SECOND FIVE-YEAR REVIEW REPORT FOR SALINA LANDFILL SUBSITE OF THE ONONDAGA LAKE SITE ONONDAGA COUNTY, NEW YORK

Prepared by

U.S. Environmental Protection Agency
Region 2
New York, New York
December 2020

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LIST OF ABBREVIATIONS & ACRONYMS

CFR	Code of Federal Regulations
EPA	U.S. Environmental Protection Agency
FYR	Five-Year Review
ICs	Institutional Controls
IRM	Interim Remedial Measure
MCL	Maximum Contaminant Level
METRO	Metropolitan Syracuse Wastewater Treatment Plant
mg/kg	milligram per kilogram
mg/L	milligrams per liter
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
OLCC	Old Ley Creek Channel
O&M	Operation and Maintenance
OU	Operable Unit
PAHs	polyaromatic hydrocarbon compounds
PCB	Polychlorinated Biphenyl
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
SVOCs	semi-volatile organic compounds
SMP	Site Management Plan
TSCA	Toxic Substances Control Act
UU/UE	Unlimited Use and Unrestricted Exposure
VOCs	Volatile Organic Compounds

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 FYRs 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 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 Contingency Plan (40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

In 1994, EPA designated Onondaga Lake, and its tributaries and upland areas which have contributed or are contributing hazardous substances to the lake (subsites), as a Superfund National Priorities List (NPL) site. The Onondaga Lake site includes 11 subsites, which 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 is an operable unit (OU). This FYR focuses only on the Salina Landfill subsite (Subsite) (OU 8) of the Onondaga Lake site. The Subsite is located in the Town of Salina, Onondaga County, New York.

The work at the Subsite has been conducted as a single OU.

This is the second FYR for the Subsite. The triggering action for this statutory FYR is the signature date of the last review, May 20, 2016. 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's second FYR team was led by Mark Granger, the EPA Remedial Project Manager. Participants included Kathryn Flynn (EPA hydrogeologist), Stephanie Kim (EPA human health risk assessor), Nicholas Mazziotta (EPA human health and ecological risk assessor), and Larisa Romanowski (EPA community involvement coordinator). The Town of Salina, the potentially responsible party, was notified of the initiation of the FYR. The FYR began on March 3, 2020.

Site Background

The approximately 55-acre Subsite is located in the Town of Salina, Onondaga County, New York. It is bounded by the New York State Thruway to the north and by Route 11 (Wolf Street) to the east. An Onondaga County Resource Recovery Agency Transfer Station is located immediately to the west of the landfill. Ley Creek, a Class B stream, runs through the approximate eastern half of the Subsite and along the southern border of the approximate western half of the Subsite. The eastern half of the Subsite is bounded to the south by the banks of a separate tributary, known as Old Ley Creek Channel (OLCC). See Appendix A, **Figure 1**, for a vicinity location map.

The Subsite is segregated into seven parcels (see Appendix A, **Figure 2**):

- **Parcel 1**: This 5-acre area is located in the northeastern portion of the Subsite.
- **Parcel 2**: This parcel, which consists of the main landfill, is approximately 25 acres.
- **Parcel 3**: This 8-acre parcel consists of utility corridors bisecting Parcels 1, 2, 4, and 5.
- **Parcel 4**: This parcel, approximately 6 acres in size, occupies the southwestern-most portion of the landfill property, immediately south of Parcel 2.
- **Parcel 5**: This parcel, approximately 5 acres in size, is located in the eastern portion of the Subsite.
- **Parcel 6**: This parcel is south of, and across Ley Creek from, the remaining parcels. It is bordered by Ley Creek to the north and west and the OLCC to the east and south. Parcel 6 is approximately 5 acres in size.
- **Parcel 7**: This 2-acre parcel is located immediately east of Parcels 1 and 5.

Beginning in the early 1960s, municipal solid waste, as well as hazardous wastes, including paint sludge, paint thinner, polychlorinated biphenyl (PCB)-contaminated wastes, and contaminated sediments dredged from Ley Creek were disposed of in the landfill.

Because of flooding events, in 1970, the Onondaga County Department of Drainage and Sanitation widened, deepened and rerouted the adjacent Ley Creek through the Town of Salina Landfill. Dredged materials were spread, among other places, along the banks of Ley Creek.

Reaching its capacity, the landfill was officially closed sometime in late 1974 or early 1975, pursuant to an order by New York State Department of Environmental Conservation (NYSDEC).

In 1997, NYSDEC and EPA jointly notified the Town that the Salina Landfill was a subsite of the Onondaga Lake NPL site due to releases or the threat of releases of hazardous substances, pollutants or contaminants into the environment.

Appendix B, attached, summarizes the documents utilized to prepare this FYR. **Appendix C**, attached, summarizes the subsite's topography, hydrology, and geology/hydrogeology. For more details related to background, physical characteristics, geology/hydrogeology, land/resource use, and history related to the Subsite, please refer to:

https://www.epa.gov/superfund/onondaga-lake

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Onondaga Lake Site (Salina Landfill Subsite)		
EPA ID: NYD986913580		
Region: 2	**State:** NY	**City/County:** Town of Salina/Onondaga County

SITE STATUS	
NPL Status: Final	
Multiple OUs? Yes	**Has the site achieved construction completion?** No

REVIEW STATUS
Lead agency: State ***[If "Other Federal Agency", enter Agency name]*:**
Author name (Federal or State Project Manager): Mark Granger
Author affiliation: EPA
Review period: 5/21/2016 – 11/2/2020
Date of site inspection: 8/4/2020
Type of review: Statutory
Review number: 2
Triggering action date: 5/20/2016
Due date *(five years after triggering action date)*: 5/20/2021

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

From 1986 through 1997, soil, sediment, groundwater, leachate, surface water, and fish tissue samples were collected by NYSDEC, EPA, and the Onondaga County Department of Health. The results showed polyaromatic hydrocarbon compounds (PAHs), VOCs, PCBs, semi-volatile organic compounds (SVOCs), dibenzofuran, cadmium, chromium, nickel, zinc, and pesticides in the soil, VOCs and SVOCs in surface water, and PCBs, pesticides, VOCs, and SVOCs in the sediment and leachate. PCBs were detected in fish samples.

On October 29, 1997, the Town of Salina entered into an Order on Consent with NYSDEC to perform a remedial investigation (RI)/feasibility study, remedial design, and remedial action for the Subsite. The RI report, which was completed in 2000, indicated that the primary contaminants in each media were as follows:

- *Surface Soils:* The primary contaminants in the surface soil of the Subsite were metals and PAHs. Additionally, elevated levels of Aroclor 1248 (ranging from 0.22 to 8.4 mg/kg) were encountered on the parcel between OLCC and Ley Creek.
- *Subsurface soils:* While several contaminants were identified in the subsurface soils, the primary group of contaminants encountered was PAHs and PCBs.
- *Sediment:* The primary contaminants in the sediment of the Subsite were PAHs, PCBs (Aroclor 1248 and 1260) and metals.
- *Groundwater:* The primary contaminants in the groundwater of the Subsite were VOCs. Additionally, elevated concentrations of SVOCs, pesticides, and metals were detected.
- *Leachate:* Benzene, chlorobenzene, Aroclor 1248, and metals were identified as the contaminants within Site leachate.
- *Surface Water:* One PAH, Aroclor 1248, aluminum, and iron were identified as the contaminants within Site surface water.

Based on these findings, the risk assessment determined that the contaminants of concern detected in the environmental media at the Subsite (*i.e.*, PAHs, metals, and Aroclor 1248), at the levels identified in the RI, posed elevated carcinogenic (under both current and future land-use scenarios) and noncarcinogenic (under the future land-use scenario) health risks to potentially-exposed populations at the Subsite. It was also determined that waste material and contaminated surface soil, as well as contaminated sediment in the western drainage ditch, posed an unacceptable ecological risk.[1] Based upon the human health and ecological risk assessments and the fact that groundwater containing hazardous substances in excess of groundwater standards discharges to Ley Creek, a tributary of Onondaga Lake, EPA and NYSDEC determined that the Subsite posed an unacceptable threat that warranted remediation.

Response Actions

During the RI, groundwater quality monitoring identified the presence of elevated VOCs in a monitoring well located very close to Ley Creek. NYSDEC performed a subsurface investigation that identified contaminated soils. These soils were addressed as an Interim Remedial Measure (IRM). During the IRM, approximately 1,250 tons of nonhazardous soils, approximately 450 tons of hazardous soils, and approximately 116 tons of Toxic Substances Control Act (TSCA)-regulated soils were disposed of off-site.

In March 2007, a Record of Decision (ROD) was signed. The ROD had the following remedial action objectives (RAOs):

[1] Surface water and sediment in Ley Creek, which runs along the southern edge of the landfill, are being addressed as a part of the Lower Ley Creek subsite. Therefore, these media were not evaluated as part of the baseline human health and ecological risk assessments.

- Reduce/eliminate contaminant leaching to ground water;
- Control surface water runoff and erosion;
- Prevent the off-site migration of contaminated groundwater and leachate;
- Restore groundwater quality to levels which meet state and federal drinking-water standards;
- Prevent human contact with contaminated soils, sediment and ground water; and
- Minimize exposure of aquatic species and wildlife to contaminants in surface water, sediments, and soils.

The selected remedy included:

- Excavation of contaminated sediments in the western drainage ditch;
- Construction of groundwater/leachate collection trenches north and south of Ley Creek;
- Consolidation of the excavated sediments and the soils and wastes (from the excavation of the collection trenches) on the landfill areas;
- Construction of 6 NYCRR Part 360 caps over the landfill areas north and south of Ley Creek;
- Lining the drainage ditches located along the northern and eastern borders of the Subsite;
- Engineered drainage controls and fencing;
- Installation of a 150,000-gallon storage tank to hold excess water volume stemming from storm events;
- Treatment of the collected contaminated groundwater/leachate at an on-site treatment plant and discharge of treated effluent to Ley Creek or disposal at the Metropolitan Syracuse Wastewater Treatment Plant (METRO) after pretreatment;
- Institutional controls (ICs) (such as restrictive covenants or environmental easements) to prohibit residential use of property and the installation and use of groundwater wells, as well as to protect and ensure the integrity of the caps, groundwater/leachate collection trenches, and engineered drainage controls;
- Maintenance of the caps and groundwater/leachate collection trenches; and
- Long-term monitoring.

In July 2007, the Town of Salina's contractor commenced the remedial design (RD) of the selected remedy. In 2008, the Town of Salina and the County entered into an agreement for METRO to accept the pretreated groundwater/leachate.

In the ROD, an alternative including excavation of the landfilled materials from the area located south of Ley Creek (Parcel 6; see Appendix A, **Figure 2**) and consolidation on the waste located north of Ley Creek was eliminated from consideration due to concerns that significant quantities of hazardous waste were commingled with the municipal refuse, which would have significantly increased the cost of the remedy because these wastes would require off-site disposal. As part of the design of the selected remedy, samples were collected from the waste from Parcel 6. Upon analysis of these samples, it was concluded that Parcel 6 likely contained a heterogeneous mixture of municipal refuse with only low concentrations of hazardous substances that were typically associated with municipal refuse. As a result of this conclusion, the remedy selected in the ROD was reevaluated and a ROD amendment calling for the consolidation of the waste was issued in September 2010.

Response Action Implementation

The RD associated with the landfill consolidation and capping was approved by NYSDEC in August 2010. NYSDEC approved the RD for the pretreatment plant in June 2014.

The construction contractor mobilized for the landfill consolidation and capping remedial action in November 2010. During the remedial action, approximately 176,000 cubic yards of material was excavated from the southern landfill. Approximately 1,100 tons of PCB-contaminated material was disposed of at the Model City Landfill in Model City, NY. After consolidating the nonhazardous material on the northern landfill, the material was graded and the landfill was capped. The following summarizes the remediation by parcel:

- **Parcel 1**: All municipal solid waste on this parcel was relocated to Parcel 2. In addition, a 1.33-acre wetland mitigation area and the groundwater/leachate pretreatment plant was constructed on this parcel.
- **Parcel 2**: Municipal solid waste and construction and demolition debris excavated from other parcels (mostly Parcels 1, 6 and 7) were relocated to this parcel. Following waste consolidation efforts, Parcel 2 was capped with a geomembrane.
- **Parcel 3**: The majority of this parcel was covered with a clay cap to facilitate better access to electric and gas utilities.
- **Parcel 4**: Municipal solid waste along Ley Creek on this parcel was pulled back approximately 30 feet and relocated to Parcel 2. Following completion of excavation activities, the parcel was graded and capped with geomembrane.
- **Parcel 5**: Municipal solid waste along Ley Creek on this parcel was pulled back approximately 30 feet and relocated to Parcel 2. Following completion of excavation activities, the parcel was graded and capped with geomembrane.
- **Parcel 6**: Municipal solid waste was excavated from this parcel and relocated to Parcel 2. PCB-impacted waste (> 50 milligrams per kilogram [mg/kg] PCBs) located in the northeastern portion of the parcel was excavated and disposed of off-site. VOC-impacted materials located in the north central portion of the parcel below the municipal solid waste were also excavated and relocated to Parcel 2. Following completion of excavation activities, the parcel was backfilled, graded and seeded. In addition, a 2.05-acre wetland mitigation area was constructed on this parcel.
- **Parcel 7**: Waste from Parcel 7 was excavated and relocated to Parcel 2. The parcel was then backfilled, graded and seeded.

See Appendix A, **Figure 3**, for a layout of the landfill cover components.

The groundwater-collection trench, installed for the entire length of the landfill along the northern bank of Ley Creek, was completed in August 2012. Cap construction related to all parcels (Parcels 1 through 7) was completed in November 2013. The pretreatment plant was constructed between June and December 2014 and began operating in January 2015.

Institutional Controls

Table 1, below, summarizes the status of the ICs.

Table 1: **Summary of Implemented Institutional Controls**

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)
Property	Yes	Yes	All	Property may not be used for residential, restricted residential, or commercial purposes	Environmental Easement; 7/25/2017
Groundwater	Yes	Yes	All	Use of groundwater underlying the property prohibited without necessary water quality treatment	Environmental Easement; 7/25/2017
Soil	Yes	Yes	All	Protect the integrity of remedy	Environmental Easement; 7/25/2017

Systems Operation/Operation & Maintenance

A network of on-site wells was designed to evaluate groundwater quality and elevation beneath the landfill; the well network is organized as follows:

Monitoring well MW-200 is located sidegradient in Parcel 1 (northeast corner), in an area from where all of the waste was removed, to provide background groundwater quality data.

Monitoring wells MW-14 and MW-15 are located within the waste mass in Parcel 2 (the main area in the northwest section of the landfill), and are used to evaluate groundwater mounding subsequent to cap installation.

Monitoring wells MW-201 and MW-202 are located on the western edge of the landfill, just beyond the western limits of Parcels 2 and 4, to evaluate downgradient groundwater quality.

Four monitoring wells are located on the southern edges of Parcels 4 and 5 near Ley Creek: MW-203; MW-205; MW-10; and MW-9. These monitoring wells are used to measure groundwater

elevations and confirm drawdown within the collection trench. Monitoring well MW-10 is also used to monitor water quality, as historical VOC contamination has been detected in this well.

Another six monitoring wells, MW-19, MW-209, MW-210, MW-211, MW-212, and MW-213, are located on Parcel 6 (which is downgradient and across Ley Creek from the other parcels) to provide groundwater quality data for that area.

See Appendix A, **Figure 4**, for the location of the monitoring wells.

In the monitoring plan, quarterly monitoring of the performance of the remedy was stipulated to be conducted for the first five years following the completion of the remedial construction. Semiannual monitoring was to be conducted for years six and seven while annual monitoring was to be conducted years eight through ten, after which the monitoring frequency is to be reassessed.

In February 2014, a Site Management Plan (SMP) was prepared to provide guidance for the post-closure groundwater monitoring of the Subsite, landfill gas monitoring, cap mowing and inspections, corrective actions, and contingencies. The SMP includes a description of institutional and engineering controls to be used at the Subsite, as well as future reporting requirements for the project, including annual periodic review reports and FYR reports. The SMP includes the following individual plans:

- National Grid Access and Operations Plan
- Engineering and Institutional Control Plan
- Environmental Monitoring Plan
- Corrective Actions Plan
- Contingency/Safety Plan
- Groundwater Collection Trench/Pretreatment Plant Operations Manual

Potential impacts on the Subsite from climate change were assessed. The performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the Subsite.

III. PROGRESS SINCE THE LAST REVIEW

The protectiveness determinations from the 2016 FYR is summarized in **Table 2**, below.

Table 2: **Protectiveness Determinations/Statements from the 2016 FYR**

OU	Protectiveness Determination	Protectiveness Statement
08	Protective	The remedy is protective of human health and the environment.

There were no issues or recommendations in the 2016 FYR.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On September 22, 2020, 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, Puerto Rico and the U.S. Virgin Islands, including the Subsite. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews.

In addition to this notification, a notice of the commencement of the FYR was sent to local public officials. The notice was provided to the town of Salina by email on June 24, 2020 with a request that the notice be posted in the town hall and on the town webpage. In addition, on June 25, 2020, the notice was distributed via the NYSDEC's Onondaga Lake News email listserv, which includes approximately 11,000 subscribers. The purpose of the public notice was to inform the community that the EPA would be conducting a FYR to ensure that the remedy implemented at the Subsite remains protective of public health and is functioning as designed. In addition, the notice included contact information, including addresses and telephone numbers, for questions related to the FYR process or the Subsite.

Once the FYR is completed, the FYR report will be made available online (www.epa.gov/superfund/onondaga-lake) and at the subsite information repositories. The information repositories are maintained at the NYSDEC Region 7 Office, 615 Erie Boulevard West, Syracuse, New York; NYSDEC Central Office, 625 Broadway, Albany, New York; Salina Town Hall, 201 School Road, Liverpool, New York; Salina Free Library, 100 Belmont Street, Salina, New York; Onondaga County Public Library, Syracuse Branch at the Galleries 447 South Salina Street, Syracuse New York; the Atlantic States Legal Foundation, 658 West Onondaga Street, Syracuse, New York, and the EPA Region 2 Superfund Records Center, 290 Broadway, 18th Floor, New York, New York.

Data Review

Water Level Elevation

Baseline and annual elevation data show that the highest groundwater elevation at the Subsite is at monitoring well MW-15 on Parcel 2. Because monitoring wells MW-15 and MW-14 are within Parcel 2, but they are not sampled, there is no information on the extent of groundwater contamination in Parcel 2. Radial flow around monitoring well MW-15 indicates there could be groundwater contamination flowing off-site to the north.

At the eastern end (upstream) and at the western end (downstream) of the collection trench, two monitoring wells are coupled with two temporary piezometers. The four monitoring wells are situated on the landfill side of the trench and the four piezometers are installed along the creek-side of the trench. Specifically, monitoring well MW-10/piezometer PZ-207 pair and monitoring well MW-9/piezometer PZ-208 pair are situated on the eastern end of the collection trench and monitoring well MW-203/piezometer PZ-204 and monitoring well MW-205/piezometer PZ-206 are situated on the western end of the collection trench.

The 2016 FYR documented an inward hydraulic gradient from Ley Creek to the collection trench based on measurements at the four monitoring well/piezometer pairs. During this review period, two of the monitoring well/piezometer pairs on the western end of the trench showed an inward gradient. On the eastern end of the trench, piezometer PZ-207 (of the monitoring well MW-10/piezometer PZ-207 pair) was not gauged from fall 2017 until May 2019. When it was measured, the piezometer PZ-207 water elevation was lower than that for monitoring well MW-10. The water elevation in piezometer PZ-208 (of the monitoring well MW-9/piezometer PZ-208 pair) was measured only in 2016 and August 2019; the water elevations were lower than monitoring well MW-9. These limited water level measurements from the two well/piezometer pairs may indicate an outward gradient from the landfill to Ley Creek.

See Appendix A, **Figure 5**, for groundwater elevation contours.

Groundwater Sampling Results

Sidegradient monitoring point (background):

During the review period, iron and sodium consistently exceed their groundwater secondary Maximum Contaminant Levels (MCLs) in MW-200, at maximum concentrations of 3.5 mg/L milligrams per liter (mg/L) (MCL is 0.3 mg/L) and 77.5 mg/L (MCL is 20 mg/L), respectively. Magnesium and manganese exceeded their MCLs sporadically with maximum concentrations of 54.4 mg/L (MCL is 35 mg/L) and 0.43 mg/L (MCL is 0.3 mg/L), respectively.

Monitoring points north of the collection trench and Ley Creek:

In monitoring well MW-10 (located close to Ley Creek south of Parcel 5), while the chloroethane concentration decreased from 1,200 µg/L in May 2016 to 700 µg/L in February 2019, the majority of the other VOCs increased substantially. Specifically, 1,1-dichloroethane increased from 350 µg/L µg/L to 760, µg/L µg/L, cis-1,2-dichloroethene increased from 620 µg/L to 8,200 µg/L (MCL is 5 µg/l), ethylbenzene increased from 580 µg/L µg/L to 1,700 µg/L (MCL is 5 µg/l), methylene chloride increased from 75 µg/L to 120 µg/L (MCL is 5 µg/l), toluene increased from 8,700 µg/L to 24,000 µg/L (MCL is 5 µg/l), vinyl chloride increased from 360 µg/L µg/L to 2,000 µg/L (MCL is 2 µg/l), and total xylenes increased from 3,500 µg/L to 5200 µg/L (MCL is 5 µg/l). Also, chloride marginally exceeded its secondary MCL of 250 mg/L through the October 2017 sampling event and arsenic marginally exceeded its MCL of 0.025 mg/L through October 2018.

In monitoring well MW-201 (located on the western edge of the landfill), in May 2016, 1,1-dichloroethane was detected at 19 µg/L (MCL is 5 µg/l) and chloroethane was detected at 25 µg/L (MCL is 5 µg/l). By February 2019, the concentrations for these contaminants only marginally exceeded their respective MCLs.

Monitoring point on the southern edges of Parcels 4 and 5 near Ley Creek

In monitoring well MW-9, acetone decreased from 54 µg/L (MCL is 50 µg/l) in May 2016 to 22 µg/L in August 2017. Chlorobenzene was first detected 5.20 µg/L in November 2018, decreasing to 4.7 µg/L in February 2019. Chloroethane decreased from 6.8 µg/L to not detected in all

subsequent samples. Toluene increased from 11 µg/L in May 2016 to 25 µg/L in February 2019. Total xylenes increased from 5.20 µg/L in August 2017 to 7.50 µg/L in February 2019.

Monitoring points on Parcel 6

In monitoring well MW-19, while vinyl chloride remained fairly stable around 390 µg/L during the review period, the concentrations of the other VOCs generally decreased. Specifically, 1,1-dichloroethane decreased from 110 µg/L in May 2016 to 55 µg/L in February 2019. Chloroethane decreased from 210 µg/L in May 2016 to 86 µg/L in February 2019. Cis-1,2-dichloroethene decreased from 510 µg/L in May 2016 to 350 µg/L in February 2019.

In monitoring well MW-211, 1,1-dichloroethane decreased from 76 µg/L in May 2016 to 14 µg/L in February 2019. Cis-1,2-dichloroethene decreased from 6,000 µg/L in May 2016 to 62 µg/L in February 2019. Trichloroethylene was detected at 460 µg/L (MCL is 5 µg/l) only in May 2016.

Collected Groundwater Flow Volumes

The monthly flow volumes to the pretreatment plant started to decline in July 2017. Total flow for the year dropped from approximately 4,534,000 gallons in 2016 to approximately 1,588,000 gallons in 2019. It is likely that decreases in flow are attributable to the impermeable liner constructed to eliminate precipitation-related water from entering the landfill. There is no data on individual pump operation available, but the six pump stations in the trench are not actively pumping at all times. Without data on individual pump station rates, it is unknown if the pumping is affecting the flux of contaminated groundwater in the areas of monitoring wells MW-10 and MW-9. While the concentration of total VOCs in the influent to the pretreatment plant fluctuates, the concentration has decreased since August 2017.

See Appendix A, **Figure 6**, for total influent VOCs.

Site Inspection

A FYR inspection of the Subsite was conducted on August 4, 2020. In attendance were Mark Granger of EPA, Jacky Luo of NYSDEC, Alma Lowry representing the Onondaga Nation, and James Lansing of Camden Group Inc. The fencing, vents, roadways, wetlands, monitoring wells, and groundwater collection and pretreatment system were all in good repair at the time the inspection. While the 50-acre cap was substantially in good repair at the time of the inspection, sporadic instances of animal burrows and minor erosion were noted.

V. TECHNICAL ASSESSMENT

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

The remedy selected in the March 2007 ROD and modified by the May 2010 ROD amendment included excavation/consolidation of the landfilled wastes, off-site treatment/disposal of TSCA wastes, capping, construction of a groundwater/leachate collection trench, construction of

pretreatment facility, long-term monitoring program, ICs, and an operation and maintenance (O&M) plan.

As per the O&M program, the landfill undergoes periodic inspections and maintenance. The integrity of the geomembrane, soil, and vegetative covers has been maintained. Fencing, monitoring wells, engineered drainage controls, and gas vents are in good repair. Vegetation in the wetland areas is well established. Also, the ICs (*i.e.,* the environmental easement) prohibit residential use of the Subsite property and help to protect the integrity of the various components of the remedy. The volume of water pumped from the trench has declined significantly in recent years and limited water level measurements are available to confirm an inward gradient in the area of monitoring well MW-10, where concentrations of VOCs have increased. An evaluation is necessary to confirm that the trench system is preventing off-site migration of leachate and contaminated groundwater to Ley Creek.

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 baseline human-health risk assessment considered exposure to soils, leachate and groundwater by child and adult trespassers, as well as future construction workers. The exposure assumptions and the toxicity values that were used to estimate the potential risks and hazards to human health followed the general risk-assessment practice at the time the risk assessment was performed and are consistent with current practice. Although specific parameters may have changed since the time the risk assessment was completed, the process that was used remains valid.

The RAOs discussed in Section II, above, remain valid and the selected remedy is protective of human health. The objective of the ongoing groundwater monitoring is to ensure that groundwater contamination and leachate are not migrating off-site. Although some monitoring wells show exceedances of drinking water standards, there is no exposure via the direct pathway (ingestion as a potable water source) because the surrounding community is connected to a public supply. An IC that was effected in 2017; it prevents the installation of wells in the area of contamination. The prohibition of groundwater use on the property further ensures that contaminated water will not be consumed.

The remaining waste material and contaminated soils not taken off-site for disposal were consolidated under the landfill cap. The cap provides an effective barrier to direct contact with contaminated material. Additionally, a fence prevents access from the east, Ley Creek prevents access from the south and highways on the north and wetlands to the west of the landfill make the Subsite difficult to access. Data for the areas where material was excavated were reviewed. Although PCBs (in Area 6) and arsenic (in Area 1) slightly exceeded the New York State commercial SCOs in a few areas, the concentrations (maximum of 5.1 mg/kg of Aroclor 1248 and 24.8 mg/kg of arsenic) were within the acceptable risk range for these compounds. These areas are

also protected by a grass and dirt cover, therefore, combined with the accessibility restrictions described previously, they are not considered to be of concern.

Vapor Intrusion

One potential exposure pathway that was not evaluated at the time of remedy selection is vapor intrusion. The potential for soil vapor intrusion is evaluated when site soils and/or groundwater are known or suspected to contain VOCs. Although increasing levels of VOCs have been observed close to Ley Creek south of Parcel 5 in monitoring well MW-10, there are no buildings nearby that might be impacted by vapors. Therefore, this pathway is currently considered incomplete. ICs to protect the cap and prohibit the development on the landfill are in place, ensuring that this pathway remains incomplete as well.

Ecological

The methodologies, exposure assumptions, and toxicity values used to determine the potential for unacceptable ecological risk followed the general risk assessment practices at the time the risk assessment was performed and remain acceptable. The RAOs specific to ecological pathways, as described in Section II remain valid. The terrestrial exposure pathway to surface soil contaminants and risks to ecological receptors ingesting contaminated sediment from the western drainage ditch have been addressed by removing waste material and contaminated soils and sediments off-site or consolidating under a cap.

Surface water and sediment in Ley Creek, which runs along the southern edge of the landfill cap, are being addressed as a separate Onondaga Lake subsite. Therefore, these media were not evaluated as part of the baseline human health and ecological risk assessments and are not addressed in this FYR.

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

No other information has come to light that would call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Table 3, below, presents the recommendations and follow-up actions for this FYR.

Table 3: Issues/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): 08	Issue Category: Remedy Performance			
	Issue: Trench Effectiveness			
	Recommendation: A focused evaluation of gradient data on either side of the collection trench and an evaluation of the pumping rates of the individual pump stations should be performed to confirm that the trench is effective in capturing contaminated groundwater. If it is determined that there are capture issues, an evaluation should be performed to identify what actions, if any, may be necessary to correct deficiencies.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	12/31/2023

Other Findings

The following are suggestions that may improve management of O&M, but do not affect current and/or future protectiveness:

- While contaminant concentrations were historically low, consideration should be given to sampling monitoring wells MW-14 and MW-15 for PCBs as part of the groundwater-sampling program to confirm the extent of contaminated groundwater relative to Parcel 2 and to confirm that no groundwater is flowing off-site to the north;
- Instances of animal burrowing and minor areas of erosion relative to the cap should be addressed;
- Historically, PCBs were collected from the four Ley Creek piezometers on the creek side of the trench and the four attendant collection-trench monitoring wells. To continue the evaluation of the groundwater, the piezometers and attendant collection-trench monitoring wells should be sampled for PCBs; and
- Upon completion of the Lower Ley Creek subsite (OU25 of the Onondaga Lake site) dredging effort, consideration should be given to installing permanent monitoring wells in place of the four existing piezometers on the Lower Ley Creek side of the collection trench (it is anticipated that the Lower Ley Creek dredging will be completed during the upcoming FYR period).

VII. PROTECTIVENESS STATEMENT

Table 4, below, presents the OU and Sitewide protectiveness statements.

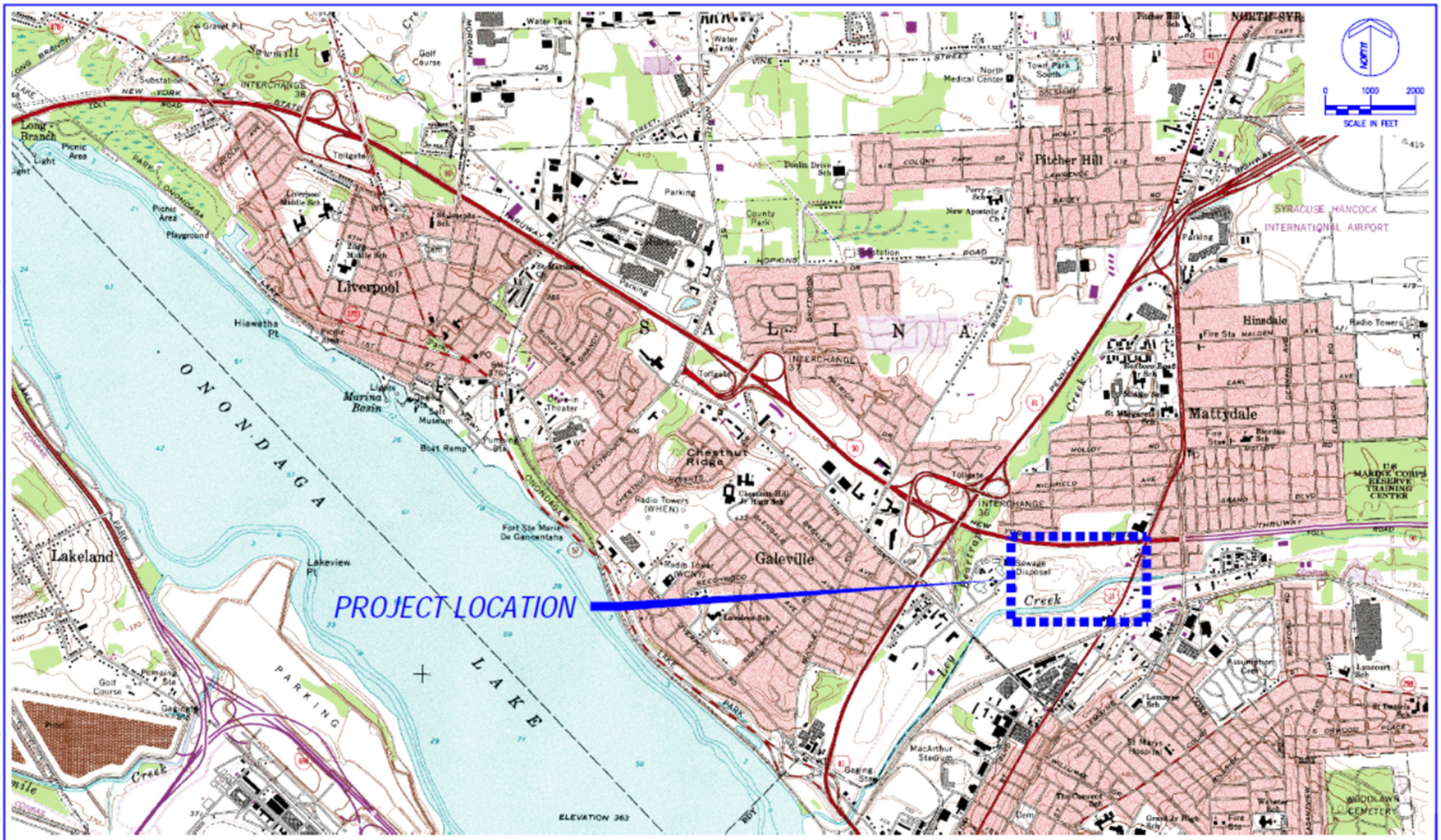
Table 4: Protectiveness Statements

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
OU8 (Subsite)	**Short-term Protective**
Protectiveness Statement: The remedy for OU8 is protective of human health and the environment in the short-term because all 55 acres of landfill-related exposure routes have been eliminated. To be protective in the long-term, a focused evaluation of gradient data should be performed on either side of the collection trench to confirm that it is effective in capturing contaminated groundwater.	

VIII. NEXT REVIEW

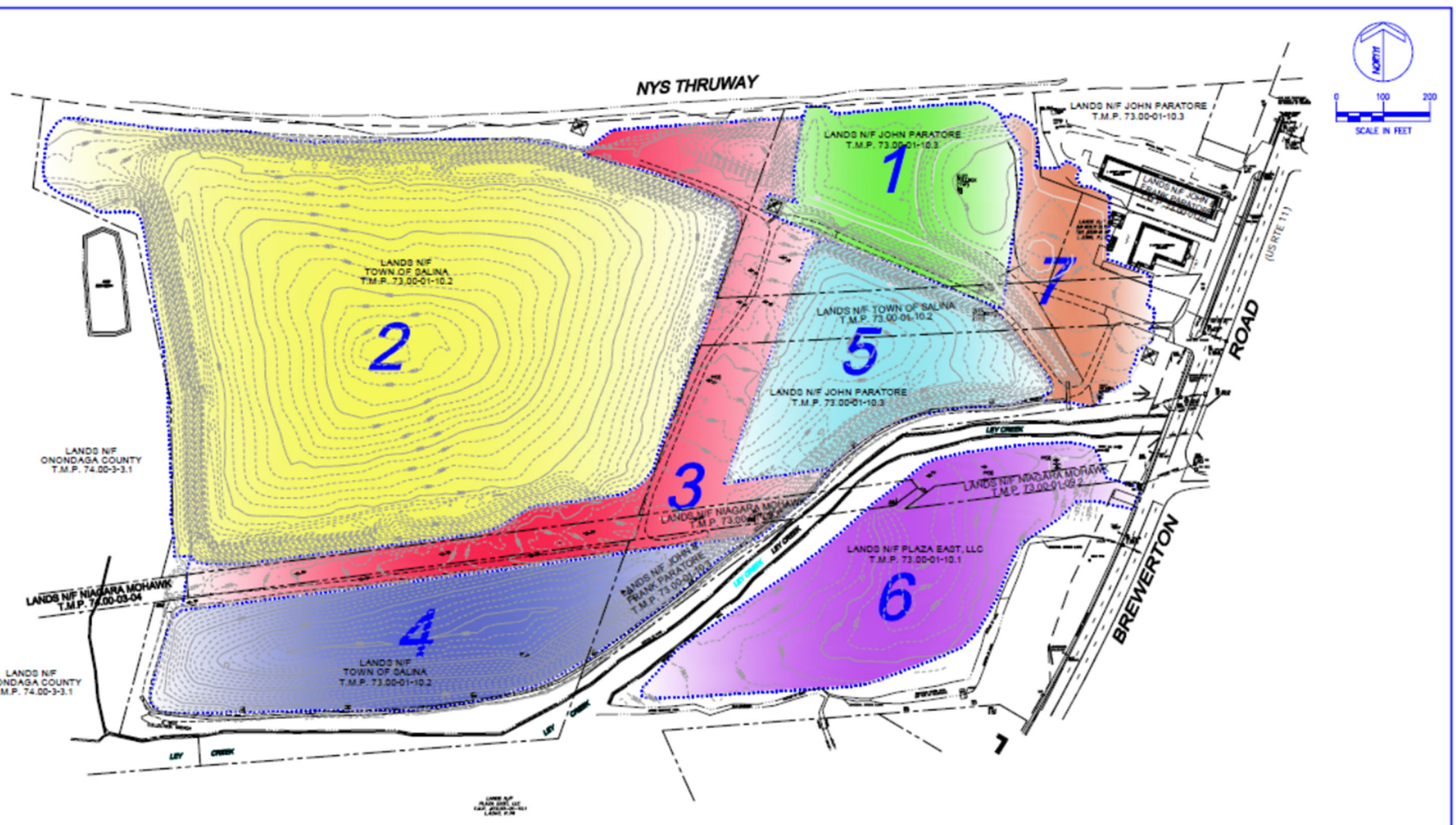
The next FYR report for the Subsite is required five years from the completion date of this review.

APPENDIX A: FIGURES



	PROJ. # 22377 SCALE: AS SHOWN DATE: 01 / 21 / 2014	CHA CLOUGH HARBOUR & ASSOCIATES LLP	Town of Salina Landfill Closure, Salina, NY Vicinity Location Map	FIG: 1

File: V:\PROJECTS\ANY\V\22377\REPORTS\SITE MANAGEMENT PLAN\ENVIRONMENTAL MONITORING PLAN\FIGURES\22377EMP_Fig-01.DWG Sheet: 2/6/2014 4:20:02 PM Plotted: 12/22/2015 2:46:56 PM User: Corc



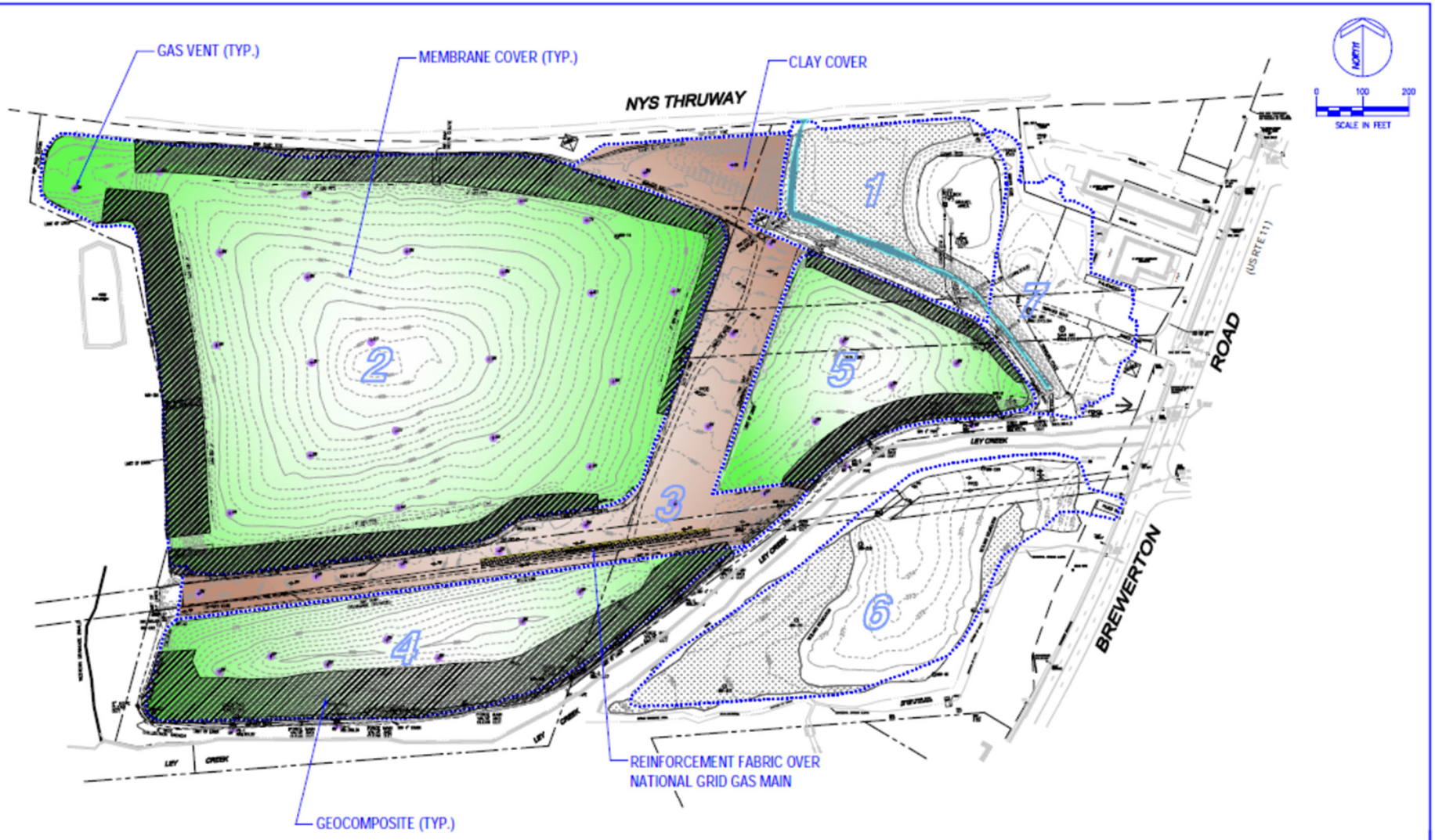
PROJ. # 22377	
SCALE: AS SHOWN	
DATE: 01 / 21 / 2014	

CLOUGH HARBOUR & ASSOCIATES LLP

Town of Salina Landfill Closure, Salina, NY

Property Ownership and Parcel Identification Map

FIG: 2



KEY:

- GAS VENT
- FORCE MAIN
- GEOMEMBRANE COVER SYSTEM
- CLAY COVER SYSTEM
- GEOCOMPOSITE

PROJ. # 22377	
SCALE: AS SHOWN	
DATE: 01 / 21 / 2014	

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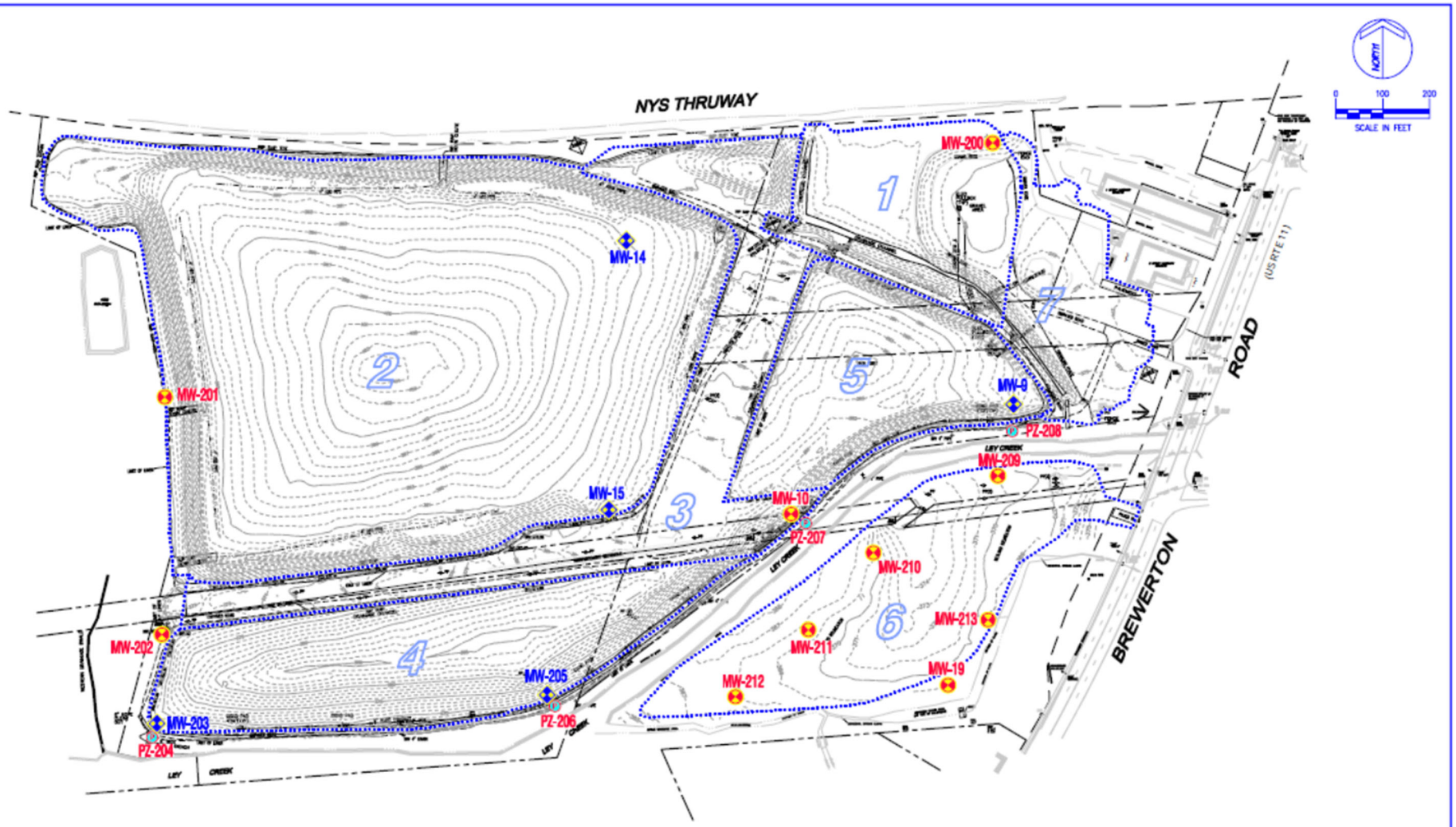
Town of Salina Landfill Closure, Salina, NY

Landfill Cover Systems

FIG: 3



KEY:

MW-X (SAMPLED / GAUGED) MONITORING WELL

MW-X (GAUGED ONLY) MONITORING WELL

PZ-206 (SAMPLED / GAUGED) ** TEMPORARY PIEZOMETER

PROJ. # 22377	
SCALE: AS SHOWN	
DATE: 01 / 21 / 2014	

CLOUGH HARBOUR & ASSOCIATES LLP

Town of Salina Landfill Closure, Salina, NY

Monitoring Well Location Map

FIG: 4

File: V:\PROJECTS\ANY\V\22377\REPORTS\SITE MANAGEMENT PLAN\ENVIRONMENTAL MONITORING PLAN\FIGURES\22377EMP_FIG-06.DWG Saved: 11/10/2014 1:30:36 PM Plotted: 12/22/2015 2:56:19 PM User: Co

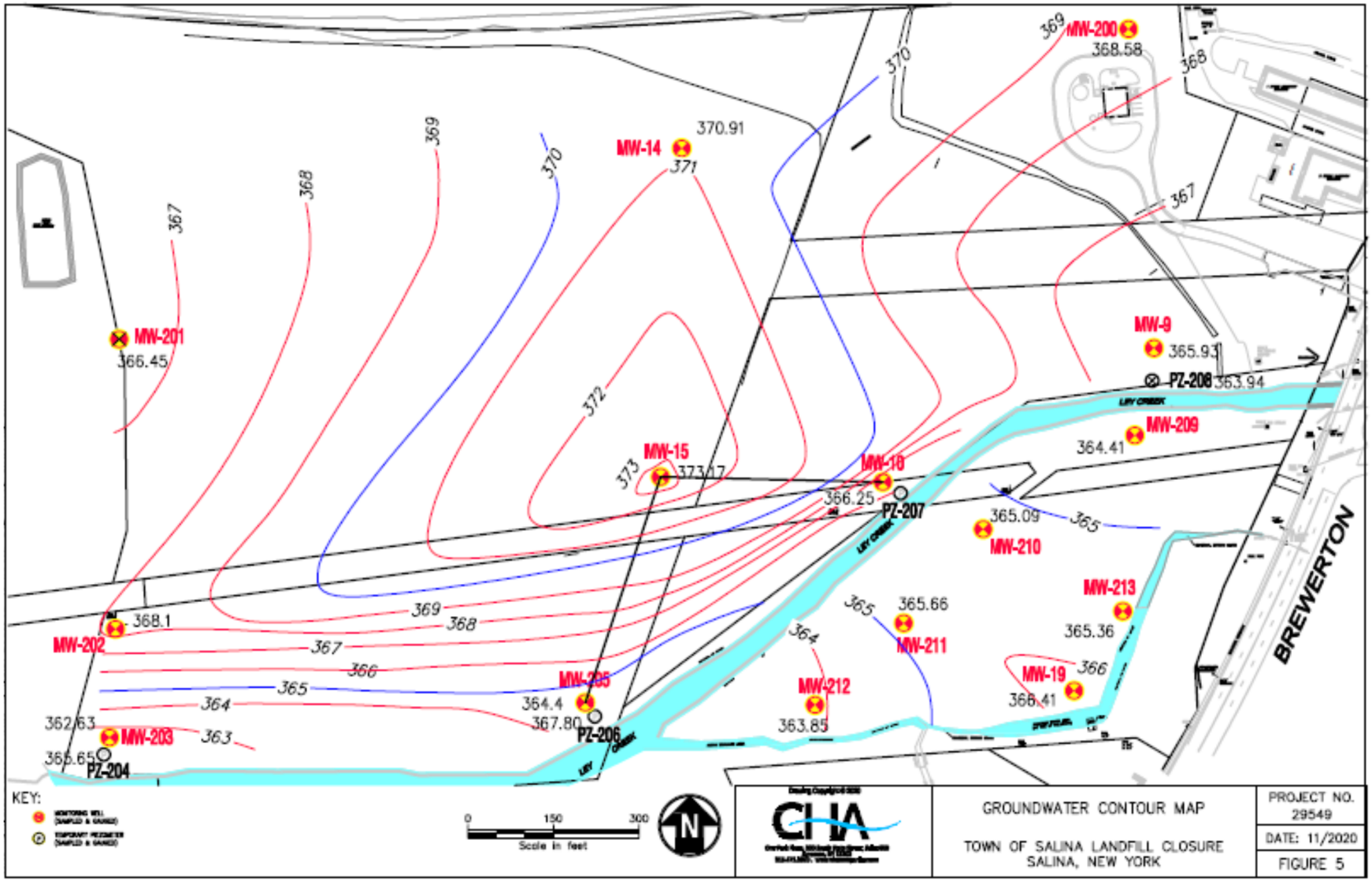
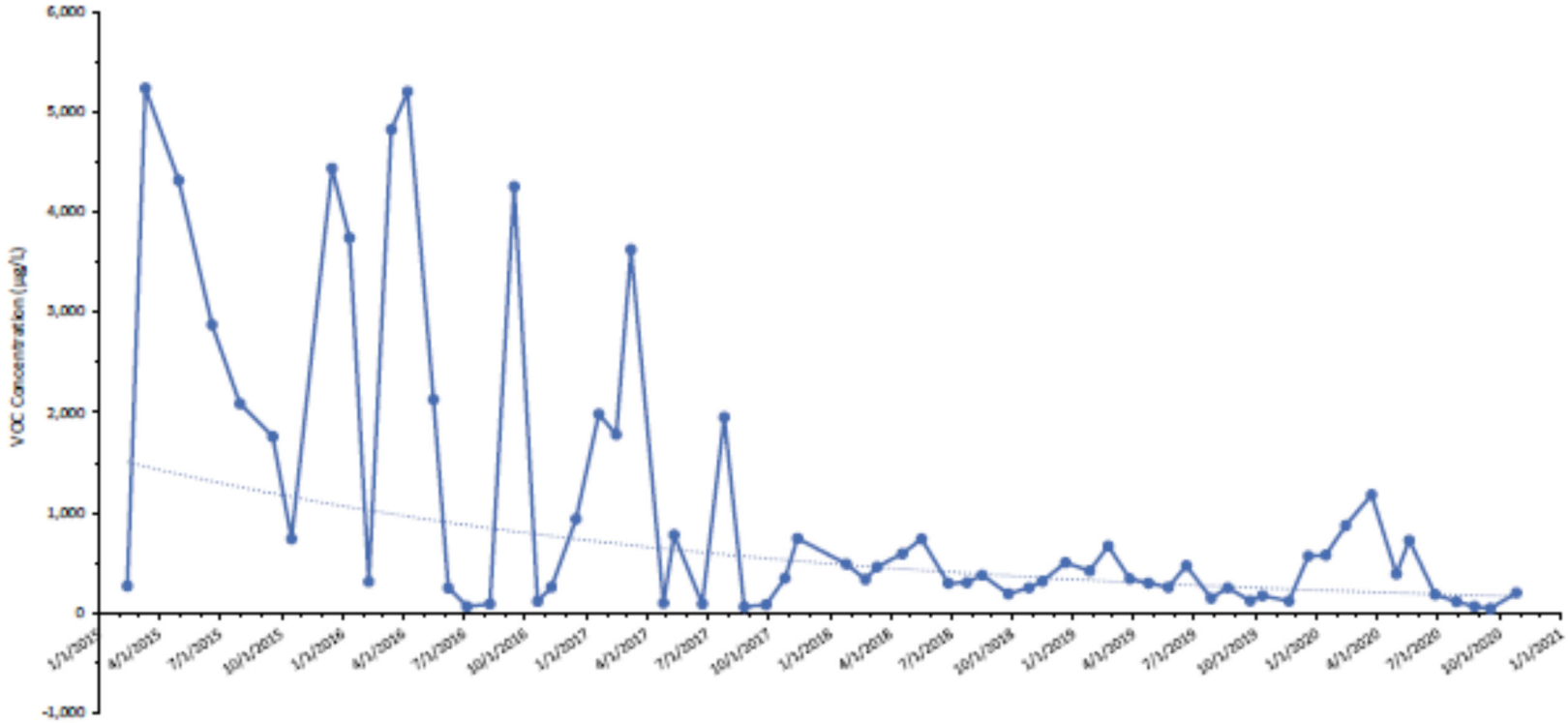

MW-200
368.58
MW-14
370.91
MW-201
366.45
MW-9
365.93
PZ-208
363.94
MW-209
364.41
MW-15
373.17
MW-10
366.25
PZ-207
365.09
MW-210
MW-213
365.36
365.66
MW-211
MW-202
368.1
MW-205
364.4
367.80
PZ-206
MW-212
363.85
MW-19
366.41
362.63
MW-203
365.65
PZ-204
LEY CREEK
BREWERTON
KEY:
0
150
300
Scale in feet
N
GROUNDWATER CONTOUR MAP
TOWN OF SALINA LANDFILL CLOSURE
SALINA, NEW YORK
PROJECT NO. 29549
DATE: 11/2020
FIGURE 5

Figure 6 - Total Influent VOCs



APPENDIX B: DOCUMENTS, DATA, AND INFORMATION REVIEWED IN COMPLETING THE FIVE-YEAR REVIEW

Documents, Data and Information Reviewed in Completing the Five-Year Review	
Document Title, Author	**Date**
Remedial Investigation	May 2001
Feasibility Study	May 2002
Record of Decision (ROD)	March 2007
Cap RD	August 2010
ROD Amendment	September 2010
Trench RD	January 2012
Pre-Treatment Plant RD	December 2013
Cap/Collection Trench RA Report	September 2014
Pre-Treatment Plant RA Report	September 2015
Site Management Plan	November 2016
2016 Monthly, Quarterly, and Annual Reports	2016
2017 Monthly, Quarterly, and Annual Reports	2017
2018 Monthly, Quarterly, and Annual Reports	2018
2019 Monthly, Quarterly, and Annual Reports	2019

Appendix C--Site's Topography, Hydrology, and Geology/Hydrogeology

Site Geology/Hydrogeology

Groundwater underlying the Subsite is found in two water-bearing units. The uppermost water-bearing unit is unconfined. The water table ranges from four to 22 feet below grade and is present either within the waste or in the uppermost sand unit. The lower water-bearing unit is under confined conditions and is present in the lower sand unit, above the till.

The bedrock geology in the area of the Subsite generally consists of sedimentary rock units from the Paleozoic-age Salina Group which, in order of oldest to youngest, consists of the Vernon Formation, the Syracuse Formation, Camillus Shale and the Bertie Formation. Specifically, the bedrock is made up of units of the Vernon Formation, which consists of upper Silurian shale and dolostone.

Land and Resource Use

The Salina Landfill is located within an area zoned as an "Industrial District." Land located immediately to the south and to the west of the Subsite is also zoned as an "Industrial District." The land directly east of the Subsite, on the opposite side of Wolf Street, is zoned both as a "Highway Commercial District" and a "One-Family Residential District." The land located to the north of the Subsite, on the opposite side of the New York State Thruway, is zoned as an "Open-Land District," a "Planned Commercial District," and a "One-Family Residential District."

Currently, the underlying aquifers are not used for drinking water. Residents located in the vicinity of the Subsite use the public water supply provided by Onondaga County.