SIXTH FIVE-YEAR REVIEW REPORT FOR POLLUTION ABATEMENT SERVICES SUPERFUND SITE OSWEGO COUNTY, NEW YORK

Prepared by

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

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Date

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LIST OF ABBREVIATIONS & ACRONYMS

AOC	Administrative Order on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
DCA	Dichloroethane
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FFS	Focused Feasibility Study
FS	Feasibility Study
FYR	Five-Year Review
GWQS	Groundwater Quality Standard
HI	Hazard Index
HHRA	Human Health Risk Assessment
ICs	Institutional Controls
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
LCW	Leachate Collection Well
MCL	Maximum Contaminant Level
µg/L	Micrograms per Liter
mg/kg	Milligram per kilogram
NPL	National Priorities List
ng/L	Nanograms per Liter
O&M	Operation and Maintenance
OU	Operable Unit
NYSDEC	New York State Department of Environmental Conservation
PFAS	Per- and Polyfluoroalkyl Substances
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PRP	Potentially Responsible Party
PCB	Polychlorinated Biphenyl
POTW	Publicly Owned Treatment Works
RAO	Remedial Action Objective
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RG	Remediation Goal
ROD	Record of Decision
VOC	Volatile Organic Compound

I. INTRODUCTION

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

This is the sixth FYR for the Pollution Abatement Services site (Site). The triggering action for this statutory FYR is February 13, 2019, the signature date of the previous FYR report. The FYR has been conducted because hazardous substances, pollutants, or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure.

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

The Site is being addressed under four operable units (OUs). OU1 involved removal actions performed from 1973 to 1982 by EPA and the New York State Department of Environmental Conservation (NYSDEC); OU2 involves the containment of the landfill and contaminated groundwater; OU3 addresses groundwater contamination found outside of the containment system; and OU4 is associated with polychlorinated biphenyl (PCB)-contaminated sediments in White and Wine Creeks, which are located adjacent to the Site property. OU2, OU3, and OU4 are evaluated in this FYR.

The FYR was led by Patricia Simmons Pierre, the EPA Remedial Project Manager. Other EPA participants included Joel Singerman (Central New York Remediation Section Chief), Marian Olsen (Human Health Risk Assessor), Abigail DeBofsky (Ecological Risk Assessor), Rachel Griffiths (Hydrogeologist) and Michael Basile (Community Involvement Coordinator (CIC)).

Site Background

The Site property, located on 15 acres within the eastern city limits of the City of Oswego, New York, is bounded on the south by East Seneca Street and on the east, north and west by wetlands formed along the stream channels of White and Wine Creeks. Just to the north (downstream) of the Site property is the confluence of White and Wine Creeks. Wine Creek flows approximately 1,800 feet beyond the confluence (northward) to a channel and into Lake Ontario. Just east of this channel is a wetland, which is located next to a residential area known as Smith's Beach (see Appendix A, Figure 1).

A high-temperature, liquid chemical waste incineration facility operated on the property from 1970 through 1977. Because the incinerator never operated properly, thousands of drums containing various chemical wastes accumulated on-Site and tank loads of liquid waste were stored in on-Site lagoons. Throughout its operational life, the facility experienced continuous operating problems and numerous air and water quality violations, including liquid waste spills and the overflow of liquid wastes from lagoons into White Creek.

The Site property is zoned for industrial use. The area between the Site property and Lake Ontario (to the north) is mostly undeveloped and includes a wetland; a cemetery and commercial and residential areas are also located to the north.

Both White and Wine Creeks are used by a wide variety of wildlife, including avian and fish species, the latter utilizing the streams for spawning. The lower reach of Wine Creek, near Lake Ontario, is used for seasonal recreational fishing. The area groundwater is classified as Class GA (drinking water source). However, residents within the Oswego City limits receive public water and the establishment of residential water supply wells within the contaminated area and City limits is prohibited by law.

Appendix B, attached, summarizes the documents referenced to conduct this FYR. For more details related to background, physical characteristics, geology/hydrogeology, land/resource use, and history related to the Site, please refer to www.epa.gov/superfund/pas.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Pollution Abatement Services		
EPA ID: NYD000511659		
Region: 2	**State:** NY	**City/County:** Oswego/Oswego
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Patricia Simmons Pierre		
Author affiliation: EPA		
Review period: 2/14/2019 - 12/4/2023		
Date of site inspection: 8/16/2023		
Type of review: Statutory		
Review number: 6		
Triggering action date: 2/13/2019		
Due date *(five years after triggering action date)*: 2/13/2024		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Based upon the results of investigations described in the "Response Actions" section, below, benzene, vinyl chloride, and metals (*i.e.,* arsenic, manganese, and barium) were identified as the contaminants of concern (COCs) in the bedrock aquifer. The human health risk assessment (HHRA) determined that the associated increased cancer risks from the ingestion of groundwater, by adults and children, assuming the aquifer is a drinking water source, exceeded the cancer risk range established under the NCP of $1x10^{-6}$ (or 1 in a million) to $1x10^{-4}$ (one in ten thousand). The cumulative upper-bound increased cancer risk at the Site from groundwater consumption was $7x10^{-4}$ (7 in ten thousand) for children and $8x10^{-4}$ (eight in ten thousand) for adults. Arsenic was a primary contributor to the risk. The noncancer hazard indexes (HIs) for this future exposure scenario was estimated at 26 for adults and 15 for children, greater than the goal of protection of a HI = 1. The noncancer HI for adults was associated with exposures to arsenic and manganese. The HI for the child was associated with arsenic, barium and manganese.

PCBs are the COCs in the sediments in White and Wine Creeks and the adjacent wetlands. Human health and ecological risk assessments associated with exposures to the creek sediments (see "Response Actions" section, below) were conducted. The HHRA found cancer risks were within the acceptable risk range established by the NCP. However, the noncancer HI for children slightly exceeded the goal of protection of 1. In addition, the ecological risk assessment concluded that the levels of PCBs present in the sediments in the depositional areas of White Creek in the vicinity of the Site property posed an unacceptable risk to ecological receptors.

Response Actions

Beginning in 1973, a series of incidents, including liquid waste spills and the overflow of liquid wastes from lagoons into White Creek, led to the involvement of EPA and NYSDEC at the Site. Response actions taken from 1973 to 1982 by EPA, NYSDEC, and the U. S. Coast Guard included an oil spill cleanup, the removal of the incineration facilities, drummed wastes, bulk liquid wastes and contaminated soils, and the closure of two lagoons on the Site property.

From 1982 to 1984, NYSDEC performed a remedial investigation/feasibility study (RI/FS) for OU2. The analytical data generated during the RI showed extensive soil and groundwater contamination on the Site property. In addition, contaminated surface water and groundwater were found to be migrating off-property. Based on the results of the RI/FS, EPA signed a Record of Decision (ROD) for OU2 in 1984. The remedial action objectives (RAOs) for this ROD were to reduce and minimize the downgradient migration of contaminants in the groundwater and to minimize any potential human health and ecological impacts resulting from the exposure to contaminants at and downgradient from the Site property. The selected remedy included the limited excavation and off-Site disposal of contaminated materials, installation of a perimeter slurry wall, site grading and capping in accordance with Resource Conservation and Recovery Act (RCRA) requirements, installation of a leachate[1] collection and treatment system, and groundwater

[1] Leachate is water that percolates from the ground surface and comes into contact with contaminated material isolated within the containment system.

monitoring. The groundwater remediation goals selected in the OU2 ROD are listed in Table 1, below.

Table 1: OU2 Remediation Goals	
COC	**Remediation Goal[2] Micrograms/Liter (µg/L)**
Benzene	0.7
Toluene	5
Ethylbenzene	5
Xylenes (Total)	5
Chlorobenzene	5
1,1- Dichloroethane	5

From 1984 to 1986, NYSDEC implemented the remedial actions called for in the OU2 ROD, except for the treatment system. Rather than installing an on-Site treatment system, NYSDEC collected the leachate from 1986 through 1991 and transported it off-Site to a RCRA-approved treatment/disposal facility.

From 1984 to 1986, NYSDEC performed an environmental assessment of the area, which included White and Wine Creeks, and determined that no remediation of the creeks was required. The ecological risk assessment concluded that the levels of PCBs present in the sediments in the depositional areas of White Creek in the vicinity of the Site posed an unacceptable risk to ecological receptors, as represented by the green backed heron and mink that might use the creek and adjacent wetlands as foraging areas. However, while the former facility was a source of PCB contamination before the construction of the containment system, there were several potential current sources of PCB contamination located upstream of the Site. Therefore, it was determined that the Site did not pose an unacceptable risk to ecological receptors in the White Creek area.

The results from groundwater sampling of monitoring wells at the Site conducted between 1987 and 1990 indicated the presence of volatile organic compounds (VOCs) in the groundwater outside the slurry wall containment system. In 1990, an Administrative Order on Consent (AOC) was entered into between EPA and a group of potentially responsible parties (PRPs) to conduct a supplemental RI/FS (OU3) to evaluate the integrity of the existing containment system, determine the nature, extent and source of the contamination, identify any threat to human health or the environment caused by the release of hazardous substances outside the containment system, and identify and evaluate remedial alternatives.

The OU3 supplemental RI report, issued in 1993, concluded that the contamination that was detected in the bedrock groundwater outside the containment system was attributable to the downward migration of contaminants through the lodgment till beneath the containment system, particularly in an area where the lodgment till is relatively thin. The supplemental RI report also noted that the highest level of contaminants occurred in the vicinity of a leachate collection well where downward hydraulic gradients existed prior to the implementation of routine leachate removal from within the containment system. The study concluded that this action effectively reversed these downward hydraulic gradients and mitigated releases from this source.

[2] New York State Groundwater Quality Standard (GWQS).

Based upon the results of the supplemental RI/FS, EPA signed a ROD for OU3 in 1993. The RAOs for this ROD were to prevent potential future exposures to contaminated groundwater on the Site property, as well as in the area between the Site property and Smith's Beach, restore groundwater quality to levels consistent with federal and state groundwater quality and drinking water standards and mitigate the off-property migration of contaminated groundwater. The OU3 remedy incorporated all of the existing components of the OU2 ROD, as well as several additional items including enhancing the source control system by optimizing the leachate extraction rate and other operating parameters in order to achieve, to the degree practicable, inward horizontal gradients in the overburden and upward vertical gradients from the bedrock toward the containment system; bedrock groundwater extraction and treatment; connecting downgradient residents in the Smith's Beach area who were using residential wells to the public water supply to ensure that potential future exposure to contaminants in the bedrock groundwater does not occur; and institutional controls (ICs) related to groundwater usage through deed restrictions at and downgradient from the Site property, up to and including the Smith's Beach area.

In addition, the OU3 ROD identified discharge of the extracted leachate and contaminated groundwater to the City of Oswego's Eastside Wastewater Treatment Plant as the preferred treatment and disposal option, with the construction of an on-Site treatment system with discharge to White or Wine Creek or to groundwater as a contingent option, should the preferred treatment and disposal option be determined not to be feasible. The OU3 ROD also noted that the interim method of handling the extracted leachate and groundwater via transport to an off-Site RCRA-approved treatment/disposal facility would continue until the selection and implementation of a final treatment option.

Several investigations related to the enhancement of the source control system were also called for in the OU3 ROD. Furthermore, because there was some uncertainty related to the source of the PCB contamination detected in the sediments in the adjacent wetlands and White and Wine Creeks and the source of pesticides detected in the surface water of Wine Creek, the OU3 ROD called for a study to determine the sources of this contamination.

In 1994, an AOC was entered into by EPA and the group of PRPs to conduct a supplemental pre-remedial design study related to the investigations called for in the OU3 ROD. EPA and the group of PRPs entered into an additional AOC in 1994 to extend the routine leachate removal and off-Site disposal, and, among other things, to connect residents in the Smith's Beach area (who were using residential wells) to the public water supply as an added measure of protection. These residential connections to the public water supply were completed in 1995.

In 1996, an Explanation of Significant Differences (ESD) was issued. The ESD explained the results of the additional investigations called for in the 1993 ROD and modified the contingent remedy for the treatment of the leachate to provide for continued transport of the leachate to an off-Site RCRA approved treatment and disposal facility. The ESD also required that a focused feasibility study (FFS) be conducted to evaluate remedial alternatives for the PCB-impacted sediments in the creeks and wetlands adjacent to the Site property.

Based upon data collected between 1991 and 1996 that suggested that PCB sediment concentrations were decreasing (presumably due to the deposition of clean sediment and/or the downstream migration and subsequent dilution of contaminated sediment) and the evaluation of remedial alternatives in the FFS, a ROD for OU4 was signed in 1997. The RAO for the OU4 ROD was to minimize exposure of fish and wildlife to PCB-contaminated sediment in White Creek and

adjacent wetlands. The OU4 ROD does not specify remediation goals for PCBs in sediment or biota (fish), however, Site PCB data is compared to a value of 1 milligram per kilogram (mg/kg), which is consistently evaluated and often applied when remediating PCB-contaminated sediments in New York State. The OU4 remedy included no further action with long-term PCB monitoring to ensure that contaminant concentrations in the sediment and biota continue to be reduced over time and that further contamination of the area from upstream sources is not occurring.

Status of Implementation

Construction of the perimeter slurry wall containment system and leachate collection system called for in the OU2 ROD was completed by NYSDEC's contractor in 1986. The slurry wall containment system includes a bentonite-clay slurry wall keyed into the underlying lodgment till; a cap, consisting of a synthetic liner, clay and vegetated soils; and a leachate collection system. The leachate collection system consists of collection drains (gravel-filled trenches), four collection wells, a network of polyvinyl chloride force mains (pressurized sewer lines), submersible pumps and controls, and a leachate collection tank.

Consent decrees to carry out the remedy called for in the OU3 ROD as modified by the 1996 ESD and the long-term monitoring called for in the OU4 ROD, were entered by the Court in 1998 and 1999, respectively.

From 1986 until 2010, leachate extracted from the containment system was transported off-Site to a RCRA-approved treatment/disposal facility. In 2010, EPA issued a second ESD for the Site, noting that discharge of leachate to a publicly owned treatment works (POTW) facility was now viable due to decreases in contaminant concentrations and modifying the remedy to allow for the direct discharge of leachate from the Site to the public sewer system, which flows directly to the City of Oswego Eastside Wastewater Treatment Plant. The transport of the leachate off-Site to a RCRA-approved treatment/disposal facility was retained in the ESD as a contingency.

Institutional Controls Summary

Implemented ICs at the Site are summarized in Table 2, below.

Table 2: Summary of Planned and/or Implemented Institutional Controls

Media, engineered controls, & 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 property development	Yes	Yes	OU3	Prevent the utilization of the groundwater underlying the Site proper, prevent the development of the Site for residential use, and allow access for maintenance and monitoring activities.	Easement was recorded by the Oswego County Clerk on April 7, 1987.
Groundwater	Yes	Yes	OU3	Prohibit installation of residential wells.	All residential properties in the vicinity of the Site are within the Oswego City limits where the installation of wells is prohibited pursuant to Section 602.3 of the New York State Plumbing Code.
Groundwater	Yes	Yes	OU3	Prevent nonresidential (two industrial properties downgradient of the property Site) exposure to contaminated groundwater.	Environmental Protection Easement and Declaration of Restrictive Covenants were recorded by the County Clerk on August 6, 2004 and March 1, 2006.

System Operations, Monitoring, Maintenance and Climate Change

Annual inspections are conducted at the Site to determine whether any intrusive activities have occurred. In addition, building and property records are reviewed to ascertain whether any filings have been made for such activities. New York State requires annual certification that ICs required by RODs are in place, and that remedy-related Operation and Maintenance (O&M) is being performed. This certification is included as an attachment to the annual O&M progress reports.

System Operations

Leachate is extracted from within the containment system monthly and discharged (under a permit) directly to the public sewer line which flows to the City of Oswego Eastside Wastewater Treatment Facility. The extracted leachate is sampled for POTW permit compliance monitoring during each monthly event prior to being discharged to the sewer line.

As of the June 2023 leachate pumping event, 5,835,019 gallons of leachate have been extracted from the containment system.

While vertical hydraulic gradients within the containment system vary, there is generally an upward gradient between the bedrock and overburden aquifers at the downgradient edge. This indicates that although groundwater sometimes migrates downward from the overburden aquifer to the bedrock aquifer in the center of the containment system, any contaminant migration is negated by the general upward gradient at the downgradient edge. There is an outward gradient at some of the well pairs around the perimeter of the containment system, however, the groundwater levels remain below the top of the slurry wall. Based upon these observations, it has been determined that the groundwater within the containment system is effectively isolated from the surrounding area.

Monitoring

The long-term monitoring program, which commenced in 1989, includes routine monitoring of the groundwater and sediment in the vicinity of the Site property.

Long-term monitoring associated with OU2 and OU3 includes semiannual (in May and November) sampling of three groundwater wells located on and downgradient of the Site property, semiannual sampling of the four leachate collection wells located within the containment system, and sampling of two bedrock monitoring wells every five years. Samples are analyzed for benzene, chlorobenzene, 1,1-dichloroethane (DCA), ethylbenzene, toluene and xylene.[3] In addition, quarterly groundwater elevation measurements are collected at selected locations within and around the containment system to ensure that horizontal gradients in the overburden aquifer remain inward and vertical gradients remain upward (from the bedrock toward the containment system). During this review period, groundwater and leachate quality sampling and groundwater level measurement activities were continued.

A long-term monitoring plan was developed in 1999 for OU4 to ensure that PCB concentrations in the creeks continue to be reduced over time, and that further contamination of the area from upstream sources is not occurring. The monitoring program included annual collection of surficial (0 to 3 inches), subsurface (3 to 6 inches and 6 to 12 inches) and suspended (trap) sediment and biota samples at five locations within White and Wine Creeks. Sampling results from the first three years of monitoring indicated that PCBs were not detected in the sediments at depth. Therefore, in 2001, EPA approved a change in the monitoring plan, requiring sampling of only the top 3 inches of sediment, as this is the zone most susceptible to change. Surficial and suspended sediment and biota sampling was conducted annually until 2008, when the sampling frequency was reduced to biennial events due to declining PCB levels. In 2014, because PCB concentrations were below 1 mg/kg at most of the sampling locations, sediment monitoring was further reduced to the collection of surficial sediment sampling at one location (SS-301) and sediment trap sampling at one location (ST-401). In 2020, because monitoring data indicated that sediment PCB concentrations had declined to levels below 1 mg/kg at the two remaining sampling locations, surficial sediment sampling at location SS-301 and sediment trap sampling at location ST-401, was discontinued.

[3] Although arsenic, barium, and manganese were identified as COCs in the risk assessment, the concentrations of these metals detected in the Site monitoring wells were less than regional background concentrations, and therefore, determined not to be Site-related.

Maintenance

Routine maintenance at the Site includes maintaining the leachate collection system, perimeter fence and access road and mowing the vegetated cap.

Leachate from the containment system collects by gravity into two trenches. Once a month, leachate collection wells, equipped with submersible pumps, are used to pump the accumulated leachate into pressurized pipes that discharge into a concrete leachate collection tank. The maximum capacity of the leachate collection tank is 44,000 gallons; however, the operating capacity of the tank is limited to approximately 20,000 gallons. The leachate is then pumped from the leachate collection tank and discharged on the same day to the City of Oswego sewer line via a force main. The City of Oswego is contacted on the day prior to pumping to ensure that the sewer system and treatment plant are ready to receive the leachate.

Climate Change

Potential impacts from climate change have been assessed at the Site using various tools–Climate Explorer, Flood Factor, and Sea Level Rise.

Over the next several decades, there is a projected increase in the number of days per year with maximum temperatures greater than 100°F in Oswego County. There is, however, little change in potential drought conditions in the coming years. There are 585 properties in Oswego that have greater than a 26% chance of being severely affected by flooding over the next 30 years. The area near the Site has a risk of flooding as a result of its proximity to Lake Ontario. Nevertheless, flooding in the area during a major rain event would not impact the containment system because leachate is not stored in the collection tank. It is pumped from the tank and discharged on the same day to the sewer line. Also, because the operation is completely manual, monthly discharge of leachate from the Site to the sewer system can be delayed, if necessary, to prevent any impacts from the Site to off-Site areas (*i.e.,* sewer overflows). In addition, transport of the leachate off-Site to a RCRA-approved treatment and disposal facility is retained as a contingency in the event that the POTW is unable to accept leachate from the Site. Therefore, 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. Appendix C, attached, includes an assessment of climate change at the Site utilizing the above-noted tools.

III. PROGRESS SINCE THE LAST REVIEW

Table 3, below, summarizes the protectiveness determinations and statements from the 2019 FYR.

Table 3: Protectiveness Determinations/Statements from the 2019 FYR

OU #	Protectiveness Determination	Protectiveness Statement
02	Protective	The implemented containment remedy for OU2 is protective of human health and the environment.
03	Protective	The implemented remedy for OU3 is protective of human health and the environment.
04	Protective	The long-term monitoring remedy for OU4 is protective of human health and the environment.

Sitewide	Protective	The Site-wide remedial actions protect human health and the environment.

While there were no recommendations made in the 2019 FYR, an Other Finding was identified. Significant damage to a section of the chain-link perimeter fence, caused by a fallen tree, was observed during the FYR site inspection performed in November 2018. However, in December of that year, the fallen tree was removed and the damaged section of the fence was repaired.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement and 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 Pollution Abatement Services Site. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews.

In addition to this notification, the CIC posted a public notice on the EPA site webpage https://www.epa.gov/superfund/pas and provided the notice to the City of Oswego by email on November 6, 2023 with a request that it be posted in municipal offices and on the City's webpages. This notice indicated that a FYR would be conducted at the site to ensure that the cleanup at the site continues to be protective of people's health and the environment. Once the FYR is completed, the results will be made available at the following repositories: U.S. Environmental Protection Agency Superfund Records Center, 290 Broadway – 18th Floor, New York, NY 10007, 212-637-4308, Oswego City Hall, 13 West Oneida St., 1st Floor, Oswego, NY 13126, (315) 342-8116. In addition, the final report will be posted at https://www.epa.gov/superfund/pas. Efforts will be made to reach out to local public officials to inform them of the results.

Data Review

Groundwater Quality Monitoring

During this review period, groundwater samples were collected from a network of five long-term bedrock monitoring wells (see Appendix A, Figure 2, for the locations). Monitoring wells M-21, LR-8, and LR-6 have been sampled as part of the long-term monitoring program since 1998 and continue to be sampled semiannually (in May and November). Downgradient monitoring wells OD-3 and M-22 were added to the monitoring network in May 2006 and are sampled at a minimum frequency of once every five years. The groundwater samples are analyzed for benzene, chlorobenzene, 1,1-DCA, ethylbenzene, toluene, and xylene.

Monitoring well M-21 (39 feet deep and situated approximately 250 feet downgradient from the containment system and immediately downgradient of the northern property line) is the furthest downgradient monitoring well in the network. During this review period, the overall concentrations of chlorobenzene in this well remained stable and consistent with the previous review period. Chlorobenzene was the only COC that exceeded its remediation goal (RG) of 5 micrograms per liter (µg/L), ranging from 0.83 µg/L (November 2018) to 6.16 µg/L (May 2021). Benzene was detected infrequently, with the highest reported concentration being 0.23 µg/L, well

below its RG of 0.7 µg/L. Concentrations of 1,1-DCA, ethylbenzene, toluene, and were not detected above their respective RGs (see Appendix A, Figure 3).
Chlorobenzene concentrations in monitoring well LR-8 (39.7 feet deep and located approximately 125 feet downgradient and to the north of the Site property) fluctuated during the review period between "not detected" (November 2019 and May 2022) and a high of 17.1 µg/L (November 2021). The concentrations of other COCs in monitoring well LR-8 during this review period were comparable to the last review period. Benzene was the only other VOC detected above its RG of 0.7 µg/L, ranging from "not detected" (November 2019 and May 2022) to a high of 2.49 µg/L (November 2018) and showing an overall decreasing trend throughout the review period. Concentrations of 1,1-DCA, ethylbenzene, toluene, and xylene were not detected above their respective RGs (see Appendix A, Figure 4).

Monitoring well LR-6 (57 feet deep and located immediately downgradient of the slurry wall to the northwest) was sampled in November 2021 and May 2022.[4] Consistent with previous sampling events, benzene, chlorobenzene, ethylbenzene, toluene, and xylene were not detected during the review period. 1,1-DCA is the only COC that has been detected in this location above its RG (5 µg/L) since long-term monitoring began at the Site. The detected concentrations of 1,1-DCA have remained below the RG and have exhibited an overall decreasing trend since May 2000. The maximum reported concentration of 1,1-DCA during this review period was 0.85 µg/L (November 2021).

Monitoring well OD-3 (42 feet deep and located approximately 150 feet downgradient of the slurry wall to the north) was sampled four times during the review period. Concentrations of 1,1-DCA, ethylbenzene, toluene, and xylene were not detected above their respective RGs during this review period. Benzene and chlorobenzene exceeded their respective RGs, with respective maximum concentrations of 1.27 µg/L and 16.3 µg/L in November 2018. These concentrations are comparable to data collected during the previous review period. Overall VOC concentrations at monitoring well OD-3 are variable and often not detected.

Monitoring well M-22 (49.7 feet deep and located immediately downgradient of the slurry wall to the north) was sampled twice during the review period, in April 2018 and May 2022.[5] Consistent with the previous review period, no COCs were detected at concentrations exceeding their RGs.

Appendix A Figures 3 and 4 provide long-term groundwater concentration graphs for monitoring wells M-21 and LR-8, respectively.

A review of the long-term leachate quality data shows variability in total VOC concentrations in the leachate since remedy implementation. Total VOC concentrations in leachate collection well LCW-2 ranged from approximately 200 µg/L to approximately 1,000 µg/L during this review period, while total VOCs in leachate collection well LCW-4 fluctuated between a low of

[4] Because concentrations in monitoring well LR-6 had been at or below RGs for all COCs since 2000, in 2016, its sampling frequency was reduced from semiannual to once every five years (in the year prior to the upcoming FYR).

[5] Because COC concentrations in monitoring well MW-22 have been below GWQS since the long-term monitoring program began, in 2016, its sampling frequency was reduced from semiannual to once every five years (in the year prior to the upcoming FYR).

approximately 500 µg/L to a high of approximately 3,800 µg/L. The VOC concentrations observed in the leachate during the review period are consistent with previous review periods.

In November 2019, emerging contaminant sampling was performed at the Site. Groundwater samples were collected and analyzed for per- and polyfluoroalkyl substances (PFAS) and 1,4-dioxane. NYSDEC has established Maximum Contaminant Levels (MCLs) of 10 nanograms per liter (ng/L) for PFAS chemicals perfluorooctanoic acid (PFOA) and perfluorooctanesulfonic acid (PFOS), and 1 µg/L for 1,4-dioxane. Samples were collected from monitoring wells LR-2 (immediately upgradient of the Site property boundary), SWW-5 (on-property, within the containment system), and M-21 (immediately downgradient of the Site property boundary). PFOA, PFOS, and 1,4-dioxane were not detected in upgradient monitoring well LR-2. Within the containment system in monitoring well SWW-5, PFOS was detected below its MCL at 6.9 ng/L and 1,4-dioxane was reported above its MCL at 1,000 µg/L. In downgradient monitoring well MW-21, PFOA was at 19 ng/L and 1,4-dioxane was detected at 630 µg/L; both detections exceed their respective MCL. Because monitoring well MW-21 is located on a neighboring industrial property that manufactures machine parts, additional information is needed to determine if the downgradient 1,4-dioxane detection is Site-related.

Groundwater Hydrology Monitoring

Horizontal water level gradients across the slurry wall were measured at six monitoring well pairs during the review period. Monitoring well pair SWW-1/SWW-2 is located on the upgradient (south) side of the containment system. This well pair always shows inward water level gradients, with a head difference of about seven feet. Monitoring well pair SWW-3/SWW-4 is on the northeastern side of the capped area. Gradients in this well pair are often directed outward and water levels are always below the top of the slurry wall. Monitoring well pair SWW-5/SWW-6 is located at the north corner of the containment system. The gradient direction in this well pair is rarely outward and water levels are always below the top of the wall. Monitoring well pair SWW7/SWW8 is located on the southwest side of the containment system. Water level gradients are usually directed inward. Monitoring well pair SWW-9/SWW-10 is on the west side of the capped area. Gradients at this well pair are typically inward and water levels are always below the top of the slurry wall. Monitoring well pair SWW-11/SWW-12 is at the northwest corner of the capped area. Gradients at this well pair are most often outward, and water levels are always below the top of the wall. The gradient magnitudes at all the well pairs vary, with larger gradients occurring during seasons with low regional water levels. Based upon these observations, it has been determined that the groundwater within the containment system is effectively isolated from the surrounding area.

Groundwater Monitoring Summary

Groundwater data collected from the bedrock aquifer downgradient of the containment system during this review period show no detections for most of the COCs. For those COCs that were detected, the concentrations were stable or decreasing. Emerging contaminant sampling results indicate that PFOS is present in the groundwater within the containment system (in monitoring well SWW-5) at concentrations below its MCL; PFOA is present downgradient of the Site property boundary (in monitoring well MW-21) at concentrations exceeding its MCL, but was not detected within the containment system or upgradient of the Site property; and 1,4-dioxane is present at concentrations exceeding its MCL, both within containment system (in monitoring well SWW-5) and downgradient of the Site property boundary (in monitoring well MW-21). Based upon these

results, it has been determined that monitoring for 1,4-dioxane monitoring should continue at the Site.

Sediment and Biota Monitoring

Because monitoring data indicated that sediment concentrations had declined to levels below 1 mg/kg, sediment sampling was discontinued as of the May 2020 event (see Appendix A, Figure 5, for PCB sediment concentration trends). The results from the final round of sediment sampling (conducted in 2018) showed PCBs at 0.56 mg/kg at Location 3 and 0.86 mg/kg at Location 4 (see Appendix A, Figure 6 for PCB fish tissue concentration trends).

Currently, PCB monitoring at the Site consists of biota sampling once every two years at Locations 1-5 (see Appendix A, Figure 1). During this review period, biota samples were collected in 2018, 2020 and 2022. The arithmetic mean PCB concentration in fish tissue was 0.61, 0.54 and 0.90 mg/kg in 2018, 2020 and 2022, respectively.

Site Inspection

A Site inspection was conducted on August 16, 2023. In attendance were Ms. Pierre and on behalf of the PRPs, Clay McClarnon of de maximis, inc., David Rigg of ARCADIS, and Martin Koennecke and Ron Bendersk of US Water Industrial Group. The purpose of the inspection was to assess the protectiveness of the remedy.

Messrs. McClarnon and Rigg were interviewed in relation to this FYR. Both indicated that the remedies are functioning as anticipated in the RODs. No issues impacting the current or future protectiveness of the remedy were identified during the site visit.

V. TECHNICAL ASSESSMENT

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

The primary objectives of the OU2 and OU3 RODs, as modified by the 1996 and 2010 ESDs, were to control the source of contamination at the Site, reduce and minimize the downgradient migration of contaminants in the groundwater, restore groundwater quality to levels consistent with federal and state groundwater quality and drinking water standards, and minimize any potential human health and ecological impacts resulting from the exposure to contaminants at and downgradient from the Site property. This was accomplished through the limited excavation and off-Site disposal of contaminated materials, installation of a perimeter slurry wall, capping, installation of a leachate collection system, treatment of the leachate at a POTW, groundwater and sediment monitoring, connecting downgradient residents in the Smith's Beach area who were using residential wells to the public water supply, and the implementation of ICs related to property use restrictions and groundwater usage at and downgradient from the Site property, up to and including the Smith's Beach area. Groundwater data collected downgradient of the containment wall indicate a decreasing trend in contaminant concentrations. Water levels at locations adjacent to the slurry indicate generally inward hydraulic flow. Overall, PCB concentrations in sediment and fish tissue are much lower than those detected during earlier investigations and have declined to levels below

1 mg/kg.[6] In addition, the observed PCB concentrations in fish tissue represent low ecological risk to potential receptors, such as mink and green heron, based upon current food chain modeling calculations.

Detections of 1,4-dioxane were reported within the containment system in monitoring well SWW-5 (1,000 µg/L) and immediately downgradient of the Site property boundary in monitoring well MW-21 (630 µg/L) in exceedance of the MCL of 1 µg/L. The downgradient detection is on a neighboring industrial property that manufactures machine parts. Additional information is needed to determine if the 1,4-dioxane is site-related and whether the downgradient detection is Site-related.

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 exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the selection of the remedies remain valid. The EPA default exposure assumptions used at Superfund sites (OSWER Directive 9200.1-120, February 6, 2014) has not been updated since the last FYR. There have been no changes in the exposure assumptions since the last FYR and the conclusions in the HHRAs and the protectiveness of the remedy have not changed. The groundwater containment system, RCRA cap, fence and ICs identified above continue to remain as barriers to direct exposure to Site contaminants.

The property is zoned industrial and there have been no changes in the physical conditions of the Site that would affect the protectiveness of the remedy since the last FYR. Soil and groundwater use at the Site is not expected to change during the next five years. The land use considerations and potential exposure pathways considered in the HHRAs remain valid and the ecological exposure scenarios remain the same.

Because there are no residential/commercial buildings on the Site property and none are expected in the future and because there are no residential/commercial buildings located within 100 feet of monitoring well M-21 (located immediately downgradient of the property line), vapor intrusion is not considered a completed pathway at the present time. In the unlikely event of future on-property construction, further evaluation of this pathway may be necessary. This further evaluation may include Site-specific considerations, such as the type of building, the location of the building relative to the maximum detected concentrations and the subsurface characteristics at the Site.

Since the last FYR, there have been no changes to the toxicity of the Site-related chemicals that would affect the protectiveness of the remedy.

The groundwater risks identified in the OU2 ROD focused on potential future use of the aquifer as a potable or drinking water source by residents and workers. Residents in the area currently receive public water. At the current time, exposure through consumption of groundwater at the Site and the downgradient properties is not a completed exposure pathway. As explained in Question A above, an Environmental Protection Easement and Declaration of Restrictive Covenants prevent potential exposures to groundwater as a drinking water supply.

[6] The OU4 ROD does not specify an RG for PCBs in the sediments in the creeks and associated wetlands. Site data is compared to a risk-based value of 1 mg/kg.

The groundwater applicable or relevant and appropriate requirements (ARARs) established in the OU2 ROD were the GWQSs (NYCRR, Title 6, Parts 701-703-see Table 2). These ARARS remain protective for the potential consumption of groundwater.
The remedy selected in the OU2 ROD did not establish specific ARARs for the soils at the Site. However, the cap was designed and constructed in accordance with RCRA requirements, it prevents direct contact with contaminated material, and it reduces the risk to human health and the environment due to contaminants leaching from the waste material.

The RAO established in the OU4 ROD is to "minimize exposure of fish and wildlife to PCB-contaminated sediments in White Creek and adjacent wetlands." PCB data for sediments collected at the Site is compared to a risk-based value of 1 mg/kg. Because monitoring data indicated that sediment concentrations had remained below 1 mg/kg for several years, sediment sampling at the Site was discontinued as of the 2020 sampling event.

Biota-Sediment Accumulation Factors have been updated since the OU4 ROD was issued. However, Site-specific fish tissue and sediment data are used to assess the risk to the ecological receptors (green heron and mink). Current food chain modeling indicates no unacceptable risk from the Site to these receptors. The 1 mg/kg risk-based value remains protective of human exposures from direct contact with the sediments (ingestion and dermal contact under residential exposures) and ecological receptors at the Site.

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

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

VI. ISSUES/RECOMMENDATIONS

Table 4, below, presents a recommendation and follow-up action for this FYR.

Table 4: Issues and Recommendations

Issues/Recommendations	
OU(s) without Issues/Recommendations Identified in the Five-Year Review:	
OU4	
Issues and Recommendations Identified in the Five-Year Review:	
OU(s): OU2 and OU3	**Issue Category: Monitoring**
	Issue: In 2019, emerging contaminant sampling was conducted at the Site. 1,4-dioxane was detected within the containment system and immediately downgradient of the Site property boundary at concentrations exceeding its MCL of 1 µg/L.
	Recommendation: 1,4-dioxane should be added to the list of analytes for the semiannual groundwater quality and monthly leachate POTW permit

	compliance monitoring events for the next FYR period to determine the extent of this contaminant at the Site and whether the downgradient detection is Site-related.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	5/31/2024

OTHER FINDINGS

The RAO established in the OU4 ROD is to "minimize exposure of fish and wildlife to PCB-contaminated sediments in White Creek and adjacent wetlands." The selected remedy calls for long-term monitoring to ensure that contaminant concentrations in the sediments and biota continue to be reduced over time. OU4 sampling data collected during this review period indicate that PCB concentrations in biota have declined to levels below the risk-based value of 1 mg/kg. If PCB concentrations remain below 1 mg/kg, then discontinuation of biota sampling at the Site should be considered.

VII. PROTECTIVENESS STATEMENTS

Table 5, below, presents the operable unit and Sitewide proactiveness statements.

Table 5: Protectiveness Statements

Operable Unit Protectiveness Statement	
Operable Unit: 02	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The implemented containment remedy for OU2 is protective of human health and the environment in the short term. In order to be protective in the long term, additional sampling for 1,4-dioxane is needed to determine the extent of this contaminant and whether the downgradient detection is Site-related.	
Operable Unit: 03	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The implemented remedy for OU3 is protective of human health and the environment in the short term. To be protective in the long term, additional sampling for 1,4-dioxane is needed to determine the extent of this contaminant and whether the downgradient detection is Site-related.	
Operable Unit: 04	*Protectiveness Determination:* Protective
Protectiveness Statement: The long-term monitoring remedy for OU4 is protective of human health and the environment.	
Sitewide Protectiveness Statement	
Protectiveness Determination: Short-term Protective	

Protectiveness Statement: The Sitewide remedial actions protect human health and the environment in the short term. To be protective in the long term, additional sampling for 1,4-dioxane is needed to determine the extent of this contaminant and whether the downgradient detection is Site-related.

VIII. NEXT REVIEW

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

APPENDIX A—FIGURES

Figure 1: Site Plan

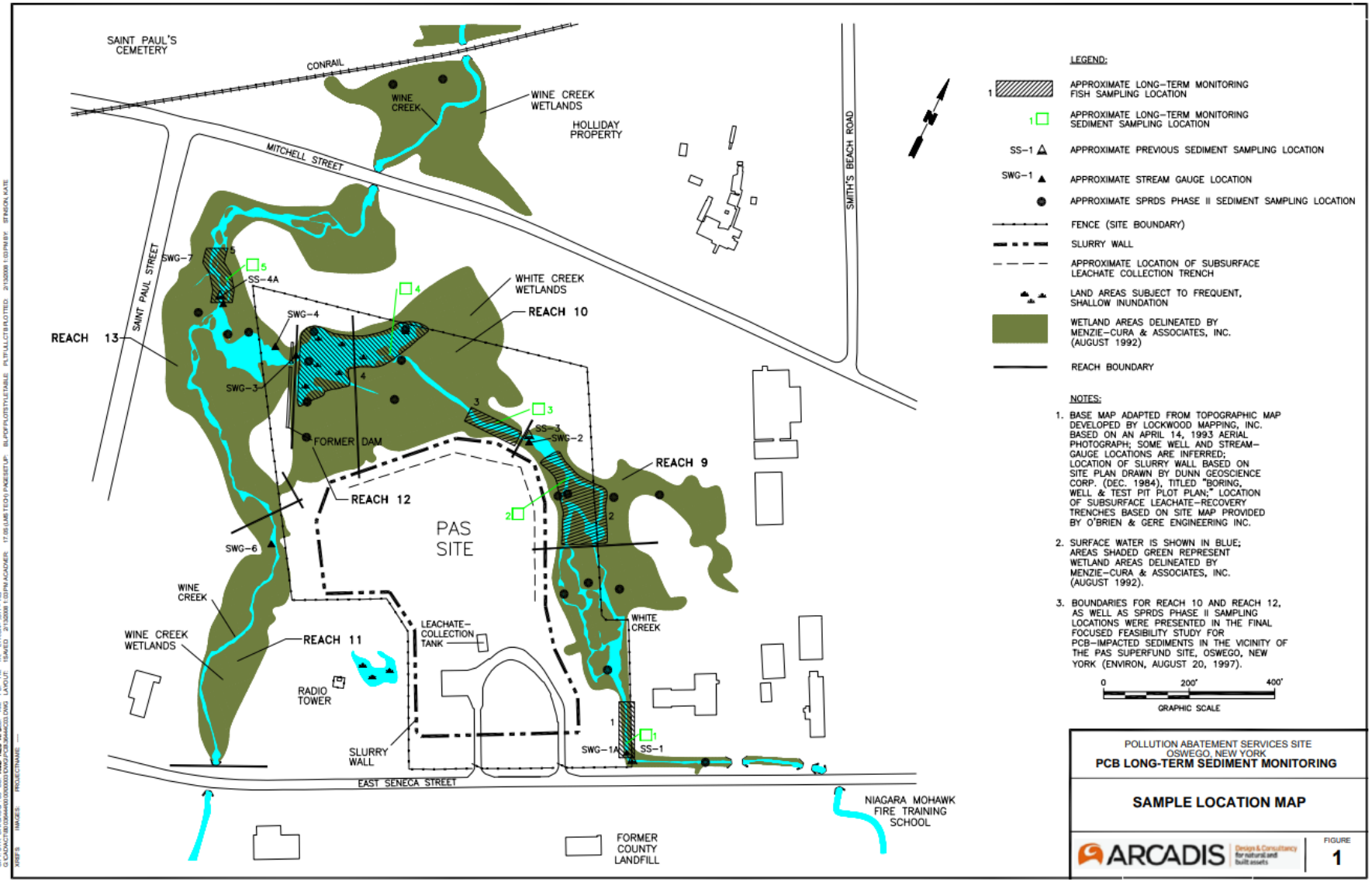
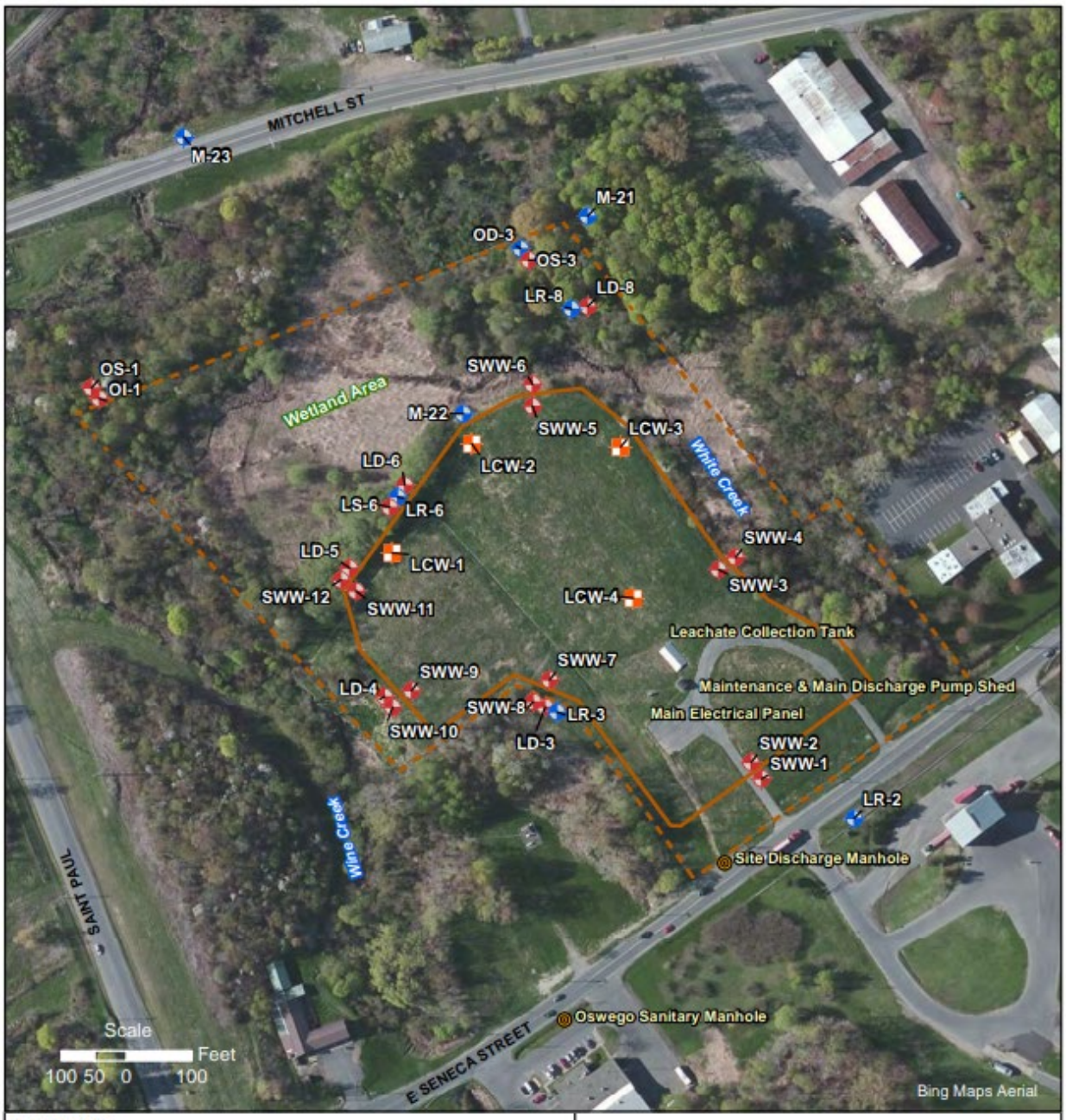


Figure 2: Well Location Map



LEGEND

Sample Locations

- Bedrock Monitoring Well
- Leachate Collection Well (Overburden)
- Overburden Monitoring Well
- Manhole
- Fence (Site Boundary)
- Slurry Wall

WELL LOCATION MAP

PAS Site, Oswego, New York

Figure 2

N

Project No.: 3131
Plot Date: 4 May 2012
Arc Operator: BJAR
Reviewed by:

ddms
1217 Bandana Boulevard North
Saint Paul, Minnesota 55108
Main Phone: (651) 842-4224
www.ddmsinc.com

R:\Projects\DEF\demax-1547\3131-PAS\DataAnalysis\GISData\Projects\120504_SiteMap.mxd

Figure 3: COC Concentration Trends at Monitoring Well M-21

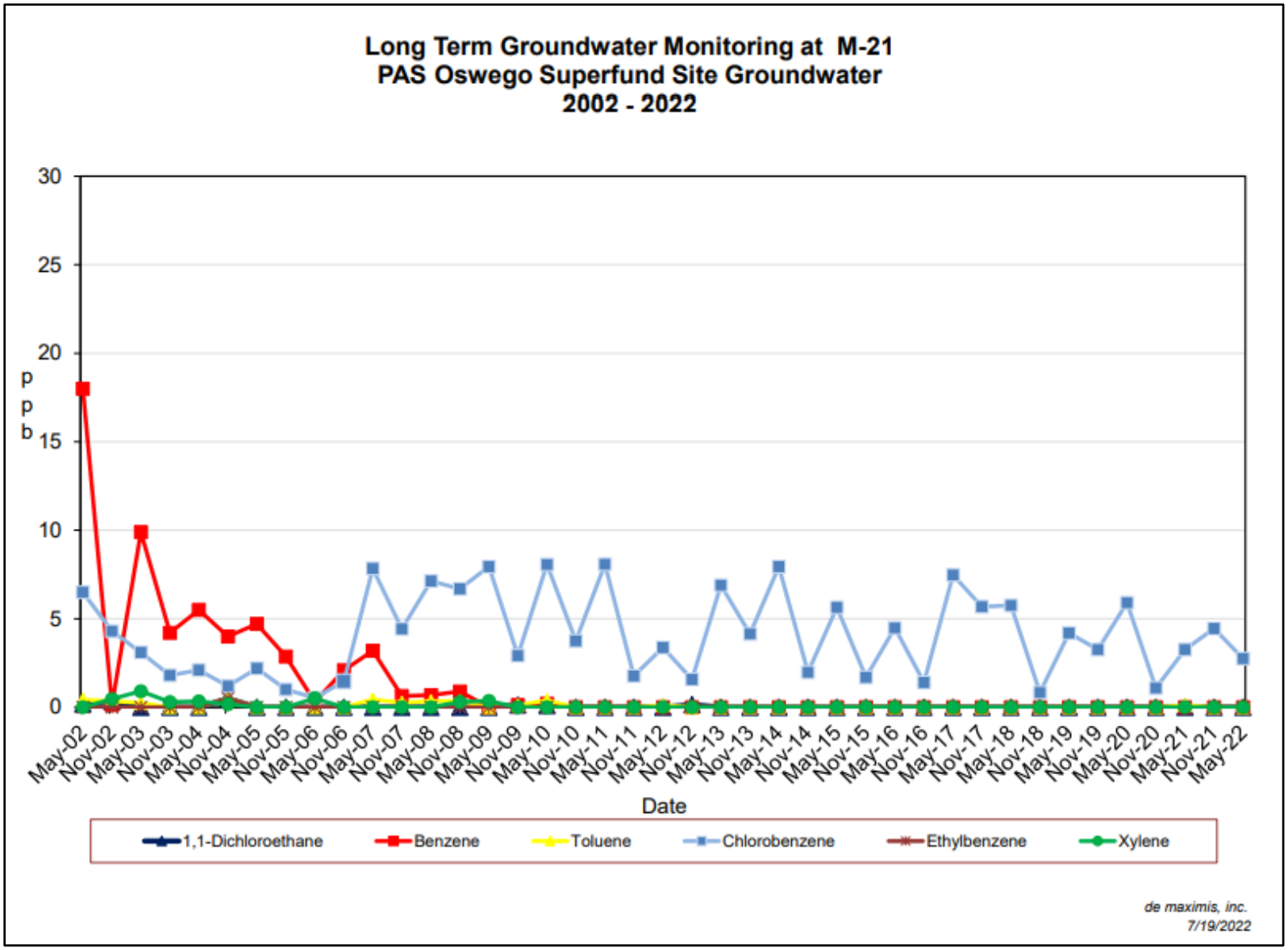


Figure 4: COC Concentration Trends at Monitoring Well LR-8

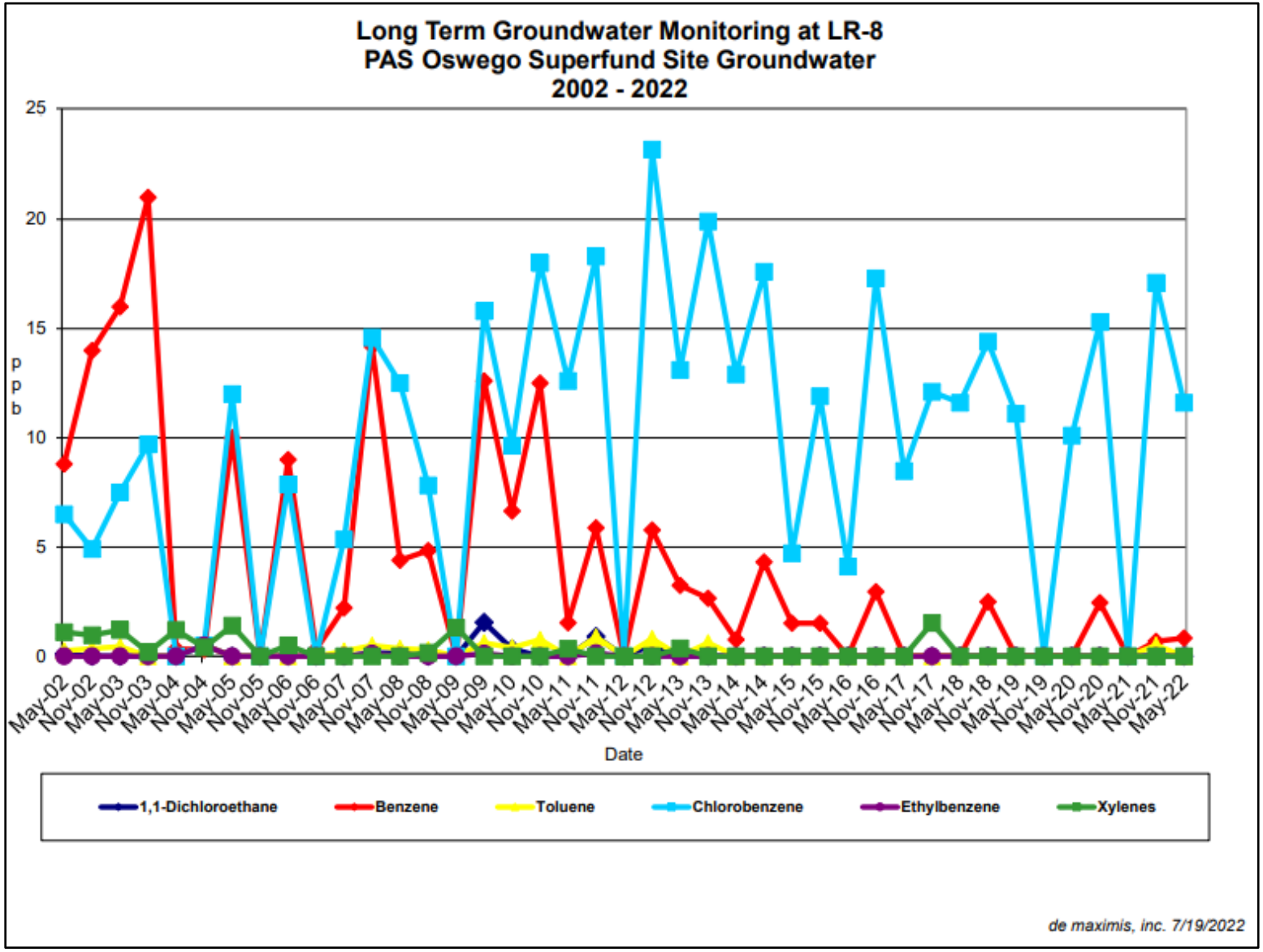


Figure 5: PCB Sediment Concentration Trend Graphs

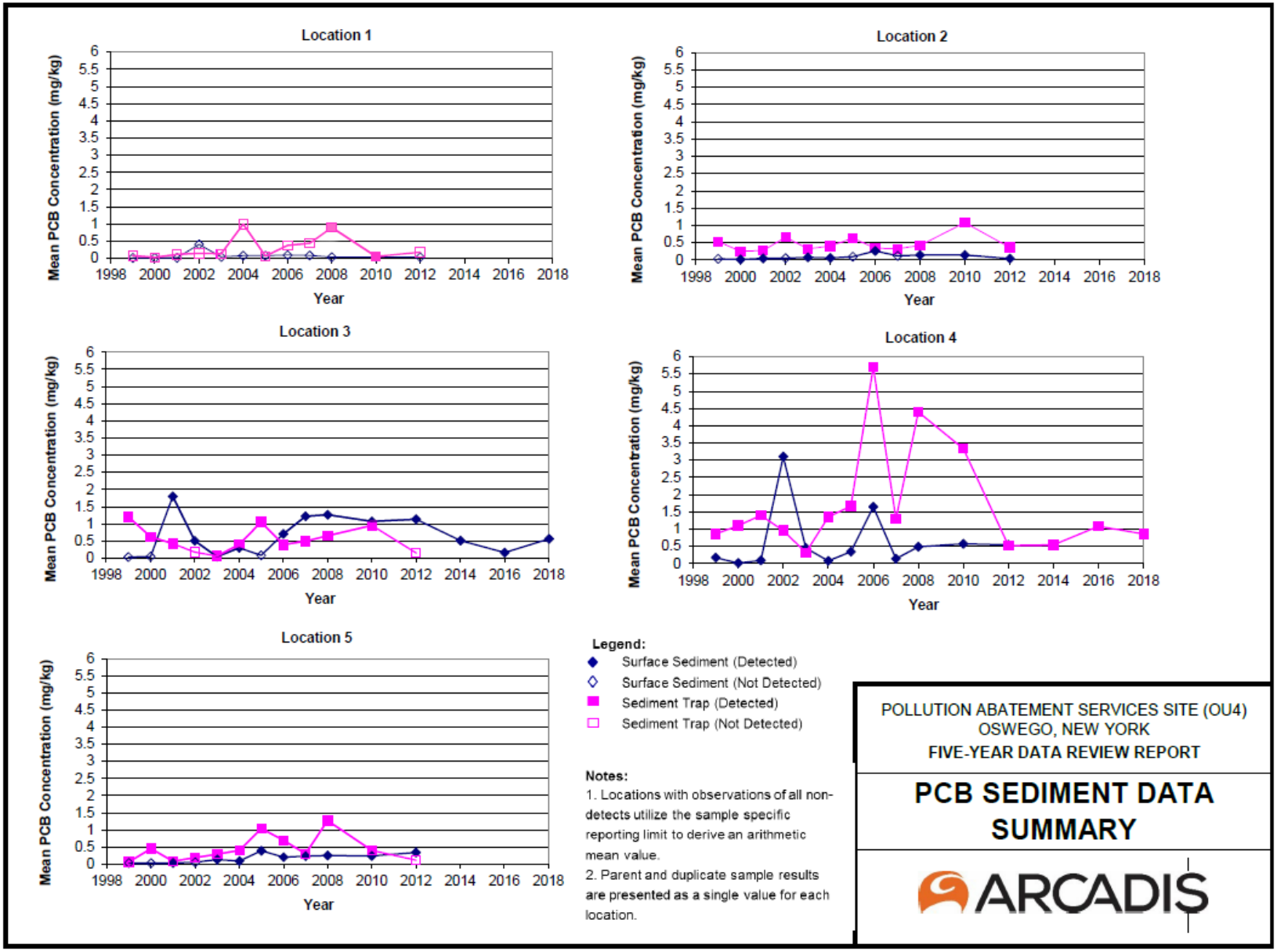


Figure 6: PCB Fish Tissue Concentration Trend Graphs

APPENDIX B -- REFERENCES

Documents, Data and Information Reviewed in Completing the Five-Year Review	
Document Title (Author)	**Submittal Date**
Record of Decision, EPA	1984
Record of Decision, EPA	1993
Explanation of Significant Differences, EPA	1996
Record of Decision, EPA	1997
First Five-Year Review Report, EPA	1998
PCB Long-Term Monitoring Plan, Blasland, Bouck & Lee	1999
Second Five-Year Review Report, EPA	2003
Third Five-Year Review Report, EPA	2008
Explanation of Significant Differences, EPA	2010
Operation, Maintenance, and Long-Term Monitoring Plan, de maximis, inc.	2013
Fourth Five-Year Review Report, EPA	2014
Fifth Five-Year Review Report, EPA	2019
Emerging Contaminant Results, de maximis, inc.	2020
Annual Operation, Maintenance, and Monitoring Progress Reports, de maximis, inc.	2018 to 2022
PCB Long-Term Monitoring Progress Reports, ARCADIS	2018, 2020 and 2022
EPA guidance for conducting five-year reviews, OSWER 9355.7-03B-P dated July 17, 2001, FYR Recommended Template (Jan, 20, 2016, OLEM 9200.0-89) and other guidance and regulations to determine if any new Applicable or Relevant and Appropriate Requirements relating to the protectiveness of the remedy have been developed since the EPA issued the ROD	

APPENDIX C – CLIMATE CHANGE ANALYSIS

According to the Region 2 *Guidance for Incorporating Climate Change Considerations in Five Year Reviews*, three climate change tools were utilized to assess the Pollution Abatement Services site. Screenshots from each of the tools assessed are included here.

The first tool utilized was The Climate Explorer. As can be seen from Figure C-1, over the next several decades there is a projected increase in the number of days per year with maximum temperatures greater than 100°F in Oswego County. As can be seen on Figure C-2, however, there is little change in potential drought conditions in the coming years. A summary of the Top Climate Concerns from the tool can be seen in Figure C-3.

The second tool utilized is called The Flood Factor. There are 585 properties in Oswego, NY that have greater than a 26% chance of being severely affected by flooding over the next 30 years. However, as can be seen in Figure C-4, the area near the Pollution Abatement Services site has a risk to flooding as a result of its proximity to Lake Ontario.

The final tool utilized is called Sea Level Rise. Because the site is located in close proximity to Lake Ontario coastal flooding impacts at the site are likely. Figure C-5 illustrates the Sea Level Rise Viewer for Oswego, NY and the surrounding area.

Despite the potential for flooding described above, flooding in the area during a major rain event would not impact the containment system because leachate is not stored in the collection tank. It is pumped from the tank and discharged on the same day to the sewer line. Also, because the operation is completely manual, monthly discharge of leachate from the Site to the sewer system can be delayed, if necessary, to prevent any impacts from the Site to off-Site areas (*i.e.,* sewer overflows). In addition, transport of the leachate off-Site to a RCRA-approved treatment and disposal facility is retained as a contingency in the event that the POTW is unable to accept leachate from the Site. Therefore, 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.

Figure C-1 – Oswego County Days with Max Temperature > 100°F

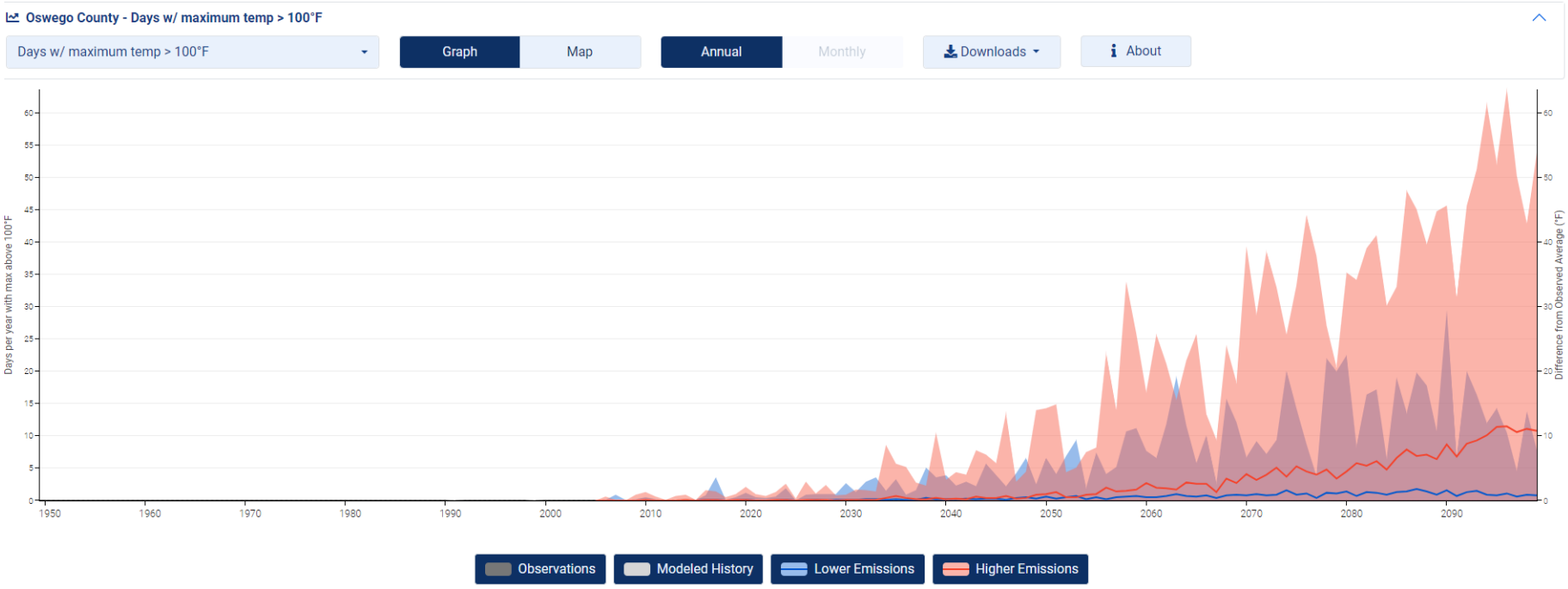


Figure C-2 – Oswego County Drought Conditions

Figure C-3 – Summary of Top Climate Concerns for Oswego County

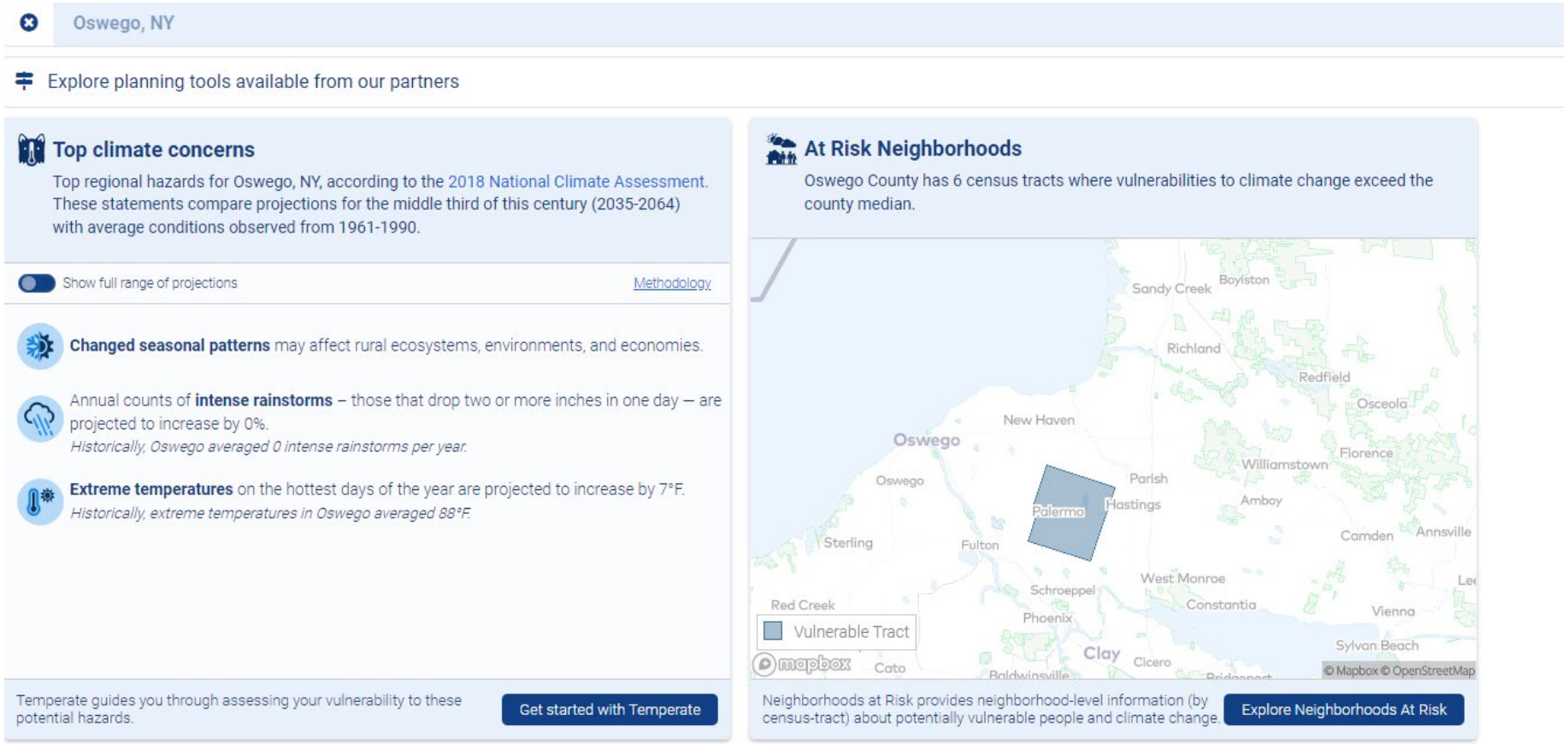


Figure C-4 – Flood Factor

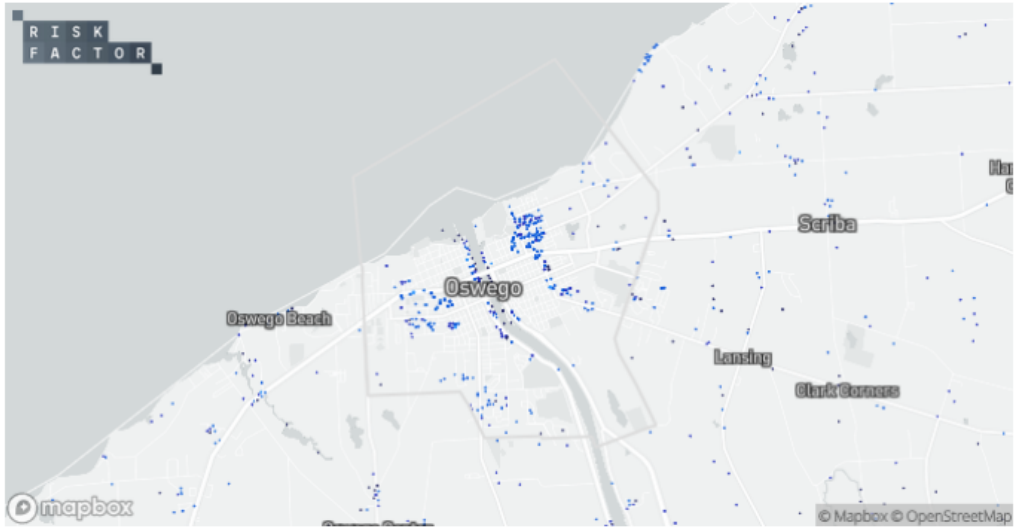
Does Oswego have risk?

Moderate

FLOOD FACTOR™

There are **585** properties in **Oswego** that have greater than a **26%** chance of being severely affected by flooding over the next 30 years. This represents **10%** of all properties in Oswego.

In addition to damage on properties, flooding can also cut off access to utilities, emergency services, transportation, and may impact the overall economic well-being of an area. Overall, **Oswego** has a **moderate risk of flooding** over the next 30 years, which means flooding is likely to impact day-to-day life within the community. This is based on the level of risk the properties face rather than the proportion of properties with risk.



Oswego Flood Risk

Residential **Minor Risk**
533 out of **5,739** homes

Road **Minor Risk**
26 out of **120** miles of roads

Commercial **Moderate Risk**
121 out of **524** commercial properties

Critical Infrastructure **Major Risk**
10 out of **19** infrastructure facilities

Social Facilities **Moderate Risk**
10 out of **39** social facilities

Minor Moderate Major Severe Extreme

Figure C-5 – Sea Level Rise Viewer