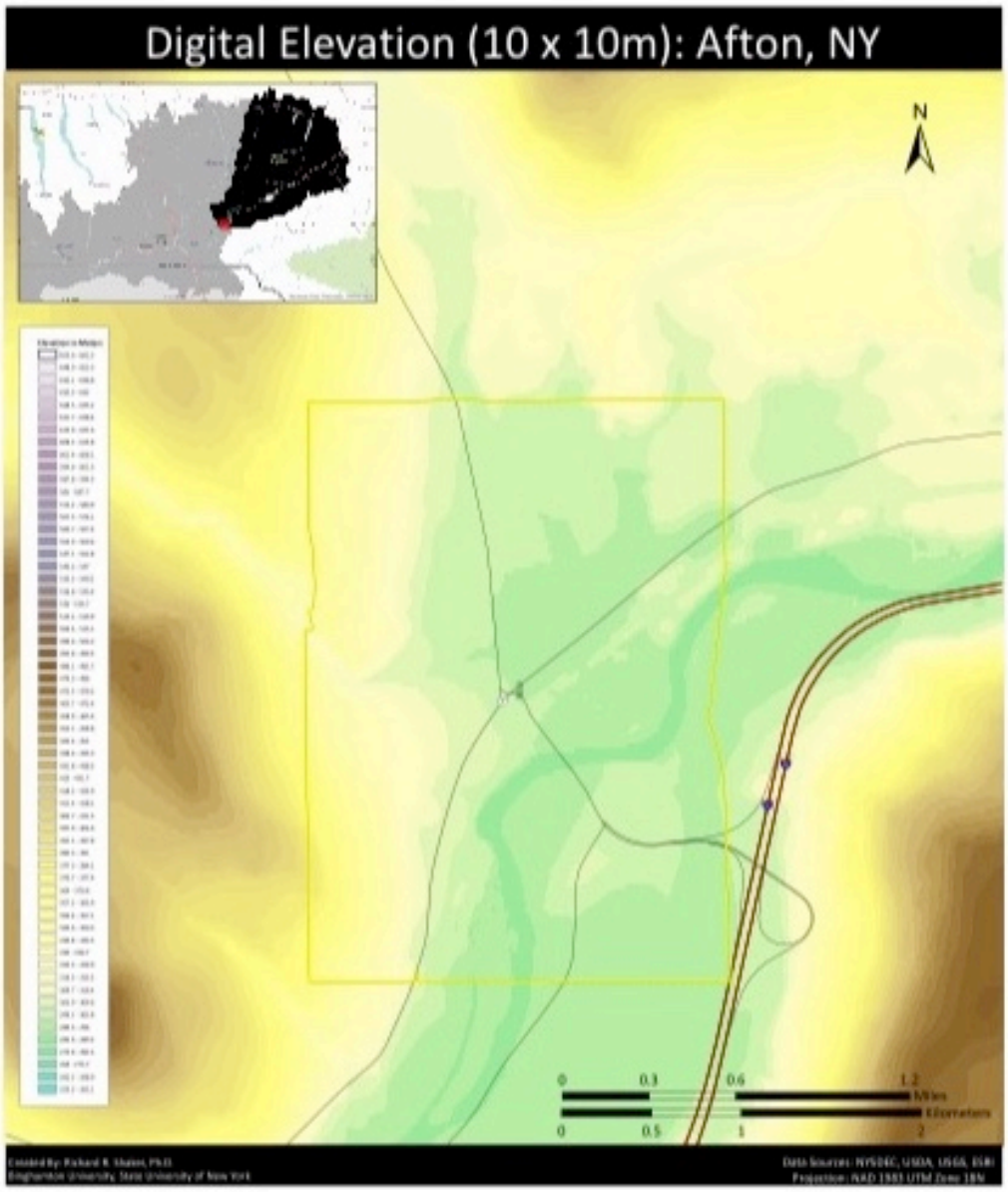


Figure 5. Digital elevation map (DEM) for the Village of Afton.

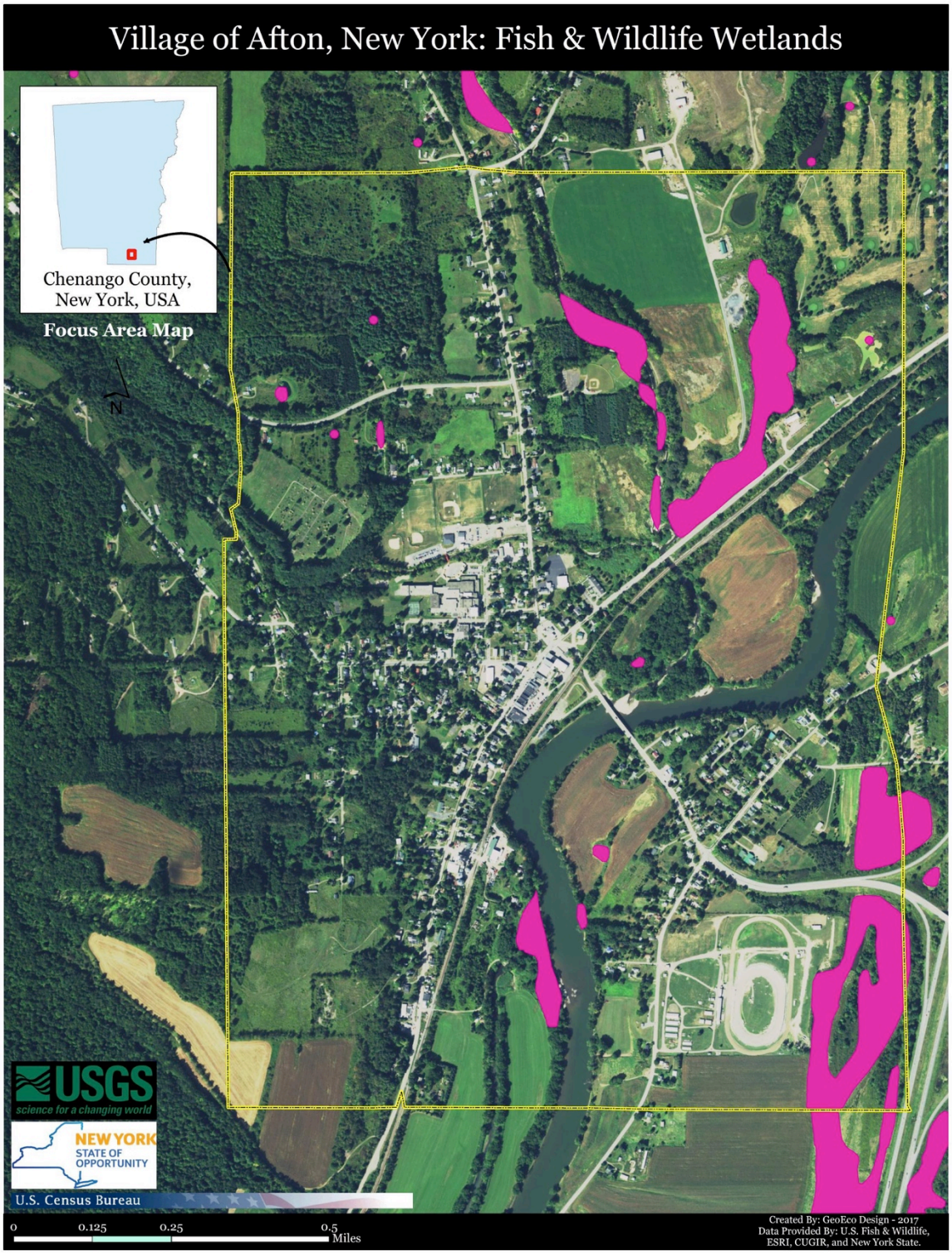


Figure 6. Orthophoto map of the Village of Afton overlaid with United States Fish and Wildlife designated wetlands.

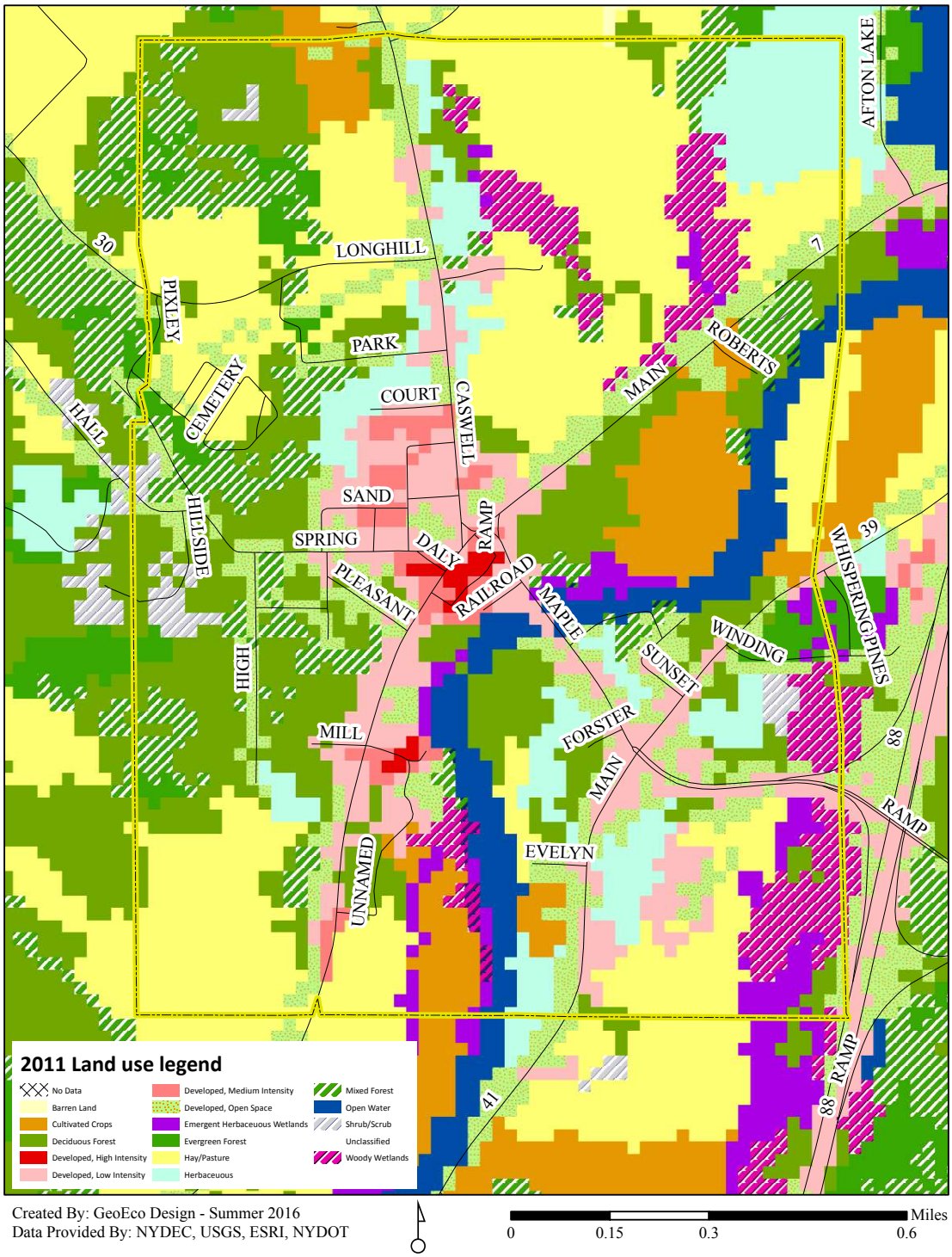


Figure 7. Map illustrating 2011 Land use/land cover for the Village of Afton. The classification system is used by the U.S. Geological Survey, and is modified from the Anderson Land Cover Classification System. For details see: https://www.mrlc.gov/nlcd11_leg.php

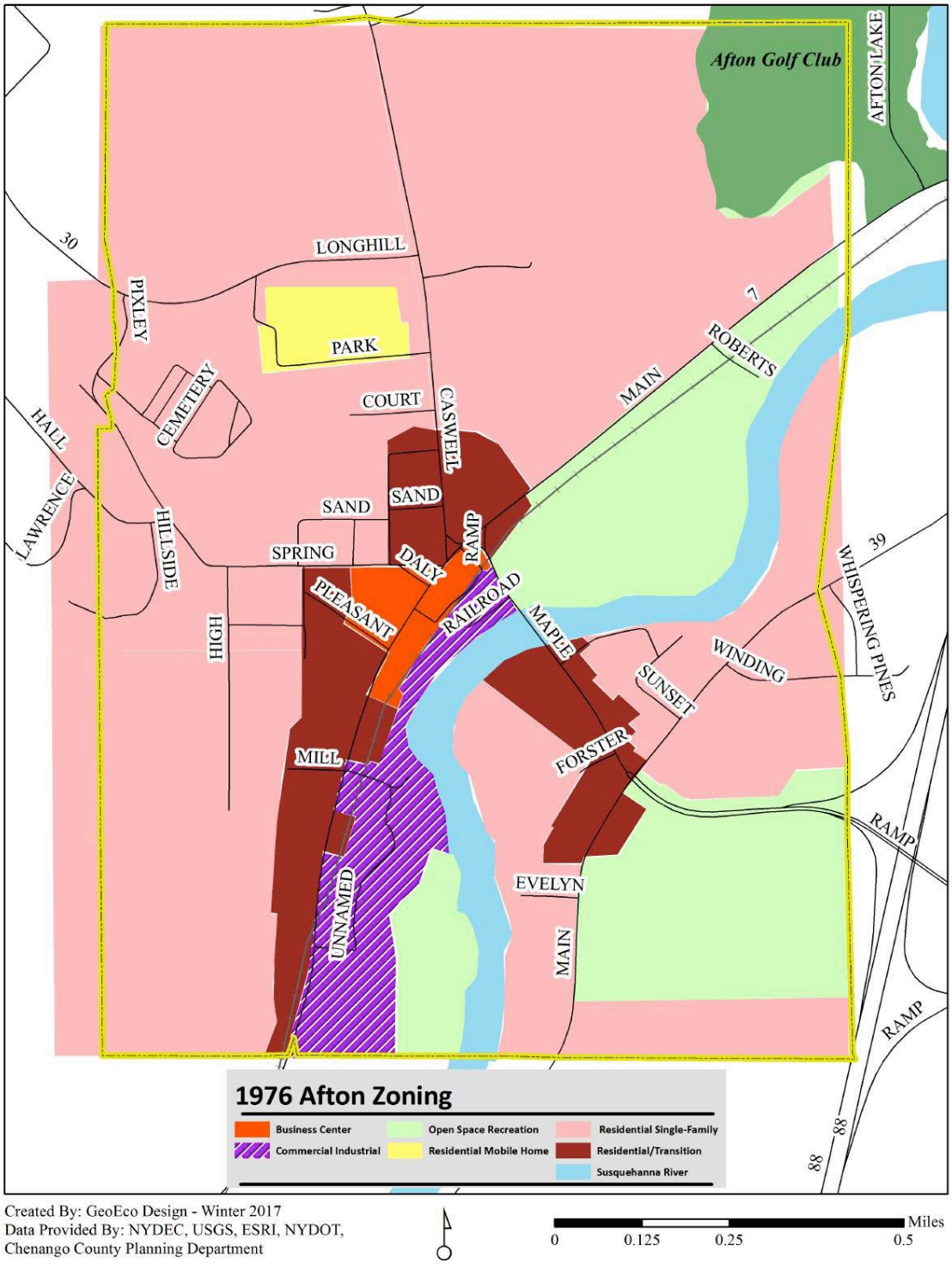


Figure 8. Map illustrating 1976 zoning for the Village of Afton.

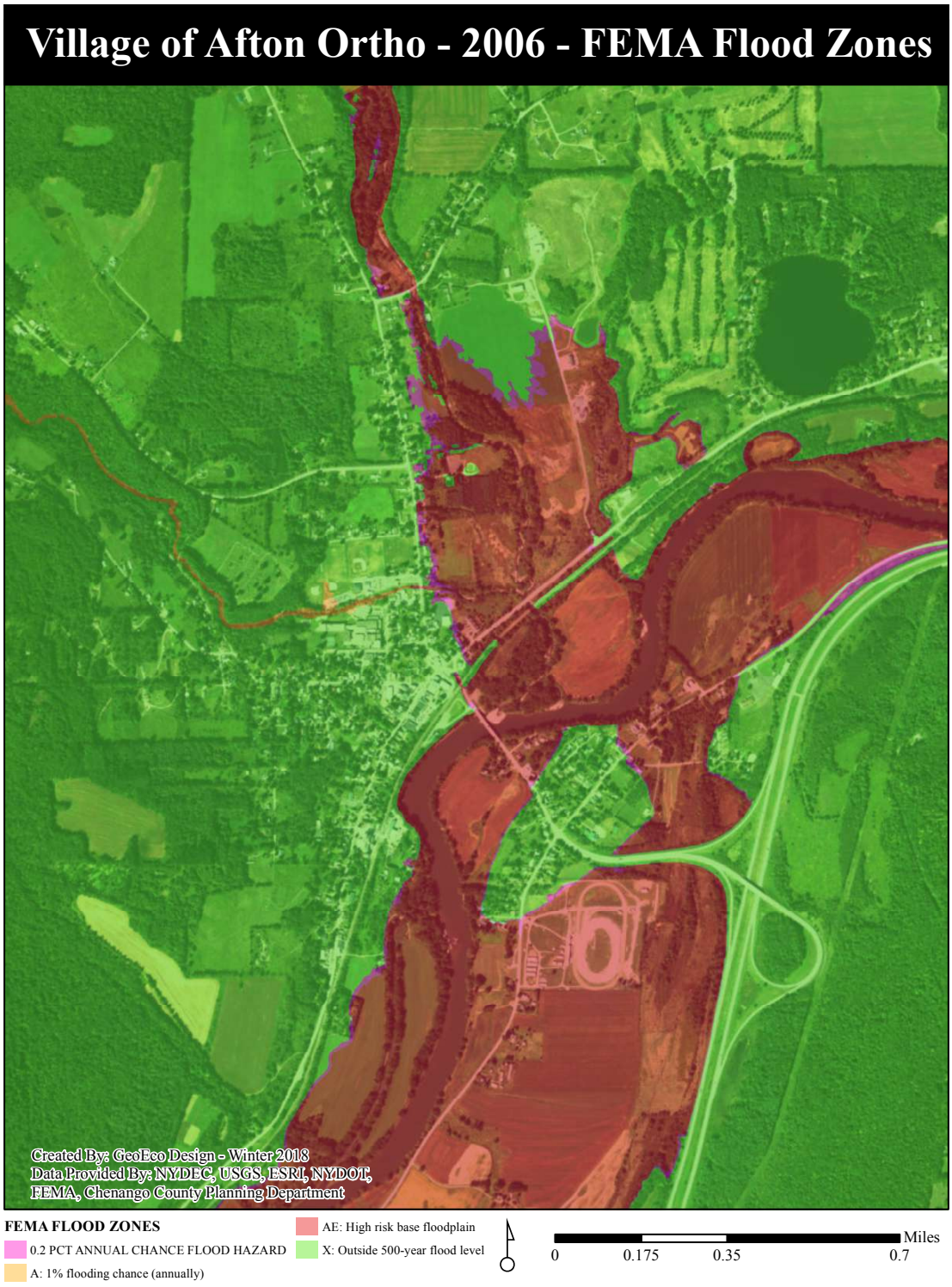


Figure 9. Current FEMA flood zones overlaid across the Village of Afton.

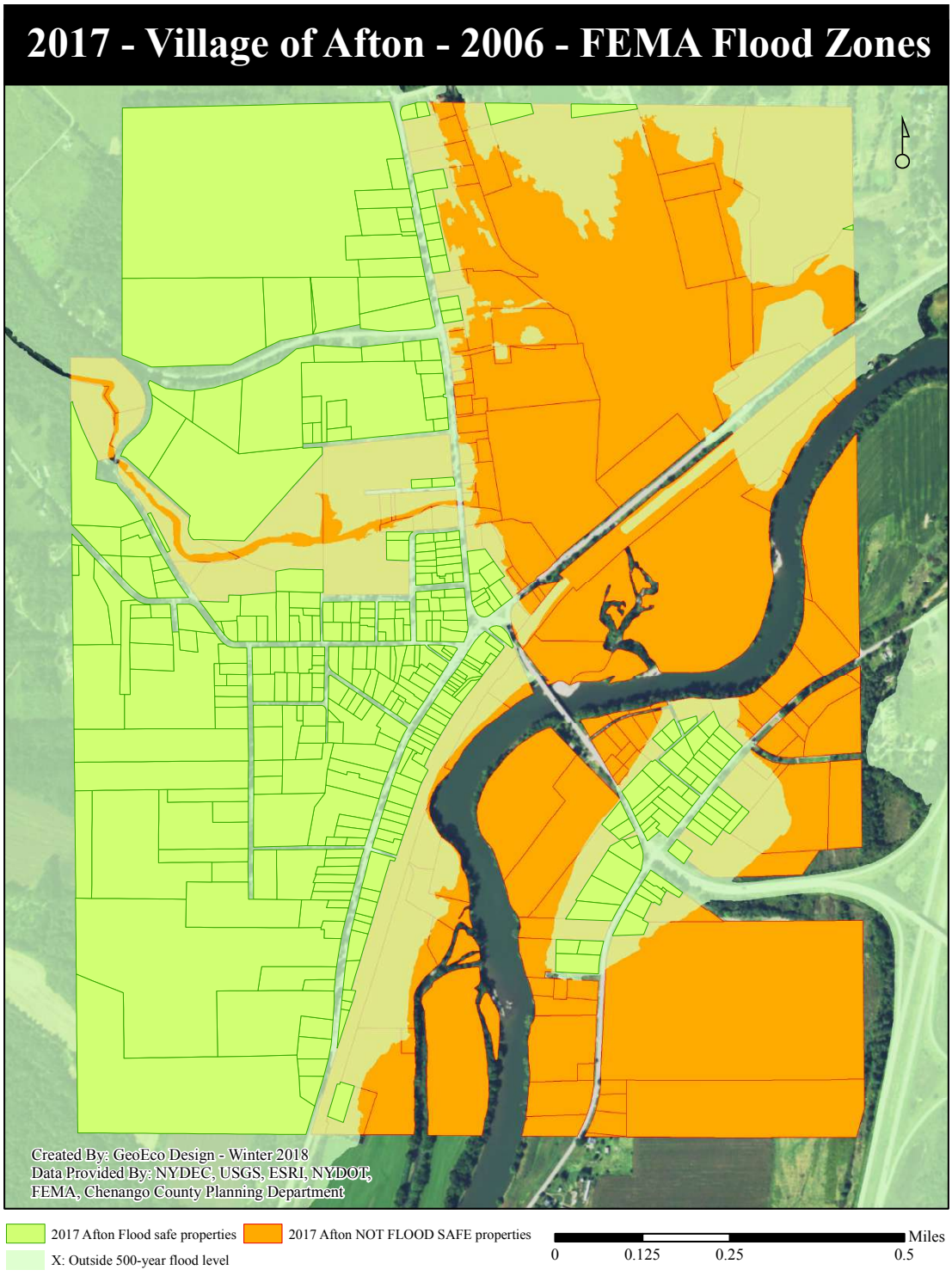


Figure 10. FEMA flood zones overlaid across the Village of Afton's 2017 property-parcel (cadastral) data.

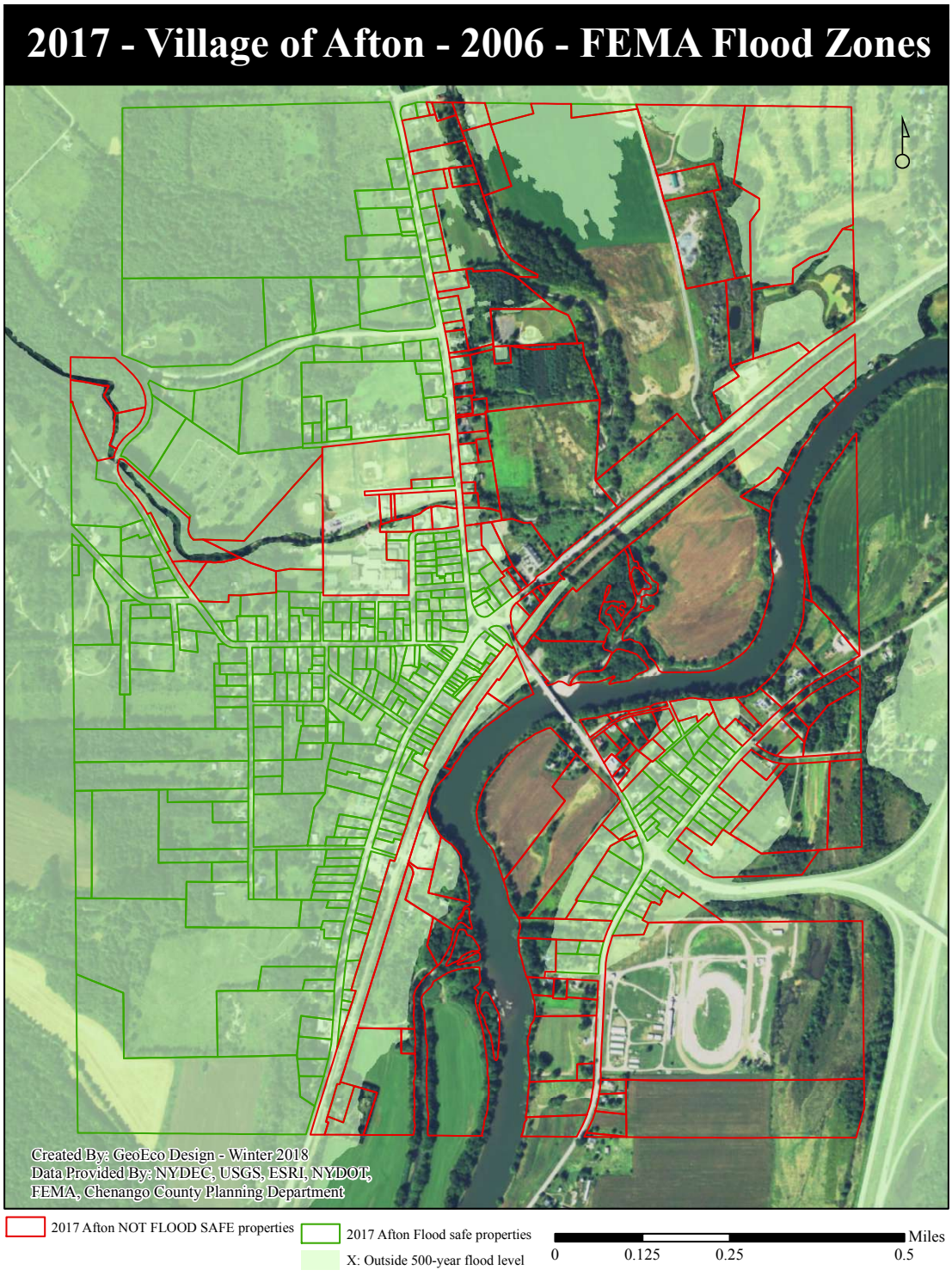


Figure 11. Village of Afton's 2017 property-parcels, with "NOT Flood-Safe" properties transparent.

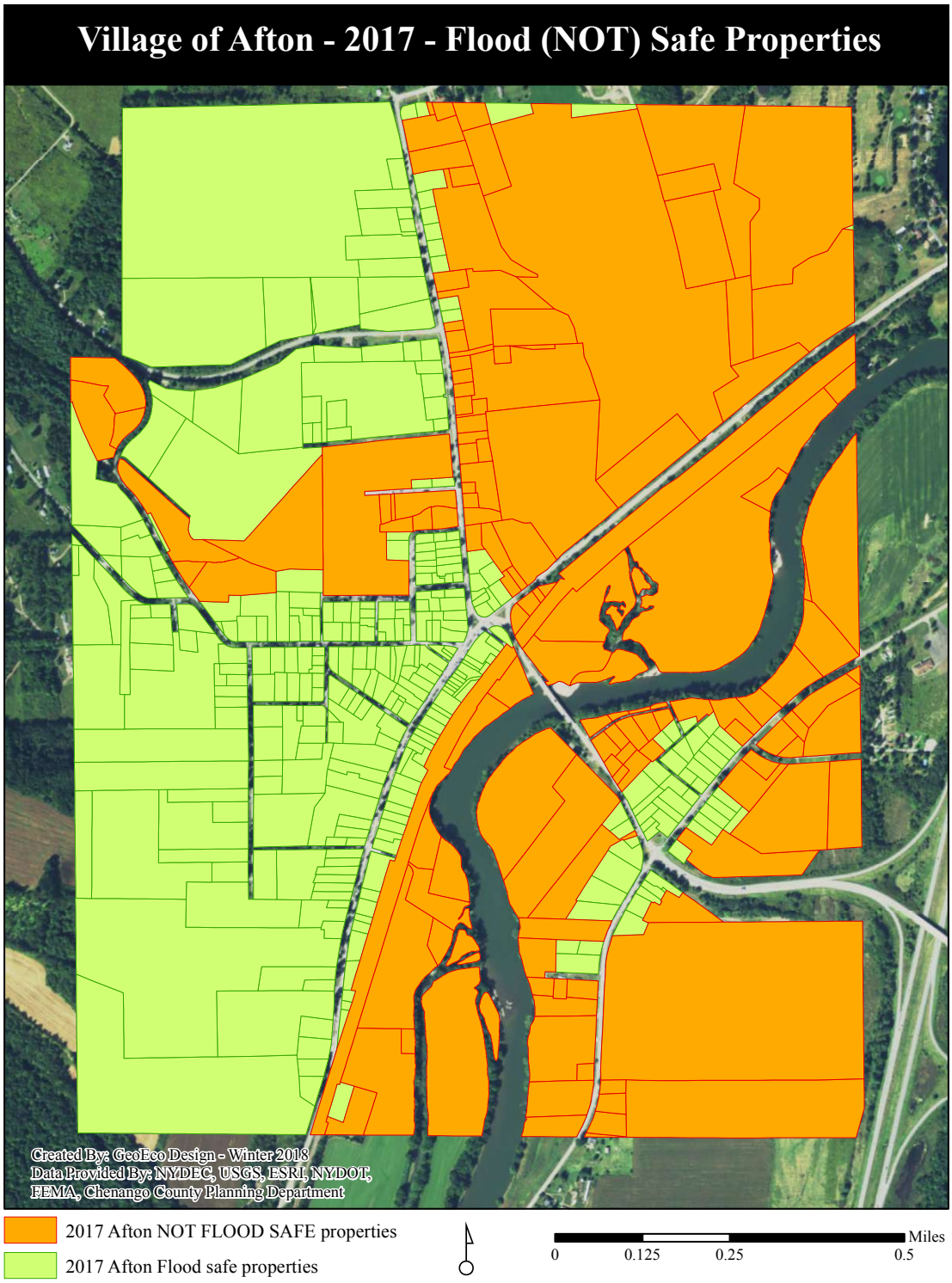


Figure 12. Map displaying 333 flood-safe, and 139 "Not Flood-Safe," properties from the 2017 cadastral data for the Village of Afton.

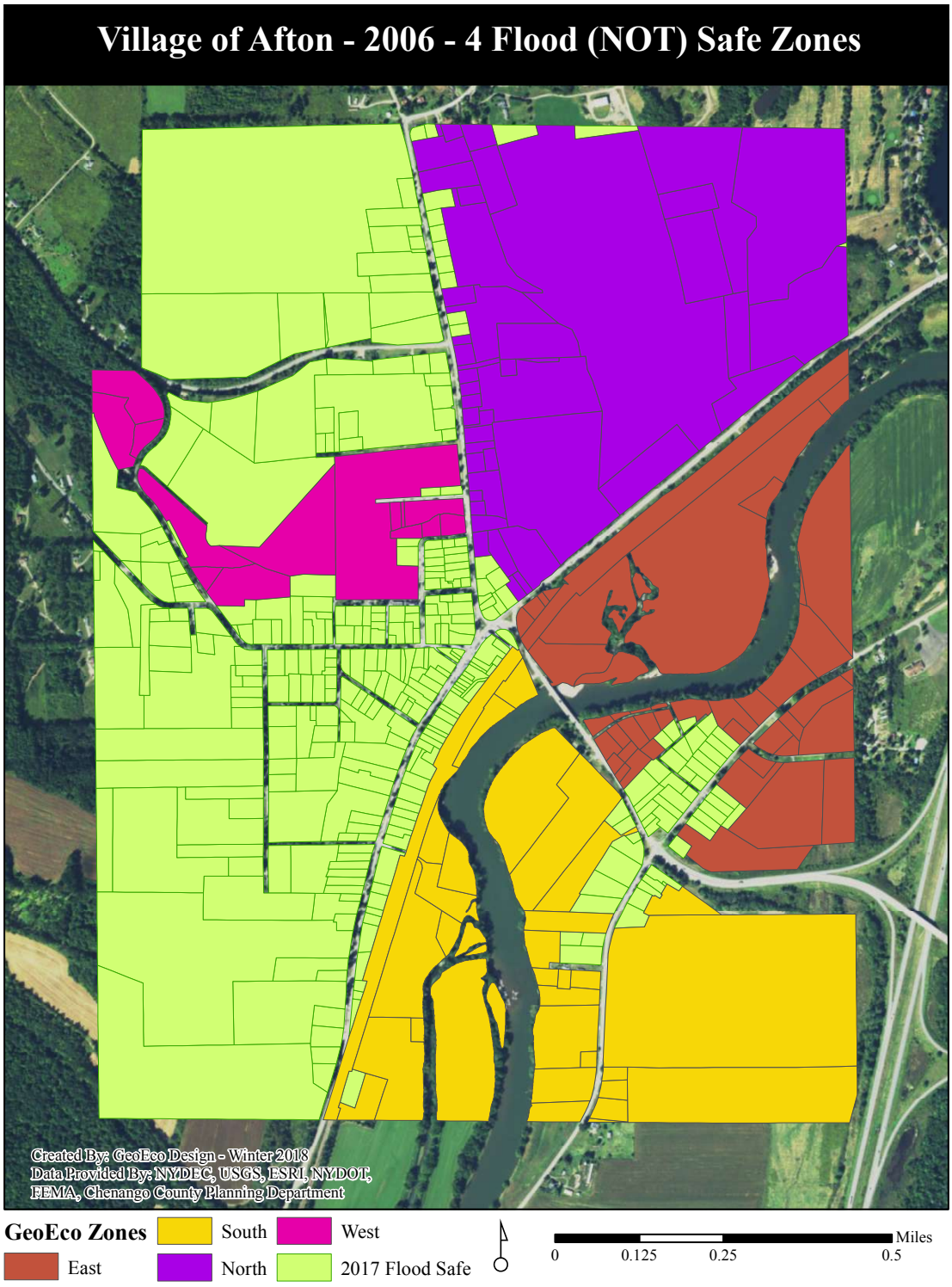


Figure 13. Map displaying four distinct flood districts across the Village of Afton.

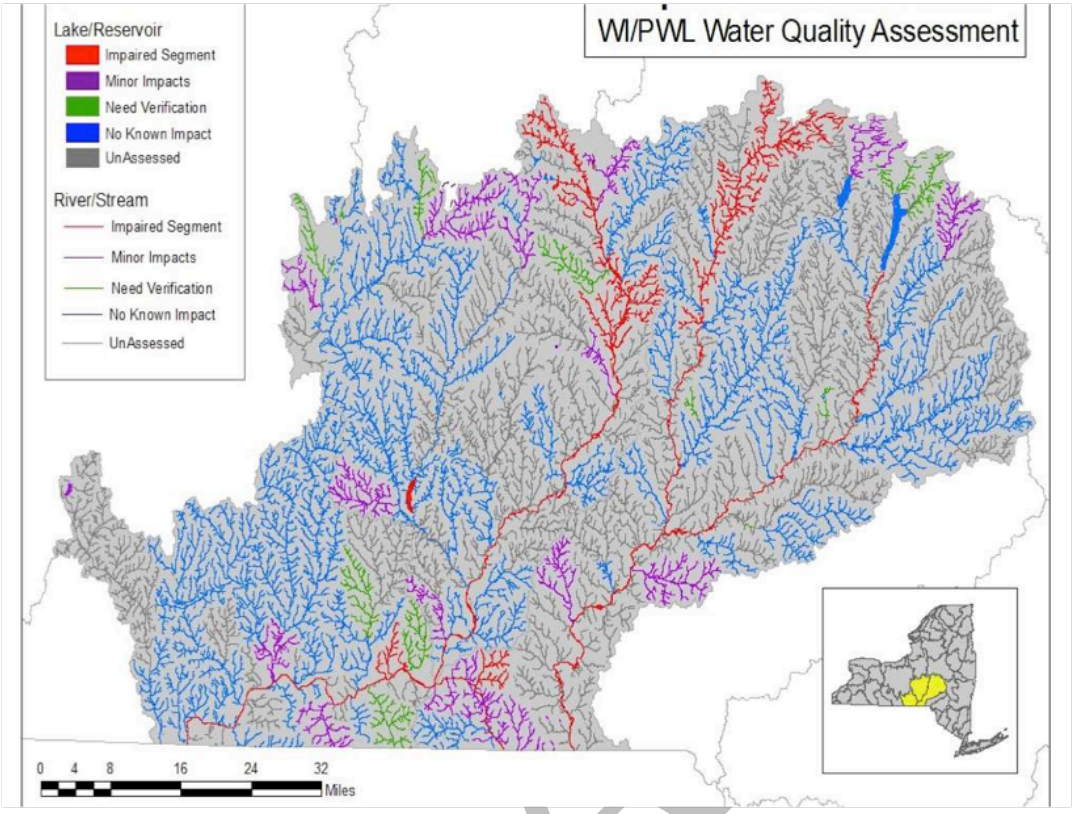


Figure 14. Map displaying impaired waterways for the headwaters of the Susquehanna River in New York.

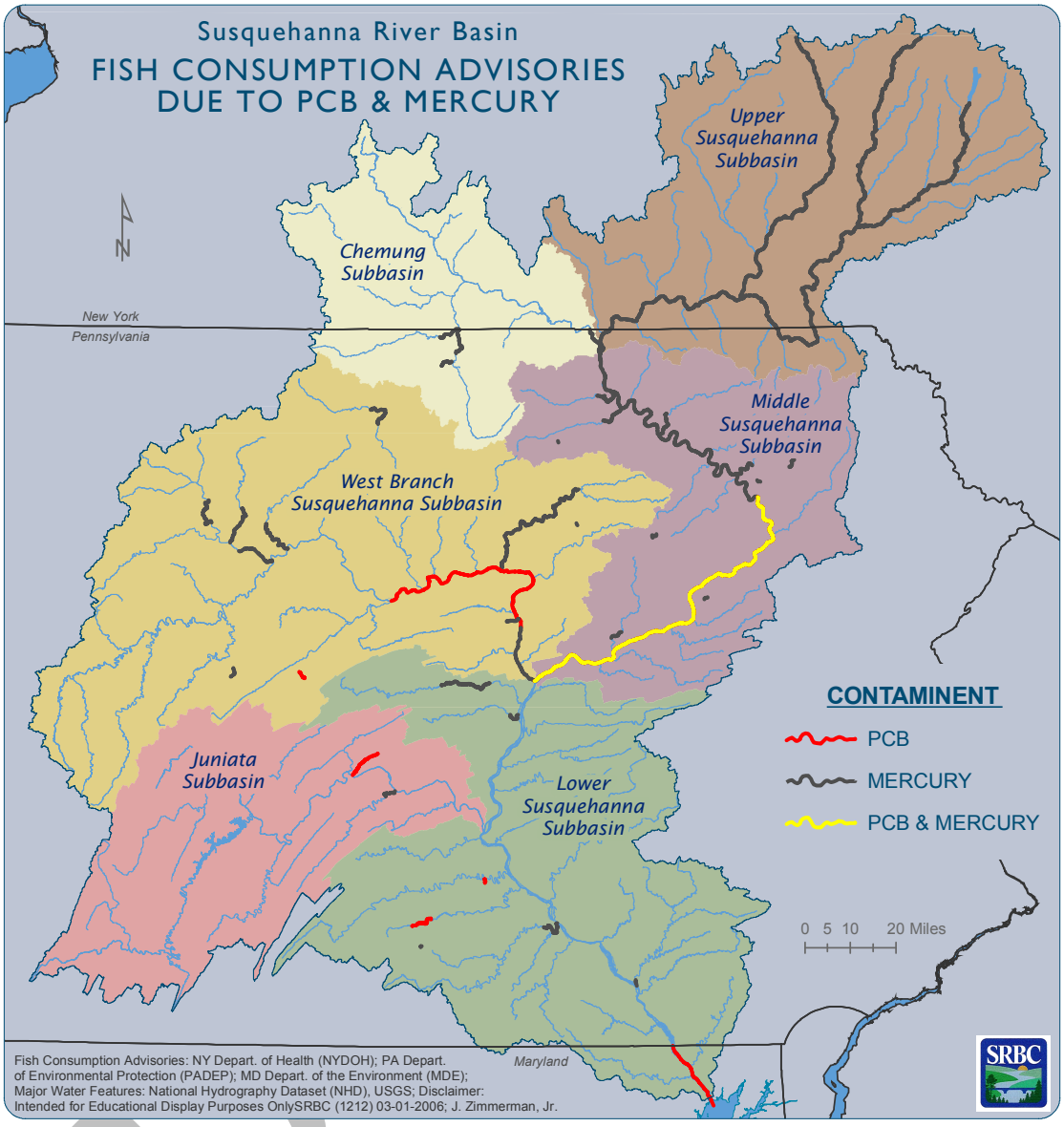


Figure 15. Map displaying heavy-metal water contaminants for the waterways of the Susquehanna River watershed.

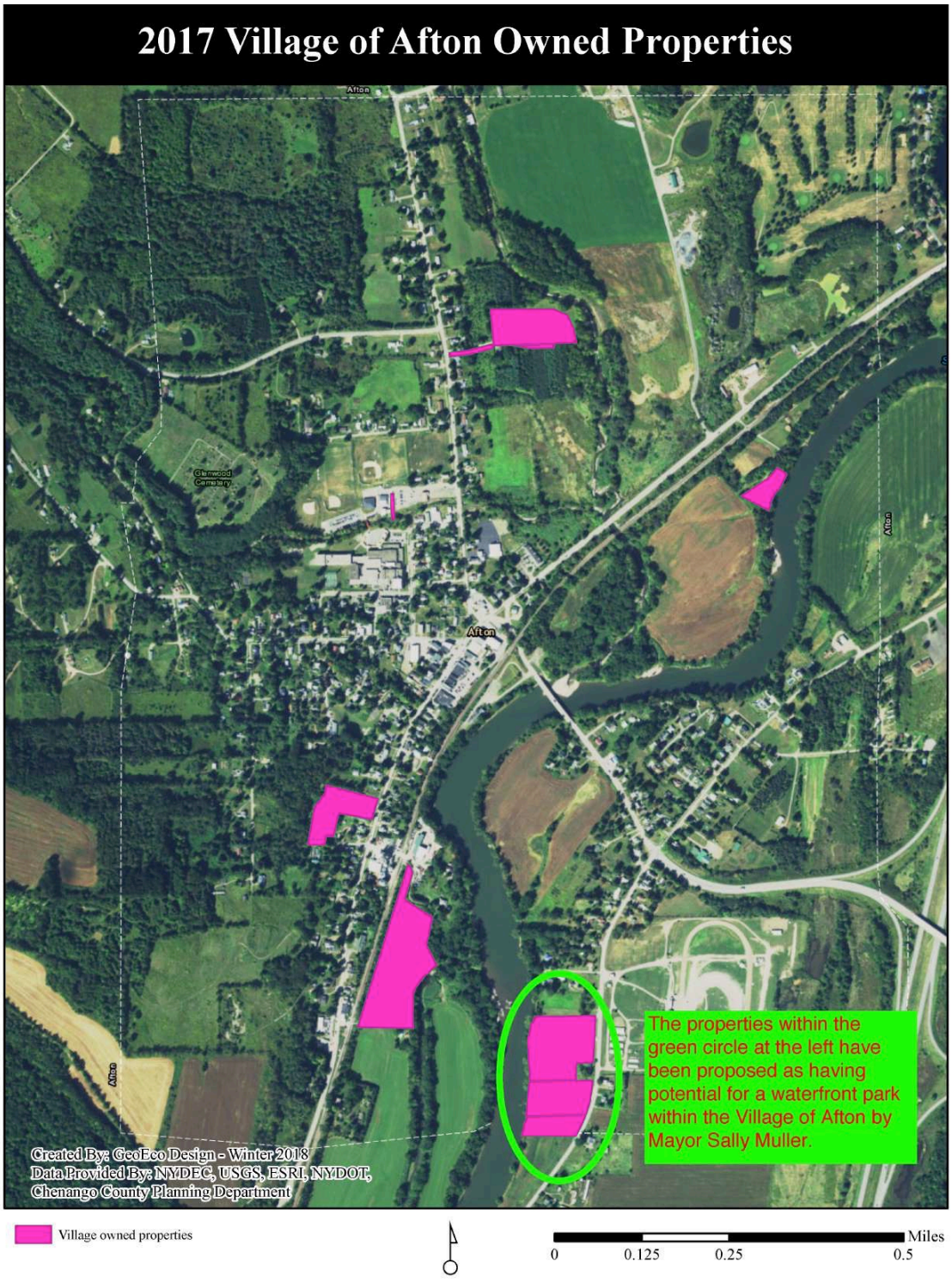


Figure 16. Map displaying potential location for Waterfront Park within the Village of Afton.

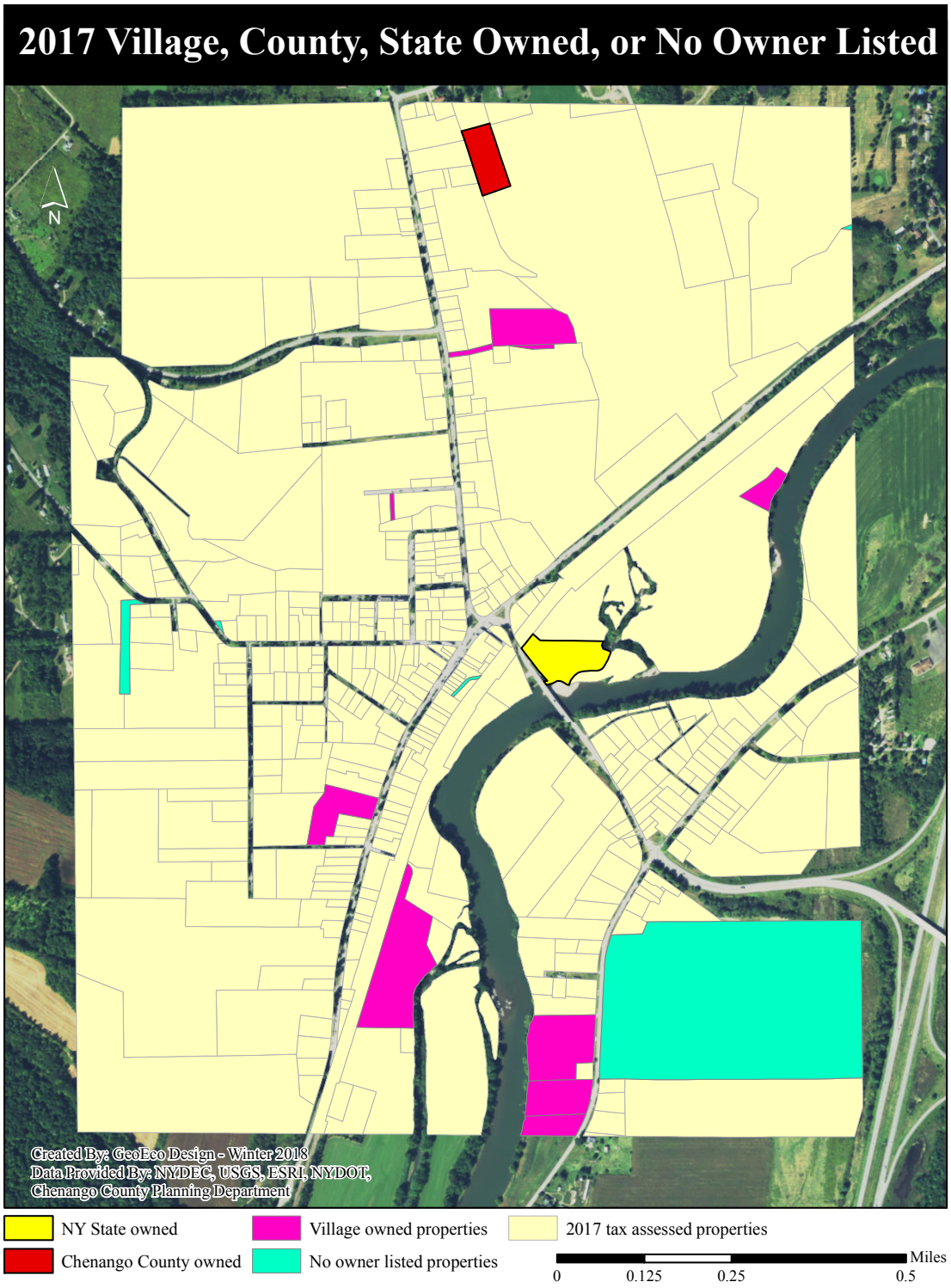


Figure 17. Map displaying government own and privately owned properties within the Village of Afton.

9. LIST OF APPENDICES

Appendix S1: NRCS Engineer Survey Diagram of 2011 High-Marks

Appendix S2: FEMA Flood Insurance Rate Map (1992)

Appendix S3: FEMA Flood Insurance Rate Map (2010)

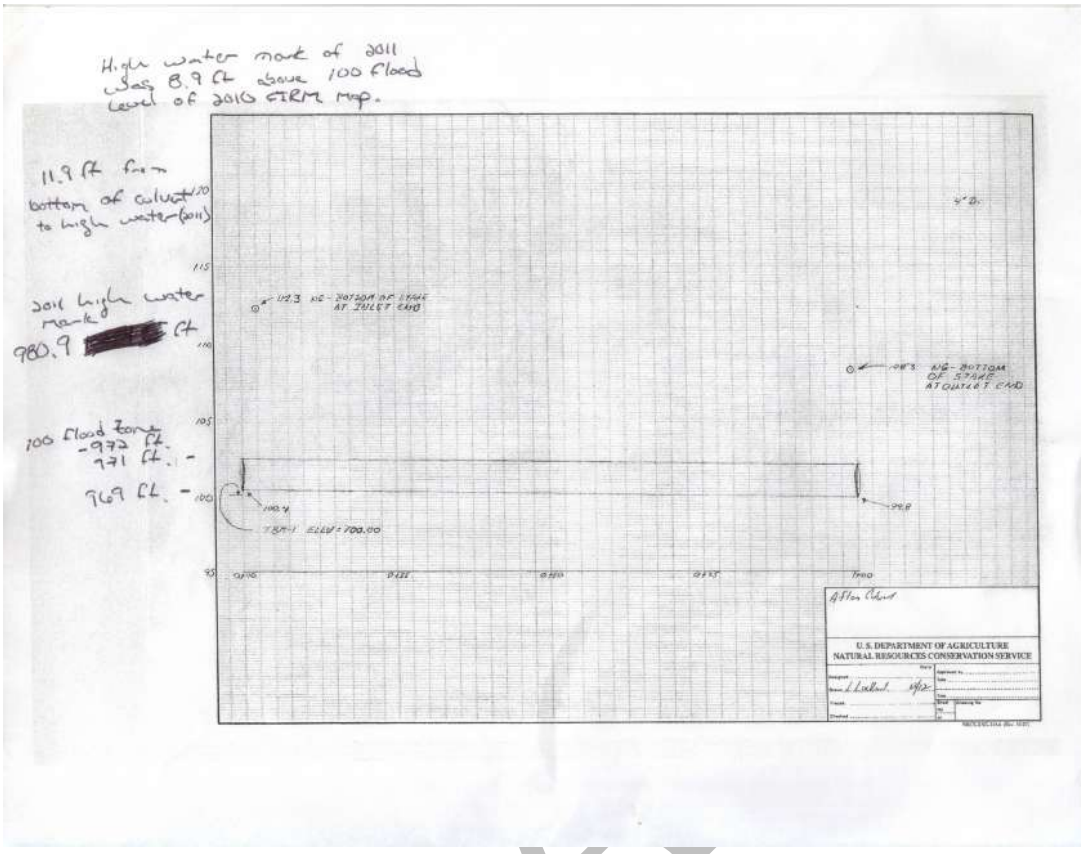
Appendix S4: Table of 139 Flood-Unsafe Tax Property Assets

Appendix S5: 2015 Village of Afton Water Quality Report

Appendix S6: 2016 Village of Afton Water Quality Report

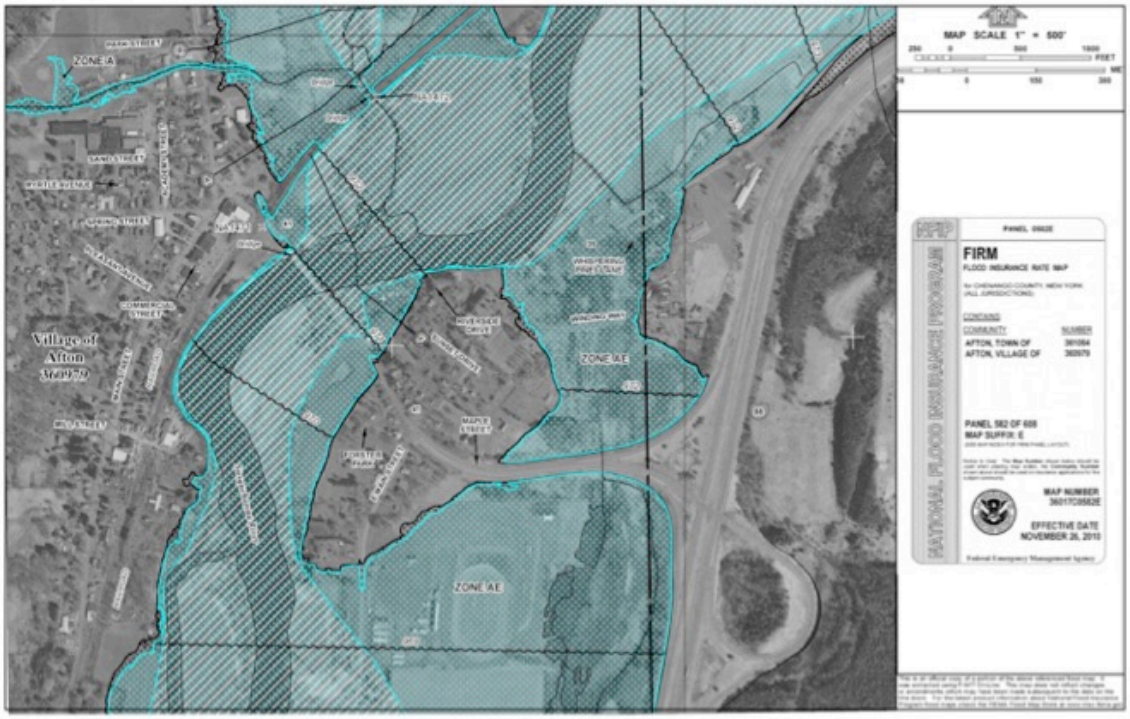
Appendix S7: Village of Afton Radiological Report

Appendix S8: Examples of Best Management Practices (BMPs) for Afton's Flood Management Park



Appendix S1. Diagram illustrating survey results of high-water marks, above and below the culvert, from NRCS Engineer (L. Lockrel, 2012).

Appendix S2. 1992 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM).



Appendix S3. 2010 Federal Emergency Management Agency (FEMA) Flood Insurance Rate Map (FIRM).

Appendix S4. Table of ownership information for the 139 Flood Not-Safe properties within the Village of Afton.

Street Address	Owner Name	Acres	Land Assess	Total Assess
2106 E Windsor Rd	Siewers, John	.00	6750.00	52500.00
5 Highland Ave	Craver, Philip B	.41	6500.00	55500.00
	Seco Realty & Development Corp	4.96	2000.00	2000.00
Main St	Village Of Afton	.20	1000.00	1000.00
100 Caswell St	Zablock, James M	8.70	9000.00	9000.00
208 Lewis Ln	Warrens Excavation and Stone	8.85	15000.00	15000.00
84 Caswell St	Dascano, Christian J Jr	.34	5000.00	51500.00
100 Caswell St	Zablocki, James	4.96	5750.00	5750.00
	Village Of Afton	3.92	3500.00	18500.00
4 Little League Rd	Howe, Patricia S	.36	5000.00	67500.00
150 Caswell St	Ricks, Leslie H	6.64	6300.00	6300.00
142 Caswell St	Henchy, Todd J	.64	750.00	750.00
148 Caswell St	Nelson, Jeffery S	.00	6000.00	52000.00
	Ricks, Leslie H	2.40	8500.00	69000.00
150 Caswell St	Ricks, Leslie H	.09	1000.00	1000.00
20 Highland Ave	Ramsey, Renee L	.52	7600.00	61600.00
	Lashway Michael	1.02	6500.00	43000.00
86 Theresa Blvd	T&N River Club, LLC	1.60	16000.00	16000.00
County Office Building	State, Of New York	3.73	5000.00	5000.00
501 Marquette Ave Ste 1410	Norfolk Southern Railway Comp	22.70	.00	643772.00
86 Theresa Blvd	T&N River Club, LLC	1.80	16000.00	208000.00
11 Mill St	McDowell & Walker Inc	1.62	20000.00	110000.00
80 Downing Dr	Quesada, Ruben G	10.00	10000.00	80000.00
37 Maple Ave	Stone, Doris B	10.00	10000.00	73500.00
9 Maple St	Browning, Peter C	3.62	7800.00	78000.00
26 Riverside Dr	Siewers, John P	.68	7500.00	19300.00
16 Riverside Dr	Mies, Robert J	1.00	7500.00	50500.00
10 Riverside Dr	Tucker, Patricia U	.43	6500.00	44100.00
38 Maple St	Williams, Robert E	.49	4500.00	4500.00
38 Maple St	Williams, Sadie L	.61	7000.00	39700.00
	Verona Family Partnership	.29	7000.00	110000.00
	Verona, Family Partnership	.30	3000.00	3000.00
28 Maple St	Decker, Tammy L	.21	5500.00	45000.00
24 Maple St	Cadden, Margaret D	.00	7000.00	44000.00
59 E Main St	Cutting, Michael P	2.30	9000.00	95000.00
16 Evelyn Ave	Burnett, Alice M	1.60	7500.00	57500.00
7 Evelyn Ave	Frisco, Mary Jo	.75	7000.00	56000.00
11 Evelyn Ave	Joslyn, Mary	.35	6000.00	25750.00
15 Evelyn Ave	Iaia, Tina M	.55	7500.00	23900.00
1260 County Rd 4	Buttner Brian J	1.49	8000.00	16000.00
	Village, Of Afton	5.23	14000.00	14000.00
30 Tyler St	Potts, Timothy	.36	5000.00	51900.00
14 E Main St	Briggs, Floyd	.47	6500.00	44500.00
	Village of Afton	3.00	9200.00	44100.00
	Village of Afton	1.58	7000.00	7000.00
540 State Hwy 41	Williams, Lawrence E Sr	.12	800.00	800.00
141 Pierce Ln	Page, Nikki L	1.08	7000.00	7000.00
9 Dyer Flat Rd	Schultz, Alfred	.72	6500.00	26400.00
	Fritzsch, Craig R	2.00	4500.00	5000.00
2906 Rt 79	A & G Realty Associates, LLC	21.60	10000.00	10000.00
	Royston, Joan	1.75	2950.00	2950.00
50 Main St	Affuso, Grace	.43	4000.00	44000.00
	Village of Afton	8.50	15000.00	20000.00
	McDowell & Walker Inc	2.50	25000.00	101000.00
214 Main St	Vance, James O	.45	11500.00	68000.00
22 Tarpon Ln	Cicero, Carol L	.40	6500.00	56000.00
	De Luca, Nicholas	.13	8000.00	8000.00
2383 State Hwy 41	Sherman, Christopher	.00	4000.00	30500.00
2 Merril St	Key Housing Dev Funding Corp	3.01	25000.00	1100000.00
30 Caswell St	First Baptist Church	1.00	8500.00	125000.00
215 Main St	Stafford, William L	.36	6500.00	70000.00
215 Main St	Stafford, William L	.25	5500.00	35000.00
30 Caswell St	First Baptist Church of Afton	.70	7500.00	44500.00
54 Caswell St	Joanne, Decker	1.61	8500.00	55000.00
54 Caswell St	Joanne, Decker	17.89	6800.00	6800.00
60 Caswell St	Wylubski, David M	.40	2500.00	2500.00
	Seco Realty & Development Corp	26.50	42250.00	42250.00
	Afton Village Dump	9.40	4160.00	4200.00
	Seco Realty & Development Corp	2.85	7500.00	7500.00
169 Main St	Town of Afton	5.83	6000.00	6000.00

	Higher Ground Christian Church	5.00	30000.00	545000.00
15 Winding Way	Vail Kenneth A	7.66	13000.00	73500.00
	Afton Glenwood Cemetery Assn	1.80	9500.00	9500.00
138 Winding Way	Johnson, Gayle E	4.00	5500.00	5500.00
9 Winding Way	Brown, William	.68	5500.00	46300.00
146 E Main St	Hosier, William L	1.01	7500.00	43300.00
146 E Main St	Hosier, William L	.45	7000.00	7000.00
148 E Main St	Nickerson, Janice	.49	5500.00	50100.00
	Palmatier, Bret	3.60	4500.00	9550.00
151 E Main St	Harris, Gerald W	1.30	5100.00	5100.00
155 E Main St	Mullin, Carolyn L	2.80	12000.00	125000.00
155 E Main St	Mullin, Carolyn L	1.78	1100.00	1100.00
125 Mountain Rd	Bagnall Properties LLC	.17	3000.00	3000.00
161 E Main St	Mewhorter, Jeffrey	3.78	8000.00	130000.00
29 Riverside Dr	Kimble, Martie J	.94	7500.00	59000.00
1649 Rita Rd	Whipple, Diane	1.93	9400.00	69600.00
491 Algerine St	Page, Nikki L	19.00	10000.00	10000.00
		.00	.00	.00
4030 State Hwy 79	Livermore, Russell	4.20	16000.00	87000.00
273 Clifton Pl Apt 4A	Patzak, Serge A	1.00	6000.00	51000.00
	Village of Afton	1.00	500.00	500.00
	Vail, Thomas C	40.90	28500.00	97500.00
2383 Route 41	Schuldt, William H	.24	1000.00	1000.00
2383 Route 41	Schuldt, William	9.70	8000.00	8000.00
151 E Main St	Harris, Gerald W	1.10	7000.00	118000.00
	Vail, Thomas C	40.90	28500.00	97500.00
	Vail, Thomas C	40.90	28500.00	97500.00
26 Riverside Dr	Siewers, John P	.68	7500.00	19300.00
2106 E Windsor Rd	Siewers, John	.00	6750.00	52500.00
16 Riverside Dr	Mies, Robert J	1.00	7500.00	50500.00
	Fritzsch, Craig R	2.00	4500.00	5000.00
	Fritzsch, Craig R	2.00	4500.00	5000.00
2906 Rt 79	A & G Realty Associates, LLC	21.60	10000.00	10000.00
2906 Rt 79	A & G Realty Associates, LLC	21.60	10000.00	10000.00
	Vail, Thomas C	40.90	28500.00	97500.00
208 Lewis Ln	County of Chenango	2.58	6200.00	21200.00
	KT Energy Services, LLC	2.00	12000.00	55800.00
544 Hall Rd	Gonzales, Ollie L	.51	7600.00	62600.00
501 Marquette Ave Ste 1410	Norfolk Southern Railway Comp	22.70	.00	643772.00
	James, Ryan	1.50	8000.00	105000.00
208 Lewis Ln	Warrens Excavation and Stone	8.85	15000.00	15000.00
66 Caswell St	Beams, Richard L	.65	7500.00	60000.00
82 Caswell St	Birch, Elizabeth A	.35	6000.00	63500.00
76 Caswell St	Cutting, Josephine T	.35	6000.00	39000.00
70 Caswell St	Cabey Robert E	.39	7000.00	35000.00
72 Caswell St	Neubauer, Roger E	.34	8400.00	18900.00
	Afton Central School District	1.64	2600.00	47600.00
	Village Garage	.40	7700.00	67000.00
Academy St	Afton Central School	17.80	252000.00	1500000.00
643 Melondy Hill Rd	Dougherty, John P	.50	3000.00	3000.00
	Dougherty, John P	.44	6000.00	61000.00
	Dougherty, John P	.71	7000.00	85000.00
2 Harpur Ln	Johnson, Jennifer	3.48	9600.00	49400.00
98 Spring St	Habberfield, Jeffrey	.60	4000.00	27500.00
5756 W 9600 N	Pixley, Edward G	4.00	5000.00	5000.00
	Lawrence, Michael J	3.00	16000.00	92300.00
Box 149	Crosby, Beryl	.95	3750.00	3750.00
703 Front St	Lesko , Charles Jr	2.79	3750.00	3750.00
Academy St	Afton Central School	7.50	6000.00	6000.00
84 Caswell St	Dascano, Christian J Jr	.34	5000.00	51500.00
Main St	Village Of Afton	.29	1000.00	10000.00
	Tryon, Richard I	.54	6500.00	73500.00
98 Caswell St	Egdorf, Lori A	.22	4500.00	40000.00
30 Caswell St	First Baptist Parsonage	.53	6500.00	46000.00
46 Caswell St	Weeks, Keith	.26	6000.00	45000.00
152 Afton Lake Rd	Smith, Donald	.19	5000.00	22000.00
60 Caswell St	Wylubski, David M	.49	7000.00	62500.00
64 Caswell St	Decker, Thomas V	.39	6500.00	45000.00
	Village of Afton	.13	2600.00	2600.00

Appendix S5. 2015 Village of Afton water quality report.

Annual Drinking Water Quality Report for 2015
Village of Afton
105 Main Street
Afton, NY 13730
(Public Water Supply ID# NY0801738)

Introduction

To comply with State regulations, the Village of Afton Water Department will be issuing an annual report describing the quality of your drinking water. The purpose of this report is to raise your understanding of drinking water and awareness of the need to protect our drinking water sources. Last year, your tap water met all State drinking water health standards. We are proud to report that our system did not violate a maximum contaminant level or any other water quality statement. This report provides an overview of last year's water quality. Included are details about where your water comes from, what it contains, and how it compares to State standards.

If you have any questions about this report or concerning your drinking water, please contact **Joshua Sweeney, Superintendent of Public Works, (607) 639-1903**. We want you to be informed about your drinking water. If you want to learn more, please attend any of our regularly scheduled village board meetings. The meetings are held the second Monday of each month at 7:00PM at the Afton Community Center.

Where does our water come from?

In general, the sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases radioactive material and can pick up substances resulting from the presence of animals or from human activities. Contaminants that may be present in source water include: microbial contaminants; inorganic contaminants; pesticides and herbicides; organic chemical contaminants; and radioactive contaminants. In order to ensure that tap water is safe to drink, the State and the EPA prescribe regulations which limit the amount of certain contaminants in water provided by public water systems. The State Health Department's and the FDA's regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Our water system serves approximately 1000 people through 380 service connections. Our water sources are a groundwater well (with groundwater drawn from a single 133-foot deep drilled well) and six springs located off of NYS Route 41 on a protected 100-acre parcel of land owned by the village. Water flows from the springs via gravity to the Spring Water Treatment Plant where it is treated with a NSF approved liquid Sodium Hypochlorite solution (bleach) for disinfection. Water is pumped from the well into the Well Treatment Plant where it is treated with a NSF approved liquid Sodium Hypochlorite solution (bleach) for disinfection, and Polyphosphate for manganese removal. The treated water from the springs typically flows via gravity to the distribution system where it connects to the line carrying treated water from the well. This water then flows to the two storage facilities (210,000-gallon steel tank and 180,000-gallon covered reservoir).

Are there contaminants in our drinking water?

As the State regulations require, we routinely test your drinking water for numerous contaminants. These contaminants include: total coliform, turbidity, inorganic compounds, nitrate, nitrite, lead and copper, volatile organic compounds, total trihalomethanes, haloacetic acids, radiological and synthetic organic compounds. The table presented below depicts which compounds were detected in your drinking water. The State allows us to test for some contaminants less than once per year because the concentrations of these contaminants do not change frequently.

It should be noted that all drinking water, including bottled drinking water, may be reasonably expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791) or the Chenango County Health Department at (607-337-1673).

Table of Detected Contaminants							
Contaminant	Violation Yes/No	Date of Sample	Level Detected (Range)	Unit Measurement	MCLG	Regulatory Limit (MCL, TT or AL)	Likely Source of Contamination
Microbiological Contaminants							
Total Coliform	No	2 samples monthly	Absent	Present/ Absent	0	Any positive sample	Naturally occurring in the environment.
Inorganic Contaminants							
Nitrate- Spring	No	12/29/15	0.325	mg/L	10	10	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
Nitrate - Well	No	12/29/15	<0.05	mg/L	10	10	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
Lead	No	9/19/13	0.011[1] (0.0005-0.042)	mg/L	0	AL= 0.015	Corrosion of household plumbing systems; Erosion of natural deposits.
Copper	No	9/19/13	0.161	mg/L	1.3	AL= 1.3	Corrosion of household plumbing systems; Erosion of natural deposits; leaching from wood preservatives.
Barium- Spring	No	10/23/13	0.005	mg/L	2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.
Barium - Well	No	10/23/13	0.130	mg/L	2	2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.
Fluoride- Well	No	10/23/13	0.20	mg/L	N/A	2.2	Erosion of natural deposits. Discharge from fertilizer and aluminum factories.
Disinfection Byproducts							
Total Tri-Halomethanes Site 1(LRAA1)	No	8/27/15	2.98	ug/L	n/a	80	By-product of drinking water chlorination needed to kill harmful organisms. TTHMs are formed when source water contains large amounts of organic matter.
Total Tri-Halomethanes Site 2(LRAA2)	No	8/27/15	0.00	ug/L	n/a	80	
Haloacetic Acids Site 1(LRAA1)	No	8/27/15	0.00	ug/L	n/a	60	By-product of drinking water chlorination needed to kill harmful organisms.
Haloacetic Acids Site 2(LRAA2)	No	8/27/15	0.58	ug/L	n/a	60	

Table of Detected Contaminants							
Contaminant	Violation Yes/No	Date of Sample	Level Detected (Range)	Unit Measurement	MCLG	Regulatory Limit (MCL, TT or AL)	Likely Source of Contamination
1-The level presented represents the 90th percentile of 10 tested sites. A percentile is a value on a scale of 100 that indicates the percent of a distribution that is equal to or below it. The 90th percentile is equal to or greater than 90% of the lead values detected at your water system. In this case, 10 samples were collected by your water system, ranging in concentrations from 0.0005 mg/L to 0.042 mg/L. The 90th percentile of collected samples is 0.011 mg/L for lead. The action level for lead was not exceeded at any of the test sites. For more information about Lead contact your local health department or www.epa.gov .							

Definitions:

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible.
Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.
Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.
Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.
Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.
Non-Detects (ND): Laboratory analysis indicates that the constituent is not present.
Nephelometric Turbidity Unit (NTU): A measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.
Milligrams per liter (mg/l): Corresponds to one part of liquid in one million parts of liquid (parts per million - ppm).
Micrograms per liter (ug/l): Corresponds to one part of liquid in one billion parts of liquid (parts per billion - ppb).
Nanograms per liter (ng/l): Corresponds to one part of liquid to one trillion parts of liquid (parts per trillion - ppt).
Picograms per liter (pg/l): Corresponds to one part per of liquid to one quadrillion parts of liquid (parts per quadrillion – ppq).
Picocuries per liter (pCi/L): A measure of the radioactivity in water.
Millirems per year (mrem/yr): A measure of radiation absorbed by the body.
Million Fibers per Liter (MFL): A measure of the presence of asbestos fibers longer than 10 micrometers.

What does this information mean?

As you can see by the table, our system had no violations. We have learned through our testing that some contaminants have been detected; however, these contaminants were detected below the level allowed by the State.

Important Information Regarding Lead:

If present, elevated levels of lead can cause serious health problems, especially for pregnant women, infants, and young children. It is possible that lead levels at your home may be higher than at other homes in the community as a result of materials used in your home's plumbing. The Village of Afton is responsible for providing high quality drinking water, but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline (1-800-426-4791) or at http://www.epa.gov/safewater/lead.

Is our water system meeting other rules that govern operations?

During 2015, our system was in compliance with applicable State drinking water operating, monitoring and reporting requirements.

Do I Need to Take Special Precautions?

Although our drinking water met or exceeded state and federal regulations, some people may be more vulnerable to disease causing microorganisms or pathogens in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and infants can be particularly at risk from infections. These people should seek advice from their health care provider about their drinking water. EPA/CDC guidelines on appropriate means to lessen the risk of infection by Cryptosporidium, Giardia and other microbial pathogens are available from the Safe Drinking Water Hotline (800-426-4791).

Information for Non- English Speaking Residents

Spanish
Este informe contiene informacion muy importante sobre su agua beber. Traduzcalo o hable con alguien que lo entienda bien

French
Ce rapport contient des infromations importantes sur votre eau potable. Traduisez-le ou parlez en avec quelqu'un qui le comprend bien.

Why Save Water and How to Avoid Wasting It?

Although our system has an adequate amount of water to meet present and future demands, there are a number of reasons why it is important to conserve water:

- Saving water saves energy and some of the costs associated with both of these necessities of life;
- Saving water reduces the cost of energy required to pump water and the need to construct costly new wells, pumping systems and water towers; and
- Saving water lessens the strain on the water system during a dry spell or drought, helping to avoid severe water use restrictions so that essential fire fighting needs are met.

You can play a role in conserving water by becoming conscious of the amount of water your household is using, and by looking for ways to use less whenever you can. It is not hard to conserve water. Conservation tips include:

- Automatic dishwashers use 15 gallons for every cycle, regardless of how many dishes are loaded. So get a run for your money and load it to capacity.
- Turn off the tap when brushing your teeth.
- Check every faucet in your home for leaks. Just a slow drip can waste 15 to 20 gallons a day. Fix it up and you can save almost 6,000 gallons per year.
- Check your toilets for leaks by putting a few drops of food coloring in the tank, watch for a few minutes to see if the color shows up in the bowl. It is not uncommon to lose up to 100 gallons a day from one of these otherwise invisible toilet leaks. Fix it and you save more than 30,000 gallons a year.

Closing

Thank you for allowing us to continue to provide your family with quality drinking water this year. In order to maintain a safe and dependable water supply we sometimes need to make improvements that will benefit all of our customers. The costs of these improvements may be reflected in the rate structure. Rate adjustments may be necessary in order to address these improvements. We ask that all our customers help us protect our water sources, which are the heart of our community. Please call our office if you have questions.

Appendix S6. 2016 Village of Afton water quality report.

Annual Drinking Water Quality Report for 2016
Village of Afton
105 Main Street
Afton, NY 13730
(Public Water Supply ID# NY0801738)

Introduction

To comply with State regulations, the Village of Afton Water Department will be issuing an annual report describing the quality of your drinking water. The purpose of this report is to raise your understanding of drinking water and awareness of the need to protect our drinking water sources. Last year, your tap water met all State drinking water health standards. We are proud to report that our system did not violate a maximum contaminant level or any other water quality statement. This report provides an overview of last year's water quality. Included are details about where your water comes from, what it contains, and how it compares to State standards.

If you have any questions about this report or concerning your drinking water, please contact **Joshua Sweeney, Superintendent of Public Works, (607) 639-1903.** We want you to be informed about your drinking water. If you want to learn more, please attend any of our regularly scheduled village board meetings. The meetings are held the second Monday of each month at 7:00PM at the Afton Community Center.

Where does our water come from?

In general, the sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and, in some cases radioactive material and can pick up substances resulting from the presence of animals or from human activities. Contaminants that may be present in source water include: microbial contaminants; inorganic contaminants; pesticides and herbicides; organic chemical contaminants; and radioactive contaminants. In order to ensure that tap water is safe to drink, the State and the EPA prescribe regulations which limit the amount of certain contaminants in water provided by public water systems. The State Health Department's and the FDA's regulations establish limits for contaminants in bottled water which must provide the same protection for public health.

Our water system serves approximately 1000 people through 380 service connections. Our water sources are a groundwater well (with groundwater drawn from a single 133-foot deep drilled well) and six springs located off of NYS Route 41 on a protected 100-acre parcel of land owned by the village. Water flows from the springs via gravity to the Spring Water Treatment Plant where it is treated with a NSF approved liquid Sodium Hypochlorite solution (bleach) for disinfection. Water is pumped from the well into the Well Treatment Plant where it is treated with a NSF approved liquid Sodium Hypochlorite solution (bleach) for disinfection, and Polyphosphate for manganese removal. The treated water from the springs typically flows via gravity to the distribution system where it connects to the line carrying treated water from the well. This water then flows to the two storage facilities (210,000-gallon steel tank and 180,000-gallon covered reservoir).

Are there contaminants in our drinking water?

As the State regulations require, we routinely test your drinking water for numerous contaminants. These contaminants include: total coliform, turbidity, inorganic compounds, nitrate, nitrite, lead and copper, volatile organic compounds, total trihalomethanes, haloacetic acids, radiological and synthetic organic compounds. The table presented below depicts which compounds were detected in your drinking water. The State allows us to test for some contaminants less than once per year because the concentrations of these contaminants do not change frequently.

It should be noted that all drinking water, including bottled drinking water, may be reasonably expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791) or the Chenango County Health Department at (607-337-1673).

Table of Detected Contaminants							
Contaminant	Violation Yes/No	Date of Sample	Level Detected (Range)	Unit Measurement	MCLG	Regulatory Limit (MCL, TT or AL)	Likely Source of Contamination
Inorganic Contaminants							
Nitrate- Spring	No	12/14/16	0.28	mg/L	10	MCL = 10	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits.
Lead	No	9/14/16	0.0015[1] (<0.001-0.009)	mg/L	0	AL= 0.015	Corrosion of household plumbing systems; Erosion of natural deposits.
Copper	No	9/14/16	0.15[1] (0.0024-0.55)	mg/L	1.3	AL = 1.3	Corrosion of household plumbing systems; Erosion of natural deposits; leaching from wood preservatives.
Barium - Well	No	5/16/16	0.137	mg/L	2	MCL = 2	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits.
Fluoride- Well	No	5/16/16	0.20	mg/L	N/A	MCL = 2.2	Erosion of natural deposits. Discharge from fertilizer and aluminum factories.
Disinfection Byproducts							
Total Tri-Halomethanes Site 1(LRAA1)	No	8/27/15	2.98	µg/L	n/a	MCL = 80	By-product of drinking water chlorination needed to kill harmful organisms. TTHMs are formed when source water contains large amounts of organic matter.

1-The level presented represents the 90th percentile of 10 tested sites. A percentile is a value on a scale of 100 that indicates the percent of a distribution that is equal to or below it. The 90th percentile is equal to or greater than 90% of the lead and copper values detected at your water system. The action level for lead and copper was not exceeded at any of the test sites. For more information about lead contact your local health department or www.epa.gov .

Definitions:

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible.

Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Maximum Residual Disinfectant Level (MRDL): The highest level of a disinfectant allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG): The level of a drinking water disinfectant below which there is no known or expected risk to health. MRDLGs do not reflect the benefits of the use of disinfectants to control microbial contamination.

Action Level (AL): The concentration of a contaminant which, if exceeded, triggers treatment or other requirements which a water system must follow.

Treatment Technique (TT): A required process intended to reduce the level of a contaminant in drinking water.

Non-Detects (ND): Laboratory analysis indicates that the constituent is not present.

Nephelometric Turbidity Unit (NTU): A measure of the clarity of water. Turbidity in excess of 5 NTU is just noticeable to the average person.

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Closing

Thank you for allowing us to continue to provide your family with quality drinking water this year. In order to maintain a safe and dependable water supply we sometimes need to make improvements that will benefit all of our customers. The costs of these improvements may be reflected in the rate structure. Rate adjustments may be necessary in order to address these improvements. We ask that all our customers help us protect our water sources, which are the heart of our community. Please call our office if you have questions.

Appendix S7. Village of Afton radiological report.

LSL Life Science Laboratories, Inc.

Josh Sweeney
Afton, Village of
19 Court St.
Afton, NY 13730

Phone: (607) 343-4642
FAX: (607) 639-1903

Federal Water Supply ID: NY0801738

Laboratory Analysis Report

Prepared For

Afton, Village of

LSL Project ID: **1720393**
Receive Date/Time: 12/13/17 17:57

LSL Central Lab
5854 Butternut Drive
East Syracuse, NY 13057
Tel. (315) 445-1900
Fax (315) 445-1104
NYS DOH ELAP #10248
PA DEP #68-2556

LSL North Lab
131 St. Lawrence Avenue
Waddington, NY 13694
Tel. (315) 388-4476
Fax (315) 388-4061
NYS DOH ELAP #10900

LSL Finger Lakes Lab
16 N. Main St., PO Box 424
Wayland, NY 14572
Tel. (585) 728-3320
Fax (585) 728-2711
NYS DOH ELAP #11667

LSL Southern Tier Office
Cuba, NY
Tel. (585) 209-4032

LSL MidLakes Office
Canandaigua, NY
Tel. (585) 728-3320

This report was reviewed by: *Date:* 1/15/18

David J. Prichard, Director of Tech. Services

A copy of this report was sent to:

-- LABORATORY ANALYSIS REPORT --

Afton, Village of Afton, NY

Sample ID: Spring | **LSL Sample ID:** 1720393-001
Location: | **Federal Water Supply ID:** NY0801738
Sampled: 12/13/17 8:00 **Sampled By:** DB | **Source Code:**
Sample Matrix: PWS | **Reason Code:**

Analytical Method / Analyte	Result	Units	Prep Method	Prep Date	Analysis Date & Time	Analyst Initials
EPA 900.0 Gross Alpha						
Gross Alpha	See Attached					
This analysis was performed by NYS DOH ELAP laboratory number 11777.						
EPA 903.0 Radium 226						
Radium 226	See Attached					
This analysis was performed by NYS DOH ELAP laboratory number 11777.						
EPA 904.0 Radium 228						
Radium 228	See Attached					
This analysis was performed by NYS DOH ELAP laboratory number 11777.						
Free Chlorine, (Client Provided)						
Free Available Chlorine	1.0	mg/l			12/13/17 08:00	DB

Sample ID: Well | **LSL Sample ID:** 1720393-002
Location: | **Federal Water Supply ID:** NY0801738
Sampled: 12/13/17 7:45 **Sampled By:** DB | **Source Code:**
Sample Matrix: PWS | **Reason Code:**

Analytical Method / Analyte	Result	Units	Prep Method	Prep Date	Analysis Date & Time	Analyst Initials
EPA 900.0 Gross Alpha						
Gross Alpha	See Attached					
This analysis was performed by NYS DOH ELAP laboratory number 11777.						
EPA 903.0 Radium 226						
Radium 226	See Attached					
This analysis was performed by NYS DOH ELAP laboratory number 11777.						
EPA 904.0 Radium 228						
Radium 228	See Attached					
This analysis was performed by NYS DOH ELAP laboratory number 11777.						
Free Chlorine, (Client Provided)						
Free Available Chlorine	0.9	mg/l			12/13/17 07:45	DB

Analysis performed at: *(1) LSL Central Lab, (2) LSL North Lab, (3) LSL Finger Lakes Lab*

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

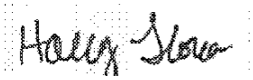
January 11, 2018

Greg Smith
Life Science Laboratories, Inc.
5854 Butternut Dr.
E. Syracuse, NY 13057
TEL: (315) 445-1105
FAX: (315) 445-1301

RE: 1720393

Dear Greg Smith: Order No.: 17120858

Summit Environmental Technologies, Inc. received 2 sample(s) on 12/18/2017 for the analyses presented in the following report.



Holly Florea

Project Manager

3310 Win St.
Cuyahoga Falls, Ohio 44223

Arkansas 88-0735, California 07256CA, Colorado, Connecticut PH-0108, Delaware, Florida NELAC E87688, Georgia E87688, Idaho OH00923, Illinois 200061, Indiana C-OH-13, Kansas E-10347, Kentucky (Underground Storage Tank) 3, Kentucky 90146, Louisiana 04061, Maryland 339, Minnesota 409711, New Hampshire 2996, New Jersey OH006, New York 11777, North Carolina 39705 and 631, North Dakota R-201, Oklahoma 9940, Oregon OH200001, Rhode Island LA000317, South Carolina 92016001, Texas T104704466-11-5, Utah OH009232011-1, Virginia 00440 and 1581, Washington C891

Summit Environmental Technologies, Inc.
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Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

Case Narrative

WO#: **17120858**
Date: **1/11/2018**

CLIENT: Life Science Laboratories, Inc.
Project: 1720393

WorkOrder Narrative:
This report in its entirety consists of the following documents: Cover Letter, Case Narrative, Analytical Results, QC Summary Report, Applicable Accreditation Information, Chain-of-Custody, Cooler Receipt Form, and other applicable forms as necessary. All documents contain the Summit Environmental Technologies, Inc., Work Order Number assigned to this report.

Summit Environmental Technologies, Inc., holds the accreditations/certifications listed at the bottom of the cover letter that may or may not pertain to this report. State Certificates and Scopes of Accreditation are attached as applicable. Results provided in this report for any parameter not listed on the Scope of Accreditation should be considered "not certified."

The information contained in this analytical report is the sole property of Summit Environmental Technologies, Inc. and that of the customer. It cannot be reproduced in any form without the consent of Summit Environmental Technologies, Inc. or the customer for which this report was issued. The results contained in this report are only representative of the samples received. Conditions can vary at different times and at different sampling conditions. Summit Environmental Technologies, Inc. is not responsible for use or interpretation of the data included herein.

All results for Solid Samples are reported on an "as received" or "wet weight" basis unless indicated as "dry weight" using the "-dry" designation on the reporting units.

This report is believed to meet all of the requirements of the accrediting agency, where applicable. Any comments or problems with the analytical events associated with this report are noted below.

Analytical Sequence QC Notes:
17120858-001aMS Radium-226_DW(903.0): MS out from acceptable range due to matrix effect.

Summit Environmental Technologies, In
3310 Win S
Cuyahoga Falls, Ohio 4422
TEL: (330) 253-8211 FAX: (330) 253-446
Website: http://www.settek.co

Qualifiers and Acronyms

WO#: **17120858**
Date: **1/11/2018**

These commonly used Qualifiers and Acronyms may or may not be present in this report.

Qualifiers

U	The compound was analyzed for but was not detected.
J	The reported value is greater than the Method Detection Limit but less than the Reporting Limit.
H	The hold time for sample preparation and/or analysis was exceeded.
D	The result is reported from a dilution.
E	The result exceeded the linear range of the calibration or is estimated due to interference.
MC	The result is below the Minimum Compound Limit.
*	The result exceeds the Regulatory Limit or Maximum Contamination Limit.
m	Manual integration was used to determine the area response.
d	Manual integration in which peak was deleted
N	The result is presumptive based on a Mass Spectral library search assuming a 1:1 response.
P	The second column confirmation exceeded 25% difference.
C	The result has been confirmed by GC/MS.
X	The result was not confirmed when GC/MS Analysis was performed.
B/MB+	The analyte was detected in the associated blank.
G	The ICB or CCB contained reportable amounts of analyte.
QC-/+	The CCV recovery failed low (-) or high (+).
R/QDR	The RPD was outside of accepted recovery limits.
QL-/+	The LCS or LCSD recovery failed low (-) or high (+).
QLR	The LCS/LCSD RPD was outside of accepted recovery limits.
QM-/+	The MS or MSD recovery failed low (-) or high (+).
QMR	The MS/MSD RPD was outside of accepted recovery limits.
QV-/+	The ICV recovery failed low (-) or high (+).
S	The spike result was outside of accepted recovery limits.
Z	Deviation; A deviation from the method was performed; Please refer to the Case Narrative for additional information

Acronyms

ND	Not Detected	**RL**	Reporting Limit
QC	Quality Control	**MDL**	Method Detection Limit
MB	Method Blank	**LOD**	Level of Detection
LCS	Laboratory Control Sample	**LOQ**	Level of Quantitation
LCSD	Laboratory Control Sample Duplicate	**PQL**	Practical Quantitation Limit
QCS	Quality Control Sample	**CRQL**	Contract Required Quantitation Limit
DUP	Duplicate	**PL**	Permit Limit
MS	Matrix Spike	**RegLvl**	Regulatory Limit
MSD	Matrix Spike Duplicate	**MCL**	Maximum Contamination Limit
RPD	Relative Percent Different	**MinCL**	Minimum Compound Limit
ICV	Initial Calibration Verification	**RA**	Reanalysis
ICB	Initial Calibration Blank	**RE**	Reextraction
CCV	Continuing Calibration Verification	**TIC**	Tentatively Identified Compound
CCB	Continuing Calibration Blank	**RT**	Retention Time
RLC	Reporting Limit Check	**CF**	Calibration Factor
DF	Dilution Factor	**RF**	Response Factor

This list of Qualifiers and Acronyms reflects the most commonly utilized Qualifiers and Acronyms for reporting. Please refer to the Analytical Notes in the Case Narrative for any Qualifiers or Acronyms that do not appear in this list or for additional information regarding the use of these Qualifiers on reported data.

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Workorder Sample Summary

WO#: **17120858**

11-Jan-18

CLIENT: Life Science Laboratories, Inc.
Project: 1720393

Lab SampleID	Client Sample ID	Tag No	Date Collected	Date Received	Matrix
17120858-001	1720393-001A,B		12/13/2017	12/18/2017 9:15:00 AM	Drinking Water
17120858-002	1720393-002A,B		12/13/2017	12/18/2017 9:15:00 AM	Drinking Water

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DATES REPORT

WO#: **17120858**

11-Jan-18

Client: Life Science Laboratories, Inc.

Project: 1720393

Sample ID	Client Sample ID	Collection Date	Matrix	Test Name	Leachate Date	Prep Date	Analysis Date
17120858-001A	1720393-001A,B	12/13/2017	Drinking Water	Gross Alpha / Gross Beta Radioactivity (EPA 900.0)		12/28/2017 8:12:01 AM	1/4/2018 5:50:00 PM
				Radium-226 (903.0)		12/28/2017 7:23:36 AM	1/3/2018 11:17:00 AM
				Radium-226/228 (903.0/904.0)			1/11/2018
				Radium-228 (904.0)		12/28/2017 7:23:36 AM	1/2/2018 3:14:00 PM
17120858-002A	1720393-002A,B			Gross Alpha / Gross Beta Radioactivity (EPA 900.0)		12/28/2017 8:12:01 AM	1/2/2018 8:18:00 AM
				Radium-226 (903.0)		12/28/2017 7:23:36 AM	1/3/2018 11:17:00 AM
				Radium-226/228 (903.0/904.0)			1/11/2018
				Radium-228 (904.0)		12/28/2017 7:23:36 AM	1/2/2018 3:14:00 PM

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Analytical Report

(consolidated)

WO#: **17120858**

Date Reported: **1/11/2018**

CLIENT: Life Science Laboratories, Inc. **Collection Date:** 12/13/2017

Project: 1720393

Lab ID: 17120858-001 **Matrix:** DRINKING WATER

Client Sample ID 1720393-001A,B

Analyses	Result	PQL	Qual	Units	Uncertainty	DF	Date Analyzed
GROSS ALPHA / GROSS BETA RADIOACTIVITY (EPA 900.0)					**E900.0**	**E900**	Analyst: **BRD**
ALPHA, Gross	ND	3.00	U	pCi/L	± 1.43	1	1/4/2018 5:50:00 PM
COMBINED RADIUM-226/228					**MBDRA226RA22**		Analyst: **BRD**
RADIUM-226/228 (903.0/904.0)							
Radium-226/Radium-228 Combined	ND	2.00	U	pCi/L	± 0.43	1	1/11/2018
COMBINED RADIUM-226/228					**E903.0**	**E903-904**	Analyst: **BRD**
RADIUM-226 (903.0)							
Radium-226	ND	1.00	UQM+	pCi/L	± 0.07	1	1/3/2018 11:17:00 AM
Yield	1.00					1	1/3/2018 11:17:00 AM
COMBINED RADIUM-226/228					**E904.0**	**E903-904**	Analyst: **BRD**
RADIUM-228 (904.0)							
Radium-228	ND	1.00	U	pCi/L	± 0.36	1	1/2/2018 3:14:00 PM
Yield	0.970					1	1/2/2018 3:14:00 PM

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	M	Manual Integration used to determine area response
MC	Value is below Minimum Compound Limit.	N	Tentatively identified compounds
ND	Not Detected	O	RSD is greater than RSDlimit
P	Second column confirmation exceeds	PL	Permit Limit

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **17120858**
11-Jan-18

Client: Life Science Laboratories, Inc.
Project: 1720393 **BatchID:** **30233**

Sample ID	lcs-30233	SampType:	LCS	TestCode:	AlphaBeta_D	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79014		
Client ID:	LCSW	Batch ID:	30233	TestNo:	E900.0	E900		Analysis Date:	12/29/2017	SeqNo:	1367360		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
ALPHA, Gross		17.2	3.00	15.00	0	115	70	130					

Sample ID	17120855-001aMS	SampType:	MS	TestCode:	AlphaBeta_D	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79014		
Client ID:	BatchQC	Batch ID:	30233	TestNo:	E900.0	E900		Analysis Date:	12/29/2017	SeqNo:	1367364		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
ALPHA, Gross		17.3	3.00	15.00	0	115	70	130					

Sample ID	17120855-001aMSD	SampType:	MSD	TestCode:	AlphaBeta_D	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79014		
Client ID:	BatchQC	Batch ID:	30233	TestNo:	E900.0	E900		Analysis Date:	12/29/2017	SeqNo:	1367365		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
ALPHA, Gross		17.9	3.00	15.00	0	119	70	130	17.30	3.43	30		

Sample ID	17120856-001adup	SampType:	DUP	TestCode:	AlphaBeta_D	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79014		
Client ID:	BatchQC	Batch ID:	30233	TestNo:	E900.0	E900		Analysis Date:	12/29/2017	SeqNo:	1367372		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
ALPHA, Gross		ND	3.00						0	0	30	U	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	M	Manual Integration used to determine
MC	Value is below Minimum Compound Limit.	ND	Not Detected	O	RSD is greater than RSDlimit
P	Second column confirmation exceeds	PL	Permit Limit	R	RPD outside accepted recovery limits

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **17120858**
11-Jan-18

Client: Life Science Laboratories, Inc.
Project: 1720393 **BatchID:** **30233**

Sample ID	17120856-001adup	SampType:	DUP	TestCode:	AlphaBeta_D	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79014
Client ID:	BatchQC	Batch ID:	30233	TestNo:	E900.0	E900		Analysis Date:	12/29/2017	SeqNo:	1367372

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual

Sample ID	mb-30233	SampType:	MBLK	TestCode:	AlphaBeta_D	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79014
Client ID:	PBW	Batch ID:	30233	TestNo:	E900.0	E900		Analysis Date:	1/2/2018	SeqNo:	1367388

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
ALPHA, Gross	ND	3.00									U

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	M	Manual Integration used to determine
MC	Value is below Minimum Compound Limit.	ND	Not Detected	O	RSD is greater than RSDlimit
P	Second column confirmation exceeds	PL	Permit Limit	R	RPD outside accepted recovery limits

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **17120858**
11-Jan-18

Client: Life Science Laboratories, Inc.
Project: 1720393 **BatchID:** **30255**

Sample ID	mb-30255	SampType:	MBLK	TestCode:	Radium-228_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79061
Client ID:	PBW	Batch ID:	30255	TestNo:	E904.0	E903-904		Analysis Date:	1/2/2018	SeqNo:	1368513

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	ND	1.00		0	0						U
Yield	0.890			0	0						

Sample ID	lcs-30255	SampType:	LCS	TestCode:	Radium-228_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79061
Client ID:	LCSW	Batch ID:	30255	TestNo:	E904.0	E903-904		Analysis Date:	1/2/2018	SeqNo:	1368514

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.66	1.00	5.000	0	73.3	70	130				
Yield	0.820			0	0						

Sample ID	lcsd-30255	SampType:	LCSD	TestCode:	Radium-228_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79061
Client ID:	LCSS02	Batch ID:	30255	TestNo:	E904.0	E903-904		Analysis Date:	1/2/2018	SeqNo:	1368515

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.98	1.00	5.000	0	79.6	70	130	3.664	8.26	20	
Yield	1.00			0	0			0.8200	19.8		

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	M	Manual Integration used to determine
MC	Value is below Minimum Compound Limit.	ND	Not Detected	O	RSD is greater than RSDlimit
P	Second column confirmation exceeds	PL	Permit Limit	R	RPD outside accepted recovery limits

Summit Environmental Technologies, Inc.
3310 W m St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **17120858**
11-Jan-18

Client: Life Science Laboratories, Inc.
Project: 1720393 **BatchID:** **30255**

Sample ID	17120858-001aMS	SampType:	MS	TestCode:	Radium-228_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79061
Client ID:	1720393-001A,B	Batch ID:	30255	TestNo:	E904.0	E903-904		Analysis Date:	1/2/2018	SeqNo:	1368518

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	3.57	1.00	5.000	0	71.4	70	130				
Yield	0.610			0.9700	0						

Sample ID	17120858-002adup	SampType:	DUP	TestCode:	Radium-228_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79061
Client ID:	1720393-002A,B	Batch ID:	30255	TestNo:	E904.0	E903-904		Analysis Date:	1/2/2018	SeqNo:	1368521

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-228	0.681	1.00		0	0			0	200	20	JR
Yield	1.00			0	0			1.000	0		

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	M	Manual Integration used to determine
MC	Value is below Minimum Compound Limit.	ND	Not Detected	O	RSD is greater than RSDlimit
P	Second column confirmation exceeds	PL	Permit Limit	R	RPD outside accepted recovery limits

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **17120858**
11-Jan-18

Client: Life Science Laboratories, Inc.
Project: 1720393

BatchID: **30255**

Sample ID	mb-30255	SampType:	MBLK	TestCode:	Radium-226_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79088		
Client ID:	PBW	Batch ID:	30255	TestNo:	E903.0		E903-904	Analysis Date:	1/3/2018	SeqNo:	1369489		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Radium-226		ND	1.00									U	
Yield		1.00											

Sample ID	lcs-30255	SampType:	LCS	TestCode:	Radium-226_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79088		
Client ID:	LCSW	Batch ID:	30255	TestNo:	E903.0		E903-904	Analysis Date:	1/3/2018	SeqNo:	1369490		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Radium-226		5.78	1.00	5.000	0	116	70	130					

Sample ID	lcsd-30255	SampType:	LCSD	TestCode:	Radium-226_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79088		
Client ID:	LCSS02	Batch ID:	30255	TestNo:	E903.0		E903-904	Analysis Date:	1/3/2018	SeqNo:	1369491		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	
Radium-226		5.72	1.00	5.000	0	114	70	130	5.780	1.04	20		

Sample ID	17120858-001aMS	SampType:	MS	TestCode:	Radium-226_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79088		
Client ID:	1720393-001A,B	Batch ID:	30255	TestNo:	E903.0		E903-904	Analysis Date:	1/3/2018	SeqNo:	1369494		
Analyte		Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	M	Manual Integration used to determine
MC	Value is below Minimum Compound Limit.	ND	Not Detected	O	RSD is greater than RSDlimit
P	Second column confirmation exceeds	PL	Permit Limit	R	RPD outside accepted recovery limits

Summit Environmental Technologies, Inc.
3310 Win St.
Cuyahoga Falls, Ohio 44223
TEL: (330) 253-8211 FAX: (330) 253-4489
Website: http://www.settek.com

QC SUMMARY REPORT

WO#: **17120858**
11-Jan-18

Client: Life Science Laboratories, Inc.
Project: 1720393 **BatchID:** **30255**

Sample ID	17120858-001aMS	SampType:	MS	TestCode:	Radium-226_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79088
Client ID:	1720393-001A,B	Batch ID:	30255	TestNo:	E903.0	E903-904		Analysis Date:	1/3/2018	SeqNo:	1369494

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	6.55	1.00	5.000	0	131	70	130				S

NOTES:
MS out from acceptable range due to matrix effect.

Sample ID	17120858-002adup	SampType:	DUP	TestCode:	Radium-226_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79088
Client ID:	1720393-002A,B	Batch ID:	30255	TestNo:	E903.0	E903-904		Analysis Date:	1/3/2018	SeqNo:	1369497

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	U
Yield	1.00							1.000	0	0	

Sample ID	17121010-001adup	SampType:	DUP	TestCode:	Radium-226_	Units:	pCi/L	Prep Date:	12/28/2017	RunNo:	79088
Client ID:	BatchQC	Batch ID:	30255	TestNo:	E903.0	E903-904		Analysis Date:	1/3/2018	SeqNo:	1369509

Analyte	Result	PQL	SPK value	SPK Ref Val	%REC	LowLimit	HighLimit	RPD Ref Val	%RPD	RPDLimit	Qual
Radium-226	ND	1.00						0	0	20	U
Yield	1.00							1.000	0	0	

Qualifiers:

*	Value exceeds Maximum Contaminant Level.	B	Analyte detected in the associated Method Blank	E	Value above quantitation range
H	Holding times for preparation or analysis exceeded	J	Analyte detected below quantitation limits	M	Manual Integration used to determine
MC	Value is below Minimum Compound Limit.	ND	Not Detected	O	RSD is greater than RSDlimit
P	Second column confirmation exceeds	PL	Permit Limit	R	RPD outside accepted recovery limits

Subcontractor Purchase Order / Chain of Custody

Life Science Laboratories, Inc.
5854 Butternut Dr., E. Syracuse, New York 130
Phone # (315) 445-1105 Fax # (315) 445-1301

Seller agrees to sell and deliver services as specified herein in accordance with the Subcontract Order. This order expressly limits acceptance to the terms of this order and any additional or different terms proposed by the seller are rejected unless expressly assented to in writing by Life Science Laboratories, Inc.

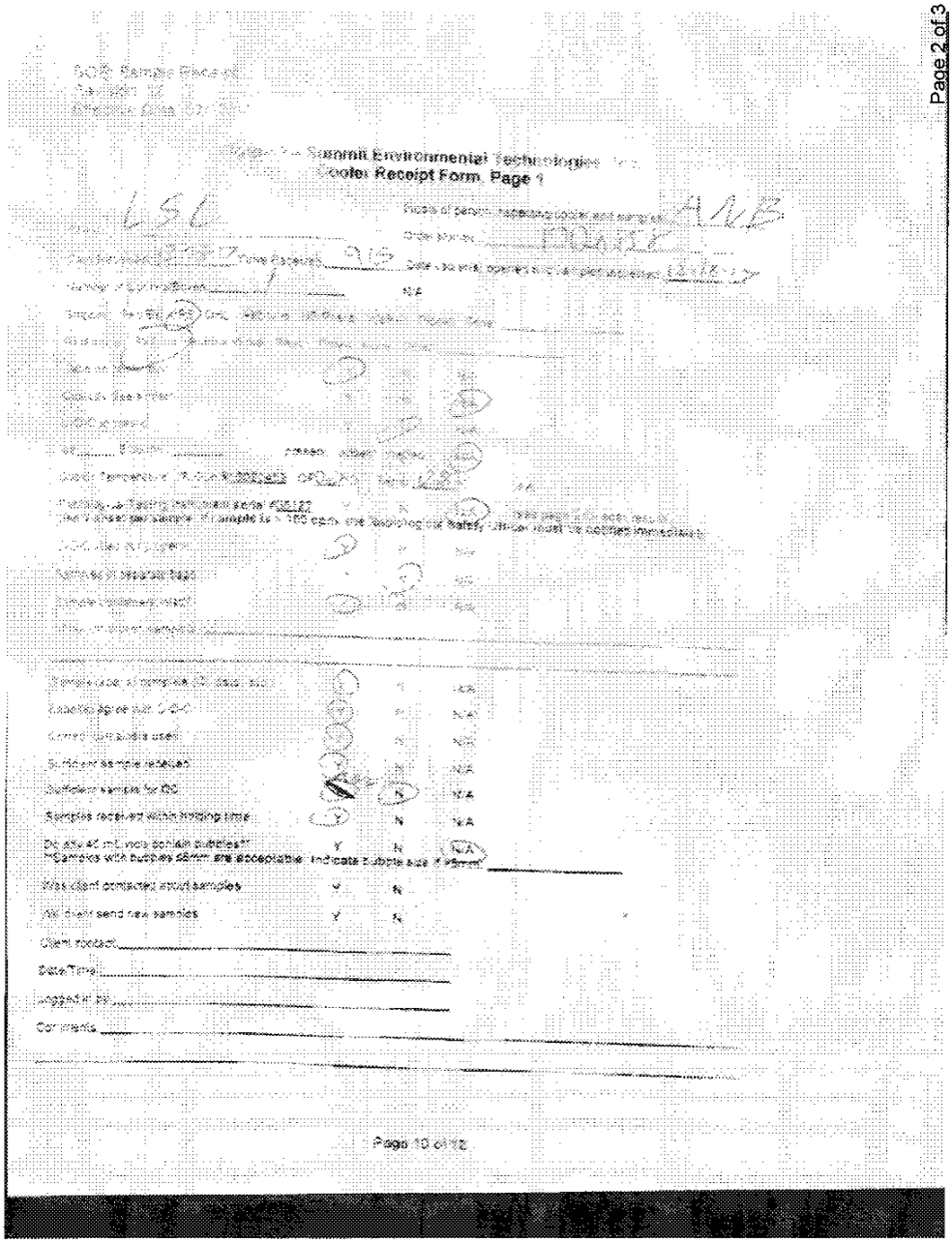
Samples sent to:	Report should be sent to:	Life Science Laboratories Project Number:	Special Instructions:
Summit Environmental Todd Rogers 2310 White Street Cuyahoga Falls, OH 44223 Phone: 330-253-8211 Fax: 330-253-4489	Life Science Laboratories, Inc. 5854 Butternut Drive East Syracuse, NY 13057 Sample Custody Department Contact Name: Greg Smith	1720393 Purchase Order Number (SO#): SO55992 Send invoice to: Accounting Department Results are required by this date: Standard	The Purchase Order Number must accompany all reports and invoices. SAMPLES ARE FOR NEW YORK STATE COMPLIANCE.

Life Science Labs Sample ID # / Client ID	Sample Date	Type grab	comp	Matrix	Preserv. Added	Containers Size/type	#	Analysis Requested	Unit Price
1720393-001A,B Spring	[illegible]	X		PW	HNO3	1/2 gal.	2	Comb. Radium 226/228, Alpha	[redacted]
1720393-002A,B Well	[illegible]	X		PW	HNO3	1/2 gal.	2	Comb. Radium 226/228, Alpha	[redacted]
								Report for	[redacted]
								Sub Total:	
								Surcharge:	
								Total:	[redacted]

1720858-001-002J

Custody Transfers	Date	Time
Sampled By:	Received By:	
Relinquished By:	Received By:	
Relinquished By:	Received for Lab By:	
	Received Intact: Y N	°C

Copies: Original — Purchasing — Administration — Accounting



Page 2 of 3

Sample Receipt Checklist

Client Name: Summit Environmental Technologies, Inc.

Cooler Receipt Form, Page 1

Page 10 of 12

SOP: Sample Receipt
Revision: 13
Effective Date: 03/17-17

Figure 3 - Summit Environmental Technologies, Inc.
Cooler Receipt Form, Page 2

Sample pH Check, Chlorine Check and/or Radiological Scan

pH Strip SET (0-14)#: [illegible]	pH Strip (2.8-4.6) SET#: [illegible]
Total DPD packet SET#: OES-02-0222	Free DPD packet SET#: OES-01-0290
Disp. Pipette SET#:	

Sample ID	Test Method	pH	Chlorine (+ or -)	CPM	Comments
		[illegible]		[illegible]	
		[illegible]		[illegible]	

P = Permanganate interference
524.1, 525, 515.1, 525.2, 547, 548.1, 549.1, 531.2, 1613 methods checked for **Total** chlorine
552.2 checked for **Free** chlorine
531.2 pH is checked for ~3.8 (SET# OES-01-0149)
524.2 = pH and Chlorine checked by lab analyst

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2018
Issued April 01, 2017
Revised August 31, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CECILIA MARKOVICH
SUMMIT ENVIRONMENTAL TECHNOLOGIES INC
3310 WIN STREET ASCOT INDUSTRIAL PARK
CUYAHOGA FALLS, OH 44223

NY Lab Id No: 11777

is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category
ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Disinfection By-products

Bromate	EPA 300.1 Rev. 1.0
Bromide	EPA 300.1 Rev. 1.0
	EPA 300.0 Rev. 2.1
Chlorate	EPA 300.1 Rev. 1.0
Chloride	EPA 300.1 Rev. 1.0

Metals I

Arsenic, Total	EPA 200.8 Rev. 5.4
Barium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Cadmium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Chromium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Copper, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Iron, Total	EPA 200.7 Rev. 4.4
Lead, Total	EPA 200.8 Rev. 5.4
Manganese, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Mercury, Total	EPA 245.1 Rev. 3.0
Selenium, Total	EPA 200.8 Rev. 5.4
Silver, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Zinc, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4

Metals II

Aluminum, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Antimony, Total	EPA 200.8 Rev. 5.4
Beryllium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Molybdenum, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Nickel, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4
Thallium, Total	EPA 200.8 Rev. 5.4
Vanadium, Total	EPA 200.7 Rev. 4.4
	EPA 200.8 Rev. 5.4

Metals III

Boron, Total	EPA 200.7 Rev. 4.4
Calcium, Total	EPA 200.7 Rev. 4.4
Magnesium, Total	EPA 200.7 Rev. 4.4
Potassium, Total	EPA 200.7 Rev. 4.4
Sodium, Total	EPA 200.7 Rev. 4.4
Uranium (Mass)	EPA 200.8 Rev. 5.4

Miscellaneous

2,3,7,8-Tetrachlorodibenzo-p-dioxin	EPA 1613B
Odor	SM 18-22 2150B (-97)
Organic Carbon, Total	SM 21-22 5310B (-00)
Perchlorate	EPA 314.0
Surfactant (MBAS)	SM 18-22 5540C (-00)

Serial No.: 56732

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and printed on secure paper. Continued accreditation depends on successful ongoing participation in the Program. Consumers are urged to call (518) 485-5570 to verify the laboratory's accreditation status.

NEW YORK STATE DEPARTMENT OF HEALTH
WADSWORTH CENTER

Expires 12:01 AM April 01, 2018
Issued April 01, 2017
Revised August 31, 2017

CERTIFICATE OF APPROVAL FOR LABORATORY SERVICE

Issued in accordance with and pursuant to section 502 Public Health Law of New York State

MS. CECILIA MARKOVICH
SUMMIT ENVIRONMENTAL TECHNOLOGIES INC
3310 WIN STREET ASCOT INDUSTRIAL PARK
CUYAHOGA FALLS, OH 44223

NY Lab Id No: 11777

Is hereby APPROVED as an Environmental Laboratory in conformance with the National Environmental Laboratory Accreditation Conference Standards (2003) for the category
ENVIRONMENTAL ANALYSES POTABLE WATER
All approved analytes are listed below:

Miscellaneous	
Turbidity	EPA 180.1 Rev. 2.0
Non-Metals	
Alkalinity	SM 18-22 2320B (-97)
Chloride	EPA 300.0 Rev. 2.1
Color	SM 18-22 2120B (-97)
Conductivity	SM 18-22 2510
Cyanide	SM 18-22 4500-CN E (-99)
Fluoride, Total	EPA 300.1 Rev. 1.0
	EPA 300.0 Rev. 2.1
Nitrate (as N)	EPA 300.0 Rev. 2.1
Nitrite (as N)	EPA 300.0 Rev. 2.1
Orthophosphate (as P)	EPA 300.0 Rev. 2.1
Silica, Dissolved	EPA 200.7 Rev. 4.4
Solids, Total Dissolved	SM 18-22 2540C (-97)
Specific Conductance	SM 18-22 2510B (-97)
Sulfate (as SO4)	EPA 300.0 Rev. 2.1
Radiological Analytes	
Gross Alpha	EPA 900.0
Gross Beta	EPA 900.0
Radium-226	EPA 903.0
Radium-228	EPA 904.0
Uranium (Activity)	EPA 908.0

Serial No.: 56732

Property of the New York State Department of Health. Certificates are valid only at the address shown, must be conspicuously posted, and are printed on secure paper. Continued accreditation requires on-site successful ongoing participation in the Program. Consumers are urged to call (518) 486-6070 to verify the laboratory's accreditation status.

Life Science Laboratories, Inc.
5854 Butternut Drive
East Syracuse, NY 13057
Phone # (315) 445-1105 Telefax # (315) 445-1301

Chain of Custody Record

1720393

Client:	Village OF AFTON WFP	Phone #	607 ~~343~~ 639-2	Contact Person: DAVID H. BIRD	LSL Project #: AftonV/O 7616
Address:	19 Court ST AFTON, NY. 13730	Fax #	607-639-1903		Client's Site I.D.:
		Authorization:			Client's Project I.D.:

LSL Sample Number	Client's Sample Identifications	Sample Date	Sample Time	Type grab	Type comp.	Matrix	Preserv. Added	Containers #	Containers size/type	Analyses	Free Cl (mg/L)	Pres. Check
001	SPRING	12/13/17	8:00AM	X			HNO3	2	1/2 gal	Comb. Radium 226/228, Alpha	1.0	
002	Well	12/13/17	7:45AM					2	½gal	" " " "	0.9	

Notes and Hazard identifications: 7.5°C

Samples Received
On Ice

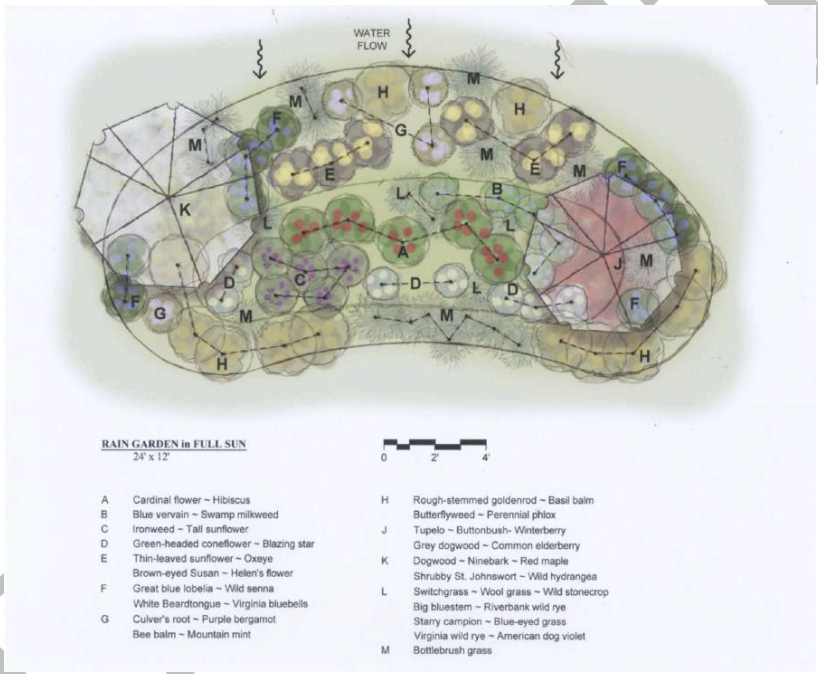
Custody Transfers		Date	Time
Sampled By: DAVID H. BIRD	Received By:		
Relinquished By: DAVID H BIRD	Received By: Bill Donaldson	12-13-17	1645
Relinquished By: Bill Donaldson	Received for Lab By: R. Durbin	12-13-17	17:57

Shipment Method: Samples Received Intact: Y N

Appendix S8. Examples of best management practices (BMPs) for the Village of Afton's waterfront flood management park.

Waterfront Park examples of natural solutions for flooding and stormwater management:

Raingarden*:* A raingarden is a shallow planted depression used to hold stormwater and runoff until it can infiltrate into the ground. Specific water loving plants are selected to be planted within the raingarden. There are many resources and examples available to assist with building a raingarden. Some raingardens include a drainpipe which leads to a retention basin, pond or holding tank. Plants can be specifically chosen to filter pollutants out of the stormwater or runoff.

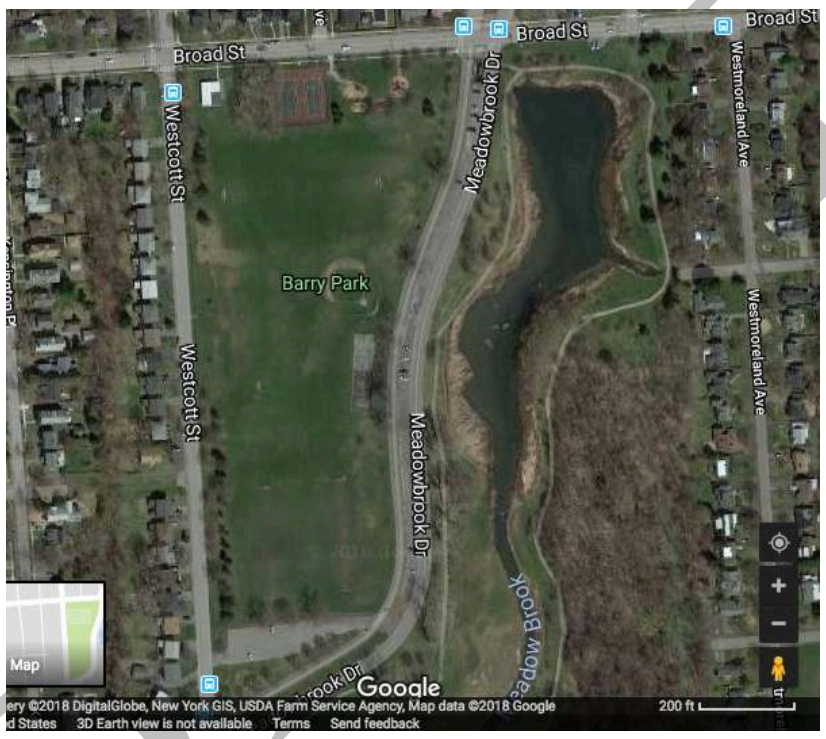


Picture credit: http://raingardenalliance.org/planting/design

Natural Floodplain*:* Restoring the Natural Flood plain is another option which could be demonstrated even in a small park. Much of the natural floodplain has been drained and filled or otherwise lost along the human habituated sections of the Susquehanna River. Floodplains are a natural part of a healthy River and floods are

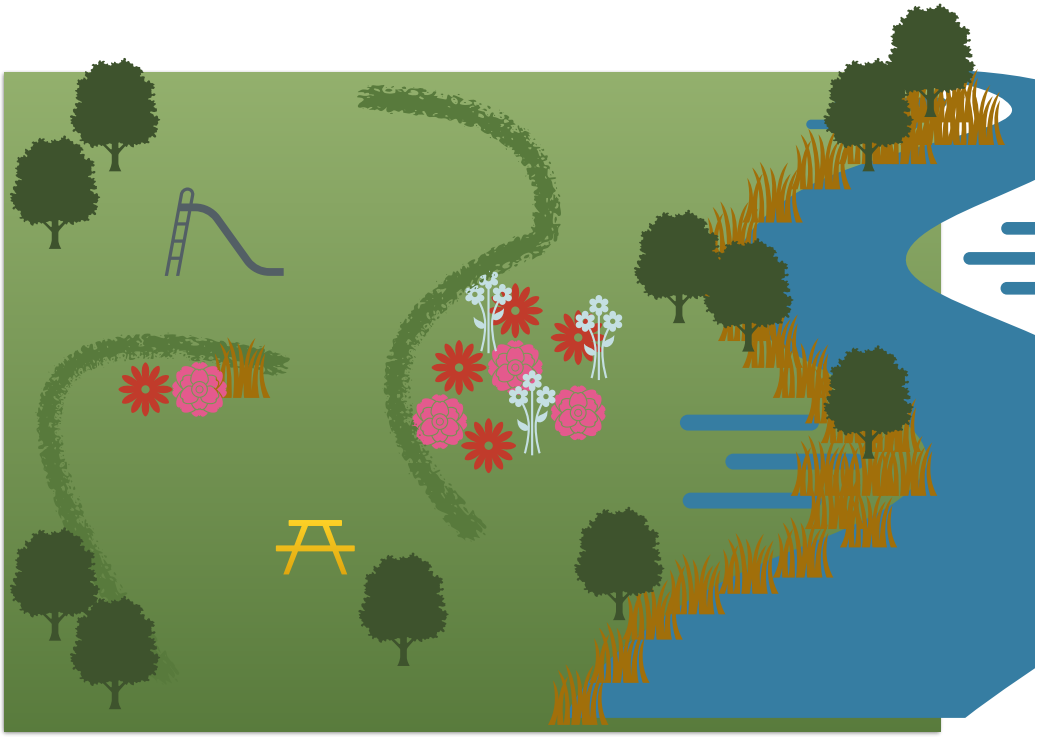
a natural occurrence. Restoring a part of the natural floodplain would include protecting and restoring the native habitat along the Susquehanna River.

Floodwater Detention and Retention Basin*:* An area that has been designed and designated to hold rain, floodwater and/or runoff. A detention pond is also known as a dry pond because the water is only held temporarily. The water in a detention pond is eventually released or infiltrated into the ground. The water in a retention pond is not temporary and only releases it's water if the pond level exceeds a specific level. The map below shows a retention pond in Syracuse, NY.



Bioswales*:* Bioswales are landscape design features built to direct and filter the flow of water such as runoff, stormwater, and floodwaters. A bioswale is also planted with vegetation which helps to filter and absorb water along the way. The picture below shows a bioswale in the foreground which is being build ans a completed bioswale on the opposite side of the road.

Photo credit: Duk at English Wikipedia - Transferred from en.wikipedia to Commons by Liftarn using CommonsHelper., Public Domain, https://commons.wikimedia.org/w/index.php?curid=11902676



Example of a general layout of a stormwater management park. Above the grass shows where the wetland could be expanded, large mature trees also are beneficial to uptake excess stormwater. A picnic area and playground help attract people to utilize the park. Grass covered berms help to guide the excess water back toward the river or into the rain gardens. A drain in the rain garden could also drain excess water into a retention or detention basin on the opposite side of the road. Parking could be sited along the road with the ditch being used as a bioswale which could drain to the same area as the rain garden. A walking trail with interpretive signage could also be added as an educational tool to teach about natural river processes as well as best management practices for stormwater.

Demonstration Stormwater Management Park

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