Remedial Investigation Work Plan -
Operable Unit-03: McCaffrey Street Site

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Acronyms

AMSL	above mean sea level
bgs	below ground surface
COC	contaminant of concern
CSM	conceptual site model
FOSA	perfluorooctanesulfonamide
FS	Feasibility Study
FSP	field sampling plan
MCL	maximum contaminant level
mph	mile per hour
N-EtFOSAA	N-Ethyl perfluorooctanesulfonamidoacetic acid
ng/g	nanograms per gram
ng/L	nanograms per liter
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OU	Operable Unit
OU-01	Operable Unit 01
OU-02	Operable Unit 02
OU-03	Operable Unit 03
PFAS	per- and polyfluoroalkyl substances
PFBA	perfluorobutanoic acid
PFBS	perfluorobutanesulfonate
PFCA	perfluoroalkyl carboxylic acid
PFDA	perfluorodecanoic acid
PFDoA	perfluorododecanoic acid
PFHpA	perfluoroheptanoic acid
PFHxA	perfluorohexanoic acid
PFHxS	perfluorohexanesulfonic acid
PFNA	perfluorononanoic acid
PFOA	perfluorooctanoic acid
PFOS	perfluorooctane sulfonate
PFPeA	perfluoropentanoic acid
PFSA	perfluoroalkane sulfonic acids
PFTriA	perfluorotridecanoic acid
PFUnA	perfluoroundecanoic acid
ppb	parts per billion
ppt	parts per trillion
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
ROD	Record of Decision
SPLP	Synthetic Precipitation Leaching Procedure
TGMP	temporary groundwater monitoring point
TOC	total organic carbon
USEPA	United States Environmental Protection Agency
WWTP	wastewater treatment plant

Executive Summary

This Remedial Investigation (RI) Work Plan for Operable Unit 3 (OU-03) of the McCaffrey Street Site (Site) in the Village of Hoosick Falls has been prepared in response to requests from the New York State Department of Environmental Conservation (NYSDEC). OU-03 is defined as off-site contamination related to the atmospheric deposition of Site-related contaminants and direct off-site disposal of Site-related liquid and/or solid wastes. This RI Work Plan focuses on the air deposition release mechanism with the primary objective to further define the nature and extent of per- and polyfluoroalkyl substances (PFAS) impacts due to potential atmospheric deposition from the Site.

Multiple investigations related to PFAS have been conducted in the Region, including an investigation specifically designed to evaluate the air deposition pathway. Several facilities associated with numerous owners and operators in Hoosick Falls and the surrounding area (the Region) utilized PFAS-containing material over several decades, some of which have yet to be investigated. Data from previous investigations are consolidated and evaluated where possible to provide the current understanding of OU-03 in this RI Work Plan, including the physical setting, potential PFAS sources and transport pathways, and nature and extent of PFAS impacts in various environmental media (soil, groundwater, surface water, and sediment).

The scope of work detailed in this RI Work Plan is designed to close data gaps, further evaluate transport pathways, and update the conceptual site model (CSM) with a refined understanding of the nature and extent of PFAS in OU-03 related to atmospheric deposition potentially from the Site. Collection of additional samples of various environmental media is planned in an area of 4,500 meters (approximately 2.8 miles) in all directions from the approximate Village center (the OU-03 Investigation Area) to support the objective of this RI Work Plan.

The scope of work to supplement the existing dataset is summarized by environmental media below.

- Soil – sampling of shallow soils at multiple depth intervals in disturbed areas including ten residential-use properties and ten agricultural-use properties (a total of 60 soil samples).
- Groundwater – installation of 14 temporary groundwater monitoring points (TGMPs) within undisturbed areas. Collection of one groundwater sample and continuous logging and sampling of soils at each TGMP (a total of 14 groundwater samples and more than 50 soil samples).
- Surface water and sediment – sampling at nine new stream locations and ten previously sampled stream and river locations under different flow conditions (a total of 28 surface water samples and up to 27 sediment samples).

Upon NYSDEC approval of this RI Work Plan, the field work will be scheduled to start as soon as practicable after obtaining private property access and in coordination with NYSDEC. The detailed evaluation and interpretation of the data, conclusions, and recommendations will be included in the OU-03 RI Report.

1.0 Introduction

This Remedial Investigation (RI) Work Plan associated with the McCaffrey Street Site (Site) was prepared in response to requests from the New York State Department of Environmental Conservation (NYSDEC). The Site (NYSDEC Site #442046) is located in the Village of Hoosick Falls (the Village) in Rensselaer County. Per- and polyfluoroalkyl substances (PFAS) are the primary contaminants of concern (COCs) at the Site. NYSDEC established three Operable Units (OUs) for the Site as follows (NYSDEC, 2021e):

- Operable Unit 01 (OU-01) currently includes the 6.41-acre Site located at 14 McCaffrey Street and groundwater contamination emanating, or having emanated, from the Site (Figure 1). Details regarding the conceptual site model (CSM), nature and extent, and planned investigations for OU-01 can be found in the most recent work plan for that OU (C.T. Male and BEC, 2022b).
- Operable Unit 02 (OU-02) includes the existing municipal water supply, which has a NYSDEC selected remedy presented in a Record of Decision (ROD; NYSDEC, 2021e).
- Operable Unit 03 (OU-03) is defined as off-site contamination related to the atmospheric deposition of Site-related contaminants and direct off-site disposal of Site-related liquid and/or solid wastes.

This RI Work Plan applies to OU-03 and focuses on impacts potentially related to the atmospheric deposition of Site-related PFAS. The off-site disposal of Site-related liquid to the municipal sewer is being investigated as described in the OU-01 Addendum to the Remedial Investigation/Feasibility Study (RI/FS) Work Plan (C.T. Male and BEC, 2022b). Historic off-site disposal of Site-related solid wastes to the Hoosick Falls Landfill is being investigated by other parties under NYSDEC's remedial program (NYSDEC Site #442007). No unregulated off-site disposal related to the Site has been reported to date.

Investigation of PFAS impacts resulting from potential air deposition began in 2019 (Regional Air Deposition Study; C.T. Male, 2019; C.T. Male and BEC, 2021b).

The Regional Air Deposition Study was not originally associated with any single facility or party, in light of the fact that several facilities associated with numerous owners and operators in the Hoosick Falls region (the Region) utilized PFAS-containing material over several decades and some have yet to be investigated. Rather, the Study was to be used to supplement and inform investigations for one or more NYSDEC Class 2 and/or Class P sites in the Hoosick Falls area (C.T. Male, 2019). Following the initial scope of work, NYSDEC established the OUs described above for the Site. Accordingly, this study is being used to further define the nature and extent of PFAS in the Region resulting from air deposition of PFAS from the Site.

As discussed herein, multiple investigations related to PFAS in addition to the Regional Air Deposition Study have been conducted in the Region. These investigations have generated analytical data for thousands of individual samples, and extensive information and data regarding the physical setting (geology, hydrogeology, etc.) in the Hoosick Falls area. To meet NYSDEC requests, this information and data are presented to provide the current understanding of OU-03 (Section 2.0).

The primary objective of this RI Work Plan is to further define the nature and extent of PFAS impacts due to atmospheric deposition potentially from the Site. Collection of additional samples of various environmental media is designed to close data gaps, further evaluated transport pathways, and update the CSM to support achieving the stated objective in the area shown on Figure 1 (i.e., the OU-03 Investigation Area as defined in Section 3.0).

2.0 Existing Information for OU-03

This section provides a summary of existing information and the current understanding of OU-03. It focuses on the physical setting, potential contaminant sources, possible migration pathways, and prior sampling results (including data summaries and interpretation). The OU-03 Investigation Area and NYSDEC Class 2 and Class P sites in the area are shown on Figure 1.

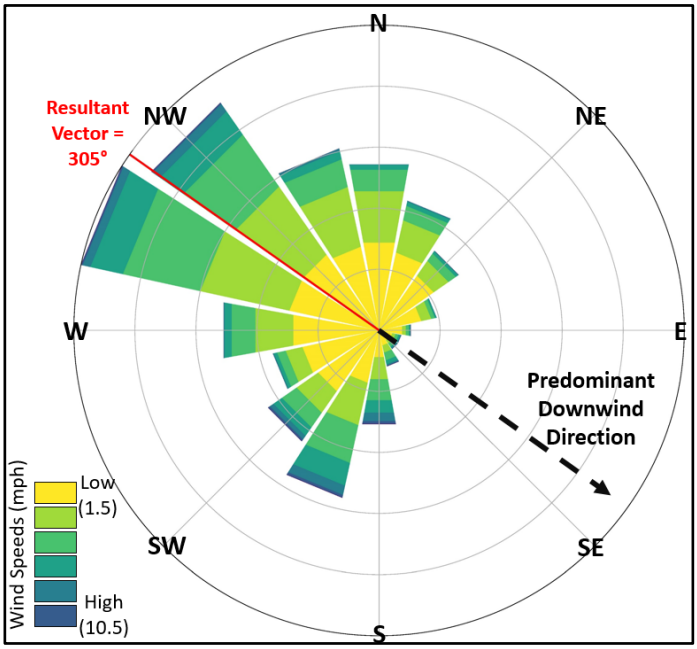
2.1 Physical Setting

2.1.1 Topography

The Village is approximately centered in the Town of Hoosick, in northeastern Rensselaer County, New York (Figure 1). The OU-03 Investigation Area is located within the Town of Hoosick and centered around the Village, as shown on Figure 1. The Region includes part of the Taconic Mountains upland physiographic province (Lafleur and Ellis, 1988) and two major river valleys—those of the Hoosic and Walloomsac Rivers. The lowest elevations in the OU-03 Investigation Area (400 feet above mean sea level [AMSL]) are found near these rivers, and elevations generally increase outwards from these rivers. The highest elevations (1,200 feet AMSL) in the OU-03 Investigation Area are found southwest and southeast of the Village (Figure 2).

2.1.2 Weather

Average precipitation in the Region is 36-38 inches per year (USDA and NRCS, 2011). Precipitation in Albany, New York from 1951-1978 averaged 36 inches per year. Two in ten years had less than 30 inches or more than 41 inches of precipitation (Work, 1988). Annual precipitation in Albany from 1979-2019 averaged 40 inches per year, with two in ten years resulting in less than 34 inches or more than 46 inches of precipitation (National Weather Service, 2020).



Graphic 1: Wind Rose for McCaffrey Weather Station

The initial phase of the Regional Air Deposition Study included the installation of a weather station on the rooftop of the Site facility in November 2018 to gather meteorological data representative of conditions at the Site. This weather station has been collecting data since its installation and provides the only available weather data for the Village. Additional details on the weather station, data collection, operation, and maintenance are included in the initial work plan (C.T. Male, 2019) and the initial data summary report (C.T. Male and BEC, 2021a). A simplified summary wind rose for the McCaffrey Street facility using data through June of 2022 is included as Graphic 1 above.

Based on the wind roses for the Weather Station, the prevailing wind direction in the vicinity of the Weather Station is predominantly from the northwest toward the southeast. There are no other available meteorological data from within the Village and valley; therefore, the data from the McCaffrey Street station are assumed to be representative of the Village and valley for the purposes of the evaluations presented within this report.

2.1.3 Geology

The bedrock geology of the Region is complex, consisting of folded and faulted rocks. The Region was covered by glaciers multiple times; however, each glaciation removed or reworked the deposits of the previous glaciation (Cadwell and Dineen, 1987). The last glaciation deposited thin, lower permeability materials in the upland valley wall flanks of the Region and thicker deposits consisting of layers of lower and higher permeability materials in the river valleys. Complex sequences of deposits mapped in the Hoosic River Valley are believed to have formed in a lake in front of the receding glacier (DeSimone, 2017). These unconsolidated materials atop bedrock (Figure 3; bedrock elevation map), consisting of alluvium and glacial lake, outwash, and till deposits, range in thickness from 0 feet (i.e., bedrock outcrops are observed in the Hoosic Riverbed and elsewhere in the investigation area) to greater than 600 feet. Figure 3 depicts depth to bedrock based on surficial geologic data (Potter, 1972), borings advanced for investigations, and data obtained from the NYSDEC Water Well Program database (NYSDEC, 2000).

2.1.4 Hydrology

The majority of the OU-03 Investigation Area lies within two subwatersheds of the Hoosic River (Nipmoose Brook-Hoosic River and Browns Brook-Hoosic River). A northeast portion of the OU-03 Investigation Area lies within the watersheds of the Walloomsac River and Little White Creek, which are tributaries of the Hoosic River (Figure 4). Smaller tributaries to the Hoosic River within the OU-03 Investigation Area include Case Brook to the northwest, Woods Brook to the east, Browns Brook to the southeast, Nipmoose Brook to the far west, and several unnamed drainage areas (Figure 4). There are relatively high rates of precipitation, infiltration, groundwater recharge, and groundwater discharge to rivers within the OU-03 Investigation Area. Tributary brooks in the region may lose water through discharge to the subsurface where they pass from upland areas to the major valleys (Kontis et al., 2004). Infiltration of surface water may be induced from the rivers by pumping of wells near the rivers. During flooding, surface water recharges adjacent floodplains and aquifers.

2.1.5 Hydrogeology

The OU-03 Investigation Area is in the Northeastern Appalachians groundwater region (Randall et al., 1988) and is characterized by rolling topography that primarily reflects the weathered bedrock surface, with discontinuous glacial and river-related landforms mantling the bedrock. The bedrock units described in Section 2.1.3 have low primary porosity. Water moves in the bedrock through secondary porosity (fractures, weathered zones, etc.). In some rock types, the secondary porosity is solution enlarged (Cushman, 1950). The frequency and permeability of secondary porosity in bedrock typically decrease with depth.

Recharge to the stratified drift filling the major valleys occurs from direct infiltration of precipitation and discharge from bedrock. Recharge from the larger rivers may occur in the case of localized pumping from

the stratified drift or higher than normal river stage. Discharge from the stratified drift occurs to wells, evapotranspiration, and the larger rivers when their stage is at or below normal. The stratified drift aquifers contain many layers with widely varying permeability. Many of these layers have limited areal extent and have variable thicknesses and hydraulic properties.

Groundwater recharge to the bedrock is controlled by the permeability and thickness of the overlying glacial deposits. Runoff in upland areas is directed to seasonal streams that typically lose discharge in areas where they flow over stratified drift near the margins of the larger valleys. Recharge to bedrock wells that are pumped continuously or have shallow bedrock connections may occur from adjacent stratified drift aquifers. Discharge from the bedrock occurs to wells and the stratified drift in the major valleys.

Based on available water well records, bedrock wells in the Region are as deep as 620 feet, with 27 percent of the wells greater than 500 feet in depth (NYSDEC, 2000). Domestic well yield is variable depending on the extent and connectivity of the fractures intersected by the well. Some shallow bedrock wells and deeper wells with shallow fracture connections may be partially supplied by groundwater in the overlying drift. Multiple site investigations have been initiated within the current OU-01 boundary, in which approximately 400 monitoring wells have been installed, sampled, and gauged. Accordingly, the hydrogeology within this area is well understood and the following aspects of hydrogeology within OU-01 are very likely applicable within the OU-03 Investigation Area:

- The groundwater flow in the shallow unconsolidated materials (i.e., water table) is consistent with the topography-controlled pattern observed across the region, meaning that the water table can be roughly conceptualized as a reflection (lower-relief version) of the ground surface (Figure 3).
- The groundwater flow patterns in the deeper unconsolidated hydrostratigraphic unit(s) exhibit a departure from the regional topography-controlled flow in the shallow unconsolidated materials.
- Zones of higher transmissivity exist within the deep unconsolidated hydrostratigraphic unit, correlating with coarse sands and gravel filling a buried bedrock valley.

Additional discussion and detailed information regarding the hydrogeology within the current OU-01 boundary is included in the OU-01 RI Work Plan Addendum (C.T. Male and BEC, 2022b).

2.2 Utilities, Land Use, and Zoning

As noted previously, the OU-03 Investigation Area is located within the Town of Hoosick and centered around the Village, as shown on Figure 1. According to the Land Use Law of the Town of Hoosick, New York, land in the Village and Town is predominantly zoned for agricultural (62%) and residential (17%) uses. Approximately 14% of land in the Village and Town is vacant (C.T. Male and BEC, 2021c).

Generally, within the current OU-01 boundary (Figure 1), residential and commercial buildings are connected to the Village's municipal water supply and municipal sewer system. However, outside of this area, residential and commercial buildings are supplied by non-public water supply wells and connected to private septic systems (i.e., septic tanks and septic leach fields). It is estimated that over 600 private septic systems are present within the OU-03 Investigation Area based on the number of non-public water wells sampled by NYSDEC and the New York State Department of Health (NYSDOH) (Figure 5A).

2.3 Potential Contaminant Sources and Migration

The Baseline CSM (C.T. Male and BEC, 2021c) identifies presently known potential sources of contamination, types of contaminants and affected media, release mechanisms and potential contaminant migration pathways, and actual/potential human and environmental receptors. Several presently known sites of interest, including Class 2 or Class P sites, are shown on Figure 1 and other figures included in this RI Work Plan. However, as described in the Baseline CSM, other presently unidentified PFAS sites of interest may also exist within OU-03.

As previously noted, OU-03 is defined as off-site contamination related to the atmospheric deposition of Site-related contaminants and direct off-site disposal of Site-related liquid and/or solid wastes. A CSM diagram for the Hoosick Falls Region is included as Figure 6 (originally included in the Baseline CSM; C.T. Male and BEC, 2021c). It graphically presents the potential sources and transport pathways for PFAS in the OU-03 Investigation Area.

The PFAS release mechanisms and migration pathways in OU-03 can be categorized as follows:

> **Air emissions and deposition.** PFAS was released to the air (and subsequently deposited onto soil and/or surface water) within portions of the OU-03 Investigation Area. The central premise for investigation of this release mechanism is that PFAS mass deposition decreases in all directions with distance from an air emissions source and is greatest in the prevailing downwind direction. Additionally, PFAS impacts in groundwater related to air deposition result from downward migration (leaching) from soils.
>
> **Off-site disposal.** Site-related liquids were directed to the municipal sewer system and site-related solid wastes were potentially disposed at the Hoosick Falls Landfill. The discharge of Site-related liquid to the municipal sewer is being investigated as described in the OU-01 Addendum to the RI/FS Work Plan (C.T. Male and BEC, 2022b). The potential for disposal of Site-related solid wastes to the Hoosick Falls Landfill is being separately investigated under NYSDEC's remedial program. No unregulated off-site disposal of Site-related liquid and/or solid wastes has been documented to date.

Delineating the nature and extent of PFAS originating from historical Site-related air emissions in OU-03 requires distinguishing from or recognizing influence from other sources and pathways. To delineate the nature and extent of PFAS from historical Site air emissions, PFAS concentrations must (1) be reasonably attributable to air deposition rather than other release/transport mechanisms (e.g., use of commercial soil amendments, groundwater transport from other sources) and (2) be distinguishable from air deposition related to non-Site sources within or outside the Region (e.g., coating operations at other facilities, open burning of waste, local air emissions sources, and/or global air emission sources). Comparison of the PFAS concentrations upwind and downwind from a potential air emissions source, consideration of other potential local sources, and discussion of background levels are used to evaluate PFAS impacts elsewhere in New York (NYSDEC, 2021f). The need for a similar approach, using multiple lines of evidence, is anticipated for OU-03.

2.4 Existing Dataset

As previously mentioned, multiple PFAS investigations have been conducted in the Region. These investigations generated analytical data for thousands of individual samples. These sample data, as summarized in this section, provide an initial basis for understanding PFAS distribution in OU-03. PFAS data for soil, groundwater, sediment, and/or surface water samples from the following sites or investigations were used for this summary.

- Regional Air Deposition Study (Section 2.4.1.1)
- Regional surface water and sediment sampling (Section 2.4.3.1)
- Municipal Water Supply Study for the Village of Hoosick Falls (ERM and CHA, 2020)
- First Street Site (80 1st Street, Hoosick Falls, NY; No. 442052)
- Interface Solutions Site (12 Davis Street, Hoosick Falls, NY; No. 442059)
- John Street Site (3 Lyman Street, Hoosick Falls, NY; No. 442049)
- Liberty Street Site (1 Liberty Street, Hoosick Falls, NY; No. 442048)
- McCaffrey Street Site (14 McCaffrey Street, Hoosick Falls, NY; No. 442046)
- Mechanic Street Site (1 Mechanic Street, Hoosick Falls, NY; No. 442050)
- River Road Site (21410 and 21446 State Route 22, Hoosick, NY; No. 442008)
- Hoosick Falls Landfill (Route 22, Hoosick, NY; No. 442007)
- CTI Agri-Cycle Site (308 and 311 Belle Road, Buskirk, NY; No. C558043)
- Former Columbia Corporation Site (11 Cottrell Rd., Hoosick, NY; No. 442005)
- United States Environmental Protection Agency (USEPA) soil sampling (various locations in OU-01; USEPA, 2016a; 2016b; 2016c; 2016d; and 2016e)
- NYSDEC Satellite disposal sites investigation (various locations near Hoosick Falls and the Region)
- NYSDEC Screening Level Soil Sampling (NYSDEC, 2018a)
- NYSDEC Surface Water and Sediment Sampling (NYSDEC, 2016)
- NYSDEC/NYSDOH Non-public well sampling

The datasets discussed herein are not limited geographically to the OU-03 Investigation Area as concentrations within and outside of this area will be utilized for evaluation of nature and extent. The existing datasets include the following samples within the region:

- More than 4,000 water samples collected from more than 1,500 non-public wells (Figure 5A);
- More than 2,600 groundwater samples collected from approximately 480 locations (Figure 5B);
- More than 2,200 soil samples collected from approximately 760 locations (Figure 5C);
- More than 290 surface water samples collected from approximately 64 locations (Figure 5D); and
- More than 159 sediment samples collected from approximately 110 locations (Figure 5E).

Because all data summarized for this RI Work Plan have been previously submitted to the NYSDEC, for ease of interpretation, the data are generally presented in concentration maps rather than in tables.

Perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS) are the most frequently detected PFAS in the dataset and are also the only PFAS subject to New York State maximum contaminant levels (MCLs) and proposed soil guidance values; therefore, discussion of these two PFAS are included for each media.

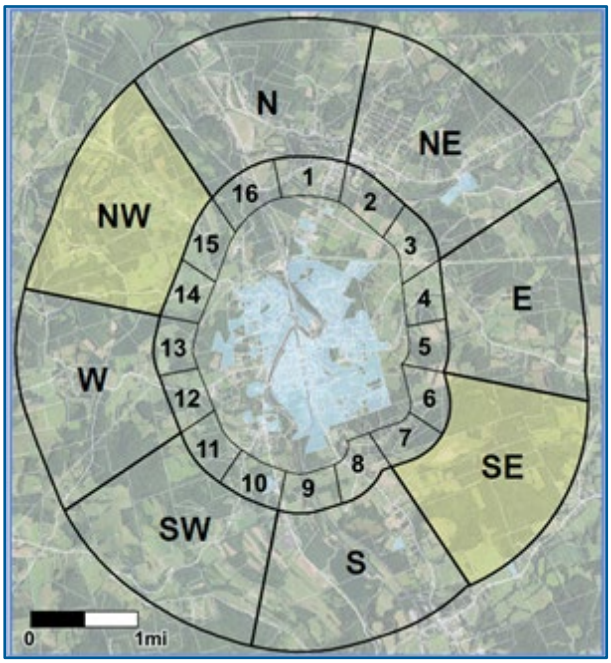
2.4.1 PFAS in Soil

This section discusses two datasets existing within the current investigation area of OU-03: (1) soil data collected during the Regional Air Deposition Study (C.T. Male and BEC, 2021a; C.T. Male and BEC), and 2) soil data collected during various investigations occurring within and near the OU-03 investigation area. The nature and extent discussion of PFAS in soil is separated accordingly below.

There are no soil cleanup objectives for PFAS in New York regulations; however, NYSDOH guidance values (NYSDEC, 2021b) have been prepared for PFOA and PFOS, are included in NYSDEC's PFAS guidance (NYSDEC, 2021a), and are referenced in the sections below.

2.4.1.1 Regional Air Deposition Study

In 2019, NYSDEC requested that the responsible parties conduct a Regional Air Deposition Study in the Hoosick Falls area to evaluate the air emissions and deposition pathway from multiple facilities in Hoosick Falls including the McCaffrey Street facility (C.T. Male, 2019). It is the only investigation conducted in the Region to date with a sampling program designed specifically to evaluate the air emission and deposition pathway.



Graphic 2: Air Deposition Study Area

The investigation was conducted in two phases—an initial phase and a supplemental phase—with the objective to determine whether the presence of PFAS is observable and consistent with an air deposition pattern from sources within the Village. The initial study area was designed as a 1,000- to 3,000-foot zone (i.e., 300 to 900 meters) beyond the Village (sectors 1 through 16 on Graphic 2) and the supplemental phase extended an additional 7,000 feet (i.e., 2,100 meters; sectors N, E, SW, etc., on Graphic 2). Although deposition onto various media (e.g., surface soil, surface water, and sediment) may have occurred, the sampling for the Regional Air Deposition Study was limited to soils since they were considered the most directly representative of air deposition.

Soil samples were collected from three intervals (0-2 inches below ground surface [bgs], 2-12 inches bgs, and 12-24 inches bgs) at each sampling location. Ultimately, 321 soil samples were collected from 107 individual sampling locations as a part of the study, with some sample locations collected as far as 3,000 meters (or two miles) from the approximate centroid of the Village. All sample locations were carefully

vetted with NYSDEC staff to be representative of air deposition and avoid other potential sources/transport pathways, as discussed in detail in the *Regional Air Deposition Study Work Plan for the Village of Hoosick Falls* (C.T. Male, 2019). The main goal of this vetting process was to ensure that the sample location was undisturbed for the last 60 years. As a result, the sample locations were often reached by foot within densely forested areas. The sampling area was divided in sectors to maximize coverage in all directions from the Village and sample locations for the supplemental phase were placed with a higher density in the predominant upwind (i.e., northwest) and predominant downwind (i.e., southeast) directions. Sampling design in the northwest sector included more samples in order to (1) characterize the primary upwind soil PFAS concentrations, and (2) potentially inform regional background conditions. The larger number of samples in the southeast sector was designed to provide a more robust dataset in the downwind direction for comparison with data collected in other directions and evaluate the PFAS concentration gradients with distance. Additional information on the sampling design and methods is included in *Regional Air Deposition Study Work Plan for the Village of Hoosick Falls* (C.T. Male, 2019) and *Supplemental Scope of Work: Regional Air Deposition Study* (C.T. Male and BEC, 2021b).

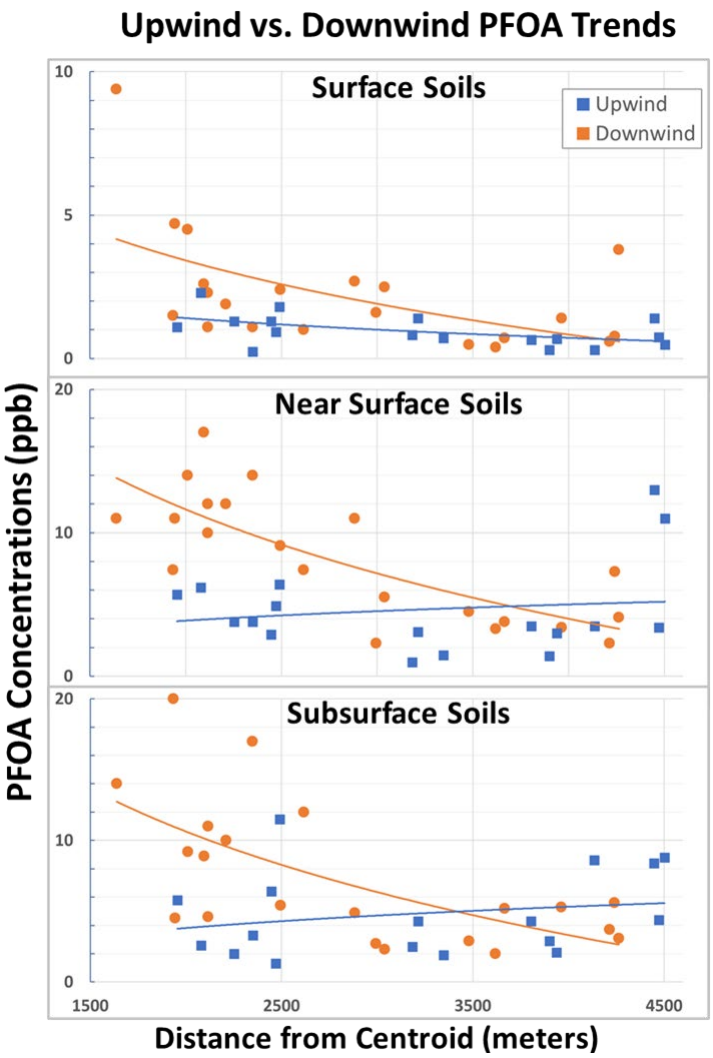
The most recent data summary report for the Regional Air Deposition Study, which includes results and evaluation of all soil samples, was submitted to NYSDEC in September 2022 (C.T. Male and BEC, 2022c). The figures from this report are included as Appendix A-1 of this RI Work Plan. The central concept to an air deposition model is that PFAS mass deposition will peak at some horizontal vector from its origin of emission and then decrease as the magnitude of that vector increases. . The anticipated regional pattern resulting from PFAS air emissions sources within the Village will be decreasing soil concentrations with distance and highest concentrations in the predominant downwind direction.

The following bullets briefly summarize the Regional Air Deposition Study (C.T. Male and BEC, 2021a; C.T. Male and BEC, 2022c):

- PFOA is the most predominant PFAS, detected in approximately 95% of the soil samples. The maximum detected concentration is 44 parts per billion (ppb; equal to nanograms per gram [ng/g]), and the median detected concentration is approximately 3 ppb. PFOA concentrations above the NYSDOH restricted residential guidance value (33 ppb) are limited to two subsurface (12-24 inches bgs) soil sample as shown on Figure 4C of Appendix A-1.

- PFOS is the second most predominant PFAS, detected in approximately 65% of the soil samples. The maximum detected concentration is 12 ppb, and the detected median concentration is approximately 0.4 ppb (Figures 5A, 5B, and 5C of Appendix A-1). PFOS is not detected above the NYSDOH restricted residential guidance value (44 ppb).

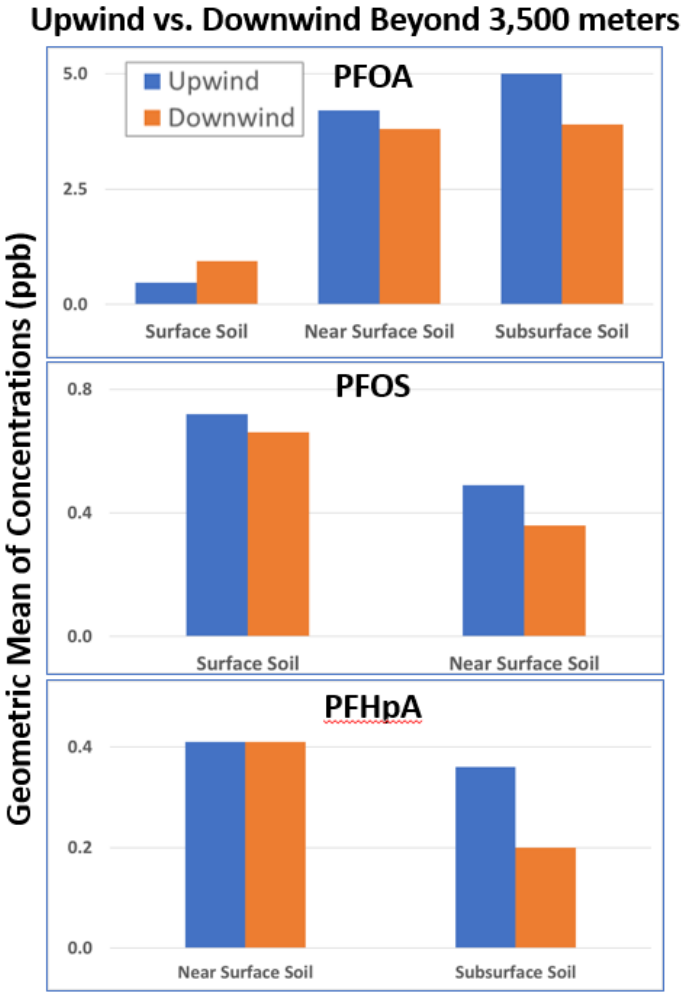
- Generally, the distribution of PFAS across sampling depth intervals demonstrates a pattern as would be predicted by their chain length (i.e., PFAS with longer chain lengths migrate more slowly and remain shallow). However, PFOA concentrations are consistently higher in the near-surface (2-12 inches bgs) and sub-surface samples (12-24 inches bgs) than in the surface soils (0-2 inches bgs).



Graphic 3: Upwind vs. Downwind PFOA Trends

- Soil concentrations for PFOA (see Graphic 3) and several other PFAS demonstrate a decreasing trend with distance in the predominant downwind direction (i.e., southeast). This is consistent with the anticipated pattern resulting from air emissions within the Village.

- As described above, there are consistencies with anticipated patterns from emissions within the Village; however, concentrations of PFOA, PFOS, and other PFAS increase in the upwind direction from the Village (see Graphic 3). Beyond 3,500 meters (approximately 2.2 miles) from the center of the Village, concentrations of several PFAS in the predominant upwind direction (i.e., northwest) are higher or comparable to downwind concentrations (Graphic 4). The magnitude and distribution of PFAS soil concentration are not entirely consistent with the deposition model described above and may indicate confounding factors (e.g. other sources, topography, unanticipated meteorological conditions, etc,).



Graphic 4: Upwind and Downwind Datasets

Based on data collected to date, the area of focus for investigation in this RI Work Plan is extended an additional 1,000 meters to 4,500 meters (i.e., approximately 2.8 miles in all directions from the Village center; see Section 3). This extension provides an appropriately conservative area for this investigation.

2.4.1.2 Other Soil Data

Hundreds of other soil samples in the OU-03 dataset were collected during various investigations for purposes other than evaluating the air deposition pathway. Many of the sampling locations were biased toward potential sources (i.e., the location of a suspected release in a site investigation) and others were screening-level samples. While the sampling locations for the air deposition study were vetted to be undisturbed for at least 60 years, many of these other sampling locations were placed specifically in locations known to be heavily disturbed (e.g., areas suspected of unregulated disposal or within the footprint of a former building). The soil samples within the dataset have a variety of depth intervals, ranging from shallow soils less than 2 feet to deeper samples near or below the water table (e.g., 10 to 30 feet bgs).

A series of figures showing PFAS concentrations in soil samples in the existing OU-03 dataset, excluding the Regional Air Deposition Study samples, are included as Appendix A-2 and listed below:

- PFOA - Figure A1
- PFOS - Figure A2
- Perfluorobutanoic acid (PFBA) - Figure A3
- Perfluoropentanoic acid (PFPeA) - Figure A4
- Perfluorohexanoic acid (PFHxA) - Figure A5
- Perfluoroheptanoic acid (PFHpA) - Figure A6
- Perfluorononanoic acid (PFNA) - Figure A7
- Perfluorodecanoic acid (PFDA) - Figure A8
- Perfluoroundecanoic acid (PFUnA) - Figure A9
- Perfluorododecanoic acid (PFDoA) - Figure A10
- Perfluorotridecanoic acid (PFTriA) - Figure A11

For simplicity, only one figure for each of these PFAS is included, showing the maximum concentration in soil samples from each location regardless of depth. The concentration ranges are shown using the same symbology as was used in the figures from the Regional Air Deposition Study Data Summary Report (Appendix A-1) to allow for comparison. There is very high soil sample density within the current OU-01 boundary (Figure 5C) and concentrations of PFAS in soil within that area were discussed within the recent OU-01 RI Work Plan Addendum (C.T. Male and BEC, 2022b). Therefore, data within OU-01 are not shown in the Appendix A-2 figures and are not discussed below.

Data generated by the site investigations of the Agricycle facility[1] in Washington County indicate exceedances of SCOs for residential use for PFOA in the vicinity of the site. These detections are significantly higher than the other PFOA detections in OU-03 and are consistent with concentrations that may indicate a source of PFOA.

PFOS soil concentrations above the restricted residential guidance value (44 ppb) are limited to 15 samples collected during investigation at the CTI Agri-Cycle site that ranged in concentration from 57 ppb to 1,100 ppb (Figure A2 of Appendix A-2). These concentrations are up to 90 times higher than any sample from the Air Deposition Study, located further upwind (i.e., northwest) than any Air Deposition Study sample and are collocated with elevated PFOA concentrations.

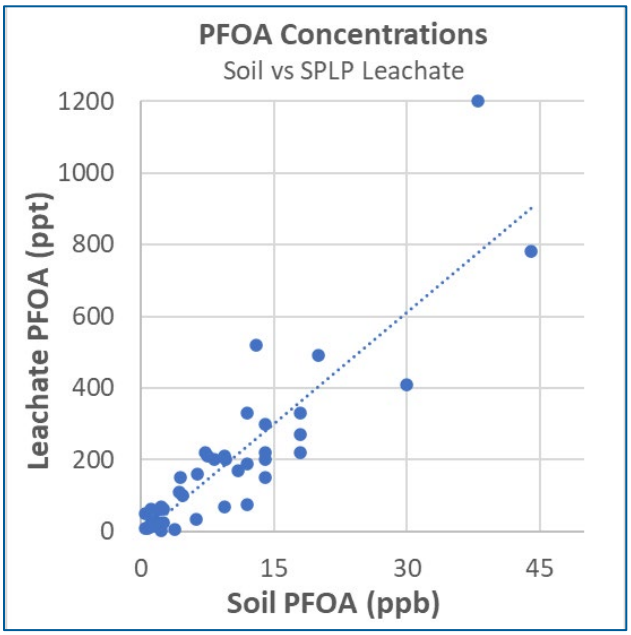
Concentrations of PFOS in soil above the residential guidance value (8.8 ppb), but below the restricted residential guidance value, are limited to a single sample collected at a site, recently designated by NYSDEC as a Class P site, located north of the Village. The site was part of a NYSDEC investigation into potential unregulated disposal sites, and the Class P site designation indicates that further site characterization is needed.

[1] The CTI Agri-Cycle site is a permitted compost facility located upwind (i.e., northwest) of the OU-03 Investigation Area (Figure 1). The site received residential yard waste and paper sludge from a number of nearby paper mills (a potential source of PFAS), managed the material in 12-foot-tall windrows for 50 days, and then spread this material onto nearby farm fields (CHA, 2021). PFOA and PFOS have been identified as the primary contaminants of concern for this site and investigation results indicate that "contamination has moved offsite" (CHA, 2021).

Seven of the other perfluoroalkyl carboxylic acids (PFCAs) detected in soils during the Air Deposition Study (PFHxA, PFHpA, PFNA, PFDA, PFUnA, PFDoA, and PFTriA) are detected at higher concentrations in samples collected during the ongoing investigation at the CTI Agri-Cycle site (Figures A5 through A11 of Appendix A-2). These concentrations were up ten times higher than those detected in any sample from the Air Deposition Study and were collocated with elevated PFOA and PFOS soil concentrations.

2.4.2 PFAS in Groundwater

PFAS in groundwater within and near the OU-03 Investigation Area could be present because of several pathways. For example, it could be the result of a direct release at a source area and subsequent travel with groundwater flow. However, for the OU-03 delineation (i.e., atmospheric deposition related to the Site) downward migration from surface soils is relevant. For this transport pathway, PFAS deposited at the ground surface will migrate downward through the soil column with percolating and infiltrating precipitation (Figure 6).



Graphic 5: SPLP sample sub-set

This pathway was evaluated during the initial phase of the Regional Air Deposition Study with the analysis of a sub-set of 45 samples using the Synthetic Precipitation Leaching Procedure (SPLP)[2] followed by PFAS analysis (C.T. Male and BEC, 2021a). The sample sub-set was selected in consultation with NYSDEC to be representative of the full range of PFAS concentrations and other parameters. PFOA concentrations in soils and SPLP leachate demonstrated a positive correlation (i.e., higher PFOA concentrations in soil correlated with higher lab-derived leachate concentrations; Graphic 5), and concentrations of roughly 1 ppb PFOA in soil generated leachate concentrations greater than 10 parts per trillion (ppt; equal to nanograms per liter [ng/L]) in the lab.

The existing groundwater dataset represents two distinct groups of data. The first group consists of groundwater samples collected from wells installed as part of site investigations (locations shown on Figure 5B), which were designed, installed, developed, and sampled in accordance with environmental investigation work plans. Many of these wells were temporary wells that collected discrete groundwater samples from the shallow/water-table aquifer. The second group consists of samples collected by the NYSDOH from existing non-public wells that provide drinking water to private properties (locations on Figure 5A). The age, installation method, construction type, sealing method, depth and other

[2] SPLP is an analytical method designed to determine the mobility of analytes present in liquids, soils, and waste. Soils are combined with water and tumbled end over end approximately 30 times per minute for 16 to 20 hours. The samples are then filtered, and the fluid (known then as leachate) is analyzed using standard analytical methods.

characteristics of these non-public wells are highly variable. In fact, the construction method and depth are unknown for many of these non-public wells.

For this summary of the existing groundwater dataset, PFOA and PFOS in groundwater samples were compared to the New York State (NYS) MCL of 10 ppt in accordance with NYSDEC guidance (NYSDEC, 2021c).

2.4.2.1 Groundwater Data from Investigations

A series of figures showing concentrations for selected PFAS in groundwater samples collected from shallow/water table monitoring wells in the existing dataset collected during various site investigations are included as Appendix B-1 and listed below:

- PFOA - Figure B1
- PFOS - Figure B2
- Perfluorobutanesulfonate (PFBS) - Figure B3
- Perfluorohexanesulfonic acid (PFHxS) - Figure B4
- PFBA - Figure B5
- PFPeA - Figure B6
- PFHxA - Figure B7
- PFHpA - Figure B8
- PFNA - Figure B9

Appendix B-1 includes one figure for each of the PFAS, showing the maximum concentration detected in groundwater samples from each monitoring well location regardless of sample date. Although the depth is not known for all groundwater samples in this dataset, they are assumed to be samples from the shallow or water-table aquifer. Data from wells that are known to be deeper aquifer or bedrock wells are not included on these figures. There is very high groundwater sample density (i.e., more than 2,000 groundwater samples) within the current OU-01 boundary (Figure 5B) and concentrations of PFAS in groundwater within that area were discussed within the recent OU-01 RI Work Plan Addendum (C.T. Male and BEC, 2022b). Therefore, data within OU-01 is not shown on these figures.

PFOA concentrations exceeding 10 ppt are found in most groundwater samples in the dataset, with a few exceptions. PFOA concentrations exceeding 500 ppt are detected in monitoring wells associated with investigations at several sites (Figure B1 of Appendix B-1). The highest concentrations are at a recently listed Class P site located immediately west of the Village (PFOA up to 1,400 ppt) and the Hoosick Falls Landfill (PFOA up to 24,000 ppt).

PFOS concentrations detected in shallow groundwater exceeding 10 ppt are very limited (Figure B2 of Appendix B-1). PFOS concentrations exceeding 10 ppt are detected in monitoring wells associated with investigations at several sites with the highest concentrations located at a recently listed Class P site north of the Village (PFOS up to 130 ppt) and the former Columbia Corporation site (PFOS up to 110 ppt) located northeast of the Village (NYSDEC, 2018b).

The highest groundwater detections of other PFAS in the dataset are found in similar locations as described above (Figures B3 through B9 in Appendix B-1). The highest groundwater concentrations of PFBS and PFHxS (both perfluoroalkane sulfonic acids [PFSAs]) are located near the CTI Agri-Cycle site. The

highest groundwater concentrations for the other PFCAs included in Appendix B-1 (PFBA, PFPeA, PFHxA, PFHpA, and PFNA) are found in monitoring wells associated with the CTI Agri-Cycle site, the former Columbia Corporation site, the Hoosick Falls Landfill, and/or the recently listed Class P site located north of the Village.

2.4.2.2 Non-Public Well Data

As of April 2019, the NYSDOH and NYSDEC have sampled and tested for PFOA in more than 1,500 non-public drinking water wells within the Town of Hoosick and surrounding areas (ERM and CHA, 2020). Additionally, NYSDEC has coordinated the installation, periodic sampling, operation, and maintenance of point-of-entry treatment systems (POETs) at many of these non-public wells. The sampled non-public well locations are shown on Figure 5A, and a series of figures showing raw water concentrations (i.e., influent samples collected prior to treatment) for PFAS in non-public wells are included as Appendix B-1 and listed below:

- PFOA - Figure B10
- PFOS - Figure B11
- PFBS - Figure B12
- PFHxS - Figure B13
- PFHpA - Figure B14
- PFNA - Figure B15

Note that most laboratory analysis by NYSDOH of non-public well samples has been limited to the six PFAS listed above, and the concentration ranges are shown using the same symbology as the groundwater figures (Appendix B-1) to allow for comparison. Many of the non-public wells in the dataset have been sampled on multiple occasions; however, the figures show only the maximum raw water concentration detected at each location regardless of sample date. As with other figures in this RI Work Plan, data within OU-01 is not shown on these figures. As noted above, the raw water samples from non-public wells are discussed separately from groundwater data generated from investigation monitoring wells. The age, installation method, construction type, sealing method, well depth, pump depth, casing integrity, and other characteristics of the non-public wells are highly variable and, in many cases, unknown. These are all variables that could potentially lead to differences in raw water PFAS concentrations. For example, a non-public well may be 200 feet deep, fully cased, and draw water from bedrock fractures while a nearby well may be shallow, poorly sealed, and draw water from surficial aquifer materials. Additionally, and as noted by NYSDEC elsewhere, PFAS may be present in samples as a result of the well pump assembly materials (e.g., Teflon wrapping, O-rings, etc.) or from nearby septic fields (NYSDEC, 2021d). Nonetheless, when considered in aggregate, the large number of non-public well raw water sample results may be informative of PFAS distribution patterns.

PFOA concentrations exceeding 10 ppt are found in raw water from many non-public wells in the region (Figure B10 in Appendix B-2). The most elevated raw water PFOA concentrations in non-public wells (i.e., exceeding 500 ppt) are in the following three areas: (1) the western side of OU-01, (2) north of the Hoosic River and Eagle Bridge, and (3) a single well located north of the Walloomsac River and North Hoosick (Hoosick Junction). Many of the non-public wells with raw water PFOA concentrations above 500 ppt along the western side of OU-01 are located near one of several sites under investigation as potential

sources of PFAS, and the concentration of PFOA in the associated investigation wells are generally comparable to these nearby non-public wells (Figure B1 of Appendix B-1 and Figure B10 of Appendix B-2). Similarly, the elevated raw water PFOA concentrations in the non-public wells north of Hoosick Junction are comparable to PFOA concentrations in nearby investigation wells associated with a recently listed Class P site. Similar comparisons are not possible for the area north of the Hoosic River and Eagle Bridge as nearby investigation data does not exist in that area.

PFOS concentrations exceeding 10 ppt are found in raw water samples from several non-public wells in the region, but at a much lower frequency than PFOA (Figure B11 in Appendix B-2). The highest raw water PFOS concentrations in non-public wells (i.e., exceeding 50 ppt) do not correlate with the highest PFOA concentrations or elevated PFOS investigative groundwater samples (see above). For example, three of the highest raw water PFOS concentrations in a non-public well (up to 103 ppt) are at the very southern margin of the OU-03 Investigation Area in the Hamlet of Hoosick. It is notable that the Hoosick Fire District, located in the Hamlet of Hoosick, has trained with and stored Class B fire-suppression foams containing PFAS (NYSDEC, 2019).

PFBS concentrations in raw water exceeding 10 ppt are found in a few isolated/scattered locations but are also generally clustered in the following two areas (Figure B12 in Appendix B-2): (1) two non-public wells in the Hamlet of Hoosick that correlate with elevated PFOS concentrations (see previous paragraph), and (2) several non-public wells northwest of the OU-03 Investigation Area near Eagle Bridge, East Buskirk, and Buskirk.

PFHxS concentrations in raw water exceeding 10 ppt are found in a few isolated/scattered locations and with some correlation with the locations of elevated PFOS and PFBS, but not PFOA (Figure B14 in Appendix B-2). The location with the highest PFHxS concentration (47 ppt) is located more than 1.5 miles north of the Hoosick Town boundary and west of the City of Center White Creek.

PFHpA concentrations in raw water exceeding 10 ppt are found throughout the Region and with some correlation with elevated PFOA concentration in several areas (Figure B15 in Appendix B-2). However, the highest PFHpA concentrations in raw water (i.e., those exceeding 50 ppt) are found in several wells in the Hamlet of Hoosick (correlating with elevated PFOS and PFBS) and several wells (including the highest concentration of 190 ppt) just south of the Walloomsac River near North Hoosick.

PFNA concentrations in raw water exceeding 10 ppt are found in a single non-public well located just south of the Walloomsac River near North Hoosick (Figure B16 in Appendix B-2). This is the same non-public well with the highest raw water concentrations of PFHpA and is located directly adjacent to the North Hoosick Fire Department, which is known to have stored Class B fire-suppression foams containing PFAS (NYSDEC, 2019).

2.4.3 PFAS in Surface Water

PFAS in surface water within and near the OU-03 Investigation Area could be present because of several pathways, including direct release or deposition to surface water, leaching and runoff from soils, and discharges from groundwater. All these pathways are relevant within and near the OU-03 Investigation Area and likely overlap. Groundwater discharge to rivers, streams, or springs (e.g., gaining streams) and

overland transport of PFAS-impacted soils as storm-generated runoff (e.g., following rainfall or during snowmelt) are the most significant pathways of PFAS to surface water in the Region (Figure 6). PFAS concentrations in surface water can be highly variable across short distances and potentially related to the size and flow of water bodies or proximity to sources. Because many smaller tributaries and manmade drainages to the Hoosic River flow only seasonally, dissolution of PFOA and PFOS from surface soils likely plays a larger role than groundwater discharge in smaller surface water body concentrations.

2.4.3.1 Regional Baseflow Sampling

The NYSDEC requested a scope of work for surface water and sediment sampling to supplement the Regional Air Deposition Study. The Regional Surface Water and Sediment Sampling plan (C.T. Male and BEC, 2021d) was approved by NYSDEC via email on November 24, 2021. One objective under this plan was to characterize PFAS in the Hoosic River and its major tributaries under baseflow conditions. Baseflow is the condition of a river or stream when its flow is at a relatively constant level and where contributions from groundwater discharges represent the highest proportion of total stream flow.

Figures from the recent data summary report for this sampling are included as Appendix C-1 to this work plan (C.T. Male and BEC, 2022a). The sampling included collection of surface water samples at ten locations, as shown on Figure 2 of Appendix C-1. All sampling locations were situated within the Browns Brook - Hoosic River subwatershed (Figure 4). Sampling locations were distributed as follows:

- Two locations within the Hoosic River, one upstream (HR1) and one downstream (HR2) of the Village boundary;
- One location in each of four tributaries to the east of the Hoosic River; and
- One location in each of four tributaries to the west of the Hoosic River.

The baseflow conditions were evaluated based on regional rainfall data and nearby river gauge stations. All ten surface water samples were collected within a five-hour period.

PFOA concentrations in these baseflow surface water samples range from 5.4 ppt to 74 ppt, with the highest concentrations detected in tributaries east of the Hoosic River (Figure 3A of Appendix C-1). The two lowest PFOA detections are from samples in the Hoosic River. The PFOA concentration in the upstream sampling location (5.4 ppt) is similar to the concentration in the downstream sampling location (8.3 ppt).

Detected PFOS concentrations in these surface water samples rangefrom 0.54 ppt to 1.5 ppt (Figure 3B of Appendix C-1). The highest detected PFOS concentration is detected in the Hoosic River sample located upstream of the Village. This indicates that under baseflow conditions, the region does not contribute a measurable amount of PFOS to the Hoosic River. Five other PFAS are detected in these baseflow samples (PFBS, PFBA, PFPeA, PFHxA, and PFHpA) at concentrations less than 3 ppt.

2.4.3.2 Regional Screening Level Sampling

An additional objective included in the Regional Surface Water and Sediment Sampling plan (C.T. Male and BEC, 2021d) was to conduct a screening level evaluation of other surface water features within the Region. Observation and assessment of surface water features was conducted alongside in-field vetting of

parcels for the Air Deposition Study (Section 2.4.1.1) to establish potential sampling locations. In coordination and consultation with NYSDEC, 13 locations were selected for surface water sampling. The locations included five springs, six streams, and two spring-fed ponds (Figure 2 Appendix C-1). These locations were spread across the following subwatersheds: Nipmoose Brook-Hoosic River, Browns Brook-Hoosic River, Walloomsac River, and Little White Creek (Figure 4). In some cases, these sample locations were more than two miles from the Village boundary. Unlike the regional baseflow sampling described above, the surface water samples for this screening-level sampling were collected across a five-month period and represent a variety of flow conditions. Figures with results for this screening-level sampling from the data summary report are also included in Appendix C-1 (C.T. Male and BEC, 2022a).

The PFOA concentrations in streams (2.8-80 ppt) are generally lower than those detected in springs (12-350 ppt) (Figure 5A of Appendix C-1). The highest PFOA detection in surface water from this sampling event (350 ppt) is from a spring north of the Walloomsac River. Springs are generally understood to be expressions of groundwater at the ground surface in the study area. PFHpA concentrations correlate with PFOA in surface water detections, with the highest PFHpA concentrations (13 ppt) also found in the spring north of the Walloomsac River (C.T. Male and BEC, 2022a). It is notable that the highest spring concentrations for PFOA are found in samples located outside of the watershed containing the Village of Hoosick Falls and not in springs located closer to the Village or in springs located in the predominant downwind direction (i.e., southeast).

PFOS is only detected in one of these 13 surface water samples (0.76 ppt), which was collected from a spring-fed pond located west of the Village. Four other PFAS (PFBS, PFOSA, PFPeA, and PFHxA) are detected in at least one of these screening-level samples with detected concentrations less than 3 ppt (C.T. Male and BEC, 2022a).

2.4.3.3 Other Surface Water Data

Many other surface water samples in the existing dataset were collected during various PFAS investigations for other purposes. Some of these other surface water samples were located near potential sources (i.e., location of a suspected release in a site investigation); however, other samples could be described as screening-level (e.g., a variety of NSYDEC sampling conducted in 2016). For many of these samples, the type of water body (e.g., spring, pond) is not known. A series of figures showing PFAS concentrations in these surface water samples, excluding the regional baseflow and screening-level sampling described above, have been included as Appendix C-2 and are listed below:

- PFOA - Figure C1
- PFOS - Figure C2
- PFBS - Figure C3
- PFHxS - Figure C4
- PFBA - Figure C5
- PFPeA - Figure C6
- PFHxA - Figure C7
- PFHpA - Figure C8
- PFNA - Figure C9

As with other figures in this RI Work Plan, only one figure for each of the PFAS was included, showing the maximum concentration in surface water samples from each location regardless of depth or sample date. There are many surface water samples within the current OU-01 boundary (Figure 5D) and concentrations of PFAS in surface water within that area were discussed within the recent OU-01 RI Work Plan Addendum (C.T. Male and BEC, 2022b). Therefore, data within OU-01 is not shown on these figures.

PFOA concentrations above 10 ppt are detected in many of these surface water samples in the existing dataset (Figure C1 of Appendix C-1). PFOA concentrations exceeding 500 ppt are detected in surface water samples collected during the Hoosick Falls Landfill investigation (PFOA up to 11,000 ppt) and two recently listed Class P sites west of the current OU-01 boundary and the Hoosic River (PFOA up to 890 ppt). PFOA are detected in the Walloomsac River at 22 ppt (northeast of the Village) and the Little Hoosic River at 130 ppt (south of the Village beyond the map extent). These PFOA concentrations are notable since these are major tributaries to the Hoosic River and concentrations are detected in sampling locations upstream of the OU-03 Investigation Area.

PFOS surface water concentrations above 10 ppt are not widespread in the existing dataset and are only found in samples associated with site investigations (Figure C2 of Appendix C-1). The highest of these PFOS concentrations (up to 820 ppt) are in surface water samples collected at the Former Columbia Corporation site. Other PFOS concentrations above 10 ppt are found in surface water samples from the CTI Agri-Cycle site (up to 180 ppt) and the Hoosick Falls Landfill (up to 45 ppt). No surface water samples within OU-01 or associated with the Site exhibit PFOS concentrations greater than 100 ppt.

The locations of surface water concentrations above 10 ppt for other PFAS in the existing dataset (PFBS, PFHxS, PFBA, PFPeA, PFHxA, PFHpA, and PFNA) (Figures C3 to C9 in Appendix C-2) generally correlate with PFOS concentrations The maximum detected concentrations for all of these PFAS are found in samples associated with the CTI Agri-Cycle site (up to 2,700 ppt for PFHxA), with one exception (i.e., PFNA maximum of 47 ppt isassociated with the Former Columbia Corporation site). For some PFAS, these detections represent concentrations that are more than 50 times higher than the maximum concentrations detected within the current OU-01 boundary.

2.4.4 PFAS in Sediment

As for other media discussed above, PFAS in sediment within and near the OU-03 Investigation Area could be present because of several pathways. PFAS can be directly released or deposited to sediment, but also may reach sediment because of runoff from soils and adsorbed from groundwater discharge. All these pathways are relevant within and near the OU-03 Investigation Area and likely overlap. The main transport pathway for PFAS to sediment from potential Site-related atmospheric deposition is likely through sedimentation of runoff from surficial soils (Figure 6). PFAS in soils from atmospheric deposition are transported overland as storm-generated runoff (e.g., following rainfall or during snowmelt) and potentially settling to sediments.

The available dataset shown on Figure 5E was generated during the same sampling efforts and investigations discussed in Section 2.4.3, with most sediment samples co-located with surface water samples. Therefore, the discussion below is organized into three similar groups.

2.4.4.1 Regional Baseflow Sampling

The regional baseflow sampling scope (Section 2.4.3.1) included sampling of sediments co-located with each of the ten surface water samples. PFAS concentrations in sediments are not dependent on flow during sample collection. Therefore, the sediment samples were not collected within a discrete time window like the surface water samples (i.e., five-hour period), but rather sampled when the sediments could be safely accessed. The sampling yielded 29 sediment samples (ten locations at three depth intervals, with refusal at one location at 6 inches).

PFOA concentrations in these sediment samples ranged from 0.27 ppb to 8.1 ppb, with the two highest concentrations detected in an unnamed tributary east of the Hoosic River (Figure 4A of Appendix C-1). One of the six samples collected from the Hoosic River yielded detectable concentrations of PFOA (0.44 ppb).

Detected PFOS concentrations in these sediment samples ranged from 0.26 ppb to 1.3 ppb, with the highest concentration detected at the downstream Hoosic River sample location (Figure 4B of Appendix C-1). PFOS is not detected in samples collected from six of the ten sampling locations. Only two other PFAS (PFHpA and PFHxA) were detected in sediment samples collected under this scope. These detections were very infrequent and all less than 0.6 ppb (C.T. Male and BEC, 2022a).

2.4.4.2 Regional Screening Level Sampling

The regional screening-level sampling scope (Section 2.4.3.2) included sampling of sediments collocated with all 13 of the surface water samples; however, no sediment was present at three of the locations. The sampling yielded 30 sediment samples (ten locations at three depth intervals). PFOA was detected in 20 of the 30 samples, while PFHpA and PFOS were detected in only three samples and no other PFAS were detected in any of the samples.

PFOA concentrations in these sediment samples ranged from 0.32 ppb to 12 ppb, with the two highest concentrations detected in a spring-fed pond approximately 6,000 feet west of the Village (Figure 6A of Appendix C-1). PFHpA detections (maximum of 0.29 ppb) generally coincided with higher PFOA detections; however, the PFOS detections (maximum of 0.46 ppb) did not (Figure 6B of Appendix C-1).

2.4.4.3 Other Sediment Data

Many other sediment samples in the existing dataset are generally collocated with the surface water samples discussed in Section 2.4.3.3 above (some located near potential sources and others for screening). Figures showing the PFOA and PFOS in these sediment samples, excluding the regional baseflow and screening level sampling described above, have been included as Appendix C-2 and are listed below:

- PFOA - Figure C10
- PFOS - Figure C12

As with other figures in this RI Work Plan, only one figure for each of the PFAS was included, showing the maximum concentration in sediment samples from each location regardless of depth. There are many sediment samples within OU-01 (Figure 5E) and concentrations of PFAS in sediment within that area were

discussed within the recent OU-01 RI Work Plan Addendum (C.T. Male and BEC, 2022b). Therefore, data within OU-01 is not shown on these figures.

PFOA concentrations in sediments above 10 ppb have been detected in a limited number of sediment samples in the existing dataset (Figure C10 of Appendix C-1). The highest sediment concentration for PFOA (39 ppb) is detected in a sample from collected as a part of NYSDEC potential disposal site investigation northwest of the Village at the margins of the OU-03 Investigation Area, just north of the Walloomsac River.

PFOS sediments concentrations above 10 ppb are even more limited in the existing dataset and are only found in samples associated with the Former Columbia Corporation site and the CTI Agri-Cycle site (Figure C12 of Appendix C-1). The highest PFOS concentrations (up to 62 ppb) are in sediment samples collected at the Former Columbia Corporation site and correlate with PFOS concentrations in surface water samples. It is notable that the maximum PFOS concentrations detected in sediment samples within the current OU-01 boundary were 8.8 ppb.

Detections of other PFAS in sediment in the existing OU-03 are limited in comparison to PFOA and PFOS, with maximum detections generally less than 3 ppb except for several PFAS detected in sediments at the Former Columbia Corporation site, which were not frequently detected elsewhere. For example, perfluorooctanesulfonamide (FOSA) and N-Ethyl perfluorooctanesulfonamidoacetic acid (N-EtFOSAA) were detected at concentrations greater than 500 ppb in a sediment sample from the Former Columbia Corporation site.

2.5 Nature and Extent Summary

Delineating the nature and extent of PFAS originating from historical Site-related air emissions in OU-03 requires distinguishing these impacts from other sources and pathways. It is generally anticipated that air emissions from a source would result in diffuse and relatively predictable distribution pattern of PFAS rather than geographically isolated high concentrations (i.e., hot spots). In addition, this pathway is expected to distribute individual PFAS in relatively consistent proportions (i.e., concentrations for individual PFAS coinciding geographically).

The Regional Air Deposition Study is the only investigation conducted in the Region to date with a sampling program designed specifically to evaluate the air emissions and deposition pathway. Using representative shallow samples of undisturbed soils (i.e., no evidence of tilling, filling, removal, or amendment for the last 60 years), this Regional Air Deposition Study found that PFOA and several other PFAS demonstrate a decreasing trend with distance in the predominant downwind direction (i.e., southeast). Beyond 3,500 meters from the approximate center of the Village there is no observable upwind/downwind concentration gradient and upwind PFAS concentrations exceeded those in the downwind direction. The trend in concentrations with distance in the predominantly upwind direction (i.e., northwest) cannot be explained by potentially Site-related atmospheric deposition (Section 2.4.1.1).. The Regional Air Deposition Study also found that the distribution of different PFAS indicates multiple air-emissions sources.

The review and evaluation of the additional data within the existing dataset (Section 2.4) yielded several notable observations regarding the nature and extent of PFAS in the Region. These observations are summarized as follows:

- PFAS concentrations in several soil samples greatly exceeded concentrations in samples from the Regional Air Deposition Study (up to 90 times higher). These samples are located upwind of the Regional Air Deposition Study investigation area and likely related to a source other than Site-related atmospheric deposition. The nature and extent to which these and other sources may be contributing to PFAS concentrations in the OU-03 Investigation Area is not fully understood.

- Several soil samples located closer to the Village than the Regional Air Deposition Study samples yielded much lower PFAS concentrations. Since they are closer to the Village (and the Site), these sample locations would be subject to higher rates of any potential Site-related PFAS deposition and expected to exhibit higher PFAS concentrations. These locations were not similarly vetted (i.e., undisturbed for 60 years) for land use and soil disturbances (e.g., tilling, filling, removal).

- PFOA concentrations exceeding 10 ppt in groundwater are found throughout the Region, with elevated concentrations of PFAS detected in samples collected at numerous other sites under investigation. These elevated concentrations are currently considered unrelated to atmospheric deposition from the Site but will be re-evaluated as more data is collected. The existing groundwater dataset within the OU-03 Investigation Area, not including the non-public well data, is limited in geographic coverage, especially in areas not proximal to known or suspected sources.

- PFAS concentrations in raw water samples from non-public wells strongly indicate influence from multiple unique sources (Section 2.4.2.2). For example, the data demonstrates clusters of non-public wells with elevated raw water PFOA concentrations and clusters of other PFAS in geographically distinct areas (i.e., miles away in opposite directions from the Site). As discussed in Section 2.4.2.2, a potential source has been identified for some, but not all, of these clusters.

- PFAS surface water concentrations from other site investigations in the Region were elevated, exceeding concentrations found within OU-01 (i.e., closer to the Site) by more than 50 times in some instances. However, it is unclear how connected these areas are to surface waters in their respective watersheds in the Region. Also, PFAS has been detected at concentrations (up to 130 ppt) in major tributaries to the Hoosic River, upstream of the OU-03 Investigation Area. This indicates the likely presence of other sources outside the OU-03 Investigation Area.

- Screening-level sampling of surface water has been conducted in the Region from various water body types and under differing flow conditions. PFAS concentrations in these water bodies do not appear to be connected to emissions sources from within the Village. Flow condition, location, drainage area, and size of the water body could potentially influence PFAS concentration in a surface water sample. The structured sampling approach of regional baseflow scope (i.e., sample under similar flow conditions; locations selected based on drainage areas across a watershed) yielded PFAS results more congruent with anticipated distribution patterns from emissions sources within the Village. The PFAS concentration at these locations during high-flow conditions

has yet to be evaluated. Additionally, similarly structured surface water sampling elsewhere in the OU-03 Investigation Area (i.e., within other drainages and watersheds) has yet to be conducted.

- PFAS sediment concentrations from site investigations in the Region were elevated, exceeding concentrations found within OU-01 (i.e., closer to the Site) by more than 100 times in some instances. PFAS detection frequencies and concentrations in sediment samples collected elsewhere in the Region (sections 2.4.4.1 and 2.4.4.2) were generally limited and lower than in soils.

As discussed in the preceding sections, analytical data for thousands of individual samples were consolidated and evaluated in an attempt to understand the nature and extent of PFAS in the Region. This effort yielded several instances in which data aligned with potentially Site-related impacts; consistent with atmospheric deposition from a source within the Village. However, impacts from other sources within and potentially outside the OU-03 Investigation Area are evident in the data and likely overlap these potentially Site-related impacts. This overlapping, along with the numerous migration pathways and variables influencing migration/retention of PFAS, makes the task of delineating the nature and extent for OU-03 challenging. Nonetheless, the extensive evaluation also identified opportunities for additional data collection that may refine the understanding of the nature and extent of PFAS in OU-03 related to the Site. These are addressed with the scope of work described in Section 3.

3.0 Proposed Scope of Work

The proposed scope of work is designed to address data gaps, further evaluates transport pathways, and update the CSM. The results from the Regional Air Deposition Study indicate PFAS concentrations in soil samples located more than 3,500 meters (approximately 2.2 miles) upwind from the approximate Village center are higher than in soil samples located at comparable distances downwind of the Site (Section 2.4.1). Increasing concentrations in the predominant upwind direction cannot be explained by air emissions sources from within the Village. These results, along with others described above, reflect an overlapping of potentially Site-related PFAS and PFAS from off-site sources including off-site air emissions sources (i.e., local upwind source(s), and/or regional background, and/or global background, etc.).

Sampling to characterize background concentrations has not been proposed in this work plan. NYSDEC has initiated a statewide background study of PFAS in soils that will provide supplemental information to consider as the results from the OU-03 investigation are evaluated. Based on review of this additional data, the need for additional background sampling for OU-03 will be evaluated in the future.

To provide a conservative area for the investigation, the area of focus for additional investigation described in this RI Work Plan will extend 1,000 meters to 4,500 meters (approximately 2.8 miles) in all directions from the approximate Village center (shown as the OU-03 Investigation Area on Figure 1). The sample locations are presented on Figures 7 through 10, and Table 1 provides a summary of the sampling, including analysis, depths, and sample rationale. The data collected under this RI Work Plan (and previous studies within OU-03) will be utilized to further refine the understanding of impacts due to atmospheric deposition of PFAS that is potentially Site-related.

3.1 Soil Investigation

Soil sampling conducted in undisturbed areas as part of the Regional Air Deposition Study characterized and delineated PFAS impacts in shallow soils (e.g., zero to two feet bgs) up to 3,500 meters from the approximate Village center (Section 2.4.1.1). The proposed soil investigation consists of two parts: (1) collection of soil samples to the water table, and (2) collection of shallow soil samples from disturbed areas for comparison to the existing undisturbed soil sample results.

3.1.1 Soil Sampling to Water Table

Soil samples will be collected and logged continuously from the ground surface to the water table at the 14 TGMP locations described in Section 3.2 (Figure 7). As discussed in Section 3.2, these locations will be in undisturbed areas, based on vetting similar to the Regional Air Deposition Study. Soil sample intervals for the first 2 feet will align with the previous phases of the air deposition study and other investigations at the Site (0-2 inches bgs, 2-12 inches bgs, and 12-24 inches bgs). Beyond 24 inches bgs, subsurface soil samples will be collected in continuous 4-foot intervals until groundwater is encountered or refusal.

The soil samples collected from the three intervals down to 24 inches bgs will be added to the data set already collected from undisturbed locations from the previous phases of the study and used to further evaluate nature and extent. The soil samples collected below 2 feet will be used to evaluate downward migration of PFAS within the soil column.

Soil sampling will be conducted according to the methods specified in the most recent Field Sampling Plan (FSP; C.T. Male and BEC, 2020a). Soil samples will be submitted for lab analysis of PFAS, total organic carbon (TOC), and pH in accordance with the most recent QAPP[3] (C.T. Male and BEC, 2020b).

3.1.2 Shallow Soil Sampling from Disturbed Areas

Soil sampling conducted in undisturbed areas as part of the Regional Air Deposition Study characterized and delineated PFAS impacts in remote, inaccessible shallow soils that were undisturbed for at least the last 60 years. However, evaluation of data indicates that samples of disturbed soils, at least those not impacted by other sources, may have lower PFAS concentrations than anticipated based on results of the Regional Air Deposition Study (Section 2.4.1.2.) Since these locations were not similarly vetted (i.e., undisturbed for 60 years), land use and soil disturbances may help explain these lower concentrations.

Shallow samples will be collected in disturbed soils and will be compared to the undisturbed shallow soil results from the Regional Air Deposition Study to better understand the effects disturbance (i.e., tilling, landscaping, etc.) has on the presence and distribution of PFAS in shallow soils within OU-03. These samples will be collected from 20 total locations and from the same three depth intervals as the Regional Air Deposition Study (e.g., 0-2 inches bgs, 2-12 inches bgs, and 12-24 inches bgs; a total of 60 samples; Table 1). Ten of the sample locations will be collected from residential-use properties (representative of landscaping and manicured lawns) and the other ten locations will be collected from agricultural use properties (representative of tilling, plowing, or other common agricultural practices). Land use categories by parcel based on available county data are shown on Figure 7. Final locations will be selected in coordination and consultation with NYSDEC. The goal will be to identify locations that meet the considerations listed below:

- Residential or agricultural use properties (as described above);
- Properties with existing access agreements;
- Areas located near Regional Air Deposition Study sampling locations; and
- Focused in areas of highest existing data density (e.g., the northwest and southeast sectors) for comparison (Figure 7).

Sampling locations will be preliminarily identified based on the above considerations and additional vetting based on aerial imagery and previous field reconnaissance conducted during the Regional Air Deposition Study sampling efforts. The locations will be provided to NYSDEC for consideration and approval prior to obtaining property access or field reconnaissance. Soil sampling will be conducted according to the methods specified in the most recent Field Sampling Plan (FSP; C.T. Male and BEC,

[3] *NYSDEC has stated that, beginning November 1, 2022, they will require the use of Method 1633 (whether finalized or in its draft form) for the analysis of PFAS in environmental media. The most recent QAPP (C.T. Male and BEC, 2020b) specifies Method 537 for PFAS analysis. Since samples to be collected in accordance with this work plan will be compared to thousands of samples analyzed using this methods, evaluation of consistency between the methods is merited prior to revising the subject QAPP. A letter proposing this evaluation, potentially including limited split samples for comparison, is forthcoming.*

2020a). Soil samples will be submitted for lab analysis of PFAS, TOC, and pH in accordance with the most recent QAPP[4] (C.T. Male and BEC, 2020b).

3.2 Groundwater Investigation

Groundwater sampling conducted in the OU-03 Investigation Area by others as part of site investigations was focused on source area and plume delineation and not potential impacts to groundwater from the air deposition pathway (Section 2.4.2.1). The geographic coverage of groundwater investigation across the OU-03 Investigation Area is limited. Over 600 non-public drinking water wells have been sampled by NYSDEC/NYSDOH in the OU-03 Investigation Area (with many more in the Region), providing better geographic coverage; however, the well depth, geologic characterization, and other well construction information are not known for many of the non-public wells (Section 2.4.2.2).

The proposed groundwater investigation is designed to characterize shallow groundwater concentrations of PFAS at 14 TGMP locations. As discussed in Section 3.1, sampling of soil at these locations will also provide information on the migration of PFAS in soils in OU-03. To the extent practical based on accessibility considerations, sampling locations will be in undisturbed areas as determined through vetting, like the Regional Air Deposition Study, and arranged throughout the OU-03 Investigation Area, as shown on Figure 8. Exact locations will be selected in coordination with NYSDEC in accordance with the following considerations, when possible:

- Accessible by a direct-push drill rig
- Properties with existing access agreements and previously vetted during the Regional Air Deposition Study
- Locations with soil data from the Regional Air Deposition Study
- Focus in predominant upwind and downwind directions (e.g., the northwest and southeast sectors)

One groundwater sample will be collected from each TGMP. Temporary points will be installed in the water table using direct-push technology to a depth that achieves a representative shallow groundwater sample. After sample collection, the temporary point and borehole will be abandoned and the ground surface restored.

Five monitoring well locations are planned for installation at the outside margins of the current OU-01 boundary as part the OU-01 RI Work Plan Addendum (C.T. Male and BEC, 2022b; Figure 8). These locations are also being vetted to be unaffected by known or suspected sources, other than potential atmospheric deposition. Groundwater data from the OU-01 wells will therefore be incorporated into evaluations of OU-03 groundwater data.

Temporary monitoring point installation, development, and groundwater sampling will be conducted according to the methods specified in the most recent FSP (C.T. Male and BEC, 2020a). Groundwater

samples will be submitted for laboratory analysis of PFAS in accordance with the most recent QAPP (C.T. Male and BEC, 2020b).

3.3 Surface Water and Sediment Investigation

Regional baseflow sampling characterized PFAS concentrations in surface water and sediment within the Hoosic River and in eight tributaries within the Browns Brook-Hoosic River subwatershed. This sampling characterized PFAS concentrations under baseflow conditions (i.e., groundwater discharges at maximum influence). The PFAS concentration in surface water at these locations under high-flow conditions (i.e., runoff from surficial soils at maximum influence) has yet to be characterized and is included in this scope as detailed below.

The approximate drainage area represented by each of these sampling locations is shown on Figure 9. The approximate drainage area for each sampling location is dependent on the size of each stream and its location within each stream's reach. Also, samples collected upstream and downstream within the same stream or river have overlapping drainage areas (i.e., the downstream locations drainage area is larger and fully encompasses the drainage area of the upstream location). As shown on Figure 9, the drainage areas for the previously sampled Regional Baseflow Sampling locations cover much of the OU-03 Investigation Area. The additional sampling locations included in this proposed scope provide additional coverage of the northern and western portions of the OU-03 Investigation Area, as shown on Figure 9. The surface water and sediment scope of work includes (Figure 9 and Table 1):

- Resampling surface water under high-flow conditions at ten previously sampled locations (i.e., Regional Baseflow sampling locations). Samples will be collected within 24 hours of a rain event for high-flow conditions. Sediments will not be resampled as they are not anticipated to demonstrate variability like surface water.
- Sampling surface water and sediment at nine new stream locations (Figure 9). Surface water and sediment will be sampled under baseflow conditions as was done during the Regional Baseflow Sampling (Section 2.4.3.1). Surface water will also be resampled at these locations under high-flow conditions, collected within 24 hours of a rain event for high-flow conditions.

Surface water and sediment sampling will be conducted according to the methods specified in the most recent FSP (C.T. Male and BEC, 2020a). Surface water samples will be submitted for laboratory analysis of PFAS, and sediment samples will be submitted for laboratory analysis of PFAS, TOC, and pH, in accordance with the most recent QAPP (C.T. Male and BEC, 2020b).

3.4 Proposed Scope Summary

The primary objective of the scope of work is to address data gaps, refine the CSM and further define the nature and extent of PFAS impacts due to atmospheric deposition potentially from the Site. The scope of work, which includes collection and analysis of more than 160 samples, is summarized below (Figure 10 and Table 1):

- Soil – Sampling of shallow soils at multiple depth intervals (0-2 inches bgs, 2-12 inches feet bgs, and 12-24 inches bgs) in disturbed areas including ten residential-use properties and ten agricultural-use properties (a total of 60 soil samples). Proposed sampling locations will be placed

near undisturbed soil sampling locations from the Regional Air Deposition Study to allow for comparison. Continuous logging and sampling of soils at each of the 14 TGMPs to the water table with shallow sample intervals matching those listed above (more than 50 soil samples in total depending on depths to the water table).

- Groundwater – installation of 14 TGMPs within undisturbed areas. Collection of one groundwater sample (a total of 14 groundwater samples) at each TGMP.
- Surface water and sediment – Resampling surface water at ten previously sampled stream and river locations under high-flow conditions (previous samples were collected during baseflow conditions). Sampling of surface water and sediment samples at nine new stream locations to provide coverage across the OU-03 Investigation Area. Sediment samples at these new locations will be collected during baseflow conditions, and surface water samples will be collected during both baseflow and high-flow conditions (a total of 28 surface water samples and up to 27 sediment samples).

3.5 Additional Assessments

A fish and wildlife impact assessment (FWIA) will be conducted for OU-03 in accordance with Appendix 3C of DER-10 Technical Guidance for Site Investigation and Remediation. The FWIA will rely upon the Baseline Ecological Risk Assessment (BERA) conducted for OU-01 (GSI, 2021a). Also, a qualitative human health exposure assessment will be conducted for OU-03 in accordance with Appendix 3B of DER-10 Technical Guidance for Site Investigation and Remediation and will rely upon the Baseline Human Health Risk Assessment (BHHRA) being conducted for OU-01 (GSI, 2021b).

4.0 Data Validation, Reporting, and Schedule

Analytical data validation will be conducted by an independent data validator in accordance with previously approved methods (C.T. Male, 2016). Analytical data gathered during the work described in this RI Work Plan will be shared with NYSDEC as part of the periodic data submittals. A detailed evaluation of the data, conclusions, and recommendations will be included in the OU-03 RI Report. Upon NYSDEC acceptance of this RI Work Plan, the work will be scheduled for initiation as soon as practicable.

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Tables

Table 1: Summary of Proposed Investigation

OU-03 Remedial Investigation Work Plan

Sample Location Name	Sample Location Type	Proposed Sample Media	Laboratory Analysis	Comments
OU03-S01	Shallow soil sample location	Soil samples[a]	PFAS, TOC, and pH	Locations within the OU-03 Investigation Area (TBD). Ten locations from residential-use properties and ten locations from agricultural-use properties. Final locations to be selected in coordination with NYSDEC.
OU03-S02				
OU03-S03				
OU03-S04				
OU03-S05				
OU03-S06				
OU03-S07				
OU03-S08				
OU03-S09				
OU03-S10				
OU03-S11				
OU03-S12				
OU03-S13				
OU03-S14				
OU03-S15				
OU03-S16				
OU03-S17				
OU03-S18				
OU03-S19				
OU03-S20				
OU03-MW01	Temporary groundwater monitoring point[b]	Groundwater[b] and Soil[c] samples	PFAS (groundwater); PFAS, TOC and pH (soil)	Located ~7,800 feet northwest of Village boundary
OU03-MW02				Located ~4,400 feet northwest of Village boundary
OU03-MW03				Located ~2,000 feet northwest of Village boundary
OU03-MW04				Located ~2,000 feet north of Village boundary
OU03-MW05				Located ~3,000 feet northeast of Village boundary
OU03-MW06				Located ~3,500 feet east of Village boundary
OU03-MW07				Located ~2,300 feet east of Village boundary
OU03-MW08				Located ~2,000 feet southeast of Village boundary
OU03-MW09				Located ~4,500 feet southeast of Village boundary
OU03-MW10				Located ~8,000 feet southeast of Village boundary
OU03-MW11				Located ~2,700 feet south of Village boundary
OU03-MW12				Located ~3,000 feet southwest of Village boundary
OU03-MW13				Located ~3,200 feet west of Village boundary
OU03-MW14				Located ~4,500 feet west of Village boundary
HF1-BB1	Surface water resample under high flow conditions[d]	Surface water sample[d]	PFAS	Browns Brook, approximately 6,000 feet east of the Hoosic River confluence
HF1-HR1				Hoosic River approximately 12,000 feet upstream (south) of the Village
HF1-HR2				Hoosic River at the northern extent of the current OU-01 boundary
HF1-UBE1				Unnamed Brook, approximately 7,000 feet east of the Hoosic River confluence
HF1-UBE3				Unnamed Brook, approximately 2,000 feet east of the Hoosic River confluence
HF1-UBW1				Unnamed Brook, approximately 2,000 feet east of the Hoosic River confluence
HF1-UBW2				Unnamed Brook, approximately 3,400 feet west of the Hoosic River confluence
HF1-UBW3				Unnamed Brook, approximately 2,500 feet west of the Hoosic River confluence
HF1-UBW4				Unnamed Brook, approximately 4,000 feet west of the Hoosic River confluence
HF1-WB1				Woods Brook, approximately 16,000 feet east of the Hoosic River confluence
OU03-SW01	Surface water and sediment sample (new location)[e]	Surface water and sediment samples[e]	PFAS	Nipmoose Brook, west of Village, approximatly 20,000 feet south of the Hoosic River confluence
OU03-SW02				Case Brook, northwest of Village, approximatly 4,600 feet south of the Hoosick River confluence
OU03-SW03				Case Brook, northwest of Village, approximatly 8,700 feet south of the Hoosick River confluence (upstream of OU03-SW02)
OU03-SW04				Unnamed Brook, north of Village, approximately 300 feet north of the Walloomsace River confluence
OU03-SW05				Unnamed Brook, north of Village, approximately 50 feet south of the Walloomsace River confluence
OU03-SW06				Woods Brook, approximately 5,600 feet east of the Hoosic River confluence (downstream of HF1-WB1)
OU03-SW07				Unnamed Brook, northeast of Village, approximately 50 feet south of the Walloomsace River confluence
OU03-SW08				Unnamed Brook, northeast of Village, approximately 50 feet south of the Little White Creek confluence
OU03-SW09				Unnamed Brook, northeast of Village, approximately 50 feet south of the Walloomsac River confluence

a - Soil samples will be collected from three depth intervals (0-2 inches bgs, 2-12 inches bgs, and 12-24 inches bgs).

b - Newly installed temporary monitoring points. Shallow (water table) groundwater monitoring points will be installed.

c - Soil samples will be collected from three depth intervals (0-2 inches bgs, 2-12 inches bgs, and 12-24 inches bgs) and then in continuous two-foot intervals until groundwater is encountered or refusal.

d - Resampling surface water under high flow conditions at ten locations previously sampled under baseflow conditions. Samples will be collected within 24 hours of a rain event for high flow conditions.

e - Sampling surface water and sediment at nine new stream locations. Surface water and sediment will be sampled under baseflow conditions, and surface water will be sampled under high flow conditions. Samples will be collected within 24 hours of a rain event for high flow conditions.

Figures

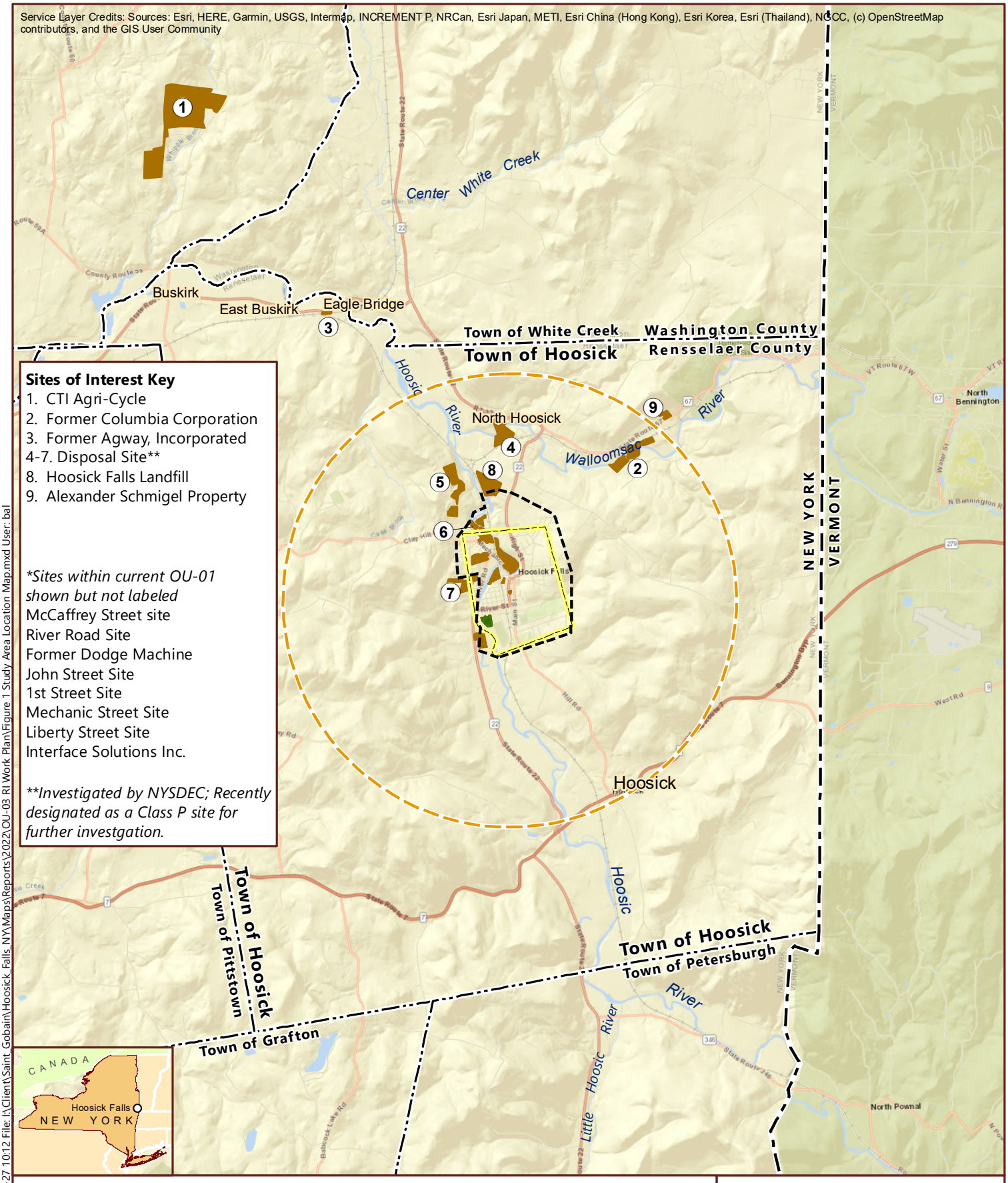
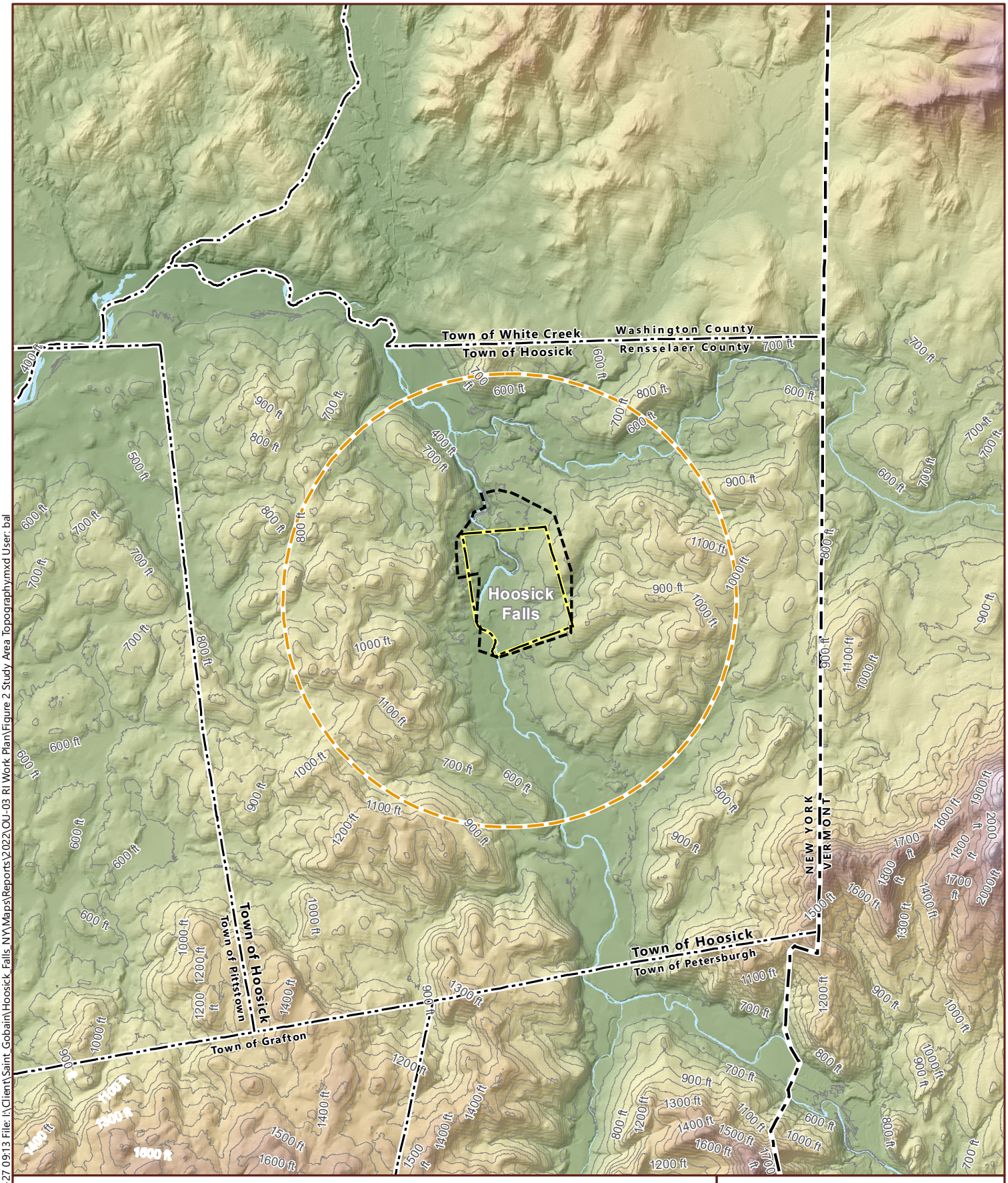


FIGURE 1

STUDY AREA LOCATION MAP
OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-09-27 10:12 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\OU-03 RI Work Plan\Figure 1 Study Area Location Map.mxd User: bal



BEC Footer: ArcGIS 10.9.1, 2022-09-27 09:13 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\OU-03 RI Work Plan\Figure 2 Study Area Topography.mxd User: bal

FIGURE 2

STUDY AREA TOPOGRAPHY
OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY

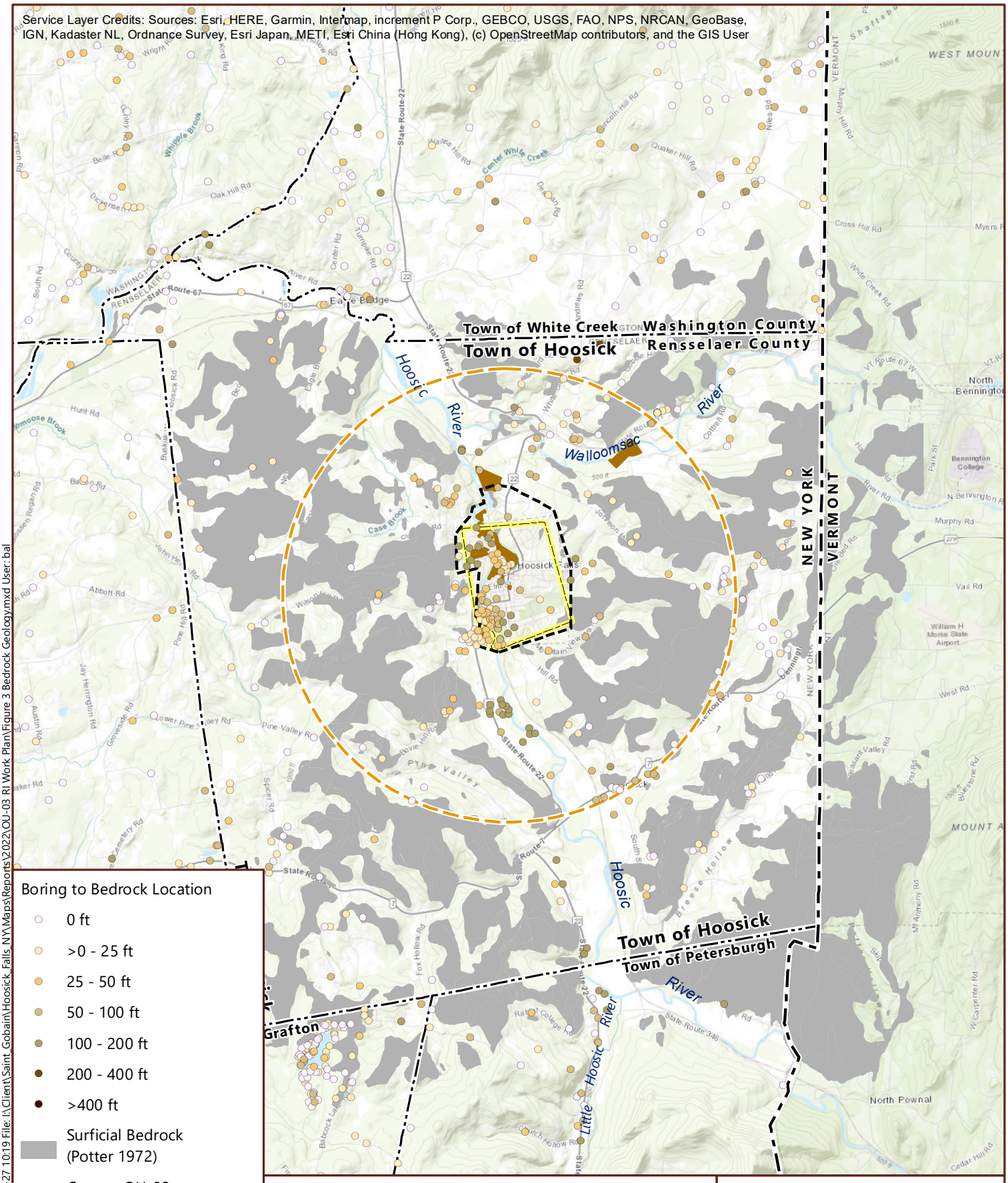


FIGURE 3

BEDROCK GEOLOGY
OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-09-27 10:19 File: I:\Client\Saint-Gobain\Hoosick_Falls_NY\Maps\Reports\2022\OU-03 RI Work Plan\Figure 3 Bedrock Geology.mxd User: bal

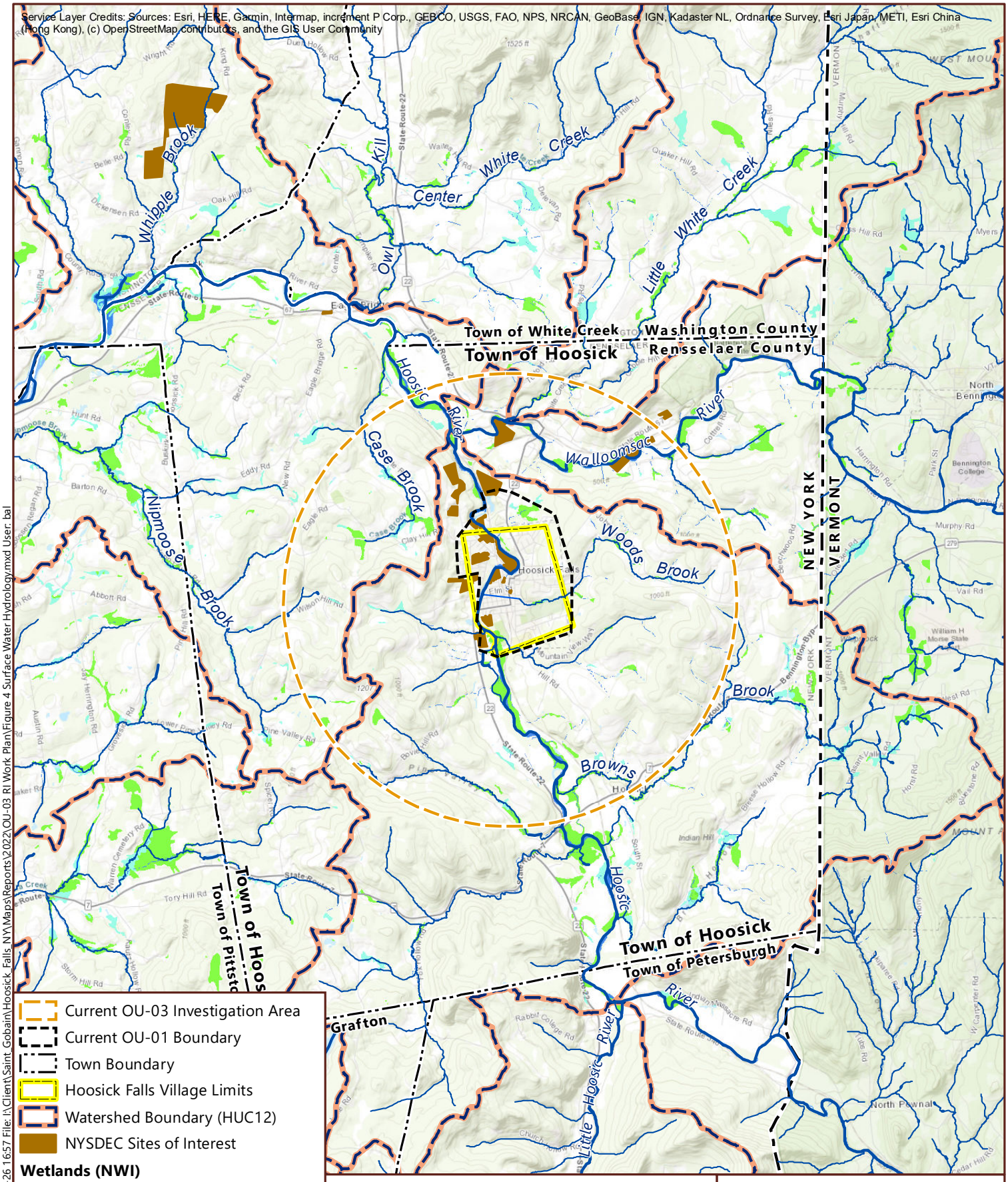


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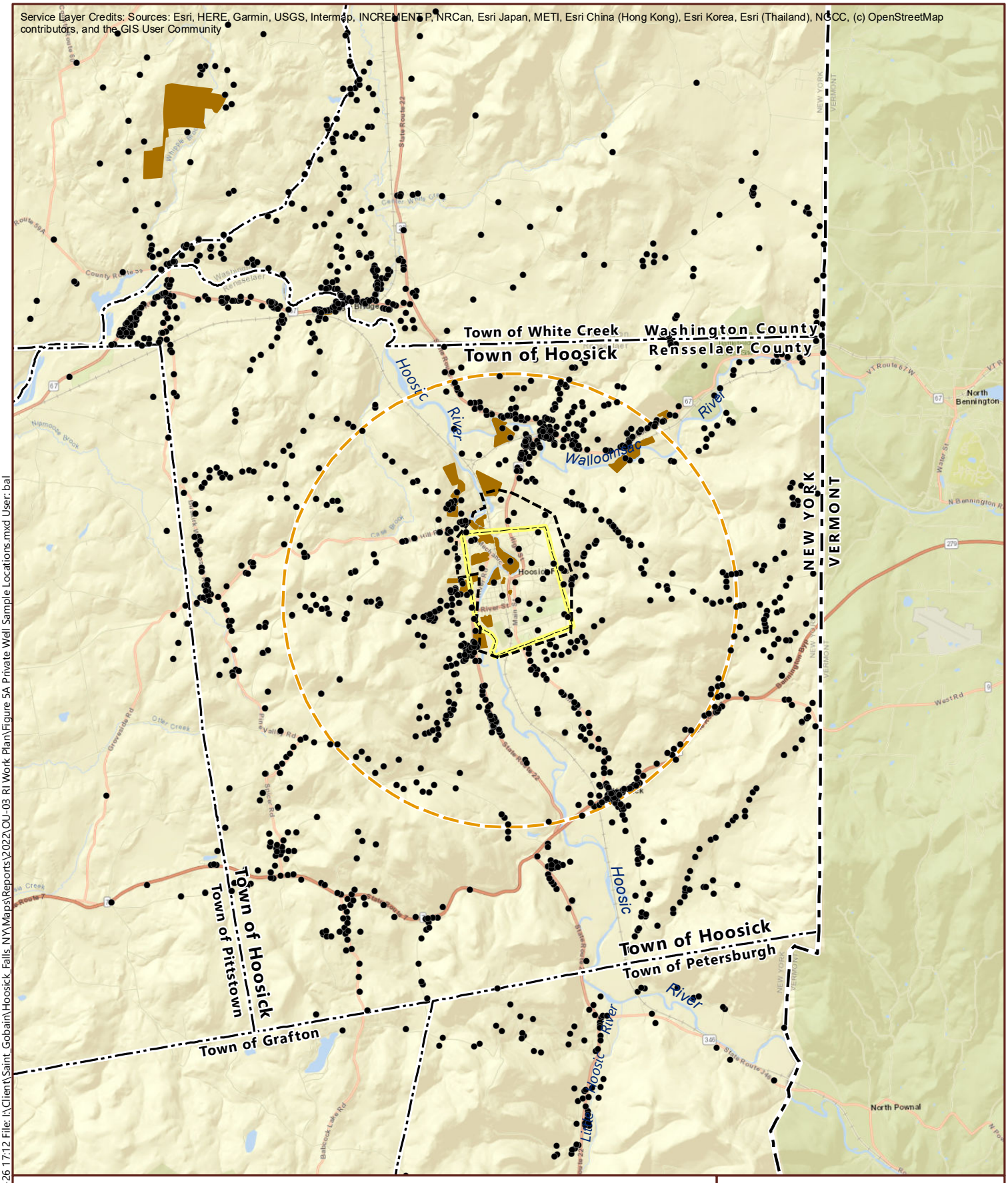
FIGURE 4

SURFACE WATER HYDROLOGY
OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY



BEC Footer: ArcGIS 10.9.1, 2022-09-26 17:12 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\OU-03 RI Work Plan\Figure 5A Private Well Sample Locations.mxd User: bal

FIGURE 5A

NON-PUBLIC WELL SAMPLE LOCATIONS
OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY

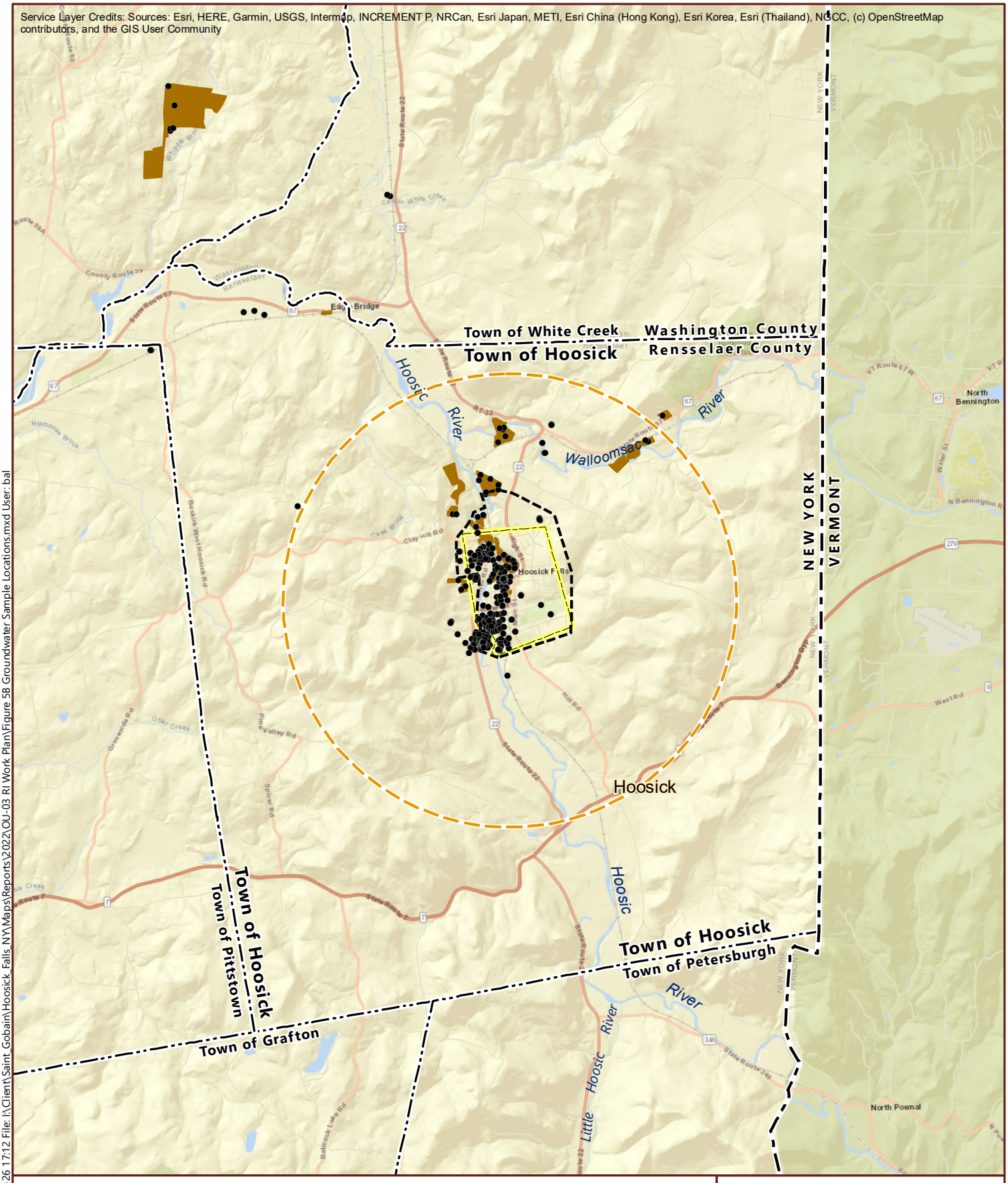


FIGURE 5B

GOUNDWATER SAMPLE LOCATIONS
OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-09-26 17:12 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\OU-03 RI Work Plan\Figure 5B Groundwater Sample Locations.mxd User: bal

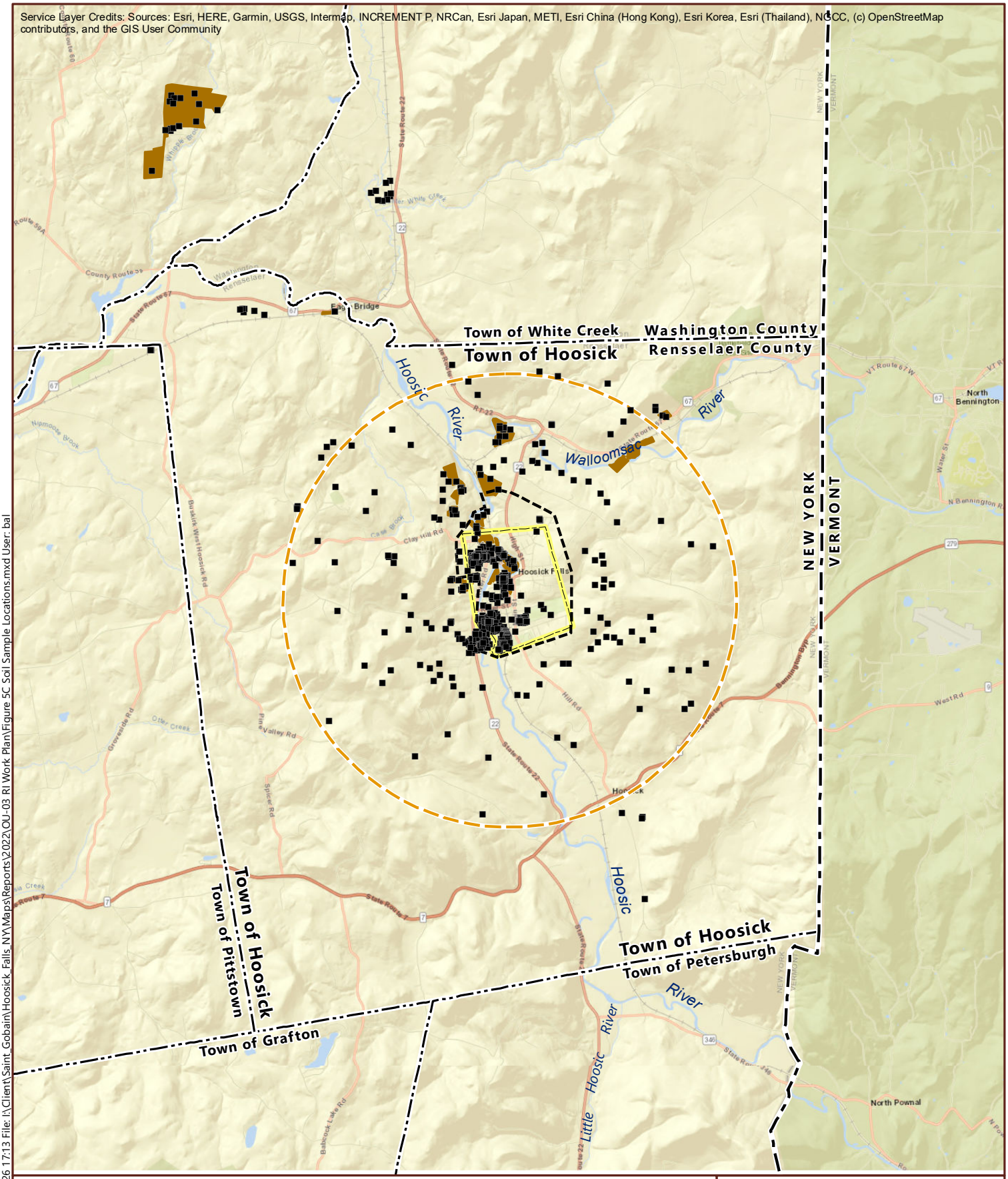


FIGURE 5C

SOIL SAMPLE LOCATIONS

OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-09-26 17:13 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\OU-03 RI Work Plan\Figure 5C Soil Sample Locations.mxd User: bal

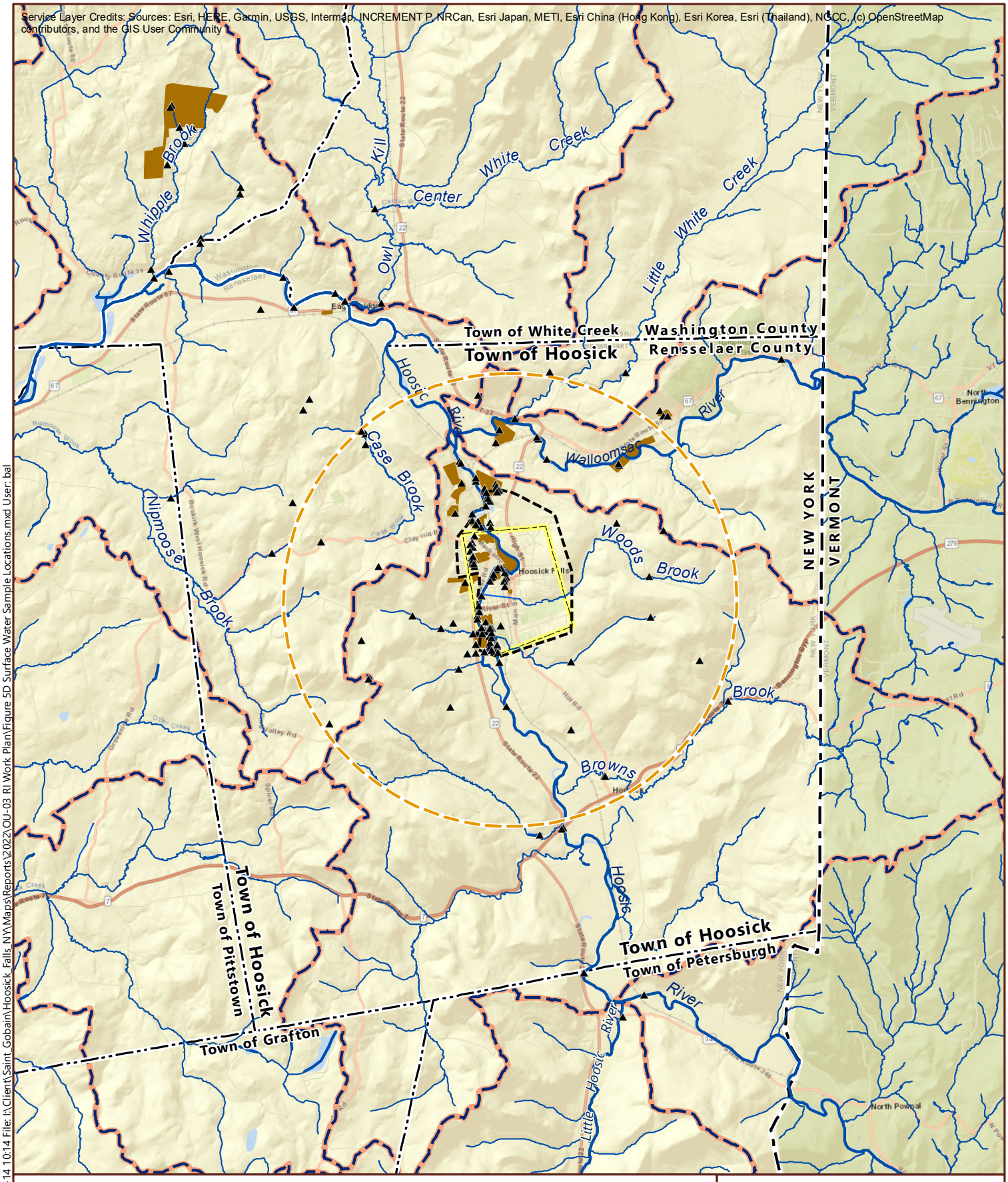


FIGURE 5D

SURFACE WATER SAMPLE LOCATIONS
OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-10-14 10:14 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\OU-03 RI Work Plan\Figure 5D Surface Water Sample Locations.mxd User: bal

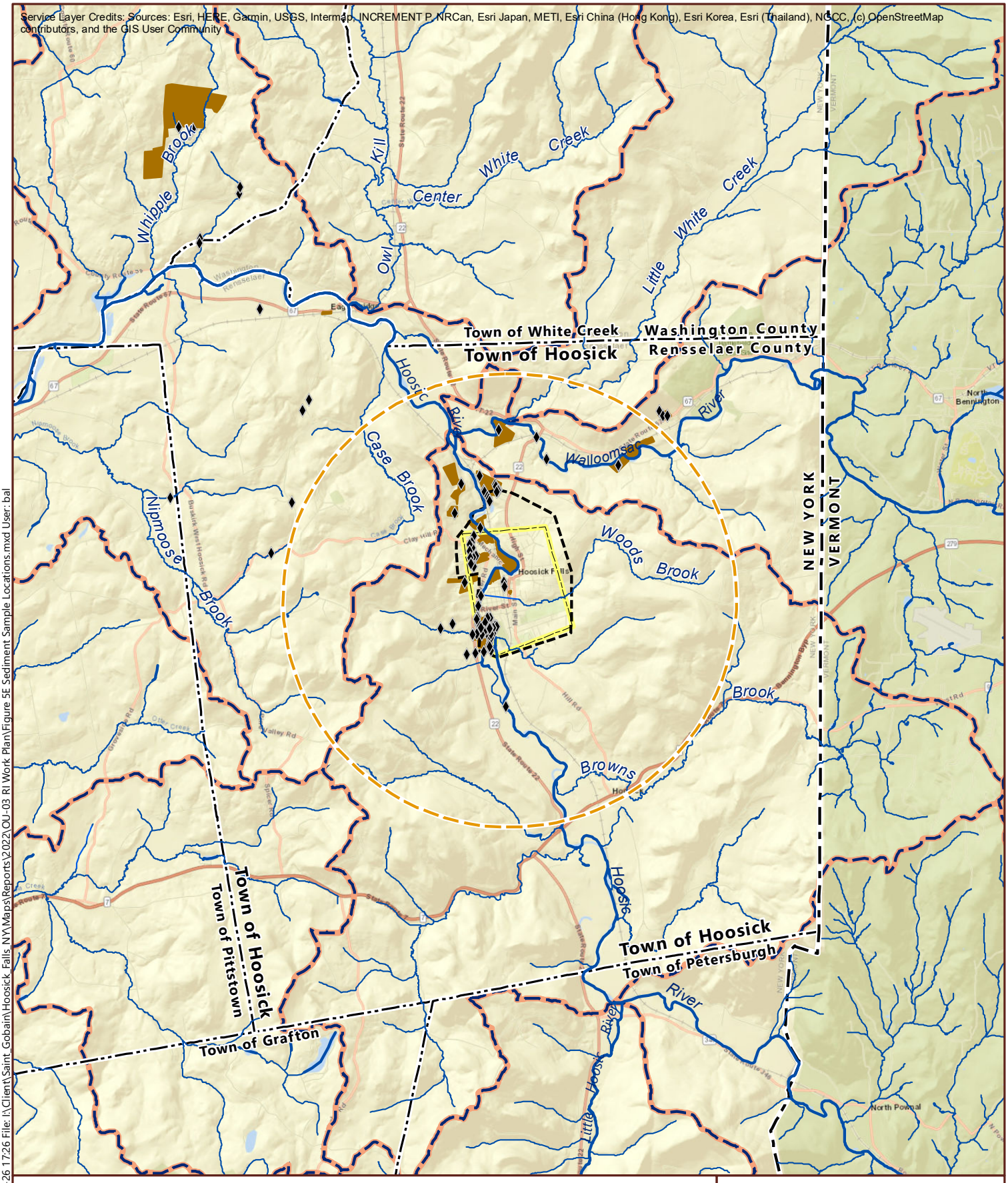


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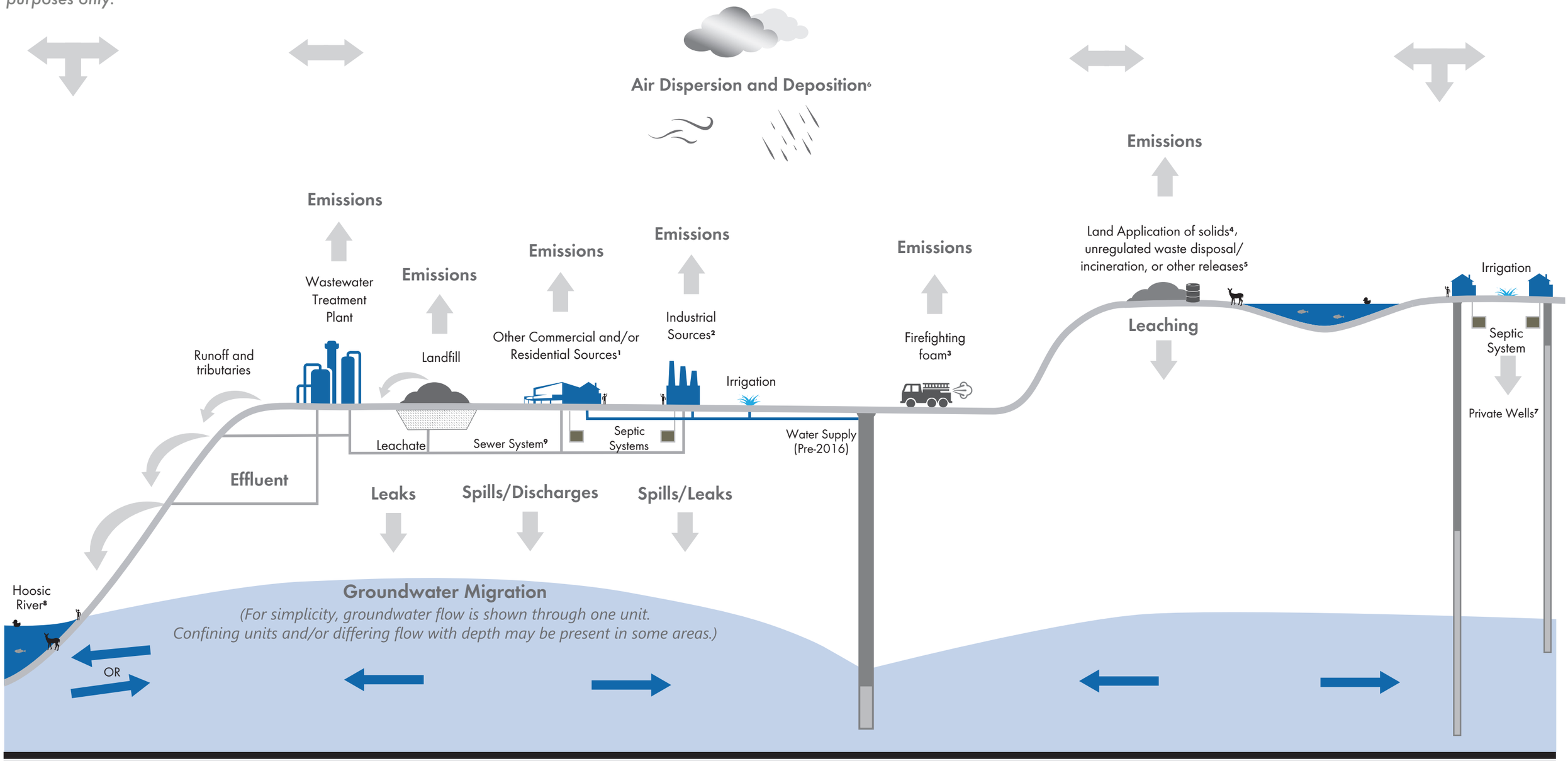
FIGURE 5E

SEDIMENT SAMPLE LOCATIONS

OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY

Diagram is conceptual and not to scale. Relative size, location, orientation, and elevation are not indicative of specific instances and are for illustration purposes only.



1. Includes fire fighting foam, car washes, carpet cleaners, dry cleaners, satellite disposal, consumer products (e.g., water-repellent clothing, furniture, food packaging, waxes, etc.) and private septic systems.
2. Includes several industrial sites within the Village of Hoosick Falls under NYSDEC investigation (See Figure 1).
3. Includes three potential firefighting foam sources identified from 2016 NYSDEC statewide survey.
4. Includes potential and known sources in or near the region (e.g., composted paper mill sludge from CTI Agri-Cycle, Former Columbia Corp. Site, Alexander Schmigel Property*)
5. Includes satellite or unregulated commercial, industrial or commercial disposal or incineration.
6. Includes potential emission point-sources from within the region as shown, potential emissions from upgradient PFAS sources outside the region.
7. Residential or agricultural wells of various construction techniques, materials, depths and ages.
8. NYSDEC sampling indicates sources within the Hoosic River Watershed upstream of the Village of Hoosick Falls.
9. Sanitary and storm sewers are combined in portions of the Village of Hoosick Falls municipal sewer system. Discharges to the surface at overflows.

*Currently being considered for delisting.

CONCEPTUAL SITE MODEL DIAGRAM FOR THE HOOSICK FALLS REGION

FIGURE 6

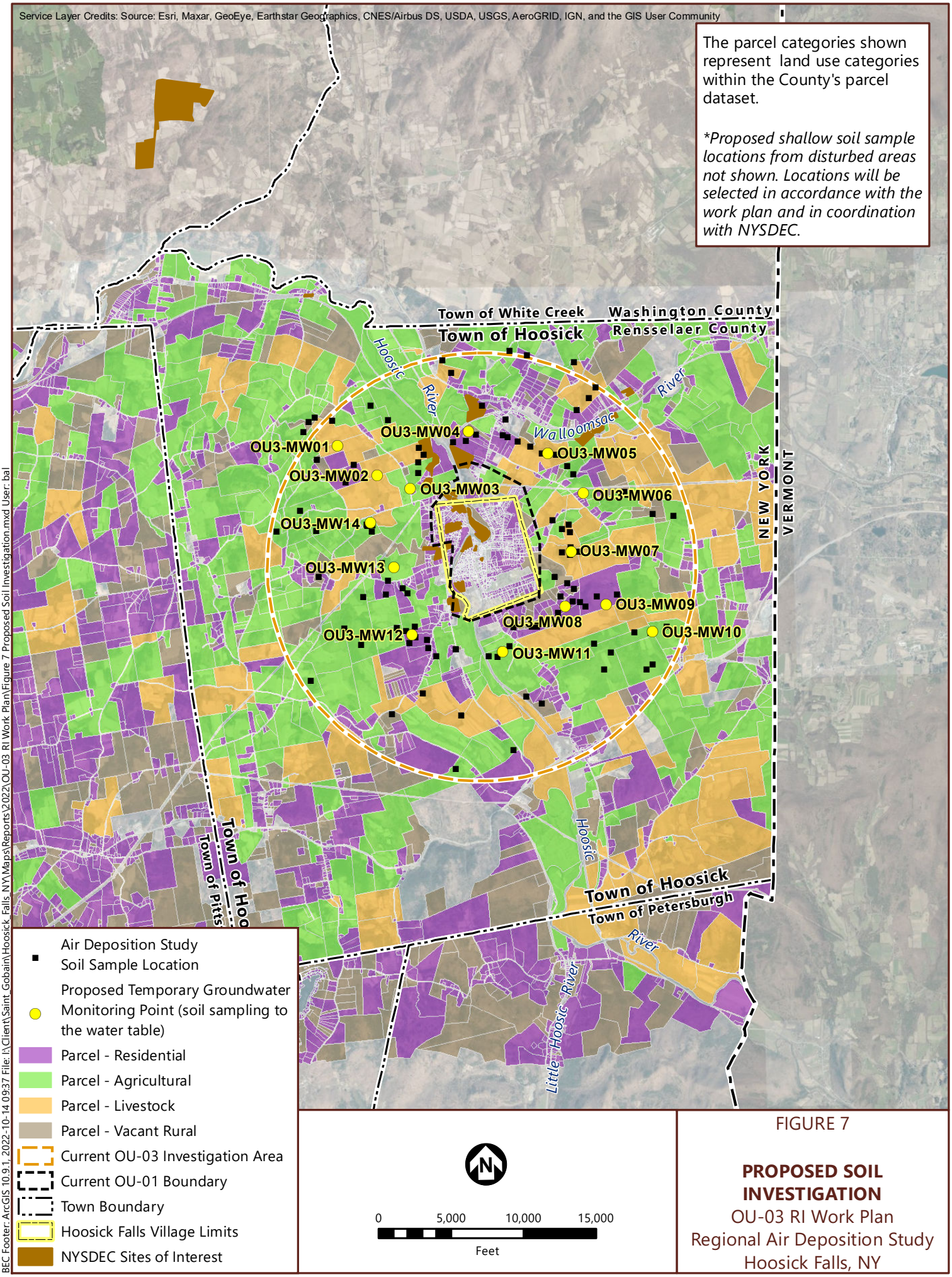


FIGURE 7

PROPOSED SOIL INVESTIGATION

OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY

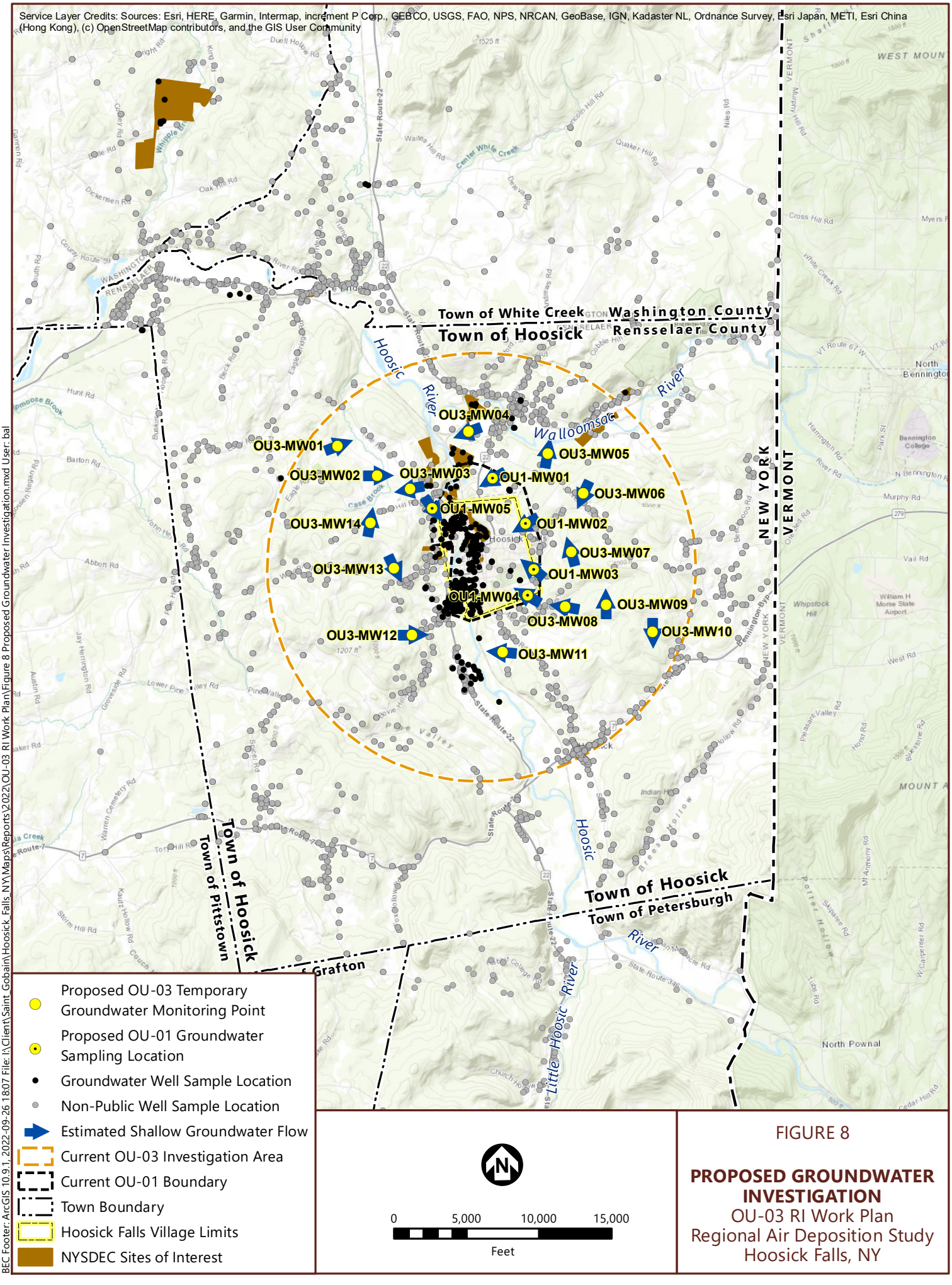


FIGURE 8

PROPOSED GROUNDWATER INVESTIGATION

OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-09-26 1807 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\OU-03 RI Work Plan\Figure 8 Proposed Groundwater Investigation.mxd User: bal

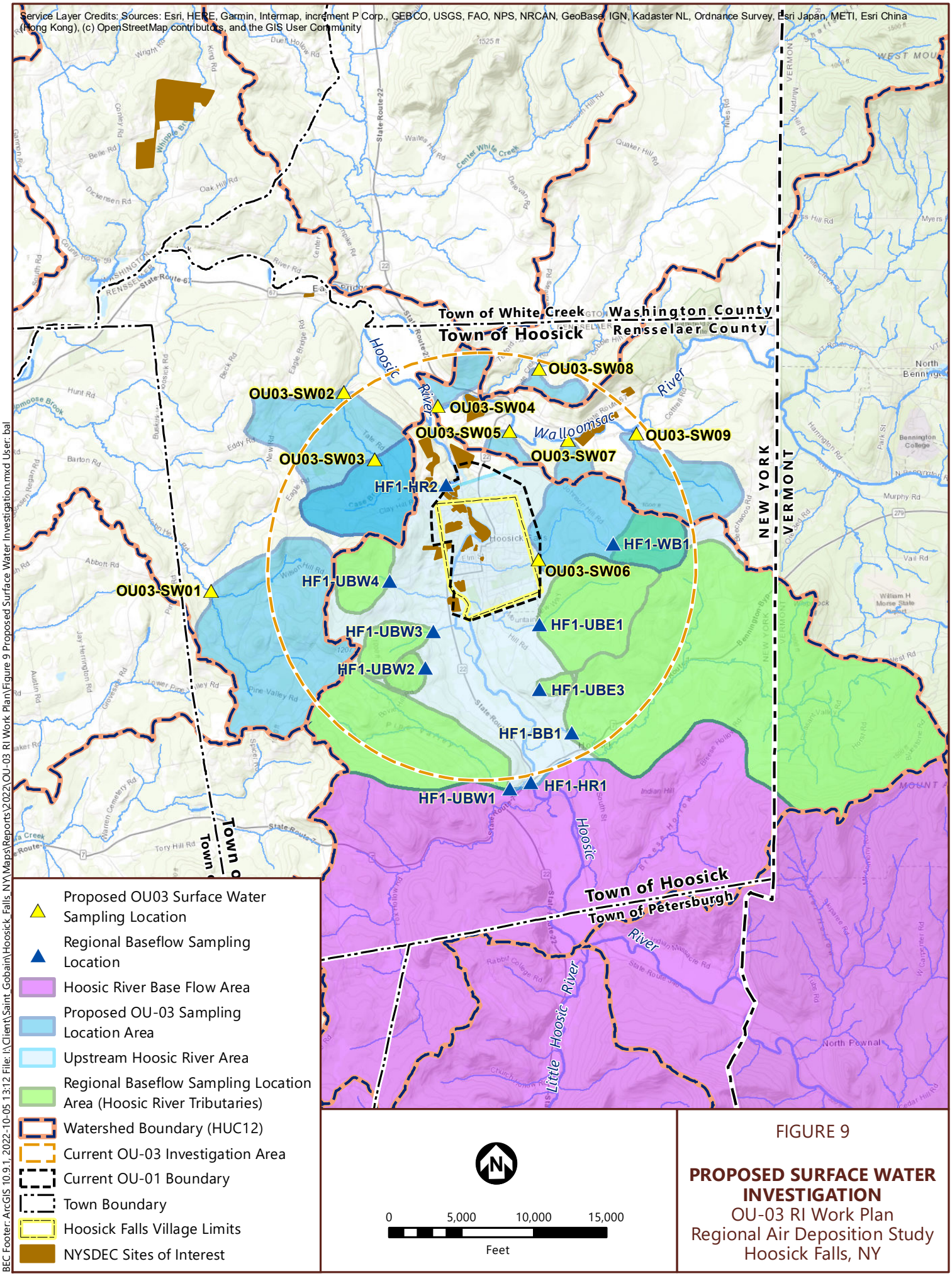
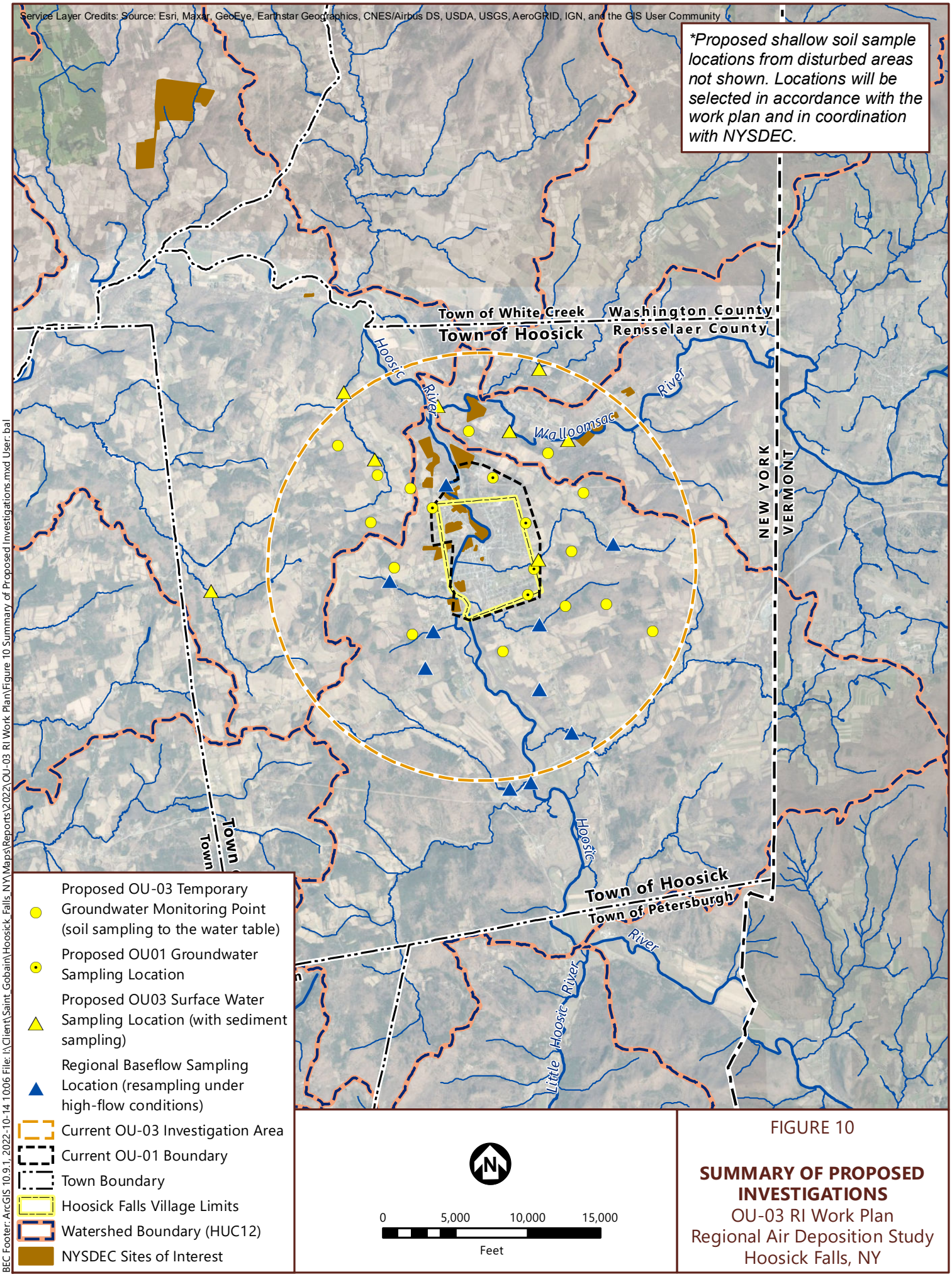


FIGURE 9

PROPOSED SURFACE WATER INVESTIGATION
OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY

BEC Footer: ArcGIS 10.9.1, 2022-10-05 13:12 File: I:\Client\Saint Gobain\Hoosick Falls NY\Maps\Reports\2022\OU-03 RI Work Plan\Figure 9 Proposed Surface Water Investigation.mxd User: bal



BEC Footer: ArcGIS 10.9.1, 2022-10-14 1006 File: I:\Client\Saint_Gobain\Hoosick_Falls_NY\Maps\Reports\2022\OU-03 RI Work Plan\Figure 10 Summary of Proposed Investigations.mxd User: bal

FIGURE 10

SUMMARY OF PROPOSED INVESTIGATIONS

OU-03 RI Work Plan
Regional Air Deposition Study
Hoosick Falls, NY