SIXTH FIVE-YEAR REVIEW REPORT FOR KING OF PRUSSIA SUPERFUND SITE WINSLOW TOWNSHIP, CAMDEN COUNTY, NEW JERSEY

Prepared by

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

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June 13, 2025

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Date

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
CEA	Classification Exception Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CVOC	Chlorinated Volatile Organic Compound
ENR	Enterprise Network Resolutions
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
GPM	Gallons Per Minute
ICs	Institutional Controls
ISCR	In-Situ Chemical Reduction
KOP	King of Prussia
MCL	Maximum Contaminant Levels
MW	Monitoring Well
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
OU	Operable Unit
O&M	Operation and Maintenance
PALs	Project Action Limits
1,1,2,2-PCA	Tetrachloroethane
PCE	Tetrachloroethylene
PRP	Potentially Responsible Party
RAO	Remedial Action Objectives
RD	Remedial Design
RI	Remedial Investigation
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SWQS	Surface Water Quality Standards
TBC	To be considered
TCE	Trichloroethylene
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 sixth FYR for the King of Prussia Technical Corporation Superfund Site (Site). The triggering action for this policy review is the completion date of the previous FYR. The FYR has been prepared due to the fact that while the remedial action will not leave hazardous substances, pollutants, or contaminants on site above levels that allow for unlimited use and unrestricted exposure, it requires five or more years to complete.

The Site consists of three Operable Units (OUs) and OU3 will be addressed in this FYR. OU3 addresses the cleanup of contaminated groundwater and is ongoing. The two OUs that are not addressed in this FYR are OU1 and OU2. OU1 addressed the soil contamination in the former lagoon area and sediments located in the swale. OU2 addressed the residually contaminated soils associated with the area of the Site referred to as the Former Buried Drum Area. All work has been completed at OU1 and OU2 and they do not require a FYR.

The Site FYR was led by Sara Lupson, the EPA Remedial Project Manager (RPM). Participants included Perry Katz (EPA New Jersey Projects/State Coordination Section Supervisor), John Mason (EPA Geologist), Abbey States (EPA Human Health Risk Assessor), Jinni Hanlee (EPA Human Health Risk Assessor), and Detbra Rosales (EPA Ecological Risk Assessor). The representatives from the Potentially Responsible Party (PRP) Group, including Brian Bussa (PRP Project Coordinator) and Tom Patterson (Roux Associates), were notified of the initiation of the five-year review. The review began on 11/1/2024.

Site Background

The Site is located at 847 Piney Hollow Road and is identified as Block 8801, Lot 1.01 on the tax map of Winslow Township, Camden County, New Jersey (Figure C-1). The Site is located approximately thirty miles northeast of Philadelphia, Pennsylvania and twenty-five miles northwest of Atlantic City, New Jersey. The Atlantic City Expressway and U.S. Route 322 (Black Horse Pike) are located approximately two miles northeast and southeast of the Site, respectively.

The Site lies in a rural area characterized by agricultural land use and sparse population. The state-owned Winslow Wildlife Management Area occupies land immediately adjacent to the southwest and northeast of the Site and is primarily used for recreational purposes. Two facilities, the South Jersey Shooting Club, Inc., and the Enterprise Network Resolutions (ENR) Contracting, LLC, are located across the street from the Site. The nearest residence is a single-family home approximately one-mile northeast (up-gradient) of the Site.

The Great Egg Harbor River, located approximately 1,000 feet southwest of the Site, runs in an easterly direction through Camden County and throughout Atlantic County. The Great Egg Harbor River serves as the boundary between Camden and Gloucester Counties. The river discharges to the Atlantic Ocean north of Ocean City, New Jersey. There are no residential wells in the vicinity of the Site. The two wells that are located on the ENR facility located across from the Site on Piney Hollow Road are not being used for potable water purposes. These two wells are located within a half mile radius of the Site.

The New Jersey Department of Environmental Protection (NJDEP) was first notified of possible unauthorized activities at the Site in January 1975. Subsequent Site inspections and samples by NJDEP and a groundwater study by Geraghty and Miller in 1976 indicated contamination of the soils and groundwater at the Site. EPA

confirmed contamination with additional sampling and investigations during 1979, 1980, and 1982. Based on the NJDEP and EPA investigations, it was determined in 1983 that contaminants in Site soils and/or groundwater and/or surface water included arsenic, vinyl chloride, phthalate esters, chloroform, trichloroethylene (TCE), copper, zinc, and 1,1,2,2-tetrachloroethane (1,1,2,2-PCA).

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: King of Prussia Superfund Site		
EPA ID: NJD980505341		
Region: 2	**State:** NJ	**City/County:** Winslow Township/Camden County
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): Sara Lupson		
Author affiliation: EPA		
Review period: 11/1/2024 - 5/1/2025		
Date of site inspection: 1/21/2025		
Type of review: Policy		
Review number: 6		
Triggering action date: 6/12/2020		
Due date *(five years after triggering action date)*: 6/12/2025		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

In December 1985, the Site was placed on the National Priorities List (NPL). In April 1985, EPA entered into an Administrative Order on Consent with five PRPs to conduct a remedial investigation and feasibility study (RI/FS). In July 1988, at the request of EPA, the PRPs installed a fence around the Site property to restrict access and prevent health risks associated with direct contact with contaminated soils and prevent illegal dumping. In April 1991, an Administrative Order was issued to address the remedial components documented in the Record of Decision (ROD) issued in 1990 (see "Response Actions, below). A chronology of Site events is provided in Appendix B.

Inorganic substances that were detected in the groundwater at the Site during the Remedial Investigation (RI) include: Beryllium, Cadmium, Chromium, Copper, Mercury, Nickel, and Zinc. Organic substances that were

detected in the groundwater at the Site during the RI include: Benzene; 1-1-Dichloroethane; Trans-1, 2-Dichloroethene; Ethylbenzene; Tetrachloroethylene (PCE); 1,1,2,2-PCA; TCE; 1,1,1-Trichloroethane; and Toluene.

The human health risk assessment that was conducted for the Site groundwater concluded that unacceptable cancer risks and non-cancer hazards at the Site existed and primarily resulted from potential use of contaminated groundwater, although there are no users of the groundwater in the proximity of the Site. The further migration of these contaminants to potable water supplies, the river, and to unaffected areas of the Site would significantly impact human health and the environment.

An Endangerment Assessment was conducted in 1989 to evaluate ecological impacts. The assessment concluded that the metals concentrations reported for surface and subsurface soils at the site and the sediments of the drainage swale exceeded levels reported to be phytotoxic in the literature. Additionally, a strict comparison of metals concentrations in the Great Egg Harbor River to available Ambient Water Quality Criteria indicated that aquatic life species may be adversely affected by site-related contaminants. Higher trophic levels that rely on the vegetation or aquatic life as a food source were also at risk.

Response Actions

In September 1990, EPA completed the excavation and recycling/disposal of 120 plastic containers, 159 tons of heavy metal contaminated soil, and 150 gallons of acid. In November 1991, EPA excavated and disposed of 200 rusted steel drums and 235 plastic carboys containing acids and organic liquids within the portion of the Site designated as the Buried Drum Area (now known as the Former Buried Drum Area). The disposal of two rusted steel tankers was completed in August 1991.

In March 1994, a groundwater Classification Exception Area (CEA) was established by the NJDEP to restrict the construction of drinking water wells within any areas of the contaminated plume. Since the Site is located in the Pinelands, the Pinelands Commission has regulations in place to restrict the construction of wells and other facilities.

Remedial Action Objectives (RAOs) and Remedy Components

EPA has issued two RODs for the Site. The first ROD (1990 ROD) addressed the soil, buried drums, tankers, sediment, and the contaminated groundwater. The second ROD (1995 ROD) determined that no further action was required to address the contaminated soils associated with the Former Buried Drum Areas. EPA decided to divide the work into three operable units, OU1, OU2, and OU3. OU3 was intended to address groundwater. All work has been completed for OU1 and OU2, which addressed contaminated soils, buried drums, tankers, and sediment. The OU3 RAOs and remedy for groundwater were established in the 1990 ROD.

The Groundwater RAOs are:

- Mitigate the groundwater contamination such that no unacceptable levels of contaminants migrate to the Great Egg Harbor River;
- Mitigate the groundwater contamination such that Applicable or Relevant and Appropriate Requirement (ARARs) are met; and
- Mitigate the groundwater contamination such that no unacceptable risk to human health can occur.

The OU3 Remedy Components selected in the 1990 ROD are:

- Construction of an on-site groundwater extraction, treatment and reinjection system to address the contaminated groundwater.
- Additional sampling and analysis of surface waters and sediments of the Great Egg Harbor River to allow a determination on whether further remediation of the river system is required.

The 1990 ROD also established Groundwater cleanup levels which are included below in Table 1. The selected cleanup levels were based on State and Federal maximum contaminant levels (MCLs), whichever was more stringent at the time the ROD was issued

Table 1: **Groundwater Cleanup Levels**

COMPOUND	Groundwater Cleanup Levels Established in 1990 ROD (µg/L)
Inorganics	
Beryllium[2]	1*
Cadmium[1]	10
Chromium[1]	50
Copper[1]	1000
Mercury[1]	2
Nickel[1]	210
Zinc[2]	5000
Volatile Organics	
Benzene[1]	1
1-1-Dichloroethane[1]	2
Trans-1,2-Dichloroethylene[1]	10
Ethylbenzene[1]	50
Tetrachloroethylene[1]	1
1,1,2,2-Tetrachloroethane[1]	1.4
Trichloroethylene[1]	1
1,1,1-Trichloroethane[1]	26
Toluene[2]	2000

[1] From Drinking Water Standards (MCLs) under NJSA 7:9-6, 7:10-16.7, 58:10A and 7:14A at the time of ROD issuance

[2] From Federal Safe Drinking Water Act (40 CFR, Parts 141 and 142) at the time of ROD issuance

* In 1994 the Beryllium MCL as defined by 40 CFR 141.62 was raised from 1 to 4 µg/L. This remains the current Federal Safe Drinking Water Act MCL for Beryllium and is referenced in this FYR.

Status of Implementation

Operable Unit 1

OU1, a component of the 1990 ROD, involved the remediation of the former lagoon soils using a multi-phased soil washing technology. OU1 was performed by the PRPs, with EPA oversight. The remedial design (RD) for this portion of the remedy was completed in January 1993 by Alternative Remedial Technologies (ART), the PRPs' contractor. OU1 remedial action activities are fully described in the July 1994 final Remedial Action Report. In summary, 19,200 tons of metals-contaminated soils and sludges were successfully treated to meet the established remediation goals set forth in EPA's September 1990 ROD. Soils meeting the established treatment goals were backfilled on-site.

Operable Unit 2

OU2, identified in the 1990 ROD, addressed the residually contaminated soils associated with the area of the Site referred to as the Former Buried Drum Area. In 1991, under a federally funded removal action, EPA excavated and disposed of the buried drums as well as plastic carboys containing acids and organic liquids within the Former Buried Drum Area. In September 1993, EPA issued a Removal Action Memorandum to the PRPs for the excavation and disposal of the soil from the Former Buried Drum Area. The PRPs completed the removal action in February 1994. On September 27, 1995, EPA issued a No Further Action ROD for the Former Drum Area. The 1995 ROD documented all activities associated with the removal action and set forth EPA’s decision not to take

any additional action in the Former Drum Area, which signified the completion of all activities associated with OU2.

Operable Unit 3

OU3, which is a component of the 1990 ROD, is being performed by the PRPs under the terms of the April 1991 Order. OU3 includes the design and construction of a groundwater extraction, treatment and reinjection system as specified in the 1990 ROD. The selected groundwater remedy for the Site established cleanup levels for the contaminants in the groundwater based on risk to human health. The remedy was selected to eliminate unacceptable risks posed to human health and the environment by extracting groundwater, which is contaminated with volatile organic and inorganic contaminants, and treating the water to health-based cleanup levels.

The design of the extraction, treatment and reinjection system was completed by the PRPs and approved by EPA on July 22, 1994. Remedial action construction completion was achieved in September 1995 and documented in a preliminary closeout report. The system began treating contaminated water in 1995. The original groundwater treatment system consisted of eleven recovery wells, which could extract the contaminated groundwater at a combined rate of 200 gallons per minute (gpm), or about 280,000 gallons per day; monitoring wells to monitor the progress of the remedy; electrochemical cells to remove the metals; and two air strippers with carbon polishing to remove the volatile organic compounds (VOCs). In addition, five on-site infiltration trenches and ten infiltration galleries are designed to re-inject the treated water into the aquifer through perforated manholes. The infiltration galleries are located outside the fence and adjacent to the river (Figure C-2).

In 2000, four recovery wells (intermediate wells R-9I and R-11I, and deep wells R-7D and R-11D) were shutdown because VOCs and metals in these four wells were detected at concentrations below cleanup levels. Seven of the eleven recovery wells continued operating at the Site. These wells included shallow wells R-1S through R-6S and intermediate well R-8I. The seven recovery wells were extracting groundwater at a rate of between 95 and 110 gpm or approximately 144,000 gallons per day.

Over time, concentrations in the aquifer began to reach equilibrium. This was demonstrated with detections of consistent, low-level contaminant concentrations collected from monitoring well samples and Mann-Kendall statistical analyses indicating declining influent concentrations to the groundwater treatment plant.

In March 2013, the PRP conducted an In-Situ Chemical Reduction (ISCR) Pilot Testing at the Site under an EPA-approved work plan. The testing was initiated to determine if the concentration of metals and VOCs in the groundwater at the Site could be chemically reduced to meet site-specific ARARs. Three areas of high metals and VOC concentrations were selected for the testing. A total of 13 injection points were utilized to inject the ISCR substrate and bacteria into each testing area. Data collected during the testing indicated that if the proper reducing environment could be maintained throughout the testing area, ISCR could be used to reduce the levels of the metal and VOC concentrations in the groundwater to meet Site cleanup standards. A second testing, under an approved work plan, was conducted in 2016. The results indicated that chemical reduction is a viable option for reducing the contaminants to meet Site cleanup standards.

In December 2018, based on the results of the two ISCR testing activities, the PRPs submitted a work plan to continue ISCR testing in the MW-3S area and three downgradient areas of the Site including R-4, MW-42S, and R-6. To avoid any interference from recovery wells located in the vicinity of the test areas, the work plan called for the temporary shutdown of the treatment plant for two years.

Since the plant would be shutdown during the testing, the work plan included several measures to protect the river. This included the injection of ISCR materials between the river and the study areas to act as a barrier to prevent contaminants from migrating to the river. It also included the collection of surface water, sediment, and groundwater samples throughout the testing period. A new monitoring well (MW-43S) was installed between the river and the barrier. This well is monitored to determine if the barrier is preventing the migration of contaminants toward the river.

The work plan also included several contingencies that would be implemented if site-related contaminants were detected in the river. The first contingency requires increasing the amount of ISCR material being injected into the barrier area. Groundwater samples would be collected from MW-27S, MW-31S, and MW-43S and sediment and surface water samples would be collected. If the increased injection of ISCR materials failed to correct the detection of contaminants in the river, the second contingency required the start-up of the treatment plant with limited pumping from recovery wells in the vicinity of the study areas. If there is a need to implement the final contingency, the treatment plant would operate at full capacity with full pumping for all recovery wells. On March 7, 2019, EPA approved the work plan. In April 2019, the ISCR testing was initiated at the Site and the treatment plant was shut down in May 2019.

In September 2020, the PRP proposed a Supplemental Test ISCR Injection Program to abate downgradient groundwater ARAR exceedances. The Supplemental Test ISCR Injection Program consisted of pH buffer and ISCR amendment injections in the MW-31S, MW-42S, and MW-43S Areas and microbial consortium injections in the MW-42S and MW-43S Areas. EPA granted formal approval in July 2020 and ISCR supplemental testing was initiated in August 2020.

In 2023, based on the results from the 2019 Test and 2020 Supplemental Test ISCR injections, the PRP proposed an additional Polishing ISCR Injection Program. The Polishing ISCR proposed to evaluate the use of a sacrificial organic carbon-based electron donor to overcome the natural sulfate-driven electron donor sink for the promotion of desired reducing conditions; the use of powdered activated carbon (PAC) as part of the ISCR amendment reagents to supplement the abiotic and biotic reduction approaches with a chlorinated volatile organic compound (CVOC) adsorption treatment technology to improve low-level CVOC treatment effectiveness. In August 2023, EPA approved the work Polishing ISCR Program, with some modifications, and Polishing ISCR Injections were initiated in September 2023. During the ten-week ISCR injection program, a slurry of Mg(OH)2 pH buffer was injected in 63 direct-push injection points divided among the MW-5S, MW-41S, R-4, and MW-43S Areas. ISCR Polishing monitoring consists of sampling nine wells (MW-5S, MW-27S, MW-31S, MW-41S, MW-42S, MW-43S, R-3, R-4, and R-6) and three surface water and sediment locations (SW-2A/SED-2A, SW-3A/SED-3A, and SW-4A/SED-4A) on a semi-annual basis, concurrent with the March Semi-Annual Site Monitoring event and the September Annual Site Monitoring Event, for two years following completion of the ISCR Polishing injections (i.e., through September 2025).

EPA will continue to monitor the ISCR data collected from monitoring/recovery wells, and the sediment and surface water to determine if there is a need to implement any of the contingencies described in the work plan. The ISCR data collected to date is further discussed below in the "Data Review" section.

IC Summary Table

Table 2: 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	Yes	Yes	Groundwater	Restrict installation of ground water wells and ground water use	Classification Exception Area (CEA) Implemented June 1993

The Site is surrounded by fencing and warning signs. In addition, off-site recovery and monitoring wells are housed in below-ground vaults to prevent vandalism. Also, the June 1993 CEA restricts the construction of

drinking water wells within any areas of the contaminated plume. Additionally, the Site is in the Winslow Fish and Wildlife Management Area and currently zoned as a Recreation and Conservation District, which prevents development.

Systems Operations/Operation & Maintenance (O&M)\

The removal and remedial actions which took place at the Site between 1990 and 1994 reduced the levels of the soil contamination to meet cleanup goals. The groundwater contamination remains above applicable standards and O&M activities are ongoing to reduce the groundwater contamination at the Site.

The PRPs, through their consultants, ENR and Roux Associates, operated the groundwater extraction and treatment system under EPA oversight from 1995 thru 2019. The O&M Plan developed by the PRPs was finalized in September 1994. The O&M Plan conforms to the requirements set forth in the New Jersey Discharge Elimination System/Discharge to Groundwater Permit Equivalent and the Pinelands Comprehensive Management Plan.

In 2019, the treatment plant was decommissioned in a limited manner to minimize component deterioration during the planned two-year shutdown needed to continue ISCR Pilot-Scale Testing at the Site. The temporary two-year shutdown was extended and is currently ongoing to facilitate additional rounds of ISCR. While shutdown, the treatment plant was vandalized. Breaches of the main electrical service switchgear, transformer, and electrical panels and conduits have rendered the main electrical service unusable.

While the system was operating, monitoring was performed to ensure the groundwater remedy continued to be effective in capturing the contaminated plume and preventing the migration of the contaminated groundwater to the Great Egg Harbor River. Monitoring continues during the temporary shutdown to ensure there is no plume migration while the system is turned off.

A network of wells is monitored for any changes in groundwater quality at the Site. Twenty-five wells are monitored on an annual basis (Figure C-3), with 16 of those wells monitored on a semi-annual basis (Figure C- 4). The monitoring plan also requires that one surface water and sediment sample from the Great Egg Harbor River be collected annually and analyzed for VOCs and metals to evaluate the impact of groundwater discharge to the river. Under the approved ISCR work plans, sampling of the surface water and sediment has increased to include three locations sampled on a semi-annual basis.

Since its start-up, the groundwater treatment plant has treated over 1,167.1 million gallons of contaminated groundwater and removed over 27.9 tons of VOCs and over 1.43 tons of metals. In addition, while the treatment plant was in operation, it was able to reduce the total influent VOC concentrations from 1,917 micrograms per liter (µg/L) to 5 µg/L, and the total metal concentrations went from 41 µg/L to 5.5 µg/L. As described above, the treatment plant was temporarily shut down in May 2019.

Remedy Resilience

Potential Site impacts from severe weather events have been assessed in Appendix D, and the performance of the remedy may be impacted by an increased risk of inland flooding and wildfires. However, given the current shutdown of the groundwater pump and treat system, impacts to the remedy are likely to be minimal.

Due to past concerns of flooding, preventative measures were incorporated into the Site Operations, Maintenance and Monitoring Plan. When the treatment plant is operational, these include:

- Cleaning the infiltration galleries to improve percolation of effluent groundwater from the infiltration gallery leach tanks to groundwater so that a greater percentage of groundwater pump and treat system plant effluent flow can be directed to the infiltration galleries; and

- Balancing groundwater pump and treat system effluent flow to the infiltration trenches and infiltration galleries to avoid overloading the infiltration trenches.

A pilot-scale phytotechnology plot was also planted in the infiltration trench area to consume excess water.

The groundwater pump-and-treat system is housed in an un-insulated corrugated metal building. As part of the decommissioning, potential chemical hazards were removed from the building to the extent possible. The Winslow Township Fire Department completed an inspection, issued Fire Safety Permit No. 20-3946 for the building, and granted approval for de-energizing the building. The building currently houses fire extinguishers, which were last certified in February 2024.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the last FYR. No issues or recommendations were identified in the last FYR.

Table 3: Protectiveness Determinations/Statements from the 2020 FYR

OU #	Protectiveness Determination	Protectiveness Statement
3	Protective	The OU3 remedy for groundwater is protective of human health and the environment.
Sitewide	Protective	The remedy for the King of Prussia Superfund Site is protective of human health and the environment.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On August 7, 2024, the EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, and Puerto Rico, including the King of Prussia Superfund Site. The announcement can be found at the following web address: https://www.epa.gov/superfund/R2-fiveyearreviews.

In addition to this notification, the EPA Community Involvement Coordinator, or CIC for the site, Shereen Kandil, posted a public notice on the EPA site webpage https://www.epa.gov/superfund/king-of-prussia and provided the notice to the Winslow Township by email on April 23, 2025 with a request that the notice be posted in municipal offices and on the village/town webpages. This notice indicated that a FYR would be conducted at the King of Prussia Superfund Site to ensure that the cleanup at the site continues to be protective of people's health and the environment. Once the FYR is completed, the results will be made available at the following repositories:

Camden County Library
Echelon Urban Center
203 Laurel Road
Voorhees, N.J. 08043

And

U.S. Environmental Protection Agency Region 2

290 Broadway – 18th floor
New York, NY 10007
Superfund Records Center.

In addition, the final report will be posted on the following website: https://www.epa.gov/superfund/king-of-prussia. Efforts will be made to reach out to local public officials to inform them of the results.

Data Review

Groundwater

The groundwater extraction and treatment system began operation in 1995 and has been temporarily shut down since May 2019 to facilitate ISCR pilot testing. Groundwater sampling is conducted to evaluate the progress being made toward meeting the groundwater RAOs, including protection of the Great Egg Harbor River, prevention of unacceptable exposure and, restoration of the aquifer such that contaminant concentrations are below ARARs across the site.

In accordance with the 2012 Site Operation, Maintenance, and Monitoring Plan and the approved ISCR Polishing Work Plan, groundwater samples are analyzed from select monitoring wells for VOCs and metals, and water level measurements are obtained to determine groundwater flow directions. Several recovery wells associated with the groundwater treatment remedy (denoted by an "R-" naming convention) were utilized for groundwater monitoring purposes during the review period. Surface water and sediment samples are analyzed for VOCs and metals. This five-year review generally considers groundwater data between December 2019 and March 2024, in addition to results from sampling focused on emerging contaminants completed in September 2024. During the last two semiannual events (November 2023 and March 2024), 26 wells were sampled during the fall event, and 18 wells were sampled during the spring event.

On the former facility property, concentrations of VOCs exceeded cleanup goals for PCE, TCE, ethylbenzene, and 1,1-dichloroethane. Overall, groundwater quality improved across this area during the review period. Wells MW-13S, MW-29S, and MW-40S each recorded exceedances of ARARs for VOCs in the previous review period but had no VOC exceedances in the current review period. MW-1S, which historically reported TCE at concentrations slightly above the 1 µg/L cleanup goal, has not recorded a TCE detection since 10/2020.

The on-property well most impacted by the shutdown was recovery well R-1. Concentrations of PCE in this well, which varied significantly during the previous review period, increased from levels below the 1 µg/L cleanup goal shortly after the treatment plant shutdown, and peaked in 10/2021 with a concentration of 190 µg/L. Most recently, PCE was detected at 49 µg/L (03/2024). TCE, which is both an industrial solvent and a potential breakdown product of PCE, was also detected at a maximum concentration in 10/2021 (78 µg/L), and has gradually declined since this time. TCE was most recently detected in this well at 31 µg/L (03/2024) (Figure C-5).

Concentrations of metals, including beryllium, chromium, nickel, and mercury, were elevated in several on-property wells. Beryllium was the most widespread and was found at a maximum concentration of 17 µg/L in R-2 (03/2023), where the concentrations have remained within the historically observed range. R-2 also reported exceedances of chromium and nickel during the review period. Mercury, which was detected at 4 µg/L at the end of the previous review period (09/2019), has not been detected since at this location. It is suspected that leaching associated with aged stainless-steel may have contributed to elevated nickel and chromium concentrations in some wells. R-2 was redeveloped in 09/2023, and concentrations of chromium dropped from 160 µg/L (03/2023) to 19 µg/L (12/2023), before rebounding to 100 µg/L. MW-15S was redeveloped in 05/2024. Monitoring will continue to track remedy performance, the impacts of the continued treatment plant shutdown, the effects of ISCR implementation, as well as the impacts of well redevelopment and maintenance.

Downgradient of the former facility property, the plume extends to the southwest toward the Great Egg Harbor River and MW-43S, which was installed in 04/2019. Areas of the downgradient plume underwent two rounds of ISCR injections during the review period, in 2020 and 2023. Approximately 300 feet downgradient of the former facility boundary, a cluster of ISCR injections in the shallow aquifer was completed in 2023 in the vicinity of MW-5S and MW-41S. Concentrations of PCE and TCE at MW-5S were variable across the review period and remained elevated above cleanup goals, although concentrations of 1,1,2,2-PCA declined when compared to the previous review period. During the most recent sampling event (03/2024), 1,1,2,2-PCA was not detected at this location, while concentrations of PCE and TCE increased to 18 µg/L and 14 µg/L, respectively (Figure C-6). Despite the recent increase, concentrations of these contaminants remain well below values observed during the remedial investigation, when 2,500 µg/L PCE and 940 µg/L TCE were recorded at this location. At nearby MW-41S, concentrations of TCE and 1,1,2,2-PCA were generally declining and lower than those observed during the previous review period. PCE concentrations were oscillatory above the 1 µg/L cleanup goal, with a maximum concentration of 76 µg/L (10/2020). Data from MW-41S immediately following the 2023 injections indicated that concentrations had fallen to concentrations below the cleanup goals for these contaminants (11/2023).

Approximately equidistant from the source property, MW-3S is located on the southeastern flank of the plume. VOCs have not exceeded cleanup goals at this location for the previous three review periods, however, concentrations of inorganic constituents are routinely elevated. ISCR injections, which were last conducted in the vicinity of this well in 2019, were not effective in significantly reducing concentrations of beryllium, which was most recently detected at 11 µg/L (03/2024; MCL = 4 µg/L) (Figure C-7). Concentrations of nickel variably increased across the review period and were most recently detected above the 210 µg/L cleanup goal, at 270 µg/L (03/2024). Chromium, which was present above cleanup goals in on-property wells R-2 and MW-1S, was not elevated in MW-3S during this review period. Redevelopment of MW-3S and well R-5, located several hundred feet downgradient, was completed in 2024. Continued monitoring of MW-3S, wells located farther downgradient, and river sediment and surface water will assess plume stability, a decreasing flux of contaminants toward the river, and whether groundwater results are representative of aquifer conditions.

The distal downgradient plume core is monitored by R-4, MW-42S, and MW-43S, which are installed near the river within the ISCR barrier area. MW-27S and MW-31S also monitor groundwater quality along the distal plume edge to the northwest and southeast of the plume center.

MW-42S, located downgradient of recovery well R-4 and upgradient of MW-43S, recorded a response to nearby injections completed in 2020. Concentrations of 1,1,2,2-PCA, PCE, and TCE decreased from 95 µg/L, 77 µg/L, and 73 µg/L at the end of the previous review period to concentrations below 5 µg/L in 12/2020 (Figure C-8). A corresponding rise in concentrations of the breakdown product cis-1,2-dichloroethylene (cis-1,2-DCE) occurred at this time, peaking at 120 µg/L in March-July 2021. Breakdown product vinyl chloride began to be detected in 2020 as well, with concentrations peaking during the most recent monitoring event in March 2024 (7 µg/L). Concentrations of both “parent” compounds (e.g., 1,1,2,2-PCA, PCE, TCE) and breakdown products have increased since 2023. Most recently, 1,1,2,2-PCA (Cleanup Goal = 1.4 µg/L) and PCE (Cleanup Goal = 1 µg/L) were detected at 27 µg/L and 15 µg/L, respectively. Cis-1,2-DCE and vinyl chloride have New Jersey Class II-A Groundwater Quality Standards of 70 µg/L and 1 µg/L, respectively. It is suggested that concentrations of VOC breakdown products with federal MCLs and/or state groundwater quality standards (including but not limited to cis-1,2-DCE and vinyl chloride) are reported across the site monitoring network moving forward.

MW-43S was installed in 2019 and is the well located furthest downgradient along the centerline of the plume. ISCR injections were emplaced in the vicinity of this well in 2019, 2020, and 2023. Between 2019 and 2021, concentrations of 1,1,2,2-PCA, PCE, and TCE at this well decreased from above 15 µg/L each to less than 5 µg/L (Figure C-9). Similar to MW-42S, this drop was accompanied by an increased abundance of cis-1,2-DCE. Since the second round of ISCR injections in September 2020, concentrations of 1,1,2,2-PCA and PCE have not exhibited a significant trend, while TCE has exhibited a slight increasing trend. Nonetheless, concentrations of 1,1,2,2-PCA, PCE, and TCE were all below 10 µg/L during the most recent sampling event. Geochemical parameters since the 2023 round of ISCR injections indicate aquifer conditions which are moderately-to-highly conducive to contaminant degradation at this location. Additional sampling near the distal plume including, but

not limited to, the areas surrounding MW-43S, MW-42S, and R-4 will continue to evaluate the ongoing effectiveness of the injections.

Concentrations of inorganic COCs in the distal plume were generally variable or declining across the review period. Beryllium was regularly observed slightly above the 4 µg/L MCL in R-4, but overall reported lower concentrations than the previous review period, and most recently was below the cleanup goal for two consecutive semiannual monitoring events (Figure C-10). Mercury, which has a cleanup goal of 2 µg/L, was regularly observed at MW-43S, but concentrations declined from 11 µg/L in March 2022 to 1 µg/L in March 2024 (Figure C-11). Slightly upgradient at MW-42S, mercury was detected at 3 µg/L in March 2019, but has not been detected above the 0.5 µg/L detection limit since October 2020. Similarly, concentrations of nickel (cleanup goal = 210 µg/L) at MW-42S spiked to 1,100 µg/L in March 2020, but have remained below the cleanup goal since October 2020. Following the plant shutdown in 2019, spikes of beryllium, nickel, mercury, and cadmium were observed at the distal edge of the plume in MW-31S, downgradient of MW-3S. However, exceedances of these metals have not been observed in groundwater at this location since 2020.

Groundwater monitoring results in the intermediate and deep wells were generally consistent with the previous FYR period. The downgradient intermediate well MW-33I exceeded the standard for PCE twice between 12/2019 – 03/2024. On-property well R-8I, which exceeded the PCE standard twice in the previous review period, recorded no VOC exceedances, however, beryllium concentrations have increased and stabilized at concentrations above the 4 µg/L MCL (11 µg/L; 04/2024). R-8I also exceeded the standard for nickel several times across the review period. Similar to the previous review period, concentrations of beryllium and nickel at MW-2I routinely exceeded cleanup goals until it was damaged in 11/2021 during redevelopment activities. In the absence of MW-2I, three intermediate and deep wells (MW-4I, MW-14D, and R-11I) were sampled for three consecutive semi-annual monitoring events between March 2022 and March 2023. Except for an initial chromium ARAR exceedance at R-11I, which may have resulted in part from the physical condition of the monitoring well, there were no ARAR exceedances at these wells. These wells were eliminated from the semi-annual monitoring scope of work starting in the second half of 2023. The damaged well was abandoned and subsequently replaced by MW-2I-R in 2024. At MW-24D, chromium and nickel, which registered exceedances during the previous review period, have been below their respective cleanup goals since September 2018.

Surface water

In accordance with the ISCR work plans approved by EPA, surface water and sediment samples were collected at least semi-annually from three locations in the Great Egg Harbor River. SW-4A/SED4A, the most upriver sampling location, is adjacent to the site and northwest of the downgradient plume. SW-2A/SED2A is adjacent to the site and southeast of the downgradient of the plume center. SW-3A/SED3A is the most downstream river location and downgradient of the site. Surface water samples collected in 2019-2024 did not exceed surface water quality standards (SWQS) for VOCs or metals.

Sediment

During this FYR period, sediment samples collected from SED-4A, located in an upstream area of the river downgradient of MW-27S, showed intermittent detections of TCE and PCE. During the 12/2020 sampling event, TCE concentrations exceeded the 0.05 mg/kg sediment project action limit (PAL). All other detections of TCE and PCE during the review period were below their respective sediment PALs. Beryllium was detected in 2019, 2020, 2021, and 2024. Chromium and copper were detected in 2019-2024, as well as nickel and zinc in 2019-2021. All metal concentrations at location SED-4A were below their respective sediment PALs.

Sediment samples collected from SED-2A (located downgradient of MW-31S) exceeded metal PALs in 2020, 2021, and 2023. Mercury was detected at this location during 8 of 13 sampling events and was present above the 1 mg/kg PAL on 5 occasions, with a maximum concentration of 11 mg/kg (12/2020). For 3 of the 5 mercury exceedances at SED-2A, chromium also exceeded its 483 mg/kg PAL, with a maximum observed concentration

of 2,200 mg/kg (12/2020). The most recent mercury and chromium exceedances occurred in 03/2023, and 03/2022, respectively. These data suggest there could be site-related impacts to river sediment in the vicinity of SED-2A, although a seep survey conducted in 2023 did not identify any discrete groundwater discharge points in the river. Copper, nickel, and zinc concentrations at location SED-2A were below the respective sediment PALs. While PCE was detected in 2020 and toluene was detected in 2021 and 2022, all VOC concentrations were below their respective sediment PALs.

All metal concentrations at SED-3A, the most downstream sampling location, were below the respective sediment PALs. Beryllium was detected at this location in 2019 and has been non detect in subsequent years. Chromium was detected in 2019-2024, copper in 2019-2021 and 2023-2024, nickel in 2019-2021 and 2023, and zinc in 2020. Mercury was also detected at SED-3A in 2019 and 2020 at levels below the sediment PAL. Toulene was detected in 2019 and 2020 but at levels that did not exceed the sediment PAL.
Generally, sediment results across the review period were below PALs, although detections of some site contaminants at SED-2A and SED-4A may be suggestive of site-related impacts. Surface water was not impacted above SWQS during the review period. Ongoing ISCR implementation is expected to continue decreasing the abundance of site contaminants in groundwater, thereby reducing potential contaminant flux to the river. Monitoring of surface water and sediment should continue to ensure the remedy is functioning as intended.

Contaminants of Emerging Concern

At the request of EPA, nine monitoring wells were sampled by the PRP Group for contaminants of emerging concern in September 2024. The wells sampled were MW-17S (shallow upgradient background well), MW-38S-R (shallow former buried drum source area well), R-1 (shallow former facility boundary well), R-2 (shallow former facility boundary well), MW-5S (shallow mid-plume well), MW-41S (shallow mid-plume well), MW-42S (shallow downgradient well), MW-43S (shallow downgradient well), and R-8I (intermediate former facility boundary well, proximal to the former wastewater lagoons). These wells and the results are shown in Figure C-12.

<u>PFAS</u>
Collected samples were analyzed using EPA Method 1633 for per- and polyfluoroalkyl substances (PFAS) with promulgated MCLs or GWQS. This included perfluorooctanesulfonic acid (PFOS), perfluorooctanoic acid (PFOA), perfluorononanoic acid (PFNA), hexafluoropropylene oxide dimer acid (HFPO-GenX), perfluorohexanesulfonic acid (PFHxS), and perfluorobutanesulfonic acid (PFBS). One or more PFAS compounds were detected in all nine monitoring wells sampled. However, only two detections exceeded the promulgated standards.

MW-38S-R, the shallow Former Buried Drum Source Area well, had a PFOS concentration of 5.3 ng/L. This exceeds the EPA MCL (4.0 ng/L) but not the NJDEP GWQS (14 ng/L). MW-41S, a shallow mid-plume well, had a concentration of 4.3 ng/L which similarly slightly exceeded the EPA MCL but not the NJDEP GWQS.

<u>1,4-Dioxane</u>
Collected samples were analyzed for 1,4-dioxane using EPA Method 8270E-SIM. 1,4-Dioxane was detected in four monitoring wells (MW-41S, MW-42S, MW-43S, and R-2), but only MW-42S exceeded the 0.4 µg/L NJDEP GWQS, with a concentration of 1.36 µg/L.

<u>1,2,3-TCP</u>
Collected samples were analyzed for 1,2,3-TCP using EPA Method 8011. There were no detections at the Site.

<u>Perchlorate</u>
Collected samples were analyzed for Perchlorate using EPA Method 6850. Perchlorate was detected in four monitoring wells (MW-17S, R-1, R-2, and R-8I), but none of the detections exceeded the NJDEP GWQS of 5 µg/L.

The results do not indicate the site is a source of contaminants of emerging concern.

Site Inspection

The inspection of the Site was conducted on 1/21/2025. In attendance on behalf of EPA were Sara Lupson, EPA RPM; Perry Katz, EPA New Jersey Projects/State Coordination Section Supervisor; John Mason, EPA Geologist; Corrine Healey, EPA Geologist; Abbey States, EPA Risk Assessor; Jinnie Hanlee, EPA Risk Assessor; and Detbra Rosales, EPA Risk Assessor. Also in attendance were representatives from NJDEP including Rory McIntyre, NJDEP Case Manager; Mike Morris, NJDEP Geologist; and Kyle Kuebler, NJDEP Environmental Specialist. In attendance on behalf of the PRP Group were Brian Bussa, KOP Group Project Coordinator; Tom Patterson, Roux Associates Principal Engineer; and Glenn Palmer, Evonik. The purpose of the inspection was to assess the protectiveness of the remedy and the condition of the Site.

The former facility property boundary is enclosed by a fence and security gate. The fence was in good condition at the time of the inspection; however, the PRP Group conveyed that breaches of fence are occasionally found during monthly inspections.

The treatment plant, which was shutdown in 2019 and remained offline at the time of inspection, was in fair condition. The caustic tank system was removed after caustic was discovered leaking from both the storage tank and associated containment. EPA approved the removal in 2022 to eliminate the potential for releases based on the condition of the tank system. Additionally, since the last FYR the treatment plant has been vandalized including breaches of the main electrical service switchgear, transformer, and random electrical panels and conduits. Based on the need to restore the electrical system, replace the caustic tank/containment, and restore all other decommissioned items, it would take an estimated six months to restart the treatment plant if a re-start was determined to be necessary. A cellular-based security camera was installed in August 2023. The camera and associated solar panel were mounted on the treatment plant building facing the storage pad and entrance gate area.

The phytoremediation plot, while dormant for the winter, was in good condition. The plot is well established, and the trees are mature enough to no longer require watering. The irrigation system was shut down in 2019 along with the treatment plant shutdown, but the trees do not show signs of drought stress. There is periodic mowing of the area to maintain access to wells and to control ticks and fungal infections. Fungicide applications take place during the growing season and leaf litter and debris are removed in the late fall to reduce/prevent future fungal impact on the phytoremediation plot.

Areas outside of the former facility property boundary were also inspected. This included external inspection of various monitoring wells, recovery wells, and the infiltration galleries. For the most part, the wells were secured and in good condition. In one instance, the well casing had been vandalized. The wells are inspected regularly and well inspection checklists are submitted with the annual and semi-annual progress reports. Vault covers are repeat targets by vandals for scrap metals. As a result, most of the metal covers have been replaced with materials less desirable to vandals.

The inspection included the Great Egg Harbor River surface water and sediment sampling sites: SW-4A/SED-4A, SW-2A/SED-2A, and SW-3A/SED-3A. For SW-4A/SED-4A and SW-2A/SED-2A, the paths to the river are steep, heavily wooded, and unlikely to be used by the public. However, the path to SW-3A/SED-3A, while steep, is straight, relatively clear, and showed signs of public use.

V. TECHNICAL ASSESSMENT

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

The Site contains three OUs. As stated in this and previous FYRs, the contaminated soil cleanup associated with OU1 and OU2 was completed in 1993. The groundwater remediation associated with OU3 is on-going.

The selected remedy for OU3 is an on-site groundwater extraction, treatment and reinjection system to address the contaminated groundwater. While the groundwater treatment system is currently shutdown to facilitate ISCR testing activities, it operated as intended in the ROD from 1995 thru 2019. During that period, the groundwater treatment system successfully reduced contaminant levels. The ISCR activities completed to date have assisted in further reducing the remaining contaminant levels, though additional work may be required to achieve cleanup levels. Detections of some Site-related contaminants in sediment at SED-2A and SED-4A suggest that contamination may be migrating to the Great Egg Harbor River. Although the concentrations identified are not associated with human health or ecological impacts (further discussed in Question B), their sporadic presence at elevated concentrations indicates that additional work may be needed to prevent unacceptable levels of contaminants from migrating to the Great Egg Harbor River. Periodic assessment of the ISCR program is ongoing and will continue during the upcoming review period. More robust surface water and sediment sampling is suggested to further evaluate whether the contaminants detected are site-related.

A CEA is in place and protects against exposure by preventing the installation of drinking water wells until the groundwater is restored. There is no current potable use of groundwater from the Site.

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?

Human Health:
For all three OUs, the exposure assumptions and the toxicity values that were used during the risk assessments followed EPA guidance at the time and are still valid. Although specific parameters and toxicity values may have changed since that time, the risk assessment process that was used is still consistent with current practice and the need to implement a remedial action remains valid. There are no changes in the physical conditions of the site or site uses that would affect the protectiveness of the selected remedy. The land use considerations and potential exposure pathways considered in the baseline human health risk assessment are still valid. Public access to the former lagoon and Former Buried Drum Areas are restricted by a fence. Additionally, the Site is in the Winslow Fish and Wildlife Management Area and currently zoned as a Recreation and Conservation District.

Several VOCs (1,1,2,2-PCA, ethylbenzene, PCE, and TCE) and metals (beryllium, chromium, nickel, copper, and mercury) in groundwater continue to exceed MCLs downgradient of the source area. As noted above, supplemental sampling for emerging contaminants in 2024 detected 1,4-dioxane and PFAS above current federal MCLs and state MCLs within Site monitoring wells. However, the low magnitude of these detections do not indicate the Site is a source. In addition, since there are no potable wells in the contaminated area, there is no human exposure through the direct contact pathway. Institutional controls are currently in place to restrict future use of Site groundwater.

The potential for soil vapor intrusion into indoor air is evaluated when Site soils and/or groundwater are known or suspected to contain VOCs. Since the Site does not contain any buildings other than the pump and treat facility, the vapor intrusion pathway is currently incomplete. However, future redevelopment of the Site could be a concern due to the remaining VOC exceedances in shallow groundwater. Shallow groundwater data collected during the FYR period was compared to EPA's vapor intrusion screening levels for groundwater. The maximum detected concentrations of TCE and PCE exceeded the upper bound of the acceptable risk range (set at 10^{-4} and a hazard of 1) at several monitoring wells downgradient of the former source area. This does not indicate that a vapor intrusion problem would occur if a building were to be erected over the plume, however, further evaluation of the vapor intrusion pathway is recommended if development of the property were to occur, including Site-specific considerations, such as the type of building, the location of the building relative to screening level exceedances, and the subsurface characteristics at the Site. Development of the property is not expected in the next five years. To ensure protectiveness, this pathway will continue to be assessed during future FYRs.

Sediment data collected during 2020-2024 show chromium and mercury were detected above cleanup levels identified in the ROD**.** Original cleanup levels were based on NJDEP residential soil criteria; the current residential direct contact soil cleanup criteria for mercury is 14 mg/kg which is an increase from 1 mg/kg identified in the ROD. There were no exceedances of 14 mg/kg mercury in sediment during the FYR period. The ROD cleanup level for total chromium is 483 mg/kg. To date, chromium has not been speciated at the site and it is not clear which form is present in the sediment, however, there is no current residential exposure at the site.

The chromium and mercury sediment exceedances are located in the Great Egg Harbor River, which is open to the public as part of the Winslow Fish and Wildlife Management Area. The Winslow Fish and Wildlife Management Area includes popular recreational destinations such as the Blue Hole, which is located northwest of the Site and across the Great Egg Harbor River. As there are no restrictions to entry of the Great Egg Harbor River, direct contact with contaminated sediment is possible under a recreational use scenario. During the Site visit for the current FYR, evidence of access was observed, including All Terrain Vehicle tracks and shoe prints on the snow near a river sampling site.

While there were sporadic exceedances of chromium cleanup levels at SED-2A, the exposure point concentration, based on the 95% upper confidence limit of all sediment data collected during the FYR period, is 242 mg/kg. This concentration is within the target risk range (1 in 10,000 to 1 in 1,000,00) for a recreator exposed to sediment at the site 50 days/year and conservatively assuming that chromium is present entirely in the hexavalent form. However, with an observed maximum sediment chromium concentration of 2,200 mg/kg, it is suggested that chromium be speciated at the Site to further characterize the presence of this metal in upgradient groundwater and sediment. A more robust sampling event that collects sediment and surface water from additional locations in the Great Egg Harbor River, with speciated chromium, is also suggested.

Ecological:
The 1989 Final Endangerment Assessment and the 1990 ROD identified no endangered species or critical habitats within proximity of the Site. However, the Great Egg Harbor River and wetland habitats along the river support migratory species that may be impacted. Terrestrial flora or fauna in the vicinity of the Site could also potentially be exposed directly or through bioaccumulation to site associated contamination. Additionally, a preliminary assessment of the Site designated the swale as a wetland. In this assessment, stressed vegetation and trees were identified in the upper swale and were thought to be caused by metals-contaminated runoff from the Site. The selected remedy of excavating the lagoon sludge, soils, and sediments in the swale eliminated any potential risk to ecological receptors.

Surface water samples collected during this FYR period indicated that concentrations were below New Jersey surface water quality criteria. However, sediment samples show chromium and mercury PALs exceedances at SED-2-A. Despite these exceedances, EPA does not believe ecological receptors are at risk because of the localization of the exceedances. In addition, chromium typically reduces to the more stable and less toxic trivalent form in the environment. While the majority of the chromium present likely exists in the trivalent form, it is suggested that more robust sampling of surface water and sediment from the Great Egg Harbor be performed in the next review period (as stated under Other Findings in Section VII below).

RAOs:
The RAOs for groundwater in the 1990 ROD include mitigating groundwater contamination such that no unacceptable levels of contaminants migrate to the Great Egg Harbor River; mitigating the groundwater contamination such that ARARs are met; and mitigating the groundwater contamination such that no unacceptable risk to human health can occur. These RAOs are still valid.

The ISCR testing activities will continue to be evaluated to determine if there is a continued decrease in site contaminants in groundwater and subsequently reduced potential contaminant flux to the river. Consistent monitoring of groundwater, surface water, and sediment will evaluate progress towards meeting the RAOs.

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 affect the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
OU1, OU2, and OU3

OTHER FINDINGS

The following findings were identified during the FYR and may improve performance of the remedy and management of O&M, but do not affect current and/or future protectiveness:

- Modify the Site Operations, Maintenance and Monitoring (OM&M) Plan to include the following:
  - Semi-annual sampling at the surface water and sediment locations SW-2A/SED-2A, SW-3A/SED-3A, and SW-4A/SED-4A.
- Speciation of chromium at sediment locations SED-2A, SED-3A, and SED-4A and groundwater in upgradient monitoring wells in addition to completing a sampling event targeting more sediment and surface water locations in the river.
- Analysis for concentrations of VOC breakdown products with federal MCLs and/or state groundwater quality standards (including but not limited to cis-1,2-DCE and vinyl chloride) across the site monitoring network.
- Repair/replace the damaged well casing observed during the January 2025 inspection.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: OU3	*Protectiveness Determination:* Protective
Protectiveness Statement: The remedy at OU3 is protective of human health and the environment.	

Sitewide Protectiveness Statement
Protectiveness Determination: Protective
Protectiveness Statement: The remedy at the King of Prussia Superfund Site is protective of human health and the environment.

VIII. NEXT REVIEW

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

APPENDIX A – REFERENCE LIST

Documents, Data, and Information Reviewed in Completing the Five-Year Review

Document Title, Author	Date
Record of Decision for the King of Prussia Superfund Site, EPA	1990
Record of Decision for the King of Prussia Superfund Site, EPA	1995
Site Operations, Maintenance and Monitoring Plan, Rev 1, Roux Associates	2012
ISCR Pilot Test Report, Roux Associates	2014
In-Situ Chemical Reduction Pilot Test Summary Report, Roux Associates	2018
Proposal for the Groundwater Shutdown and Remedial Optimization Testing for Operable Unit 3, Roux Associates	2019
Fifth Five-Year Review, EPA	2020
Permit-by-Rule Amendment Authorization Request Supplemental Test In-Situ Chemical Reduction Injection Program, Roux Associates	2020
Semi-Annual Progress Reports 2020-2024, Roux Associates	2020-2024
In-Situ Chemical Reduction (ISCR) Polishing Injections and Monitoring Work Plan - Revision 1, Roux Associates	2023
Contaminants of Emerging Concern Groundwater Sampling Workplan	2024
Contaminants of Emerging Concern Groundwater Sampling Summary Memorandum, Roux Associates	2024

APPENDIX B - CHRONOLOGY OF SITE EVENTS

Events	Date
Operation of the waste recycling facility began.	1971
Waste recycling operations cease and the Site was abandoned.	1973-1974
NJDEP was notified of waste recycling activities.	1975
NJDEP inspected and collected groundwater samples at the Site.	1976
The Site was placed on the National Priorities List.	1985
RI/FS began.	1985
Buried drums and plastic containers were excavated and removed from the Site.	1989
RI/FS and Supplemental Feasibility Study (SFS) were issued to the public.	1990
EPA issued a ROD for the Site to address soils, groundwater, and buried drums.	1990
PRPs signed an Administrative Order to complete the remedial activities described in the ROD.	1991
The removal of buried drums from the Former Buried Drum Area was completed by EPA under a removal action.	1991
EPA removed the tankers and their contents from the Site.	1991
Contaminated soil associated with the tankers area was removed and treated by soil washing. Approximately 19,200 tons of metal contaminated soil were removed and treated by the PRP.	1993
Focused Feasibility Study to address the contaminated soil in the Former Buried Drum Area was completed by the PRPs. Soil removal was selected.	1993
The PRPs completed the removal of the soil from the Former Buried Drum Area of the Site.	1994
EPA approved the RD report for the groundwater treatment system.	1994
EPA issued a No Further Action ROD for the Former Buried Drum Area.	1995
Operation of the groundwater treatment plant began.	1995
EPA completed First Five-year Review	2000
EPA completed Second Five-year Review	2005
EPA completed Third Five-year Review	2010
PRPs completed first ISCR Study	2014
EPA completed Fourth Five-year Review	2015
PRPs completed second ISCR Study	2018
PRP Submitted Proposal for the GWRTS Shutdown and Remedial Optimization Testing for OU 3	2019
EPA approved Work Plan to Shut-down the Treatment Plant	2019
PRPs Shut-down Treatment Plan	2019
PRP conducted ISCR injections as part of the GWRTS Shutdown and Remedial Optimization Test	2019
EPA completed Fifth Five-year Review	2020
PRP conducted supplemental ISCR injections	2020
PRP conducted polishing ISCR injections	2023
PRP conducting sampling for contaminants of emerging concern	2024

APPENDIX C – SITE MAPS AND FIGURES

Figure C-1 – Site Location Map

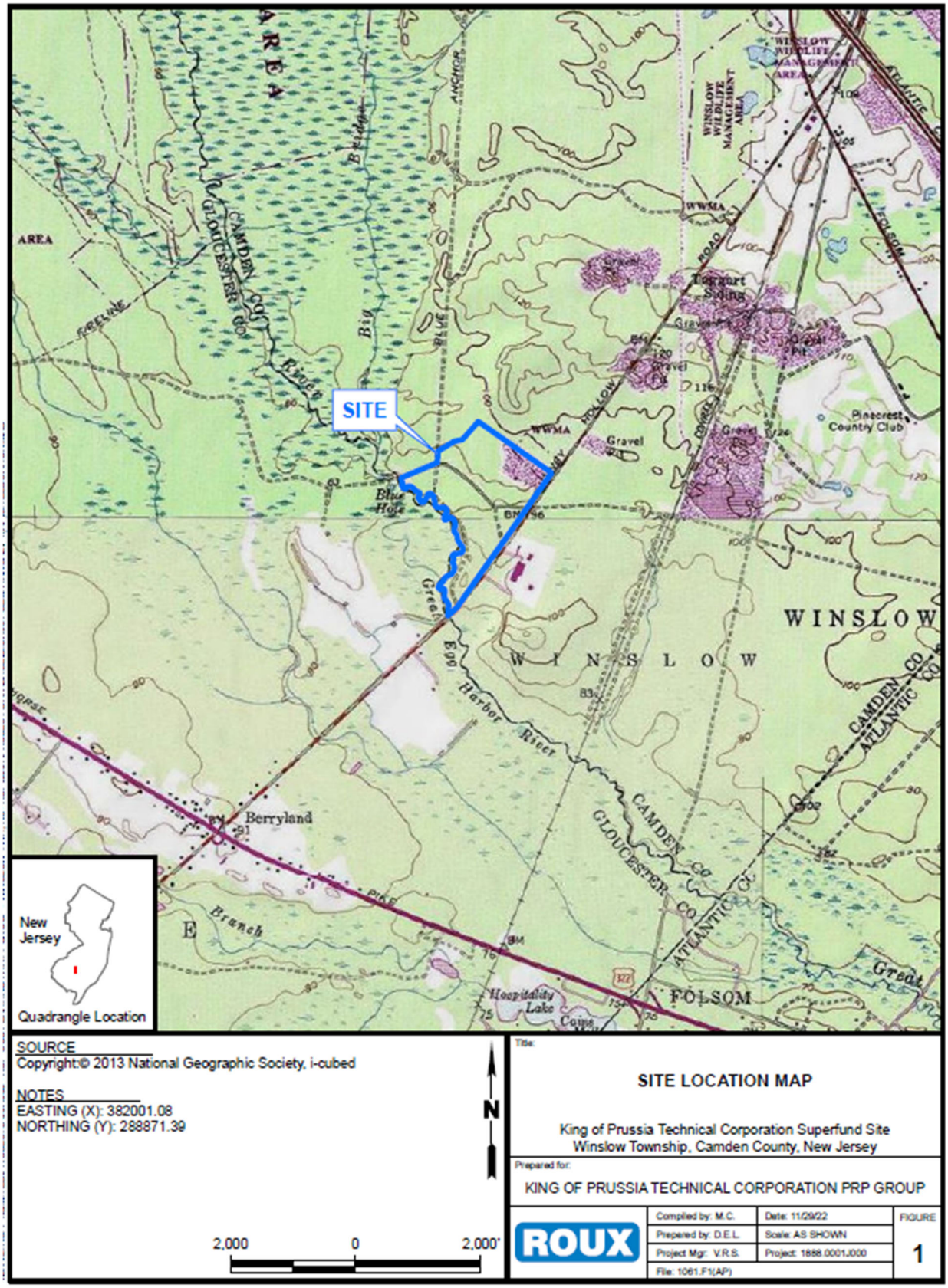


Figure C-2 - Aerial Photograph/Site Plan

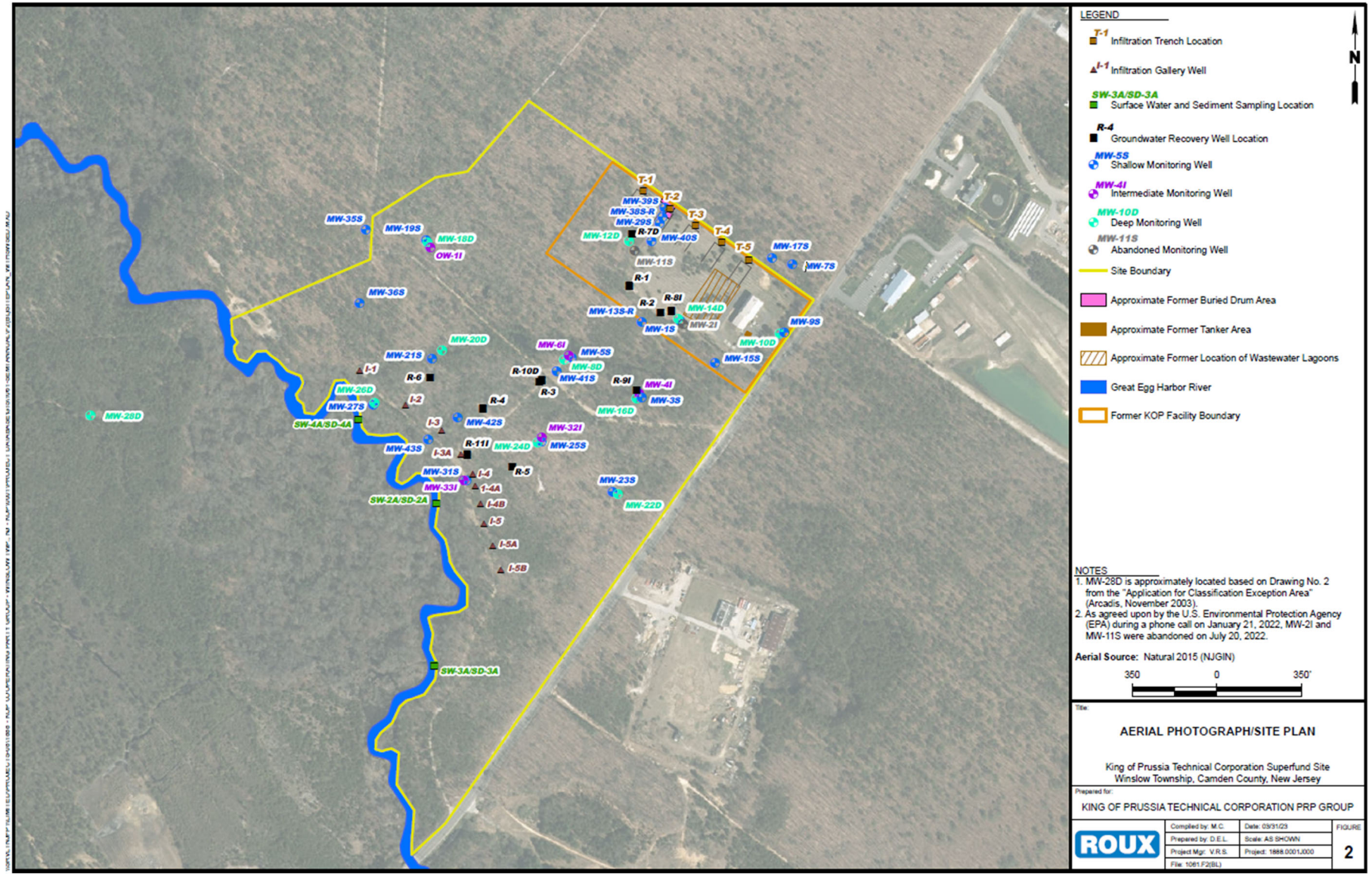


Figure C-3 – Annual Sampling Locations

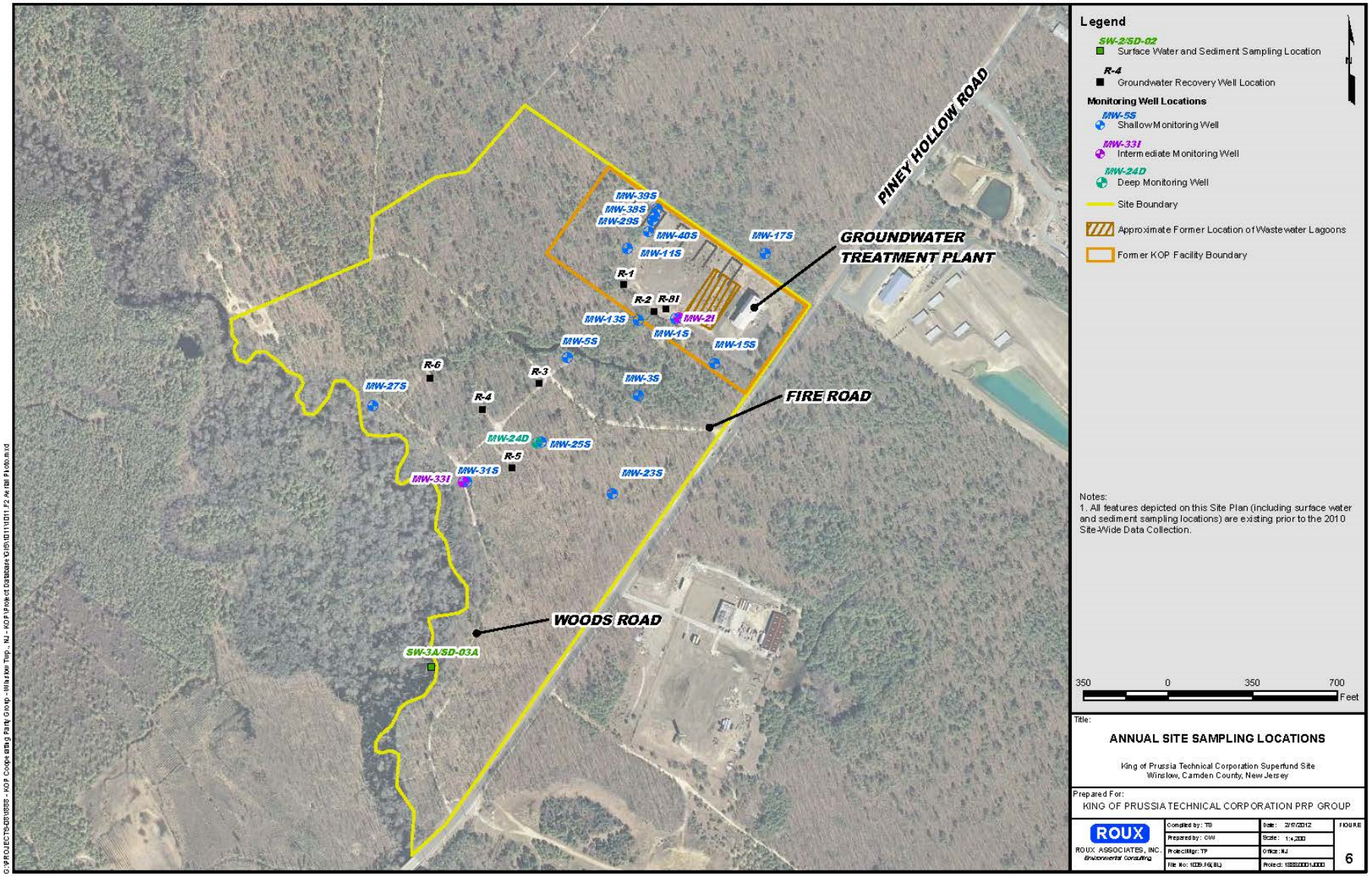


Figure C-4- Semi-Annual Sampling Locations

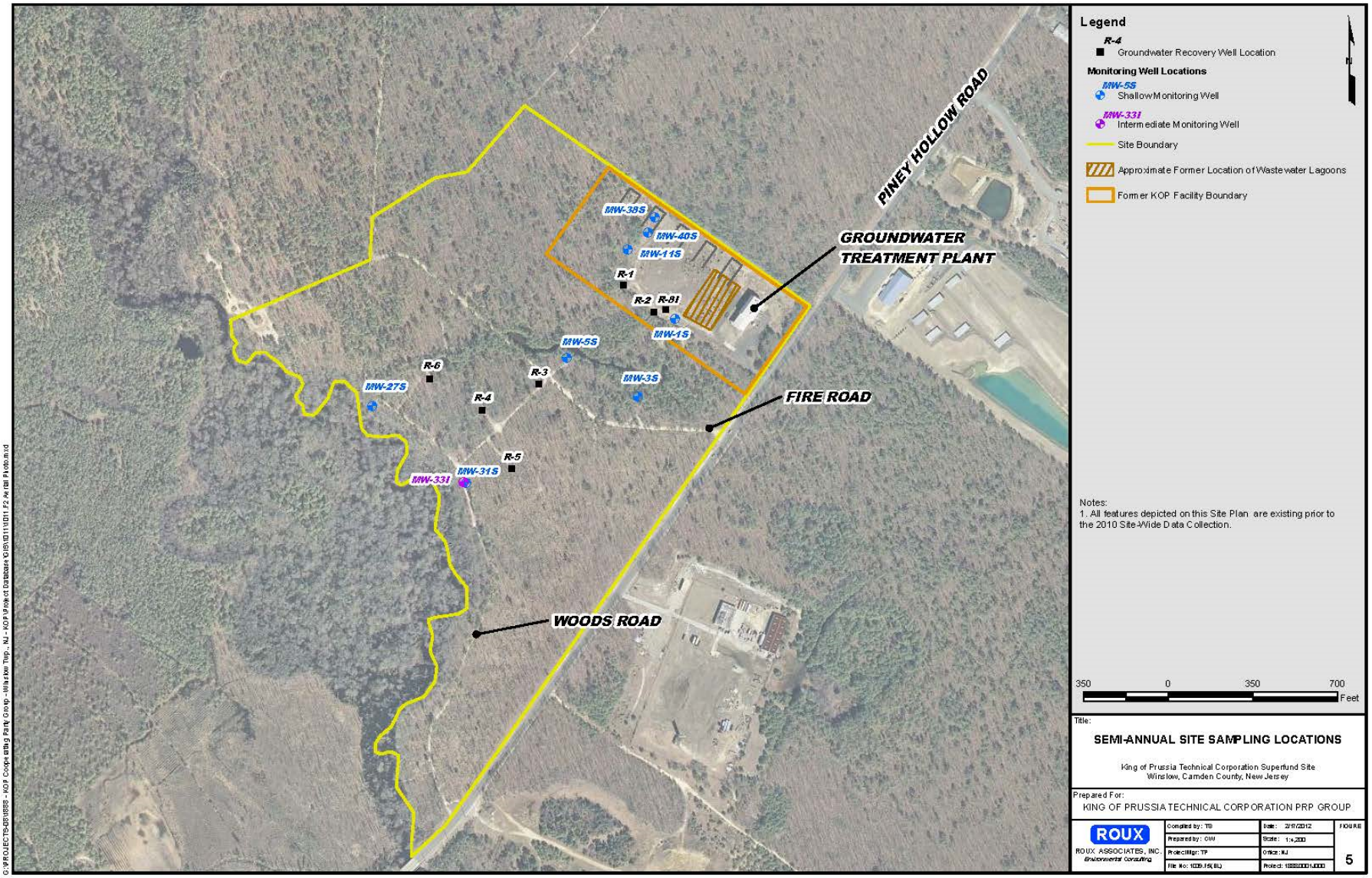


Figure C-5- PCE and TCE in R-1

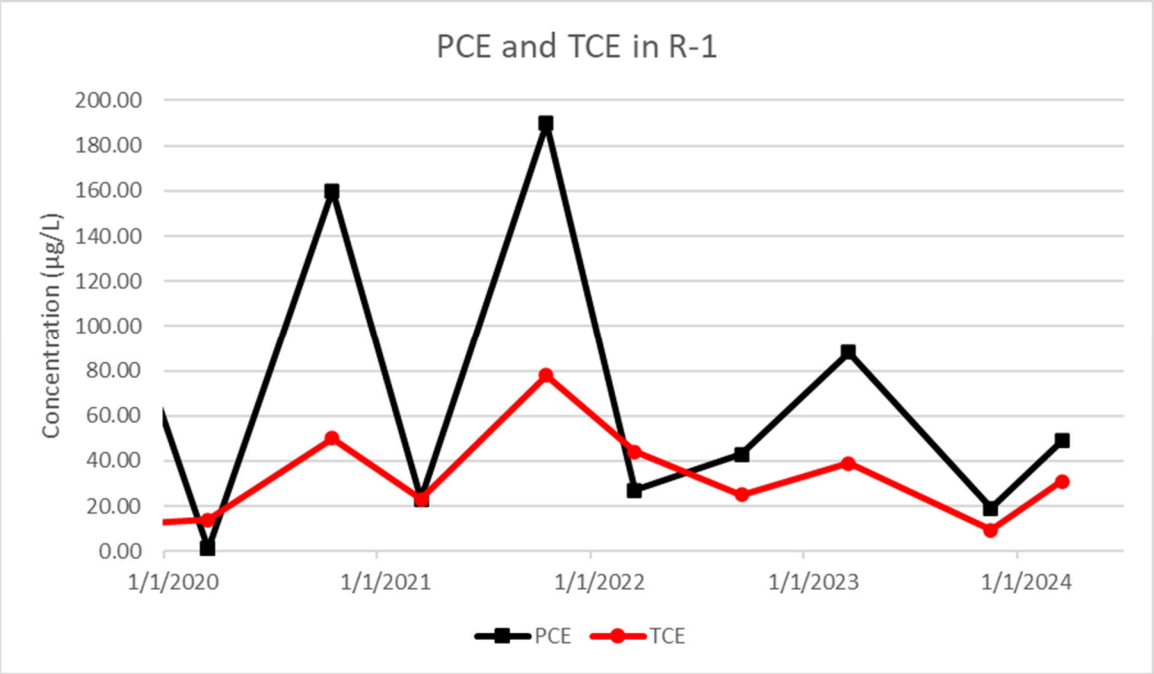


Figure C-6- VOCs in MW-5S

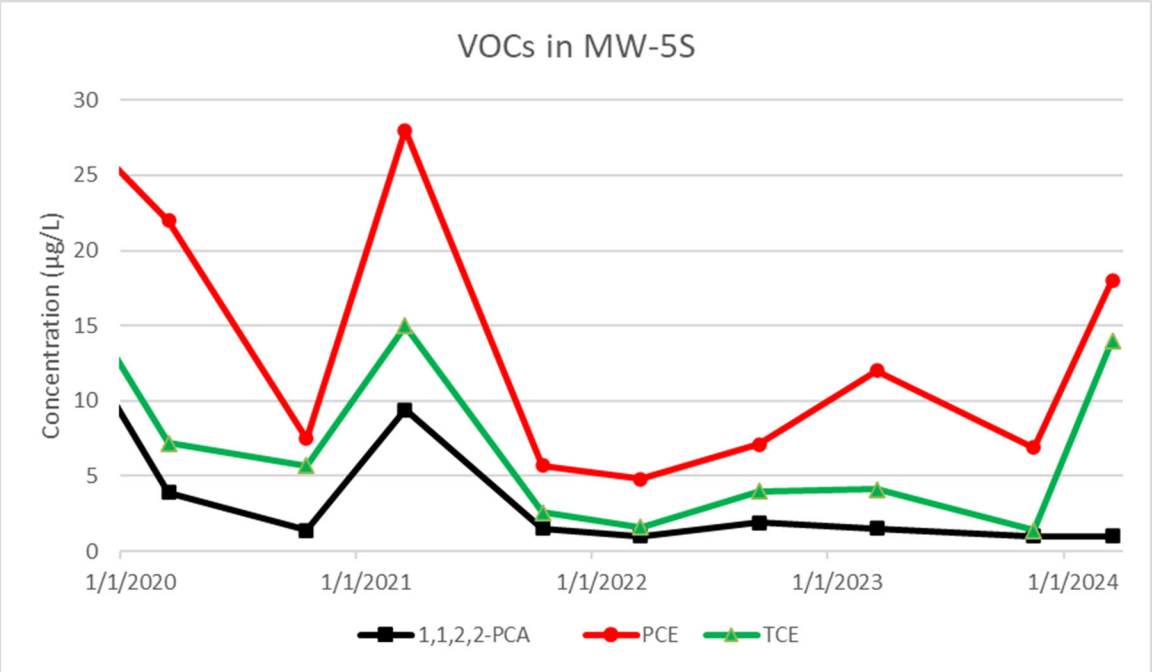


Figure C-7- Beryllium in MW-3S

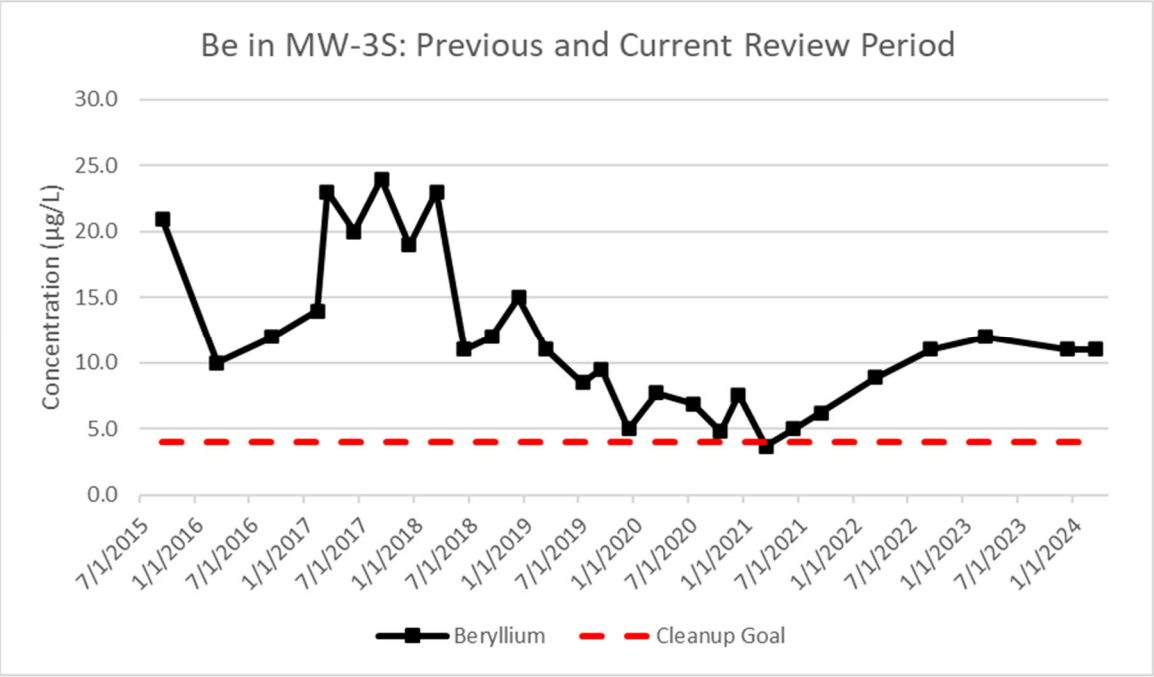


Figure C- 8 VOCs in MW-42S

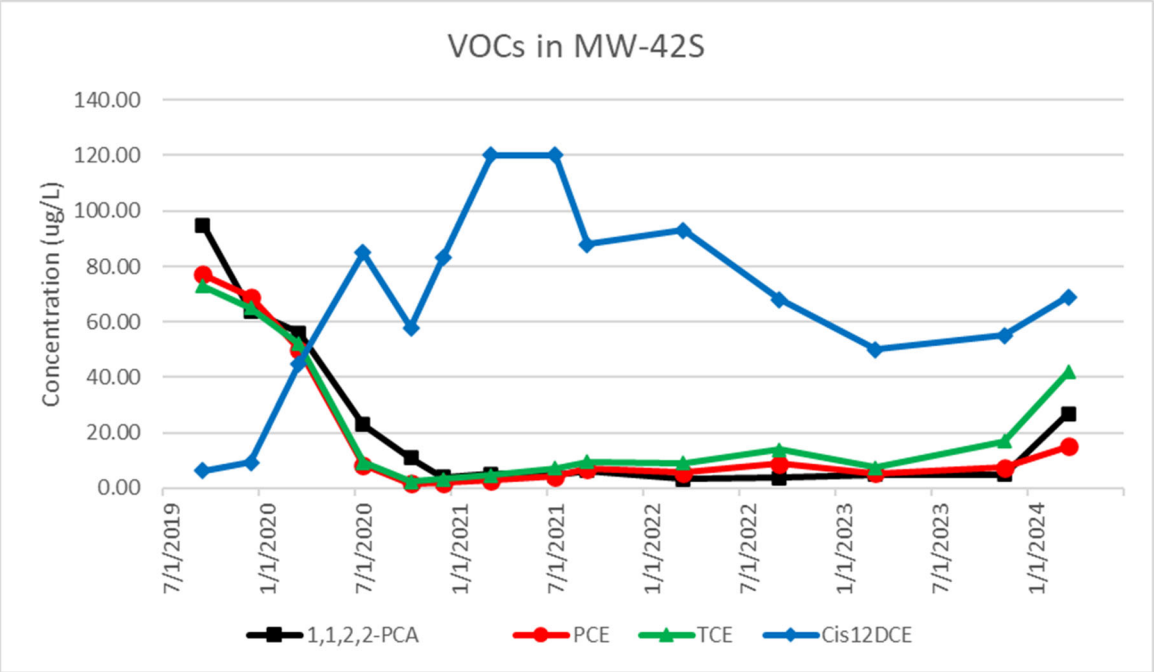


Figure C-9 - VOCs in MW-43S

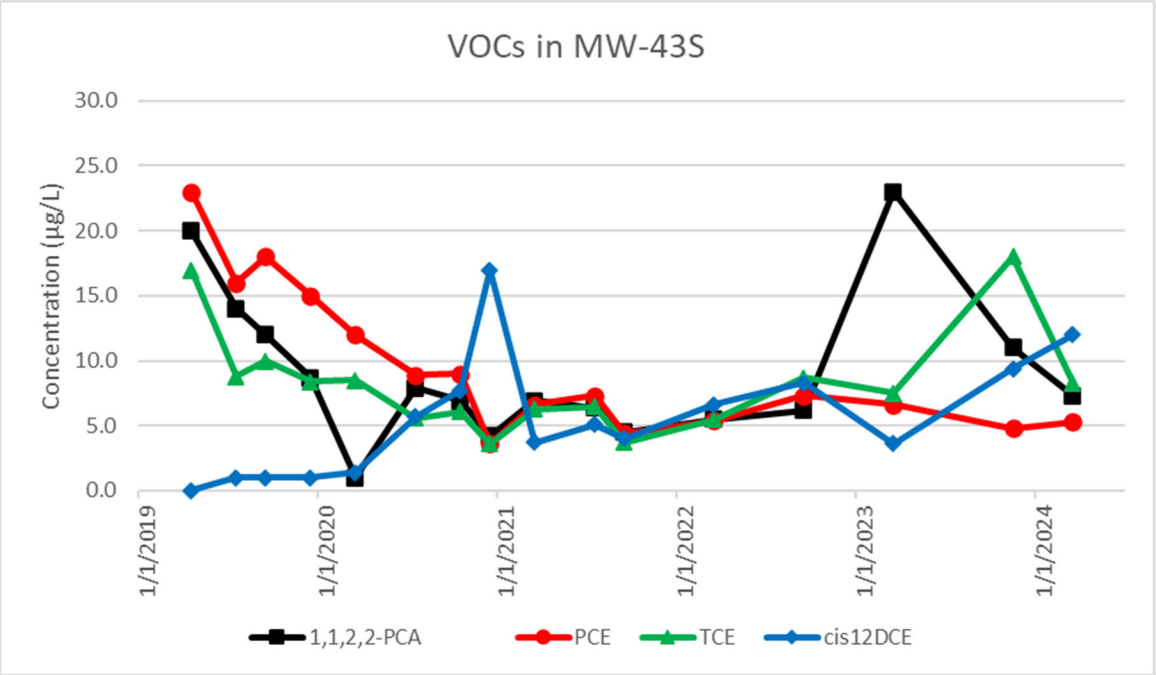


Figure C-10 - Beryllium in R-4

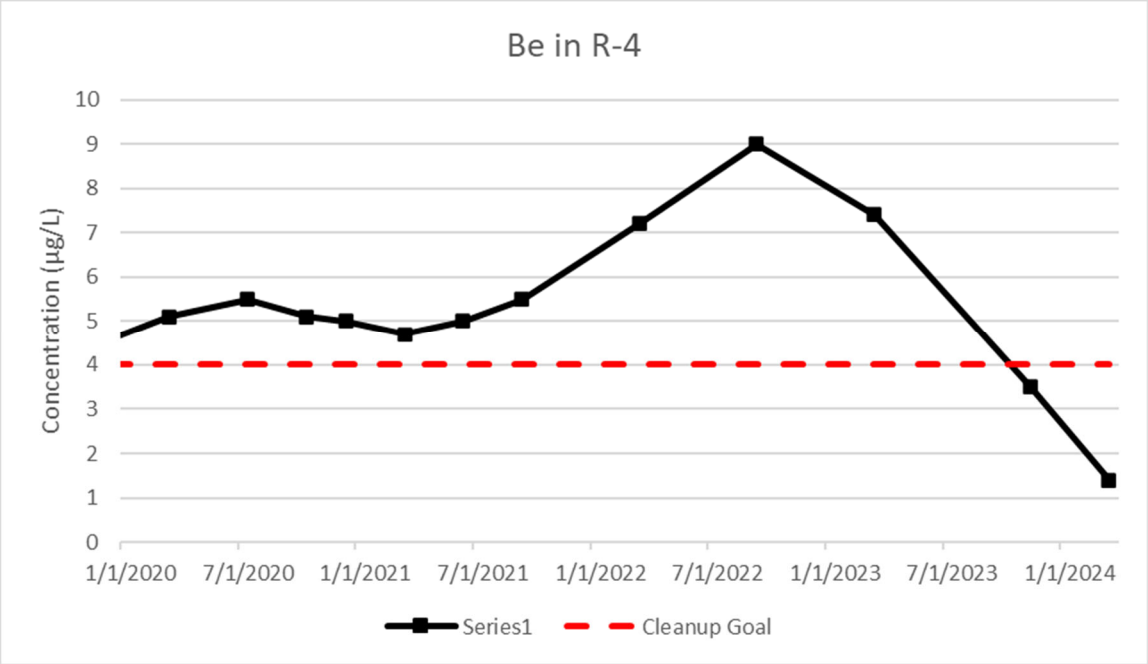


Figure C-11 - Mercury in MW-43S

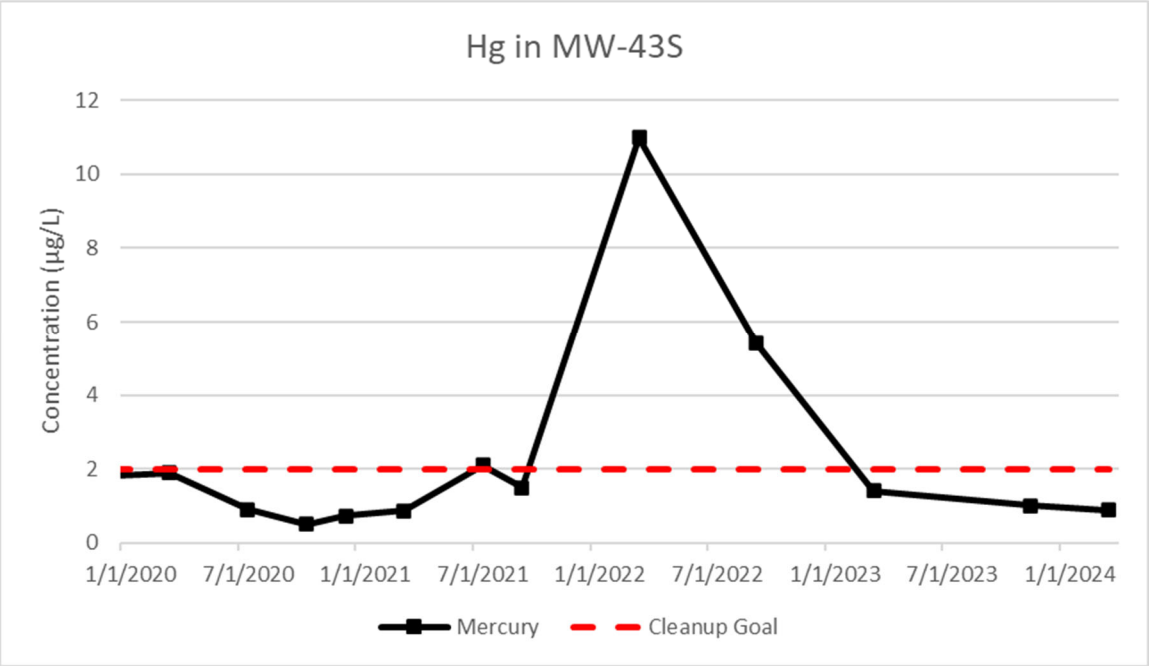
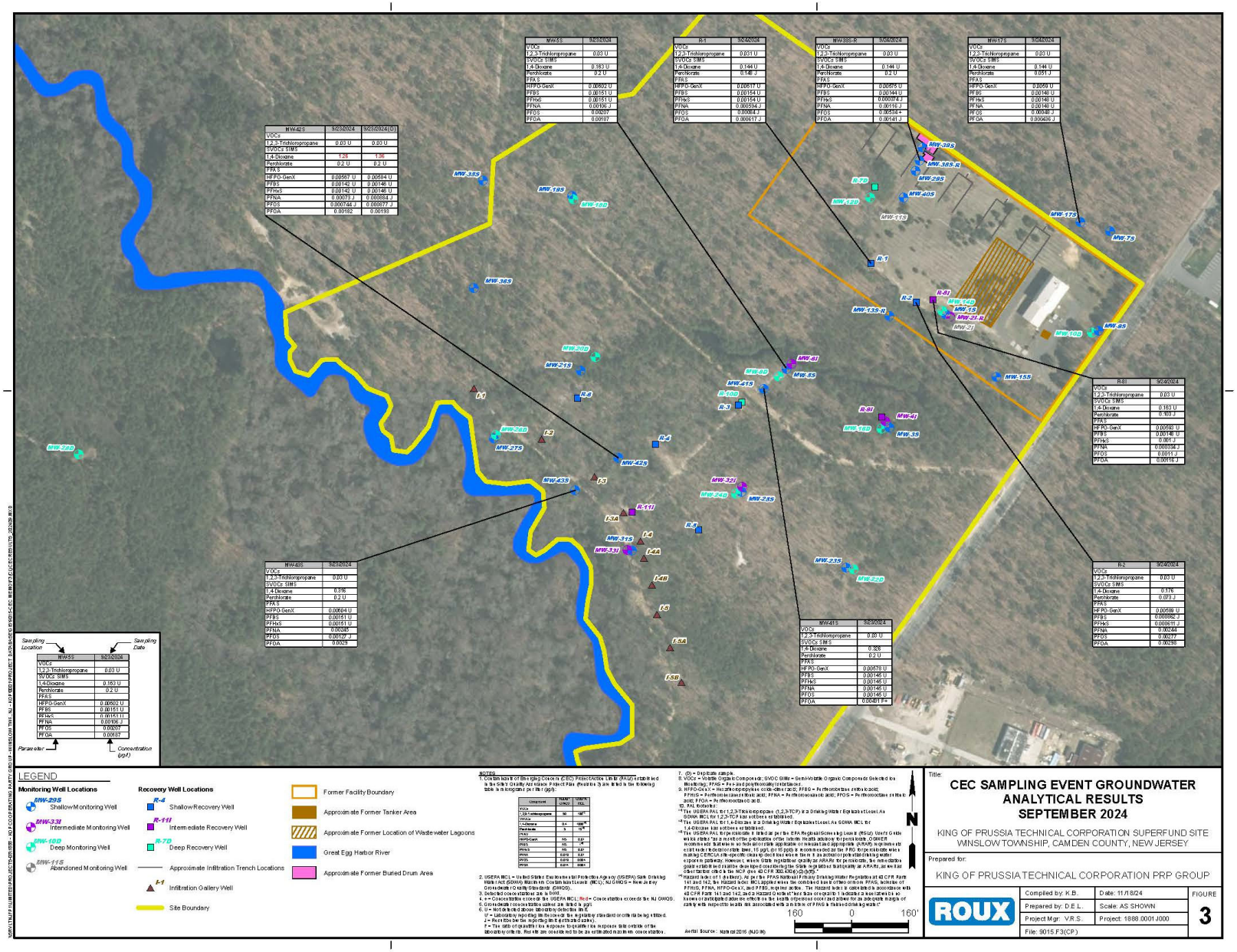


Figure C-12 – Contaminants of Emerging Concern Sampling Results



APPENDIX D – REMEDY RESILIENCE ASSESSMENT

Three tools were utilized to assess the King of Prussia Superfund Site. Screenshots from each of the tools assessed are included herein.

The first tool used was the *CMRA.* The CMRA tool was used to explore five hazards (extreme heat, drought, wildfire, flooding, and coastal inundation) for Camden County, where the Site is located. According to this tool, the National Risk Index Rating for extreme heat is "Relatively High." There is a projected increase in the number of days per year with maximum temperatures >100°F, as shown in Figure D-1. However, increases in temperature over time are not expected to impact the OU3 remedy as the groundwater treatment plant is not currently operational and activities are limited to periodic groundwater sampling, inspection, and injection.

The National Risk Index Rating for drought is "Relatively Low." Figure D-2 shows an increase in average annual total precipitation. However, it is coupled with a decrease in days per year with precipitation. The National Risk Index Rating for wildfire is "Relatively Moderate". As shown in Figure D-3, there is an expected increase in the number of dry days per year and an increase in the number of consecutive dry days per year. This is paired with an increase in annual days with a maximum temperature above 100°F. However, as the groundwater treatment plant is not currently operational and activities on site are limited, wildfires are not expected to impact the remedy. As part of the limited decommissioning of the groundwater treatment plant, potential chemical hazards were removed from the building to the extent possible. The Winslow Township Fire Department completed an inspection, issued Fire Safety Permit No. 20-3946 for the building, and granted approval for de-energizing the building. The building currently houses fire extinguishers, which were last certified in February 2024.

The tool shows a National Risk Index Rating of "Relatively High" for flooding. Figure D-4 shows an increase in the annual total precipitation, combined with an increase in the number of annual days that exceed the 99th percentile precipitation. However, as the groundwater treatment plant is not currently operational and activities on site are limited, flooding is not expected to have impact the remedy. Additionally, due to past concerns of flooding, preventative measures were incorporated into the Site Operations, Maintenance and Monitoring Plan. When the treatment plant is operational, these include:

- Cleaning the infiltration galleries to improve percolation of effluent groundwater from the infiltration gallery leach tanks to groundwater so that a greater percentage of groundwater pump and treat system plant effluent flow can be directed to the infiltration galleries; and
- Balancing groundwater pump and treat system effluent flow to the infiltration trenches and infiltration galleries to avoid overloading the infiltration trenches.

A pilot-scale phytotechnology plot was also planted in the infiltration trench area to consume excess water in that area.

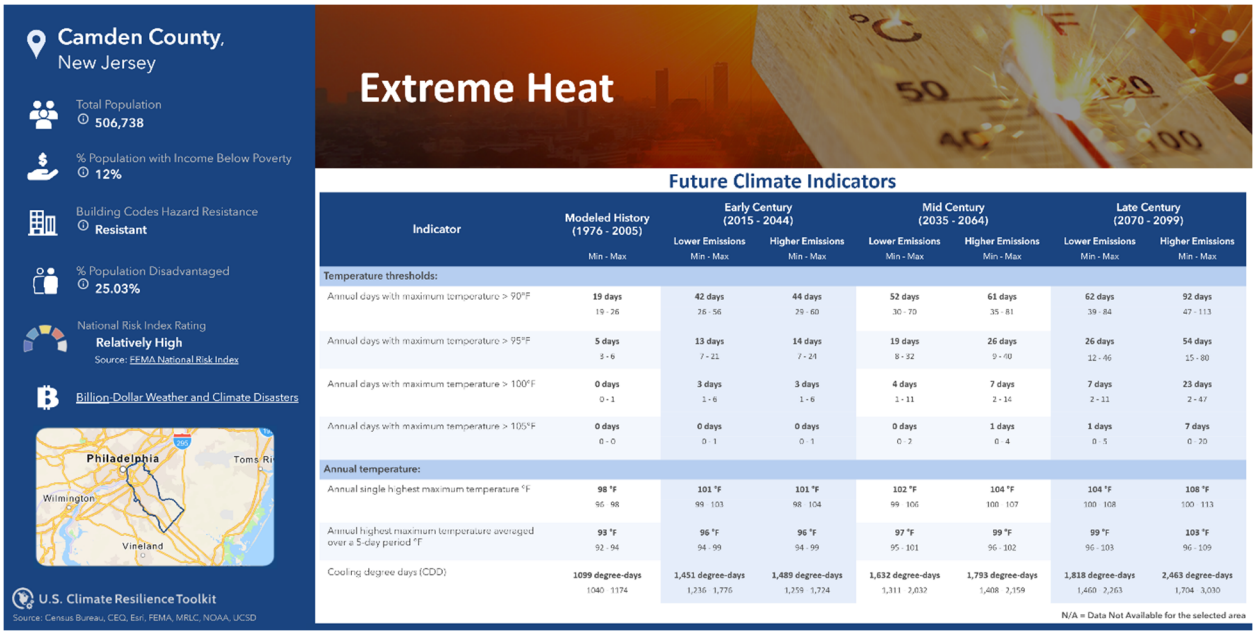
As shown on Figure D-5, the National Risk Index Rating for coastal inundation is "Relatively Moderate". However, the second tool utilized, NOAA Sea Level Rise Viewer, indicates that although located adjacent to the Great Egg Harbor River, the site is not expected to experience any flooding related to sea level rise. This can be seen through the comparison of Figures D-6 and D-7, which show the site, marked with a red star, at current conditions and with a 10-foot sea level rise respectively.

The final tool utilized is called the USGS U.S. Landslide Inventory. This tool was used to explore the national landslide inventory and landslide susceptibility. As shown by Figure D-9, there have been no

landslides recorded in the vicinity of the site, which is outlined in in orange on the figure. The figure also shows that the bulk of the site has negligible risk of landslide (no color) while the bank of the river has a relatively low risk of landslide (yellow and orange areas).

Based on this information, potential Site impacts from severe weather events have been assessed, and the performance of the remedy may be impacted by increased risk of wildfires and inland flooding. However, given the status of the pump and treat remedy, impacts are likely to be minimal.

Figure D-1. Extreme Heat Risk for Camden County

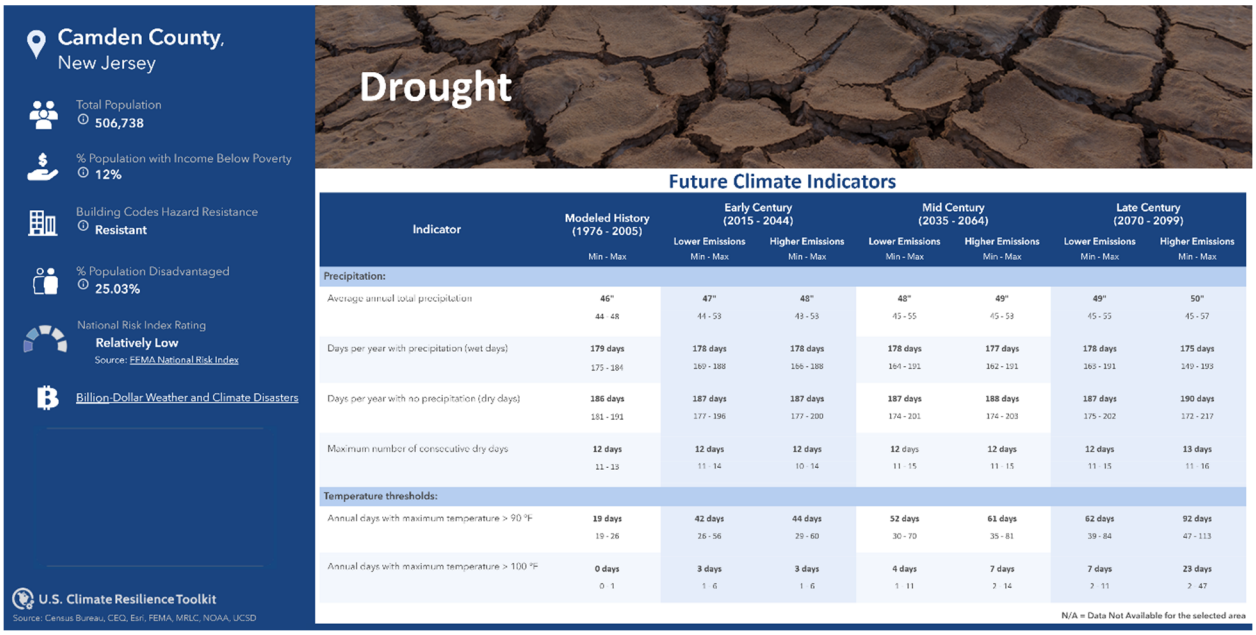


Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Temperature thresholds:							
Annual days with maximum temperature > 90°F	19 days 19 - 26	42 days 26 - 56	44 days 29 - 60	52 days 30 - 70	61 days 35 - 81	62 days 39 - 84	92 days 47 - 113
Annual days with maximum temperature > 95°F	5 days 3 - 6	13 days 7 - 21	14 days 7 - 24	19 days 8 - 32	26 days 9 - 40	26 days 12 - 46	54 days 15 - 80
Annual days with maximum temperature > 100°F	0 days 0 - 1	3 days 1 - 6	3 days 1 - 6	4 days 1 - 11	7 days 2 - 14	7 days 2 - 11	23 days 2 - 47
Annual days with maximum temperature > 105°F	0 days 0 - 0	0 days 0 - 1	0 days 0 - 1	0 days 0 - 2	1 days 0 - 4	1 days 0 - 5	7 days 0 - 20
Annual temperature:							
Annual single highest maximum temperature °F	98 °F 96 - 98	101 °F 99 - 103	101 °F 98 - 104	102 °F 99 - 106	104 °F 100 - 107	104 °F 100 - 108	108 °F 100 - 113
Annual highest maximum temperature averaged over a 5-day period °F	93 °F 92 - 94	96 °F 94 - 99	96 °F 94 - 99	97 °F 95 - 101	99 °F 96 - 102	99 °F 96 - 103	103 °F 96 - 109
Cooling degree days (CDD)	1099 degree-days 1040 - 1174	1,451 degree-days 1,236 - 1,776	1,489 degree-days 1,259 - 1,724	1,632 degree-days 1,311 - 2,032	1,793 degree-days 1,408 - 2,159	1,818 degree-days 1,460 - 2,263	2,463 degree-days 1,704 - 3,030

N/A = Data Not Available for the selected area

Figure D-2: Drought Risk for Camden County



Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Average annual total precipitation	46"	47"	48"	48"	49"	49"	50"
	44 - 48	44 - 53	43 - 53	45 - 55	45 - 53	45 - 55	45 - 57
Days per year with precipitation (wet days)	179 days	178 days	178 days	178 days	177 days	178 days	175 days
	175 - 184	169 - 188	166 - 188	164 - 191	162 - 191	163 - 191	149 - 193
Days per year with no precipitation (dry days)	186 days	187 days	187 days	187 days	188 days	187 days	190 days
	181 - 191	177 - 196	177 - 200	174 - 201	174 - 203	175 - 202	172 - 217
Maximum number of consecutive dry days	12 days	12 days	12 days	12 days	12 days	12 days	13 days
	11 - 13	11 - 14	10 - 14	11 - 15	11 - 15	11 - 15	11 - 16
Temperature thresholds:							
Annual days with maximum temperature > 90 °F	19 days	42 days	44 days	52 days	61 days	62 days	92 days
	19 - 26	26 - 56	29 - 60	30 - 70	35 - 81	39 - 84	47 - 113
Annual days with maximum temperature > 100 °F	0 days	3 days	3 days	4 days	7 days	7 days	23 days
	0 - 1	1 - 6	1 - 6	1 - 11	2 - 14	2 - 11	2 - 47

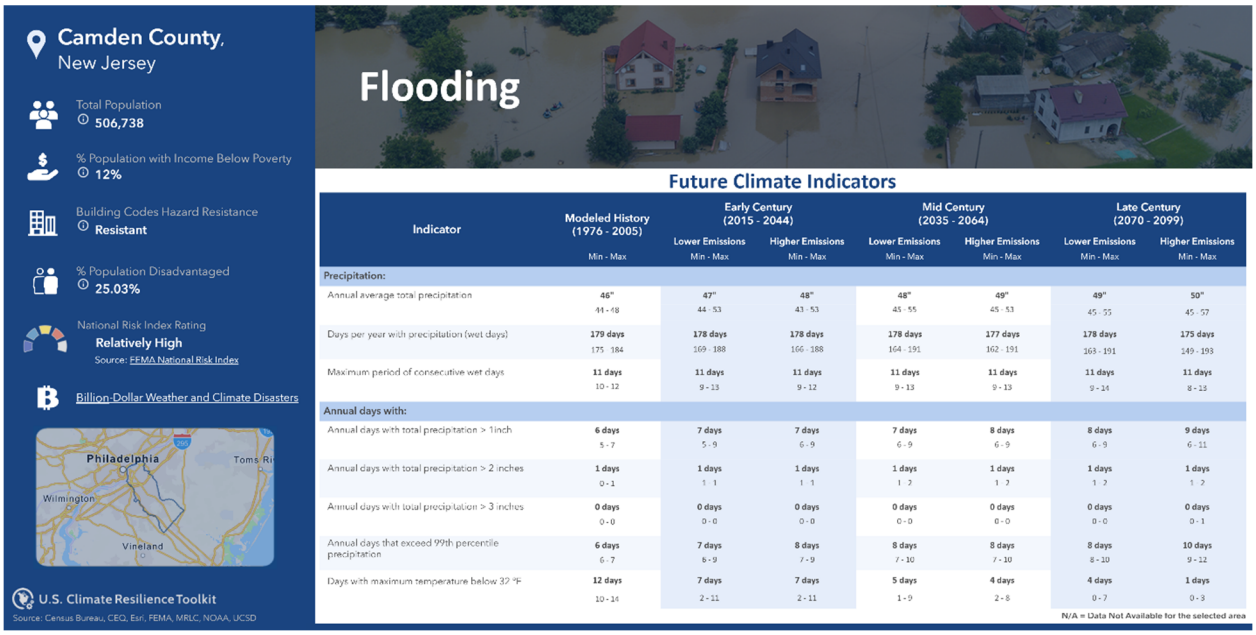
N/A = Data Not Available for the selected area

Figure D-3: Wildfire Risk for Camden County

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Days per year with no precipitation (dry days)	186 days	187 days	187 days	187 days	188 days	187 days	190 days
	181 - 191	177 - 196	177 - 200	174 - 201	174 - 203	175 - 202	172 - 217
Maximum number of consecutive dry days	12 days	12 days	12 days	12 days	12 days	12 days	13 days
	11 - 13	11 - 14	10 - 14	11 - 15	11 - 15	11 - 15	11 - 16
Days per year with precipitation (wet days)	179 days	178 days	178 days	178 days	177 days	178 days	175 days
	175 - 184	169 - 188	166 - 188	164 - 191	162 - 191	163 - 191	149 - 193
Temperature thresholds:							
Annual days with maximum temperature > 90°F	19 days	42 days	44 days	52 days	61 days	62 days	92 days
	19 - 26	26 - 56	29 - 60	30 - 70	35 - 81	39 - 84	47 - 113
Annual days with maximum temperature > 100°F	0 days	3 days	3 days	4 days	7 days	7 days	23 days
	0 - 1	1 - 6	1 - 6	1 - 11	2 - 14	2 - 11	2 - 47

N/A = Data Not Available for the selected area

Figure D-4: Flooding Risk for Camden County



Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Annual average total precipitation	46" 44 - 48	47" 44 - 53	48" 43 - 53	48" 45 - 55	49" 45 - 53	49" 45 - 55	50" 45 - 57
Days per year with precipitation (wet days)	179 days 175 - 184	178 days 169 - 188	178 days 166 - 188	178 days 164 - 191	177 days 162 - 191	178 days 163 - 191	175 days 149 - 193
Maximum period of consecutive wet days	11 days 10 - 12	11 days 9 - 13	11 days 9 - 12	11 days 9 - 13	11 days 9 - 13	11 days 9 - 14	11 days 8 - 13
Annual days with:							
Annual days with total precipitation > 1 inch	6 days 5 - 7	7 days 5 - 9	7 days 6 - 9	7 days 6 - 9	8 days 6 - 9	8 days 6 - 9	9 days 6 - 11
Annual days with total precipitation > 2 inches	1 days 0 - 1	1 days 1 - 1	1 days 1 - 1	1 days 1 - 2	1 days 1 - 2	1 days 1 - 2	1 days 1 - 2
Annual days with total precipitation > 3 inches	0 days 0 - 0	0 days 0 - 0	0 days 0 - 0	0 days 0 - 0	0 days 0 - 0	0 days 0 - 0	0 days 0 - 1
Annual days that exceed 99th percentile precipitation	6 days 6 - 7	7 days 6 - 9	8 days 7 - 9	8 days 7 - 10	8 days 7 - 10	8 days 8 - 10	10 days 9 - 12
Days with maximum temperature below 32 °F	12 days 10 - 14	7 days 2 - 11	7 days 2 - 11	5 days 1 - 9	4 days 2 - 8	4 days 0 - 7	1 days 0 - 3

Figure D-5: Coastal Inundation Risk for Camden County

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Sea level rise:							
Percent of selected county impacted by global sea level rise	N/A	0%	0%	0%	0%	1%	1%

Figure D-6: Water Level at Site at Current Conditions

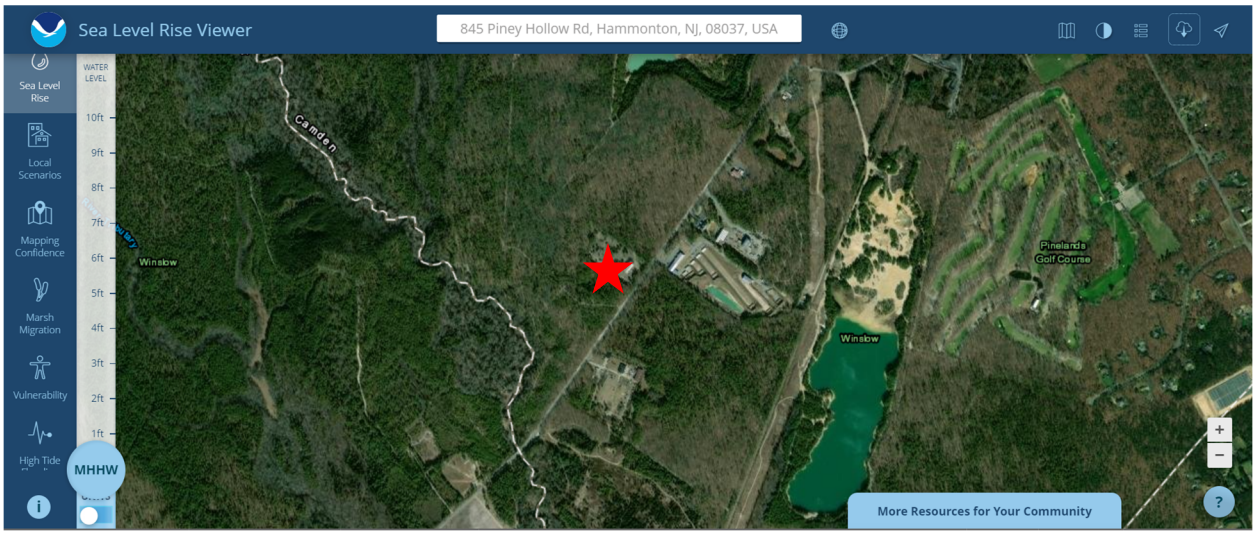


Figure D-7: Water Level at Site with 10-foot Sea Level Rise

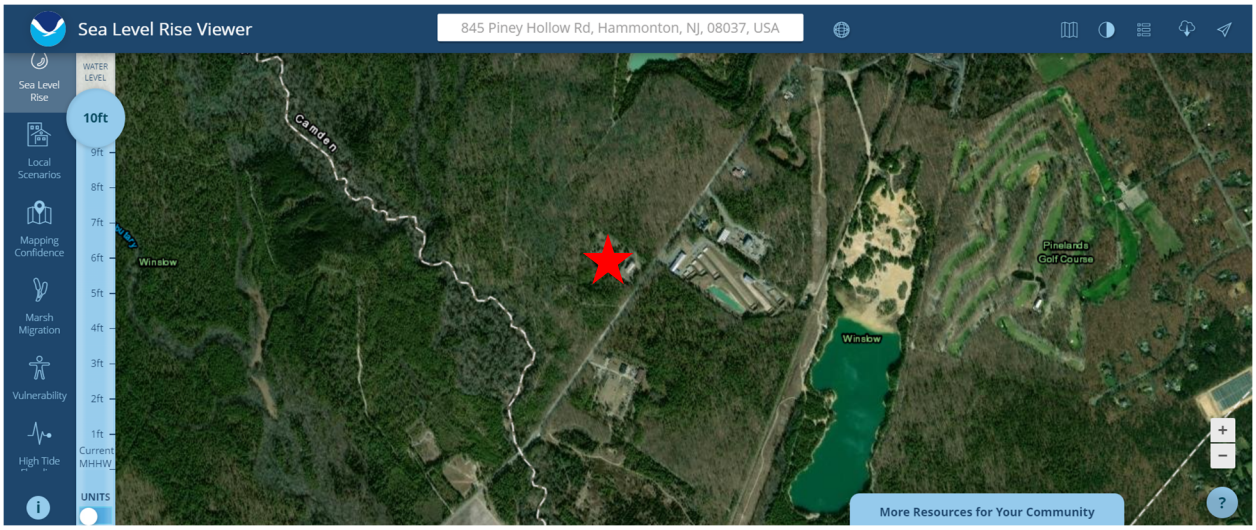


Figure D-8: Landslide Inventory and Susceptibility at the Site