FIFTH FIVE-YEAR REVIEW REPORT FOR CARROLL AND DUBIES SEWAGE DISPOSAL SUPERFUND SITE TOWN OF DEERPARK, ORANGE 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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Table of Contents

LIST OF ABBREVIATIONS & ACRONYMS

CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COCs	Contaminants of Concern
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
MCLs	Maximum Contaminant Levels
mg/kg	Milligram per kilogram
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OU	Operable Unit
O&M	Operation and Maintenance
PCE	Tetrachloroethene
PRPs	Potentially Responsible Parties
ROD	Record of Decision
RA	Remedial Action
RAO	Remedial Action Objective
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
RPM	Remedial Project Manager
TCE	Trichloroethene
ug/L	Micrograms per Liter
VOC	Volatile Organic Compound

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 FYRs such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

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

This is the fifth FYR for the Carroll and Dubies Sewage Disposal (C&D) Superfund Site (Site), located in the City of Port Jervis, Town of Deerpark, Orange County, New York. The triggering action for this statutory FYR is the completion date of the previous FYR, dated March 3, 2020. The FYR has been prepared due to the fact that hazardous substances, pollutants, or contaminants remain at the Site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The Site is being addressed in two phases or operable units (OUs). These OUs address the identification and abatement of the source of contamination on the property and the groundwater contamination at the Site. The OUs are:

- OU1 - Excavation and off-site disposal of waste, contaminated soil and sediments.
- OU2 - Natural attenuation of organic contaminants in groundwater, implementation of institutional controls (ICs), groundwater monitoring, and sampling of sediment and surface water in Gold Creek.

Both OUs are included in this FYR.

The C&D Superfund Site FYR was led by EPA Remedial Project Manager (RPM) Maria Jon. Participants included: Damian Duda (Eastern New York Remediation Section Chief), Julie McPherson (Human Health and Ecological Risk Assessor), John Mason (Hydrogeologist), and Natalie Loney (Community Involvement Coordinator (CIC)). The potentially responsible party (PRP) was notified of the initiation of the FYR. The review began on August 28, 2024.

Site Background

The C&D Site is located in the Neversink Valley, approximately 3,000 feet northeast of the City of Port Jervis on Canal Street in the Town of Deerpark, Orange County, New York (**See Appendix A, Figure 1**). From approximately 1971 to 1979, the Site was used as a disposal facility consisting of a series of lagoons. The majority of wastes disposed in the lagoons were septic waste, municipal sewage sludge, solid waste, as well as liquid industrial wastes, primarily from the cosmetic industry.

In June 1979, the New York State Department of Environmental Conservation (NYSDEC) prohibited the disposal of industrial wastes at the Site. The Site continued to be used for the disposal of septic and municipal sewage wastes until 1989.

The Site and the land immediately adjacent to the Site are currently zoned exclusively for industrial land use. See **Figure 2.** The immediate surrounding area includes exposed bedrock to the northwest; remnants of the former Delaware and Hudson Canal and towpath are to the southeast; undeveloped woodlands; and an active sand and gravel quarry to the northeast. A cement block manufacturing operation and the City of Port Jervis landfill are located to the south. The landfill is no longer active; however, Orange County currently operates a solid waste transfer station on a portion of the landfill property. In 2004, the City of Port Jervis began a small sand and gravel operation on land owned by the City of Port Jervis, downgradient from the former lagoons and in the vicinity of some of the Site monitoring wells. Also, on the west side, upgradient from the former lagoons, the Port Jervis Police Department owns a firing range which does not conflict with the ICs that have been placed on the Site.

Approximately 1,500 feet to the east of the Site is Gold Creek and its associated wetlands. The Neversink River is located approximately 2,000 feet beyond Gold Creek. Gold Creek and the Neversink River drain into the Delaware River.

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

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Carroll and Dubies Sewage Disposal		
EPA ID: NYD010968014		
Region: 2	**State:** NY	**City/County:** Town of Deerpark/Orange

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): Maria Jon
Author affiliation: EPA
Review period 8/28/2024 thru 2/3/2025
Date of site inspection: 10/28/2024
Type of review: Statutory
Review number: 5
Triggering action date: 3/3/2020
Due date *(five years after triggering action date)*: 3/3/2025

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

The initial Remedial Investigation (RI) and supplemental RI were completed in October 1992 and December 1993, respectively. The Feasibility Study (FS) for the lagoons was completed in July 1994. A supplemental groundwater RI was completed in April 1995. The FS for the groundwater was completed in May 1996.

Through the Site investigations, EPA determined that the contaminants of concern (COCs), present in the former lagoons and surrounding soils included benzene, dichlorobenzene, tetrachloroethene, toluene, arsenic, lead and chromium. Some of the highest concentrations of volatile organic compounds (VOCs) and metals detected in the lagoons were benzene at 2,800 parts per million (ppm), tetrachloroethene at 12,000 ppm, toluene at 13,000 ppm, chromium at 16,000 ppm, and lead at 609 ppm. Groundwater samples were collected downgradient of the lagoons and analyzed for organic and inorganic compounds. Some of the highest concentrations of organic contaminants in groundwater included benzene detected at 2,400 micrograms per liter (µg/L), 1,2-dichloroethene µg/L (1,2-DCE) at 130 µg/L, and tetrachloroethene (PCE) at 100 µg/L.

A baseline risk assessment for OU1 was completed in September 1995 to evaluate the potential risks to human health and the environment associated with the Site contaminants in the lagoons. The results of the baseline risk assessment indicated that the soils and sludges associated with the lagoons demonstrated an unacceptable non-carcinogenic risk to construction workers. The primary contributor to this risk was chromium-containing dust which could be inhaled during excavation activities.

A baseline risk assessment for the groundwater operable unit was completed in April 1996 to evaluate potential risks to human health and the environment associated with the Site contaminants in groundwater. EPA determined from the risk assessment that the contaminants in the groundwater at the Site exceeded federal or state Maximum Contaminant Levels (MCLs) and, if not addressed by implementing the response actions selected in the records of decision (RODs), may present an unacceptable risk to future groundwater users.

A qualitative ecological assessment was conducted in March 1995 in conjunction with the OU1 RI/FS and concluded that the Site provides low to moderate habitat value to wildlife. The degree of physical disturbance on-Site and lack of continuous quality habitat in adjacent areas restrict the diversity and extent of wildlife use at the Site. Therefore, only minor impacts on wildlife are expected to occur. In addition, the baseline risk assessment for OU2 dated April 1996 determined that there were no impacts to ecological receptors in Gold Creek, since contaminants in groundwater have not migrated to Gold Creek and are not anticipated to migrate there in the future.

Remedy Selection

In March 1995, EPA signed a ROD for OU1. The remedial action objectives (RAOs) for this OU are:

- To prevent leaching of contaminants in the soils/sludges at levels which will contribute to the contravention of groundwater quality and drinking water standards in the groundwater in the vicinity of the Site, and
- To minimize potential risks to hypothetical excavation workers.

The major components of the OU1 ROD include:

- Excavation of all contaminated materials from Lagoons 1, 2, 3, 4, 6, 7 and 8, as well as the contaminated soils in the vicinity of those lagoons.

- Treatment of excavated soil/sludges which contain organic constituents above the treatment levels specified in the ROD via on-site *ex-situ* vapor extraction.

- Additional treatment of Lagoon 7 soils/sludges via on-site *ex-situ* bioslurry (treatment targeted primarily for semi-volatile contaminants).

- Stabilization/solidification of soils/sludges which fail the Resource Conservation and Recovery Act (RCRA) Toxicity Characteristic Leaching Procedure (TCLP) levels for inorganic constituents, as specified in 40 C.F.R. §262.24.

- Placement of treated and untreated soil/sludge in a lined and capped cell consistent with the modified requirements of New York Code of Rules and Regulations Part 360. The base of the cell was to have consisted of a high-density polyethylene (HDPE) liner and a sand drainage layer. The cell was to be sloped to a leachate collection system. The cap was to have consisted of a low-permeability clay layer, an HDPE membrane, a sand drainage layer, and a topsoil cover layer.

- Recommendations that deed and well restrictions be imposed to protect the integrity of the cap.

On August 28, 1998, EPA issued an Explanation of Significant Differences (ESD) for OU1, modifying the remedy to require that all of the subject waste and soil be treated to below health-based levels or disposed of off-site, eliminating the need for on-site containment of waste.

The modified remedy included the following components:

Excavation of all waste materials from Lagoons 1, 2, 3, 4, 6, 7 and 8, as well as the contaminated soils near those lagoons that equal or exceed the contaminant levels specified in the ROD. For subsurface soil impacted by volatile organic compounds, *in-situ* soil vapor extraction (SVE) treatment will be utilized to treat these soils to below levels requiring excavation unless it is more practicable to excavate and dispose these soils off-site. The excavation depth will not exceed the depth to groundwater. On-site treatment of selected excavated soil and interbedded wastes that exceed the RCRA TCLP levels for organic constituents by *ex-situ* soil vapor extraction prior to off-site disposal.

- Off-site treatment of industrial wastes that exceed the RCRA Land Disposal Restrictions, as specified in 40 C.F.R. Part 268, at the receiving hazardous waste management facility prior to off-site disposal.

- Off-site treatment of soil and sludges that fail the RCRA TCLP levels for inorganic constituents at the receiving hazardous waste management facility prior to off-site disposal.

- Off-site disposal of excavated wastes and soils in either a permitted non-hazardous waste management facility (municipal sewage sludge/septage wastes and impacted soils) or a permitted hazardous waste management facility (industrial wastes, interbedded wastes and municipal sewage sludge/septage wastes and soils impacted by industrial wastes) following any required treatment.

- Development of an air-monitoring system and installation of air pollution control equipment to ensure compliance with air pollution control regulations.

- Backfilling and re-grading of excavated areas with clean soil.

EPA issued the OU2 ROD on September 30, 1996. The RAOs for OU2 are:

- To reduce or eliminate potential health risks associated with ingestion of Site contaminated groundwater by potential future industrial workers; and

- To reduce the concentration of contaminants in the groundwater to drinking water standards.

The OU2 ROD remedy included the following components:

- Natural attenuation of organic contaminants in groundwater to below federal and state drinking water standards through naturally occurring removal processes;

- Monitoring of the groundwater to evaluate improvement in groundwater quality and ensure the effectiveness of the remedy;

- Conduct sediment and surface water sampling in Gold Creek to ensure contaminants do not impact the creek; and

- Implementation of institutional controls in the form of deed restrictions, contractual agreements, local law or ordinances or other governmental action for the purpose of restricting the installation and use of groundwater wells throughout the contaminated groundwater plume.

Status of Implementation

The PRPs' contractor, Shield Environmental Associates, Inc. (Shield), prepared remedial design (RD) plans and specifications for the revised OU1 remedy, which EPA approved on September 29, 1998. The remedial action began in April 1999; OU1 construction activities, including backfill work, were completed by January 2000.

A total of 368 post-excavation confirmatory soil samples were collected from the foundation soils, sidewalls, ditches and perimeters of the lagoons at the designated grid points. Sample

locations with analytical results above the excavation levels for the COCs were subsequently excavated. Then, additional samples were collected from beneath the excavation. This sampling procedure was followed until the analytical results were below the excavation levels for the indicator COCs.

Cover soils from Lagoons 3, 4, 6, 7, and 8 were removed and stockpiled into 150-cubic yard increments at the Site. Each stockpile was sampled and analyzed for the indicator COCs. The analytical results for the cover soil samples were compared to the excavation levels for the indicator COCs. The stockpiles that did not exceed the contaminant levels for the indicator COCs were deemed to have met the performance standards and were used for fill during the final grading of the lagoons. In addition, off-site borrow material was needed to complete the final grading and to fulfill the design requirements. Approximately 11,000 cubic yards of off-site borrow fill material were delivered to the Site, sampled and found to meet the performance standards required by the RD.

The total amount of contaminated waste material remediated was 22,885 cubic yards. The analytical results from post-excavation soil samples collected from the excavated areas indicated that the remediation of all waste materials from Lagoons 1, 2, 3, 4, 6, 7 and 8, as well as the contaminated soils near the lagoons, had reduced contamination of Site soils in the unsaturated zone to below contaminant levels, specified in the ROD. These actions eliminated the need to treat the soil via on-site *ex--situ* vapor extraction and for an on-site containment cell.

No construction activities were needed to implement the OU2 remedy.

Institutional Controls Summary

Table 1: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Soil	Yes	Yes	Site Property	Prohibit the disturbance of the surface or subsurface of the land in any manner and include restrictions on future uses of the property.	Environmental Easement/Restrictive Covenants were placed on the real property on August 11, 2004.
Groundwater	Yes	Yes	Site Property	Restrict the extraction, consumption exposure or use of groundwater at the Site while the groundwater contamination is above health-based levels.	Environmental Easement/Restrictive Covenants were placed on the real property on August 11, 2004.

Systems Operations/Operation & Maintenance

Long-term operational systems were not required for the lagoons remediation or OU1; therefore, no system operation and maintenance (O&M) activities occur at the Site. As part of the groundwater monitoring program, a site inspection is conducted to ensure ICs are working at the Site.

OU2 activities include monitoring of the groundwater and sampling of sediment and surface water in Gold Creek. The groundwater monitoring network consists of 10 wells located near and downgradient of the former lagoons. These wells are currently sampled for VOCs, redox, dissolved oxygen, pH, temperature, and turbidity. Additionally, surface water and sediment samples are currently taken from Gold Creek to the south and southeast of the Site and analyzed for the presence of VOCs twice during each FYR period. As part of this FYR, the PRP requested a reduced sampling approach from once every five quarters to once every nine quarters. This resulted in two sampling episodes, third quarter 2021 and fourth quarter 2023.

Remedy Resiliency

Potential Site impacts from severe weather events have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of severe weather events in the region and near the Site. Please see **Appendix C** for additional information.

III. PROGRESS SINCE THE LAST REVIEW

This section includes the protectiveness determinations and statements from the last FYR as well as the recommendations from the last FYR and the current status of those recommendations.

Table 2: Protectiveness Determinations/Statements from the 2020 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The remedy for OU1 is protective of human health and the environment.
2	Short-term Protective	The implemented remedy for OU2 is protective of human health and the environment in the short term because all exposure pathways have been interrupted. In order to be protective in the long-term, options for addressing sustained PCE concentrations need to be evaluated.
Sitewide	Short-term Protective	The implemented remedy for Carroll and Dubies is protective of human health and the environment in the short term because all exposure pathways have been interrupted. In order to be protective in the long-term, options for addressing sustained PCE concentrations need to be evaluated.

Table 3: **Status of Recommendations from the 2020 FYR**

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (if applicable)
OU2	Sustained concentrations of PCE downgradient of former lagoons suggests the presence of residual source.	Investigate potential options for reducing PCE concentrations.	Ongoing	The PRP is in the process of preparing a focused soil investigation work plan in the area of monitoring wells OW-2, OW-5, and OW-6. These monitoring wells consistently recorded regulatory exceedances of chlorinated VOCs including maximum observed concentrations of 87 µg/L in 10/2023 of tetrachloroethene (PCE). The purpose of the investigation is to determine if waste material is present and to assess the presence or absence of VOCs throughout the soil column.	TBD

In addition to the issue and recommendation above, EPA suggested that the following regular O&M and monitoring activities be modified, accordingly:

1. A well integrity survey should be conducted, and well defects should be corrected. For example, wells in which the concrete pad or well cap are defective, such as OW-22 and MW-4, should be repaired.

Status Response: These activities were completed.

2. Surface water and sediment sampling in Gold Creek should continue to be conducted twice within the next five years.

Status Response: The PRP did not include surface water and sediment sampling of Gold Creek in the 2021 sampling effort. In response to EPA's direction to include it in future efforts, sampling was performed in 2023. Given the 2023 results, sampling once every five years was determined to be sufficient for this FYR period. The next sampling is planned for the first quarter of 2026.

3. Chlorobenzene has been increasing in monitoring wells OW-18 and -19. The contamination in this area is suspected to be attributed to the Port Jervis municipal landfill.

Additional efforts to confirm this should be coordinated with the PRPs, NYSDEC and the City of Port Jervis.

Status Response:

Additional data has been collected and reviewed during this FYR period. Benzene and/or chlorobenzene was detected in wells OW-10R, OW-13R, OW-18, OW-19 and OW-22. The presence of these contaminants originates from the southwestern portion of the Site and is separate from the groundwater contaminants in the area of OW-2, OW-5 and OW-6 located to the east and downgradient of former Lagoon 2.

Benzene has generally shown an improvement since the last review period, although there were limited detections slightly exceeding NYSDEC criteria as described in Data Review. Chlorobenzene continued to be detected at elevated concentrations downgradient of the historic municipal landfill though it did not exceed NYSDEC criteria downgradient of former lagoon 8. Although concentrations had been increasing during the previous review period, no discernable trend was identified during the current review period. In addition, a review of landfill leachate parameters (i.e., methane, chloride, and total organic carbon (TOC)) collected over a period of five sampling events from 2008 to 2013 indicates that the results from OW-13R, downgradient of Lagoon 4; OW-22, within the closed municipal landfill; and OW-18, downgradient of the municipal landfill, are very similar. However, the results for OW-2, located to the east and downgradient of former Lagoon 2, had low to nondetectable concentrations of chloride, methane, and TOC. Based on this information, it is believed that the conditions previously observed in OW-18 and OW-19 are closely related to the closed municipal landfill. Therefore, additional work is not necessary at this point, beyond the continuation of groundwater monitoring and monitoring at Gold Creek.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On August 7, 2024, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, and Puerto Rico, including the Carroll and Dubies 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, Natalie Loney posted a public notice on the EPA site profile page https://www.epa.gov/superfund/carroll-and-dubies and the notice was provided to the Town of Deer Park on February 1, 2025, with a request that the notice be posted on the Town of Deer Park webpage https://townofdeerparkny.gov/?p=8307. The purpose of the public notice was to inform the community that the EPA will be conducting the fifth FYR to ensure that the remedy implemented at the Site remains protective of human health and the environment and is functioning as designed. The notice included the contact information for the Remedial Project Manager and CIC for questions related to the FYR process or the Site. Once the FYR is

completed, the results will be made available on EPA's Carroll and Dubies Superfund site and at the local Site repository located at the Deer Park Town Hall- Drawer A, Route 209 North, Huguenot, NY 12746. In addition, efforts will be made to reach out to stakeholders and local public officials to inform them of the results.

Data Review

The OU2 remedy calls for the natural attenuation of organic contaminants within the contaminated sediment aquifer, as well as long-term groundwater monitoring, sampling of Gold Creek, and the implementation of institutional controls in order to restrict groundwater utilization within the contaminated area. The groundwater monitoring network consists of 10 wells located on-site and downgradient of the former lagoons. Monitoring wells were sampled twice during the current FYR period. Additionally, surface water and sediment samples were collected from Gold Creek to the south and southeast of the Site and analyzed for the presence of VOCs once during the review period.

In the immediate Site area, groundwater tends to flow to the south-southeast toward Gold Creek (see **Figure 3**). Two contaminant plumes exist which extend downgradient from the former lagoons: a plume originating from the area formerly containing Lagoons 3, 7, and 8 defined by elevated concentrations of benzene and chlorobenzene, and a plume originating from the area formerly occupied by Lagoon 2 defined by elevated concentrations of chlorinated VOCs. Concentrations of constituents belonging to both contaminant groups have been observed in some wells on-site, which may indicate co-mingling of the plumes.

Chlorinated Solvents

The chlorinated VOC plume originates from the northeastern portion of the site. During the current review period, detectable concentrations of PCE, trichloroethene (TCE), and/or 1,2-dichloroethene (1,2-DCE) were recorded at wells OW-2, OW-5, OW-6, and OW-19. Within this subset of wells, OW-2, OW-5, and OW-6 recorded chlorinated VOC concentrations in exceedance of NYSDEC regulatory criteria. OW-13R, which historically recorded low levels of chlorinated VOC contamination, continued to report no detectable concentrations during the current review period.

Monitoring well OW-2 consistently recorded regulatory exceedances of chlorinated VOCs including maximum observed concentrations of 87 µg/L PCE (10/2023), 8.1 µg/L TCE (10/2023), and 40 µg/L 1,2-DCE (09/2021). This well has historically recorded the highest total amount of chlorinated VOCs at the Site, and concentrations appear to have plateaued across the past two FYR periods. Concentrations were stable across the review period (**Figure 4**), with an average PCE concentration of 76 µg/L, compared to 74 µg/L during the previous review period. Based upon the persistently elevated PCE concentrations in this well and immediately downgradient, the PRPs are planning an investigation of the subsurface soil within the vicinity of the former source areas and downgradient of OW-2. The purpose of the investigation is to determine if waste material and/or VOCs are present throughout the soil column. The results of

this investigation will inform potential treatment options which may facilitate the achievement of groundwater RAOs in a reasonable timeframe.

At OW-6, a well downgradient of OW-2 which has consistently exceeded regulatory standards for chlorinated VOCs, contaminant concentrations have generally stabilized since 2015 (**Figure 5**). Since the previous review period, PCE concentrations in OW-6 have oscillated about a mean value above the 5 µg/L MCL, with a maximum observed value of 44 µg/L (10/2023) during the review period. The PCE concentrations observed in OW-6 are likely reflective of downgradient contaminant migration in the subsurface from the OW-2 area. EPA recommends that OW-25, which is downgradient of OW-6, is incorporated into the regular sampling plan moving forward, in order to ensure plume delineation and serve as a "sentinel" well for potential contaminant migration offsite.

Benzene and Chlorobenzene Plume

The benzene-chlorobenzene plume originates primarily from the southwestern portion of the Site. Wells in exceedance of the NYSDEC criteria for benzene (1 µg/L) during the current review period include OW-10R, OW-13R, and OW-18. In general, wells which exceeded the benzene standard during the current review period recorded values only slightly above the 1 µg/L standard. The highest recorded concentration was 3.9 µg/L in well OW-18 (09/2021).

Since the completion of OU1 remedy construction (1/2000), benzene concentrations across the monitoring network have declined substantially in affected wells. In the 06/2000 sampling event, the highest observed benzene concentration was 200 µg/L in OW-13. The maximum observed benzene concentration during the most recent sampling in October 2023 was 2.1 µg/L (OW-13R) (**Figure 6**). OW-19, which recorded a maximum concentration of 1.6 µg/L during the previous review period, did not register any detectable concentrations of benzene during the two monitoring events in 2021 and 2023. OW-21 and OW-22 were sampled only once during the review period due to necessary repairs, but did not contain any detectable benzene, an improvement from the 2015-2019 review period.

Chlorobenzene concentrations exceeded the regulatory limit (5 µg/L) in wells OW-18, OW-19, and OW-22 during the current review period. Concentrations in these wells have not exhibited a strong trend across the most recent two review periods (2015-2023) but have increased overall since OU1 remedy completion (**Figure 7**). OW-10R, located just downgradient of Lagoon 8, did not exceed the chlorobenzene standard for the second consecutive review period. OW-18, located at the toe of the historic Port Jervis municipal landfill, contained the highest recorded chlorobenzene concentration of the review period (18 µg/L) during the most recent sampling event. This may indicate that chlorobenzene is migrating beyond the extent of the monitoring network. However, a review of the data suggests that the historic landfill, which is not a part of the Carroll and Dubies Superfund Site, is contributing to elevated chlorobenzene concentrations in OW-18 and OW-19.

Wells downgradient of the former source areas and upgradient of the landfill have not exceeded the 5 µg/L standard since 2013 (6 µg/L; OW-10R), and have been below this review period's 18 µg/L maximum concentration since the completion of the OU1 RA in 2000. Well OW-22, which

is completed within the landfill, recorded chlorobenzene concentrations as high as 9 µg/L across the previous and current review periods. OW-22 and nearby OW-21 were only sampled once during the review period as a result of repairs associated with settling within the landfill interior. In addition, historic geochemical data (leachate parameters such as methane, chloride, and TOC) showed similar results among wells within and downgradient of the landfill, which differed from those in areas downgradient of select lagoons, thus suggesting the influence of the landfill on groundwater quality in this area. Therefore, it is believed that the conditions previously observed in OW-18 and OW-19 are closely related to the closed municipal landfill.

Gold Creek

In order to ensure that Site-related contamination is not impacting the creek, sediment and surface water sampling were conducted. In 2023, sampling was conducted at two locations: SED/SW-1 approximately 300 ft south of OW-19, and the upstream location SED/SW-2, located approximately 300 ft east of OW-24. Similar to the previous review period, no detections of VOCs were reported in surface water. Sediment sampling returned detections of acetone and 2-butanone at the downstream location SED-1: an estimated 150 µg/kg acetone (03/2018) and an estimated 49 µg/kg 2-butanone. These are not Site COCs.

Natural Attenuation

Wells within the monitoring well network are sampled during every groundwater sampling event for water quality parameters, including pH, temperature, redox potential, and dissolved oxygen. Reducing conditions which may support natural attenuation via reductive dechlorination are present in several downgradient wells, including OW-18, OW-19, and OW-22. Chlorinated solvents were not elevated above relevant groundwater standards in these wells during this review period.

Emerging contaminant sampling

In 2019, groundwater samples were collected from three monitoring wells for analysis of 1,4-dioxane and per- and polyfluoroalkyl substances (PFAS) as part of the state-led Emerging Contaminants Program.

Three monitoring wells were sampled for this program, OW-5, OW-13R , and OW-24:

- OW-5 is downgradient of the historic lagoons and has detectable chlorinated VOCs.
- OW-13R is downgradient of the historic lagoons and side gradient of the closed local landfill. Benzene is detected in this well; historically chlorinated VOCs were detected.
- OW-24 is farther downgradient and is nondetectable for VOCs.

1,4-Dioxane was detected in OW-5 at 3.9 ug/L. OW-13R detected 1,4-dioxane at a low concentration of 0.26 ug/L. 1,4-Dioxane was detected in OW-24 at 2.8 J ug/L, qualified by the laboratory as estimated because the result was less than the reporting limit of 3.0 ug/L.

Perfluorooctane sulfonate (PFOS) and perfluorooctanoic acid (PFOA), the two primary PFAS compounds, were detected in OW-5 at 8.4 nanograms per liter (ng/L) and 9.7 ng/L, respectively. OW-13R detected PFOS at 9.5 ng/L and PFOA at 10 ng/L. OW-24 detected PFOS at 1.7 ng/L and PFOA at 1.8 ng/L.

During the previous review period. PFOA and PFOS were detected at concentrations less than the "proposed" state MCLs, and 1,4-dioxane was detected above its "proposed" state MCL. Since that time, new MCLs have taken effect.

In April 2024, EPA finalized MCLs for several PFAS, including PFOA (4 (ng/L), acid (PFOS) (4 ng/L), perfluorohexane sulfonic acid (PFHxS) (10 ng/L), perfluorononanoic acid (PFNA) (10 ng/L), hexafluoropropylene oxide dimer acid (HFPO-DA) (10 ng/L), and PFAS mixtures containing Perfluorobutanesulfonic acid (PFBS) (HI = 1). New York State adopted MCLs of 10 nanograms per liter (ng/L) for PFOA, 10 ng/L for PFOS, and 1 µg/L for 1,4-dioxane.

Although the PFAS and 1,4-dioxane concentrations identified are relatively low in magnitude, sampling additional monitoring wells to determine whether their presence is site-related is suggested as a result of the new federal PFAS MCLs and the finalized New York State MCL for 1,4-dioxane.

Site Inspection

A Site inspection was conducted on October 28, 2024. In attendance were Maria Jon (EPA RPM), Julie McPherson (EPA Human Health and Ecological Risk Assessor), John Mason (EPA Geologist), Emma Mendelsohn (EPA Risk Assessor), Jinnie Hanlee (EPA Ecological Risk Assessor), and Barbara and Kevin Jones, Cardinal Resources (Consultant to the PRPs). The purpose of the inspection was to assess the continued protectiveness of the remedy.

Employees at the solid waste transfer station, Public Works gravel pit, and shooting range monitor the area; and the entrance road is gated. In recent years, there has not been evidence of trespassing and there has never been evidence of vandalism or site disturbance. During the June 2019 sampling event an inspection of the former lagoon areas (the areas that were excavated, backfilled, graded, and seeded with grass) indicated some naturalization with saplings and other native vegetation. However, during the FYR site inspection, EPA observed solid waste was exposed along the historic municipal landfill perimeter, near the downgradient monitoring wells.

V. TECHNICAL ASSESSMENT

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

The elements of the groundwater remedy set forth in EPA's September 1996 OU2 ROD are (1) natural attenuation of organic contaminants in groundwater to below federal and state drinking water standards, (2) monitoring of the groundwater to evaluate improvement in groundwater quality and ensure effectiveness of the remedy, (3) performance of sediment and surface water

sampling in Gold Creek to ensure contaminants do not impact the creek, and (4) implementation of institutional controls in the form of deed restrictions, restricting the installation and use of groundwater wells on the Site. Currently, the zoning downgradient of the Site is primarily industrial (between the Site and Gold Creek) and includes an active gravel operation. Groundwater modeling performed during the remedial investigation indicated that the cleanup levels would be achieved within five years of completion of the OU1 source control remedy. The groundwater model also predicted that the cleanup levels would be achieved in the same timeframe whether by natural attenuation processes or by active treatment.

Contaminant concentrations at the former source areas have generally declined since completion of the OU1 RA and exhibit stable to declining concentrations. Although the selected groundwater remedy prevents exposure, it has not yet resulted in restoration of groundwater to meet federal MCLs and/or state groundwater standards. In the case of the sustained elevated PCE concentrations near former Lagoons 1 and 2, additional action may be necessary to achieve groundwater RAOs in a reasonable time frame. A focused soil investigation work plan targeting the vicinities of OW-2, OW-5 and OW-6 is currently under development. It is also suggested that OW-25 is reincorporated into the regularly-sampled monitoring well network in order to thoroughly delineate the chlorinated VOC plume.

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?

Some chemical-specific toxicity values have changed since the Site was originally assessed. In order to account for changes in toxicity values since the baseline human health risk assessment was performed, the maximum detected concentrations of the COCs identified during the past five years were compared to residential groundwater Regional Screening Levels (RSLs), National Primary Drinking Water Standard Maximum Contaminant Levels (MCLs) and their respective NYSDEC Groundwater criteria. MCLs are promulgated standards that apply to public water systems and are intended to protect human health by limiting the levels of contaminants in drinking water. RSLs are a human health risk-based value that is equivalent to a cancer risk of 1 x 10^{-6} or a hazard quotient of 1. This analysis indicates that several Site-related contaminants continue to exceed their respective MCLs or NYSDEC groundwater criteria, but do not call into question the conclusions of the risk assessment.

Currently, there are no on-site groundwater users at the Site. The residential properties located to the east/southeast of Gold Creek use private wells. Although the residential wells downgradient of the Site are not part of the monitoring program, previous sampling results conducted in 1991,1993, 1994, 1995, and 1996 did not indicate any impacts by Site-related contaminants. In additon, within the past five years, sentinel wells have not detected site related COCs above ARARs. Therefore, it is not expected that private wells would be currently impacted by Site-related contaminants given the declining concentrations observed since the remedy was implemented. As a result of restrictions placed on installing potable supply wells in the impacted area (between the Site and Gold Creek), no one is currently utilizing the groundwater as drinking water source in this area; therefore, the exposure pathway has been interrupted. Groundwater use

is not expected to change in this area within the next five years. Thus, current exposures to either off-site residents or recreational users of Gold Creek are not occurring.

The soil remedy was also revisited to address the protectiveness of the remedy presented in the 1995 ROD and the 1998 ESD. The soil cleanup levels in 1995 were established for the COCs and were determined at the time to protect human health and to reduce the concentration of contaminants in the groundwater to drinking water standards. The NYSDEC Residential Soil Cleanup Objectives and the EPA Residential RSLs are lower than the cleanup levels identified in the 1995 ROD, justifying the continued need for institutional controls. Although the cleanup goals are higher than the current state standards, clean fill was placed in the excavated areas which has interrupted the exposure to any residual contamination in the soils.

The RAOs for the Site discussed under Section II remain valid.

Vapor Intrusion

Soil vapor intrusion was not previously evaluated in the RI as a potential future exposure pathway. The evaluation conducted for this FYR compared the maximum detected concentrations of the chemicals of potential concern with their EPA vapor intrusion screening levels (VISLs). The maximum detected concentrations of several Site-related chemicals continue to exceed their respective screening criteria. This does not indicate that a vapor intrusion problem would occur if a building were to be erected over the plume. This merely indicates that further investigation would be necessary if a building were to be constructed that includes Site-specific considerations, such as the type of building, the location of the building, and the subsurface characteristics of the Site. Currently, there are no buildings overlying the affected plume area (*i.e.*, between the Site and Gold Creek); therefore, the exposure pathway is incomplete.

Ecological Risk

Ecological risk was qualitatively addressed in the ROD (1996) for OU1 and OU2. It was determined that OU1 provides low to moderate habitat value to wildlife due to the degree of physical disturbance on the Site and the lack of continuous quality habitat. Moreover, the excavation and backfill actions to the surface soil eliminate any potential risk to terrestrial receptors.

For OU2, the ROD concluded that there were no impacts to ecological receptors in Gold Creek because Site contaminants in groundwater had not migrated to Gold Creek. This was confirmed in the 2023 Sampling Report, in which VOCs were not detected in Gold Creek. Sediment samples collected during the same effort were also largely non-detect, except for acetone and 2-butanone (MEK) detections in one of two samples. Groundwater monitoring results indicate that acetone and 2-butanone were not detected in the past five years, which suggests that the presence of these analytes is not Site-related. Overall, the absence of VOCs in surface water and the minimal detections in sediment indicate low ecologic risk from the Site.

Continued monitoring should be performed to ensure the future ecological protection at the Site.

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

No other information has been identified that would call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

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

Issues and Recommendations Identified in the Five-Year Review:

OU(s): OU2	**Issue Category:** Remedy Performance			
	Issue: Sustained concentrations of PCE downgradient of former lagoons suggests the presence of residual source.			
	Recommendation: Use the results of the soil study to develop a remedial approach, if necessary, for addressing residual soil contamination in the vicinity of OW-2, OW-5 and OW-6. Include monitoring well OW-25 in the monitoring well program.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	12/29/2028

OTHER FINDINGS

In addition, the following are suggestions that were identified during the FYR and may improve management of O&M, but do not affect current and/or future protectiveness:

1. PFAS and 1,4-dioxane sampling during the previous sampling event was conducted in a limited number of wells downgradient of the source area. Based on the concentrations (which have slightly exceeded the Federal MCL), it is recommended that PFAS and 1,4-dioxane be analyzed in monitoring wells in the source area where the concentrations of site related contaminants are significantly higher than in the wells that were sampled for PFAS and 1,4-dioxane previously. There is no exposure to site groundwater currently.
2. During the site inspection in October 2024, EPA observed solid waste exposed along the historic municipal landfill perimeter, near the downgradient monitoring wells. The municipal waste in this area will be referred to the appropriate local municipal authority.

VII. PROTECTIVNESS STATEMENT

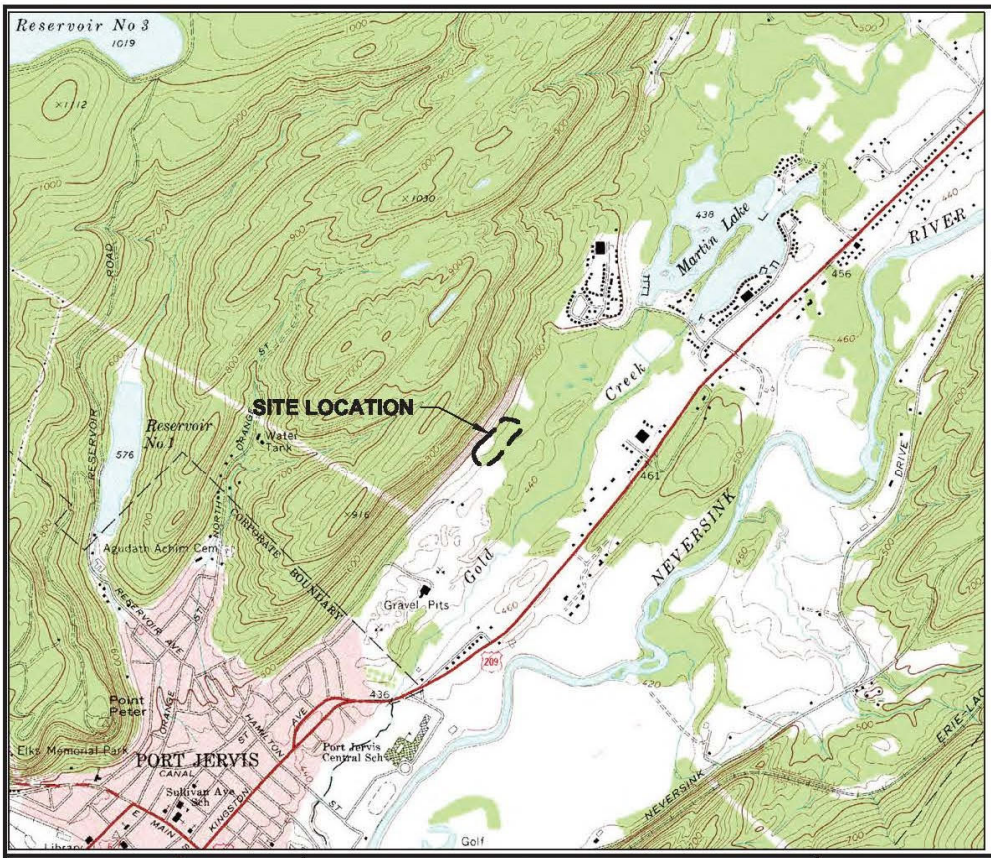
Protectiveness Statement(s)	
Operable Unit: OU1	*Protectiveness Determination:* Protective
Protectiveness Statement: The remedy for OU1 is protective of human health and the environment.	
Operable Unit: OU2	*Protectiveness Determination:* Short-term Protective
Protectiveness Statement: The implemented remedy for OU2 is protective of human health and the environment in the short term because all exposure pathways have been interrupted. In order to be protective in the long-term, the source of the sustained PCE concentrations downgradient of the former lagoons needs to be further evaluated and, if necessary, options for addressing it need to be developed.	

Sitewide Protectiveness Statement
Protectiveness Determination: Short-term Protective
The implemented remedy for Carroll and Dubies is protective of human health and the environment in the short term because all exposure pathways have been interrupted. In order to be protective in the long-term, the source of the sustained PCE concentrations downgradient of the former lagoons needs to be further evaluated and, if necessary, options for addressing it need to be developed.

VIII. NEXT REVIEW

The next FYR for the C&D Superfund Site is required five years from the completion date of this review.

APPENDIX A – FIGURES



2,000' 0 2,000'

SCALE IN FEET

LEGEND:

APPROXIMATE SITE BOUNDARY

SOURCE:

USGS TOPOGRAPHIC QUADRANGLE MAP
PORT JERVIS NORTH, NEW YORK, DATED 1991.

CARDINAL RESOURCES

CARROLL AND DUBIES SUPERFUND SITE
TOWN OF DEERPARK, ORANGE COUNTY, NEW YORK

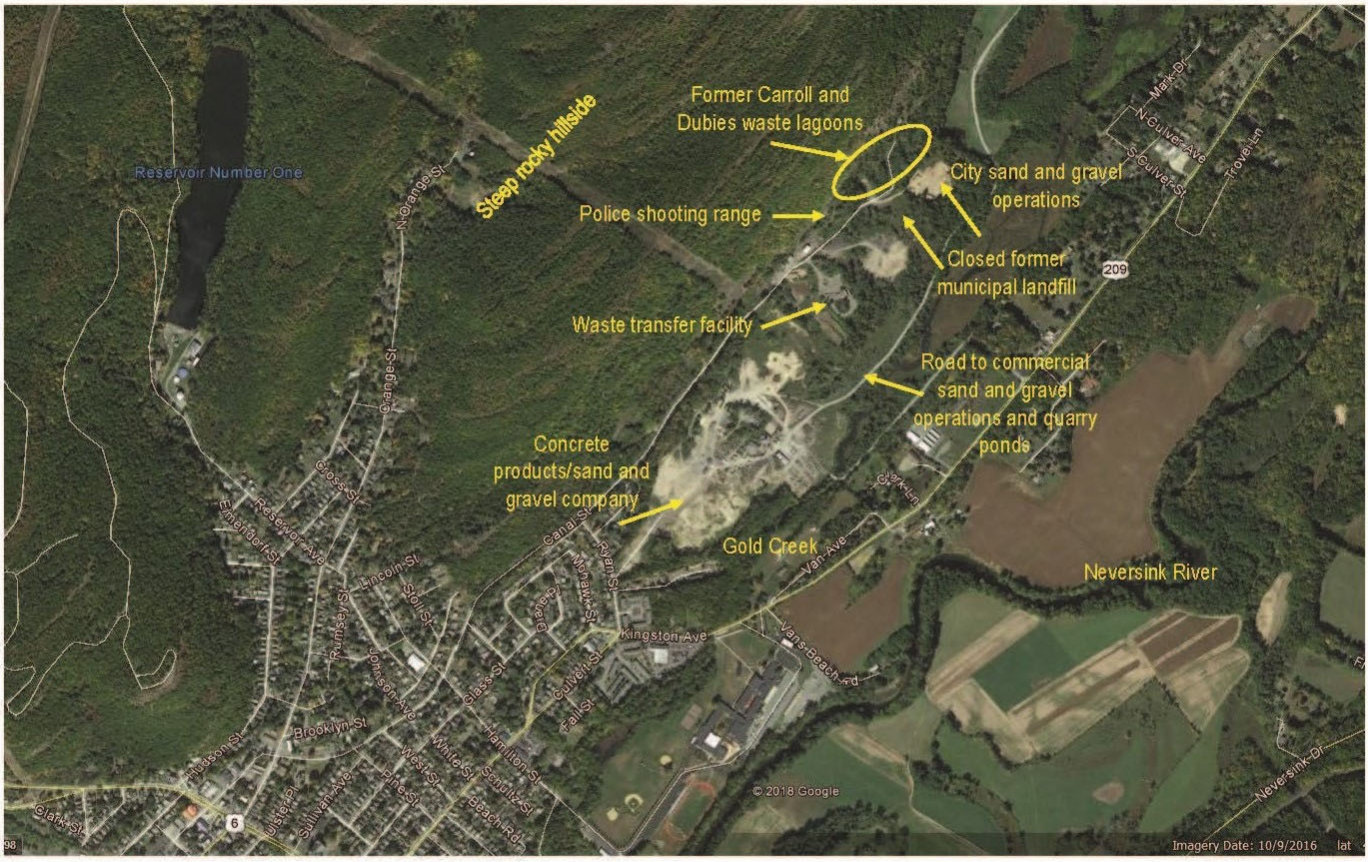
105-0035

NO	DRWN	DATE	REVISION	CHKD	DATE	APP'D	DATE
1							
0	ECM						

FIGURE 1

SITE LOCATION MAP

CADD FILE	9005	SCALE	AS NOTED	CURRENT DATE:	03-07-2005
DRAWING NO.	105-0035-0300-01			REVISION	0



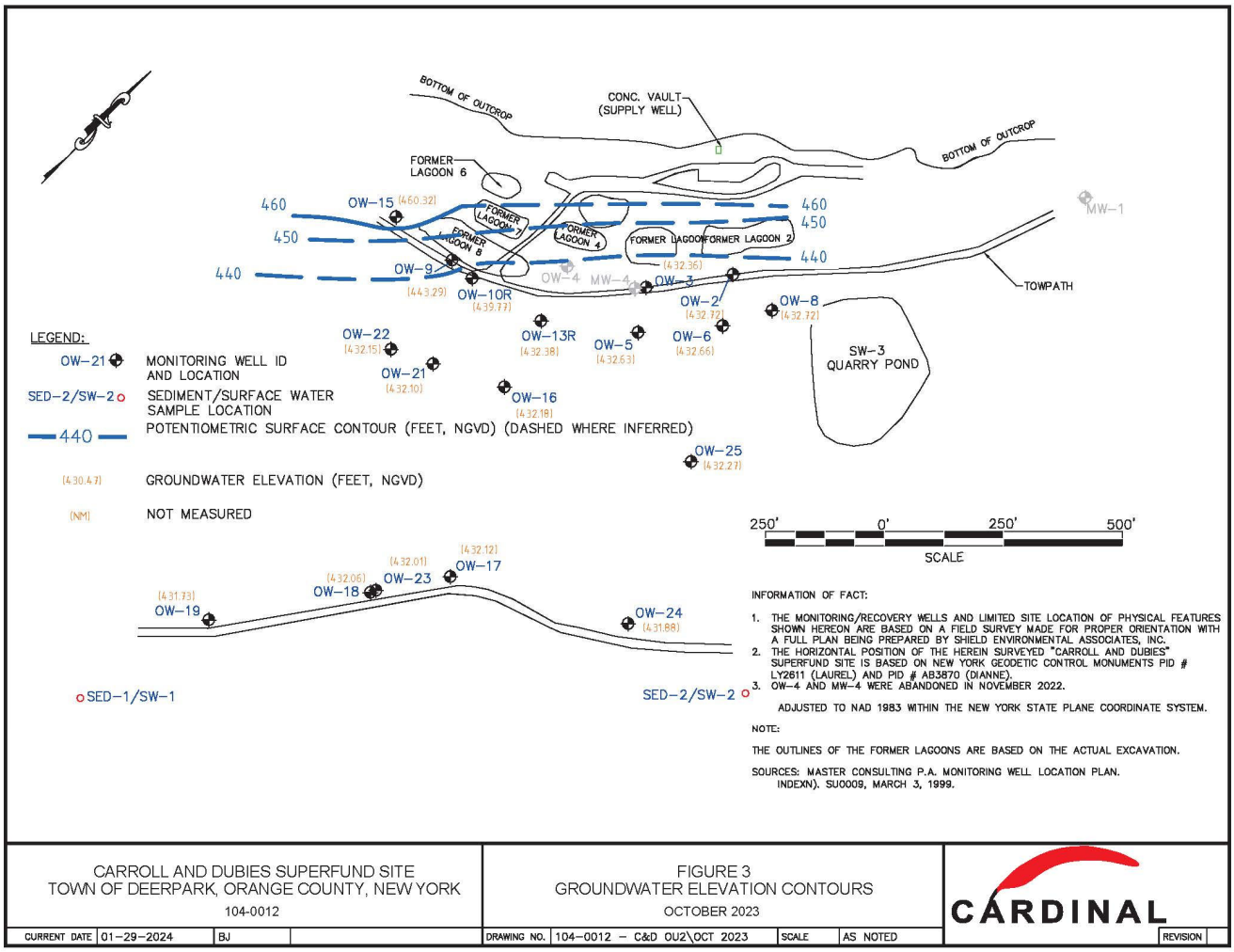
NO	DRWN	DATE	REVISION	CHKD	DATE	APPVD	DATE
6							
5							
4							
3							
2							
1							
0			INITIAL ISSUE				

Carroll and Dubies Superfund Site
Town of Deerpark,
Orange County, New York

Figure 2
Land and Resource Use

CARDINAL RESOURCES

DATE	July 15, 2019	FILE		DWG NO.		SCALE		REVISION	0



CARROLL AND DUBIES SUPERFUND SITE
TOWN OF DEERPARK, ORANGE COUNTY, NEW YORK
104-0012

FIGURE 3
GROUNDWATER ELEVATION CONTOURS
OCTOBER 2023

CARDINAL

CURRENT DATE	01-29-2024	BJ		DRAWING NO.	104-0012 - C&D OU2\OCT 2023	SCALE	AS NOTED	REVISION	

Figure 4 – Chlorinated VOCs Concentrations in Monitoring Well OW-2

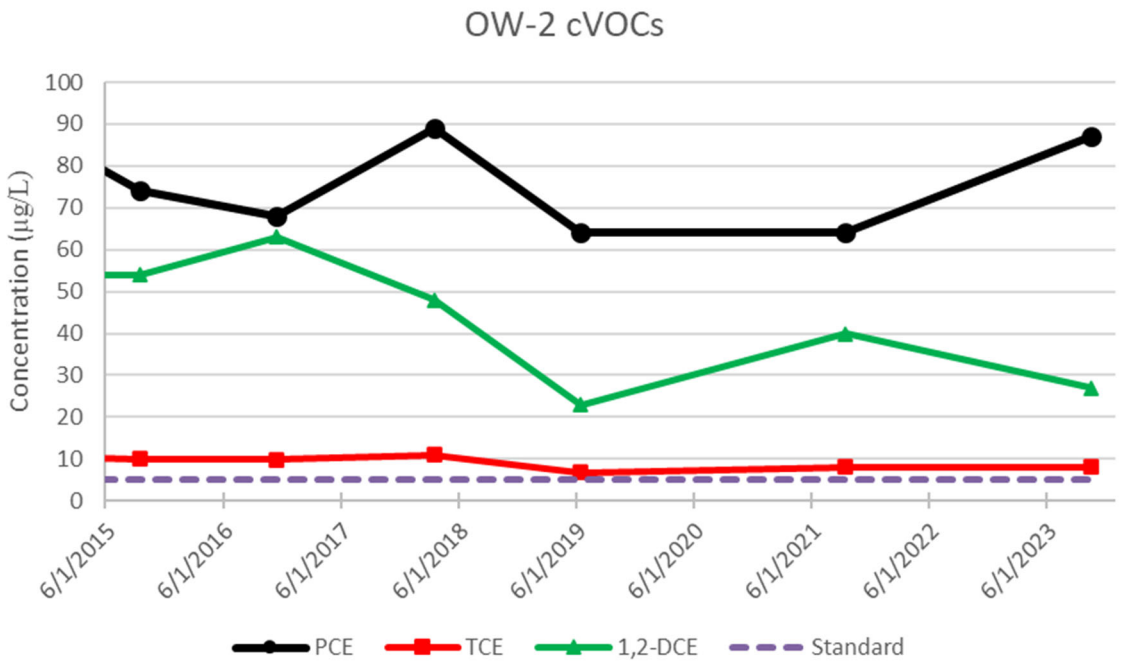


Figure 5 – Chlorinated VOCs Concentrations in Monitoring Well OW-6

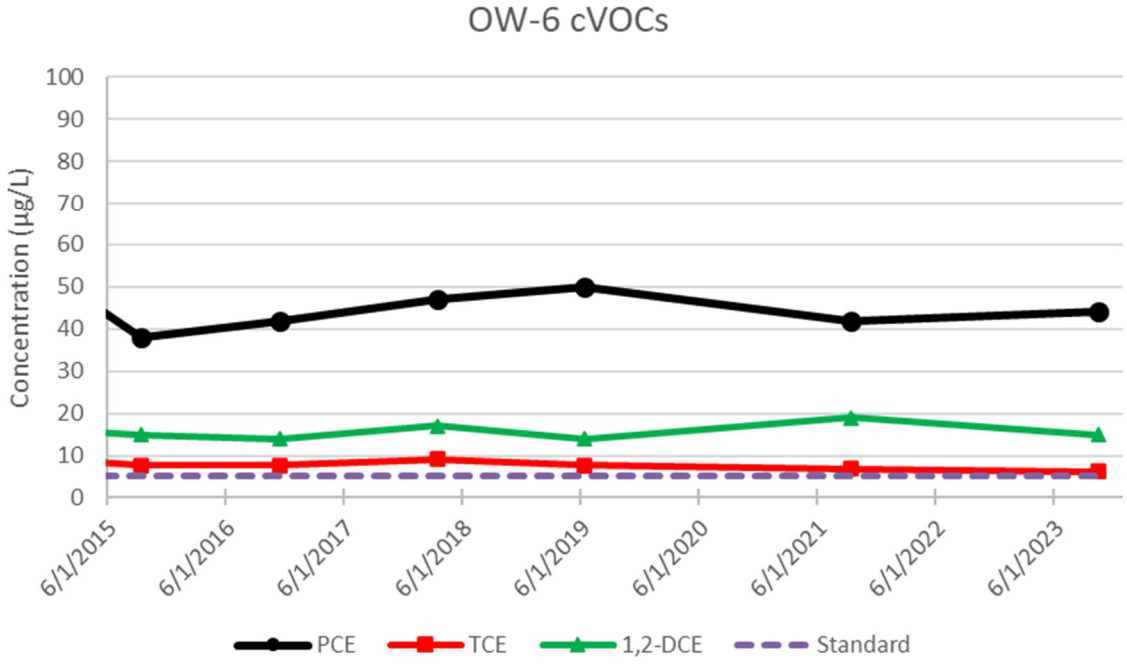


Figure 6 – Benzene Concentrations in Monitoring Well OW-13R

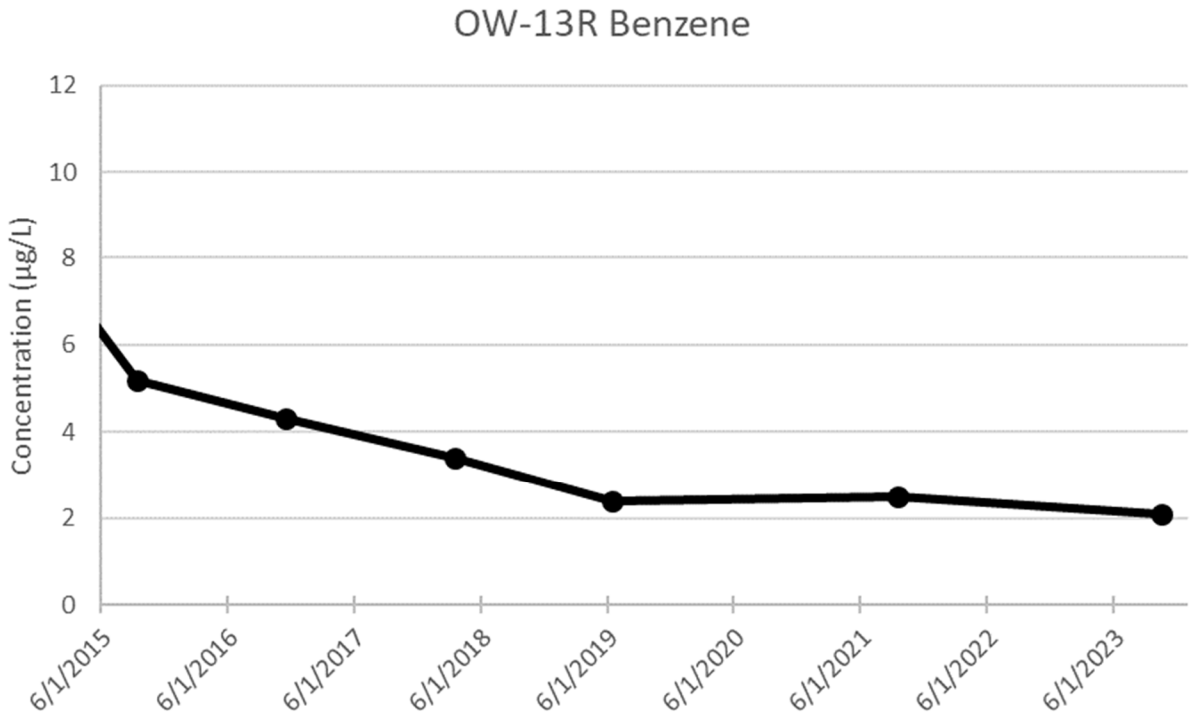
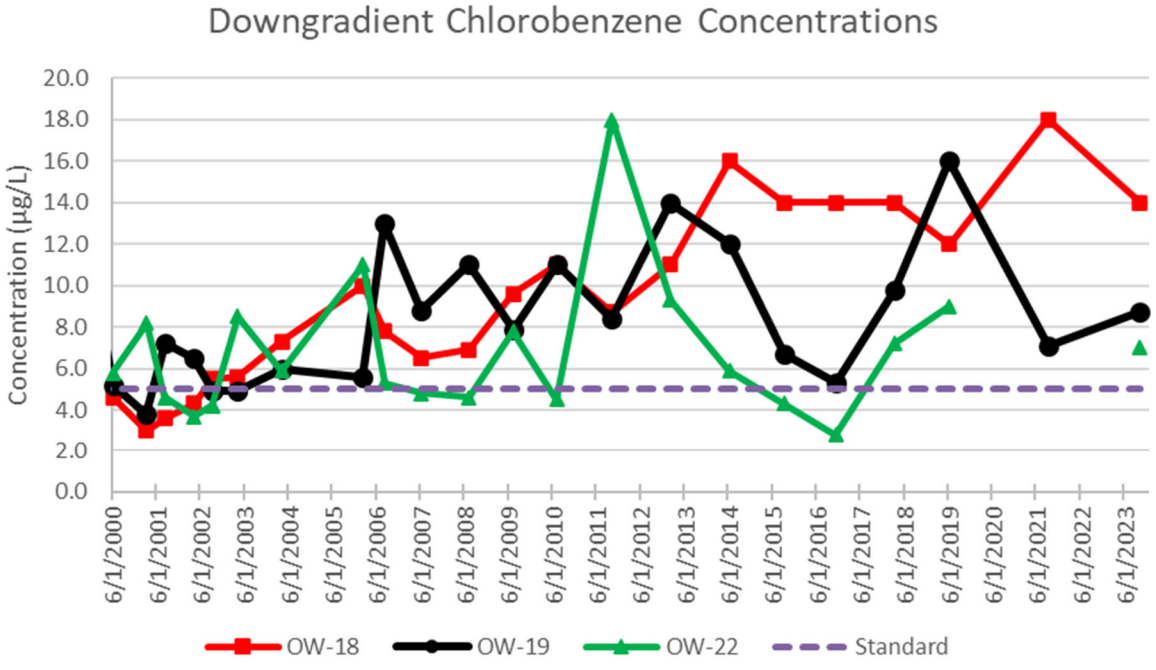


Figure 7 – Chlorobenzene Concentrations in Monitoring Wells OW-18, OW-19 and OW-22



APPENDIX B – REFERENCE LIST

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

Document Title, Author
Record of Decision, Carroll and Dubies Sewage Disposal, Operable Unit 1, March 1995
Baseline Risk Assessment, Carroll and Dubies Sewage Disposal, Remediation Technology, September 1995
Supplemental Hydrogeologic Remedial Investigation, Carroll and Dubies Sewage Disposal, Remediation Technologies, Inc., September 1995
Baseline Risk Assessment for the Groundwater Operable Unit, Carroll and Dubies Sewage Disposal, Remediation Technology, April 3, 1996
Groundwater Modeling Report, Carroll and Dubies Superfund Site, Port Jervis, New York, prepared by Remediation Technologies, Inc., January 1996
Record of Decision, Carroll and Dubies Sewage Disposal, Operable Unit 2, September 30, 1996
EPA Explanation of Significant Differences (ESD) for Carroll and Dubies Sewage Disposal, Operable Unit 1, August 28, 1998
Remedial Action Report, Carroll and Dubies Sewage Disposal, Shield Environmental Associates, Inc., February 2000
Annual Monitoring Report, Carroll and Dubies Sewage Disposal, Cardinal Resources, September 2015
Annual Monitoring Report, Carroll and Dubies Sewage Disposal, Cardinal Resources, November 2016
Annual Monitoring Report, Carroll and Dubies Sewage Disposal, Cardinal Resources, March 2018
Annual Monitoring Report, Carroll and Dubies Sewage Disposal, Cardinal Resources, June 2019
Annual Monitoring Report, Carroll and Dubies Sewage Disposal, Cardinal Resources, September 2021
Annual Monitoring Report, Carroll and Dubies Sewage Disposal, Cardinal Resources, October 2023

APPENDIX C – REMEDY RESILIENCE ASESSMENT

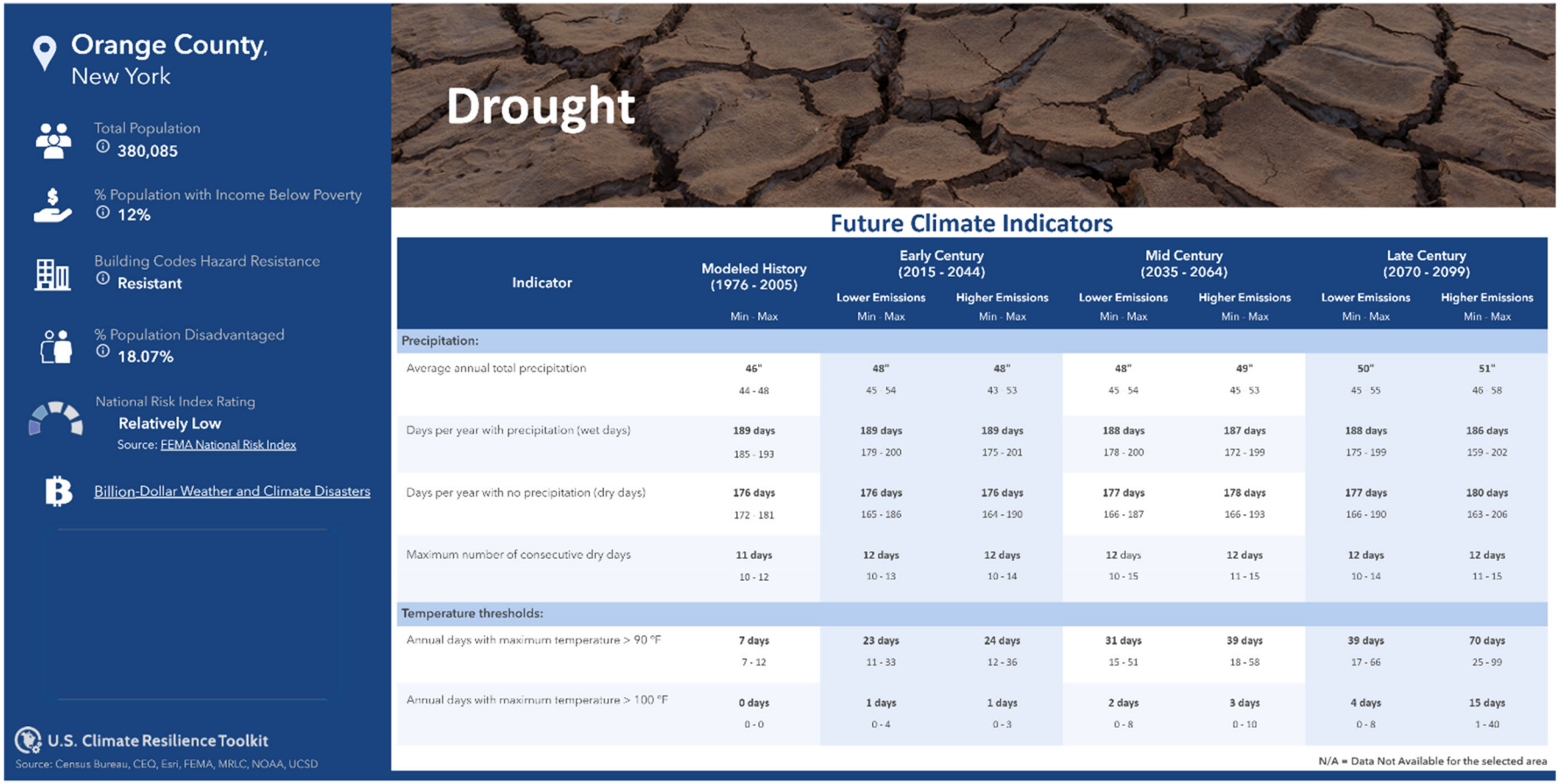
Three tools were utilized to assess the Carroll and Dubies Sewage Disposal Superfund Site. The first tool used to assess the site was the CMRA Assessment Tool. The tool examined five hazards for the county the Site. The drought (**Figure C-1**) and wildfires (**Figure C-2**) hazards received risk index ratings of "Relatively Low" and "Very Low", respectively. The extreme heat hazard was assessed to be "Relatively Moderate", projecting an increase of days per year with maximum temperatures over 100 degrees (**Figure C-3**). The hazards of flooding and coastal inundation received risk index ratings of "Relatively Moderate" and "Relatively Low". The annual average of total precipitation is projected to increase, slightly by an increase of days that exceed the 99th percentile in precipitation per year (**Figure C-4**). The county is not expected to face an increased impact from coastal flooding (**Figure C-5**).

The second tool utilized is called NOAA Sea Level Rise Viewer. As the Site is located inland and away the coastal area, the Site or its surrounding areas are not expected to face any impact from sea level rise (**Figure C-6**) and high tide flooding (**Figure C-7**).

The third tool utilized is called the USGS U.S. Landslide Inventory. According to this tool, there have been no landslides recorded in the vicinity of the Site, although the area may be vulnerable based on local topography (**Figure C-8**). Nevertheless, there is no active remedial component to this Site.

Potential site impacts from severe weather events have been assessed, and the performance of the remedy will not be impacted due to the expected effects in the region and near the Site. O&M activities at the Site are limited to groundwater sampling and site inspections, and therefore should not be affected.

Figure C-1



Orange County, New York

Total Population
380,085

% Population with Income Below Poverty
12%

Building Codes Hazard Resistance
Resistant

% Population Disadvantaged
18.07%

National Risk Index Rating
Relatively Low
Source: FEMA National Risk Index

Billion-Dollar Weather and Climate Disasters

U.S. Climate Resilience Toolkit
Source: Census Bureau, CEQ, Esri, FEMA, MRLC, NOAA, UCSD

Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Average annual total precipitation	**46"** 44 - 48	**48"** 45 - 54	**48"** 43 - 53	**48"** 45 - 54	**49"** 45 - 53	**50"** 45 - 55	**51"** 46 - 58
Days per year with precipitation (wet days)	**189 days** 185 - 193	**189 days** 179 - 200	**189 days** 175 - 201	**188 days** 178 - 200	**187 days** 172 - 199	**188 days** 175 - 199	**186 days** 159 - 202
Days per year with no precipitation (dry days)	**176 days** 172 - 181	**176 days** 165 - 186	**176 days** 164 - 190	**177 days** 166 - 187	**178 days** 166 - 193	**177 days** 166 - 190	**180 days** 163 - 206
Maximum number of consecutive dry days	**11 days** 10 - 12	**12 days** 10 - 13	**12 days** 10 - 14	**12 days** 10 - 15	**12 days** 11 - 15	**12 days** 10 - 14	**12 days** 11 - 15
Temperature thresholds:							
Annual days with maximum temperature > 90 °F	**7 days** 7 - 12	**23 days** 11 - 33	**24 days** 12 - 36	**31 days** 15 - 51	**39 days** 18 - 58	**39 days** 17 - 66	**70 days** 25 - 99
Annual days with maximum temperature > 100 °F	**0 days** 0 - 0	**1 days** 0 - 4	**1 days** 0 - 3	**2 days** 0 - 8	**3 days** 0 - 10	**4 days** 0 - 8	**15 days** 1 - 40

N/A = Data Not Available for the selected area

Figure C-2

Orange County, New York

Total Population
380,085

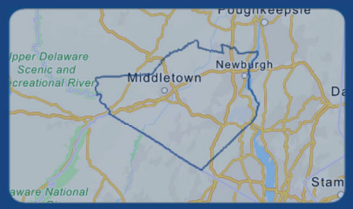
% Population with Income Below Poverty
12%

Building Codes Hazard Resistance
Resistant

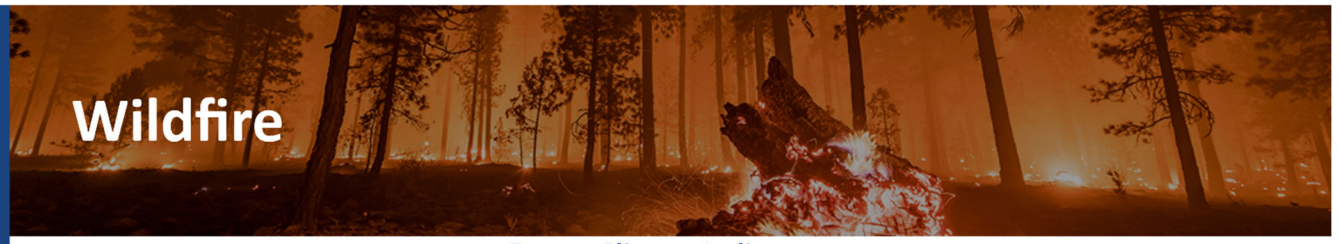
% Population Disadvantaged
18.07%

National Risk Index Rating
Very Low
Source: FEMA National Risk Index

Billion-Dollar Weather and Climate Disasters



U.S. Climate Resilience Toolkit
Source: Census Bureau, CEQ, Esri, FEMA, MRLC, NOAA, UCSD



Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Days per year with no precipitation (dry days)	**176 days** 172 - 181	**176 days** 165 - 186	**176 days** 164 - 190	**177 days** 166 - 187	**178 days** 166 - 193	**177 days** 166 - 190	**180 days** 163 - 206
Maximum number of consecutive dry days	**11 days** 10 - 12	**12 days** 10 - 13	**12 days** 10 - 14	**12 days** 10 - 15	**12 days** 11 - 15	**12 days** 10 - 14	**12 days** 11 - 15
Days per year with precipitation (wet days)	**189 days** 185 - 193	**189 days** 179 - 200	**189 days** 175 - 201	**188 days** 178 - 200	**187 days** 172 - 199	**188 days** 175 - 199	**186 days** 159 - 202
Temperature thresholds:							
Annual days with maximum temperature > 90°F	**7 days** 7 - 12	**23 days** 11 - 33	**24 days** 12 - 36	**31 days** 15 - 51	**39 days** 18 - 58	**39 days** 17 - 66	**70 days** 25 - 99
Annual days with maximum temperature > 100°F	**0 days** 0 - 0	**1 days** 0 - 4	**1 days** 0 - 3	**2 days** 0 - 8	**3 days** 0 - 10	**4 days** 0 - 8	**15 days** 1 - 40

N/A = Data Not Available for the selected area

Figure C-3

Orange County, New York

Total Population
380,085

% Population with Income Below Poverty
12%

Building Codes Hazard Resistance
Resistant

% Population Disadvantaged
18.07%

National Risk Index Rating
Relatively Moderate
Source: FEMA National Risk Index

Billion-Dollar Weather and Climate Disasters

U.S. Climate Resilience Toolkit
Source: Census Bureau, CEQ, Esri, FEMA, MRLC, NOAA, UCSD

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	**7 days** 7 - 12	**23 days** 11 - 33	**24 days** 12 - 36	**31 days** 15 - 51	**39 days** 18 - 58	**39 days** 17 - 66	**70 days** 25 - 99
Annual days with maximum temperature > 95°F	**1 days** 1 - 2	**6 days** 1 - 13	**7 days** 2 - 11	**9 days** 2 - 21	**14 days** 4 - 24	**14 days** 3 - 31	**37 days** 7 - 67
Annual days with maximum temperature > 100°F	**0 days** 0 - 0	**1 days** 0 - 4	**1 days** 0 - 3	**2 days** 0 - 8	**3 days** 0 - 10	**4 days** 0 - 8	**15 days** 1 - 40
Annual days with maximum temperature > 105°F	**0 days** 0 - 0	**0 days** 0 - 1	**0 days** 0 - 0	**0 days** 0 - 2	**1 days** 0 - 3	**1 days** 0 - 4	**5 days** 0 - 22
Annual temperature:							
Annual single highest maximum temperature °F	**95 °F** 94 - 96	**99 °F** 96 - 102	**99 °F** 96 - 102	**100 °F** 97 - 105	**102 °F** 97 - 107	**102 °F** 98 - 107	**107 °F** 98 - 114
Annual highest maximum temperature averaged over a 5-day period °F	**90 °F** 89 - 91	**94 °F** 91 - 98	**94 °F** 91 - 96	**95 °F** 92 - 99	**96 °F** 93 - 101	**96 °F** 93 - 102	**101 °F** 93 - 109
Cooling degree days (CDD)	**690 degree-days** 638 - 741	**999 degree-days** 785 - 1,267	**1,037 degree-days** 821 - 1,283	**1,163 degree-days** 875 - 1,530	**1,315 degree-days** 958 - 1,686	**1,331 degree-days** 902 - 1,824	**1,953 degree-days** 1,234 - 2,615

N/A = Data Not Available for the selected area

Figure C-4

Orange County, New York

Total Population
380,085

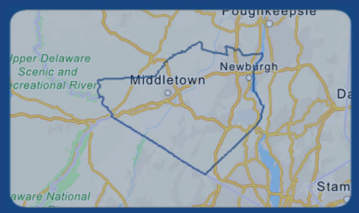
% Population with Income Below Poverty
12%

Building Codes Hazard Resistance
Resistant

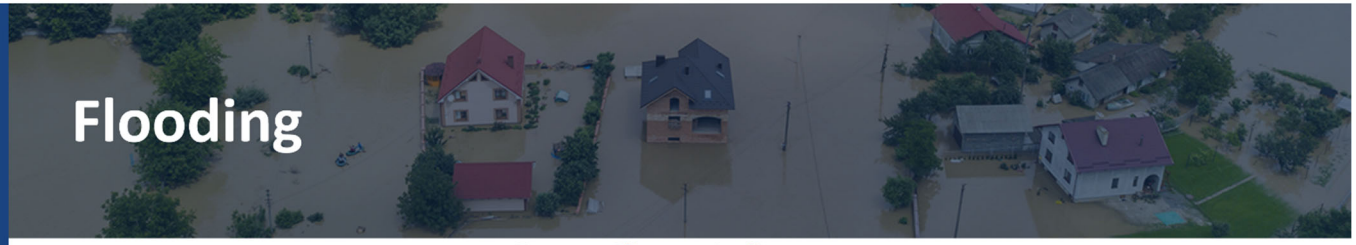
% Population Disadvantaged
18.07%

National Risk Index Rating
Relatively Moderate
Source: FEMA National Risk Index

Billion-Dollar Weather and Climate Disasters



U.S. Climate Resilience Toolkit
Source: Census Bureau, CEQ, Esri, FEMA, MRLC, NOAA, UCSD



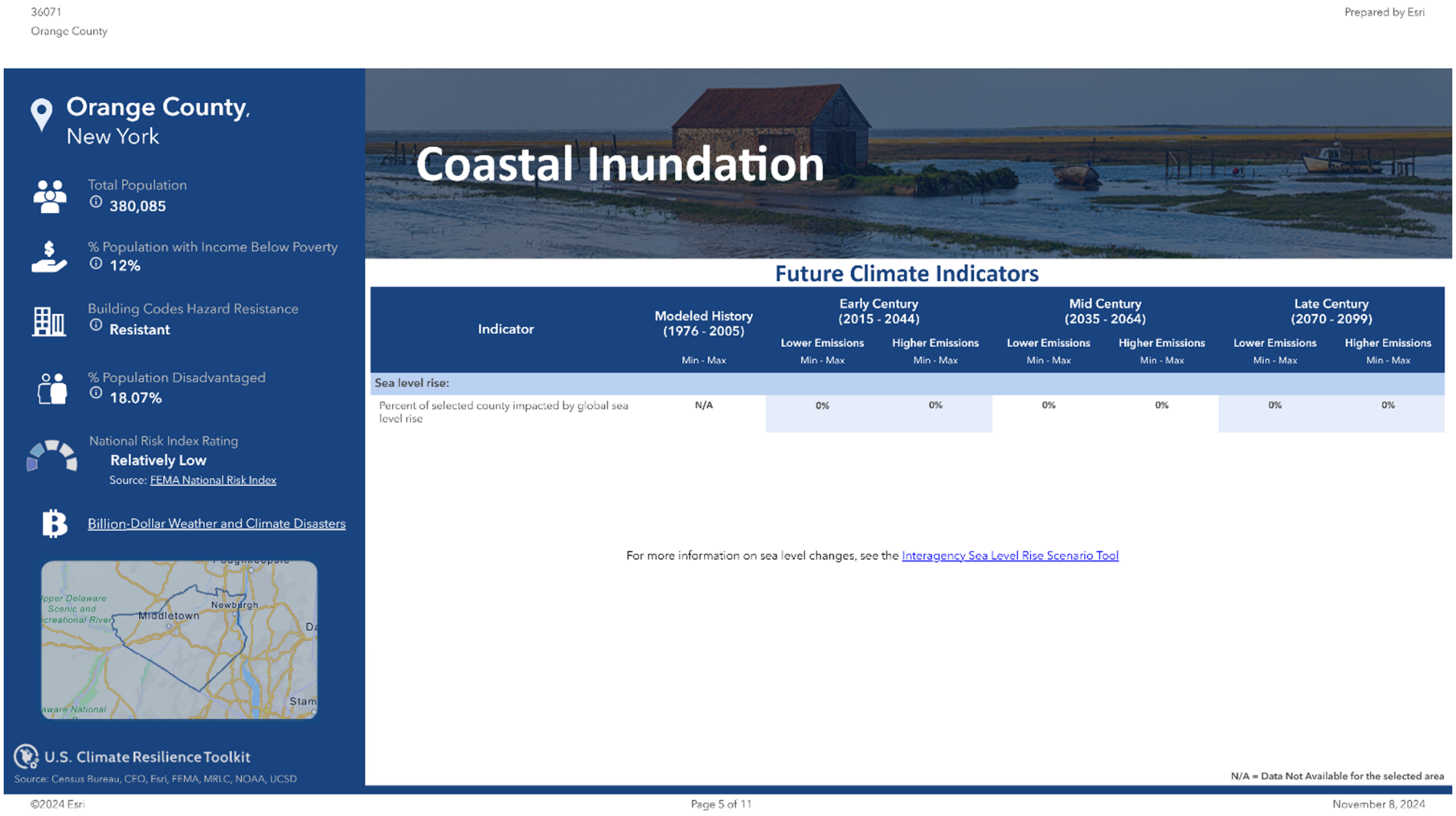
Flooding

Future Climate Indicators

Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Annual average total precipitation	**46"** 44 - 48	**48"** 45 - 54	**48"** 43 - 53	**48"** 45 - 54	**49"** 45 - 53	**50"** 45 - 55	**51"** 46 - 58
Days per year with precipitation (wet days)	**189 days** 185 - 193	**189 days** 179 - 200	**189 days** 175 - 201	**188 days** 178 - 200	**187 days** 172 - 199	**188 days** 175 - 199	**186 days** 159 - 202
Maximum period of consecutive wet days	**12 days** 10 - 12	**12 days** 10 - 13	**12 days** 11 - 14	**12 days** 10 - 14	**12 days** 10 - 14	**12 days** 10 - 13	**12 days** 9 - 15
Annual days with:							
Annual days with total precipitation > 1inch	**6 days** 5 - 7	**7 days** 6 - 8	**7 days** 5 - 10	**7 days** 6 - 8	**8 days** 6 - 10	**8 days** 6 - 9	**9 days** 6 - 11
Annual days with total precipitation > 2 inches	**1 days** 0 - 1	**1 days** 0 - 1	**1 days** 0 - 1	**1 days** 0 - 1	**1 days** 0 - 1	**1 days** 1 - 1	**1 days** 0 - 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 - 0
Annual days that exceed 99th percentile precipitation	**6 days** 5 - 7	**7 days** 6 - 8	**7 days** 6 - 9	**7 days** 7 - 9	**8 days** 7 - 10	**8 days** 7 - 9	**10 days** 9 - 12
Days with maximum temperature below 32 °F	**27 days** 25 - 31	**19 days** 7 - 26	**18 days** 10 - 25	**16 days** 4 - 22	**13 days** 6 - 21	**13 days** 2 - 21	**5 days** 1 - 12

N/A = Data Not Available for the selected area

Figure C-5


36071
Orange County
Prepared by Esri
Orange County, New York
Total Population
380,085
% Population with Income Below Poverty
12%
Building Codes Hazard Resistance
Resistant
% Population Disadvantaged
18.07%
National Risk Index Rating
Relatively Low
Source: FEMA National Risk Index
Billion-Dollar Weather and Climate Disasters
Middletown
Newburgh
U.S. Climate Resilience Toolkit
Source: Census Bureau, CEO, Esri, FEMA, MRLC, NOAA, UCSD
Coastal Inundation
Future Climate Indicators
Indicator
Modeled History (1976 - 2005)
Min - Max
Early Century (2015 - 2044)
Lower Emissions
Min - Max
Higher Emissions
Min - Max
Mid Century (2035 - 2064)
Lower Emissions
Min - Max
Higher Emissions
Min - Max
Late Century (2070 - 2099)
Lower Emissions
Min - Max
Higher Emissions
Min - Max
Sea level rise:
Percent of selected county impacted by global sea level rise
N/A
0%
0%
0%
0%
0%
0%
For more information on sea level changes, see the Interagency Sea Level Rise Scenario Tool
N/A = Data Not Available for the selected area
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Page 5 of 11
November 8, 2024

Figure C-6

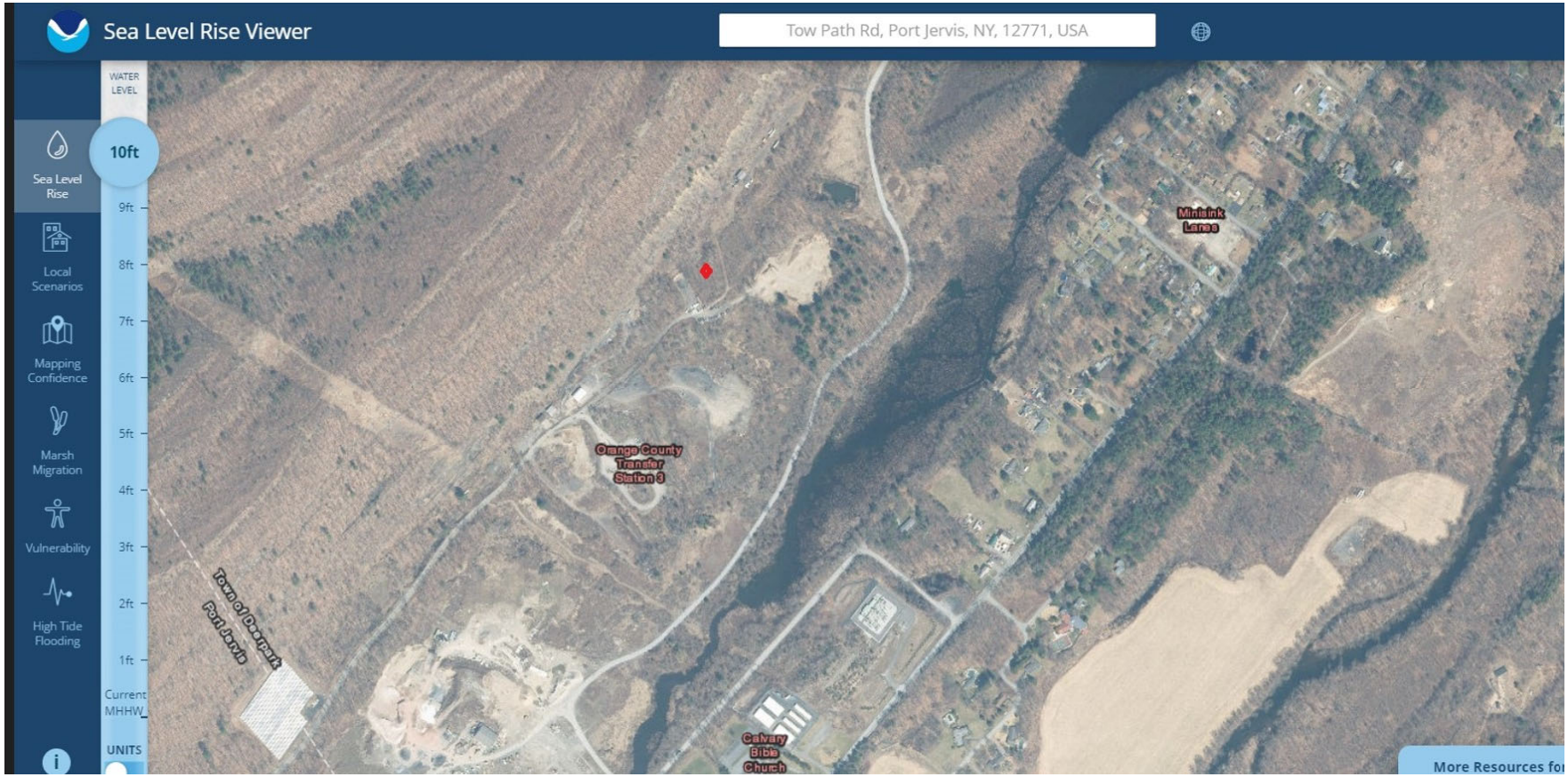

Sea Level Rise Viewer
Tow Path Rd, Port Jervis, NY, 12771, USA
WATER LEVEL
10ft
9ft
8ft
7ft
6ft
5ft
4ft
3ft
2ft
1ft
Current MHHW
UNITS
Sea Level Rise
Local Scenarios
Mapping Confidence
Marsh Migration
Vulnerability
High Tide Flooding
Orange County Transfer Station 3
Minisink Lanes
Calvary Bible Church
More Resources fo

Figure C-7

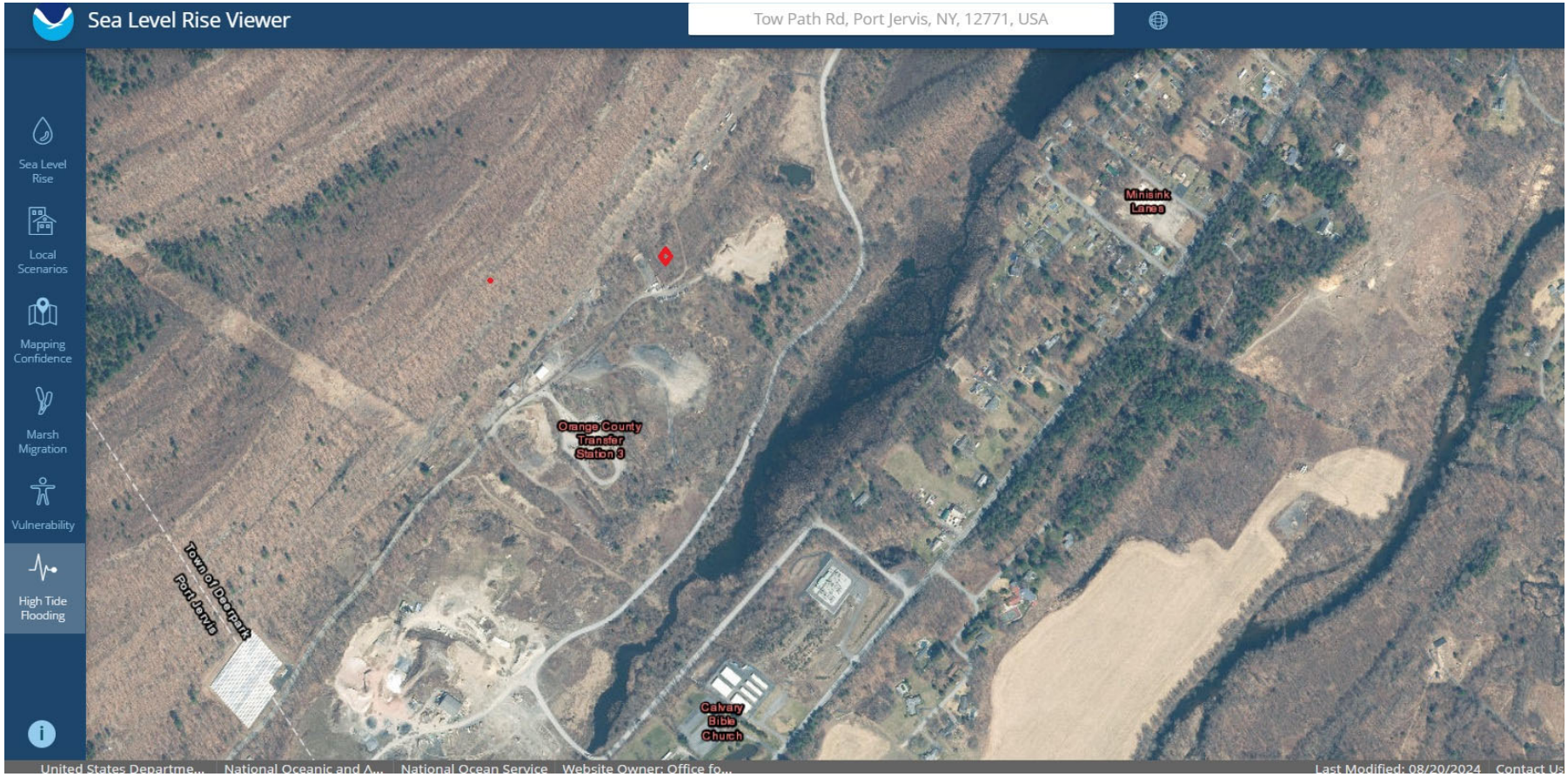
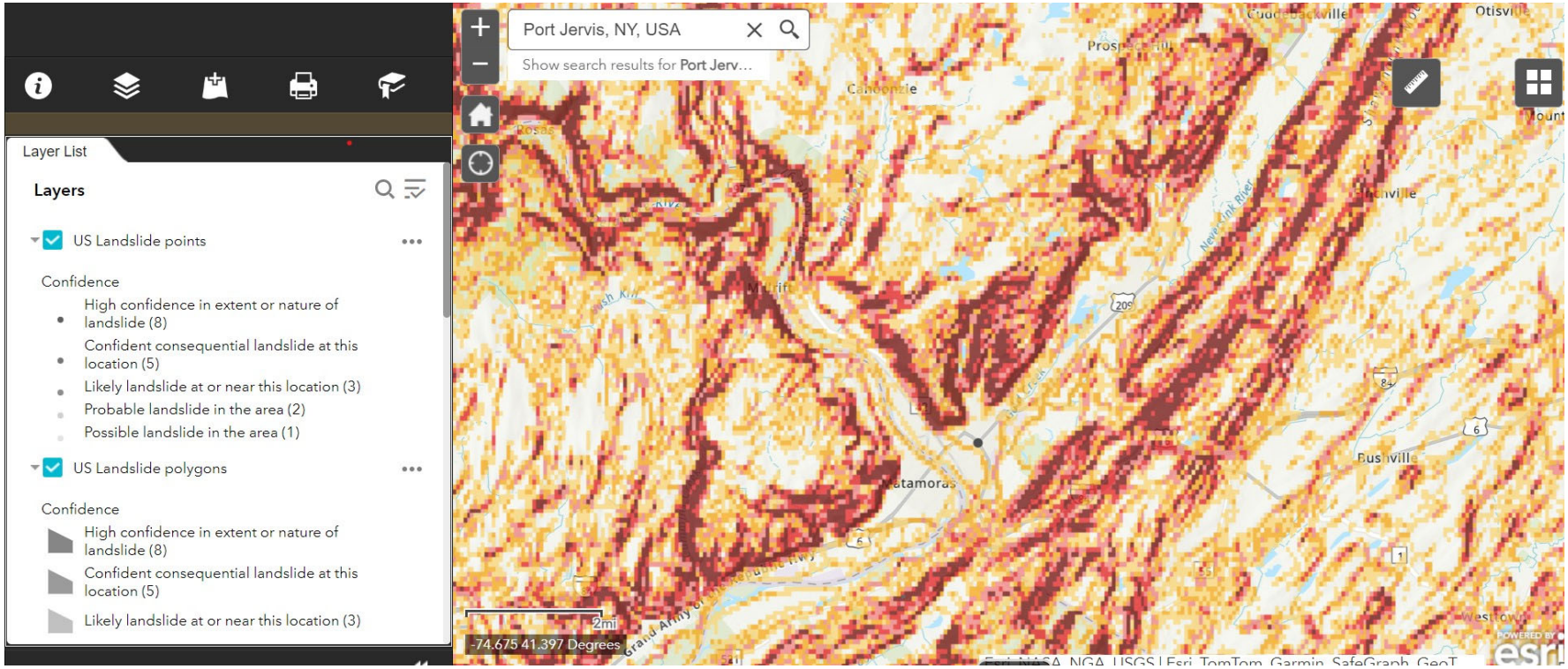

Sea Level Rise Viewer
Tow Path Rd, Port Jervis, NY, 12771, USA
Sea Level Rise
Local Scenarios
Mapping Confidence
Marsh Migration
Vulnerability
High Tide Flooding
Orange County Transfer Station 3
Minisink Lanes
Calvary Bible Church
Town of Deerpark
Port Jervis
United States Departme...
National Oceanic and A...
National Ocean Service
Website Owner: Office fo...
Last Modified: 08/20/2024
Contact Us

Figure C-8


Layer List
Layers
US Landslide points
Confidence
High confidence in extent or nature of landslide (8)
Confident consequential landslide at this location (5)
Likely landslide at or near this location (3)
Probable landslide in the area (2)
Possible landslide in the area (1)
US Landslide polygons
Confidence
High confidence in extent or nature of landslide (8)
Confident consequential landslide at this location (5)
Likely landslide at or near this location (3)
Port Jervis, NY, USA
Show search results for Port Jerv...
2mi
-74.675 41.397 Degrees
esri