FIFTH FIVE-YEAR REVIEW REPORT FOR NIAGARA COUNTY REFUSE SUPERFUND SITE NIAGARA COUNTY, NEW YORK

Prepared by

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

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LIST OF ABBREVIATIONS & ACRONYMS

AWQS	Ambient Water Quality Standard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
ICs	Institutional Controls
MCL	Maximum Contaminant Level
ug/L	Microgram per liter
mg/L	Milligram per liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
ng/L	Nanogram per liter
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
O&M	Operation and Maintenance
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PRP	Potentially Responsible Party
RAO	Remedial Action Objective
ROD	Record of Decision
RPM	Remedial Project Manager
SVOCs	Semi-volatile Organic Compounds
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 in order 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 U.S. Environmental Protection Agency (EPA) is preparing this FYR review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

This is the fifth FYR for the Niagara County Refuse Superfund Site (Site). The triggering action for this statutory review is the signing date of the previous FYR Report, July 19, 2019. The FYR has been prepared due to the fact that hazardous substances, pollutants or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site consists of one operable unit, which will be addressed in this FYR.

The Niagara County Refuse Superfund Site FYR was prepared by Julio Vazquez, EPA Remedial Project Manager (RPM). Participants included William Yeung, EPA hydrogeologist, Julie McPherson, EPA human health and ecological risk assessor, and Michael Basile, EPA community involvement coordinator. The lead contact for a group of potentially responsible parties (PRPs) for the Site was notified of the initiation of the FYR. Additionally, the local community, as well as elected local officials, were notified of the initiation of the FYR. The review began on 8/2/2023.

Site Background

The Site is a former municipal landfill, comprised of approximately 65 acres, located along the eastern border of the Town of Wheatfield, New York and the western border of the City of North Tonawanda. The Site lies approximately 500 feet north of the Niagara River. To the west of the Site lies former farmland, currently undeveloped; to the north is wooded wetlands, a Niagara-Mohawk Power Corporation transmission line, and a right-of-way owned by the New York State Department of Transportation; to the east are woodlands and low-density housing (approximately 1,000 feet from the Site boundary); and to the south are access roads, railroad tracks, River Road, and the Niagara River. More than 100 waste generators or transporters are thought to have used the Site. Disposed materials included plating-tank sludge, tetrachloroethylene and phenolic resins. See Appendix A, Figure 1, for a map of the Site.

The bedrock zone and the overlying overburden zone (lower till unit) are the primary water-bearing formations. Regional groundwater flow in these two aquifers generally flows in a south/southwesterly direction towards the Niagara River beneath the southern half of the Site and in a north/northwesterly direction towards Black Creek beneath the northern half of the Site. Water level elevations collected within the landfill consistently indicate that there is a radial groundwater flow from the landfill outward in all directions, enabling leachate to migrate to the perimeter collection system.

Based on the results of investigations performed in the early 1980s, the Site was placed on the National Priorities List (NPL) in September 1983. Under EPA oversight, fourteen PRPs performed a Remedial Investigation/Feasibility Study (RI/FS), which served as the basis for the selection of a remedy in the 1993 Record of Decision (ROD). The site was deleted from the NPL in July 2004.

Since the completion of the remedial action, Niagara County has given some consideration to potential reuse or redevelopment scenarios for the Site within the restrictions of the institutional controls (ICs) that have been put in place at the Site (see Table 1 below). The long grasses maintained as cap cover and the revitalized wetland area at the north end of the Site have attracted various wildlife species, particularly native and migrating birds. There has been some preliminary discussion about setting up blinds for bird watching. In addition, there is interest in using portions of the site for a solar energy project. The New York State Energy Research and Development Authority is executing a Memorandum of Understanding with Niagara County, the Town of Wheatfield and the Niagara County Refuse Site Trust to conduct a feasibility assessment of the site for a solar PV project. If the feasibility assessment comes out positively then steps may be taken to advance a solar PV project at the site. The provisions in the Environmental Protective Easement and Declaration of Restrictive Covenants, March 2001, would need to be followed.

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

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Niagara County Refuse		
EPA ID: NYD000514257		
Region: 2	**State:** NY	**City/County:** Wheatfield/Niagara
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Julio Vazquez		
Author affiliation: EPA		
Review period: 8/2/2023 – 5/1/2024		
Date of site inspection: 4/24/2024		
Type of review: Statutory		
Review number: 5		
Triggering action date: 7/19/2019		
Due date *(five years after triggering action date)*: 7/19/2024		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Based on the results of the RI report, which measured the levels of volatile organic compounds (VOCs), semi-volatile organic compounds (SVOCs), pesticides, and metals in various Site media, EPA determined that although contamination was present in the landfill, the low permeability clays beneath and around the Site had prevented the vertical and horizontal migration of contaminants. An analysis of the groundwater around the Site perimeter showed little or no impact from the landfill. Additionally, residents nearby the Site receive municipal water. However, EPA performed a risk assessment for the Site based on the data collected during the RI, and the risk assessment determined that uncontrolled leachate outbreaks, caused by the infiltration of rainwater through the landfill and subsequent seeping out from the sides of the landfill cells, would continue to degrade the quality of perimeter Site groundwater, resulting in a potential future risk from groundwater ingestion. This formed the basis for the decision to cap the landfill and to continue monitoring the groundwater around the perimeter of the Site after the remedial action was completed.

EPA's baseline risk assessment addressed the potential risks to human health by identifying several potential exposure pathways by which the public may be exposed to contaminant releases at the Site under current and future land-use conditions. The greatest carcinogenic risk attributable to the Site is the potential future risk associated with the ingestion of Site perimeter groundwater by area residents. This generated a risk of $2x10^{-4}$, which is at the upper bound of EPA's acceptable risk range. This risk is primarily attributable to the metal arsenic, although the levels detected in Site groundwater wells were below the EPA and New York State Department of Health (NYSDOH) maximum contaminant level (MCL).

Ecological risks attributable to the Site were also considered and evaluated in the ecological risk assessment. The ecological risk assessment established that surface water and sediment concentrations of metals (primarily aluminum, lead, and zinc) and pesticides (primarily 4,4-DDT) may result in adverse acute and/or chronic effects in aquatic organisms within the drainage swales and streams present on the Site or in close proximity. Additionally, stressed vegetation had been observed in the northern wetland area, which may be attributable to the Site.

Response Actions

Remedy Selection

Based on the findings of the RI/FS, EPA signed a ROD for the Site on September 24, 1993, selecting the following remedy:

- Construction of a New York State Part 360 Standard Landfill Cap.
- Construction of a clay perimeter barrier wall.
- Construction of a gas venting system beneath the cap.
- Construction of a leachate collection system.
- Removal of the field tile drains located to the west of the landfill.
- Performance of an ecological assessment of the adjacent wetlands.
- Implementation of deed and access restrictions.
- Implementation of a long-term operation & maintenance program for the cap, and gas venting and leachate collection systems.

- Implementation of long-term air and water quality monitoring.

The remedy also calls for an evaluation of Site conditions at least once every five years, beginning from the start of construction, to determine if the selected remedy is operating as intended and remains protective of human health and the environment.

The remedy selected in the ROD meets the remedial action objectives (RAOs) for the Site. The RAOs, as noted in the ROD, are:

- Preventing direct contact with landfill contents.
- Controlling surface water runoff and erosion.
- Collecting and treating landfill leachate.
- Controlling landfill gas.
- Preventing the infiltration of contaminants into groundwater.
- Remediating contaminated wetland areas, if necessary.

Status of Implementation

EPA negotiated a Consent Decree with the PRP group for the design through a remedial action. The Consent Decree became effective on February 3, 1995. The design, approved in 1997, included the use of modern geotextiles for the cap in place of a traditional clay barrier layer and sand drainage layer. The cap liner was tied directly into native clay material outside the leachate collection system, eliminating the need for a clay barrier wall. An ecological assessment of the adjacent wetlands was performed prior to the start of construction and a wetland mitigation plan, calling for limited wetland replanting at the Site and wetland creation off-site at the nearby Gratwick Park Site, was approved in October 1998.

On-site construction commenced in November 1998 under the direction of Niagara County (a PRP at the Site) with EPA providing oversight of the construction activities through an interagency agreement with the U.S. Army Corps of Engineers. The Site was surveyed, cleared and grubbed, a security fence was erected, and erosion and sediment control measures were put in place. Installation of the leachate collection system and its tie-in to the City of North Tonawanda sanitary sewer by forcemain was completed over the winter months. Early spring was devoted to grading the Site and filling the central swales of the landfill with clean fill. Placement of the first layer of the cap (gas vent stone), began in May 1999 and the leachate collection system became operational during the summer of 1999, eliminating any potential pathway for leachate to migrate off-site. The tile drains on the west side of the landfill were removed during the summer. An unusually dry season, along with contractor efficiency, allowed for relatively uninterrupted construction activity throughout the summer and fall. The key trench was constructed concurrently with the multi-layered cap as the two were tied in to complete a uniform seal around the landfill. By November 1999, the cap had been placed over the entire Site and seeding had been completed.

The construction contractor returned to the Site in May 2000 to assess the remaining work to be done. The wetland plantings and some tree perimeter plantings were completed at that time. It was determined that cleaning the drainage swales of accumulated silt and debris, some erosion repair work to the cap surface, and some spot reseeding were the only activities remaining to be completed. This work was completed during the summer months and in September 2000, EPA conducted a final inspection with NYSDEC and the PRPs. In December 2000, EPA issued its approval of the Remedial Action Report,

signifying that the remedial action had been completed in accordance with the ROD and Remedial Design, and the project entered the operation, maintenance, and monitoring phase.

IC Summary Table

Table 1: Summary of Planned and/or Implemented ICs

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)
Groundwater and Soils	Yes	Yes	Entire site	Restrict installation of ground water wells and groundwater use; preserve the integrity of the cap and all systems associated with waste containment and monitoring; prohibit the erection of any permanent structure on the property without EPA and County approval.	Environmental Protective Easement and Declaration of Restrictive Covenants, March 2001.

The restrictive covenants placed on the real property at the Site by Niagara County and the Town of Wheatfield were filed with the land records on March 19, 2001 and March 23, 2001, respectively. These items complete the institutional controls (ICs) requirement of the ROD.

Systems Operations/Operation & Maintenance

The Operation, Maintenance and Monitoring Manual was approved by EPA on December 29, 2000. The operation and maintenance (O&M) activities outlined in the manual are being performed by Parsons (formerly Parsons Engineering Science, Incorporated) under contract to Niagara County. O&M activities were initiated in January 2001. The Site is inspected monthly and monitoring data are collected on a pre-set schedule. The results are contained in the quarterly, semi-annual, and annual monitoring reports. The monthly inspections of the landfill include visual inspections of the perimeter collection system, off-site forcemain, wetlands, perimeter fence, drainage ditches, swale outlets, culverts, gas vents, monitoring wells, and the cap surface. Additionally, effluent from the leachate conveyance system is sampled for compliance with the City of North Tonawanda Industrial Wastewater Discharge Permit and water levels are measured within the landfill to confirm that the perimeter collection system provides hydraulic containment of site-related leachate and groundwater.

Maintenance is performed on the cap on both a scheduled and as-needed basis. For example, pumps are routinely inspected and pressure-washed, repairs are made to the perimeter fence when needed, weeds and tall grass are trimmed around wells and manhole covers, and the grass cover of the cap is cut once yearly in the late summer. The leachate collection system is monitored both from a control building and a visual inspection of the wet wells and the gas vents are regularly inspected for integrity. The wet wells are gravity fed collection points along the leachate collection system equipped with pumps. When the leachate builds up to a level defined by a float switch, the pump turns on lowering the leachate level to a point in which an additional float switch shuts the pump off. All leachate is pumped to Wet Well A, which then discharges

to the North Tonawanda Wastewater Treatment Plant (the POTW). A flowmeter is installed at Wet Well A measuring the leachate discharged to the POTW.

It should be noted that air monitoring is not an included activity in the approved manual in that, during the development of the manual, an evaluation of the air around the gas vents was performed, which indicated that the gas generation rate in the landfill was very low, primarily due to the age and composition of the wastes. In addition, lateral subsurface gas migration was considered to be prevented by the perimeter barrier system. However, depth to water measurement trends have indicated the potential for increased landfill gas accumulation under the cap in recent years. This was first evidenced by significant hydraulic head increases (approximately 3.8 feet) at piezometer East-B in 2011. This occurrence may have been due to leachate draining observed in piezometers East-A, -C and -D since 2001, which exposed more waste in the unsaturated zone to aerobic degradation and contributed to increasing levels of landfill gases. The rise in hydraulic head levels at well East-B coincided with an apparent shift of the groundwater mound southward, which had historically been centered beneath well East-C on the north end of the landfill. Between December 2014 and April 2015, a sharp decrease in hydraulic head of 4.2 feet was observed at East-B, which correlated to the physical collapse of this piezometer. Abnormal hydraulic head fluctuations continued to be observed at piezometers East-C and East-D between 2015 and 2017, before returning in sync with one another, as well as East-A, in 2017. Landfill gas is not captured, but is released through vents across the site. However, additional information is needed to evaluate the cap and passive venting system to ensure engineering issues do not exist. As a result of discussions between EPA and the PRP in 2023, two gas samples will be collected from landfill gas vents in the area of East-B in 2024. The air samples will be analyzed for methane and other landfill gases. Based on the results of this sampling, the feasibility of installing a replacement piezometer for East-B will be determined as well.

Surface water sampling conducted in 2001 and 2002 in accordance with the O&M Manual for the Site did not reveal surface water impacts and was discontinued. Based on the groundwater sampling results obtained during the first two years of O&M, quarterly groundwater sampling was replaced with semi-annual sampling in 2003. Semi-annual groundwater sampling continued for three years and, based on the uniform monitoring results obtained during this period and in accordance with the O&M Manual, the sampling frequency was modified in 2006. Beginning in 2006, VOCs and SVOCs samples were collected every other year and total metals samples were collected annually. Beginning in 2019, collection of groundwater samples for VOCs, SVOCs, and mercury analysis were eliminated from the sampling requirements although annual monitoring of metals continued. In April 2023, in accordance with this schedule, groundwater samples were collected and analyzed for inorganics in accordance with EPA Method 200.7 and Method SW-6010. Additionally, as per the request of the USEPA, anions (bicarbonate, sulfate, chloride, and nitrate-nitrite) and cations (sodium, potassium, magnesium, calcium, and ammonium) samples were also collected. An Industrial Wastewater Discharge Permit was issued by the City of North Tonawanda for the treatment of Site leachate in February 2007 and is renewed periodically. The most recent renewal was issued in 2022 and is effective from March 31, 2022 through April 1, 2025. The new permit has a reduced analytical parameter list compared to the original permit, but continues to require a semi-annual sampling frequency.

The wetland replacement area of the Site, representing 0.17 acres, is routinely monitored for habitat health and vegetation data is recorded and provided in the annual monitoring report. Inspections of the wetland creation area of the Site have shown that the wetlands are well established, exhibiting substantial growth and propagation.

Climate Change

Potential site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the Site. See Appendix C for the climate assessment.

III. PROGRESS SINCE THE LAST REVIEW

Table 1: Protectiveness Determinations/Statements from the 2019 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The remedy is protective of human health and the environment.
Sitewide	Protective	The implemented remedy for the site is protective of human health and the environment.

The previous FYR was completed on July 19, 2019, pursuant to OSWER Directive 9355.7-03B-P. That review determined that the remedial action as designed and constructed pursuant to the 1993 ROD was performing satisfactorily and that the remedy implemented was protective of human health and the environment.

There were no issues and recommendations identified in the last FYR. However, a suggestion was made that the following steps should be implemented to provide information to confirm that leachate is not migrating from the landfill:

- Collect groundwater samples and water level information from the "wet wells" and viable piezometers located within the landfill;
- Compare contaminant concentrations and water level information at the "wet wells" and viable piezometers to perimeter wells currently being sampled;
- Track the concentration of leachate indicator parameters detected in the "wet wells," viable piezometers and the perimeter monitoring wells at the Site over time;
- If determined necessary based on the "wet well" and viable piezometer sampling results, consider developing groundwater contour maps to evaluate groundwater flow and mounding effects across the landfill; and
- Subsequent to the evaluation of the "wet well" data over a period of time, evaluate the usefulness of installing an upgradient well within the vicinity of the landfill to re-establish and/or confirm background concentrations.

During the review period, groundwater samples were collected from the four perimeter monitoring wells and three of the piezometers within the landfill and were analyzed for total and dissolved metals as well as anions/cations annually between 2020 and 2023. Water level measurements were also recorded at the wells sampled during this period. The results are further discussed under the Data Review section below. Based on discussions between EPA and the PRP in 2023, an expanded set of leachate parameters will begin to be sampled in 2024 on a biennial basis from the four perimeter wells and three piezometers in addition to cation/anion parameters. These parameters will include ammonia, chemical oxygen demand, total organic carbon, total dissolved solids, sulfate, alkalinity, chloride, bromide, and total hardness. Additionally, leachate parameters will be collected from Wet Well A where leachate from the landfill discharges to the POTW.

The development of water level contour maps has not been completed; however, a plan for collecting the data necessary to construct these maps is currently under discussion with the PRP. Evaluating the usefulness of installing additional monitoring wells at the Site will be further considered upon review of water level contours. Monitoring well installation upgradient of the Site may be beneficial to re-establish and/or confirm background concentrations and downgradient of the Site to better understand the potential extent of the redox zone.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On August 7, 2023, 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 Niagara County Refuse Site. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews.

In addition to this notification, on January 17, 2024, EPA provided a public notice titled "U.S. Environmental Protection Agency Reviews Cleanup at the Niagara County Refuse Site" to the Town of Wheatfield and requested that the town post the notice on the municipal website. The notice stated that there was a FYR underway and providing EPA contact information to address any questions about the FYR process or the Site in general. The results of the review and the report will be made available at the Site information repository located at the North Tonawanda Public Library at 505 Meadow Drive, North Tonawanda, NY and will also be available on the Site's website: https://www.epa.gov/superfund/niagara-county-refuse.

Data Review

The sampling program included in the O&M Manual was developed to confirm that the perimeter collection system and the perimeter barrier system of the landfill cap effectively prevent the migration of contaminants from the Site. Effluent from the leachate conveyance system is also sampled for compliance with the City of North Tonawanda Industrial Wastewater Discharge Permit.

Effluent and Leachate Collection

Effluent sampling results have consistently demonstrated compliance with the requirements of the City of North Tonawanda Industrial Wastewater Discharge Permit. During the last five years, the average amount of leachate collected per year has been 3.13 million gallons. The average leachate collected per year during the previous five-year review period was 3.12 million gallons per year. However, the average leachate collected historically (in years 2005 and 2006) was 6.75 million gallons per year, indicating that in the last 10 years average annual leachate generation is about half of that generated historically. Additional leachate indicator sample collection, to begin in 2024 from the three piezometers in the landfill and the four perimeter monitoring wells, will aid in assessing this decreasing trend and whether there is potential system bypass and migration of leachate from the landfill. Leachate indicator parameters include the following metals: chromium, iron, lead, magnesium, manganese, sodium, potassium, ammonium, and sulfate. Additional parameters to be collected will include ammonia, chemical oxygen demand, total organic carbon, total dissolved solids, alkalinity, chloride, bromide, and total hardness.

Water Level Measurements

Monthly water level measurements were collected to (1) ensure that water levels inside the landfill are lowered by the operation of the perimeter collection system; and (2) allow planning for groundwater sampling dates, when the maximum number of wells could be sampled. Water levels were collected from the wet wells, the piezometers (hydraulic monitoring locations) within the limits of the landfill, and the groundwater monitoring wells (see Appendix D Site Map) as suggested per the 2019 FYR. Water levels in the wet wells were collected during the monthly inspections and recorded on water level records. Water levels varied (rose or fell) between 0.4 and 2.9 feet over the course of the reporting period. The fluctuations in water level can be attributed to seasonal variability; however, water levels within the landfill have been consistently lower than those outside of the collection system. This indicates that the landfill is largely maintaining hydraulic control and potentially dewatering, which is expected and desired for a capped landfill. Nevertheless, the rises in water elevation observed between 2011 and 2015 in former piezometer East-B may be indicative of landfill gas generation at times, which could potentially reoccur as the landfill continues to dewater and more waste is exposed to aerobic degradation. The installation of a replacement piezometer for East-B should be considered to further assess water levels in the central area of the landfill. Additionally, transducer installation in the pumping wells followed by a shutdown of the pumps for a short period of time would be beneficial in obtaining background water elevations. Additional data collection after a series of further shutdowns and restarts would aid in further understanding water levels under pumping conditions as well as measuring recovery and drawdown. This data will also be used to create the groundwater contour maps suggested in the 2019 FYR, as discussed under Section III.

Monitoring Well Results

Shallow perimeter groundwater outside of the landfill boundaries is sampled from monitoring wells located to the north, west and south of the landfill. The data collected from these monitoring wells are used in determining the effectiveness of the remedy in preventing landfill leachate from migrating beyond the landfill and degrading groundwater quality (see Table 2, Appendix D). Beginning in 2019, EPA approved the elimination of VOCs, SVOCs, and mercury for analysis due to a lack of detections for these analytes. Therefore, the following text describes inorganic sampling results collected during this FYR period.

Fourteen metals were identified in one or more of the groundwater samples from the monitoring wells. Three of the detected metals exceeded either state standards (New York State Ambient Water Quality Standards and Guidance Values (AWQS)) or federal maximum contaminant levels (MCLs). In general, the detected values are consistent with ranges observed in previous sampling events, as summarized below.

- Total iron was detected in each of the monitoring wells for each sampling event in this review period and exceeded the state standard of 0.3 mg/L in NCR-4S for each sampling event. Dissolved iron was identified in NCR-4S, NCR-5S and NCR-13S and exceeded the state standard in NCR-4S with a concentration of 2.1 mg/L during the May 4, 2021 sampling event. Dissolved iron was below the state standard in NCR-5S and NCR-13S during the same sampling event. Exceedances in total iron concentrations were also identified in all of the monitoring wells during the April 19, 2023 sampling event, although the dissolved iron concentrations for this sampling event were below the detection criteria. According to the ROD, iron typically exceeded MCLs in the regional groundwater during the RI thus indicating that exceedances are likely related to background conditions. Overall total iron concentrations within the monitoring wells have been

variable but have had an overall increase in concentration during the 2023 sampling event with exceedances in all monitoring wells.

- Total and dissolved magnesium exceeded the state AWQS guidance value (not a standard) in each of the four monitoring wells during each sampling event during this review period. Historically, total magnesium has exceeded the AWQS guidance value. Overall, the concentrations of both total and dissolved magnesium within the monitoring wells have been stable during this review period.
- Total and dissolved sodium were identified in each of the four monitoring wells during this review period. Total and dissolved sodium slightly exceeded the state guidance value (20 mg/L) in NCR-4S during the May 4, 2021, April 13, 2022 and April 19, 2023 sampling events with concentrations of 21.9 mg/L, 23.9 mg/L and 20.9 mg/L, respectively. The total sodium concentration at this well was equal to the state guidance value during the July 1, 2020 event. The ROD also noted that sodium is likely related to background conditions based on regional groundwater data. Overall, both total and dissolved sodium concentrations within the monitoring wells have been stable during this review period.

Piezometer Results

The piezometers sampled (East-A, East-C, and East-D) are all within the landfill footprint and are, therefore, expected to show higher levels of contamination relative to monitoring wells outside of the landfill perimeter. As such, 17 metals were identified in one or more of the groundwater samples from the piezometers collected during this review period. Nine of the detected metals exceeded either the state standards or federal MCLs. A summary of the results is provided in the paragraph below.

Concentrations of antimony exceeding both the state AWQS (0.003 mg/L) and federal MCL (0.006 mg/L) were detected in East-C (0.15 mg/L for total antimony and 0.31 mg/L for dissolved antimony) and East-D (0.011mg/L for total antimony and 0.0078 mg/L for dissolved antimony) during the April 2022 sampling event with concentrations decreasing to non-detectable levels during the April 2023 sampling event for East-D; antimony concentrations were detected above the federal MCL in East-A (0.0077 mg/L for dissolved antimony) and East-C (0.083 mg/L for total antimony and 0.22 mg/L for dissolved antimony) during the April 2023 sampling event. Dissolved antimony concentrations within East-C are more than twice the concentration of the total antimony for the April 2022 and April 2023 sampling events, which is abnormal and should be monitored in future sampling events. Arsenic concentrations were detected at levels above the federal MCL (0.01 mg/L) andstate AWQS (0.025 mg/L), with a dissolved arsenic arsenic concentration of 0.044 mg/L. However, arsenic concentrations in East-C decreased to below the state AWQS and the federal MCL during subsequent monitoring events. Chromium concentrations were detected at levels exceeding both the federal MCL (0.1 mg/L) and the state AWQS (0.05 mg/L) in East-C and the state AWQS only in East-D for all monitoring events. Nickel concentrations have consistently exceeded the state AWQS (0.1 mg/L) for East-C and East-D as well as East-A during the most recent monitoring event in April 2023. Zinc concentrations were detected in each piezometer with East-C being the only piezometer with state AWQS (2 mg/L) exceedances for each monitoring event. Iron, lead, magnesium, and manganese concentrations have exceeded state standards for each piezometer during all monitoring events in this review period. Sodium concentrations for each piezometer have exceeded the state AWQS guidance value during all monitoring events in this review period. Overall, antimony concentrations within the piezometers have remained stable with the exception of East-D, which saw a reduction of antimony concentration from 2022 to 2023. Chromium, arsenic, nickel, iron, lead, magnesium, manganese, and sodium concentrations have remained stable throughout the review period.

General chemistry results also exceeded criteria for three of the analytes. Chloride concentrations have exceeded the state AWQS for the East-C and East-D piezometers for each monitoring event. Nitrogen (ammonia) concentrations have consistently exceeded the state AWQS in East-C and exceedances were present in East-D during all monitoring events except the May 2021. Sulfate concentrations exceeded the state AWQS (250 mg/L) in East-C for all monitoring events and for East-A during the April 2023 sampling event. Overall, chloride concentrations have remained stable throughout the review period. Nitrogen (ammonia) and sulfate concentrations showed variable fluctuations in concentrations throughout the review period.

Comparison of Total/Dissolved Metals and General Chemistry Results Between Wells and Piezometers

The monitoring wells (NCR-3S, NCR-4S, NCR-5S, and NCR-13S) are installed outside the perimeter of the landfill and the collection system. The piezometers (East-A, East-C, and East-D) are within the landfill footprint. Between 2020 and 2023, total antimony, arsenic, cadmium, cobalt, lead, selenium and vanadium were detected at times in the piezometers and were not detected in the monitoring wells. For example, while antimony was not detected in the monitoring well samples, antimony was detected at a concentration of 0.083 mg/L from piezometer East-C during the April 19, 2023 sampling event. In addition, concentrations of arsenic (0.057 mg/L in East-C), cadmium (0.01 mg/L in East-C), cobalt, lead (0.15 mg/L in East-A, 0.6 mg/L in East-C, and 0.28 mg/L in East-D), and vanadium were detected in the piezometers but not in the monitoring wells during the May 4, 2021 sampling event. Other analytes (i.e., chromium, manganese, nickel, and zinc) that were detected but below criteria in each of the well samples were found above criteria in one or more of the samples from the piezometers. Additional analytes (aluminum, barium, calcium, copper, iron, magnesium, potassium, sodium, and vanadium) were typically found at higher concentrations in the samples from the piezometers than the wells.

Similar relationships between the monitoring wells and piezometers were observed for the dissolved metals as well. Dissolved aluminum, antimony, arsenic, beryllium, cadmium, chromium, cobalt, iron, lead, selenium and vanadium were generally detected in the piezometers and were not detected in the monitoring wells at times during the review period. Although manganese, nickel, and zinc were below criteria in each of the well samples, they were found above criteria in one or more samples from the piezometers. Other analytes (barium, calcium, copper, magnesium, potassium, and sodium) were typically found at higher concentrations in the samples from the piezometers than the wells.

The general chemistry parameters were typically one to four orders of magnitude higher in the samples from the piezometers as well. Most notably chloride (as Cl), nitrogen, ammonia (as N), and sulfate (as SO4). Nitrate-nitrite results were comparable between the wells and the piezometers.

In general, concentrations of total and dissolved metals, as well as the general chemistry parameters within the piezometers, are more varied and tend to be detected at greater concentrations with exceedances at higher frequencies than the monitoring wells. This is expected, however, since the piezometers are located within the footprint of the landfill.

Background Influences

Information provided within the Remedial Investigation report dated 1992 indicates that the Site is underlain by glacial till that is poorly sorted and of variable permeability. The till unit overlies the Lockport Group bedrock in the region. Boring logs from monitoring wells indicate that overburden soils from one to eight feet below ground surface predominantly consist of sand or partial sand. The geology

of the overburden material indicates that material underlying the Site has variable hydraulic conductivity. While an upgradient groundwater monitoring well was installed as part of the remedial investigation, this well is no longer available for sampling to provide current background concentrations for metals at the Site. Historically, the USGS monitored groundwater quality in the Lockport Group from three monitoring wells within the vicinity of the Site. The wells were identified as WF-1, WF-2 and PN-1, which were located 2.8 miles to the northeast, 1.5 miles due west and 4.5 east of the Site, respectively. All of these wells have reportedly been abandoned. Analytical data collected from these wells in 1988 indicated that sodium, iron, magnesium, chloride, sulfate and aluminum consistently exceeded regulatory standards. Comparing this data with sample results collected from the perimeter monitoring wells over the last five years indicates that concentrations of these chemicals have largely decreased since the time of the ROD. Although magnesium and sodium remain elevated (i.e., total results ranging up to 69.8 and 23.9 mg/L, respectively, during this FYR period), the concentrations have declined by at least an order of magnitude since WF-1 was sampled in 1988 when total magnesium and sodium ranged up to 422 mg/L and 3,044 mg/L, respectively. Total iron, however, has generally increased from a maximum concentration of 4.7 mg/L in 1988 to a maximum of 9.1 mg/L during this review period.

In addition, two rounds of groundwater samples were collected from 23 wells installed at the Site in 1991 during the RI investigation. Round 1 was performed in March 1991 and Round 2 was completed in April 1991. Overall, the inorganics detected in the perimeter monitoring wells that are still evaluated today have largely decreased, with the exception of very slight increases in aluminum, iron, and lead in NCR-4S. These wells will continue to be monitored.

Per- and Polyfluoroalkyl Substances (PFAS) and 1,4-Dioxane Groundwater Sampling

Groundwater samples were collected in April 2021 and analyzed for PFAS and 1,4-dioxane at NCR-3S, NCR-4S, NCR-5S, and NCR-13S to evaluate the presence/absence of 1,4-dioxane and PFAS at the Site. In 2020, New York State adopted drinking water MCLs of 1 micrograms per liter (ug/L) for 1,4-dioxane and 10 nanograms per liter (ng/L) each for perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS). In April 2024, EPA finalized federal MCLs for PFOA and PFOS which consists of 4 ng/L for each compound.

1,4-Dioxane was detected at all monitoring wells except NCR-5S; however, the concentrations detected were all below the New York State drinking water MCL of 1 ug/L (i.e., the maximum concentration was found in NCR-4S at 0.24 ug/L). PFAS concentrations were detected in each of the monitoring wells. However, the range of PFOS concentrations (from 0.71 ng/L at NCR-3S to 9.6 ng/L at NCR-13S) and PFOA (from 0.52 ng/L at NCR-4S to 5.3 ng/L at NCR-13S) only slightly exceeded the federal MCL of 4 ng/L. In addition, the surrounding area is serviced by public water. Based on the low magnitude of these exceedances and a lack of exposure, additional sampling for PFAS is not anticipated at this time although EPA will continue to work with the State to determine future sampling needs.

Site Inspection

The inspection of the Site was conducted on 4/24/2024. In attendance were Maeve Wurtz, EPA Remedial Project Manager, William Yeung, EPA Hydrogeologist, Taylor Monnin, NYSDEC Project Manager, Tony Manns, GHD Equipment Manager and Eric Felter, a geologist with Parsons Engineering, representing the PRP group. The purpose of the inspection was to assess the protectiveness of the remedy.

During the site inspection, there were no problems or deviations observed with respect to the ongoing operation and maintenance activities. Upcoming monitoring activities (e.g., leachate sampling, landfill gas sampling, groundwater contour evaluations) were further discussed.

V. TECHNICAL ASSESSMENT

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

The Site is a former municipal landfill. The greatest carcinogenic risk attributable to the Site was associated with the potential ingestion of contaminated groundwater. The remedial actions included capping of the landfill, construction of a gas venting system and leachate collection system, implementation of institutional controls, and long term monitoring of air and water quality.

The remedial actions were initiated in 1998 and completed in 2000. O&M activities commenced in 2001 and included monthly inspections and water level measurements, routine cap maintenance, and media monitoring. Surface water sampling was discontinued after two years in accordance with the O&M Plan based on favorable sampling results. Initially, groundwater was sampled quarterly. After two years, the sampling frequency was reduced to semi-annually, and then annually after the fifth year of the O&M program. The analytical parameters were also modified from the original O&M Plan. Beginning in 2019, VOC, SVOC, and mercury analyses were no longer required, while metals continued to be monitored. Visual inspections of the wetland community on the northern border of the Site indicate that it is thriving.

Water level data generally show that the remedy is maintaining hydraulic control. In addition, lower groundwater elevations beneath the landfill cap and higher groundwater elevations outside of the landfill indicates possible dewatering from the Site. While this is expected for a capped landfill, the steep rises in water elevation observed between 2011 and 2015 in former piezometer East-B may have been indicative of landfill gas generation, before those levels rapidly declined corresponding to the piezometer's collapse. In addition, the average annual amount of leachate collected during this and the previous FYR period is approximately half of that observed in 2005/2006. These observations may have led to an increase in the amount of waste exposed to aerobic degradation in the unsaturated zone, thus contributing to continued potential for increased landfill gas accumulation under the cap over time. Although landfill gases are passively released across the site, additional information is needed to evaluate the cap and passive venting system to ensure engineering issues do not exist. Similar to the conclusions presented in the last FYR, these rapid changes in groundwater elevations, paired with the decreased leachate collected, indicate there may be potential vertical and/or horizontal migration of leachate from the Site at times. Additional leachate indicator sample collection, the development of groundwater contour maps, and landfill gas sampling to be performed in 2024 will aid in assessing whether there is potential system bypass and migration of leachate from the landfill as well as gas accumulation under the cap.

Nevertheless, institutional controls have been in place since 2001 and the restrictive covenants provide notice that hazardous substances are buried on the property. The use of the property is restricted in perpetuity in that future Site use must not breach the integrity of the cap, cover, liners or any other components of the containment system; must not disturb or disrupt the function of the Site's monitoring systems; nor otherwise increase the potential hazard to human health or the environment posed by the Site. Additional restrictions prohibit the installation of wells on the property and prohibit the erection of any permanent structure or building without the prior approval of EPA and Niagara County. Nearby residents also utilize the municipal water supply for drinking water. Therefore, all exposures to Site

contamination have been closed and groundwater will continue to be monitored to ensure the remedy is effective.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

The remedial action objectives identified in the 1993 ROD remain valid. The remedial action objective for groundwater is to control the source of contamination at the Site and to reduce and minimize the migration of contaminants into Site media thereby minimizing any human health or ecological impacts. Some chemical specific toxicity values have changed since the Site was originally assessed; however, comparisons of chemical concentrations detected in groundwater to state AWQS and federal MCLs is valid.

Soil vapor intrusion was not assessed in the remedial investigation performed for this Site. However, a potential future exposure pathway based on the conservative (health protective) assumption that buildings are located above the maximum detected concentration of the contaminants of concern in the groundwater was assessed in the 2008 FYR. Furthermore, in 2019, VOC and SVOC analysis were eliminated from the sampling requirements at the site due to analytes not being detected in groundwater samples. Based on that 2008 evaluation, and the fact that VOCs were not detected in 2016, it is not anticipated that this exposure pathway is a concern at this Site. Additionally, the easement prohibits the erection of any permanent structure or building without the approval of EPA and Niagara County and the nearest residential structures to the Site are sufficiently distant to not be impacted by vapor contamination from the Site.

The ecological risk assessment established that surface water and sediment concentrations of metals and pesticides may result in adverse acute and/or chronic effects in aquatic organisms within the drainage swales and streams present on the Site or in close proximity. Additionally, stressed vegetation had been observed in the northern wetland area, which may have been attributable to the Site. To account for lost ecological habitat associated with the remedial construction, a wetland mitigation plan was developed and executed, which included limited wetland replanting at the Site and wetland creation off-site at nearby Gratwick Park. The ecological risk exposure pathways were eliminated with the construction of the landfill cap.

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

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU1

No formal issues and recommendations are proposed for this FYR; however, the suggestions provided below are included to aid in the operation and monitoring of the landfill.

OTHER SUGGESTIONS

Water level data generally show that the remedy is maintaining hydraulic control; however, the rapid changes in groundwater elevations between 2011-2015, decreases in leachate collected and the presence of certain leachate indicator parameters detected in groundwater samples indicate the possibility that leachate may also be migrating from the landfill to some degree. The following steps would be useful to confirm that leachate is not exiting the landfill and to assess the potential buildup of landfill gases under the cap:

- Continue collecting groundwater samples for inorganics and water level information from the perimeter monitoring wells and viable piezometers located within the landfill on an annual basis.
- Continue the collection of groundwater samples for anions/cations from perimeter monitoring wells and viable piezometers on a biennial basis.
- Continue sampling for leachate indicator parameters on a biannual basis in the perimeter monitoring wells, viable piezometers and "wet well" A where leachate from the site discharges to the POTW.
- Continue comparing inorganic, anion/cation and leachate indicator parameter concentrations between the viable piezometers and perimeter monitoring wells as well as water level information between these wells in addition to the "wet wells".
- Install transducers in pumping wells to monitor fluctuations in groundwater elevation.
- Develop updated groundwater contour maps to assess the need for further monitoring well installation upgradient of the site to re-establish and/or confirm background concentrations and downgradient of the Site to better understand the potential extent of the redox zone.
- Collect gas samples from passive vents located near the former location of piezometer East-B.
- Re-install the East-B piezometer pending the results of the landfill gas sample collection to provide further insight on changes in water levels that may be related to the effectiveness of the landfill cap.

Each of the items above have been discussed with the PRP since the last Five-Year Review Report (July 2019) and our October 11, 2023 letter. The items below were agreed to by the PRP in their November 10, 2023 response:

- Collection of groundwater data information as described in the first three bullets above will be completed after the completion of annual groundwater sampling in 2024.
- Beginning in 2024, leachate parameters will be collected on a biennial basis from the four groundwater monitoring wells, three viable piezometers within the landfill, and from Wet Well A.
- Transducers will be placed in the four groundwater monitoring wells and three piezometers on the landfill.
- Two gas samples will be collected from landfill gas vents in the area of East-B in 2024. The air samples will be analyzed for methane and other landfill gases.
- Determination regarding the installation of a replacement piezometer for East-B after the landfill gas analytical results are received.

VII. PROTECTIVNESS STATEMENT

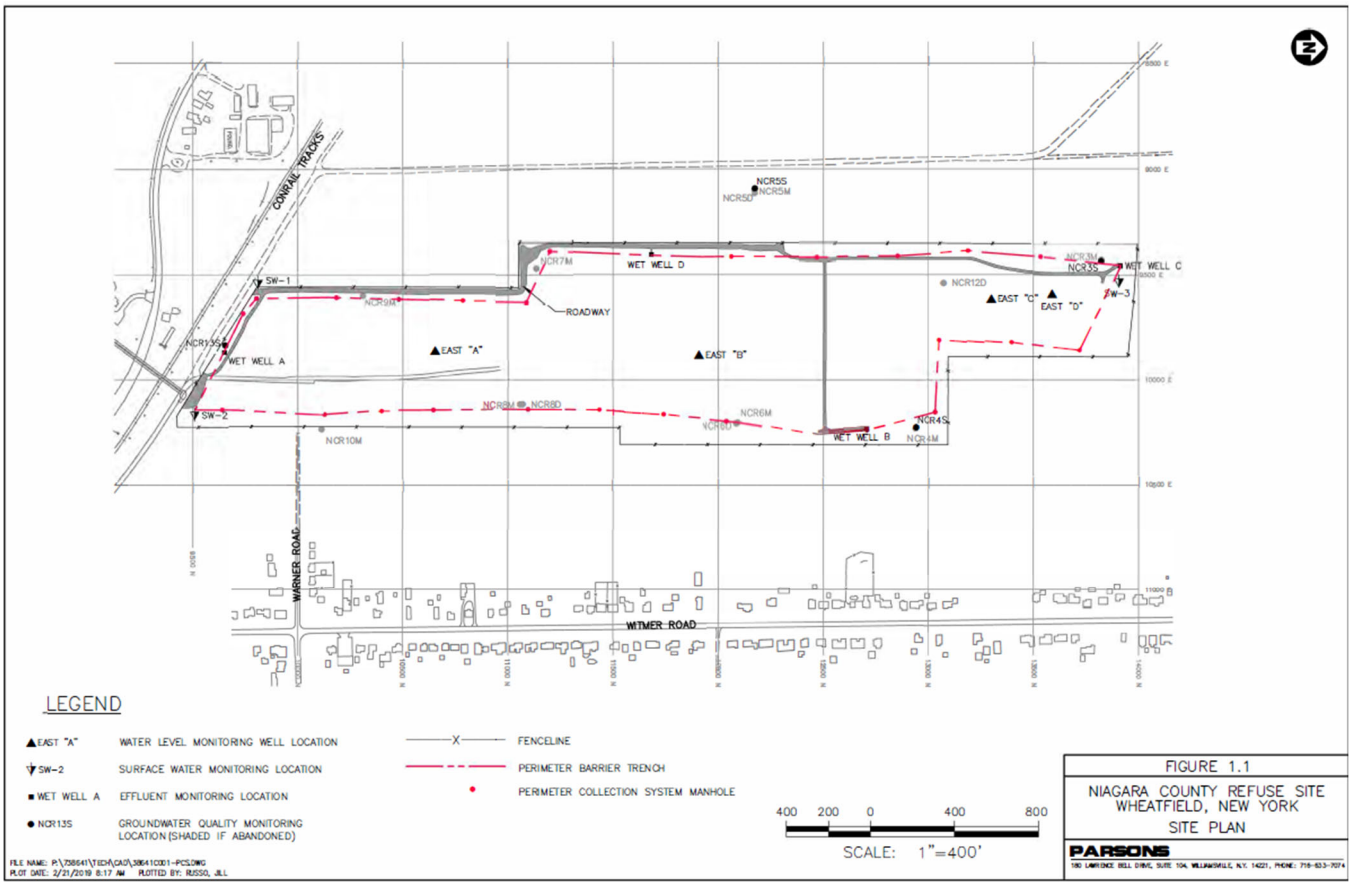
Protectiveness Statement(s)	
Operable Unit: OU1	*Protectiveness Determination:* Protective
Protectiveness Statement: The remedy is protective of human health and the environment.	

Sitewide Protectiveness Statement
Protectiveness Determination: Protective
Protectiveness Statement: The implemented remedy for the site is protective of human health and the environment.

VIII. NEXT REVIEW

The next FYR report for the Niagara County Refuse Superfund Site is required five years from the completion date of this review.

APPENDIX A – SITE MAP



APPENDIX B - ANNUAL REPORTS LIST

Documents, Data and Information Reviewed in Completing the Five-Year Review	
Document Title, Author	**Date**
Record of Decision	September 1993
First Five-Year Review	October 2003
Second Five-Year Review	November 2008
Third Five-Year Review	September 2014
Fourth Five-Year Review	July 2019
2018 Annual Monitoring Report, Parsons Engineering	February 2019
2019 Annual Monitoring Report, Parsons Engineering	June 2019
2020 Annual Monitoring Report, Parsons Engineering	August 2020
2021 Annual Monitoring Report, Parsons Engineering	July 2021
2022 Annual Monitoring Report, Parsons Engineering	July 2022
2023 Annual Monitoring Report, Parsons Engineering	June 2023

Note: EPA letter of December 11, 2018 eliminated Quarterly Data Summary Reports. Stated in the letter: “Reporting should be done annually within two to three months of groundwater sampling in order to provide current results and VOCs, SVOCs, and mercury can be eliminated from analysis. Following an evaluation by EPA's Division of Environmental Science and Assessment, Monitoring and Assessment Branch, it has been determined that continued validated groundwater monitoring data is required only for metals in order to support the data summaries in EPA's five-year reviews.”

APPENDIX C – GROUNDWATER TABLES

Table 2.1
Detected Analytes in Groundwater Samples
Niagara County Refuse Site
Wheatfield, Niagara County, New York

City of North Tonawanda NY1A8791 216 Payne Ave North Tonawanda, NY C/O Niagara County Refuse Site Validated Groundwater Sampling Event		Location ID: Sample ID: Lab Id: Source: SDG: Matrix: Sampled:	NYS DEC AWQS*	NYS DOH MCL	US EPA MCL	NCR-3S WG-11109668-0418 18/042418-SG-NCR3S 480-134493/134747-1 TALBUFF 480134493/480134747 WATER 4/18/2018 & 4/24/18	NCR-4S WG-11109668-0418 18/042418-SG-NCR4S 480-134493/134747-2 TALBUFF 480134493/480134747 WATER 4/18/2018 & 4/24/18	NCR-5S WG-11109668-0418 18/042418-SG-NCR5S 480-134493/134747-3 TALBUFF 480134493/480134747 WATER 4/18/2018 & 4/24/18	NCR-13S WG-11109668-0418 18/042418-SG-NCR13S 480-134493/134747-5 TALBUFF 480134493/480134747 WATER 4/18/2018 & 4/24/18	Field Duplicate WG-11109668-0418 18/042418-SG-NCR6S 480-134493/134747-4 TALBUFF 480134493/480134747 WATER 4/18/2018 & 4/24/18
CAS NO.	COMPOUND	Validated:				5/16/2018	5/16/2018	5/16/2018	5/16/2018	5/16/2018
	VOLATILES	UNITS:								Dup of NCR-5S
	NONE DETECTED									
	SEMIVOLATILES									
	NONE DETECTED									
	TOTAL METALS									
7429-90-5	ALUMINUM	mg/l	-	-	-	0.260	7.20	2.90	0.250	0.350
7440-39-3	BARIUM	mg/l	1	2	2	0.037	0.081	0.200	0.053	0.056
7440-41-7	BERYLLIUM	mg/l	0.003+	0.004	0.004	0.002 U	0.00033 J	0.002 U	0.002 U	0.002 U
7440-70-2	CALCIUM	mg/l	-	-	-	99.9	159 J+	104	158 J+	157 J+
7440-47-3	CHROMIUM	mg/l	0.05	0.10	0.10	0.003 J	0.0067	0.0098	0.0033 J	0.003 J
7440-48-4	COBALT	mg/l	-	-	-	0.004 U	0.00072 J	0.00066 J	0.004 U	0.004 U
7440-50-8	COPPER	mg/l	0.2	-	-	0.004 J	0.011	0.0048 J	0.0016 J	0.002 J
7439-89-6	IRON	mg/l	0.3>	0.3+	-	**0.350**	**25.5 J+**	**2.1 J+**	**0.540 J+**	**0.490 J+**
7439-92-1	LEAD	mg/l	0.025	0.025	0.015	0.01 U	0.014	0.0069 J	0.01 U	0.01 U
7439-95-4	MAGNESIUM	mg/l	35	-	-	49	50.9	55.7	67.4	65.3
7439-96-5	MANGANESE	mg/l	0.3>	0.3+	-	0.006 J	**0.53**	0.088	0.053 J	0.04
7440-02-0	NICKEL	mg/l	0.10	-	-	0.005 J	0.0052 J	0.0082 J	0.0025 J	0.0026 J
7440-09-7	POTASSIUM	mg/l	-	-	-	2.1	8.8	0.86	0.83	0.90
7440-23-5	SODIUM	mg/l	20	20	20	5.6	**24.7**	7.3	12.0	10.8
7440-62-2	VANADIUM	mg/l	-	-	-	0.005 U	0.0034 J	0.0029 J	0.005 U	0.005 U
7440-66-6	ZINC	mg/l	2.0+	5	-	0.021	0.37 J	0.014 J+	0.0031 J	0.0062 J
	DISSOLVED METALS									
7440-39-3	BARIUM	mg/l	1	2	2	0.041	0.058	0.160	0.043	0.053
7440-43-9	CADMIUM	mg/l	0.005	0.005	0.005	0.00051 J	0.002 U	0.002 U	0.002 U	0.002 U
7440-70-2	CALCIUM	mg/l	-	-	-	118	153	92.4	157	149
7440-50-8	COPPER	mg/l	0.2	-	-	0.0042 J	0.010 U	0.010 U	0.010 U	0.010 U
7439-89-6	IRON	mg/l	0.3>	0.3+	-	0.053	**1.2**	0.019 J	**0.340 J**	**0.039 J**
7439-92-1	LEAD	mg/l	0.025	0.025	0.015	0.01 U	0.0035 J	0.01 U	0.0047 J	0.01 U
7439-95-4	MAGNESIUM	mg/l	35	-	-	59.3	51.5	52.1	77.1	62.4
7439-96-5	MANGANESE	mg/l	0.3>	0.3+	-	0.019 J	**0.510**	0.055 J	0.110 J	0.031 J
7440-02-0	NICKEL	mg/l	0.10	-	-	0.0054 J	0.0018 J	0.010 U	0.0024 J	0.0014 J
7440-09-7	POTASSIUM	mg/l	-	-	-	1.7	8.7	0.28 J	0.66	0.78
7440-23-5	SODIUM	mg/l	20	20	20	6.9	**26.4**	7.0	18.4 J	9.8 J
7440-66-6	ZINC	mg/l	2.0+	5	-	0.023	0.0084 J	0.0035 J	0.0051 J	0.0028 J

* = NYSDEC Ambient Water Quality Standards + = Guidance value
> = Sum of iron and manganese should not exceed 500 ug/L NYSDEC or 300 ug/L NYSDOH
J = estimated value. J+ = estimated biased high. - = No standard identified. U = Not detected at given value.
Boxed values exceed NYSDEC AWQS.
Bold values exceed NYSDOH maximum contaminant levels (MCL).
Shaded values exceed USEPA maximum contaminant levels.

Table 2.1
Detected Analytes in Groundwater Samples
Niagara County Refuse Site
Wheatfield, Niagara County, New York

City of North Tonawanda NY1A8791 North Tonawanda, NY C/O Niagara County Refuse Site Validated Groundwater Sampling Event April 2019 Detected Compound Summary		Location ID: Sample ID: Lab Sample Id: Source: SDG: Matrix: Sampled: Validated:	NYS DEC AWQS*	NYS DOH MCL	US EPA MCL	NCR3S WG-11109668-041119-DST-NCR3S 480-151872-1 TALBUFF 4801518721 WATER 4/11/2019 9:00 5/13/2019	NCR4S WG-11109668-041119-DST-NCR4S 480-151872-2 TALBUFF 4801518721 WATER 4/11/2019 9:10 5/13/2019	NCR5S WG-11109668-041119-DST-NCR5S 480-151872-3 TALBUFF 4801518721 WATER 4/11/2019 8:40 5/13/2019	NCR13S WG-11109668-041119-DST-NCR13S 480-151872-5 TALBUFF 4801518721 WATER 4/11/2019 8:15 5/13/2019	Duplicate of WG-11109668-041119-DST-NCR13S NCR13S WG-11109668-041119-DST-NCR6S 480-151872-4 TALBUFF 4801518721 WATER 4/11/2019 8:15 5/13/2019
CAS NO.	COMPOUND	UNITS:								
	METALS									
7429-90-5	ALUMINUM	mg/l	-	-	-	0.1 J	1.5	0.078 J	0.062 J	ND
7440-39-3	BARIUM	mg/l	1	2	2	0.041	0.053	0.15	0.042	0.044
7440-70-2	CALCIUM	mg/l	-	-	-	97	144	85.5	132	130
7440-47-3	CHROMIUM, TOTAL	mg/l	0.05	0.10	0.10	0.0014 J	0.0018 J	ND	ND	ND
7440-48-4	COBALT	mg/l	-	-	-	ND	0.00065 J	ND	ND	ND
7440-50-8	COPPER	mg/l	0.2	-	-	0.0051 J	0.0028 J	0.0021 J	ND	0.0019 J
7439-89-6	IRON	mg/l	0.3>	0.3+	-	0.16	**4.2**	0.067	0.066	0.054 J
7439-95-4	MAGNESIUM	mg/l	35	-	-	**46.1**	**48.2**	**45.7**	**49.4**	**46.9**
7439-96-5	MANGANESE	mg/l	0.3>	0.3+	-	0.0038	0.23	0.0019 J	0.072	0.061
7440-02-0	NICKEL	mg/l	0.10	-	-	0.0045 J	0.0021 J	0.0015 J	0.002 J	0.0015 J
7440-09-7	POTASSIUM	mg/l	-	-	-	1.7	9.9	0.4 J	0.74	0.86
7440-23-5	SODIUM	mg/l	20	20	20	3.9	**25.6**	8.1 J	8.1	7 J
7440-66-6	ZINC	mg/l	2.0+	5	-	0.011	0.074	ND	0.0017 J	ND
	DISSOLVEDMETALS									
7429-90-5	ALUMINUM	mg/l	-	-	-	ND	0.07 J	0.13 J	ND	0.073 J
7440-39-3	BARIUM	mg/l	1	2	2	0.04	0.049	0.14	0.036	0.033
7440-43-9	CADMIUM	mg/l	0.005	0.005	0.005	0.00051 J	0.00052 J	0.0005 J	0.0005 J	0.00063 J
7440-70-2	CALCIUM	mg/l	-	-	-	99.2	148	85.9	134	143
7440-50-8	COPPER	mg/l	0.2	-	-	0.0035 J	ND	0.0028 J	0.0017 J	0.002 J
7439-89-6	IRON	mg/l	0.3>	0.3+	-	0.024 J	**0.46**	0.07	0.042 J	0.11 J
7439-95-4	MAGNESIUM	mg/l	35	-	-	**46.4**	**48.4**	**42.9**	**55.7**	**73.5**
7439-96-5	MANGANESE	mg/l	0.3>	0.3+	-	0.002 J	0.22	0.0019 J	0.067	0.077
7440-02-0	NICKEL	mg/l	0.10	-	-	0.0022 J	0.0018 J	ND	0.0026 J	0.0033 J
7440-09-7	POTASSIUM	mg/l	-	-	-	1.6	10.1	0.32 J	0.7	0.63
7440-23-5	SODIUM	mg/l	20	20	20	4.1	**27**	8.1	14.7 J	**28.2 J**
7440-66-6	ZINC	mg/l	2.0+	5	-	0.01	0.015	0.0029 J	0.0028 J	0.0048 J

* = NYSDEC Ambient Water Quality Standards + = Guidance value
> = Sum of iron and manganese should not exceed 500 ug/L NYSDEC or 300 ug/L NYSDOH
J = estimated value. J+ = estimated biased high. - = No standard identified. U = Not detected at given value.
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Niagara County Refuse Site
Wheatfield, Niagara County, New York

City of North Tonawanda NY1AS791 216 Payne Ave North Tonawanda, NY C/O Niagara County Refuse Site Validated Groundwater Sampling Event June 2020 Detected Compound Summary		Location ID: Sample ID: Lab Sample Id: Source: SDG: Matrix: Sampled: Validated:	NYS DEC AWQS*	NYS DOH MCL	US EPA MCL	NCR-3S WG-11109668-051920-DT-006 480-170182-6 TALBUFF 4801701821 WATER 5/19/2020 9:30 7/1/2020	NCR-4S WG-11109668-051920-DT-007 480-170182-7 TALBUFF 4801701821 WATER 5/19/2020 9:45 7/1/2020	NCR-5S WG-11109668-051920-DT-001 480-170182-1 TALBUFF 4801701821 WATER 5/19/2020 8:05 7/1/2020	NCR-13S WG-11109668-051920-DT-002 480-170182-2 TALBUFF 4801701821 WATER 5/19/2020 8:25 7/1/2020	Duplicate of NCR-13S NCR-13S WG-11109668-051920-DT-003 480-170182-3 TALBUFF 4801701821 WATER 5/19/2020 8:25 7/1/2020	EAST-A WG-11109668-051920-DT-008 480-170182-8 TALBUFF 4801701821 WATER 5/19/2020 10:05 7/1/2020	EAST-C WG-11109668-051920-DT-004 480-170182-4 TALBUFF 4801701821 WATER 5/19/2020 9:00 7/1/2020	EAST-D WG-11109668-051920-DT-005 480-170182-5 TALBUFF 4801701821 WATER 5/19/2020 9:15 7/1/2020
CAS NO.	COMPOUND	UNITS:											
	METALS												
7429-90-5	ALUMINUM	mg/l	-	-	-	ND	1.1	ND	ND	ND	7.8	7.2	1.2
7440-38-2	ARSENIC	mg/l	25	50	50	ND	ND	ND	ND	ND	0.014	0.079	0.02
7440-39-3	BARIUM	mg/l	1	2	2	0.057	0.059	0.16	0.048	0.042	0.62	0.19	0.65
7440-41-7	BERYLLIUM	mg/l	0.003+	0.004	0.004	ND	ND	ND	ND	ND	0.00045 J	0.0003 J	ND
7440-43-9	CADMIUM	mg/l	5	5	5	ND	ND	ND	ND	ND	0.0055	ND	ND
7440-70-2	CALCIUM	mg/l	-	-	-	126	133	93.7	134	143	226	2780	142
7440-47-3	CHROMIUM, TOTAL	mg/l	0.05	0.10	0.10	0.0014 J	0.0012 J	ND	ND	ND	0.037	**0.18**	0.075
7440-48-4	COBALT	mg/l	-	-	-	ND	ND	0.00088 J	ND	ND	0.013	0.18	0.022
7440-50-8	COPPER	mg/l	0.2	-	-	0.0034 J	0.0027 J	ND	0.0056 J	0.0035 J	0.11	ND	0.016
7439-89-6	IRON	mg/l	0.3◇	0.3+	-	0.18	**3.3**	**0.4**	0.07 J	**0.33 J**	**164**	**1540**	**55.9**
7439-92-1	LEAD	mg/l	0.025	0.025	0.015	ND	ND	ND	ND	ND	**0.46**	**0.79**	**0.24**
7439-95-4	MAGNESIUM	mg/l	35+	-	-	**65.3**	**46.2**	**45.5**	**55.5**	**69.8**	**126**	**1400**	**420**
7439-96-5	MANGANESE	mg/l	0.3◇	0.3+	-	0.16	0.17	0.13	0.029 J	0.048 J	**0.99**	**17.8**	0.11
7440-02-0	NICKEL	mg/l	0.10	-	-	0.0049 J	0.0041 J	0.005 J	0.0045 J	0.0033 J	0.05	1	0.21
7440-09-7	POTASSIUM	mg/l	-	-	-	3	6.8	0.31 J	2.4 J	1.4 J	15	1010 J+	**438**
7782-49-2	SELENIUM	mg/l	10	50	50	ND	ND	ND	ND	ND	ND	0.022	ND
7440-23-5	SODIUM	mg/l	20	20	20	6.3	20	5.1	7.9 J	16.1 J	**66.1**	**2260**	**1450**
7440-62-2	VANADIUM	mg/l	-	-	-	ND	ND	ND	ND	ND	0.019	0.035	0.0095
7440-66-6	ZINC	mg/l	2.0+	5	-	0.015	0.067	0.0048 J	ND	0.0023 J	0.24	**31.3**	0.37
	DISSOLVED METALS												
7429-90-5	ALUMINUM	mg/l	-	-	-	ND	0.87	ND	ND	ND	-	8.8	1
7440-38-2	ARSENIC	mg/l	25	50	50	ND	ND	ND	ND	ND	-	0.074	0.022
7440-39-3	BARIUM	mg/l	1	2	2	0.054	0.058	0.16	0.049	0.041	-	0.18	0.65
7440-41-7	BERYLLIUM	mg/l	0.003+	0.004	0.004	ND	ND	ND	ND	ND	-	0.00035 J	ND
7440-43-9	CADMIUM	mg/l	5	5	5	ND	ND	ND	ND	ND	-	0.0037 J	ND
7440-70-2	CALCIUM	mg/l	-	-	-	130	132	96.9	137	138	-	2780	140
7440-47-3	CHROMIUM	mg/l	0.05	0.10	0.10	ND	0.0013 J	ND	ND	ND	-	**0.19**	**0.013**
7440-48-4	COBALT	mg/l	-	-	-	ND	ND	0.00074 J	ND	ND	-	0.18	0.021
7440-50-8	COPPER	mg/l	0.2	-	-	0.0027 J	0.0026 J	ND	0.0017 J	0.1 J+	-	ND	0.013
7439-89-6	IRON	mg/l	0.3◇	0.3+	-	0.11	**3.2**	0.13	0.1	0.13	-	**1610**	**51**
7439-92-1	LEAD	mg/l	0.025	0.025	0.015	ND	ND	ND	ND	0.0078 J	-	**1.2**	**0.21**
7439-95-4	MAGNESIUM	mg/l	35+	-	-	**65.7**	**45.8**	**47.4**	**60.1**	**65.9**	-	**1390**	**419**
7439-96-5	MANGANESE	mg/l	0.3◇	0.3+	-	0.14	0.16	0.13	0.014 J	0.027 J	-	**19.8**	0.11
7440-02-0	NICKEL	mg/l	0.10	-	-	0.0048 J	0.0036 J	0.0033 J	0.0023 J	0.0024 J	-	**1.1**	0.21
7440-09-7	POTASSIUM	mg/l	-	-	-	2.1	6.5	0.19 J	0.96 J	0.65 J	-	1060	**435**
7782-49-2	SELENIUM	mg/l	10	50	50	ND	ND	ND	ND	ND	-	0.014 J	ND
7440-23-5	SODIUM	mg/l	20	20	20	6.3	19.6	5.4	9.9 J	14 J	-	**2320**	**1430**
7440-62-2	VANADIUM	mg/l	-	-	-	ND	ND	ND	ND	ND	-	0.035	0.0083
7440-66-6	ZINC	mg/l	2.0+	5	-	0.014	0.055	0.0021 J	ND	0.059	-	**31.3**	0.29
	OTHER												
ALKB	ALKALINITY, BICARBONATE	mg/l	-	-	-	547	528	447	553	569	672	ND	28.2
16887-00-6	CHLORIDE (AS CL)	mg/l	250	250	-	ND	ND	1.1	2.8	3.6	213	**2590**	**1160**
7664-41-7	NITROGEN, AMMONIA (AS N)	mg/l	2	-	-	0.02 U	0.02 UJ	0.02 U	0.02 U	0.02 U	3.7	1570	**855**
NO3NO2N	NITROGEN, NITRATE-NITRITE	mg/l	10	10	10	0.089	0.058	0.055	0.092	0.099	0.074	1.1	0.22
14808-79-8	SULFATE (AS SO4)	mg/l	250	250	250+	87.7	66	3.1 J	139	185	9.2 J	**1760**	100 U

* = NYSDEC Ambient Water Quality Standards + = Guidance value or secondary standard
◇ = Sum of iron and manganese should not exceed 500 ug/L NYSDEC or 300 ug/L NYSDOH
J = estimated value. J+ = estimated biased high. - = No standard identified. U = Not detected at given value.
Boxed values exceed NYSDEC AWQS.
Bold values exceed NYSDOH maximum contaminant levels (MCL).
Shaded values exceed USEPA maximum contaminant levels.

Table 2.1
Detetcted Analytes in Groundwater Samples
Niagara County Refuse Site
Wheatfield, Niagara County, New York

Location ID:					NCR-3S	NCR-4S	NCR-5S	NCR-13S	Duplicate of NCR-13S	EAST-A	EAST-C	EAST-D
Sample ID:					WG-11109668-050421	WG-11109668-050421	WG-11109668-050421	WG-11109668-050421	WG-11109668-050421	WG-11109668-050421	WG-11109668-050421	WG-11109668-050421
Matrix:					WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
SDG:					4801842481	4801842481	4801842481	4801842481	4801842481	4801842481	4801842481	4801842481
Lab Sample ID:		NYS DEC	NYS DOH	US EPA	480-184248-1	480-184248-2	480-184248-3	480-184248-5	480-184248-4	480-184248-6	480-184248-7	480-184248-8
Sampled:					5/4/2021	5/4/2021	5/4/2021	5/4/2021	5/4/2021	5/4/2021	5/4/2021	5/4/2021
CAS. No.	Chemical Name	Unit	AWQS*	MCL	MCL							
	TOTAL METALS											
7429-90-5	Aluminum	mg/l	-	-	-	0.2 U	0.63	0.18 J	0.2 U	0.2 U	2.2	7.4	1.5
7440-38-2	Arsenic	mg/l	0.025	0.050	0.050	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	**0.057**	0.015
7440-39-3	Barium	mg/l	1	2	2	0.048	0.055	0.14	0.063	0.051	0.45	0.19	0.62
7440-43-9	Cadmium	mg/l	0.005	0.005	0.005	0.001 U	0.001 U	0.001 U	0.001 U	0.001 U	0.0014	**0.01**	0.0029
7440-70-2	Calcium	mg/l	-	-	-	121	116	86	151	151	193	2820	135 J+
7440-47-3	Chromium, Total	mg/l	0.05	0.10	0.10	0.004 U	0.0011 J	0.0042	0.004 U	0.004 U	0.013	**0.24**	0.084
7440-48-4	Cobalt	mg/l	-	-	-	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	0.0029 J	0.2	0.023
7440-50-8	Copper	mg/l	0.2	-	-	0.004 J	0.002 J	0.0031 J	0.0021 J	0.0025 J	0.048	0.05 U	0.028
7439-89-6	Iron	mg/l	0.3>	0.3+	-	0.06	**1.1**	0.15	0.046	0.032	**64.3**	**1490**	**77.6 J+**
7439-92-1	Lead	mg/l	0.025	0.025	0.015	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	**0.15**	**0.6**	**0.28**
7439-95-4	Magnesium	mg/l	35+	-	-	54.1	35	39.9	58.8	66.7	122	1380	414
7439-96-5	Manganese	mg/l	0.3>	0.3+	-	0.0079	0.023	0.0033	0.003 U	0.00062 J	**0.41**	**18.2**	0.12 J+
7440-02-0	Nickel	mg/l	0.10	-	-	0.0029 J	0.01 U	0.0026 J	0.01 U	0.01 U	0.018	1.1	0.22
7440-09-7	Potassium	mg/l	-	-	-	1.4	9	0.28 J	1	0.85	17.7	889	372 J+
7440-23-5	Sodium	mg/l	20	20	20	6.4	**21.9**	8	8.4 J	13.9 J	**70.3**	**2370**	**743**
7440-62-2	Vanadium	mg/l	-	-	-	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	0.0049 J	0.026	0.011
7440-66-6	Zinc	mg/l	2.0+	5	-	0.0089 J	0.021	0.0024 J	0.01 U	0.0021 J	0.16	**27.9**	0.59
	DISSOLVED METALS												
7429-90-5	Aluminum	mg/l	-	-	-	0.2 U	1.2	0.07 J	0.2 U	0.2 U	- -	6.8	1.5
7440-38-2	Arsenic	mg/l	0.025	0.050	0.050	0.015 U	0.015 U	0.015 U	0.015 U	0.015 U	- -	0.044	0.017
7440-39-3	Barium	mg/l	1	2	2	0.049	0.057	0.14	0.061	0.055	- -	0.18	0.62
7440-43-9	Cadmium	mg/l	0.005	0.005	0.005	0.002 U	0.002 U	0.002 U	0.002 U	0.002 U	- -	**0.0083 J**	0.0041
7440-70-2	Calcium	mg/l	-	-	-	117	105	77	142	137	- -	2650	122
7440-47-3	Chromium, Total	mg/l	0.05	0.10	0.10	0.004 U	0.0018 J	0.0012 J	0.004 U	0.004 U	- -	**0.23**	0.083
7440-48-4	Cobalt	mg/l	-	-	-	0.004 U	0.004 U	0.004 U	0.004 U	0.004 U	- -	0.19	0.027

Location ID:					NCR-3S	NCR-4S	NCR-5S	NCR-13S	NCR-13S	EAST-A	EAST-C	EAST-D
Sample ID:					WG-11109668-050421	WG-11109668-050421	WG-11109668-050421	WG-11109668-050421	WG-11109668-050421	WG-11109668-050421	WG-11109668-050421	WG-11109668-050421
Matrix:					WATER	WATER	WATER	WATER	WATER	WATER	WATER	WATER
SDG:					4801842481	4801842481	4801842481	4801842481	4801842481	4801842481	4801842481	4801842481
Lab Sample ID:		NYS DEC	NYS DOH	US EPA	480-184248-1	480-184248-2	480-184248-3	480-184248-5	480-184248-4	480-184248-6	480-184248-7	480-184248-8
Sampled:					5/4/2021	5/4/2021	5/4/2021	5/4/2021	5/4/2021	5/4/2021	5/4/2021	5/4/2021
CAS. No.	Chemical Name	Unit	AWQS*	MCL	MCL							
7440-50-8	Copper	mg/l	0.2	-	-	0.0031 J	0.0026 J	0.0024 J	0.002 J	0.0019 J	- -	0.05 U	0.025
7439-89-6	Iron	mg/l	0.3>	0.3+	-	0.05 U	**2.1**	0.068	0.05	0.031 J	- -	**1410**	**98.5**
7439-92-1	Lead	mg/l	0.025	0.025	0.015	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U	- -	**0.46**	**0.23**
7439-95-4	Magnesium	mg/l	35+	-	-	57.4	35.4	41.9	61.4	61.5	- -	1370	446
7439-96-5	Manganese	mg/l	0.3>	0.3+	-	0.0057	0.02	0.0016 J	0.003 U	0.00058 J	- -	**17.3**	0.14
7440-02-0	Nickel	mg/l	0.10	-	-	0.0034 J	0.0013 J	0.0019 J	0.01 U	0.0021 J	- -	1	0.22
7440-09-7	Potassium	mg/l	-	-	-	1.2	8.4	0.32 J	0.9	0.82	- -	830	379
7440-23-5	Sodium	mg/l	20	20	20	6.4	**20.9**	9.1	9.6	11.1	- -	**2220**	**1580**
7440-62-2	Vanadium	mg/l	-	-	-	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U	- -	0.016 J	0.014
7440-66-6	Zinc	mg/l	2.0+	5	-	0.0085 J	0.03	0.0015 J	0.0018 J	0.0022 J	- -	**26.5**	0.73
	OTHER												
ALKB	Alkalinity, Bicarbonate (As CaC	mg/l	-	-	-	488	425	400	616	687	666	19900	6780
16887-00-6	Chloride (As Cl)	mg/l	250	250	-	2.5 U	1 U	1.1	2.5 U	2.5 U	230	**3010**	**1480**
7664-41-7	Nitrogen, Ammonia (As N)	mg/l	2	-	-	0.02 U	0.02 U	0.02 UJ	0.02 U	0.02 U	- -	1360	0.62
NO3NO2N	Nitrogen, Nitrate-Nitrite	mg/l	10	10	10	0.51	0.043 J	0.033 J	0.049 J	0.045 J	- -	0.05 U	0.22
14808-79-8	Sulfate (As SO4)	mg/l	250	250	250+	86.6	71.8	5.1	93.7	84.5	85.7	**1920**	17.6 J

* = NYSDEC Ambient Water Quality Standards + = Guidance value or secondary standard
> = Sum of iron and manganese should not exceed 500 ug/L NYSDEC or 300 ug/L NYSDOH
J = estimated value. J+ = estimated biased high. - = No standard identified. U = Not detected at given value.
Boxed values exceed NYSDEC AWQS.
Bold values exceed NYSDOH maximum contaminant levels (MCL).
Shaded values exceed USEPA maximum contaminant levels.

Table 2.1
Detected Analytes in Groundwater Samples
Niagara County Refuse Site
Wheatfield, Niagara County, New York

Location ID:					EAST-A	EAST-C	EAST-D	Duplicate of EAST D				
Sample ID:					WG-11109668-041322-BJG-EAST A	WG-11109668-041322-BJG-EAST C	WG-11109668-041322-BJG-EAST D	WG-11109668-041322-BJG-NCR-6S	NCR-1SS WG-11109668-041322-BJG-NCR-1SS	NCR-3S WG-11109668-041322-BJG-NCR-3S	NCR-4S WG-11109668-041322-BJG-NCR-4S	NCR-5S WG-11109668-041322-BJG-NCR-5S
Matrix:					WG	WG	WG	WG	WG	WG	WG	WG
Lab Sample ID:					480-196752-8	480-196752-7	480-196752-6	480-196752-5	480-196752-2	480-196752-4	480-196752-3	480-196752-1
Sample Date:		NYS DEC	NYS DOH	US EPA	4/13/2022	4/13/2022	4/13/2022	4/13/2022	4/13/2022	4/13/2022	4/13/2022	4/13/2022
Sample Type Code:		AWQS*	MCL	MCL	N	N	N	FD	N	N	N	N
Chemical Name	Unit											
Total Metals												
Aluminum	mg/l	-	-	-	0.81	8.8	1.6	2	0.2 U	0.2 U	4	0.2 U
Antimony	mg/l	0.003	0.006	0.006	0.02 U	**0.15 J**	**0.011 J**	**0.016 J**	0.02 U	0.02 U	0.02 U	0.02 U
Arsenic	mg/l	0.025	0.050	0.050	0.01 U	0.05 U	0.02	0.016	0.01 U	0.01 U	0.01 U	0.01 U
Barium	mg/l	1	2	2	0.21	0.19	0.67	0.77	0.06	0.062	0.088	0.14
Cadmium	mg/l	0.005	0.005	0.005	0.001 U	0.005 U	0.0039	0.0026	0.001 U	0.001 U	0.001 U	0.001 U
Calcium	mg/l	-	-	-	223	2830	130	138	167	126	159	109
Chromium, Total	mg/l	0.05	0.10	0.10	0.0072	**0.23**	0.086	0.092	0.004 U	0.004 U	0.0031 J	0.004 U
Cobalt	mg/l	-	-	-	0.0015 J	0.22	0.029	0.03	0.004 U	0.004 U	0.004 U	0.004 U
Copper	mg/l	0.2	-	-	0.026	0.05 U	0.019	0.026	0.01 U	0.0018 J	0.0049 J	0.01 U
Iron	mg/l	0.3>	0.3+	-	**45.7**	**1640**	**95.8 J**	**139 J**	0.1	0.068	**9.1**	0.061
Lead	mg/l	0.025	0.025	0.015	**0.12**	**0.94**	**0.27**	**0.33**	0.005 U	0.005 U	0.0082	0.005 U
Magnesium	mg/l	35+	-	-	143	1380	442	445	61.3	60.1	49.8	48.2
Manganese	mg/l	0.3>	0.3+	-	**0.34**	**19.7**	0.14	0.15	0.048	0.0021 J	0.096	0.003 J
Nickel	mg/l	0.10	-	-	0.014	1.1	0.24	0.25	0.0017 J	0.0027 J	0.0043 J	0.0014 J
Potassium	mg/l	-	-	-	17	1010	538	525	0.73	2	8.1	0.34 J
Sodium	mg/l	20	20	20	**81.4**	**2400**	**1560**	**1530**	8.1 J	5.8	**23.9**	5.2
Vanadium	mg/l	-	-	-	0.002 J	0.031	0.018	0.018	0.005 U	0.005 U	0.005 U	0.005 U
Zinc	mg/l	2.0+	5	-	0.19	**33.1**	0.69	0.84	0.01 U	0.0075 J	0.12	0.01 U
Dissolved Metals												
Aluminum	mg/l	-	-	-	--	8.3	1.1	1.4	0.2 U	0.2 U	0.2 U	0.2 U
Antimony	mg/l	0.003	0.006	0.006	--	**0.31 J**	**0.0078 J**	**0.0096 J**	0.02 U	0.02 U	0.02 U	0.02 U
Arsenic	mg/l	0.025	0.050	0.050	--	**0.066 J**	0.018	0.018	0.015 U	0.015 U	0.015 U	0.015 U
Barium	mg/l	1	2	2	--	0.18	0.6	0.6	0.051	0.055	0.064	0.15
Cadmium	mg/l	0.005	0.005	0.005	--	0.01 U	0.0012 J	0.0024 J	0.00061 J	0.00057 J	0.002 U	0.002 U
Calcium	mg/l	-	-	-	--	2720	113	116	150	111	131	104
Chromium, Total	mg/l	0.05	0.10	0.10	--	**0.24**	0.074	0.077	0.004 U	0.004 U	0.0025 J	0.004 U
Cobalt	mg/l	-	-	-	--	0.21	0.023	0.025	0.004 U	0.004 U	0.004 U	0.004 U

Location ID:					EAST-A	EAST-C	EAST-D	EAST-D	NCR-1SS	NCR-3S	NCR-4S	NCR-5S
Sample ID:					WG-11109668-041322-BJG-EAST A	WG-11109668-041322-BJG-EAST C	WG-11109668-041322-BJG-EAST D	WG-11109668-041322-BJG-NCR-6S	WG-11109668-041322-BJG-NCR-1SS	WG-11109668-041322-BJG-NCR-3S	WG-11109668-041322-BJG-NCR-4S	WG-11109668-041322-BJG-NCR-5S
Matrix:					WG	WG	WG	WG	WG	WG	WG	WG
Lab Sample ID:					480-196752-8	480-196752-7	480-196752-6	480-196752-5	480-196752-2	480-196752-4	480-196752-3	480-196752-1
Sample Date:		NYS DEC	NYS DOH	US EPA	4/13/2022	4/13/2022	4/13/2022	4/13/2022	4/13/2022	4/13/2022	4/13/2022	4/13/2022
Sample Type Code:		AWQS*	MCL	MCL	N	N	N	FD	N	N	N	N
Chemical Name	Unit											
Copper	mg/l	0.2	-	-	--	0.05 U	0.015	0.018	0.0016 J	0.0048 J	0.0044 J	0.05 U
Iron	mg/l	0.3>	0.3+	-	--	**1520 J+**	**46.4**	**60.2**	0.083	0.028 J	0.11	0.05 U
Lead	mg/l	0.025	0.025	0.015	--	**0.79**	**0.13 J**	**0.21 J**	0.01 U	0.01 U	0.01 U	0.01 U
Magnesium	mg/l	35+	-	-	--	1370	441	433	63.9	54.9	43.5	48.5
Manganese	mg/l	0.3>	0.3+	-	--	**19**	0.17	0.24	0.062	0.0018 J	0.058	0.028 J
Nickel	mg/l	0.10	-	-	--	1	0.21	0.21	0.01 U	0.0014 J	0.0027 J	0.0015 J
Potassium	mg/l	-	-	-	--	981	462	457	0.54	1.7	6.5	0.24 J
Selenium	mg/l	10	50	50	--	0.11 J	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U	0.025 U
Sodium	mg/l	20	20	20	--	**2210**	**1520**	**1530**	10.8	4.8	19.5	5.4
Vanadium	mg/l	-	-	-	--	0.045	0.014	0.014	0.005 U	0.005 U	0.005 U	0.005 U
Zinc	mg/l	2.0+	5	-	--	**32.9**	0.33	0.49	0.0025 J	0.0073 J	0.012	0.0015 J
Other												
Alkalinity, Bicarbonate (As CaCO3)	mg/l	-	-	-	673	250 U	5 U	5 U	598	445	521	511
Alkalinity, Total (As CaCO3)	mg/l	-	-	-	673	10100	5 U	5 U	598	445	521	511
Chloride (As Cl)	mg/l	250	250	-	248	**3290**	**1780**	**1650**	1.9 J	1.4 J	2.5 U	1.9
Sulfate (As SO4)	mg/l	250	250	250+	240	**3210 J**	100 U	100 U	75	80.2	62.8	1.3 J
Nitrogen, Ammonia (As N)	mg/l	2	-	-	--	1470	658	664	0.2 U	0.2 U	0.2 U	0.2 U
Nitrogen, Nitrate-Nitrite	mg/l	10	10	10	--	0.05 UJ	0.03 J	0.052 J	0.11	1.9	0.072	0.047 J

* = NYSDEC Ambient Water Quality Standards + = Guidance value or secondary standard
> = Sum of iron and manganese should not exceed 500 ug/L NYSDEC or 300 ug/L NYSDOH
J = estimated value. J+ = estimated biased high. - = No standard identified. U = Not detected at given value.
Boxed values exceed NYSDEC AWQS.
Bold values exceed NYSDOH maximum contaminant levels (MCL).
Shaded values exceed USEPA maximum contaminant levels.

Table 2.1
Detected Analytes in Groundwater Samples
Niagara County Refuse Site
Wheatfield, Niagara County, New York

Location ID:					EAST-A		EAST-C	EAST-D	EAST-D	NCR-13S	NCR-3S	NCR-4S	NCR-5S
Sample ID:					WG-11109668-041923-BJG-EAST A		WG-11109668-041923-BJG-EAST C	WG-11109668-041923-BJG-EAST D	WG-11109668-041923-BJG-NCR-6S	WG-11109668-041923-BJG-NCR-	WG-11109668-041923-BJG-NCR-3S	WG-11109668-041923-BJG-NCR-4S	WG-11109668-041923-BJG-NCR-5S
Matrix:					WG		WG	WG	WG	WG	WG	WG	WG
SDG:					4802080661		4802080661	4802080661	4802080661	4802080661	4802080661	4802080661	4802080661
Lab Sample ID:					480-208066-8		480-208066-5	480-208066-6	480-208066-7	480-208066-2	480-208066-4	480-208066-3	480-208066-1
Sample Date:		NYS DEC	NYS DOH	US EPA	4/19/2023		4/19/2023	4/19/2023	4/19/2023	4/19/2023	4/19/2023	4/19/2023	4/19/2023
Sample Type Code:		AWQS	MCL	MCL	N		N	N	Duplicate of EAST-D	N	N	N	N
Chemical Name	Unit												
Total Metals													
Aluminum	mg/l	-	-	-	--		6.9	1.3	1.3	0.26	0.16 J	2.8	1.1
Antimony	mg/l	0.003	0.006	0.006	--		**0.083 J**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Arsenic	mg/l	0.025	0.050	0.050	--		0.1 U	0.018	0.017	0.01 U	0.01 U	0.01 U	0.01 U
Barium	mg/l	1	2	2	--		0.2 J	0.53	0.51	0.047	0.053	0.071	0.17
Calcium	mg/l	-	-	-	--		2860 J	118	113	130	108	126	98.9
Chromium, Total	mg/l	0.05	0.10	0.1	--		**0.23**	0.081	0.08	0.0023 J	0.0028 J	0.0025 J	0.0096
Cobalt	mg/l	-	-	-	--		0.2	0.023	0.023	0.004 U	0.004 U	0.004 U	0.004 U
Copper	mg/l	0.2	-	-	--		0.041 J	0.011	0.012	0.0035 J	0.0042 J	0.0059 J	0.0051 J
Iron	mg/l	0.3>	0.3+	-	--		**1570 J**	**36.5**	**33.5**	**0.72**	**0.89**	**7.1**	**0.96**
Lead	mg/l	0.025	0.025+	0.015	--		**0.95 J**	**0.18**	**0.17**	0.005 U	0.005 U	0.006	0.005 U
Magnesium	mg/l	35+	-	-	--		1420	429	430	51.3	52.1	41.1	43.9
Manganese	mg/l	0.3>	0.3+	-	--		**18.8 J**	0.11	0.12	0.017	0.071	0.047	0.018
Nickel	mg/l	0.1	-	-	--		1	0.2	0.2	0.01 U	0.0016 J	0.01 U	0.0048 J
Potassium	mg/l	-	-	-	--		984	418 J+	415 J+	0.69	1.7	7.8	0.58
Sodium	mg/l	20	20	20	--		**2290**	**1890**	**1740**	8.4	5.6	**21.1**	5.8
Vanadium	mg/l	-	-	-	--		0.018 J	0.011	0.011	0.005 U	0.005 U	0.005 U	0.0015 J
Zinc	mg/l	2.0+	5	-	--		**30.4 J**	0.26	0.26	0.0037 J	0.016	0.13	0.0088 J
Dissolved Metals													
Aluminum	mg/l	-	-	-	0.57		5.9	0.53	0.27	0.2 U	0.2 U	0.2 U	0.2 U
Antimony	mg/l	0.003	0.006	0.006	**0.0077 J**		**0.22 J**	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U	0.02 U
Arsenic	mg/l	0.025	0.050	0.050	0.015	U	0.2 U	0.017	0.018	0.01 U	0.01 U	0.01 U	0.01 U
Barium	mg/l	1	2	2	0.19		0.19	0.43	0.36	0.046	0.053	0.065	0.17
Calcium	mg/l	-	-	-	226		2940	107	110	132	107	126	99.5
Chromium, Total	mg/l	0.05	0.10	0.1	0.0063		**0.2**	0.069	0.065	0.004 U	0.004 U	0.004 U	0.004 U
Cobalt	mg/l	-	-	-	0.0015	J	0.2	0.02	0.021	0.004 U	0.004 U	0.004 U	0.004 U

Location ID:					EAST-A		EAST-C	EAST-D	EAST-D	NCR-13S	NCR-3S	NCR-4S	NCR-5S
Sample ID:					WG-11109668-041923-BJG-EAST A		WG-11109668-041923-BJG-EAST C	WG-11109668-041923-BJG-EAST D	WG-11109668-041923-BJG-NCR-6S	WG-11109668-041923-BJG-NCR-	WG-11109668-041923-BJG-NCR-3S	WG-11109668-041923-BJG-NCR-4S	WG-11109668-041923-BJG-NCR-5S
Matrix:					WG		WG	WG	WG	WG	WG	WG	WG
SDG:					4802080661		4802080661	4802080661	4802080661	4802080661	4802080661	4802080661	4802080661
Lab Sample ID:					480-208066-8		480-208066-5	480-208066-6	480-208066-7	480-208066-2	480-208066-4	480-208066-3	480-208066-1
Sample Date:		NYS DEC	NYS DOH	US EPA	4/19/2023		4/19/2023	4/19/2023	4/19/2023	4/19/2023	4/19/2023	4/19/2023	4/19/2023
Sample Type Code:		AWQS	MCL	MCL	N		N	N	Duplicate of EAST-D	N	N	N	N
Chemical Name	Unit												
Copper	mg/l	0.2	-	-	0.04		0.2 U	0.0031 J	0.01 U	0.0017 J	0.0033 J	0.01 U	0.0024 J
Iron	mg/l	0.3>	0.3+	-	**34.8**		**1480**	**20.3**	**14.5**	0.05 U	0.05 U	0.05 U	0.05 U
Lead	mg/l	0.025	0.025+	0.015	**0.073**		**0.28**	**0.064**	**0.025**	0.005 U	0.005 U	0.005 U	0.005 U
Magnesium	mg/l	35+	-	-	153		1410	437	447	54.6	51.2	41.1	44.3
Manganese	mg/l	0.3>	0.3+	-	**0.34**		**18.7**	0.069	0.068	0.0084	0.038	0.0028 J	0.003 U
Nickel	mg/l	0.1	-	-	0.011		1	0.19	0.19	0.01 U	0.0016 J	0.01 U	0.0015 J
Potassium	mg/l	-	-	-	14.4	J+	914	427	438	0.65	1.4	7.3	0.33 J
Sodium	mg/l	20	20	20	**75.4**		**2270**	**1690**	**1740**	11.1	4.6	**20.5**	6
Vanadium	mg/l	-	-	-	0.0016	J	0.1 U	0.0088	0.0086	0.005 U	0.005 U	0.005 U	0.005 U
Zinc	mg/l	2.0+	5	-	0.17		**30.5**	0.089 J	0.032 J	0.01 U	0.012	0.019	0.01 U
Other													
Chloride (As Cl)	mg/l	250	250	-	241		**3130**	**1820**	**1690**	1.7 J	1 U	2.5 U	1.4
Sulfate (As SO4)	mg/l	250	250	250+	**272**		**2400**	19.9 J	20 J	85.9	72.8	56.2	2.9 J
Alkalinity, Bicarbonate (As CaCO3)	mg/l	-	-	-	97.6		10 UJ	10 U	10 U	437	463	412	376
Nitrogen, Ammonia (As N)	mg/l	2	-	-	2		1650	680	645	0.02 U	0.02 U	0.02 U	0.02 U
Nitrogen, Nitrate-Nitrite	mg/l	10	10	10	0.49		0.05 UJ	0.041 J	0.052	0.07	0.082	0.029 J	0.16

* = NYSDEC Ambient Water Quality Standards + = Guidance value or secondary standard
> = Sum of iron and manganese should not exceed 500 ug/L NYSDEC or 300 ug/L NYSDOH
J = estimated value. J+ = estimated biased high. - = No standard identified. U = Not detected at given value.
Boxed values exceed NYSDEC AWQS.
Bold values exceed NYSDOH maximum contaminant levels (MCL).
Shaded values exceed USEPA maximum contaminant levels.

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APPENDIX D – CLIMATE ASSESSMENT

According to the Region 2 Guidance for Incorporating Climate Change Considerations in Five Year Reviews, three climate change tools were utilized to assess the Niagara County Refuse Site. Screenshots from each of the tools assessed are included below.

The first tool utilized is called *The Climate Explorer.* According to this tool, Wheatfield, NY is projected to face an increase of extreme temperatures on the hottest days of the year by 7°F. As seen in **Figure 1**, there is a projected increase in days per year with a maximum temperature > 100° F. **Figure 2** displays an increase in potential drought conditions due to a slight increase in the "dry days" per year with no precipitation. A summary of the Top Climate Concerns from the tool can be seen in **Figure 3**. These trends are not expected to impact the remedy at this site.

The second tool utilized is called *Risk Factor (formerly Flood Factor).* According to this tool, there are 2,494 properties in North Tonawanda (Wheatfield is not shown in the tool) that have a > 26% risk of being severely affected by flooding over the next 30 years, which represents 56% of all properties in North Tonawanda. Overall, North Tonawanda has a moderate risk of flooding over the next 30 years, and the site is expected to be minimally impacted (**Figures 4-5**).

The third tool utilized is called *Sea Level Rise.* Wheatfield/North Tonawanda is not at risk of severe flooding due to sea level rise or high tide flooding and is not considered to be socially vulnerable (**Figures 6-8**).

The last tool utilized includes the U.S. Landslide Inventory. Wheatfield/North Tonawanda does not show any landslide risks (**Figures 9**).

Based on the information above, potential Site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk from the expected effects of climate change in the region and near the Site.

Figure 1

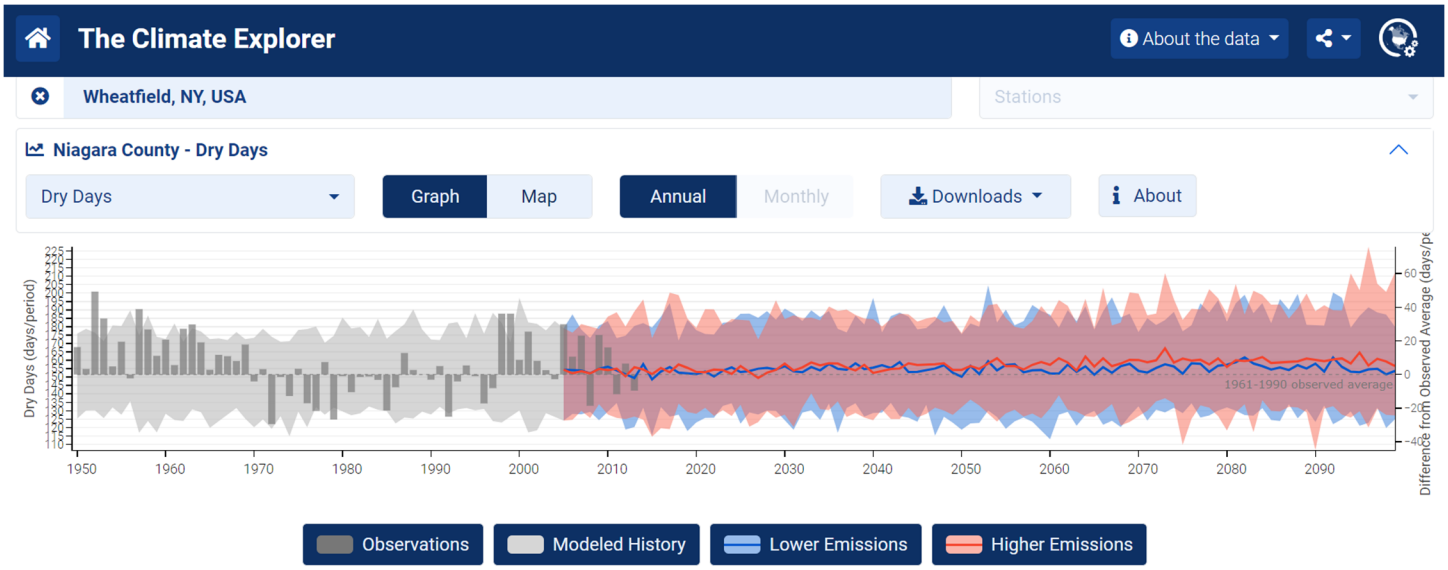

Figure 2

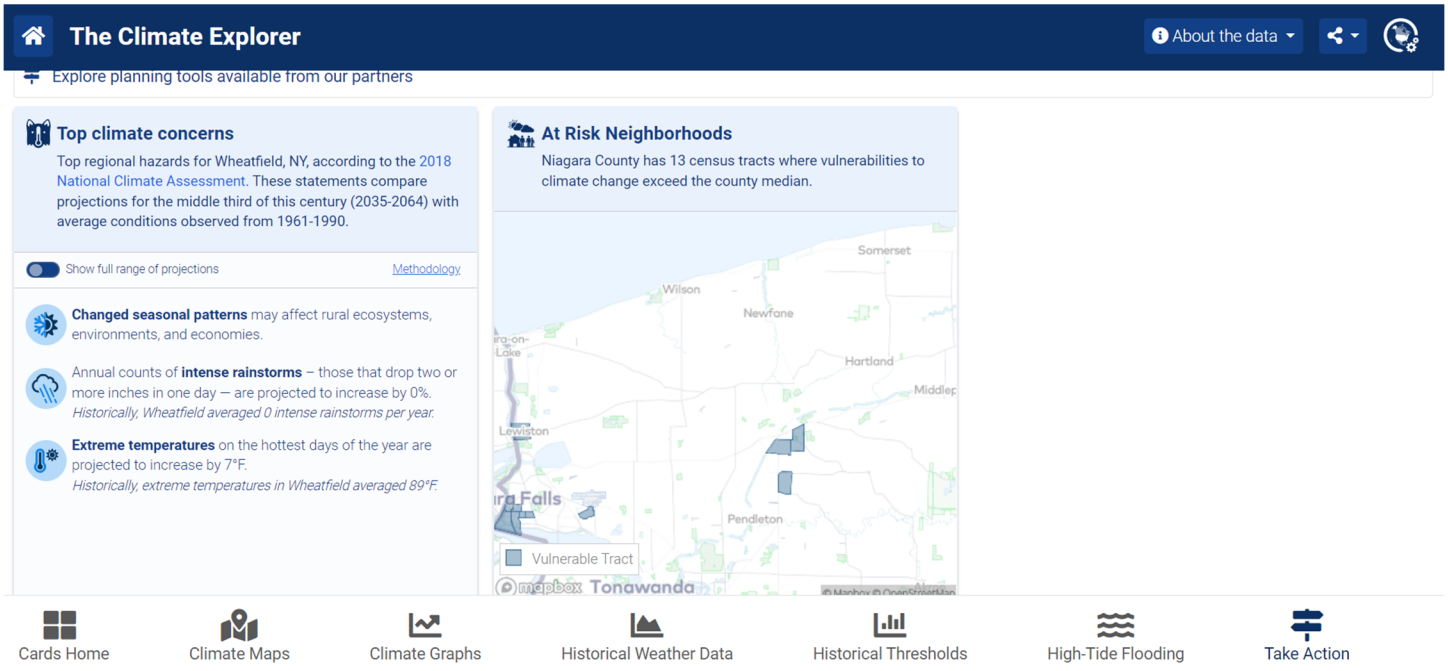

Figure 3

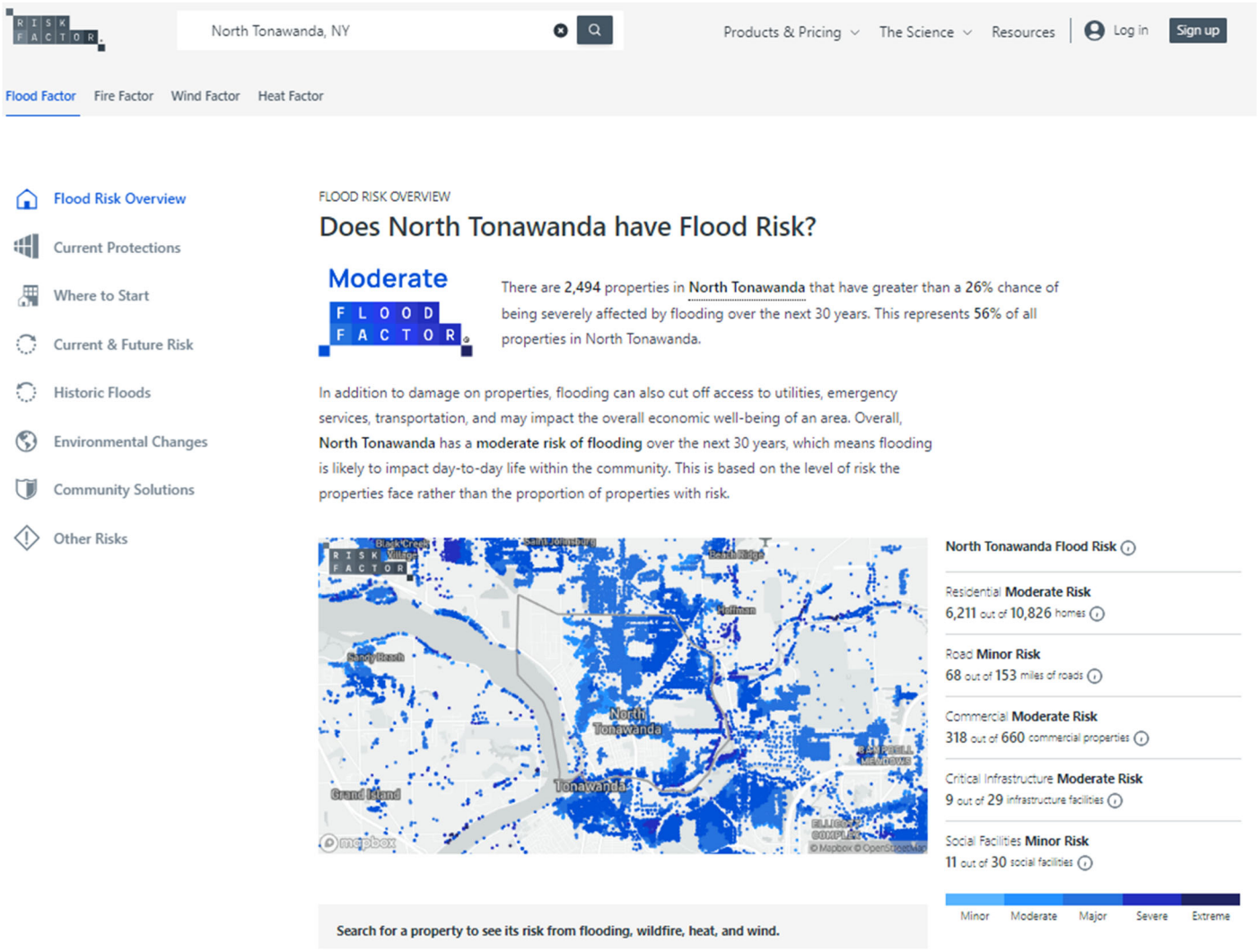

Figure 4

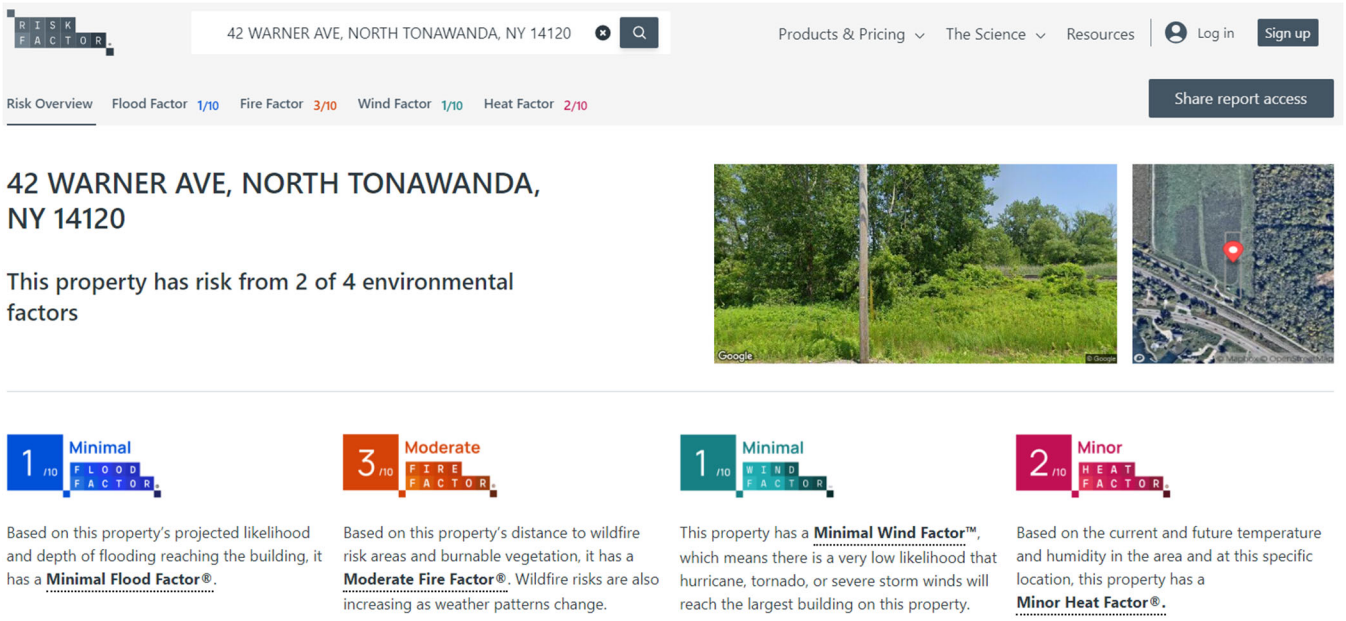

Figure 5

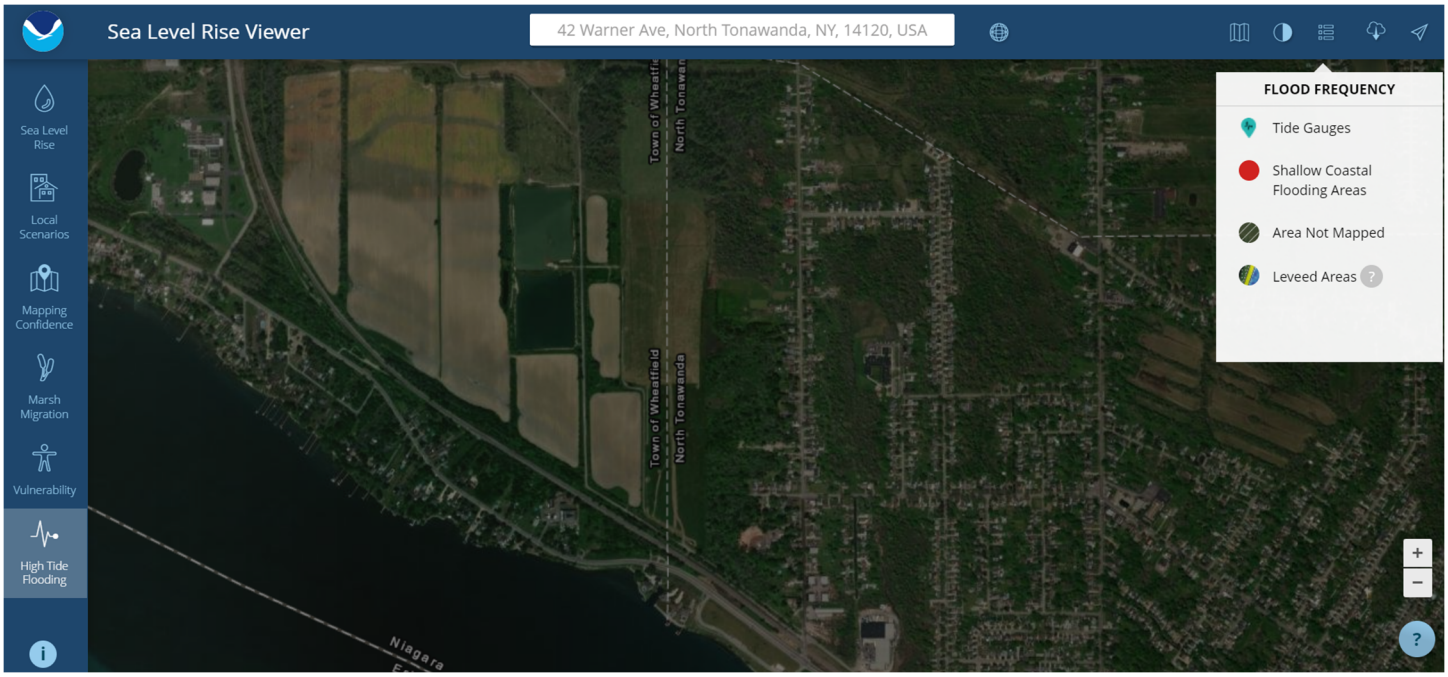

Figure 6

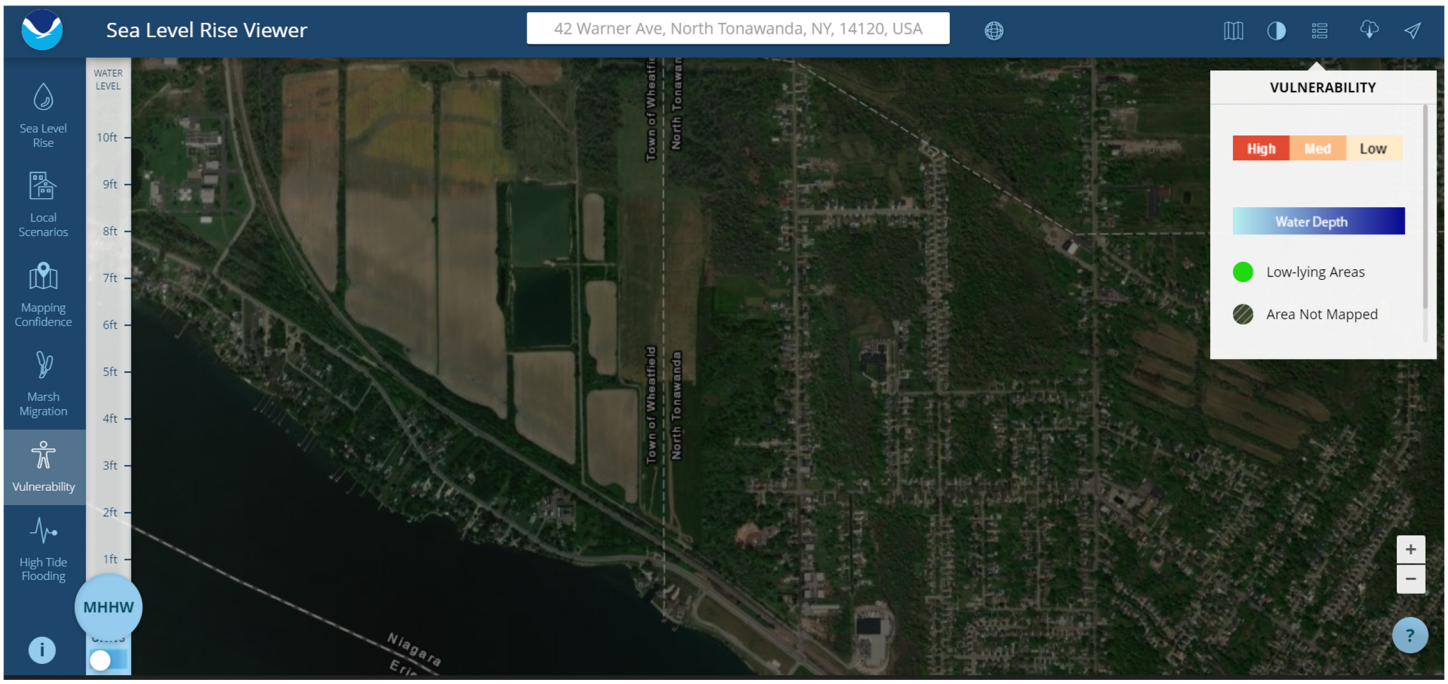

Figure 7

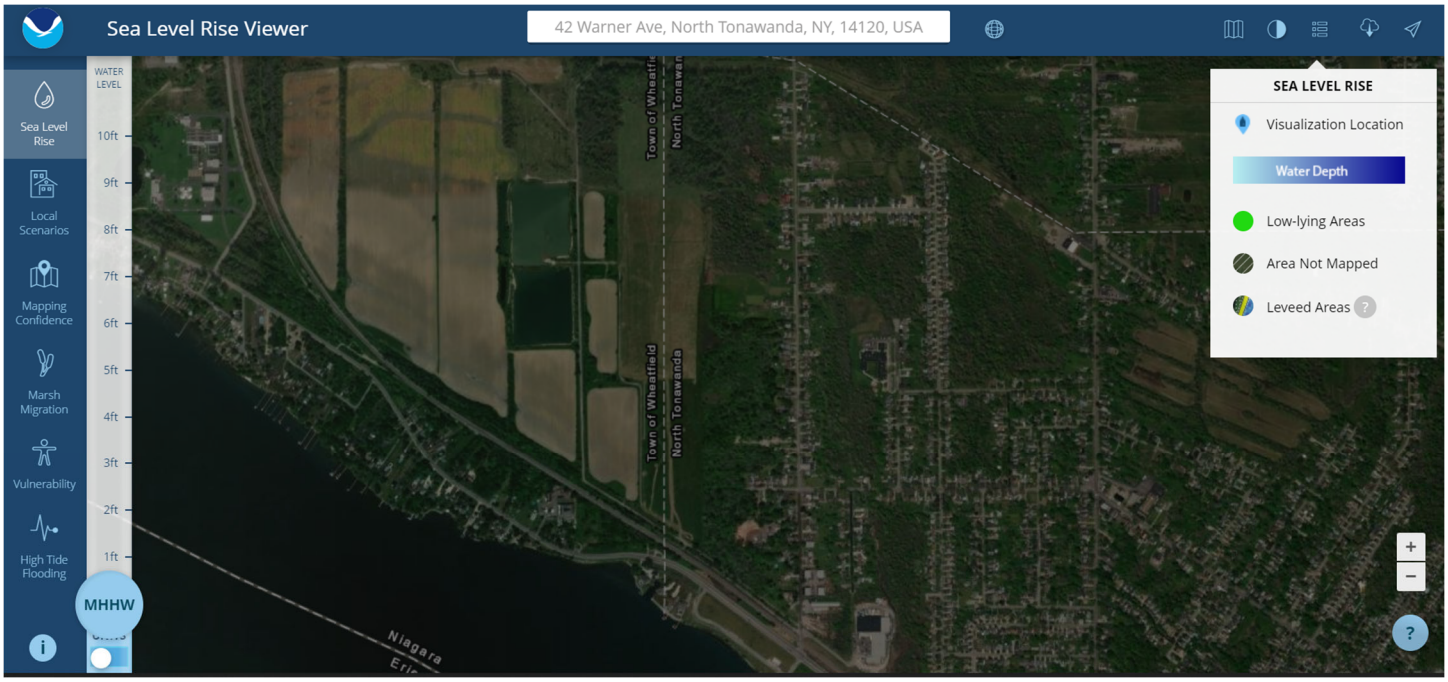

Figure 8

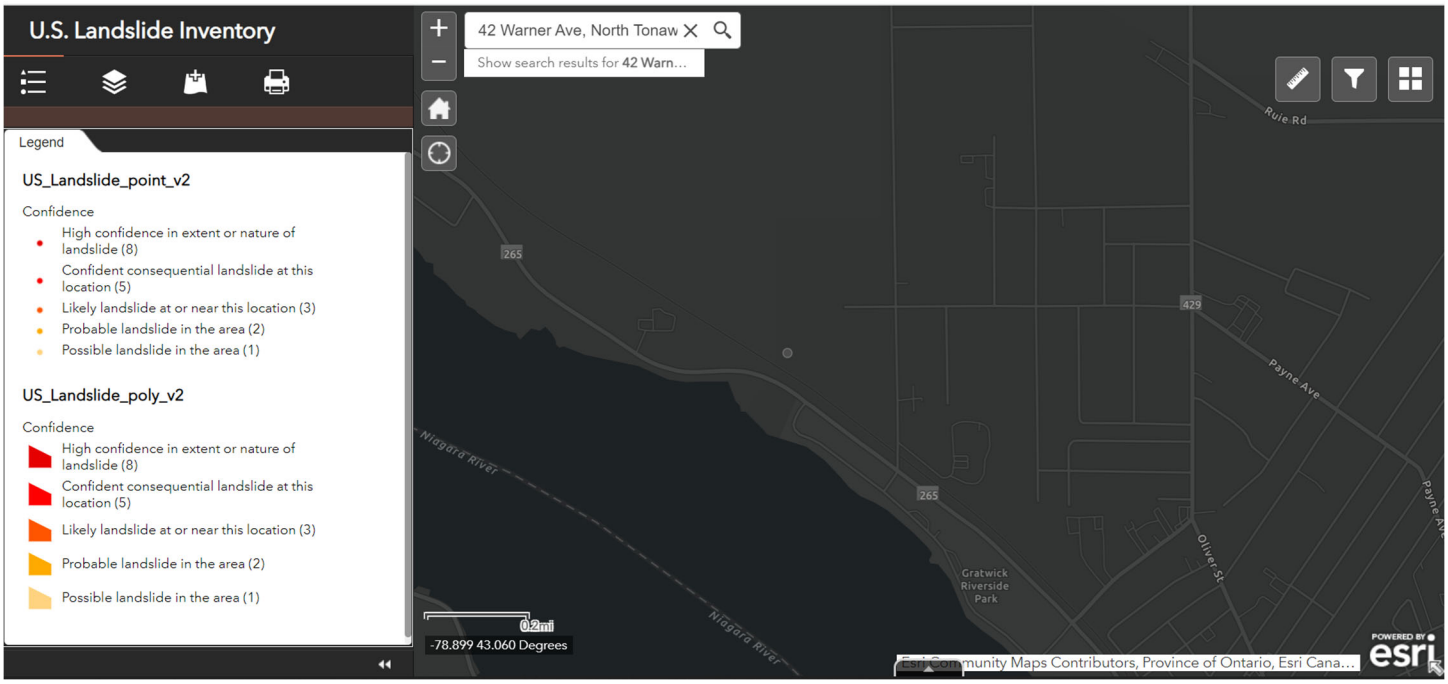

Figure 9