THIRD FIVE-YEAR REVIEW REPORT
SEMET RESIDUE PONDS SUBSITE
ONONDAGA LAKE SITE
ONONDAGA COUNTY, NEW YORK

Prepared by

U.S. Environmental Protection Agency
Region 2
New York, New York

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July 14, 2025

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Date

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Table of Contents

LIST OF ABBREVIATIONS & ACRONYMS

BCA	Brushy Cleared Area
BERA	Baseline Ecological Risk Assessment
BUD	Beneficial Use Determination
cy	cubic yard
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FRP	Fiberglass Reinforced Plastic
FYR	Five-Year Review
FFS	Focused Feasibility Study
GWTP	Groundwater Treatment Plant
HHRA	Human Health Risk Assessment
ICs	Institutional Controls
ISS	In-Situ Solidification/Stabilization
IRM	Interim Remedial Measure
µg/kg	Micrograms per Kilogram
µg/L	microgram per liter
MNA	Monitored Natural Attenuation
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
OU	Operable Unit
PV	Performance Verification
POC	Point of Compliance
PRP	Potentially Responsible Party
RCRA	Resource Conservation and Recovery Act
RAO	Remedial Action Objectives
ROD	Record of Decision
RA	Remedial Action
RD	Remedial Design
RI	Remedial Investigation
RPM	Remedial Project Manager
SCOs	Soil Cleanup Objectives
SMP	Site Management Plan
SVOCs	Semivolatile organic compounds
UU/UE	Unlimited Use/Unrestricted Exposure
VOCs	Volatile Organic Compounds
WMA	Waste Management Area
WQC	Water Quality Criterion
WASDS	Willis Avenue/Semet Drainage Swale

I. INTRODUCTION

The purpose of a five-year review (FYR) is to evaluate the implementation and performance of a remedy to determine if the remedy is and will continue to be protective of human health and the environment. The methods, findings, and conclusions of reviews are documented in FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The Onondaga Lake Superfund site currently includes eleven subsites (subsites are defined as any site that is situated on Onondaga Lake's shores or tributaries that has contributed contamination to or threatens to contribute contamination to Onondaga Lake). Each subsite consists of one or more operable units (OUs). This FYR report evaluates the Semet Residue Ponds subsite (Subsite). This is the third FYR for the Subsite. The triggering action for this statutory review is the completion of the second FYR on May 12, 2020. The FYR has been prepared because hazardous substances, pollutants, or contaminants remain at the Subsite above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Subsite consists of two OUs. OU6 addresses the Semet residue material and impacted shallow and intermediate groundwater and OU27[1] addresses contaminated soil below and in proximity to the ponds, as well as Semet residue that was unable to be addressed as part of the OU6 remedy. The remedial actions (RAs) at both OUs have been completed. Both OUs are the subject of this FYR.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act, Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Section 300.430(f)(4)(ii)) and considering EPA policy.

This FYR was led by the EPA remedial project manager (RPM) and lead author, Thomas Mongelli. Participants included the New York State Department of Environmental Conservation (NYSDEC) project manager Jacky Luo, EPA hydrogeologist Sabrina Gonzalez, EPA human health risk assessor, Marian Olsen, EPA ecological risk assessor Detbra Rosales, and EPA community involvement coordinator Larisa Romanowski. The potentially responsible party (PRP), Honeywell International Inc. (Honeywell), was notified of the initiation of the FYR. The review began on August 1, 2024.

Site Background

The approximately 40-acre, triangular-shaped Subsite is located in an industrial area along the southern shore of Onondaga Lake. It is bordered on the west and south by Crucible Industries, LLC (Crucible), on the south by CSX railroad tracks and an industrial complex, on the north by

[1] For purposes of consistency with Subsite documents, activities will be discussed in this document in the context of the New York State Department of Environmental Conservation's (NYSDEC's) OU1 and OU2 designations (equivalent to EPA's OU6 and OU27, respectively). To support tracking in EPA's Superfund Enterprise Management System, however, the protectiveness determinations will be based on EPA's OU6 and OU27 designations.

Interstate Route 690 (I-690) and State Fair Boulevard, and on the east by the former Willis Avenue Facility. Before it was remediated, the Subsite included five irregularly-shaped former waste disposal ponds with an average depth of 9 feet in Pond 4 and between 2.5 to 4 feet in the other four ponds, covering a total of 11 acres, and a 13-acre "Brushy Cleared Area" (BCA), located northeast of the OU1 area. There were also two smaller ponds, known as the Stringer Ponds, located adjacent to the southwest side of Ponds 3 and 4. The Subsite location is shown on Appendix A, Figure A1, and a site plan is shown on Appendix A, Figure A2.

From 1917 to 1970, the Semet-Solvay Division of Allied Chemical & Dye Company (predecessor to Honeywell) operated the Semet Residue Ponds as depositories for a tarry, organic-based residue generated by the acid washing of coke light oil during the production of benzene, toluene, naphthalene, xylene and "motor benzol" at its BTX (Benzol) Plant located immediately south of the railroad tracks that are on the southern border of the Subsite. Prior to that time, the area was used as a settling basin for the disposal of Solvay waste, known as Waste Bed A.

The ponds were constructed via drag line and bulldozer excavation into Waste Bed A. Dikes bordering the ponds were reportedly built from fill materials, including concrete rubble, old electrolytic cell parts, ashes, cinders, soil, Solvay waste, bricks, stone, etc. In addition to the Solvay waste, the area received coarse ash and cinders via conveyer buckets from stoker-fired boilers at the nearby Syracuse Works. A calcium carbonate-rich waste material, which originated from a former ammonium chloride operation, was also disposed of adjacent to Pond 2 (see Appendix A, Figure A2) prior to 1951. The surface of the ponds were approximately four inches thick and appeared as a weathered-black to brown granular material. Below the granular material was a highly viscous, black material that resembled tar.

Appendix B, attached, summarizes the documents utilized to prepare this FYR report.

SEMET RESIDUE PONDS FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Semet Residue Ponds Subsite/Onondaga Lake		
EPA ID: NYD986913580		
Region: 2	**State:** NY	**City/County:** Town of Geddes, Onondaga County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: State		
Author name (Federal or State Project Manager): Thomas Mongelli		
Author affiliation: EPA		
Review period: 8/1/2024 – 5/12/2025		
Date of site inspection: 10/1/2024		
Type of review: Statutory		
Review number: 3		
Triggering action date: 5/12/2020		
Due date *(five years after triggering action date)*: 5/12/2025		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

A remedial investigation (RI) to determine the nature and extent of contamination was conducted at the Subsite between 1989 and 1995 and included sampling of groundwater, surface water, sediments, soil, air, and waste material.

Fifteen Subsite-related volatile organic compounds (VOCs) were detected in the groundwater, including benzene, which ranged from 1 microgram per liter (µg/L) to 55,000 µg/L; toluene, which ranged from 0.6 µg/L to 3,900 µg/L; xylene, which ranged from 0.6 µg/L to 330 µg/L; and 2-butanone, which had concentrations that ranged from 16 µg/L to 710 µg/L. The NYSDEC ambient water quality standards for Class GA groundwater for benzene, toluene, and xylene are 1.0 µg/L, 5.0 µg/L, and 5.0 µg/L, respectively. The NYSDEC ambient groundwater quality guidance value for 2-butanone is 50 µg/L. These compounds can be traced to the material deposited in the ponds

or their breakdown products. Semivolatile organic compounds (SVOCs) detected include phenol, 2-methylphenol, 4-methylphenol, and 2,4-dimethylphenol at concentrations ranging from 2 µg/L to 10,000 µg/L and naphthalene at concentrations ranging from 3 µg/L to 1,100 µg/L. The NYSDEC ambient water quality standards for Class GA groundwater for total phenolic compounds is 1.0 µg/L and the ambient water quality guidance values for naphthalene is 10 µg/L.

Surface water samples were collected in Onondaga Lake and Tributary 5A during the RI. The samples contained benzene at concentrations ranging from 87 to 110 µg/L in Onondaga Lake and from 18 to 110 µg/L in Tributary 5A. These values exceeded the NYSDEC ambient water quality standard of 10 µg/L for human consumption of fish in Onondaga Lake's Class C waters. The reported groundwater benzene concentration of 55,000 µg/L exceeded the NYSDEC 1998 Water Quality Criterion (WQC) for fish propagation protection of 210 µg/L. The reported toluene groundwater concentration of 3,900 µg/L exceeded the WQC of 100 µg/L. The reported naphthalene groundwater concentration of 1,100 exceeded the WQC of 13 µg/L.

A benzene concentration in lake sediment of 16,000 micrograms per kilogram (µg/kg) significantly exceeded the NYSDEC human health bioaccumulation sediment criteria of 18.0 µg/kg. This benzene concentration also exceeded the benthic Class A, B, and C sediment guidance values of <530 µg/kg, 530-1,900 µg/kg, and >1,900 µg/kg, respectively.

The residues in the five ponds consisted of an organic phase and an acid phase. The organic phase was composed of more than 100 organic compounds, primarily, aromatic hydrocarbons, substituted aromatic hydrocarbons, alkanes, substituted alkanes, polyaromatic hydrocarbons, aldehydes, and ketones. Benzene, toluene, xylene, and naphthalene were found to comprise up to 10% of the organic phase of the pond residues. The acid phase of the pond residues was highly acidic, with a pH between 1 and 2.6. Because of the significant toxicity posed by the high acid content and low pH, the residue in the five ponds was considered to be a principal threat.

As part of the RI process, a baseline risk assessment was conducted to estimate the risks to human health and the environment. The baseline risk assessment, consisting of a human health risk assessment (HHRA), which evaluated risks to people, and a baseline ecological risk assessment (BERA), which evaluated risks to the environment, analyzed the potential for adverse effects, both under current conditions at the time and if no actions were taken to control or reduce exposure to hazardous substances at the Subsite. Individual HHRAs and BERAs were completed for OU1 and OU2 of the Subsite.

The primary exposure scenario that represented a potential risk to human health involved trespassers who directly contacted the pond residue. Due to its acid content (pH of 1 to 2.6), direct contact with the Semet residue was identified as a primary acute hazard that would result in burns to the skin, which could have severe and potentially fatal effects. The likelihood of this exposure scenario was reduced prior to the remediation of the pond residue with the construction of a six-foot chain-link fence that limited access to the Subsite.

Due to its acid content, there was a significant risk to wildlife should it come into contact with the pond residue. As with human exposure, wildlife coming into direct contact with the pond residue would suffer burns, which could have severe, and potentially fatal effects. Also, based upon the

use of forage plant uptake factors for benzene from the soil, the concentration of benzene present in the pond residue, and the consideration of a white-footed mouse as a receptor, it was determined that there was a potential ingestion risk to a terrestrial herbivore and higher species. It was also determined that there was a potential risk to the vegetation that was present.

Response Actions

A number of response actions were undertaken to eliminate the migration of waste material and contaminated groundwater from the Subsite.

In 1994, an interim remedial measure (IRM) to cover Ponds 3 and 4 with a spray-applied, cement-mortar coating to mitigate the emission of organic vapors from the ponds was initiated. The IRM was expanded in 1996 to cover the remaining ponds. Prior to completion of OU1 construction activities, the cover was reapplied to all five ponds on an annual basis, usually in August.

Between 1996 and 1999, the I-690 storm drain system was evaluated and rehabilitated to isolate contaminants from the Subsite and the adjacent Willis Avenue Chlorobenzene subsite from infiltrating into the storm sewer.

Another IRM was performed from 2001 to 2002, which included soil sampling, subsurface borings, and test pits to evaluate the presence and extent of Semet material seeps associated with the five ponds. A temporary cover was placed over the observed seeps to minimize direct contact exposure to human and ecological receptors. Additionally, plastic and earthen material was placed over these areas annually to minimize odors.

In 2002, a Record of Decision (ROD) was issued for OU1. The selected remedy included excavation and reuse of the material present in the ponds, specifically, on-site processing for use in the production of a soft tar product (RT-12), covering the Semet residue seeps until the materials were remediated, installation of a groundwater collection trench to prevent groundwater discharges to Tributary 5A, installation of a watertight sheet pile wall, collection trench, and groundwater extraction wells to prevent groundwater discharges to Onondaga Lake, installation of a treatment facility to process wastewater and groundwater, and maintenance of the temporary covers and fencing to limit human and wildlife exposure to contaminated soils and residues until the remediation was completed. The remedy also called for long-term groundwater monitoring and the imposition of institutional controls (ICs) to restrict on-site groundwater use and prevent human exposure to contaminated soils and residues until the selected remedy is fully implemented.

The ROD established the following remedial action objectives (RAOs):

- Prevent direct contact (human and wildlife) with the pond residue;
- Reduce volatile emissions from the pond residue; and
- Eliminate, to the extent practicable, migration of groundwater to Onondaga Lake and Tributary 5A that does not attain applicable state and federal water quality criteria for Site-related constituents.

In 2019, a ROD was issued for OU2, which included soils surrounding and below the Semet Residue Ponds and in the BCA and any remaining Semet residue unable to be beneficially reused off-site. The selected remedy included treatment of any remaining Semet residue via *in-situ* solidification/stabilization (ISS), installation of a geomembrane cap and 18 inches of clean soil/granular backfill over the former Semet residue areas, and installation of a one-foot thick soil cover over the BCA and Lakeshore Area.[2] The remedy also called for grading to support redevelopment of the Subsite, development of a health and safety plan, development of a Community Air Monitoring Plan, development of a site management plan (SMP), continued maintenance and monitoring of the Willis-Semet Berm Improvement IRM, and ICs to restrict land use to commercial (including passive recreational)/industrial use, restrict groundwater use, and require that intrusive activities in areas where contamination remains and future on-site buildings be evaluated for the potential for vapor intrusion and include vapor intrusion sampling and/or installation of mitigation measures, if necessary, be conducted in accordance with the SMP.
The OU2 ROD established the following RAOs:

- Prevent, or reduce to the extent practicable, ingestion/direct contact with contaminated Solvay waste/soil/fill material to be protective under the current and reasonably anticipated future land uses;
- Prevent, or reduce to the extent practicable, inhalation of or exposure to contaminants volatilizing from contaminated Solvay waste/soil/fill material and groundwater, and unacceptable inhalation threat associated with soil vapor; and
- Prevent, or reduce to the extent practicable, the release of Subsite-related contaminants to groundwater, surface water and sediment that may cause unacceptable adverse effects on shallow and intermediate groundwater, surface water or sediment quality in Tributary 5A and Onondaga Lake.

Status of Implementation

Shallow and Intermediate Groundwater

Because of the presence of historical fill materials (*e.g.,* Solvay waste) deposited at the Subsite, it is not anticipated that groundwater standards will be achievable at the Subsite within a reasonable timeframe. Therefore, the area is being treated as part of a waste management area (WMA) with the groundwater point of compliance (POC) being the WMA boundary (*i.e.,* outside of the barrier wall installed as part of an IRM; see Appendix A, Figure 2). The material within the WMA includes Solvay waste comingled with hazardous substances that are contaminants of concern for the Subsite. The management of the waste within the WMA includes meeting Resource Conservation and Recovery Act (RCRA) municipal landfill capping requirements. In many areas, existing covers and/or Solvay waste/soil/fill material is expected to meet the $1x10^{-5}$ centimeter per second permeability rate required under the RCRA Subtitle D standards. Buildings and asphalt parking lots are expected to achieve and exceed the infiltration requirements. In areas where existing covers or Solvay waste/soil/fill material do not meet the standard, cover material will include materials needed to achieve the required infiltration rate requirements.

[2] The Lakeshore Area is situated on the northeast portion of the Subsite between the southern shore of Onondaga Lake and the west bound lane of I-690.

Given the comingling of the shallow and intermediate groundwater with that of the adjacent Willis Avenue Chlorobenzene subsite, shallow and intermediate groundwater beyond the WMA POC for these two subsites was addressed under the remedy for the Willis Avenue Chlorobenzene subsite (*i.e.,* monitored natural attenuation [MNA]). A ROD for this subsite was signed in September 2019.

To eliminate the migration of contaminated shallow and intermediate groundwater the following measures were implemented:

- Construction of a shallow sand-filled groundwater collection trench with a slotted Fiberglass Reinforced Plastic (FRP) groundwater collection pipe;
- Construction of two groundwater pump stations designed to convey collected groundwater to the Willis Avenue Groundwater Treatment Plant (GWTP);
- Installation of an FRP pipe and Ductile Iron Pipe force main;
- Excavation and relocation of Semet material from the Stringer Ponds;
- Excavation and relocation of material from within the Tributary 5A limits;
- Installation of an isolation layer and placement of material within the Tributary 5A limits;
- Culvert cleaning and inspection; and
- Site grading and restoration of the tributary banks and channel.

The groundwater collection system includes a six-inch slotted FRP collection pipe buried in sand trenches under, or adjacent to, Tributary 5A. The trenches discharge to pump stations designed to pump collected groundwater to the Willis Avenue GWTP at an estimated flow rate of 40 gallons per minute.

An isolation layer was constructed over the groundwater collection trench and beneath the Tributary 5A stream bed, with the primary objective to minimize the potential discharge of contaminated groundwater into the tributary and subsequently into Onondaga Lake. The layer also minimizes the potential for migration of contaminated sediments into Onondaga Lake and the potential for surface water to enter the collection trench. While Tributary 5A sediment contamination is being addressed as part of the Willis Avenue Chlorobenzene subsite to allow for the placement of this isolation layer, material was excavated from within the tributary limits and relocated on-site.

During the installation of the groundwater collection trench conveyance piping, Semet material located in the Stringer Ponds was excavated and relocated to Semet Residue Pond 2. The Stringer Ponds were located between the Semet Residue Ponds and Reach 1. Approximately 5,200 cubic yards (cy) of material were removed from the Stringer Ponds.

As part of the remedial activities, sediment was removed from a 60-inch culvert between Reach 2 and Onondaga Lake using high pressure water from a jet truck commencing at the Reach 2 inlet and working toward Onondaga Lake. A 72-inch culvert connecting Reach 1 and Reach 2 was cleaned by manual excavation and hydraulic flushing. The sediment from both culverts was collected and relocated on-site. After removing sediment from the 72-inch culvert, it was observed that its deteriorated condition allowed for groundwater infiltration. As a result, the corrugated metal pipe was replaced with a centrifugally cast fiberglass polymer mortar pipe.

Site restoration included the placement of a minimum of six inches of topsoil to achieve the final designed grade at the Subsite along with seeding using a seed mix indigenous to the area to minimize erosion. Fencing and asphalt surfaces disturbed during the construction were replaced. Approximately 12,880 cy of material was excavated from within the Tributary 5A boundary, consolidated at the Willis Avenue staging area, graded into a single pile, and seeded. Erosion control fencing was subsequently replaced with a wood chip control berm. Approximately 9,600 cy of non-tributary material was excavated during the construction of the pump stations and the 72-inch culvert replacement. These non-tributary wastes were consolidated at the Semet staging area, graded into a single pile, covered with six inches of topsoil, and seeded.

From 2008 to 2009, a 1,612-foot long sheet pile barrier wall and groundwater collection system was installed along the Lakeshore Area to eliminate the discharge of contaminated groundwater and non-aqueous phase liquid to Onondaga Lake. This system was completed as the first phase of a three-phase, 7,600-foot barrier wall system constructed along the southwest shore of Onondaga lake between 2006 and 2012.

From 2011 to 2012, construction activities were performed at the Willis Avenue/Semet Drainage Swale (WASDS) project to prevent the migration of contaminated shallow groundwater into Onondaga Lake. A 1,922-foot long groundwater collection trench was installed under the WASDS swale footprint parallel to State Fair Boulevard. The solid wall pipe conveys the collected groundwater to the Tributary 5A Reach 2 pump station where it is eventually treated by the Willis Avenue GWTP. Approximately 430 cy of material was removed from the WASDS project area to accommodate the installation of the groundwater collection system, including 280 cy's of material from the Semet portion of the WASDS.

Semet Pond Material

As was noted above, the 2002 ROD called for the excavation and on-site processing of Semet material into a driveway sealer known as RT-12. This portion of the selected remedy was largely based on a 1999 Petition for Beneficial Use Determination (BUD) that was approved by NYSDEC in 2002. However, after the signing of the ROD, it became necessary to reevaluate remedial alternatives for the Semet residues due to a change in market conditions for RT-12. This reevaluation included a fuel recycling pilot study that was completed in 2005. The results of this study were documented in a 2005 Synthetic Fuel Recycle Pilot Program report and a focused feasibility study (FFS) and second BUD in 2006. The second BUD proposed an on-site treatment process using a rotary distiller to separate the Semet residue into two products--a liquid consisting largely of benzene, toluene, and xylene to be used as a feed stock for benzene-derived products and a solid, called Semet heel, to be used as a commercial fuel product, with properties similar to that of coal.

In 2009, a pre-remedial design (RD) volume verification investigation was conducted to more accurately estimate the volume of Semet residue. The volume verification investigation indicated less volume of Semet residue (approximately 21.1 million gallons) than initially estimated (between 50 and 80 million gallons), necessitating further volume refinement prior to implementation of RD/RA activities. Another investigation was conducted in 2010 to further refine the estimated volume of Semet residue. An FFS amendment, which reevaluated the remedial

alternatives for the Semet residue, concluded that two alternatives, on-site distillation for beneficial reuse and off-site thermal treatment/reuse, should be further evaluated. Subsequently, Honeywell proposed to perform treatability studies to reduce uncertainties in the implementation of two potential remedial alternatives.

A Semet Residue Characterization for Thermal Treatment Remedy Selection Treatability Study was conducted to provide a range of dewatered Semet residue samples to off-site thermal treatment facilities for evaluation, characterize a range of dewatered Semet residue samples for evaluation of on-site distillation for beneficial reuse, and identify target compounds for future air monitoring programs. Analytical data from samples collected in 2010 indicated that Ponds 3 and 4 contained a higher fraction of light hydrocarbons than Ponds 1, 2, and 5. While the generic New York State Department of Health guideline for acceptable perimeter limits for total VOCs in air is 5 parts per million (ppm) via a photoionization detector, air monitoring data revealed that the primary (approximately 66%) VOC constituent was benzene, which has a short-term guideline of 0.4 ppm. Therefore, a project-specific VOC perimeter limit of 1.2 ppm was proposed for the Subsite and approved by NYSDEC for subsequent treatability studies.

A Demonstration Program was undertaken in 2014 to provide further refinement of treatment options for the Semet residue. As part of this effort, removal, direct loading, and shipment of Semet residue from Ponds 2 and 5 were performed. Three thousand one hundred seventy-eight tons of material (2,946 tons from Pond 2 and 232 tons from Pond 5) were shipped to Green America Recycling, LLC, located in Hannibal, Missouri. The change to the remedy was memorialized in a 2017 Explanation of Significant Differences (ESD). Under the Demonstration Programs, more than 32,000 tons of Semet residue were excavated and sent off-site for thermal processing and beneficial reuse.

In 2017, another Demonstration Program began to determine the effectiveness of *in situ* treatment of the Semet residue that was inappropriate for beneficial reuse. This targeted treatment program involved the addition of amendments, primarily Portland cement, to alter the physical characteristics of any remaining Semet residue to a granular form to decrease the mobility of the material. The targeted treatment areas were approximately 15 feet by 15 feet areas extending in rows across each pond. Upon encountering targeted material, amendments were added until a granular appearance and minimum 10 pounds per square inch of unconfined compressive strength was achieved.

Brushy Cleared Area

Remedial activities in the BCA included the placement of several cover systems across the site to address Solvay waste and contaminated soil/fill material. The RA, which was performed from 2019 to 2021, included the following components:

- Installation of a geomembrane cap and, as necessary, 18 inches of clean soil/granular backfill to prevent unacceptable exposure risks in former pond and other Semet Residue areas;

- Installation of a minimum 1-foot-thick soil cover in the BCA and Lakeshore Area to be protective for both current and reasonably anticipated future land used where shallow soil concentrations are above 6 NYCRR Part 375 Soil Cleanup Objectives for commercial use;
- Installation of a 1-foot-thick soil cover in the Semet Main Area's southwest corner; and
- Grading to support commercial and/or industrial development.

Institutional Controls Summary

Table 1: Summary of Planned and/or Implemented ICs for the Semet Residue Ponds Subsite

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Site Use	Yes	Yes	Sitewide	Restrict land use to commercial (including passive recreational) or industrial use	Declaration of Covenants and Restrictions & Environmental Easement (Planned June 2026)
Groundwater	Yes	Yes	Sitewide	Restrict the use of on-site groundwater	Declaration of Covenants and Restrictions & Environmental Easement (Planned June 2026)
Soils/fill material	Yes	Yes	Sitewide	Prevent human exposure to contaminated soils and residues until the selected remedy is fully implemented[3] and require intrusive activities be conducted in accordance with the Site Management SMP.	Declaration of Covenants and Restrictions & Environmental Easement (Planned June 2026)
Vapor Intrusion	Yes	Yes	Sitewide	Require vapor intrusion investigation and/or mitigation measures be conducted for future on-site structures, as appropriate, in accordance with the SMP.	Declaration of Covenants and Restrictions & Environmental Easement (Planned June 2026)

3 Preventing human exposure to contaminated soils and residues until the selected remedy is fully implemented was included in the SMP; however, because the OU1 and OU2 remedies have been fully implemented, this portion of the SMP is no longer relevant and will not be included in the planned ICs.

Systems Operations/Operation and Maintenance

The Tributary 5A collection system consists of automatic control of the wet well submersible pumps and monitoring of the collection pipeline and force main. The pumps are operated based on the groundwater level within the wet wells, as measured by a submersible level transducer. The pump stations are designed to operate at a constant level set below the invert of the low-density polyethylene liner.

The Operations and Maintenance Plan calls for weekly inspections focusing on preventative maintenance, groundwater collection system maintenance, pump station maintenance, and restored area maintenance. The inspections also include site security and pump operation, and inspection and cleaning of observation ports, collection pipes, and force mains. Also included is the cleaning of pumps and wet wells, mowing, reseeding, etc.

Maintenance of the site cover includes monitoring to determine if the success criteria are met and to identify the need for corrective actions, as warranted. Corrective actions for the covers may consist of repair in areas of disturbance or reapplication of vegetation in areas of non-survivorship.

The groundwater containment system has two components--the Tributary 5A groundwater collection system and the lakeshore barrier wall.

The 2022 performance verification (PV) program included groundwater collection system verification activities and data interpretation and was performed in accordance with the Tributary 5A Groundwater Remedial Alternative Site Monitoring and Verification Plan (OBG 2013a; Site Monitoring and Verification Plan) and NYSDEC-approved adaptive changes.

Site monitoring and verification includes evaluation of the collection trench for the presence of contaminated overburden groundwater discharged to Tributary 5A. To document an inward hydraulic gradient for groundwater control, groundwater elevations are measured at observation ports along Reach 1 and Reach 2. Surface water elevation was established as the PV target as part of the 2018 NYSDEC-approved adaptive changes to the PV program. An operational target of maintaining groundwater below the Tributary 5A liner invert was established to support comparison with the PV target. Over the past five years, groundwater elevation data were compared to the surface water elevations in accordance with the performance target specified in the *Site Monitoring and Verification Plan*.

Monitoring also includes annual sampling of six sediment and surface water locations, as well as monitoring of vegetation and tributary channels. A co-located sediment and surface water sampling location was added in 2014 at the outfall of the 60-inch culvert connecting Reach 2 to Onondaga Lake. See Appendix A, Figure A3.

Evaluations of the overall vegetative establishment indicates that restoration efforts continue to be successful. Tributary 5A continues to meet the vegetative cover, invasive species, and shrub survival performance standards identified in the Tributary 5A Groundwater Remedial Alternative Monitoring and Verification Plan of 85%, less than 5%, and 90%, respectively.

Performance verification of the lakeshore barrier wall includes weekly visual inspections of the system and monitoring of trench water levels by tracking piezometer water levels against Onondaga Lake surface water elevations. Though the system operational target is for collection trench levels to be lower than lake elevation, the primary hydraulic containment measure provided by the system is the sheet pile barrier wall. Appendix A, Figure A4, includes a depiction of the barrier wall and piezometer locations.

The volume of annual Tributary 5A groundwater treated between 2020 and 2022 was 20,600,000 gallons, 19,800,000 gallons, and 25,200,000 gallons, respectively. In general, correlations between total precipitation and total groundwater treated were noted and are likely associated with the overall groundwater recharge within the Tributary 5A drainage area. Additional fluctuations from year to year may be attributed to brief treatment plant shutdowns due to system upgrades or power outages and collection system/pump station operation shutdowns to perform maintenance (e.g., collection system flushing, pump maintenance, and transducer maintenance).

The tributary banks, channel, and the Willis/Semet Ditch (WSD) are visually inspected in accordance with the Site Monitoring and Verification Plan. Monitoring activities include the following:

- Inspection of the tributary and WSD for signs of erosion and deposition and the presence of exposed liners;
- Inspection of the tributary banks for the presence of cracks, bulges, or depressions; and
- Assessment of the condition of tributary culverts, headwalls, and the Crucible outfalls.

The following provides an overview of observations made during the 2022 Subsite inspections:

- The Reach 1 channel and banks were stable and well-vegetated with no erosion observed;
- The eastern bank of Reach 2 was stable and well-vegetated with no observed erosion except for a known location of exposed liner and geogrid that was originally documented in 2020 at the temporary check dam located at the downstream end of the reach. Maintenance to address this issue was performed;
- Because portions of the western bank of Reach 2 were sparsely vegetated, an additional application of seed and erosion control fabric was applied in June 2022 to reinforce vegetative surface cover. Inspections in 2023 and 2024 show this area is well vegetated and no erosion has been observed.; and
- Outfalls and other structures appeared to be functioning properly and in good condition.

Remedy Resilience Assessment

Potential impacts to the site area from severe weather were assessed using the tools identified in Appendix C, attached. Based on this assessment, it has been concluded that the performance of the remedy is currently not at risk due to the expected effects of weather-related events in the region and near the Subsite.

III. PROGRESS SINCE THE LAST REVIEW

The protectiveness determinations from the last FYR are summarized in Table 2, below.

Table 2: **Protectiveness Determinations/Statements from the 2020 FYR**

OU #	Protectiveness Determination	Protectiveness Statement
6	Short-term Protective	The remedy at OU6 is protective of human health and the environment in the short-term because remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks. For the remedy to be protective in the long term, ICs need to be established.
27	Will be Protective	The remedy at OU27 is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks.

The previous FYR had one recommendation. The status of the recommendation is summarized in Table 3, below.

Table 3: Status of Recommendations from the 2020 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
6	The 2002 Semet ROD called for ICs to restrict on-site groundwater use and prevent human exposure to contaminated soils and residues until the pond residue components of the remedy are complete. These ICs are not yet in place.	An IC restricting groundwater use should be implemented at the Subsite.	Ongoing	Effort to obtain ICs is underway and is expected to be completed in 2026.	N/A

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On August 7, 2024, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, and Puerto Rico, including the Semet Residue Ponds subsite of the Onondaga Lake Superfund site. The

announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews.

In addition to this notification, the EPA Community Involvement Coordinator, or CIC for the site, Larisa Romanowski, posted a public notice on the EPA site webpage https://www.epa.gov/superfund/onondaga-lake and provided the notice to the Town of Geddes by email on January 30, 2025, with a request that the notice be posted in municipal offices and on the town webpage. This notice indicated that a FYR would be conducted at the Semet Residue Ponds subsite of the Onondaga Lake Superfund site to ensure that the cleanup at the site continues to be protective of people's health and the environment.

Once the FYR is completed, the results will be made available at the following repositories: NYSDEC, Region 7, 615 Erie Blvd. West, Syracuse, NY; Atlantic States Legal Foundation, 658 West Onondaga Street, Syracuse, NY; Onondaga County Public Library, 447 South Salina Street, Syracuse, NY; NYSDEC, Central Office, 625 Broadway, Albany, NY; Solvay Public Library, 615 Woods Road, Solvay, NY. In addition, the final report will be posted on the following website: https://www.epa.gov/superfund/onondaga-lake. Efforts will be made to reach out to local public officials to inform them of the results.

Data Review

Groundwater

For the lakeshore barrier wall, the most recent annual performance verification and monitoring report for 2022 indicated that with the exception of some instances from March to May 2022, when levels read around or above the fluctuating lake elevation, piezometer water levels along the Semet portion of the wall generally remained below the lake elevation, which is the system's operational target. Precipitation, snow melt, and high winds were recorded during this March to May period. Trench water levels in this area remained below the top of the wall throughout the monitoring period, which is the primary hydraulic containment measure provided by the system. The system operated continuously in 2022, except for minor shutdowns associated with maintenance or repair activities.

Groundwater at the Subsite is affected by and commingled with the groundwater contamination emanating from the adjacent Willis Avenue Chlorobenzene subsite. As was noted in the "Status of Implementation" section above, the area is being treated as part of a WMA with the groundwater POC being the WMA boundary (i.e., outside of the barrier wall). The groundwater remedy for this Subsite and the Willis Avenue Chlorobenzene subsite includes the restoration of shallow/intermediate groundwater at the WMA's POC via MNA and is included in the ROD for Willis Avenue, which was signed in 2019. Groundwater is not collected for chemical analysis as part of this Subsite. Therefore, groundwater data was not reviewed as part of this FYR but will instead be further evaluated as part of the Willis Avenue remedy. Groundwater elevations are measured in Tributary 5A and the lakeshore barrier wall for performance verification.

Surface Water

Surface water sample results identified VOCs and SVOCs in each of the six monitoring locations in Tributary 5A. VOCs exceeded the NYSDEC Class C Surface Water Standards and Guidance Value (SGV) at surface water sampling location T5A-SW 20. However, this exceedance was not observed upgradient or in previous years, signifying the source of the exceedance is most likely from outside sources, such as stormwater entering Tributary 5A. In late 2024, NYSDEC issued a notice of violation to an adjacent property and is currently working with the owner to identify the source of contamination and subsequently address the observed contamination in Tributary 5A. Additionally, there was a 60-inch culvert collapse near this sampling location, which may have impacted surface water results. There were no exceedances of SVOCs in 2022, which is consistent with the previous five years. Various inorganic compounds were detected in the surface water. Iron, aluminum and vanadium were found to exceed SGV criteria at various locations and have likely originated from off-site sources, such as stormwater runoff from adjacent roads and trails. Lastly, chloride exceeded its SGV in four locations (T5A-SW 17, T5A-SW 18, T5A-SW 19, and T5A-SW 20). Because these sample locations are near State Fair Boulevard, a road that is heavily salted during the winter months, the chloride may be attributable to runoff from the road.

Sediment

Soil brought on-site as part of the Tributary 5A RA was screened against NYSDEC Part 375 Unrestricted Use Soil Cleanup Objectives (SCOs). Therefore, these SCOs have been the appropriate screening values for the sediment samples because new sediment in the tributary originating from the Subsite would not be expected to exceed these values.

VOCS, SVOC, and inorganic contaminants were detected in sediment samples collected from various locations. Acetone was found to exceed its SCO in 2022 at sediment sample locations T5A-SED-15 and T5A-SED-18; this is consistent with previous sample results. Benzo(a)anthracene, benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene exceeded their respective SCOs at sediment sample location T5A-SED-17. SVOC concentrations increased between sediment sample locations T5A-SED-15 and T5ASED-17 and decreased at the downstream locations (sediment sample locations T5A-SED-18 and T5A-SED-19). This trend is consistent with previous observations. Inorganic constituents including arsenic, cadmium, manganese, nickel, selenium, silver, zinc and mercury all exceeded their respective SCOs in various samples; the levels were consistent with prior years. Much of the surrounding areas are comprised of commercial and industrial properties, which are likely influencing the presence of various constituents in Tributary 5A, including 12 SPDES permitted outfalls that contribute most of the flow to the tributary. Nevertheless, NYSDEC is investigating other potential sources of contamination to Tributary 5A. As discussed in Question B below, the sediment results for Tributary 5A are not considered to be of ecological concern.

Site Inspection

An inspection of the Subsite was conducted on October 1, 2024. In attendance were Claudia Shuman of EPA and Tracy Smith of NYSDEC.

The covers appeared to be in good condition, with no areas of erosion noted. Vegetation was well established in the vegetated soil cover areas and woody vegetation, which can impact the integrity of the cover systems, is regularly removed. No damage to site fencing or guiderails was observed.

V. TECHNICAL ASSESSMENT

QUESTION A: *Is the remedy functioning as intended by the decision documents?*

Field activities related to the excavation of Semet residue materials are now complete, with over 32,000 tons of Semet material transported off-site for beneficial reuse. Targeted treatment of the remaining Semet material via ISS has been completed with all the treated areas having met the unconfined compressive strength objective of 10 pounds per square inch. The groundwater containment portion of the OU1 remedy has also been fully implemented and continues to function as intended. Performance verification activities performed for Tributary 5A in 2022 (year 10) showed the continued success of the remedy in this area. As noted in the "Data Review" section above, while surface water and sediment samples in Tributary 5A were found to exceed their respective SGVs and SCOs, these exceedances are likely originating from off-site sources (*i.e.,* Crucible outfalls) and additional investigations regarding these off-site sources are being performed by NYSDEC. The Tributary 5A liner system remains intact and functioning as intended to prevent impacted groundwater from entering the tributary and, subsequently, Onondaga Lake. A comparison of groundwater elevation levels to tributary surface water levels also indicates that there continues to be no direct connection between Site groundwater and the tributary. Trench water levels associated with the Semet portion of the Lakeshore Hydraulic Containment System have been observed to generally remain below Onondaga Lake elevations or the top of the wall with only brief periods when levels are observed to be higher than the fluctuating lake elevation. The recently implemented OU2 remedy eliminated potential exposure to contaminated soils through the placement of a clean soil and/or paved surface cover. All the implemented components of the OU1 and OU2 remedies are currently functioning as intended.

ICs are not yet in place at the Subsite but are anticipated to be implemented in the near future. In the interim, engineering controls, including covers and fencing around the perimeter of the Subsite, prevent exposure to site-related contaminants.

QUESTION B: *Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

Human Health

There have been no changes in the physical conditions of the Subsite over the past five years that would change the protectiveness of the remedy. The HHRA conducted for OU1 concluded that there was potential unacceptable risk for trespassers who directly contacted the pond residue, while the OU2 HHRA concluded there was a potential for unacceptable risk to the indoor/outdoor industrial worker and to the construction worker exposed to chemicals in the surface Solvay waste/soil/fill material. The exposure assumptions and pathways assessed in the RODs for the two OUs followed the Risk Assessment Guidance for Superfund used by the Agency and remain valid.

Although specific parameters may have changed since the time the risk assessments were completed, the processes that were used remain valid. In addition, some of the toxicity values that were used in the HHRAs have changed; however, the changes would not impact the remedial decision that was made for the Subsite.

The OU1 and OU2 human health-related RAOs remain valid and the selected remedies are protective of human health. The implementation of the OU1 and OU2 remedies have effectively interrupted potential exposures to trespassers, indoor/outdoor industrial workers, and construction workers at the Subsite. Although the groundwater beneath the Subsite is classified by New York State as "Class GA," indicating a potable source of drinking water, it is not currently being used as a drinking water source. The implementation of ICs that restrict the use of groundwater will ensure that the groundwater will not be used as a potable water supply in the future. The ICs will also restrict land use and require that intrusive activities in areas where contamination remains, as well as future on-site buildings be evaluated for the potential for vapor intrusion and include vapor intrusion sampling and/or installation of mitigation measures, if necessary, be conducted in accordance with the SMP. There are currently no buildings on the Subsite.

The cleanup goals identified in the RODs for OU1 and OU2 remain valid.

Ecological

A habitat-based ecological assessment identified different habitats within the Subsite and potential areas where wildlife would reside. The ecological assessment also noted that the physical effects from dermal exposure of contaminants, outweighed the exposure from incidental ingestion due to the extreme corrosiveness (pH <1) of the waste material. Additionally, ingestion of plant material was associated with an unacceptable risk to benzene.

The ecological-related RAOs established at the time of the ROD are still valid. The implemented remedies at this site included waste material removal. Any remaining residue present within the ponds were treated on-site via ISS and covered with a geomembrane cap and fill material. Furthermore, the Subsite has been cleared of vegetation, which reduces the likelihood of wildlife activity in this area. If site usage were to change in the future such that vegetation is allowed to re-establish, this exposure pathway to wildlife will be re-evaluated.

Performance verification activities for Tributary 5A in 2022 (year 10) showed the continued success of the remedy in this area. Even though VOCs and other contaminants were found in surface water and sediment samples above comparison criteria, they likely originated from off-site sources. Clean fill material was placed in the tributary as part of the remedy. Vegetation was planted to prevent erosion and establish stability. The data continues to show successful coverage of vegetation at the subsite. The implemented remedy remains protective of the environment and wildlife.

QUESTION C: *Has any other information come to light that could call into question the protectiveness of the remedy?*

There is no new information that calls into question the protectiveness of the remedies.

VI. ISSUES/RECOMMENDATIONS

Table 5, below, presents the recommendations and follow-up actions for this FYR.

Table 5: Issues and Recommendations

Issues/Recommendations				
OU(s) without Issues/Recommendations Identified in the Five-Year Review:				
None				
Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 6 and 27	**Issue Category: Institutional Controls**			
	Issue: The OU6 ROD called for ICs to restrict on-site groundwater use and prevent human exposure to contaminated soils and residues until the selected remedy is fully implemented. The OU27 ROD called for ICs to restrict land use to commercial (including passive recreational)/industrial use, restrict groundwater use, and require that intrusive activities in areas where contamination remains as well as evaluating the potential for vapor intrusion (sampling and/or installation of mitigation measures, if necessary) in any future on-site buildings be conducted in accordance with the SMP. Because the OU6 and OU27 remedies have been fully implemented, preventing human exposure to contaminated soils and residues until the selected remedy is fully implemented is no longer relevant. The other components of the OU6 and OU27 ICs are, however, still relevant and have not been implemented.			
	Recommendation: ICs restricting groundwater use, restricting land use to commercial (including passive recreational)/industrial use, and requiring that intrusive activities in areas where contamination remains as well as the evaluation for vapor intrusion (investigation and/or mitigation measures) be conducted in accordance with the SMP should be implemented at the Subsite.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	State	6/30/2026

VII. PROTECTIVENESS STATEMENT

Table 6, below, provides protectiveness statements.

Table 6: Protectiveness Statements

Protectiveness Statement(s)	
OU6	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The remedy at OU6 is protective of human health and the environment in the short-term because the completed remedial activities have adequately addressed all exposure pathways that could result in unacceptable risks. For the remedy to be protective in the long term, ICs need to be established.	
Protectiveness Statement(s)	
OU27	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The remedy at OU27 is protective of human health and the environment in the short-term because the completed remedial activities have adequately addressed all exposure pathways that could result in unacceptable risks. For the remedy to be protective in the long term, ICs need to be established.	

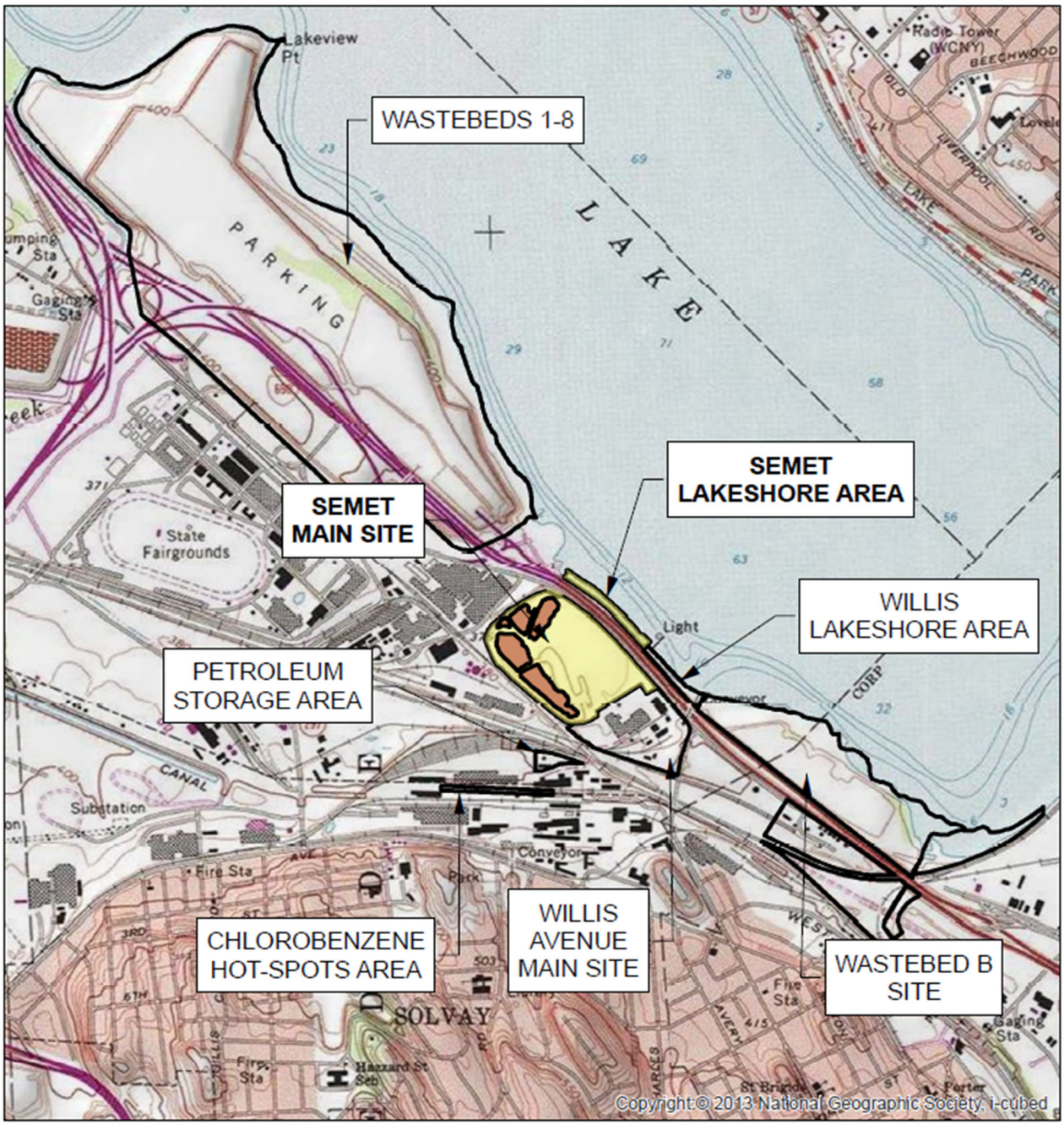
Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The remedies implemented at OU6 and OU27 are protective of human health and the environment in the short-term because the completed remedial activities have adequately addressed all exposure pathways that could result in unacceptable risks. For the remedy to be protective in the long term, ICs need to be established.

VIII. NEXT REVIEW

The next FYR report for the Subsite of the Onondaga Lake site is required five years from the completion date of this review.

APPENDIX A – FIGURES

FIGURE A1

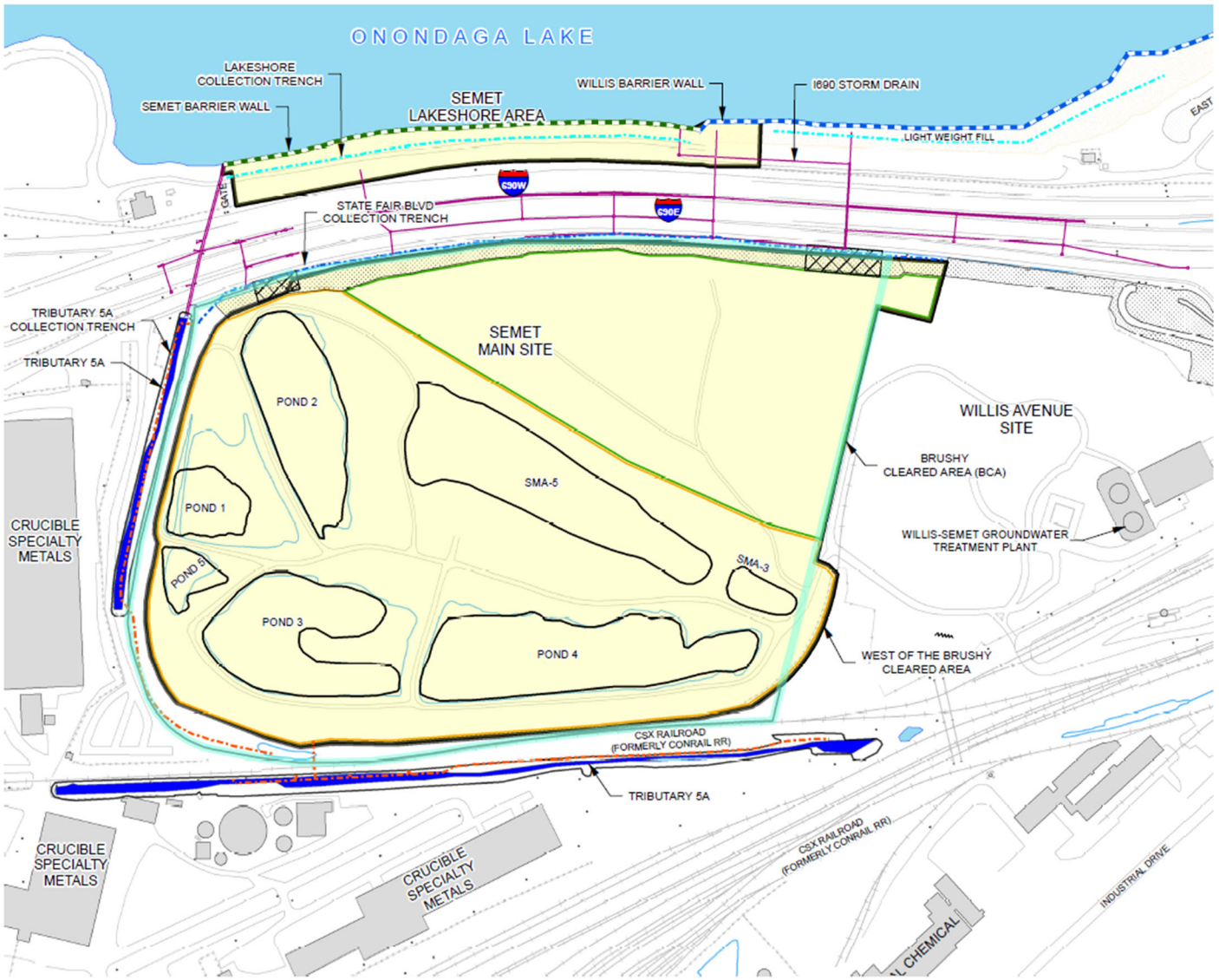


ADAPTED FROM: SYRACUSE WEST, NY USGS QUADRANGLE

HONEYWELL INTERNATIONAL INC.
SEMET RESIDUE PONDS SITE
GEDDES, NEW YORK

N

FIGURE A2



LEGEND

IRMS & REMEDIAL ACTIONS

- STATE FAIR COLLECTION TRENCH
- LAKESHORE COLLECTION TRENCH
- TRIBUTARY 5A COLLECTION TRENCH
- I-690 STORM DRAIN
- SEMET BARRIER WALL
- WILLIS BARRIER WALL
- TRIBUTARY 5A
- TRIBUTARY 5A SEDIMENT REMOVAL
- SOIL REMOVAL AREA
- BALLFIELD / WILLIS / SEMET BERM AREA

STUDY AREA

- SEMET RESIDUE PONDS SITE
- WASTEBED A AREA
- BRUSHY CLEARED AREA (BCA)
- WEST OF THE BCA
- SEMET BERM AREA

HONEYWELL INTERNATIONAL INC.
SEMET RESIDUE PONDS SITE
GEDDES, NEW YORK

SITE PLAN

0 125 250 500
Feet

FEBRUARY 2019
1163.63447

O'BRIEN & GERE ENGINEERS, INC.

FIGURE A3

LEGEND

- CATCH BASIN
- SURFACE WATER AND SEDIMENT SAMPLE LOCATIONS
- CRUCIBLE OUTFALL/CULVERT LOCATIONS
- TRIB-5A / I-690 STORM DRAINAGE SYSTEM

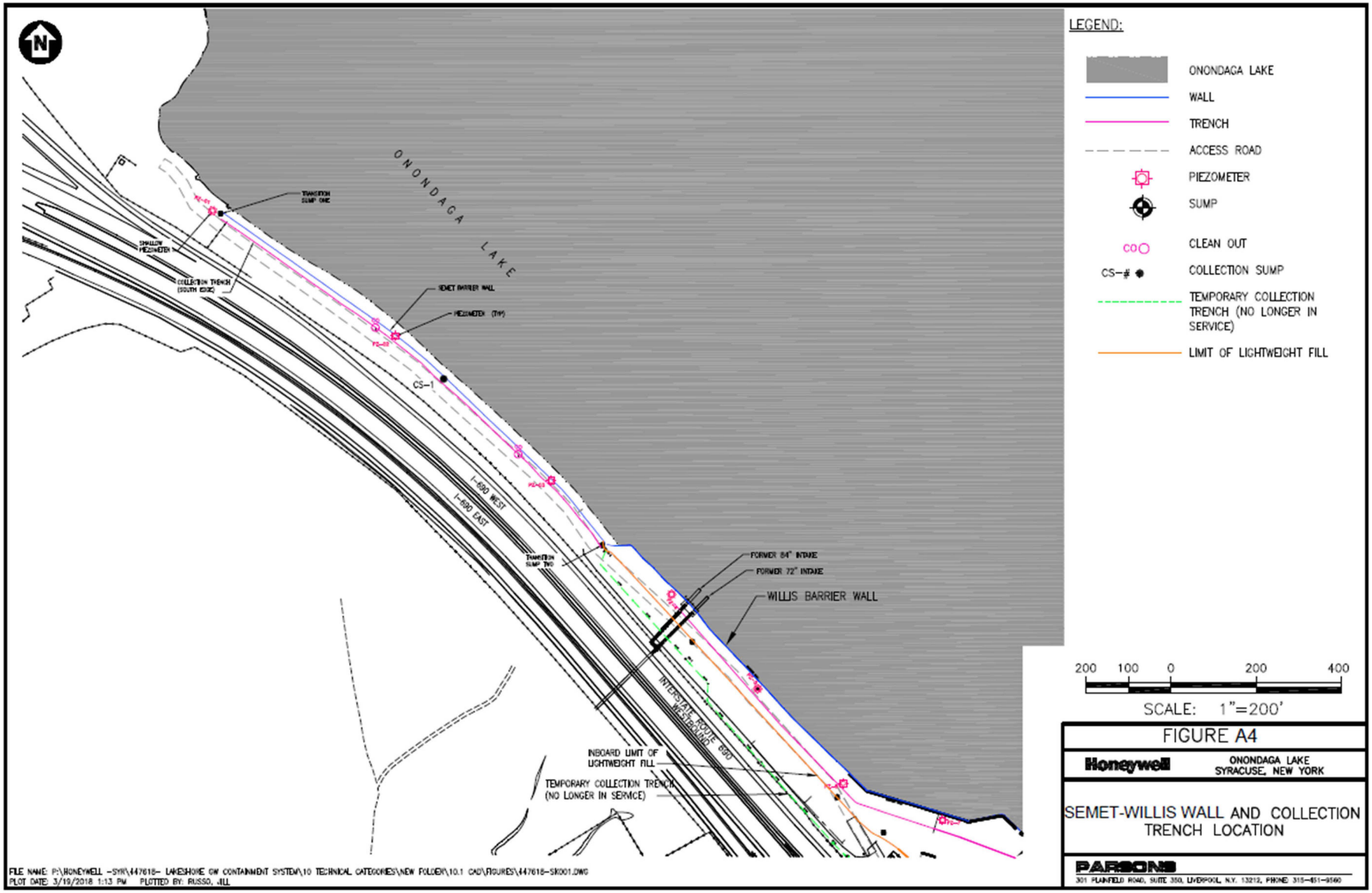
HONEYWELL
TRIBUTARY 5A
GEDDES, NEW YORK

SURFACE WATER AND SEDIMENT MONITORING LOCATIONS

0 125 250 500
Feet

1163.69551
MARCH 2019

O'BRIEN & GERE ENGINEERS, INC.


LEGEND:
ONONDAGA LAKE
WALL
TRENCH
ACCESS ROAD
PIEZOMETER
SUMP
CLEAN OUT
CS-# COLLECTION SUMP
TEMPORARY COLLECTION TRENCH (NO LONGER IN SERVICE)
LIMIT OF LIGHTWEIGHT FILL
ONONDAGA LAKE
TRANSITION SUMP ONE
SHALLOW PIEZOMETER
COLLECTION TRENCH (SOUTH SIDE)
SEMET BARRIER WALL
PIEZOMETER (TYP)
CS-1
I-690 WEST
I-690 EAST
TRANSITION SUMP TWO
FORMER 84" INTAKE
FORMER 72" INTAKE
WILLIS BARRIER WALL
INTERSTATE ROUTE 690
INBOARD LIMIT OF LIGHTWEIGHT FILL
TEMPORARY COLLECTION TRENCH (NO LONGER IN SERVICE)
200 100 0 200 400
SCALE: 1"=200'
FIGURE A4
Honeywell
ONONDAGA LAKE
SYRACUSE, NEW YORK
SEMET-WILLIS WALL AND COLLECTION TRENCH LOCATION
PARSONS
301 PLAINFIELD ROAD, SUITE 350, LIVERPOOL, N.Y. 13212, PHONE: 315-451-9560
FILE NAME: P:\HONEYWELL -SYR\447618- LAKESHORE GW CONTAINMENT SYSTEM\10 TECHNICAL CATEGORIES\NEW FOLDER\10.1 CAD\FIGURES\447618-SK001.DWG
PLOT DATE: 3/19/2018 1:13 PM PLOTTED BY: RUSSO, JILL

APPENDIX B – REFERENCE LIST

O'Brien & Gere. 1992. *Remedial Investigation Report, Semet Residue Ponds*. October 1991, Revised May 1992.

NYSDEC and EPA. 2002. *Record of Decision. Semet Residue Ponds Site. Sub-Site to the Onondaga Lake NPL Site.* March. NYSDEC and EPA. 2017. *Explanation of Significant Differences Semet Residue Ponds Subsite of the Onondaga Lake Superfund Site*. July.

NYSDEC and EPA. 2019. *Record of Decision. Operable Unit 2 of the Semet Residue Ponds Subsite of the Onondaga Lake Superfund Site.* March.

Ramboll, 2023. *Honeywell Lakeshore Upland Sites Performance Verification 2022 Annual Reports, Appendix B, Tributary 5A Performance Verification 2022 Annual Report.* June

APPENDIX C – REMEDY RESILINECE ASSESSMENT

In accordance with regional practice, two tools were utilized to assess the site. Screenshots from each of the tools assessed are included below.

The first tool was the CMRA Assessment Tool. The tool examined five hazards for the county the site falls within. According to this tool, the National Risk Index Ratings for extreme heat, wildfire, and flooding were "very low" or "relatively low." No Risk Index Rating was provided for drought, although the tool did not indicate any significant changes in projected precipitation over the next century. Accordingly, Figure D-1 shows a slight projected increase in days per year with maximum temperatures > 100°F throughout the century. Figures D-2 and D-3 show a projected stabilization in annual average total precipitation and dry days, respectively. Similar to Figure D-2, Figure D-4 also shows stabilized precipitation, thus, suggesting that future flood risks are minimal. The CMRA tool did not provide any data associated with coastal inundation (see Figure D-5). This is because the site is located over 300 miles from the Atlantic Coast and is, therefore, not likely subject to sea level rise impacts.

The second tool is called the "USGS U.S. Landslide Inventory." As shown by Figure D-6, there have been no landslides recorded in the vicinity of the Subsite.

Based on this information, potential site impacts from severe weather have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of weather-related events in the region and near the site.

Figure D-1

Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Temperature thresholds:							
Annual days with maximum temperature > 90°F	**3 days** 3 - 6	**12 days** 4 - 23	**13 days** 5 - 21	**18 days** 6 - 35	**24 days** 9 - 43	**25 days** 8 - 51	**52 days** 16 - 91
Annual days with maximum temperature > 95°F	**0 days** 0 - 1	**2 days** 0 - 9	**3 days** 0 - 7	**4 days** 0 - 17	**7 days** 1 - 18	**8 days** 1 - 24	**25 days** 3 - 57
Annual days with maximum temperature > 100°F	**0 days** 0 - 0	**0 days** 0 - 2	**0 days** 0 - 2	**1 days** 0 - 6	**2 days** 0 - 8	**2 days** 0 - 6	**9 days** 0 - 36
Annual days with maximum temperature > 105°F	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 1	**0 days** 0 - 4	**0 days** 0 - 3	**3 days** 0 - 22
Annual temperature:							
Annual single highest maximum temperature °F	**92 °F** 91 - 93	**96 °F** 92 - 100	**96 °F** 93 - 100	**97 °F** 93 - 103	**99 °F** 94 - 107	**99 °F** 94 - 106	**104 °F** 96 - 115
Annual highest maximum temperature averaged over a 5-day period °F	**87 °F** 86 - 88	**90 °F** 88 - 95	**91 °F** 88 - 94	**92 °F** 88 - 97	**93 °F** 89 - 99	**94 °F** 89 - 100	**99 °F** 91 - 110
Cooling degree days (CDD)	**495 degree-days** 453 - 529	**765 degree-days** 585 - 1,000	**802 degree-days** 612 - 1,036	**917 degree-days** 660 - 1,282	**1,055 degree-days** 759 - 1,451	**1,077 degree-days** 773 - 1,567	**1,678 degree-days** 1,016 - 2,418

N/A = Data Not Available for the selected area

Figure D-2

Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Average annual total precipitation	**40"** 39 - 41	**42"** 40 - 44	**42"** 39 - 44	**42"** 39 - 46	**43"** 39 - 45	**43"** 40 - 46	**44"** 41 - 47
Days per year with precipitation (wet days)	**238 days** 234 - 241	**234 days** 222 - 244	**234 days** 218 - 241	**233 days** 224 - 244	**231 days** 218 - 243	**232 days** 216 - 243	**228 days** 206 - 249
Days per year with no precipitation (dry days)	**128 days** 124 - 131	**131 days** 121 - 143	**131 days** 124 - 147	**132 days** 121 - 141	**134 days** 122 - 147	**133 days** 122 - 149	**137 days** 116 - 159
Maximum number of consecutive dry days	**8 days** 7 - 9	**9 days** 7 - 10	**9 days** 8 - 11	**9** days 8 - 10	**9 days** 7 - 12	**9 days** 8 - 11	**10 days** 7 - 12
Temperature thresholds:							
Annual days with maximum temperature > 90 °F	**3 days** 3 - 6	**12 days** 4 - 23	**13 days** 5 - 21	**18 days** 6 - 35	**24 days** 9 - 43	**25 days** 8 - 51	**52 days** 16 - 91
Annual days with maximum temperature > 100 °F	**0 days** 0 - 0	**0 days** 0 - 2	**0 days** 0 - 2	**1 days** 0 - 6	**2 days** 0 - 8	**2 days** 0 - 6	**9 days** 0 - 36

N/A = Data Not Available for the selected area

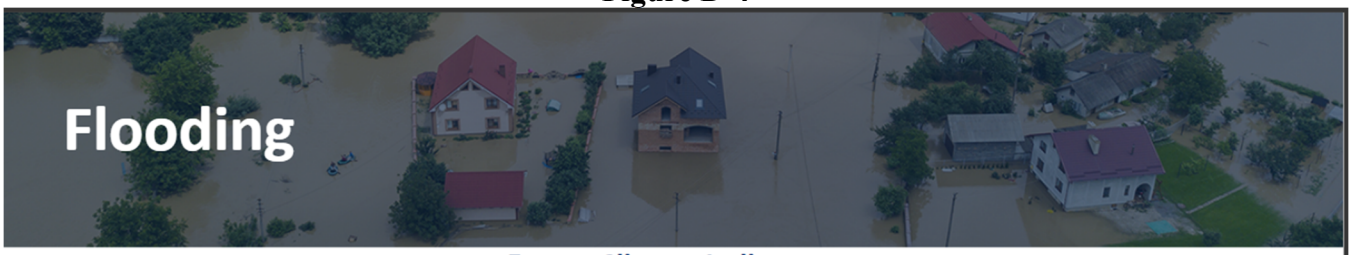
Figure D-3

Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Days per year with no precipitation (dry days)	**128 days** 124 - 131	**131 days** 121 - 143	**131 days** 124 - 147	**132 days** 121 - 141	**134 days** 122 - 147	**133 days** 122 - 149	**137 days** 116 - 159
Maximum number of consecutive dry days	**8 days** 7 - 9	**9 days** 7 - 10	**9 days** 8 - 11	**9 days** 8 - 10	**9 days** 7 - 12	**9 days** 8 - 11	**10 days** 7 - 12
Days per year with precipitation (wet days)	**238 days** 234 - 241	**234 days** 222 - 244	**234 days** 218 - 241	**233 days** 224 - 244	**231 days** 218 - 243	**232 days** 216 - 243	**228 days** 206 - 249
Temperature thresholds:							
Annual days with maximum temperature > 90°F	**3 days** 3 - 6	**12 days** 4 - 23	**13 days** 5 - 21	**18 days** 6 - 35	**24 days** 9 - 43	**25 days** 8 - 51	**52 days** 16 - 91
Annual days with maximum temperature > 100°F	**0 days** 0 - 0	**0 days** 0 - 2	**0 days** 0 - 2	**1 days** 0 - 6	**2 days** 0 - 8	**2 days** 0 - 6	**9 days** 0 - 36

N/A = Data Not Available for the selected area

Figure D-4



Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Annual average total precipitation	**40"** 39 - 41	**42"** 40 - 44	**42"** 39 - 44	**42"** 39 - 46	**43"** 39 - 45	**43"** 40 - 46	**44"** 41 - 47
Days per year with precipitation (wet days)	**238 days** 234 - 241	**234 days** 222 - 244	**234 days** 218 - 241	**233 days** 224 - 244	**231 days** 218 - 243	**232 days** 216 - 243	**228 days** 206 - 249
Maximum period of consecutive wet days	**17 days** 15 - 19	**17 days** 14 - 19	**17 days** 15 - 21	**17 days** 14 - 19	**17 days** 15 - 20	**17 days** 15 - 20	**17 days** 15 - 23
Annual days with:							
Annual days with total precipitation > 1inch	**2 days** 2 - 3	**3 days** 2 - 4	**3 days** 2 - 4	**3 days** 3 - 4	**3 days** 3 - 4	**3 days** 2 - 4	**4 days** 3 - 5
Annual days with total precipitation > 2 inches	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 1
Annual days with total precipitation > 3 inches	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0	**0 days** 0 - 0
Annual days that exceed 99th percentile precipitation	**4 days** 4 - 6	**5 days** 5 - 7	**5 days** 5 - 7	**6 days** 5 - 8	**6 days** 5 - 8	**6 days** 5 - 8	**7 days** 7 - 9
Days with maximum temperature below 32 °F	**51 days** 47 - 54	**38 days** 20 - 48	**37 days** 27 - 48	**33 days** 14 - 44	**29 days** 16 - 38	**28 days** 9 - 40	**15 days** 5 - 28

N/A = Data Not Available for the selected area

Figure D-5

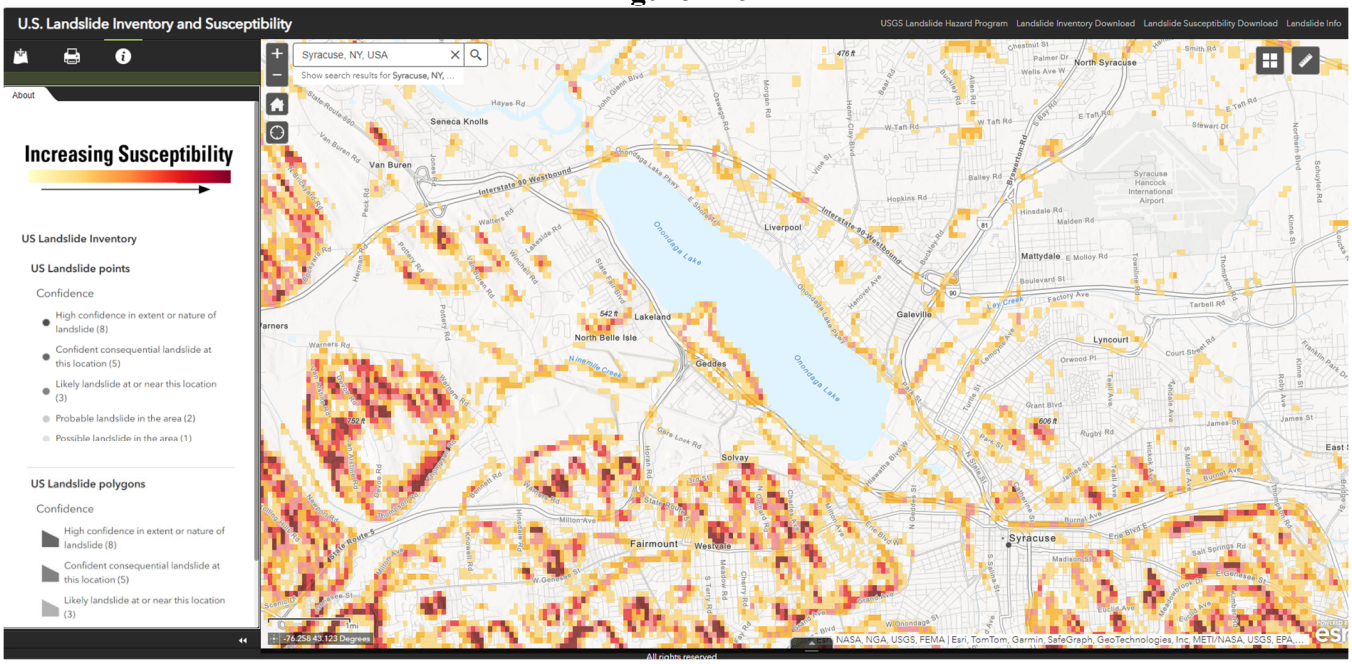
Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Sea level rise:							
Percent of selected county impacted by global sea level rise	N/A	N/A	N/A	N/A	N/A	N/A	N/A

For more information on sea level changes, see the Interagency Sea Level Rise Scenario Tool

N/A = Data Not Available for the selected area

Figure D-6


U.S. Landslide Inventory and Susceptibility
USGS Landslide Hazard Program
Landslide Inventory Download
Landslide Susceptibility Download
Landslide Info
About
Increasing Susceptibility
US Landslide Inventory
US Landslide points
Confidence
High confidence in extent or nature of landslide (8)
Confident consequential landslide at this location (5)
Likely landslide at or near this location (3)
Probable landslide in the area (2)
Possible landslide in the area (1)
US Landslide polygons
Confidence
High confidence in extent or nature of landslide (8)
Confident consequential landslide at this location (5)
Likely landslide at or near this location (3)
Syracuse, NY, USA
Show search results for Syracuse, NY, ...
Seneca Knolls
Van Buren
Liverpool
Onondaga Lake
Lakeland
North Belle Isle
Gaddes
Solvay
Fairmount
Westvale
Syracuse
North Syracuse
Mattydale
Galeville
Lyncourt
-76.258 43.123 Degrees
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