INVESTIGATION REPORT

Mayville Water Supply Contamination
Spill Number 2008000
Village of Mayville
Chautauqua County
March 2021

Prepared by
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Region 9
270 Michigan Avenue
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LIST OF ACRONYMS

AMSL	Above Mean Sea Level
AFFF	Aqueous Film Forming Foam
BCP	Brownfield Cleanup Program
CCDOH	Chautauqua County Department of Health
COC	Contaminant of Concern
DUSR	Data Usability and Summary Report
ECs	Emerging Contaminants
ELAP	Environmental Laboratory Accreditation Program
FBGS	Feet Below Ground Surface
GWQS	Ground Water Quality Standards
IRM	Interim Remedial Measures
MDPW	Mayville Department of Public Works
MS/MSD	Matrix Spike / Matrix Spike Duplicate
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NCLSD	North Chautauqua Lake Sewer District
PPB	Parts per Billion
PPM	Parts per Million
PPT	Parts per Trillion
PCB	Polychlorinated Biphenyl
PID	Photo-ionization Detector
PFAS	Per- and Polyfluoroalkyl Substances
PFNA	Perfluorononanic Acid
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctane Sulfonic Acid
PFBS	Perfluorobutanesulfonic acid
PFBA	Perfluorobutanoic acid
PFDA	Perfluorodecanoic acid
PFDOA	Perfluorododecanoic acid

PFHPA	PERFLUOROHEPTANOIC ACID
PFHXS	PERFLUOROHEXANESULFONIC ACID
PFHXA	PERFLUOROHEXANOIC ACID
FOSA	PERFLUOROOCTANESULFONAMIDE
PFPEA	PERFLUOROPENTANOIC ACID
PFTEA	PERFLUOROTETRADECANOIC ACID
PFTRIA	PERFLUOROTRIDECANOIC ACID
PFUNA	PERFLUOROUNDECANOIC ACID
SCG	STANDARDS, CRITERIA, GUIDANCE
SCO	SOIL CLEANUP OBJECTIVE
SVOC	SEMI VOLATILE ORGANIC COMPOUND
SWQS	SURFACE WATER QUALITY STANDARDS
TAL	TARGET ANALYTE LIST
TCL	TARGET COMPOUND LIST
TCMB	TOWN OF CHAUTAUQUA MUNICIPAL BUILDING
TOGS	TECHNICAL AND OPERATIONAL GUIDANCE SERIES
USEP	UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
VOC	VOLATILE ORGANIC COMPOUND
QA/QC	QUALITY ASSURANCE / QUALITY CONTROL
6:2 FTS	6:2 FLUOROTELOMER SULFONIC ACID
8:2 FTS	8:2 FLUOROTELOMER SULFONIC ACID

EXECUTIVE SUMMARY

Elevated concentrations of the contaminant perfluorononanoic acid (PFNA) have been detected in the public water supply system for the Village of Mayville (the Village). PFNA is a member of the class of contaminants known as per- and polyfluoroalkyl substances (PFAS). The PFAS family of synthetic fluorinated compounds were mass produced in the United States for decades, dating back to the 1950s. PFAS are used in a wide variety of industrial and commercial applications such as textiles, aqueous film forming foams (AFFF), metal plating, semi-conductors, paper and food packaging, coating additives, cleaning products, pesticides and personal care products. According to United States Environmental Protection Agency (USEPA), PFAS compounds pose potential adverse impacts to the environment and human health.

In response to these detections, the New York State Department of Environmental Conservation (NYSDEC) initiated an investigation to identify any potential source areas of PFNA. Tasks completed during the preliminary investigation included a site reconnaissance, interviews with locals and Village officials, the installation of six (6) monitoring wells, and the collection and analysis of samples from various environmental media (supply wells, surface water, sediment, groundwater, and surface soils). The investigation was divided into six areas: area of Supply Wells 1 and 2, area of Supply Well 3, Mud Creek, the Town of Chautauqua Municipal Building (TCMB), Lakeside Park, and area of Supply Well 4. The TCMB and Lakeside Park locations were selected and investigated as potential source areas due to the reported use of AFFF at both locations.

As part of this investigation, samples were collected in three phases. The first phase occurred on December 15, 2020. During this event, groundwater samples were collected from all four (4) supply wells, from three (3) pre-existing monitoring wells adjacent to the supply wells, and one (1) surface water sample from Mud Creek. The second phase occurred on January 7, 2021. Samples collected during this event included two (2) groundwater samples from additional pre-existing wells, three (3) surface water samples from Mud Creek, a surface water and a sediment sample from the outfall at the TCMB, and six (6) surface soils samples from the TCMB and Lakeside Park. The final phase of the sample collection occurred on January 12, 2021. Six (6) groundwater samples were collected from each of the monitoring wells installed by NYSDEC for purposes of this

investigation.

PFNA was detected in Supply Well 1 at 280 nanograms per liter (ng/L, or parts per trillion [ppt]), in Supply Well 2 at 140 ppt, and in Supply Well 3 at 290 ppt. PFNA was not detected at Supply Well 4 or any of the adjacent monitoring wells located near Supply Wells 2, and 4. Low levels of PFNA were detected in surface water samples collected from Mud Creek. Within Mud Creek, the Morris Street location sample contained a concentration of 2.6 ppt, and along Bloomer Road a concentration of 0.28 ppt was detected. The NYSDEC installed monitoring wells contained PFNA concentrations up to 290 ppt in the area of Supply Wells 1 and 2, up to 16 ppt in the area of Supply Well 3 , and up to 110,000 ppt in the TCMB area. Elevated PFNA levels were also detected in the TCMB outfall, where surface water concentrations up to 6,300 ppt and sediment concentrations up to 8.2 ppb were detected. PFNA concentrations in the surface soil samples collected at the TCMB ranged from 16 to 680 micrograms per kilogram (ug/Kg, or parts per billion [ppb]) and at Lakeside Park the concentrations ranged from 0.52 to 17 ppb.

The most significant concentrations of PFNA and other PFAS compounds, including PFOA, were detected at the former football field of the TCMB. Samples from this area indicate that the football field at the TCMB is a primary source area of PFNA. Further investigation is required to evaluate PFNA contaminant migration from this area and its potential impact on Supply wells 1, 2, and 3. Sample results from new Supply Well 4 and an evaluation of the local geology indicate that the source of PFNA at the TCMB probably does not represent a potential threat to Supply Well 4. The bedrock ridge between the TCMB and Supply Well 4 likely indicates a drainage divide between Supply Well 4 and the TCMB. Additional sampling and investigation will help to provide a better understanding of the local geology, contaminant migration pathways, the extent of PFNA contamination within groundwater, and the interaction of surface water drainage with groundwater.

As elevated levels of PFNA were detected in three of the four Village of Mayville public water supply wells, NYSDOH, in consultation with the Chautauqua County Department of Health and Village of Mayville officials, recommended that 30 nearby private wells be evaluated to determine if they contained similar contamination. A coordinated effort between NYSDEC, NYSDOH, Chautauqua County Department of Health, and Village of Mayville officials resulted in the sampling of 25 private wells in December 2020 with

agreement from the property owners. Five properties either did not respond or declined the offer for private well sampling. The samples were analyzed for six of the most common PFAS compounds including PFNA, PFOS and PFOA. One additional well was identified and sampling of this well will be conducted soon. Results from the December 2020 sampling event indicated that none of the private wells sampled contained PFNA contamination or any of the other five compounds analyzed. For security purposes, the locations of the supply wells and private wells are not displayed within this report.

1.0 INTRODUCTION AND OBJECTIVES

1.1 Introduction

Industry and modern technology have created thousands of new chemicals that would not otherwise exist in nature. Although some of these chemicals have proven benefits, the effect of many such chemicals on human health is unknown or not fully understood. With advances in science and technology, public health scientists and experts can identify contaminants that pose previously unknown hazards to human health. These chemicals, collectively referred to as "emerging contaminants" (ECs), enter our environment and ultimately may affect our drinking water supplies. New York State has taken the initiative to sample and ensure that public water supply systems are safe from potentially hazardous contaminant substances such as ECs.

To address concerns for ECs, the Chautauqua County Department of Health (CCDOH) collected samples from supply wells in the Village of Mayville (the Village). Results indicated elevated levels of the EC compound perfluorononanoic acid (PFNA) in the public water supply. The New York State Department of Environmental Conservation (NYSDEC) mobilized to investigate groundwater and to identify the source(s) of the contaminant PFNA.

The NYSDEC created a spill (Spill ID 2008000), evaluated available groundwater data from Superfund and Brownfield sites in the area, and began interviewing local officials to facilitate the investigation of potential source areas of PFNA in the Village of Mayville. As part of this investigation, several samples were collected from surface water, supply wells, and from existing monitoring wells found throughout the Village. Under the New York State standby response contract, NYSDEC selected the LiRo Group (LiRo) to support additional investigation. As part of the investigation, LiRo hired SJB Services, Inc (SJB) to install an additional six (6) monitoring wells at locations throughout the Village where AFFF or other potential PFNA-containing products may have been used, based on the interviews with local officials. The monitoring wells were installed to determine whether each suspect area is a source of the contamination, and to begin to develop a conceptual model of contaminant migration based on the local geology.

1.2 Contaminant of Concern

The primary contaminant of concern (COC) identified in the Village of Mayville is PFNA. PFNA is a 9-carbon chain compound and a member of the per- and polyfluoroalkyl substances (PFAS) family. The PFAS family of synthetic fluorinated compounds was mass produced in the United States for decades, dating back to the 1950s. PFAS are used in a wide variety of industrial and commercial applications such as textiles, aqueous film forming foam (AFFF) used to fight flammable liquid fires, metal plating, semi-conductors, paper and food packaging, coating additives, cleaning products, pesticides and personal care products. According to United States Environmental Protection Agency (USEPA), perfluorooctanoic acid (PFOA) and perfluorooctane sulfonic acid (PFOS), compounds closely related to PFNA, pose potential adverse impacts to human health and the environment due to their persistent nature and ability to bio-accumulate; in August of 2020, New York State adopted maximum contaminant levels (MCLs) of 10 parts per trillion (ppt) each in drinking water for these compounds.

Production of the “legacy” long carbon chain compounds, generally considered to be eight carbon chains and longer, was largely phased out beginning in 2002 and continued over the course of the next thirteen years. However, manufacturing of the next generation of fluorinated chemicals has introduced new PFAS chemicals into the environment and little is known about their potential impact to human health. In 2016 New York State designated PFOA and PFOS as hazardous substances, banned the use of AFFF containing these compounds for training exercises, and required these foams to be replaced with PFOS/PFOA-free foams by April 2017.

1.3 Investigation Objectives

The primary objectives of the investigation were to identify the source of the PFNA, determine if other contaminants exist, and assess the extent of contamination. The investigation was conducted in a phased approach as the project evolved and new information became available. Because multiple, distinct areas throughout the Village were investigated, the results are presented based on location. The specific objectives of this investigation were to:

- Collect groundwater samples from the three (3) existing and one (1) recently

installed public supply wells.

- Collect groundwater samples from four (4) additional existing monitoring wells found throughout the Village;
- Collect groundwater samples from private supply wells;
- Collect surface water samples along Mud Creek and other potential source areas;
- Collect surface soil and sediment samples in potential source areas;
- Install, develop, and sample six (6) monitoring wells in various locations throughout the Village;
- Evaluate local geology and develop a conceptual model of contaminant migration; and
- Survey the public supply wells and the sample locations.

The NYSDEC was the lead agency for the Mayville investigation, which was supported by a NYSDEC Standby Contractor.

2.0 SITE HISTORY AND BACKGROUND

2.1 Site Description

The Village of Mayville is located on the north end of Chautauqua Lake in Chautauqua County, New York. Settlement within the Mayville area first occurred around 1804 and the Village of Mayville was officially formed in 1830. The area of the Village totals approximately 1.99-square miles and is surrounded by rural countryside. According to the 2010 census the village has a population of around 1,714 (Mayville, 2010). The location of the Village of Mayville is presented on Figure 1.

The Village is primarily served by the Mayville Public Water Supply System, although some residents receive their water via private water wells. As of December 2020, the public water system consisted of 3 supply wells located throughout the Village. In January 2021, a newly installed supply well (Supply Well 4) was put into operation. Throughout the report, the potable water supply wells are referred to primarily as “supply wells”.

2.2 Supply Wells

Of the four supply wells, Supply Well 1 is located furthest to the south. Supply Well 1 is believed to have been installed in approximately 1946 using the cable tool method to an approximate depth of 32.5 feet below the current ground surface. The well is constructed with an 18-inch diameter outer steel casing (drive pipe) and a 10-inch diameter inner steel casing. Supply Well 1 has a gravel-packed, 5-foot long, 12-inch diameter, #80 slot screen attached to the bottom of the inner casing. The well screen extends from approximately 27.5 to 32.5 feet below ground surface (fbgs) within the water-bearing sand and gravel unit. The well is housed in a brick building that has a tiled concrete floor.

Supply Well 2 was installed in 1951 approximately 225-feet to the northwest of Supply Well 1. Supply Well 2 is a 32-feet deep large diameter (~8 feet) caisson well, constructed with pre-cast concrete cylinders. Supply Well 2 has a 2-foot long screen installed from approximately 29 to 31 fbgs in the same sand and gravel unit as Supply Well 1. The well is housed in a concrete block building that has a concrete floor.

Supply Well 3 was installed in 1967 using the cable tool method to an approximate depth of 73 fbgs. The well is constructed with an 18-inch diameter outer steel casing (drive pipe) and a 12-inch diameter inner steel casing. The top of the annulus between casings is sealed with concrete. Supply Well 3 has a gravel-packed, 12-foot long, 12-inch diameter, #100 (top 8 feet) and #80 (bottom 4 feet) slot screen attached to the bottom of the 12-inch inner casing at a depth of 59 to 71 fbgs. The screen was placed within a water bearing sand and gravel unit that extends from approximately 53 to 71 fbgs; shale bedrock was encountered below 71 fbgs. The well is housed in a concrete block building that has a concrete floor.

The Village of Mayville sits atop a bedrock ridge, mantled in a thin layer of glacial till, that emanates from Chautauqua Lake and rises to the northwest along Erie Street. Valleys are present on either side of the ridge that contain water-bearing alluvial and glaciofluvial deposits where the supply wells are located. Supply Well 4 is located on the northeast side of the ridge; supply wells 1 through 3 are located on the southwest side of the ridge and are hydraulically separated from Supply Well 4. Supply Well 4 is approximately 1-mile northeast of the nearest supply well, Well 3. Supply Well 4 was installed in September 2019 using a dual rotary Barber drill rig (air rotary drilling with rotary steel casing advancement) to a total depth of 68 fbgs. Supply Well 4 has a 10-foot long, 12-inch diameter, 0.05-inch slot stainless steel wire-wrapped screen attached to the bottom of a 12-inch diameter steel casing at a depth of 58 to 68 fbgs. The screen was placed within an extensive water bearing sand and gravel unit that extends from approximately 40 to at least 87 fbgs. The well was housed in a temporary wooden structure.

All figures provided in this report present approximate locations; once survey data becomes available the figures will be updated, if necessary.

2.3 Potential Source Areas

Mayville does not have an extensive history of industrial and manufacturing operations. Historic industries that existed within the Village and the surrounding area are detailed in the paragraphs below.

Kling Factories was a furniture manufacturing plant, located less than ¼-mile east of Supply Wells 1 and 2, that operated in the Village of Mayville from 1911 and 1962. In 1962,

Ethan Allen purchased the company and continued to manufacture furniture at the Mayville plant until the plant closed in 2003 (Kling, 2008). According to a November 24, 1998 Buffalo News report, an extensive boiler fire occurred at the plant. (McCarthy, 1998). It is unknown if any chemical releases occurred or if AFFF was applied to extinguish the fire.

Mayville Machine, formerly known as Johnson Racing Engines, is located on the western side of Mud Creek along the north side of Route 430. The business is located approximately ½-mile upgradient from Supply Well 3 and ¾-mile upgradient from Supply Well 2. Supply wells 2 and 3 are located on the eastern side of Mud Creek. Fluoropolymers, a group within the class of PFAS, are commonly used in the coating and plating of performance race engines. This property was reportedly also once a furniture factory (Sterling Furniture Company) until the mid-1990s. Water and stain-repellent coatings, which can contain PFAS compounds, are frequently used on furniture fabrics.

Standard Portable is a 1.06-acre Brownfield Cleanup Site (NYSDEC Site # C907030A) located in the Village of Mayville along Valley Street on the west end of Chautauqua Lake and is 0.35-mile downgradient of Supply Well 1. The facility was first operated by Wappat Saw Company and later became Standard Portable. Historically, various metal working operations occurred onsite including degreasing and solvent disposal. The operations included the use of the solvent trichloroethene. Under the Brownfield Cleanup Program (BCP), interim remedial measures (IRM) were implemented to clean up this site and a pilot study is being conducted to evaluate the effectiveness of the IRM. EC sampling performed in October 2018 from six (6) monitoring wells at this site did not identify significant PFAS contamination in groundwater. PFNA was only detected in one well at a maximum concentration of 1.3 nanograms per liter (ng/L, equivalent to parts per trillion [ppt]). PFOS was detected in all six wells sampled at a maximum concentration of 5.6 ng/L, PFOA was detected in four of the six wells at a maximum concentration of 3.3 ng/L, and the maximum total of PFAS compounds detected in any well was 21.6 ng/L. Based on these low levels and different chemical profile than the Supply Well detections, the Standard Portable site was ruled out as a source of the drinking water contamination.

PFAS compounds are known to be the active ingredients of AFFF. According to the Mayville Fire Department, AFFF was applied in three (3) areas of the Village. The foam was used to fight fires, for training use, and graduation ceremonies.

- AFFF was reportedly used during 5 training exercises from 2014 to 2018 at the former football field at the Town of Chautauqua Municipal Building (TCMB). Based on accounts from the local fire department, the volume of foam that was applied varied based on the training event. Training events were held on several occasions by both local and state fire agencies. The volume of foam concentrate used during each training event reportedly ranged from 40 to over 100 gallons. After 2016, training was likely conducted with PFOA/PFOS-free training foam.

- Training foam was also repeatedly sprayed during graduation ceremonies at Lakeside Park. According to several accounts, 5 to 10 gallons of training foam concentrate was sprayed at this location twice per year from the 1990s up until 2018. The foam was reportedly applied in three (3) separate areas at Lakeside Park.

- Approximately 15 gallons of AFFF concentrate was also used during a 2018 automotive junkyard fire on East Chautauqua Street.

2.6 Site Geology and Hydrogeology

The geology of the Mayville area is complex due to variations in glacial deposits and the topography of the underlying bedrock. Bedrock geology across the area is primarily shale and siltstones. As noted previously, the Village of Mayville sits atop a bedrock ridge, mantled in a thin layer of glacial till, that emanates from Chautauqua Lake and rises to the northwest along Erie Street. Valleys are present on either side of the ridge that contain water-bearing alluvial and glaciolacustrine deposits where the supply wells are located. The water-bearing deposits are often discontinuous, of limited areal extent, and sandwiched between finer-grained (silty-clayey-fine sandy) units that act as confining or semi-confining units to limit vertical groundwater flow. Supply Wells 1 through 3 are situated in the small, east-west trending valley located west of the village proper. This small valley is drained by Mud Creek which flows into Chautauqua Lake. Supply Well 4 is located on the northeastern flank of the ridge. The Mud Creek Valley has been the focus of this investigation since the PFNA contamination has impacted Supply Wells 1 through 3, which are located in the Mud Creek Valley.

The ground surface elevation drops significantly from the top of the ridge to the valleys on both sides of the ridge; approximately 120 feet on the northeastern side and 160 feet on the southwestern side. Located at the top of the ridge, the TCMB is approximately 0.35-mile to the north of Supply Well 3. The elevation difference between Supply Well 3, located near the eastern side of the Mud Creek Valley, and the TCMB is approximately 160 feet. Supply Well 3 is less than 0.5-mile to the northwest of Supply Wells 1 and 2. Supply Wells 1 and 2 are near the center of the Mud Creek Valley. The elevation difference between Supply Wells 1 & 2 and Supply Well 3 is approximately 20 feet. A topographic contour map of the Village is provided on Figure 2.

Groundwater at the former football field on the lower tier at the TCMB is drained by a system of drainage tile that discharges from a 12-inch diameter corrugated galvanized-steel pipe into the wooded area located southwest of the southern corner of the former field. Flow from the outfall has created a small drainage rill that flows to the south and enters a concrete-lined highway ditch located along the north side of Route 430 (West Chautauqua Street). The ditch transports the discharge from the former field southwestward towards Bloomer Road/Patterson Street. The surface drainage enters an underground drainage structure before reaching Bloomer Road/Patterson Street. The location of where the drainage then flows was not identified during previous site visits, but it is believed to flow southward under West Chautauqua Street toward Patterson Street. Further evaluation of the drainage flow will be conducted during future site visits.

Historic atlases from 1867 and 1881 display a former “Mill Race” that originated in the vicinity of West Chautauqua Street and Bloomer Road and extended through the Village southeastward to mills located near the intersection of Erie and Water Streets, directly on Chautauqua Lake. The mill race appears to have been located near the current location of Patterson Street and was reportedly filled sometime subsequent to 1881. The former mill race could be a potential migration pathway for surface water originating at the TCMB.

Observations gathered during the investigation revealed that the depth to bedrock and the water-bearing zones varied significantly based on well location. In the two well borings at the TCMB (MW-6 and MW-7), significant water-bearing zones were essentially absent in the overburden, with between 17 and 27 feet of fill and glacial till overlying bedrock. At Supply Well 3, the water-producing sand and gravel unit was encountered at a

depth of 53 to 71 fbgs (18-feet thick), with bedrock encountered at 71 fbgs. At test well TW-1, located approximately 300 feet east of Supply Well 3, the water-producing sand and gravel unit thinned and was encountered at a depth of 52 to 58 fbgs (6-feet thick), with bedrock encountered at 62 fbgs. At new monitoring well MW-5, located approximately 650 feet southwest of Supply Well 3, water-bearing sand and gravel units were encountered at depths of 4.5 to 14 fbgs, 30 to 37 fbgs, and 49 to 58 fbgs. The depth to shale bedrock at a private water supply well ~1/2-mile to the west-southwest of Supply Well 3 (the center of the Mud Creek Valley) was 160.5 fbgs. At Supply Wells 1 and 2, a thinner sand and gravel water-producing unit is encountered at a depth of 27 to 32 fbgs (5-feet thick). Deeper wells located less than ¼-mile to the southwest and southeast of Supply Wells 1 and 2 had depths of 130.6 fbgs (Sweatman Farm Well) and 120 fbgs (NCLSD) to shale bedrock.

Six (6) monitoring wells (MW-2 through MW-7) were installed by the NYSDEC within the Village of Mayville. Depth to groundwater in these wells ranged from artesian (MW-2 located in the area of Supply Wells 1 and 2) to 9.5 fbgs (MW-4adjacent to Supply Well 3). Due to the scale of this investigation, groundwater flow varies based on location. Groundwater elevation data is not yet available for analysis since the survey of the monitoring wells is pending. It is assumed that the general shallow groundwater flow in the Mud Creek Valley is downslope and toward Mud Creek, with eventual discharge to Chautauqua Lake. However, the water-bearing units tapped by the Supply Wells are all confined or semi-confined.

3.0 AREAS OF INVESTIGATION

The NYSDEC investigation included multiple areas throughout the Village. The following subsections discuss each area that was investigated.

3.1 Supply Wells 1 and 2 Sample Locations

Supply Well 1 is approximately 225 feet to the southeast of Supply Well 2. Both Wells are screened within the same sand and gravel zone found at depths ranging from 27 to 32 fbgs. Mud Creek is adjacent to the supply wells and flows from the northwest to southeast into Chautauqua Lake. The creek is located approximately 45 feet to the west of Supply Well 1 and 135 feet to the west of Supply Well 2. Supply Well 2 is a caisson well where surface water runoff has the potential to comingle with well water. During seasonal high groundwater episodes, the water level in this well rises above the top of the well pit floor. During the initial NYSDEC site visit on December 15, 2021, a monitoring well was discovered approximately 100 feet to the northwest of Supply Well 2 and was initially identified as “MW Near Well 2”. Throughout the report this well will be referred to as MW-1.

The NYSDEC collected one (1) sample from the sampling port at Supply Well 1. At Supply Well 2, access to groundwater within the well was also available. Two (2) samples were collected from this location: one sample was collected directly from the well before it reached the pump (collected within the well with a disposable high-density polyethylene [HDPE] bailer and cotton twine) and one sample was collected from the sampling port after the water had passed through the well pump. The purpose of these samples was to determine whether a component of the piping/pumping system could be introducing PFNA contamination to the water supply. A groundwater sample was also collected from MW-1 with a disposable HDPE bailer and cotton twine. Additionally, one (1) surface water sample was collected from Mud Creek; this sample will be discussed further in the Mud Creek Sample Locations subsection.

As part of the investigation, a monitoring well (MW-2) was installed between Supply Well 1 and Supply Well 2. MW-2 was installed to a depth of 26 feet with a 5-foot screen set from 21 to 26 fbgs. To further delineate the extent of contamination, an additional monitoring well (MW-3) was installed approximately 500 feet to the north-northeast of

Supply Well 2.. MW-3 had a total depth of 40.5 fbgs and was screened from 30.5 to 40.5 fbgs. Following installation and development of MW-2 and MW-3, samples were collected and submitted for laboratory analyses by LiRo.

The North Chautauqua Lake Sewer District (NCLSD) Water Pollution Control Plant is located at 2 Clark Street. The facility has a non-potable water supply well with a depth of 150 fbgs (bedrock encountered at 120 fbgs). Groundwater from this well is pumped from 100 fbgs and transferred to the NCLSD building. Within the NCLSD building, there are two spigots that provide a direct feed from the well outside. One (1) sample, along with one (1) matrix spike/matrix spike duplicate (MS/MSD) sample, was collected from the spigot within the facility's grit screening room.

3.2 Supply Well 3 Sample Locations

Supply Well 3 is approximately 0.4-miles northwest of Supply Well 2. During the initial NYSDEC site visit, an 8-inch diameter monitoring well was observed 265 feet to the west of Supply Well 3; the discovered monitoring well was identified as "MW Near Well 3." It was later determined that the well identified as "MW Near Well 3" was previously identified as TW-2; throughout the report this well will be referred to as TW-2. One (1) sample was collected from the sampling port at Supply Well 3 and one sample was collected from TW-2 using a dedicated and disposable HDPE bailer with cotton twine.

As part of the investigation two monitoring wells were installed in the proximity of Supply Well 3. One monitoring well (MW-4) was installed 30 feet directly to the east of Supply Well 3. MW-4 was installed to a depth of 68 fbgs with a 15-foot screen extending from 52.5 to 67.5 fbgs. MW-5 was installed approximately 0.14-mile to the southwest of Supply Well 3. The total depth of MW-5 is 66 fbgs with a screen interval of 51 to 66 fbgs. Following installation and development of both monitoring wells, samples were collected by LiRo.

3.3 Town of Chautauqua Municipal Building Sample Locations

Due to the past use of AFFF for training purposes on the former football field, the Town of Chautauqua Municipal Building (TCBM) was deemed a suspected source area. The TCMB was formally the Mayville High School Building that was acquired by the Town of

Chautauqua. The building lies on the top of the northwest-southeast trending ridge that extends through Mayville. The elevation difference between the TCMB and Supply Well 3 is approximately 160 feet. The former football field was constructed in two tiers, the upper tier was previously utilized as the primary football field and the lower field was used as a practice field. In the early 2000s, a portion of the upper tier was filled using debris from a local highway project. Currently the former football field and practice field area consists of three tiers. The upper-most tier (filled with highway debris) has the same elevation as the TCMB. Using the functions of Google Earth, it was determined that the upper tier has an approximate elevation of 1496 feet above mean sea level (amsl). This second tier, also referred to as the elevation of the former football field, has an approximate elevation of 1476 feet amsl, a 20-foot difference from the upper tier. The bottom tier, or the former practice field, has an approximate elevation of 1451 feet amsl, a 25-foot difference from the second tier and 45-feet below the upper tier.

Information from interviews with Town/Village employees indicated that the former football field and practice field has a drainage system. The drainage system was added several years ago when the field would flood due to snow melt and large storm events. The drainage water passes through a storm water basin at the bottom tier and connects to an outfall (1-foot in diameter) in the adjacent wooded area. During the January 7th sampling event conditions were favorable for snow melt. An estimated 10 gallons per minute was flowing out of the discharge pipe. Other locals have indicated that “during high rain events the amount of water coming from that outfall is quite impressive and floods onto Route 430.” Flow from the outfall has created a small drainage rill that flows to the south and enters a concrete-lined highway ditch located along the north side of Route 430 (West Chautauqua Street)..

As a suspected source area, several sample locations were selected in this area. As a part of the investigation, two (2) monitoring wells were installed within the former football/practice field areas. One (1) well (MW-6) was installed on the southeastern end of the bottom tier. MW-6 was installed to 17 fbgs at the top of bedrock. The well screen was placed between 7 and 17 fbgs. MW-7 was installed on the uppermost tier in the area where the fire training foam had been repeatedly applied. MW-7 was installed to 20 fbgs with a well screen placed between 5 and 20 fbgs. Following the installation of MW-6 and MW-7, both wells were developed and sampled by LiRo.

During the January 7, 2021 sampling event, a surface water sample along with a duplicate sample were collected from the outfall location. In addition, a sediment sample and a duplicate sediment sample were collected from a depth of 0 to 3 inches bgs from the sediments below the outfall.

Surface soil samples were also collected during the January 7th sampling event from the upper tier area where suspected AFFF was applied. A total of 4 samples were collected from a depth of 0 to 6 inches bgs. Sample locations for the TCMB are shown on Figure 3.

3.4 Mud Creek Sample Locations

Geographically, Mud Creek is at the bottom of a valley that extends through the Village of Mayville, south of the northwest-southeast trending ridge. The creek collects groundwater, stormwater runoff, and surface water from the surrounding tributaries and ultimately discharges into Chautauqua Lake. A total of three (3) sample locations were selected along Mud Creek. During the December 15, 2020 sampling event a surface water sample was collected from Mud Creek adjacent to the MDPW building. The water sample was collected from below the road culvert on Morris Street which passes over the creek, the sample was identified as “Mud Creek.” For consistency purposes, this location was sampled once again during the January 7, 2021 sampling event. During the second sampling event the sample is identified in this report as “Mud Creek – Morris St.” Of the three sample locations, the samples mentioned above were the furthest downstream, roughly 0.6-miles from the discharge point to Chautauqua Lake.

Approximately 0.7-miles upstream from the Mud Creek Morris St sample location, a sample was collected on the south side of Sherman-Mayville Road. The sample identified in this report as “Mud Creek – Sherman Mayville” was collected below the road culvert that passes over the creek.

The final surface water sample location from Mud Creek was collected along Bloomer Road. The sample was collected from a road culvert on the west side of Bloomer Road, roughly 0.8-miles upstream from the Mud Creek – Sherman Mayville sample location. The sample is identified in this report as Mud Creek – Bloomer Road. The sample locations for Mud Creek are shown on Figure 4.

Grab samples were collected in Mud Creek by direct immersion of the sample bottles beneath the water surface. No sampling equipment, other than the clean laboratory-provided sample containers, was used for the surface water sample collection.

3.5 Lakeside Park Sample Locations

Lakeside Park is located along South Erie Street adjacent to the northwest end of Chautauqua Lake. Based on accounts from local fire department personnel, fire training foam was sprayed in three (3) locations at the park. Due to the use of training foam at Lakeside Park, two (2) surface soil samples were collected from a depth of 0 to 6 inches bgs at two (2) locations within the park circle were the baseball diamond is situated, which was reportedly the location that received the greatest number of foam applications. Sample locations for Lakeside Park are displayed on Figure 5.

3.6 Supply Well 4 Sample Locations

During the December 15, 2020 NYSDEC site visit, Supply Well 4 was sampled to determine if PFAS contaminants were present. While the other three supply wells are located on the southwestern side of the Mayville bedrock ridge, Supply Well 4 is located on the northeastern side of the ridge. Supply Well 4 is approximately 1-mile from the nearest other supply well, Supply Well 3. Alongside Supply Well 4 was a monitoring well, initially identified as “MW Near Well 4.” It was later determined that the well identified as “MW Near Well 4” was previously identified as OW-2; throughout the report this well will be referred to as OW-2. Supply Well 4 and OW-2 were both sampled during the initial site visit. The sample from Supply Well 4 was collected from a temporary sampling port installed on the discharge pipe after the well pump and the sample from OW-2 was collected using a dedicated and disposable HDPE bailer with cotton twine.

4.0 FIELD ACTIVITIES

To meet the objectives of the Mayville Investigation discussed in Section 1.0, the following activities were completed in the Village of Mayville: (1) collection of groundwater samples from the public water supply for chemical analysis; (2) collection of additional groundwater samples from existing monitoring wells throughout the village or chemical analysis; (3) collection of groundwater samples from private wells samples throughout the Village; (4) collection of surface water samples from Mud Creek and other potential source areas for chemical analysis; (5) the collection surface soil samples for chemical analysis; (6) the installation of six monitoring wells throughout the village and the collection of groundwater samples from each of the six wells for chemical analysis; and (7) the surveying of sample locations and elevations. As of February 1, 2021, the survey has not been conducted. The NYSDEC will conduct the survey as weather conditions become more favorable. Specific details of the work completed during the Mayville Investigation are described in the following subsections.

4.1 Monitoring Well Installation

During the Mayville Investigation, six (6) new monitoring wells were installed by SJB between December 18, 2020 and January 7, 2021 using a track-mounted Dietrich D-50 rotary drilling rig. In general, continuous 2-inch split spoon soil sampling was performed in advance of the 4.25-inch inner diameter hollow stem augers to characterize the local geology and groundwater bearing zones. However, soil sampling intervals were less rigorous at monitoring wells being installed adjacent to existing wells with boring logs. Soils were screened and characterized by a LiRo geologist. A photoionization detector (PID) was used to screen the recovered soil samples for volatile organics.

The screened intervals for monitoring wells MW-2 and MW-3 were selected to monitor the same confined water-bearing zone as Supply Wells 1 and 2 and the screened intervals for monitoring wells MW-4 and MW-5 were selected to monitor the same confined water-bearing zone as Supply Well 3. The monitoring wells at the TCMB (MW-6 and MW-7), where bedrock was encountered at shallower depths, were installed to monitor the water table aquifer in a suspected source area. Four (4) of the six wells were installed with flush-mount protective casings (i.e., road boxes) and the remaining two (2) wells were installed

with stick-up protective casings and bollards. Drilling equipment was placed on pallets and decontaminated upon arriving on site, and between drilling locations, with a high-pressure steam cleaner onto the ground in the vicinity of each well boring location.

4.2 Monitoring Well Development

Following installation, the monitoring wells were developed to remove soil particles from the groundwater, well annulus, and well screen, and to facilitate hydraulic communication between the formation and the well screen. The wells were developed by LiRo on December 30 and 31, 2020 and January 4, 6, and 8, 2021. The bulk of the well development was completed using a Waterra Hydrolift Pump, which simultaneously surges the well screen while removing water and sediment from the well, and dedicated and disposable HDPE tubing and Delrin foot valves. The initial development of well MW-3 was performed with a dedicated, disposable HDPE bailer. During the bailer development, a small dab of grease was noted on the bailer upon retrieval from MW-3. It is suspected that the grease is a result of the well installation activities.

During development, the purged water was monitored for pH, temperature, conductivity, dissolved oxygen, oxidation reduction potential (ORP), and turbidity using a YSI Pro DSS multi-parameter meter with a flow through cell. While the field parameters stabilized, turbidities did not get below 50 Nephelometric Turbidity Units (NTUs). The development water was discharged directly to the ground surface near each well in accordance with Department guidance for water table wells.

4.3 Groundwater Sampling and Analysis

During the December 15, 2020 and the January 7, 2021 NYSDEC sample events, a total of eight (8) groundwater samples were collected. Clean, dedicated, and disposable HDPE bailers along with cotton string were utilized to collect the groundwater samples. To confirm the absence of ECs on the sampling equipment, an equipment rinse blank (Sample ID: Bailer Blank) was performed on the sampling materials used.

Groundwater samples were also collected from each of the newly installed monitoring wells. The six (6) monitoring wells were purged and sampled by LiRo on January 12, 2021 using low-flow sampling techniques with a peristaltic pump and dedicated and

disposable HDPE and silicone tubing. A sampling equipment rinse blank (Sample ID: RB-01) was also performed on the equipment used for this method of sample collection. Prior to sampling, the wells were purged until field parameters stabilized (i.e., pH, temperature, conductivity, dissolved oxygen, and ORP). While the field parameters generally stabilized, turbidities below 50 NTUs could not always be achieved. The purge water was discharged directly to the ground surface near each well.

A sample of the water (Sample ID: Drilling Water) used by the drillers for decontaminating (i.e., steam cleaning) the drilling equipment and to install the monitoring wells was also collected for PFAS analysis on January 4, 2021. This water was municipal tap water originating from SJB's maintenance shop in Hamburg, NY. Because the Drilling Water had been treated with chlorine at the Erie County Water Authority facility, sample bottles with the preservative trizma were required. Low concentrations of PFAS compounds was detected within the Drilling Water sample.

The table below presents a breakdown of the chemical analyses performed by Eurofins TestAmerica for each of the groundwater samples. Where noted below, certain groundwater samples were only analyzed for PFAS compounds, while others were analyzed for the full Superfund Target Compound List (TCL).

Groundwater Samples			
Sample ID	**Sample Date**	**Sample Time**	**Analysis Performed**
Well 1	12/15/2020	12:22	PFAS - method 537.1 DW
Well 2A	12/15/2020	11:17	PFAS - method 537.1 DW
Well 2B	12/15/2020	11:45	PFAS - method 537.1 DW
MW-1	12/15/2020	12:05	PFAS - method 537.1 DW
MW-2	1/12/2021	9:15	PFAS - method 537 modified
MW-3	1/12/2021	9:55	PFAS - method 537 modified
NCLSD	1/7/2021	14:40	Target Compound List*PFAS - method 537 modified 1,4-Dioxane - method 8270 SIM
Well 3	12/15/2020	13:30	PFAS - method 537.1 DW
Well 3 DUP	12/15/2020	13:30	PFAS - method 537.1 DW
TW-2	12/15/2020	13:40	PFAS - method 537.1 DW
MW-4	1/12/2021	10:55	PFAS - method 537 modified

Groundwater Samples			
Sample ID	**Sample Date**	**Sample Time**	**Analysis Performed**
MW-5	1/12/2021	12:00	Target Compound List* PFAS - method 537 modified 1,4-Dioxane - method 8270 SIM
MW-5 DUP	1/12/2021	12:00	Target Compound List* PFAS - method 537 modified 1,4-Dioxane - method 8270 SIM
MW-6	1/12/2021	13:40	Target Compound List* PFAS - method 537 modified 1,4-Dioxane - method 8270 SIM
MW-6 DUP	1/12/2021	13:40	PFAS - method 537 modified
MW-7	1/12/2021	14:50	Target Compound List* PFAS - method 537 modified 1,4-Dioxane - method 8270 SIM
Well 4	12/15/2020	15:00	PFAS - method 537.1 DW
OW-2	12/15/2020	15:10	PFAS - method 537.1 DW
RB-01**	1/12/2021	15:30	Target Compound List* PFAS - method 537 modified 1,4-Dioxane - method 8270 SIM
Bailer Blank ***	12/15/2020	15:25	PFAS - method 537.1 DW
Drilling Water****	1/4/2021	11:30	PFAS - method 537.1 DW

*** Target Compound List includes:** VOCs - method 8260C, SVOCS - method 8270D, Pesticides - method 8081B, PCBs - method 8082A, Herbicides - method 8151A, Metals - method 6010C, Mercury - method 7470A, Cyanide - method 9012B
**RB-01 – An equipment rinse blank was performed on the low flow sampling equipment. Low Flow equipment was used by LiRo during the 1/12/21 sampling event.
***Bailer Blank – An equipment rinse blank performed on the bailers used during the DEC sampling event on 12/15/20.
****Driling Water – A sample of the water used to decontaminate drilling equipment and for well construction.

The analytical results for these samples are summarized in Section 5.0 of this report.

4.4 Surface Water Sampling and Analysis

Surface water samples were collected from three (3) locations along Mud Creek and at the outfall of the TCMB. Grab samples were collected in Mud Creek by direct immersion of the sample bottles beneath the water surface. At the TCMB outfall, grab samples were collected directly into the sample bottles from the outfall discharge before the water met the

ground surface. No sampling equipment, other than the clean laboratory-provided sample containers, was used for the surface water sample collection.

The table below presents a breakdown of the chemical analysis performed by Eurofins TestAmerica for each of the surface water samples.

Surface Water Samples				
Sample Location	**Sample ID**	**Sample Date**	**Sample Time**	**Analysis Performed**
Mud Creek (Morris St)	Mud Creek	12/15/2020	10:46	PFAS - method 537.1 DW
Mud Creek (Morris St)	Mud Creek - Morris St	1/7/2021	14:00	Target Compound List* PFAS - method 537 modified 1,4-Dioxane - method 8270 SIM
Mud Creek (Sherman-Mayville Rd)	Mud Creek - Mayville Sherman	1/7/2021	12:50	Target Compound List* PFAS - method 537 modified 1,4-Dioxane - method 8270 SIM
Mud Creek (Bloomer Rd)	Mud Creek - Bloomer Rd	1/7/2021	12:30	Target Compound List* PFAS - method 537 modified 1,4-Dioxane - method 8270 SIM
Town of Chautauqua Municipal Building (Outfall)	Outfall SW-1	1/7/2021	11:30	Target Compound List* PFAS - method 537 modified 1,4-Dioxane - method 8270 SIM
Town of Chautauqua Municipal Building (Outfall)	DUP - Outfall	1/7/2021	11:30	Target Compound Llist* PFAS - method 537 modified 1,4-Dioxane - method 8270 SIM

*** Target Compound List includes:** VOCs - method 8260C, SVOCS - method 8270D, Pesticides - method 8081B, PCBs - method 8082A, Herbicides - method 8151A, Metals - method 6010C, Mercury - method 7470A, Cyanide - method 9012B

The analytical results for these samples are summarized in Section 5.0 of this report.

4.5 Surface Soil/Sediment Sampling and Analysis

Surface soil samples were collected using a stainless-steel trowel, spoon, and a mixing bowl. Prior to soil sample collection, a rinse blank was performed on all the sample equipment using PFAS free deionized water. The sampling equipment was decontaminated before sampling, and between sample locations, with tap water and Liquinox detergent, followed by subsequent tap water and PFAS free deionized water rinses.

The following process was used for the collection of the surface soil samples. The

top layer of grass was removed first, and the trowel was advanced 6 inches into the ground surface. Sample aliquots for volatile organic compound analyses were placed directly into the sample containers. Sample aliquots for the remaining analyses were placed into the stainless-steel bowl and mixed using a metal spoon. Any water that accumulated within the bowl was drained out. Once an adequate volume of soil had been collected and properly mixed, the sample was placed into the sample jars.

The sediment sample was collected in a similar fashion. The sample was collected from till that had been washed by drainage from the outfall. The depth of collection for the sediment sample was 0 to 3 inches. Best attempts were made to drain excess water prior to containerizing the samples.

The table below presents a breakdown of the chemical analysis performed by Eurofins TestAmerica for each of the surface soil and sediment samples.

Surface Soil & Sediment Samples				
Sample Location	**Sample ID**	**Sample Date**	**Sample Time**	**Analysis Performed**
Town of Chautauqua Municipal Building (Former Football Field)	SS-1	1/7/2021	10:30	Target Compound List* PFAS - method 537 modified
Town of Chautauqua Municipal Building (Former Football Field)	SS-2	1/7/2021	10:40	Target Compound List* PFAS - method 537 modified
Town of Chautauqua Municipal Building (Former Football Field)	SS-3	1/7/2021	10:10	Target Compound List* PFAS - method 537 modified
Town of Chautauqua Municipal Building (Former Football Field)	SS-4	1/7/2021	10:00	Target Compound List* PFAS - method 537 modified
Town of Chautauqua Municipal Building (Outfall)	Outfall Sed-1	1/7/2021	11:40	Target Compound List* PFAS - method 537 modified
Town of Chautauqua Municipal Building (Outfall)	Outfall Sed-1 DUP	1/7/2021	11:40	Target Compound List* PFAS - method 537 modified
Lakeside Park	Lakeside-1	1/7/2021	15:25	PFAS - method 537 modified
Lakeside Park	Lakeside-1	1/7/2021	15:30	PFAS - method 537 modified
Water Sample - Rinse Blank performed on Surface Soil Sampling Equipment	Rinse Blank	1/7/2021	9:30	Target Compound List* PFAS - method 537 modified

Surface Soil & Sediment Samples				
Sample Location	**Sample ID**	**Sample Date**	**Sample Time**	**Analysis Performed**

*** Target Compound List includes:** VOCs - method 8260C, SVOCS - method 8270D, Pesticides - method 8081B, PCBs - method 8082A, Herbicides - method 8151A, Metals - method 6010C, Mercury - method 7470A, Cyanide - method 9012B

The analytical results for these samples are summarized in Section 5.0 of this report.

5.0 INVESTIGATION RESULTS

A description of the activities completed during the Mayville Investigation is presented in Section 4.0. In this section, a detailed evaluation of the observations made during the investigation and the analytical results obtained from the samples are presented. Analytical results are summarized by the location of the samples. The investigation samples are divided into 6 locations (e.g., area of Supply Wells 1 and 2, area of Supply Well 3,Town of Chautauqua Municipal Building, Mud Creek, Lakeside Park, and area of Supply Well 4).

Groundwater analytical results for PFAS compounds were evaluated against the New York State Department of Health (NYSDOH) maximum contaminant levels for PFOS and PFOA (both 10 ppt), 10 NYCRR Part 5: Drinking Water Supplies, which are the current guidance values used by NYSDEC for groundwater investigations. All other PFAS compounds were compared to NYSDEC screening values outlined in the January 2021 edition of the NYSDEC's *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substance (PFAS)* guidance document. Compounds analyzed under the Target Compound List (TCL) were evaluated against the water quality standards and guidance values contained in the June 1998 NYSDEC publication entitled *Technical and Operational Guidance Series (TOGS) 1.1.1: Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limitations* and its addenda.

For this report, analytical results for surface soil were compared to the PFOS and PFOA residential and protection of groundwater soil cleanup values outlined in January 2021 edition of the NYSDEC's *Sampling, Analysis, and Assessment of Per- and Polyfluoroalkyl Substance (PFAS)* guidance document. All other compounds were evaluated against the soil cleanup objectives (SCOs) of Tables 375-6.8(a) and 375-6.8(b) contained in the December 2006 NYSDEC publication entitled *6NYCRR Part 375: Environmental Remediation Programs*. Due to the nature of the sediment sample that was collected, the sample was compared to the soil SCOs detailed above.

5.1 Supply Well 1 and Supply Well 2 Sample Locations

EC samples collected by the CCDOH contained a PFNA concentration of 75 ppt in Supply Well 1. A concentration of 130 ppt was detected at Supply Well 2. Following these

results, the NYSDEC mobilized to further evaluate and assess the groundwater in the vicinity of these Supply Wells.

NYSDEC resampled Supply Well 1 and Supply Well 2 on December 15, 2020. One (1) sample was collected from Supply Well 1 and two (2) samples were collected from Supply Well 2, one from the well itself and one from a sampling port in the pumping/piping system. Additionally, a monitoring well referred to as MW-1 was sampled. NYSDEC sampled the NCLSD water supply well on January 7, 2021. In the area surrounding Supply Wells 1 and 2, two new monitoring wells were installed (MW-1 and MW-2). Both of these newly installed NYSDEC monitoring wells were sampled by LiRo on January 12, 2021.

The supply wells and MW-1 were analyzed for PFAS compounds via method 537.1, drinking water. MW-2 and MW-3 were analyzed for PFAS compounds via method 537 modified, the standard analytical method for environmental investigations in New York State. The well at the NCLSD was non-detect for all PFAS compounds. The following PFAS contaminants were detected in the groundwater samples surrounding the area of Supply Wells 1 and 2:

- PFNA concentrations ranged from 140 to 290 ppt, detected in 4 of the 6 samples;
- perfluorobutanesulfonic acid (PFBS) concentrations ranged from 0.7 to 1 ppt, detected in all of the samples;
- perfluorobutanoic acid (PFBA) concentrations ranged from 2.5 to 4 ppt, detected in MW-2 and MW-3;
- perfluoroheptanoic acid (PFHpA) concentrations ranged from 1.2 to 3.2 ppt, detected in 4 of the 6 samples;
- perfluorohexanesulfonic acid (PFHxS) concentrations ranged from 0.48 to 0.66 ppt, detected in 5 of the 6 samples;
- perfluorohexanoic acid (PFHxA) concentrations ranged from 1.4 to 4.5 ppt, detected in 4 of the 6 samples;
- PFOS was detected only in MW-1 at a concentration of 0.78 ppt;
- PFOA concentrations ranged from 0.76 to 8.8 ppt, detected in 5 of the 6 samples; and
- perfluoropentanoic acid (PFPeA) was detected only in MW-3 at a concentration of 7.8 ppt.

The maximum contaminant level for PFOA and PFOS in drinking water is 10 ppt. Currently, there are no standards for the remaining PFAS compounds, but a screening level of 100 ppt has been established by the NYSDEC for the remaining PFAS compounds. The analytical results are presented on Table 1, Groundwater Results (Per- and Polyfluoroalkyl Substance). These results confirmed the previous CCDOH findings, primarily that the

impact to groundwater is primarily from PFNA, and neither PFOA or PFOS exceeds the MCL for drinking water. Because similar results were obtained from the well and piping system in Supply Well 2, the piping/pumping system was eliminated as a source of contamination.

5.2 Supply Well 3 Sample Locations

EC samples collected by the CCDOH contained a PFNA concentration of 330 ppt in Supply Well 3. NYSDEC resampled Supply Well 3 and nearby well TW-2 on December 15, 2020. Supply Well 3 and TW-2 were analyzed for PFAS compounds via method 537.1, drinking water. A duplicate sample was also collected from Supply Well 3.

In the area surrounding Supply Well 3, two new monitoring wells were installed (MW-4 and MW-5). On January 12, 2021 both wells were sampled by LiRo. The sample from MW-5 was submitted for Target Compound List (TCL) analyses plus PFAS compounds and 1,4-dioxane. The following PFAS contaminants were detected in the groundwater:

- PFNA concentrations of 370 ppt and 390 ppt were detected in Supply Well 3. A concentration of only 16 ppt was detected in adjacent well MW-4;
- PFBS concentrations of 0.053 ppt were detected in Supply Well 3 and MW-4;
- PFBA was detected in MW-4 at a concentration of 4.5 ppt;
- PFHpA was detected at concentrations of 2.3 ppt and 2.4 ppt in Supply Well 3 and 0.84 ppt in MW-4;
- PFHxA was detected at concentrations of 2.7 ppt in Supply Well 3 and 0.84 ppt in MW-4;
- PFOS was detected at a concentration of 0.51 ppt in TW-2;
- PFPeA was detected at a concentration of 1.2 ppt detected in MW-4; and
- PFOA was detected at concentrations of 5.6 ppt and 6.1 ppt in Supply Well 3 and 1.9 ppt in MW-4.

The maximum contaminant level for PFOA and PFOS is 10 ppt. Currently there are no standards for the remaining PFAS compounds, but a screening level of 100 ppt has been established by the NYSDEC for remaining PFAS compounds. These results confirmed the previous CCDOH findings, primarily that the impact to groundwater is primarily from PFNA, and neither PFOA or PFOS exceeds the MCL for drinking water. The analytical results are presented on Table 1, Groundwater Results (Per- and Polyfluoroalkyl Substance).

As described above, MW-5 was analyzed for the TCL. Analytical results indicated

that acetone was the only contaminant detected above NYS Groundwater Quality Standards (GWQS). Acetone was detected at 150 ppb; the GWQS is 50 ppb. Results are presented on Table 2, Groundwater Results (TCL).

5.6 Town of Chautauqua Municipal Building Results

5.6.1 Town of Chautauqua Municipal Building Surface Soil Results

To investigate the former football field where the firefighting foam had been applied, NYSDEC collected four (4) surface soil samples (SS-1, SS-2, SS-3, and SS-4). The surface soil samples were collected from the upper tier of the football field, surrounding well MW-7. One (1) sediment sample (Outfall Sed-1), along with a duplicate sample (Outfall Sed-1 DUP), was collected from the drainage outfall below the bottom tier of the field. The depth of the soil sample collection was 0 to 6 inches and the depth of the sediment sample collection was 0 to 3 inches. These samples were submitted to the lab for analysis of the TCL plus PFAS compounds and 1,4-dioxane. The following PFAS contaminants were detected in the surface soil and sediment samples:

- PFNA concentrations ranging from 4.8 to 680 ppb, detected in all 6 samples;
- Perfluorotridecanoic acid (PFTriA) concentrations ranged from 18 to 2,500 ppb, detected in all 6 samples;
- Perfluoroundecanoic acid (PFUnA)concentrations ranged from 35 to 1,700 ppb, detected in all 6 samples;
- 8:2 Fluorotelomer sulfonic acid (8:2 FTS) concentrations ranged from 4.5 to 130 ppb, detected in 3 of the 6 samples;
- 6:2 Fluorotelomer sulfonic acid (6:2 FTS) concentrations ranged from 2.2 to 4.9 ppb, detected in 3 of the 6 samples;
- PFBA concentrations ranging from 0.11 to 0.81 ppb, detected in all 6 samples;
- Perfluorodecanoic acid (PFDA) concentrations ranged from 0.26 to 30 ppb, detected in all 6 samples;
- Perfluorododecanoic acid (PFDoA) concentrations ranged from 1 to 43 ppb, detected in all 6 samples;
- PFHpA concentrations ranged from 0.044 to 1.7 ppb, detected in 5 of the 6 samples;
- Perfluorohexanesulfonic acid (PFHxS) was detected at a concentration of 0.054 ppb in SS-1;
- PFHxA concentrations ranged from 0.36 to 1.9 ppb, detected in 4 of the 6 samples;
- PFOS concentrations ranged from 0.29 to 0.43 ppb, detected in 3 of the 6 samples;
- PFOA concentrations ranged from 0.35 to 6.2 ppb, detected in 4 of the 6 samples;
- PFPeA concentrations ranged from 0.1 to 1.8 ppb, detected in 4 of the 6 samples; and
- Perfluorotetradecanoic acid (PFTeA) concentrations ranged from 0.085 to 13 ppb,

detected in all 6 samples.

PFOA and PFOS are the only PFAS contaminants with NYSDEC soil guidance values. The residential soil guidance values for PFOA or PFOS are 6.6 ppb and 8.8 ppb, respectively, which were not exceeded by the TCMB sample results. However, the groundwater protection guidance value of 1.1 ppb for PFOA was exceeded in 2 of the surface soil samples from the TCMB field.

A breakdown of the PFAS components present in the most contaminated TCMB field soil sample (SS-4) indicate that the contaminants remaining in the soil are comprised primarily of 54% PFTriA (C-13), 42% PFUnA (C-11) and 1.7% PFNA (C-9). No sulfonate compounds, such as PFOS, were found in this sample. Although some of the PFAS compounds initially present may have dissolved out of the soil and migrated from this area during precipitation events, this pattern of PFAS detections may be useful in determining the specific foam(s) that have contaminated the Mayville water supply.

PFAS surface soil results are presented on Table 3, Surface Soil Results (Per- and Polyfluoroalkyl Substances).

Surface soil samples collected at the TCMB were also analyzed for the TCL. Compounds were evaluated against the NYSDEC Part 375 Soil Cleanup Objectives (SCOs). SVOCs (semi-volatile organic compounds), particularly polycyclic aromatic hydrocarbon compounds (PAHs), were detected at concentrations above industrial SCOs. Asphaltic road millings were present in the fill encountered in the upper tier at the TCMB. Pesticides including 4,4'-DDT and Lindane were detected above residential SCOs. No volatile organic compounds (VOCs), herbicides, and polychlorinated biphenyls (PCBs) were detected. These results are presented on Table 2, Surface Soils Results (TCL).

Four surface soil samples (0 – 6 inches) were collected in the area of the former football field, where firefighting foam containing PFAS was used during training exercises. The football field samples showed elevated levels of polycyclic aromatic hydrocarbons (PAHs) and certain PFAS (including PFNA and the 11- and 13-carbon perfluorinated organic acids). Since PAHs are products of incomplete combustion, and PFAS compounds are a known component of firefighting foams, the elevated levels are consistent with the previous use of the property. Two additional surface soil samples collected from Lakeside Park did not show PFAS at levels of public health concern.

Based on these sampling results, the levels of PAHs and PFAS in the soil at the former football field do not pose an immediate health hazard because of the infrequent use of the area and the low potential for repeated, long term contact with the soil. The potential for exposure to the soil can be further reduced by limiting access to the area, maintaining a grass cover, avoiding unnecessary digging, and washing hands after soil contact.

5.6.2 Town of Chautauqua Municipal Building Surface Water Results

To further investigate the water draining from the former field, a surface water sample (Outfall SW-1) along with a duplicate surface water sample (DUP – Outfall) were collected from the outfall location. Both samples were submitted to the lab for analysis of the TCL plus PFAS compounds and 1,4-dioxane. The following PFAS contaminants were detected in the surface soil and sediment samples at the outfall sample location:

- PFNA was detected at concentrations of 4,900 to 6,300 ppt;
- PFTriA was detected at concentrations of 33 to 36 ppt;
- PFUnA was detected at concentrations of 1,500 to 2,000 ppt;
- 8:2 FTS was detected at concentrations of 18 to 26 ppt;
- 6:2 FTS was detected at concentrations of 22 to 23 ppt;
- PFBS was detected at concentrations of 0.59 to 0.63 ppt;
- PFBA was detected at concentrations of 39 to 40 ppt;
- PFDA was detected at concentrations of 94 to 130 ppt;
- PFDoA was detected at concentrations of 7.4 to 12 ppt;
- PFHpA was detected at concentrations of 68 to 69 ppt;
- PFHxS was detected at a concentration of 2 ppt;
- PFHxA was detected at concentrations of 84 to 85 ppt;
- PFOS was detected at concentrations of 3.5 to 4.7 ppt;
- PFOA was detected at concentrations of 63 to 74 ppt; and
- PFPeA was detected at a concentration of 150 ppt.

PFAS surface water results are presented on Table 5, Surface Water Results (Per- and Polyfluoroalkyl Substances). There are currently no surface water standards or guidance values for PFAS compounds. However, because the discharge from the former football field is groundwater collected by the drainage tile system, comparison to the 10 ppt maximum contaminant levels for PFOA and PFOS is appropriate. The detected PFOA concentrations (63 and 74 ppt) exceed the 10 ppt maximum contaminant level and PFNA, PFUnA, PFDA, and PFPeA detections exceed the 100 ppt screening level.

The surface water sample collected at the TCMB was also analyzed for the TCL.

Compounds were evaluated against the NYSDEC surface water quality standards (SWQS). No exceedances were detected, results are presented on Table 6, Surface Water Results (TCL).

5.6.2 Town of Chautauqua Municipal Building Groundwater Results

The investigation into the TCMB and the former football field required the installation of two (2) monitoring wells, MW-6 and MW-7. On January 12, 2021 both wells were sampled by LiRo and were analyzed for the TCL plus PFAS compounds and 1,4-dioxane. A duplicate sample was collected from MW-6. The following PFAS contaminants were detected in the groundwater:

- PFNA concentrations of 6.3 and 6.5 ppt were detected at MW-6 and 110,000 ppt PFNA was detected at MW-7;
- 6:2 FTS concentration of 620 ppt detected at MW-7;
- PFBA concentration of 380 ppt detected at MW-7;
- PFDA concentration of 450 ppt detected at MW-7;
- PFHpA concentrations of 0.26 and 0.3 ppt were detected at MW-6. 2,100 ppt was detected at MW-7;
- PFHxA concentration of 1,900 ppt detected at MW-7;
- PFOA concentrations of 0.73 and 0.90 ppt were detected at MW-6. 3,000 ppt was detected at MW-7;
- PFPeA concentrations of 0.51 and 0.53 ppt were detected at MW-6. 2,600 ppt was detected at MW-7; and
- PFUnA concentration of 5,100 ppt detected at MW-7.

The maximum contaminant level for PFOA and PFOS is 10 ppt. Currently there are no standards for the remaining PFAS compounds, a screening level of 100 ppt has been provided for the remaining PFAS compounds. These results indicate that the TCMB field is a primary source of contamination to the former supply wells.

A breakdown of the PFAS components present in the most contaminated TCMB field groundwater sample (MW-7) indicate that the contaminants present in groundwater are comprised primarily of 86% PFNA (C-9), 4% PFUnA (C-11), 2.3% PFOA (C-8), 2% PFPeA (C-5), 1.6% PFHpA (C-7), 1.4% PFHxA (C-6) and 1.4% 6:2 FTS (a fluorotelemeric sulfonate). No other sulfonate compounds, such as PFOS, were found in this sample. This chemical signature is substantially different than the soil sample from this area (SS-4) discussed above. These results suggest that the more soluble compounds (primarily C-9

and lower) from the released foam(s) have largely dissolved out of the soil matrix and migrated into groundwater, leaving the less soluble C-11 and C-13 compounds in the soil. As a result, any attempt to attribute the Mayville contamination to a particular foam or foams must consider the soil and groundwater signatures together.

The analytical results are presented on Table 1, Groundwater Results (Per- and Polyfluoroalkyl Substance).

Samples from MW-6 and MW-7 were also analyzed for the TCL. Analytical results indicated that no contaminants were detected above NYS Groundwater Quality Standards (GWQS). Results are presented on Table 2, Groundwater Results (TCL).

5.7 Mud Creek Results

Surface water samples from Mud Creek were collected during both NYSDEC sampling events. The sample identified as "Mud Creek" was collected on December 15, 2020 from below the culvert along Morris Street. This sample was analyzed for PFAS compounds only.

During the second NYSDEC sampling event, three (3) samples were collected from Mud Creek, including the location sampled during the first sampling event. The samples were identified based upon the roadway they were collected near (Mud Creek – Morris Rd, Mud Creek – Sherman Mayville, and Mud Creek – Bloomer Rd). The samples were analyzed for the TCL plus PFAS compounds and 1,4-dioxane. The PFAS results of all four (4) surface water samples are detailed below:

PFAS Compounds

- PFNA concentrations ranged from 0.28 to 2.6 ppt in 3 of the 4 samples;
- PFBS concentrations ranged from 0.25 to 1.5 ppt and were detected in all the samples;
- PFHpA concentrations ranged from 0.27 to 0.77 ppt in 3 of the 4 samples;
- PFHxS concentrations ranged from 0.6 to 2.3 ppt in 3 of the 4 samples;
- PFHxA concentration of 1.9 ppt was detected in 2 of the 4 samples;
- PFOS concentrations ranged from 1.2 to 1.6 ppt in 2 of the 4 samples;
- PFPeA concentrations ranged from 0.45 to 2.7 ppt in 2 of the 4 samples; and
- PFUnA concentration of 0.76 ppt was detected in 1 of the 4 samples.

The maximum contaminant level for PFOA and PFOS is 10 ppt. Currently there are

no standards for the remaining PFAS compounds, a screening level of 100 ppt has been provided for the remaining PFAS compounds. These results indicate that Mud Creek is not a significant source of contamination to the former supply wells. The analytical results are presented on Table 5, Surface Water Results (Per- and Polyfluoroalkyl Substance).

All three samples collected during the second NYSDEC sampling event were also analyzed for the TCL. 4.4'-DDT and aldrin were above the NYS Class C SWQS. Results are presented on Table 6, Surface Water Results (TCL).

5.8 Lakeside Park Results

Due to the use of AFFF at the Lakeside Park, two (2) surface soil samples were collected. The samples, identified as Lakeside-1 and Lakeside-2, were analyzed for PFAS compounds via method 537 modified. The following PFAS contaminants were detected in the surface soil at Lakeside Park:

PFAS Compounds

- PFNA concentrations were 0.69 ppb (Lakeside-1) and 12 ppb (Lakeside-2);
- 6:2 FTS concentration of 5.3 ppb (Lakeside-2);
- 8:2 FTS concentration of 7.6 ppb (Lakeside-2);
- PFBA concentrations were 1.4 ppb (Lakeside-1) and 3 ppb (Lakeside-2);
- PFDA concentrations were 0.29 ppb (Lakeside-1) and 8.5 ppb (Lakeside-2);
- PFDoA concentrations were 0.15 ppb (Lakeside-1) and 1.2 ppb (Lakeside-2);
- PFHpA concentrations were 0.43 ppb (Lakeside-1) and 11 ppb (Lakeside-2);
- PFHxA concentrations were 1 ppb (Lakeside-1) and 12 ppb (Lakeside-2);
- PFOS concentrations were 1.2 ppb (Lakeside-1) and 1.1 ppb (Lakeside-2);
- PFOA concentrations were 0.69 ppb (Lakeside-1) and 12 ppb (Lakeside-2);
- PFPeA concentrations were 4.2 ppb (Lakeside-1) and 22 ppb (Lakeside-2);
- PFTeA concentration of 0.31 ppb (Lakeside-2);
- PFTriA concentrations were 0.45 ppb (Lakeside-1) and 0.97 ppb (Lakeside-2);
- PFUnA concentrations were 0.69 ppb (Lakeside-1) and 5.7 ppb (Lakeside-2);

PFOA and PFOS are the only PFAS contaminants with NYSDEC soil guidance values. Lakeside-2 was the only sample to display an exceedance, with a PFOA concentration of 12 ppb, compared to the current residential guidance value of 6.6 ppb and the protection of groundwater value of 1.1 ppb. Although these levels may contribute to local groundwater contamination in the Lakeside Park area, the park's location downgradient of the supply wells and pattern of highest PFNA levels farthest from the park

(Supply Well 3), suggest this is not a significant source to the supply wells. However additional investigation would be necessary to confirm this conclusion if Supply Wells 1, 2, or 3 were to be reactivated. PFAS surface soil results are presented on Table 3, Surface Soil Results (Per- and Polyfluoroalkyl Substances).

5.9 Supply Well 4 Results

As part of the initial NYSDEC investigation, the newly installed Supply Well 4 was sampled to determine if PFAS contaminants were present. Along with Supply Well 4, a monitoring well located a few feet away, identified as OW-2, was also sampled. Supply Well 4 and OW-2 were analyzed for PFAS compounds via method 537.1, drinking water. Both wells were non-detect for all PFAS compounds.

5.10 Private Well Results

As elevated levels of PFNA were detected in three of the four Village of Mayville public water supply wells, NYSDOH, in consultation with the Chautauqua County Department of Health and Village of Mayville officials, recommended that 30 nearby private wells be evaluated to determine if they contained similar contamination. A coordinated effort between NYSDEC, NYSDOH, Chautauqua County Department of Health, and Village of Mayville officials resulted in the sampling of 25 private wells in December 2020 with agreement from the property owners. Five properties either did not respond or declined the offer for private well sampling. The samples were analyzed for six of the most common PFAS compounds including PFNA, PFOS and PFOA. One additional well was identified and sampling of this well will be conducted soon. Results from the December 2020 sampling event indicated that none of the private wells sampled contained PFNA contamination or any of the other five compounds analyzed.

6.0 DISCUSSION AND RECOMMENDATIONS

6.1 Discussion

The results of this investigation confirm the presence of PFNA in groundwater, surface water, and soil at several locations in the Village. Samples collected from the wells installed by the NYSDEC and surface water samples collected by the NYSDEC demonstrate that the contaminant is present in the area of Supply Wells 1 and 2, the area of Supply Well 3, and the TCMB. The most significant concentrations of PFNA and other PFAS compounds were found at the former football field of the TCMB. The PFAS detections in soil, groundwater, and surface water samples at this location suggest that this is the most likely source area.

Further investigation is recommended to gain a more complete understanding of the source area(s) and its impact upon groundwater and the supply well system. The installation of supplemental monitoring wells will provide of a better understanding of the local geology, groundwater flow and migration pathways, and the extent of contamination. Collection of groundwater samples prior to and post pumping at Supply Wells 1, 2, and 3 would also aid in determining migration pathways. Additionally, soil contamination in potential source areas should be more fully delineated if any removal action is contemplated.

7.0 REFERENCES

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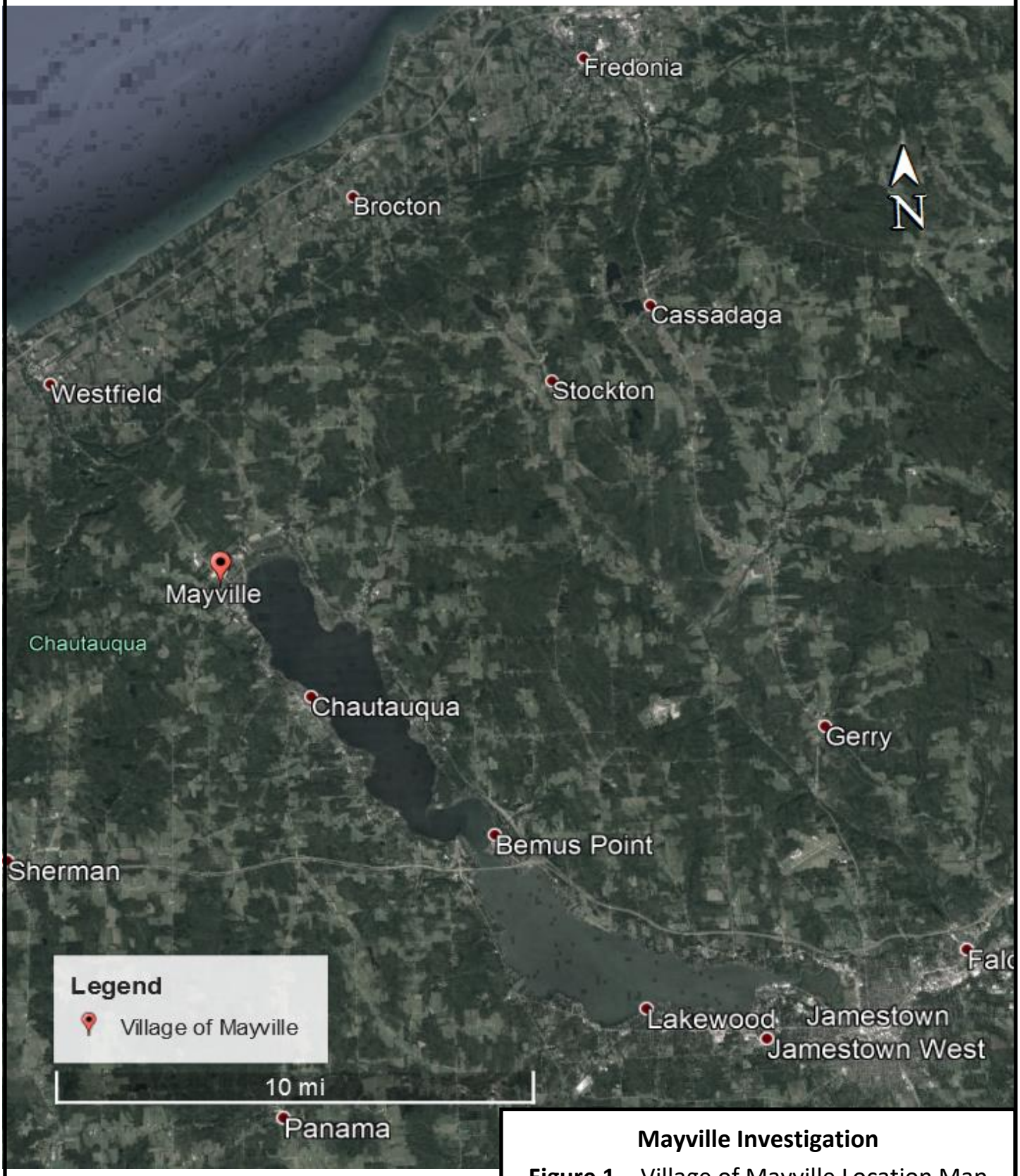
FIGURES



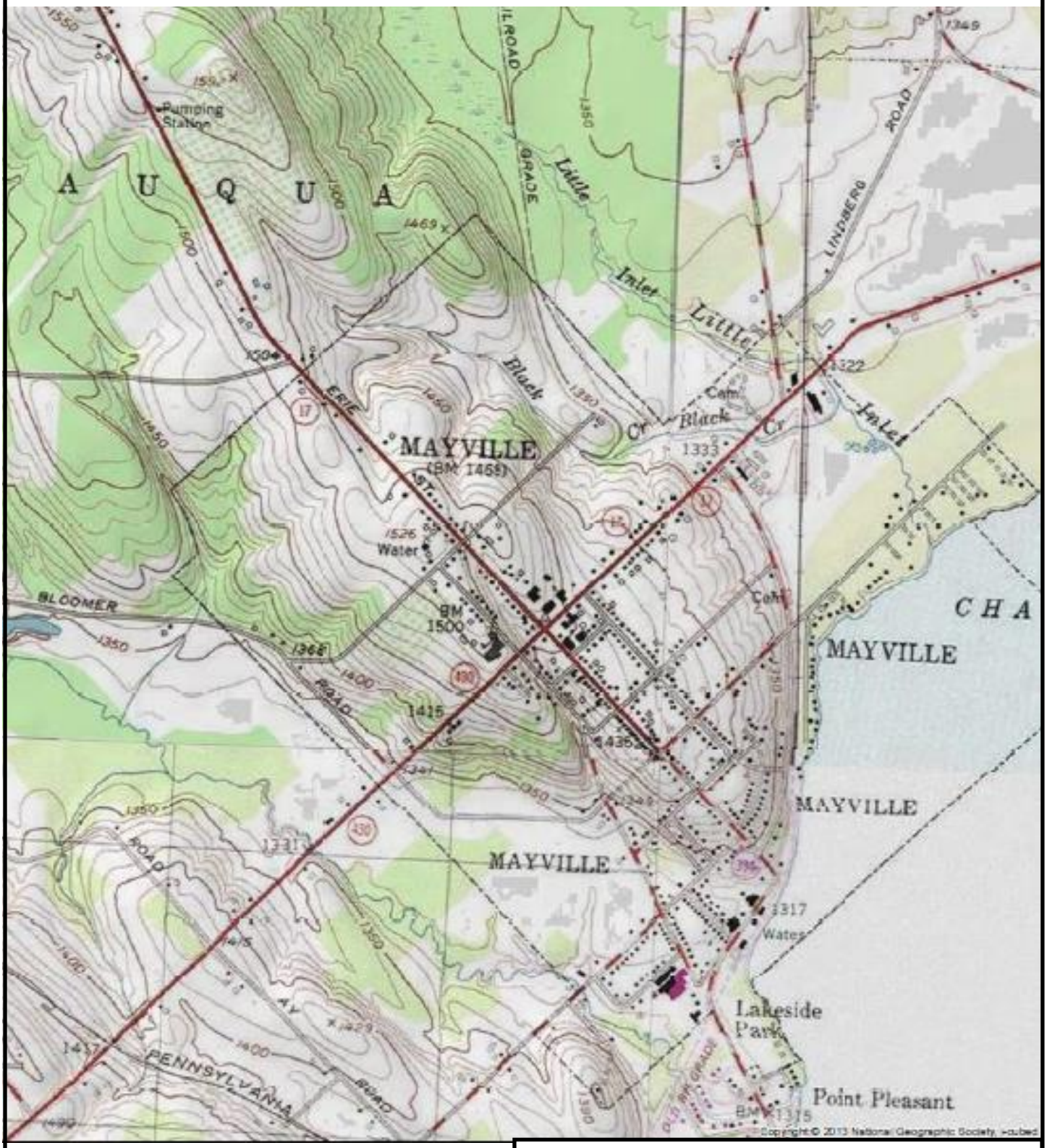
Mayville Investigation

Figure 1 – Village of Mayville Location Map

Drawing Date: February 2, 2021

Village of Mayville, Chautauqua County

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation



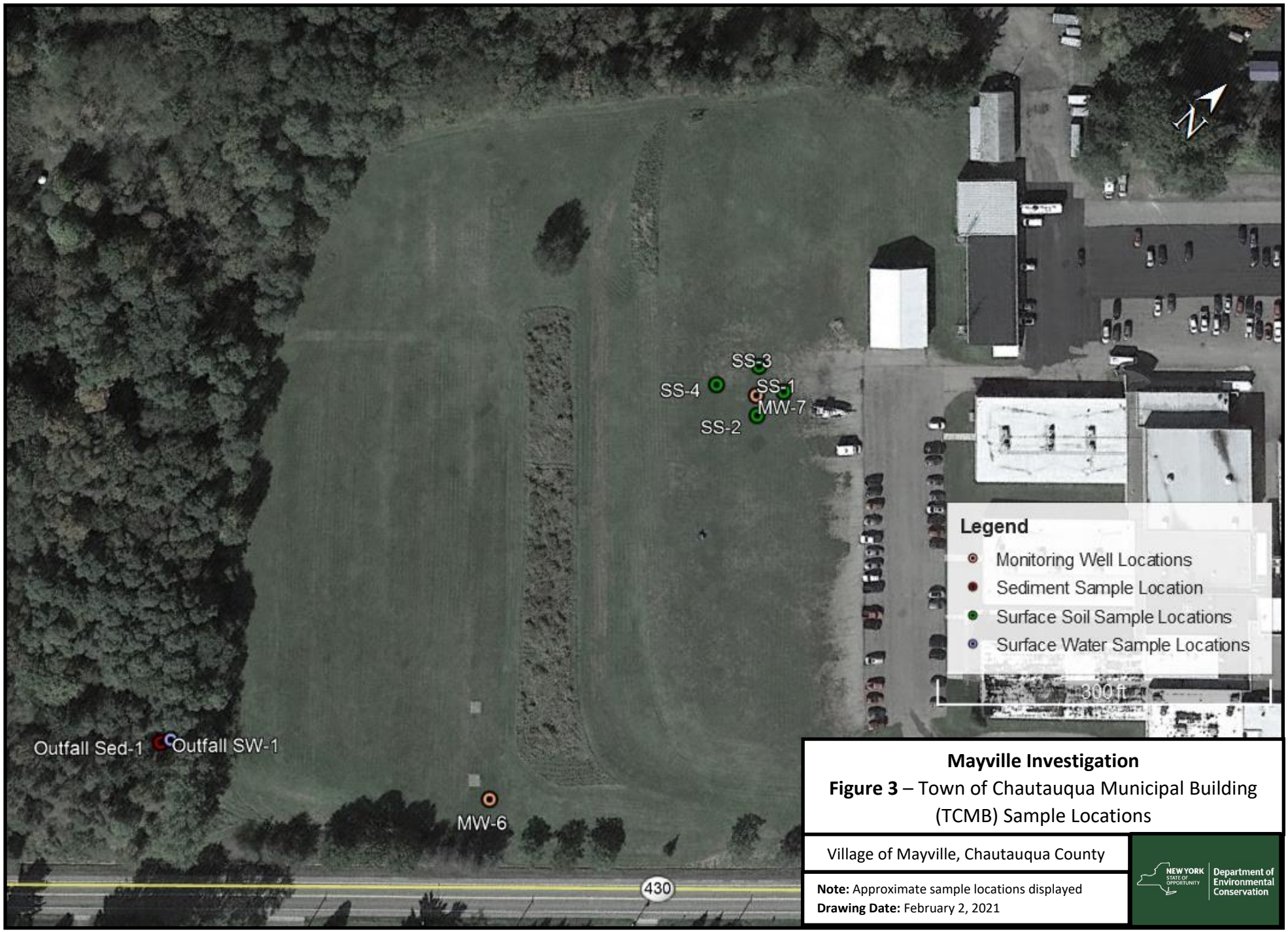
Mayville Investigation

Figure 2 –Mayville Contour Map

Drawing Date: February 2, 2021

Village of Mayville, Chautauqua County

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation



Mayville Investigation

Figure 3 – Town of Chautauqua Municipal Building (TCMB) Sample Locations

Village of Mayville, Chautauqua County

Note: Approximate sample locations displayed
Drawing Date: February 2, 2021

NEW YORK STATE OF OPPORTUNITY | Department of Environmental Conservation

Mayville Investigation

Figure 4 – Mud Creek Sample Locations

Village of Mayville, Chautauqua County

Note: Approximate sample locations displayed
Drawing Date: February 2, 2021

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Mayville Investigation

Figure 5 – Lakeside Park Sample Locations

Village of Mayville, Chautauqua County

Note: Approximate sample locations displayed
Drawing Date: February 2, 2021

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TABLES

Table 1 - Groundwater Results (Per- and Polyfluoroalkyl Substances)

Sample ID Sample Date Well Screen Interval (ft bgs) Screened Unit	NYSDEC Water Screening Values ●	Supply Well 1 12/15/2020 27.5' - 32.5' Sand & Gravel	Supply Well 2 (Sample A) 12/15/2020 29' - 31' Sand & Gravel	Supply Well 2 (Sample B) 12/15/2020 29' - 31' Sand & Gravel	MW-1 12/15/2020 28.8'- 38.8' Unknown	MW-2 (NYSDEC Well) 01/12/2021 21' - 26' Sand & Gravel	MW-3 (NYSDEC Well) 01/12/2021 30.5' - 40.5' Sand & Gravel
Per- and Polyfluoroalkyl Substances (PFAS) (ng/L)							
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	100.0	NA	NA	NA	NA		
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	100.0	NA	NA	NA	NA		
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	100.0					NA	NA
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	100.0					NA	NA
4,8-Dioxa-3h-perfluorononanoic acid (DONA)	100.0					NA	NA
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	100.0					NA	NA
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	100.0						
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	100.0						
Perfluorobutanesulfonic acid (PFBS)	100.0	0.72 J	0.7 J	0.71 J	0.53 J	1 J	0.79 J
Perfluorobutanoic acid (PFBA)	100.0	NA	NA	NA	NA	2.5 J	4 J
Perfluorodecanesulfonic acid (PFDS)	100.0	NA	NA	NA	NA		
Perfluorodecanoic acid (PFDA)	100.0						
Perfluorododecanoic acid (PFDoA)	100.0						
Perfluoroheptanesulfonic Acid (PFHpS)	100.0	NA	NA	NA	NA		
Perfluoroheptanoic acid (PFHpA)	100.0	3.2	1.2 J	1.3 J			3.2
Perfluorohexanesulfonic acid (PFHxS)	100.0	0.54 J	0.48 J	0.56 J		0.66 J	0.6 J
Perfluorohexanoic acid (PFHxA)	100.0	3.4	1.4 J	1.4 J			4.5
Perfluorononanoic acid (PFNA)	100.0	**280**	**140**	**140**			**290**
Perfluorooctanesulfonamide (FOSA)	100.0	NA	NA	NA	NA		
Perfluorooctanesulfonic acid (PFOS)	10.0				0.78 J		
Perfluorooctanoic acid (PFOA)	10.0	8.8	3.2	3.4	0.76 J		7.3
Perfluoropentanoic acid (PFPeA)	100.0	NA	NA	NA	NA		7.8
Perfluorotetradecanoic acid (PFTeA)	100.0						
Perfluorotridecanoic acid (PFTriA)	100.0						
Perfluoroundecanoic acid (PFUnA)	100.0						

Notes:

● = Sampling, Analysis, and Assessment of Per- and Polyfluoroakyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs, NYSDEC, January 2021. The values shown for PFOS and PFOA are the maximum contaminant levels for drinking water found in 10 NYCRR Part 5: Drinking Water Supplies, NYSDOH, Updated August 26,2020.

J = Analyte was positively identified at an estimated concentration.

NA = Not analyzed.

ng/L = nanograms per liter or parts per trillion.

Blanks = Contaminant was analyzed for but not detected at or above the laboratory detection limit.

(5.6) = Results from a duplicate sample.

Yellow shaded values exceed NYSDOH drinking water standards or guidance values.

Well MW-1 is listed as Well Near Well 2 in the lab report.

Sample A from Supply Well 2 was collected directly from the well using a bailer.

Sample B from Supply Well 2 was collected after the well pump and piping at the well sample port.

Table 1 (Cont.) - Groundwater Results (Per- and Polyfluoroalkyl Substances)

Sample ID Sample Date Well Screen Interval (ft bgs) Screened Unit	NYSDEC Water Screening Values ●	Supply Well 3 12/15/2020 59' - 71' Sand & Gravel	TW-2 12/15/2020 58' - 69' Sand & Gravel	MW-4 (NYSDEC Well) 01/12/2021 52.5' - 67.5' Sand & Gravel	MW-5 (NYSDEC Well) 01/12/2021 51' - 66' Sand & Gravel	MW-6 (NYSDEC Well) 01/12/2021 7' - 17' Silt/Fine Sand	MW-7 (NYSDEC Well) 01/12/2021 5' - 20' Silt/Fine Sand
Per- and Polyfluoroalkyl Substances (PFAS) (ng/L)							
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	100.0	NA	NA				**1,900**
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	100.0	NA	NA				**620**
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	100.0			NA	NA	NA (NA)	NA
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	100.0			NA	NA	NA (NA)	NA
4,8-Dioxa-3h-perfluorononanoic acid (DONA)	100.0			NA	NA	NA (NA)	NA
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	100.0			NA	NA	NA (NA)	NA
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	100.0						
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	100.0						
Perfluorobutanesulfonic acid (PFBS)	100.0	0.53 J (ND)		0.53 J			
Perfluorobutanoic acid (PFBA)	100.0	NA	NA	4.5			**380**
Perfluorodecanesulfonic acid (PFDS)	100.0	NA	NA				
Perfluorodecanoic acid (PFDA)	100.0						**450**
Perfluorododecanoic acid (PFDoA)	100.0						
Perfluoroheptanesulfonic Acid (PFHpS)	100.0	NA	NA				
Perfluoroheptanoic acid (PFHpA)	100.0	2.3 (2.4 J)		0.84 J		0.3 J (0.26 J)	**2,100**
Perfluorohexanesulfonic acid (PFHxS)	100.0						
Perfluorohexanoic acid (PFHxA)	100.0	2.7 (2.7 J)		0.84 J			**1,900**
Perfluorononanoic acid (PFNA)	100.0	**370 (390)**		16	0.82 J	6.3 (6.5)	**110,000 E**
Perfluorooctanesulfonamide (FOSA)	100.0	NA	NA				
Perfluorooctanesulfonic acid (PFOS)	10.0		0.51 J				
Perfluorooctanoic acid (PFOA)	10.0	5.6 (6.1 J)		1.9		0.9 J (0.73 J)	**3,000**
Perfluoropentanoic acid (PFPeA)	100.0	NA	NA	1.2 J		0.53 J (0.51 J)	**2,600**
Perfluorotetradecanoic acid (PFTeA)	100.0						
Perfluorotridecanoic acid (PFTriA)	100.0						
Perfluoroundecanoic acid (PFUnA)	100.0						**5,100**

Notes:

● = Sampling, Analysis, and Assessment of Per- and Polyfluoroakyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs, NYSDEC, January 2021.
The values shown for PFOS and PFOA are the maximum contaminant levels for drinking water found in 10 NYCRR Part 5: Drinking Water Supplies, NYSDOH, Updated August 26,2020.

J = Analyte was positively identified at an estimated concentration.

NA = Not analyzed.

Blanks = Contaminant was analyzed for but not detected at or above the laboratory detection limit.

ng/L = nanograms per liter or parts per trillion.

(5.6) = Results from a duplicate sample.

Yellow shaded values exceed NYSDOH drinking water standards or guidance values.

TCMB = Town of Chautauqua Municipal Building

Table 1 (cont.) - Groundwater Results (Per- and Polyfluoroalkyl Substances)

Sample ID Sample Date Well Screen Interval (ft bgs) Screened Unit	NYSDEC Water Screening Values ●	Supply Well 4 12/15/2020 58' - 68' Sand & Gravel	OW-2 12/15/2020 58' - 68' Sand & Gravel	NCLSD Well 01/07/2021 121' - 150' Bedrock
Per- and Polyfluoroalkyl Substances (PFAS) (ng/L)				
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	100.0	NA	NA	
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	100.0	NA	NA	
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	100.0			NA
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	100.0			NA
4,8-Dioxa-3h-perfluorononanoic acid (DONA)	100.0			NA
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	100.0			NA
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	100.0			
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	100.0			
Perfluorobutanesulfonic acid (PFBS)	100.0			
Perfluorobutanoic acid (PFBA)	100.0	NA	NA	
Perfluorodecanesulfonic acid (PFDS)	100.0	NA	NA	
Perfluorodecanoic acid (PFDA)	100.0			
Perfluorododecanoic acid (PFDoA)	100.0			
Perfluoroheptanesulfonic Acid (PFHpS)	100.0	NA	NA	
Perfluoroheptanoic acid (PFHpA)	100.0			
Perfluorohexanesulfonic acid (PFHxS)	100.0			
Perfluorohexanoic acid (PFHxA)	100.0			
Perfluorononanoic acid (PFNA)	100.0			
Perfluorooctanesulfonamide (FOSA)	100.0	NA	NA	
Perfluorooctanesulfonic acid (PFOS)	10.0			2.5
Perfluorooctanoic acid (PFOA)	10.0			
Perfluoropentanoic acid (PFPeA)	100.0	NA	NA	
Perfluorotetradecanoic acid (PFTeA)	100.0			
Perfluorotridecanoic acid (PFTriA)	100.0			
Perfluoroundecanoic acid (PFUnA)	100.0			

Notes:

● = Sampling, Analysis, and Assessment of Per- and Polyfluoroakyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs, NYSDEC, January 2021. The values shown for PFOS and PFOA are the maximum contaminant levels for drinking water found in 10 NYCRR Part 5: Drinking Water Supplies, NYSDOH, Updated August 26, 2020.

J = Analyte was positively identified at an estimated concentration.

NA = Not analyzed.

Blanks = Contaminant was analyzed for but not detected at or above the laboratory detection limit.

ng/L = nanograms per liter or parts per trillion.

(5.6) = Results from a duplicate sample.

Yellow shaded values exceed NYSDOH drinking water standards or guidance values.

NCLSD = North Chautauqua Lake Sewer District

Table 2 - Groundwater Results (Target Compound List)

Sample ID Sample Date Well Screen Interval (ft bgs) Screened Unit	NYSDEC Groundwater Standards	Rinse Blank 01/07/2021 -- --	NCLSD Well 01/07/2021 121' - 150'	MW-5 (NYSDEC Well) 01/12/2021 51' - 66' Sand & Gravel	MW-6 (NYSDEC Well) 01/12/2021 7' - 17' Silt/Fine Sand	MW-7 (NYSDEC Well) 01/12/2021 5' - 20'	RB-01 -- 01/12/2021 -- --
VOCs (ug/L)							
Acetone	50			150 F1			
Benzene	1				0.82 J		
Methylene Chloride	5	1.4				11 J	
Xylene, Total			1.3 J	150			
SVOCs (ug/L)							
Acenaphthene	20					1.7 J	
Carbazole						0.82 J	
Di-n-butyl phthalate	50	0.4 J	0.31 J			0.35 J	0.32 J
Dibenzofuran						0.88 J	
Fluorene	50					0.88 J	
Naphthalene	10					1.6 J	
Phenanthrene	50					0.85 J	
Pesticides (ug/L)							
4,4'-DDT	0.20	0.014 JB	0.014 JB				
alpha-BHC	0.01					0.009 J	
delta-BHC	0.04	0.01 J					0.01 J
Metals (mg/L)							
Aluminum	10000			2200 (2300)	250	1240	
Arsenic	2500		5.8 JB	(6.6 J)		1.5	
Barium	100000		600 ^6+	260 ^6+ (250 ^6+)	30 ^6+	280 ^6+	
Beryllium	300					0.44 J	
Calcium			2740	36200 (35500)	2380	17600	
Chromium	5000			2.3 J (2.3 J)	0.44	1.8	
Cobalt					1.3	0.55	
Copper	20000			2 J (2.4 J)	1.8 J	1.2	
Iron	30000		18	1900 (2000)	220	1370	
Lead	2500					1.3	
Magnesium	3500000		770	8400 (8300)	410	2740	
Manganese	30000	0.45 J	23	110 B (120 B)	980 B	2700 B	
Nickel	10000			1.6 J (1.7 J)	4.5 J	1.8	
Potassium			190	2000 (2100)	230	1300	120 J
Sodium	2000000		13700	14800 F1 (15100)	320	115000	610 J
Vanadium				3.4 J (3.8 J)	3.8 J	1.8	
Zinc	200000		1.1	6.4 J (6.1 J)	5.5 J	4	
General Chemistry (ug/L)							
Cyanide	200					0.0071 J	

Notes:

J = Analyte was positively identified at an estimated concentration.

B = Compound found in blank sample

F1 = MS and/or MSD recovery exceeds control limits

^6+ Interference check standard is outside acceptance limits

Blanks = Contaminant was analyzed for but not detected at or above the laboratory detection limit.

ug/L = micrograms per liter or parts per billion.

mg/L = miligrams per liter or parts per million

(5.6) = Results from a duplicate sample.

Yellow shaded values exceed NYS Ground Water Standards

TCMB = Town of Chautauqua Municipal Building

NCLSD = North Chautauqua Lake Sewer District

Table 3 - Surface Soil Results (Per- and Polyfluoroalkyl Substances)

Sample ID Depth (ft) Sample Date	NYSDEC Residential Soil Guidance Values ●	SS-1 0" - 6" 01/07/2021	SS-2 0" - 6" 01/07/2021	SS-3 0" - 6" 01/07/2021	SS-4 0" - 6" 01/07/2021	Outfall Sed-1 0" - 3" 01/07/2021	Lakeside-1 0" - 6" 01/07/2021	Lakeside-2 0" - 6" 01/07/2021
Per- and Polyfluoroalkyl Substances (PFAS) (ug/Kg)								
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	NS	25 J	2.2 J	4.9				5.3 J F1
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	NS	130 J	4.5 J	56 J				7.6 J F1
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	NS							
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	NS							
Perfluorobutanesulfonic acid (PFBS)	NS							F1
Perfluorobutanoic acid (PFBA)	NS	0.81 B	0.47 B	0.35 B	0.51 B	0.12 JB (0.11JB)	1.4 B	3.0 B
Perfluorodecanesulfonic acid (PFDS)	NS							
Perfluorodecanoic acid (PFDA)	NS	30.0	1.6	9.7	7.0	0.26 (0.42)	0.29 J	8.5 F1
Perfluorododecanoic acid (PFDoA)	NS	22.0	3.0	43.0	36.0	1 (1.3)	0.15 J	1.2
Perfluoroheptanesulfonic Acid (PFHpS)	NS							
Perfluoroheptanoic acid (PFHpA)	NS	1.7	0.40	0.66	0.31	(0.044 J)	0.43	11 F1
Perfluorohexanesulfonic acid (PFHxS)	NS	0.054 J						
Perfluorohexanoic acid (PFHxA)	NS	1.90	0.36	0.67	0.40		1.0	12.0
Perfluorononanoic acid (PFNA)	NS	680.0	16.0	220.0	37.0	4.8 (8.2)	0.52	17.0
Perfluorooctanesulfonamide (FOSA)	NS							
Perfluorooctanesulfonic acid (PFOS)	8.8	0.43 J	0.33 J	0.29 J			1.2	1.1
Perfluorooctanoic acid (PFOA)	6.6	6.2	0.35	2.9	0.43		0.69	**12 F1**
Perfluoropentanoic acid (PFPeA)	NS	1.8	1.1	0.53	1.20	(0.1 J)	4.2	22.0
Perfluorotetradecanoic acid (PFTeA)	NS	13.00	0.70	22.00	6.40	0.085 J (0.15 J)		0.31 J
Perfluorotridecanoic acid (PFTriA)	NS	1,700	120.0	2,500 E	1,200	18 (31)	0.45	0.97 F2
Perfluoroundecanoic acid (PFUnA)	NS	1,700	130.0	1,500	920.0	35 (42)	0.69	5.7 F1

Notes:

● = Sampling, Analysis, and Assessment of Per- and Polyfluoroakyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs, NYSDEC, October 2020. There are no sediment guidance values for PFAS compounds, residential soil guidance values have been used for comparison purposes.

ug/Kg = micrograms per kilogram or parts per billion.

B = Analyte was detected in the associated blank, as well as in the sample.

E = Result exceeded the calibration range.

F1 = MS and/or MSD recovery is outside acceptance limits.

F2 = MS/MSD RPD exceeds control limits.

J = Analyte was positively identified at an estimated concentration.

NS = No standard or guidance value available.

TCMB = Town of Chautauqua Municipal Building

Blanks = Contaminant was analyzed for but not detected at or above the laboratory detection limit.

Yellow shaded values exceed NYSDEC residential soil guidance values.

Table 4 - Surface Soil Results (Target Compound List)

Sample ID Depth (ft) Sample Date	Part 375 - Soil Cleanup Objectives					SS-1 0" - 6" 01/07/2021	SS-2 0" - 6" 01/07/2021	SS-3 0" - 6" 01/07/2021	SS-4 0" - 6" 01/07/2021	Outfall Sed-1 0" - 3" 01/07/2021
	USCO	RSCO	RRSCO	CSCO	ISCO					
VOCs (mg/Kg)										
Toluene	0.7	100	100	500	1000			0.00045 J		
SVOCs (mg/Kg)										
Acenaphthylene	100	100	100	500	1000			0.27 J	0.67 J	
Anthracene	100	100	100	500	1000				0.55 J	
Benzo[a]anthracene	1	1	1	5.6	11	4.4	0.97 J	0.97 J	2.2	0.27 J
Benzo[a]pyrene	1	1	1	1	1.1	6.1	1.3 J	1.2 J	2.6	0.27 J
Benzo[b]fluoranthene	1	1	1	5.6	11	8.9	1.5 J	1.4 J	2.9	0.28 J
Benzo[g,h,i]perylene	100	100	100	500	1000	5.4	1 J	0.91 J	1.7 J	0.12 J
Benzo[k]fluoranthene	0.8	1	3.9	56	110	3.6	0.62 J	0.65 J	1.3 J	0.14 J
Carbazole						0.71 J				
Chrysene	1	1	3.9	56	110	6.2	0.97 J	1 J	2.1	0.24 J
Dibenz(a,h)anthracene	0.33	0.33	0.33	0.56	1.1	1.2 J			0.52 J	
Fluoranthene	100	100	100	500	1000	12	1.7 J	1.7	3.9	0.380 J (0.031 J)
Indo[1,2,3-cd]pyrene	0.5	0.5	0.5	5.6	11	4.7	0.92 J	0.82	1.6 J	0.13 J
Phenanthrene	100	100	100	500	1000	3.4	0.58 J	0.53	1.5 J	
Pyrene	100	100	100	500	1000	8.3	1.4 J	1.4	3.1	0.310 J (0.026 J)
Pesticides (mg/Kg)										
4,4'-DDT	0.003	1.7	7.9	47	94		0.013 J	0.013 J		
delta-BHC	0.04	100	100	500	1000	0.013 J	0.0098 J			0.0031 J
gamma-BHC (Lindane)	0.1	0.28	1.3	9.2	23	0.0097 J				
Metals (mg/Kg)										
Aluminum						11900	13000	12300	11200	10800 (11300)
Arsenic	13	16	16	16	16	9.2	10.9	9.3	8.5	10.5 (13)
Barium	350	350	400	400	10000	72.3 ^6+	77.6 ^6+	68.8 ^6+	74.8 ^6+	59 ^6+ (72.7 ^6+)
Beryllium	7.2	14	72	590	2700	0.56	0.61	0.53	0.53	0.54 (0.56)
Calcium						35100	4680	7960	25400	2490 (2630)
Chromium, Total	30	36	180	1500	6800	15.8	17	16.8	12.6	13 (13.9)
Cobalt						8.9	9.7	8.8	7.3	8.4 (11.5)
Copper	50	270	270	270	10000	22.5	21.3	19.1	19.2	17.6 (20.6)
Iron						18900	22800	22300	18100	21300 (25800)
Lead	63	400	400	1000	3900	43.5	42.7	39.3	35.7	17.2 (18.1)
Magnesium	1600	2000	2000	10000	10000	4870	3830	4960	4250	2890 (3340)
Manganese						607	612	545	594	590 (1120)
Mercury	0.18	0.81	0.81	2.8	5.7	0.053	0.056	0.035	0.041	0.011 (0.013 J)
Nickel	30	140	310	310	10000	20.8	22.5	20.8	17.6	19.8 (22.3)
Potassium						1970	1670	1510	1590	1410 (1330)
Selenium	3.9	36	180	1500	6800	2.3 J	2.3 J	2.1 J	1.7 J	1.9 J (2.5 J)
Silver	2	36	180	1500	6800		0.31 J	0.27 J		0.34 J (0.25 J)
Sodium						1100	406	723	411	115 J (99.8 J)
Vanadium						20.8	21.6	22.6	18.3	18.2 (20.7)
Zinc	109	2200	10000	10000	10000	81.8	78	78.7	75.6	69.9 (104)

Notes:

● = Sampling, Analysis, and Assessment of Surface Soils Under NYSDEC's Part 375. There are no cleanup objectives for sediment, soil values used for comparison

^6+ Interference check standard is outside acceptance limits

mg/Kg = milligrams per kilogram or parts per million.

J = Analyte was positively identified at an estimated concentration.

(5.6) = Results from a duplicate sample.

TCMB = Town of Chautauqua Municipal Building

Table 5 - Surface Water Results (Per- and Polyfluoroalkyl Substances)

Sample ID Sample Date	NYSDEC Water Screening Values ●	Mud Creek Morris St. 12/15/2020	Mud Creek - Morris St. 01/07/2021	Mud Creek - Bloomer Rd. 01/07/2021	Mud Creek - Sherman* 01/07/2021	Outfall SW-1 TCMB 01/07/2021
Per- and Polyfluoroalkyl Substances (PFAS) (ng/L)						
6:2 Fluorotelomer sulfonic acid (6:2 FTS)	100.0	NA				22 (23)
8:2 Fluorotelomer sulfonic acid (8:2 FTS)	100.0	NA				18 (26)
11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid	100.0		NA	NA	NA	NA
9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid	100.0		NA	NA	NA	NA
4,8-Dioxa-3h-perfluorononanoic acid (DONA)	100.0		NA	NA	NA	NA
Hexafluoropropylene Oxide Dimer Acid (HFPO-DA)	100.0		NA	NA	NA	NA
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	100.0					
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	100.0					
Perfluorobutanesulfonic acid (PFBS)	100.0	1.5 J	1.5 J	0.33 J	0.25 J	0.59 J (0.63 J)
Perfluorobutanoic acid (PFBA)	100.0	NA				40 (39)
Perfluorodecanesulfonic acid (PFDS)	100.0	NA				
Perfluorodecanoic acid (PFDA)	100.0					**94 (130)**
Perfluorododecanoic acid (PFDoA)	100.0					7.4 (12)
Perfluoroheptanesulfonic Acid (PFHpS)	100.0	NA				
Perfluoroheptanoic acid (PFHpA)	100.0	0.71 J	0.77 J	0.27 J		69 (68)
Perfluorohexanesulfonic acid (PFHxS)	100.0	2.2	2.3	0.60 J		2 (2)
Perfluorohexanoic acid (PFHxA)	100.0	1.9	1.9			84 (85)
Perfluorononanoic acid (PFNA)	100.0	2.6	1.6 J	0.28 J		**4,900 (6,300)**
Perfluorooctanesulfonamide (FOSA)	100.0	NA				
Perfluorooctanesulfonic acid (PFOS)	10.0	3.8	8	0.82 J	0.99 J	3.5 (4.7)
Perfluorooctanoic acid (PFOA)	10.0	1.2 J	1.6 J			**63 (74)**
Perfluoropentanoic acid (PFPeA)	100.0	NA	2.7	0.45 J		**150 (150)**
Perfluorotetradecanoic acid (PFTeA)	100.0					
Perfluorotridecanoic acid (PFTriA)	100.0					36 (33)
Perfluoroundecanoic acid (PFUnA)	100.0	0.76 J				**1,500 (2,000)**

Notes:

● = Sampling, Analysis, and Assessment of Per- and Polyfluoroakyl Substances (PFAS) Under NYSDEC's Part 375 Remedial Programs, NYSDEC, October 2020. The values shown for PFOS and PFOA are the maximum contaminant levels for drinking water found in 10 NYCRR Part 5: Drinking Water Supplies, NYSDOH, Updated August 26,2020.

*** = Sherman Mayville.**

J = Analyte was positively identified at an estimated concentration.

NA = Not analyzed.

ng/L = micrograms per liter or parts per trillion.

(5.6) = Results from a duplicate sample.

Yellow shaded values exceed NYSDEC water screening values or NYSDOH drinking standards.

TCMB = Town of Chautauqua Municipal Building

Table 6 - Surface Water Results (Target Compound List)

Sample ID Sample Date	NYSDEC Surface Water Standards	Outfall SW-1 01/07/2021	Mud Creek - Bloomer Rd 01/07/2021	Mud Creek - Sherman* 01/07/2021	Mud Creek - Morris St 01/07/2021
SVOCs (ug/L)					
Di-n-butyl phthalate	50				0.32 J
Pesticides (ug/L)					
4,4'-DDT	0.00001	0.015 JB (0.014 JB)	0.017 JB	0.021 JB	
Aldrin	0.00100			0.0098 J	
delta-BHC	0.008	(0.013 J)	0.013 J	0.017 J	
Metals (mg/L)					
Aluminum	100	0.068 J	0.076 J	0.12 J	0.16 J
Barium		0.04 (0.041)	0.021 ^6+	0.025 ^6+	0.028 ^6+
Calcium		70.5 (71.5)	25.7	24.1	26.4
Iron	300	0.053 (0.065)	0.067	0.18	0.25
Magnesium		8.9 (9.1)	4.5	4.6	4.9
Manganese		0.039 (0.039)	0.003	0.024	0.032
Potassium		1.8 (1.9)	0.76	0.8	0.86
Sodium	20000	81.8 (83.5)	19	8.5	10.8
Zinc		0.0039 J (0.0039 J)	0.0017 J	0.0015 J	

Notes:

J = Analyte was positively identified at an estimated concentration.

B = Compound found in blank sample

F1 = MS and/or MSD recovery exceeds control limits

^6+ Interference check standard is outside acceptance limits

Blanks = Contaminant was analyzed for but not detected at or above the laboratory detection limit.

ug/L = micrograms per liter or parts per billion.

mg/L = miligrams per liter or parts per million

(5.6) = Results from a duplicate sample.

Yellow shaded values exceed NYS Surface Water Standards

*** Sherman-Mayville Rd**

TCMB = Town of Chautauqua Municipal Building