

**SECOND FIVE-YEAR REVIEW REPORT FOR
NEPERA CHEMICAL COMPANY SUPERFUND SITE
ORANGE COUNTY, NEW YORK**



Prepared by

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

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
AWQS	Ambient Water Quality Standard
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminants of Concern
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentration
FS	Feasibility Study
FYR	Five-Year Review
HHRA	Human Health Risk Assessment
ICs	Institutional Controls
MCLs	Maximum Contaminant Levels
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
O&M	Operation and Maintenance
PRP	Potentially Responsible Party
PRG	Preliminary Remediation Goal
RAO	Remedial Action Objectives
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SCO	Soil Cleanup Objective
SVOC	Semi-Volatile Organic Compound
TAGM	Technical and Administrative Guidance Memorandum
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 FYR reports such as this one. In addition, FYR reports identify issues found during the review, if any, and document recommendations to address them.

The U.S. Environmental Protection Agency (EPA) is preparing this FYR pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (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 second FYR for the Nepera Chemical Company Superfund Site (the 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 the remedial action will not leave hazardous substances, pollutants, or contaminants on site above levels that allow for unlimited use and unrestricted exposure (UU/UE), but requires five or more years to complete.

The Site is addressed in its entirety, under one operable unit, which includes both a soils component and a groundwater component. EPA's FYR for the Site was led by Damian Duda, Supervisor and Emily Wong, remedial project manager (RPM) for the Site. Participants included Kathryn Flynn (hydrogeologist), Nicholas Mazziotta (human health and ecological risk assessor), and Shereen Kandil (community involvement coordinator). The potentially responsible parties: Nepera, Inc., Warner-Lambert Company, and Cambrex Corporation, were notified of the initiation of the FYR. The review began in November 2022.

Site Background

The Nepera Chemical Company site is located on Maybrook Road in Hamptonburgh, Orange County, New York. **Figure 1** provides a map of the area. The Site includes a 29-acre property which is bounded on the north by Orange County Highway 4, Beaverdam Brook to the west, the Otter Kill to the south, and an undeveloped tract of land to the east. The vicinity near the Nepera Property is residential and agricultural in nature and is zoned residential/agricultural. Three residences exist in the immediate vicinity of the Site and are located approximately 250 feet, 175 feet and 450 feet to the west, north and northeast of the Nepera Property boundary, respectively. These residences rely on private wells for their drinking water. The public water supply wells for the Village of Maybrook are located approximately 800 feet to the east-northeast of the Nepera Property.

The Nepera Chemical Company used the property to discharge wastewater from their chemical manufacturing facility located in Harriman, New York. From 1953 through 1967, Nepera constructed and used lagoons at the Site for the discharge of industrial wastewater. The lagoons, comprising an area of approximately five acres, were constructed within the property. No wastewater disposal has taken place at the Site since December 1967. All of the lagoons were back-filled with soil by 1974. **Figure 2** illustrates the various aspects of the Site.

There are two aquifers that exist beneath the Site, the overburden and the bedrock aquifer. The overburden aquifer is the surficial unit which overlies the bedrock aquifer. The unconsolidated deposits that form the overburden are generally thin (e.g., 5 to 20 feet). The fractured bedrock is comprised of shale and sandstone and provides a primary source for public water in the area. The existing groundwater monitoring well network is depicted in **Figure 3**.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Nepera Chemical Company Superfund Site		
EPA ID: NY000511451		
Region: 2	State: NY	City/County: Hamptonburgh, Orange County
SITE STATUS		
NPL Status: Final		
Multiple OUs? No	Has the site achieved construction completion? Yes	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Emily Wong		
Author affiliation: EPA Remedial Project Manager		
Review period: 8/23/2018 - 4/1/2023		
Date of site inspection: 4/4/2023		
Type of review: Policy		
Review number: 2		
Triggering action date: 8/23/2018		
Due date (five years after triggering action date): 8/23/2023		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

The remedial investigation (RI) completed in 2007 indicated that both groundwater (overburden and bedrock) and the soil within the area of the lagoons were contaminated with organic contaminants. The baseline risk assessment, consisting of a human health risk assessment (HHRA), which evaluated risks to people, and a baseline ecological risk assessment (BERA), which evaluated risks to the environment,

documented that this contamination posed a threat to human health and the environment because of risk from possible ingestion, inhalation, or dermal contact with the soils and/or groundwater. The contaminants of concern (COCs) identified for the Site's soil and groundwater are benzene, chlorobenzene, ethylbenzene, toluene, xylenes, 2-amino pyridine, pyridine, alpha picoline, acetone, aniline, and 2-4 bipyridine. Based on the HHRA, the COCs posed a risk to human health from ingestion of groundwater and from direct contact with contaminated soil associated with a future construction worker. The results of the BERA suggested that there are contaminants in groundwater, soils, and sediment, but they are not present at levels posing significant risks for ecological receptors.

Response Actions

A Record of Decision was issued on September 28, 2007 (2007 ROD). The remedial action objectives (RAOs) identified for the Site are to:

1. Prevent exposure of human receptors to contaminated soils and contaminated groundwater;
2. Minimize migration of contaminants from soils to groundwater;
3. Restore the aquifer(s) to beneficial use;
4. Ensure that hazardous constituents within the soil meet acceptable levels consistent with reasonably anticipated future use; and
5. Minimize potential human contact with waste constituents.

In order to address the RAOs, the soils remedy included excavation in the source area (former lagoon area), the design and construction of an onsite biocell to contain the excavated soil, the installation of a soil vapor extraction (SVE) system within the biocell, and operation of the SVE and the biocell systems to remediate contaminated soil. The groundwater remedy required that the excavated area be treated with oxygenating or oxygen-releasing compounds to create an aerobic environment and, thereby, stimulate biodegradation of contaminants within the area of elevated groundwater contamination. In addition, a monitoring program would be implemented to monitor the effects of the soils and groundwater remedies on both the overburden and bedrock aquifers. Institutional controls (ICs) will be enacted at the Site, which include the development of an environmental easement/restrictive covenant to be filed in the property records of Orange County that include groundwater use restrictions at the Site until cleanup levels are reached. Last, a site management plan (SMP) would be developed to address soil and groundwater at the site.

Additional activities were performed during the remedial design (RD), including: onsite soil borings, soil sampling, surveying activities, and recalculation of the volume estimates of the contaminated soil within the former source area. Based upon this information, it was determined that the estimated volume of soil that would be characteristic waste pursuant to the Resource Conservation Recovery Act (RCRA) was much less than originally anticipated and estimated in the ROD; the resultant projected costs to excavate and dispose the soils off-site was also much less than projected in the ROD. At the request of the PRPs, EPA considered the benefits of modifying the selected remedy for soils and determined that a change in the remedy would be appropriate.

As a result, a ROD Amendment was signed on July 22, 2011. The RAOs remained unchanged. The ROD amendment was only for the soils portion of the 2007 ROD in order to address the source areas and includes the following components:

- 1) Excavation of contaminated soils throughout the former lagoon area where contaminants in soils exceed New York State Department of Environmental Conservation (NYSDEC) Soil Cleanup Objectives (SCOs) for unrestricted use;
- 2) Transport of contaminated soils that exceed the SCOs to a permitted Treatment, Storage, and Disposal (TSD) facility for treatment and off-site disposal;
- 3) Post-excavation confirmatory sampling; and
- 4) Backfilling the excavated areas with clean fill.

The groundwater remedy selected in the 2007 ROD remained unchanged.

Table A below lists the cleanup levels for the Site contaminants in soil and groundwater. The cleanup objectives are based on federal and state promulgated applicable or relevant and appropriate requirements (ARARs), risk-based levels, background concentrations, and guidance values. The SCO for 2-aminopyridine was established for the protection of groundwater.

Table A - Cleanup Objectives		
Contaminant	Cleanup Levels for Soils (µg/kg)	Cleanup Levels for Groundwater (µg/L)
Benzene	60 ¹	1
Chlorobenzene	1,100 ¹	5
Ethylbenzene	1,000 ¹	5
Toluene	700 ¹	5
Xylenes	260 ¹	5
2-amino pyridine	400 ²	1
Pyridine	400 ²	50
Alpha picoline	575 ²	50
Acetone	50 ¹	50
Aniline	1,510 ²	5
2,4-bipyridine ³	400 ²	50

¹ The values shown are from *NYSDEC Subpart 375: Remedial Program Soil Cleanup Objectives*.

² The values shown were derived by NYSDEC based on the *Division Technical and Administrative Guidance Memorandum: Determination of Soil Cleanup Objectives and Cleanup Levels, Division of Hazardous Waste Remediation, January 24, 1994*.

³ The parameter was determined to be present in Site soils as a result of soil sampling activities performed in 2010.

Status of Implementation

Soils

The remedial action for the soil was substantively complete in 2012. During the remedial action, approximately 83,210 tons of source material, *i.e.*, contaminated soils, throughout the former lagoon area, were excavated and transported to a permitted TSD facility for treatment and off-site disposal. The excavated area was treated with oxygen-releasing compounds below the water table to create an aerobic environment within the aquifers, and, thereby, stimulate biodegradation of contaminants within the aquifers. Following these activities, the excavated areas were backfilled with clean fill soil.

These actions have resulted in the removal of contaminated soil from the source area (the former lagoon area), and, thereby, have reduced the potential for the ongoing migration of contaminants (e.g., benzene compounds and 2-aminopyridine) from the source area to groundwater.

Upon completion of excavations of each lagoon, post-excavation confirmatory soil sampling was conducted to ensure that no contaminants were left behind that exceeded NYSDEC SCOs for unrestricted use. Excavation activities continued beyond the boundaries of the lagoons and down to bedrock. An evaluation of the post-excavation soil sampling data collected in 2012 showed that the source area soils contaminated with site-related contaminants above cleanup objectives were effectively excavated and removed from the Site. An additional investigation was performed to evaluate any residual contamination found in soils beyond the extent of the excavation. Samples were collected (by geoprobe and from test pits) in areas outside of the former source areas, north of Lagoon 5. The visual characteristics of the soils were different than soils excavated from within the former source areas and corresponded to the saturated zone. Based on these observations, as well as the thickness of the overburden, the impacted soil found north of Lagoon 5 was not considered source material but was determined to have been dispersed through groundwater transport.

Subsequently, additional areas of dispersed materials were encountered under the access road adjacent to Lagoon 4 and in the southernmost area of the Site, adjacent to the southern perimeter of Lagoons 1 and 3. These dispersed materials had the same analytical signature as those found north of Lagoon 5, and were observed below the water table, similar to the material in the area north of Lagoon 5. In addition, the southernmost limit of excavation of Lagoon 3 was extended into the former railroad bed and encroached on a wooded area that had not been part of the former lagoon operation, suggesting that the materials had been dispersed via the groundwater pathway. Collectively, the data have been used to define the locations where dispersed materials exist. The assessment and determination of dispersed materials is documented in the September 2013 Interim Remedial Action Report and the September 2013 Preliminary Close-Out Report (PCOR). It was decided that the dispersed materials would not be excavated, but instead would be managed as a part of the ongoing groundwater monitoring and remediation. All equipment demobilization activities were completed by January 13, 2013.

Groundwater

During the remedial action, the excavations performed in the lagoons proceeded down to bedrock. As such, much of the excavated soils were located within the overburden aquifer, and, therefore, contained a significant amount of moisture. The soils were de-watered using a temporary water treatment system that was installed to treat more than 2.1 million gallons of dewatering water prior to discharge into Beaverdam Brook, under an NYSDEC discharge authorization. Finally, prior to backfilling the excavated area with clean fill soils, the groundwater remedy required that the excavated area be treated with oxygenating or oxygen-releasing compounds to create an aerobic environment and, thereby, stimulate biodegradation of contaminants within the area of elevated groundwater contamination. This action was performed throughout the area of excavation.

The installation of additional monitoring wells was completed on August 13, 2013. Groundwater monitoring activities will continue until the data reflect that the cleanup objectives have been achieved for groundwater. The EPA performed a Site inspection on August 19, 2013, that verified that all remedial construction activities were completed. The PCOR was completed in September 2013.

Institutional Controls (ICs) Summary

IC Summary Table (Planned and/or Implemented ICs)

Media, engineered controls, and areas that do not support UU/UE based on current conditions	IC 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	Orange County, including the Site.	The ROD recommends that an environmental easement be implemented to restrict the use of groundwater as a source of potable water. A local county ordinance has also been imposed to prevent and/or regulate the installation of drinking water wells in impacted areas.	Environmental Easement (March 2023) and Orange County, Department of Health Services Private Water Systems Standards
Soil	Yes	Yes	The Site	The ROD recommends that an environmental easement be implemented to restrict the excavation and/or disturbance of soils in any areas undergoing remediation.	Environmental Easement (March 2023)
Vapor	Yes	Yes	The Site	The ROD recommends that an environmental easement be implemented to restrict the construction of new buildings at the Site.	Environmental Easement (March 2023)

The ROD includes requirements for ICs related to groundwater use at the Site. The recommendation that groundwater well restrictions be imposed to prevent the installation of drinking water wells in impacted areas has been carried out, in part, by compliance with Orange County, Department of Health Services Private Water Systems Standards, which restricts installation of private wells. In addition, the ROD also includes a requirement for instituting restrictive covenants and/or environmental easements for limiting future use of the Site until cleanup goals are achieved.

Systems Operations/Operation & Maintenance (O&M)

When remedial actions were completed, all equipment and systems were dismantled and/or removed from the property. O&M activities conducted at the Site are limited to groundwater monitoring only. The current network of Site monitoring wells are shown in **Figure 3**. These wells are sampled semi-

annually to monitor the effectiveness of the bioremediation remedy and evaluate contaminant trends in groundwater to determine progress towards reducing contaminants in groundwater to below drinking water standards. In addition to the routine, semi-annual groundwater monitoring events, sampling of adjacent residential wells is performed annually. The most recent annual residential sampling event was completed in May 2022.

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

III. PROGRESS SINCE THE LAST REVIEW

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

Table 1: Recommendations from the 2018 FYR

OU: 1	Issue Category: Institutional Controls			
	Issue: ICs required by ROD for groundwater are not in place.			
	Recommendation: Implement necessary deed restrictions			
Affect Current Protectiveness	Affect Future Protectiveness	Party Responsible	Oversight Party	Milestone Date
No	Yes	PRP	EPA/State	12/2/2019

The 2018 FYR also included the following suggestion under Other Findings: Finalize the SMP.

Table 2: Protectiveness Determinations/Statements from the 2018 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The remedy protects human health and the environment in the short-term because contaminated soils have been excavated and Orange County well restrictions prevent exposure to contaminated groundwater. In order to be protective in the long term, on-property deed restrictions need to be implemented.
Sitewide	Short-term Protective	The remedy protects human health and the environment in the short-term because contaminated soils have been excavated and Orange County well restrictions prevent exposure to contaminated groundwater. In order to be protective in the long term, on-property deed restrictions need to be implemented.

To meet IC requirements set forth in the ROD, the Declaration of Covenants and Restrictions and Environmental Easement was lodged and recorded at the Orange County Clerk’s Office on March 29,

2023. The final SMP was approved by EPA on April 26, 2023 and will be used to enforce the deed restrictions and the ICs as stated within the environmental easement.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On August 15, 2022, 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 Nepera Chemical 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 (CIC) for the site, Shereen Kandil, posted a public notice on the EPA site webpage www.epa.gov/superfund/nepera-chemical and provided the notice to the county by email on March 13, 2023 with a request that the notice be posted in municipal offices and on the county webpages. This notice indicated that a Five-Year Review (FYR) would be conducted at the Nepera Chemical Superfund site to ensure that the cleanup at the site continues to be protective of human health and the environment. Once the FYR is completed, the results will be made available at the following repositories: **Hamptonburgh Town Office**, 18 Bull Rd Campbell Hall, NY 10916, and **EPA Region 2 Records Center**, 290 Broadway, 18th Floor, New York, NY 10007. In addition, the final report will be posted on the following website: www.epa.gov/superfund/nepera-chemical. Efforts will be made to reach out to local public officials to inform them of the results.

Data Review

Groundwater

The current groundwater monitoring network (**Figure 3**) includes 26 wells screened in the overburden and bedrock aquifers. The wells are mostly located on the north and south sides of the former lagoon areas but there is also an overburden well located west of the former lagoon area and four bedrock wells in the former lagoon area. Since October 2013, the monitoring wells have been sampled semi-annually. The compounds analyzed are VOCs, SVOCs, and the site-specific compounds 2-aminopyridine, aniline, 2,4'-bipyridine, alpha picoline, and pyridine.

Benzene and 2-aminopyridine are generally the highest concentration of the site-specific compounds in both aquifer zones. In May 2022, the highest concentration of benzene in the overburden aquifer was 52.1 µg/l and the highest 2-aminopyridine concentration was 36.5 µg/l, both occurring at monitoring well MW-7. The highest benzene bedrock concentration in May 2022 was 102 µg/l at MW-20D-13, and the highest 2-aminopyridine result was 18.8 µg/l at DW-1-95. These wells are both located on the south side of the site, downgradient of the former lagoon areas. Chlorobenzene and total xylenes were also elevated in overburden and bedrock wells during other sampling events in this review period.

The recent data shows that current contaminant concentrations are lower than the pre-excavation levels and have generally decreased since 2013 in the overburden and bedrock monitoring wells.

Concentrations tend to be higher on the south side of the Site and in the bedrock monitoring wells. Figures 4a, 4b, 4c, and 4d show benzene and 2-aminopyridine concentrations since 2013 at selected overburden and bedrock monitoring wells. Overburden wells in the northern area of dispersed materials

(MW-2, SW-2 and SW-3) and wells in the southern area (SW-8 and SW-9) show declining trends in benzene, and MW-7 on the northern side is relatively stable. 2-aminopyridine concentrations in the overburden wells on both sides of the site have generally declined. In the bedrock wells, benzene concentrations have declined at MW-20D-13 and MW-22D-13 on the southern side and have been relatively stable at southern side at well DW-1-95 and northern side well DW-2-95. 2-aminopyridine concentrations in the bedrock wells declined at DW-1-95 and DW-2-95. MW-20D-13 and MW-22D-13 have had relatively stable 2-aminopyridine concentrations followed by low results in May 2022.

Although contaminant concentrations have declined since the oxygen-releasing compounds (ORCs) were applied to the base of the lagoon soils excavations in order to enhance bioremediation of Site-related groundwater contamination, current conditions are not consistent with further aerobic biodegradation. Ongoing monitoring data will be reviewed, and additional statistical analyses will be performed based on the monitoring data, *e.g.*, to assess the potential evidence of increasing trends. If monitoring data shows an increasing trend, the introduction of supplemental ORCs could be considered. In 2022, Wells SW-8, MW-20D-13, MW-22D-13, and DW-1-95 showed no measurable dissolved oxygen measurements and declining trends of COCs but showed elevated concentrations of benzene and 2-aminopyridine but below historical highs.

There are low concentrations during sampling events at some wells that are not representative of declining trends. For example, MW-22D had a 2-aminopyridine concentration of 629 µg/l in October 2020, 630 µg/l in April 2021, 561 µg/l in October 2021, and 1.8U in May 2022. MW-7 had 15.5 µg/l of 2-aminopyridine in October 2020, 11.4 µg/l in April 2021, a non-detected concentration in October 2021, but then the May 2022 concentration was 36.5 µg/l.

Groundwater monitoring at well clusters MW-5, MW-10, and MW-11, which are downgradient of the source areas, does not show VOC or 2-aminopyridine impacts in the overburden and bedrock aquifers, indicating that those contaminants are not migrating off-Site. Groundwater elevation measurements show that there is flow to the north and south from the center of the site, similar to the conditions observed in the RI.

Groundwater sampling for the emerging contaminants per- and polyfluoroalkyl substances (PFAS) was conducted in April 2019 and April 2021. The New York State Maximum Contaminant Level (MCL) for PFOS and PFOA is 10 ng/L. In 2019, monitoring wells MW-2, MW-7, MW-4D-91, MW-11D-01, MW-11U-01, MW-17D-13 and MW-20D-13 were sampled. MW-17D had a PFOA concentration of 33.3 ng/l. The range of detected PFOA concentrations at other wells was 1.45J to 9.90 ng/l. The range of detected PFOS concentrations was 1.85J to 5.52 ng/l. Monitoring wells DW-2-95, MW-1D-91, MW-5D-91, MW-10D-01, MW-16D-13 and MW-17D-13 were sampled in April 2021. MW-17D-13 had a PFOA concentration of 24.9 ng/L. The range of PFOA concentrations at the other wells was 1.5 ng/l to 8.7 ng/l, and the range of detected PFOS concentrations at all sampled wells was 1.1J to 5.2 ng/l. EPA will continue to work with the NYSDEC to determine future sampling needs.

1,4-Dioxane was sampled at monitoring wells MW-2, MW-7, MW-4D-91, MW-11D-01, MW-11U-01, MW-17D-13 and MW-20D-13 in April 2019. There were two detections at wells MW-17D-13 and MW-20D-13 of 0.242 µg/L and 0.422 µg/l, respectively. These results, however, were below the NYSDEC MCL of 1 µg/L established in 2021.

Residential Well Sampling

Residential wells at four properties located near the Site continued to be sampled annually during this FYR period. The most recent sampling event was completed in May 2022. Each sampling event performed between 2018 and 2022 indicated all site-related compounds were not detected. In October 2020, the residential wells were also sampled for PFAS and 1,4-dioxane. All results for 1,4-dioxane were non-detect. PFAS compounds, however, were detected at two residences with one residential well containing PFOA at 12.6 ng/L, slightly above the NYSDEC MCL of 10 ng/L. In response, NYSDEC provided the affected residence with bottled water and scheduled additional sampling in the Spring of 2021. In April 2021, NYSDEC resampled both residences for PFAS, and the results for PFOA and PFOS were below the NYSDEC MCL. In May 2021, additional samples were collected from each of the four residential wells. PFAS compounds were detected at both of the properties where it had been found previously but remained at concentrations below the NYSDEC MCL. Nevertheless, NYSDEC installed a point-of-entry treatment (POET) system at the residence which had previously experienced slightly elevated results. NYSDEC has taken the lead on maintaining the POET system and performing additional monitoring and/or sampling in the future. Although additional sampling for PFAS is not anticipated at these residential wells, they may be re-evaluated, depending on the regulatory nature of PFAS.

Site Inspection

The FYR Site inspection was conducted on April 4, 2023. In attendance were Emily Wong and Damian Duda of EPA, Justin Starr of NYSDEC, Erich Zimmerman of TetraTech (PRP consultant) and representatives of the PRPs (Seth Levine of Cambrex Corporation and Chris Clark of Warner-Lambert Company). The purpose of the inspection was to assess the protectiveness of the remedy. The inspection team observed that the property has remained an inactive field. General maintenance activities will be completed based on site observations, including relabeling worn monitoring wells, replacing locks on monitoring wells, and updating the signage at the entrance to the site to reflect updated contact information.

V. TECHNICAL ASSESSMENT

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

The remedy is functioning as intended by the ROD signed on September 28, 2007, as amended by the Amendment to the ROD signed on July 22, 2011.

The soil remedy was completed, and confirmation samples indicate soil cleanup levels have been met in the source area. However, contaminated soils remain outside the source area, a result of contaminant transport and dispersion through groundwater. It is anticipated that the ongoing groundwater remedy will address this contamination and groundwater wells in this area will continue to be evaluated to determine the effectiveness of remediation.

By removing contaminants from the former source area and placing oxygenating or oxygen-releasing compounds in the excavated area, levels of contaminants in groundwater have generally decreased steadily on site. Off-site well sampling indicates that the plume is stable and not migrating off the Site property. Results from residential wells also indicate that the plume is not migrating since the site COCs have not been detected in any sampling performed during this FYR period. Although PFOA was slightly elevated at one residential well in 2020, subsequent sampling events have identified concentrations below the State MCL, and NYSDEC installed a POET system for this residence. NYSDEC continues to maintain the POET system installed, and EPA will continue to work with NYSDEC to determine future monitoring and/or sampling needs. Groundwater and residential well monitoring will also continue to ensure that the remedy remains effective.

The ROD includes requirements for ICs on the property. An environmental easement was implemented in 2023 to enforce the ICs by limiting the Site to industrial use until cleanup goals have been achieved. Restrictions also include prohibiting soil excavation and/or disturbance, construction of new buildings, and use of groundwater as drinking water. A SMP addressing contaminated soils and groundwater was also established for the site in 2023. In addition, groundwater well restrictions imposed to prevent the installation of drinking water wells in impacted areas has been carried out, in part, by compliance with Orange County, Department of Health Services Private Water Systems Standards, which restricts installation of private wells. The groundwater well restriction is in place preventing unacceptable use of groundwater.

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?

There have been no changes in the physical conditions of the Site over the past five years that would impact the protectiveness of the remedy. The exposure assumptions, pathways, and toxicity data used to evaluate human health and ecological risks remain valid. Although specific parameters may have changed since the time the risk assessment was completed, the process that was used also remains valid. The RAOs and cleanup criteria established for the Site remain valid as well and the remedial actions taken (*i.e.*, soil removal, groundwater biodegradation and monitoring, and IC placement) have eliminated any potential soil or groundwater pathways of concern related to the site COCs as identified in the HHRA. Perimeter fencing further reduces access to the property. It is expected that the land will continue to be unused over the next five years.

Groundwater beneath the Site property is classified by New York State as "GA", indicating a potential potable water supply. Although onsite groundwater is not used, there are residences, located approximately 250 feet, 175 feet and 450 feet to the west, north and northeast of the Nepera Property boundary, respectively, that rely on private supply wells for drinking water. These supply wells have never been impacted by site-related contaminants. As mentioned previously in this FYR, however, PFOA was detected at one residential well slightly above the NYSDEC MCL in 2020. Subsequent sampling has not identified levels above the state MCL. Nevertheless, NYSDEC installed a POET system at the residence and continues to maintain it, thus interrupting exposure. Ongoing groundwater and residential well monitoring will continue until RAOs have been achieved.

The ROD established the federal MCLs and NYSDEC Class GA groundwater standards as the cleanup criteria for the COCs in groundwater, which remain valid. The cleanup levels used for benzene,

chlorobenzene, ethylbenzene, toluene, xylenes, and acetone in soil were based on the NYSDEC Part 375 SCOs for unrestricted use, which also remain valid. The cleanup goals for 2-aminopyridine, pyridine, alpha picoline, and aniline were derived by NYSDEC for impact to groundwater, based on the Technical and Administrative Guidance Memorandum (TAGM) 4046 objectives. While the TAGM objectives have since been succeeded by the 6 Part 375 (2006) and CP-51 (2010) SCOs, the process that was used remains valid.

Vapor intrusion is not a pathway of concern since there are no buildings presently located onsite or anticipated for construction over the next five years. ICs for the Site prohibit construction of buildings without an investigation into the potential for vapor intrusion. If mitigation of vapors is necessary, work activities must be performed in compliance with an EPA-approved SMP, according to the environmental easement. In addition, there have been no detections of site-related VOCs in off-site wells.

A baseline ecological risk assessment (BERA) was conducted to identify the potential environmental risks associated with surface water, ground water, sediment and soil. Although contaminants were identified in groundwater, soils, and sediment they were not present at levels posing significant risks to ecological receptors. The exposure assumptions and pathways, toxicity data, and RAOs for ecological receptors are still appropriate and the BERA conclusions remain valid.

Changes in Toxicity Characteristics

In the absence of toxicity information applicable to 2-aminopyridine, a chronic oral reference dose for 4-aminopyridine was used as a surrogate at the time the HHRA was completed. The reference dose, 2.0E-05 mg/kg-day, was selected from the 1997 Health Effects Assessment Summary Tables (HEAST) in consultation with the Superfund Technical Support Center (STSC). However, upon additional review during the previous FYR period, STSC notified Region 2 staff that this RfD was no longer available for use due to incomplete and questionable reporting of results in the principal study used in its derivation. After additional research, STSC found that 4-aminopyridine remained the most appropriate surrogate for 2-aminopyridine. To date, however, there are no toxicity values recognized for use in HHRA in accordance with the toxicological hierarchy established in OSWER directive 9285.7-53 (2003). Consequently, the conclusion reached in the human health risk evaluation of 2-aminopyridine contains a high degree of uncertainty. Nevertheless, the groundwater cleanup goal established for this compound (1 µg/L) in the ROD is based on the NYSDEC Class GA Ambient Water Quality Standard for aminopyridines, which specifically includes both 2-aminopyridine and 4-aminopyridine. The cleanup goal for 2-aminopyridine in soil was derived by NYSDEC for the impact to groundwater pathway using the aforementioned NYSDEC groundwater standard. Considering soil and groundwater concentrations of 2-aminopyridine exceeded these values at the time of the ROD, the decision to include 2-aminopyridine as a COC remains valid. Therefore, the changes in toxicity value references for this compound do not impact the remedial decision that was made for 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 come to light that would call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

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

Other Findings:

The following are recommendations that were identified during the FYR but do not affect current and/or future protectiveness:

- Review groundwater data to ensure that the remedy is progressing and the RAOs will be met. While contaminant concentrations have generally declined over time, sampling results at some wells have not been consistently trending downwards.
- Reevaluate the frequency of monitoring well sampling and/or reduce the number of wells sampled based on non-detected concentrations. Wells that have consistently shown no contamination or impacts over the course of several years should be considered for intermittent sampling or removal from the semi-annual monitoring events.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
<i>Operable Unit:</i> NA	<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy implemented at the Nepera Chemical site is protective of human health and the environment	

Sitewide Protectiveness Statement
<i>Protectiveness Determination:</i> Protective
<i>Protectiveness Statement:</i> The remedy implemented at the Nepera Chemical site is protective of human health and the environment

VIII. NEXT REVIEW

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

APPENDIX A – TABLES

Table 1: Chronology of Site Events

Table 2: Documents Reviewed

Table 1: Chronology of Site Events	
Site added to the NPL	May 10, 1999
NYSDEC and the Nepera Trust enter into a Consent Order to develop and implement a Remedial Investigation and a Feasibility Study	September 29, 2000
Remedial Investigation conducted	2000 to 2007
Feasibility Study completed	2007
Issuance of the Record of Decision	September 28, 2007
EPA and the Nepera Trust enter into a Consent Agreement to perform remedial design and action activities at the Site.	October 2008
The Nepera Trust performs remedial design activities	September 2008
Final Remedial Design Report Submittal	November 2010
USEPA issues Proposed Remedial Action Plan for an Amended ROD	May 2011
Issuance of an Amendment to the ROD	July 15, 2011
Initial Phase of Remedy Implementation	October 2011
Evaluation of Dispersed Materials North of Lagoon No. 5, Coordination with USEPA and USEPA Approval of Management of Dispersed Materials as Part of the Groundwater Remedy	May – July, 2012
Final Soil Excavation, Characterization, Post-Excavation Sampling; Drum/Waste Disposal; Backfill; and Site Restoration	August – November, 2012
USEPA Approval of the Groundwater Monitoring Well Installation Plan	February 2013
Additional Monitoring Well Installations	July – August 2013
Final USEPA Site Inspection	August 19, 2013
Implementation of Declaration of Covenant, Restrictions and Environmental Easement	March 29, 2023
Five Year Review Site Visit	April 4, 2023

Table 2: Documents Reviewed		
Author	Date	Title/Description
US Environmental Protection Agency	September 2007	Record of Decision, Nepera Chemical Company Site
US Environmental Protection Agency	July 2011	Amendment to the Record of Decision
US Environmental Protection Agency/Nepera Trust	September 28, 2004	Consent Decree to perform a Remedial Action
Nepera Trust/Cornerstone Engineering	July 2011	Remedial Action Work Plan
Cornerstone Engineering	2013 - 2017	Quarterly and Semi-Annual Groundwater Monitoring Reports
Cornerstone Engineering	September 27, 2013	Interim (Final) Remedial Action Report
U.S. Environmental Protection Agency	September 27, 2013	Preliminary Close-Out Report
U.S. Environmental Protection Agency	August 23, 2018	First Five-Year Review
Nepera Trust / Cornerstone Engineering	2018 -2022	Progress Reports (Semi-Annual and Quarterly) Groundwater Reports
Nepera Trust/Cornerstone Engineering	April 2023	Site Management Plan

APPENDIX B – FIGURES

Figure 1:	Site Location Map
Figure 2:	Site Property, Former Lagoon Area, and RI Groundwater Monitoring Well Locations
Figure 3:	Current Groundwater Monitoring Well Network
Figures 4a, 4b, 4c, and 4d:	Contaminant Trend Plots

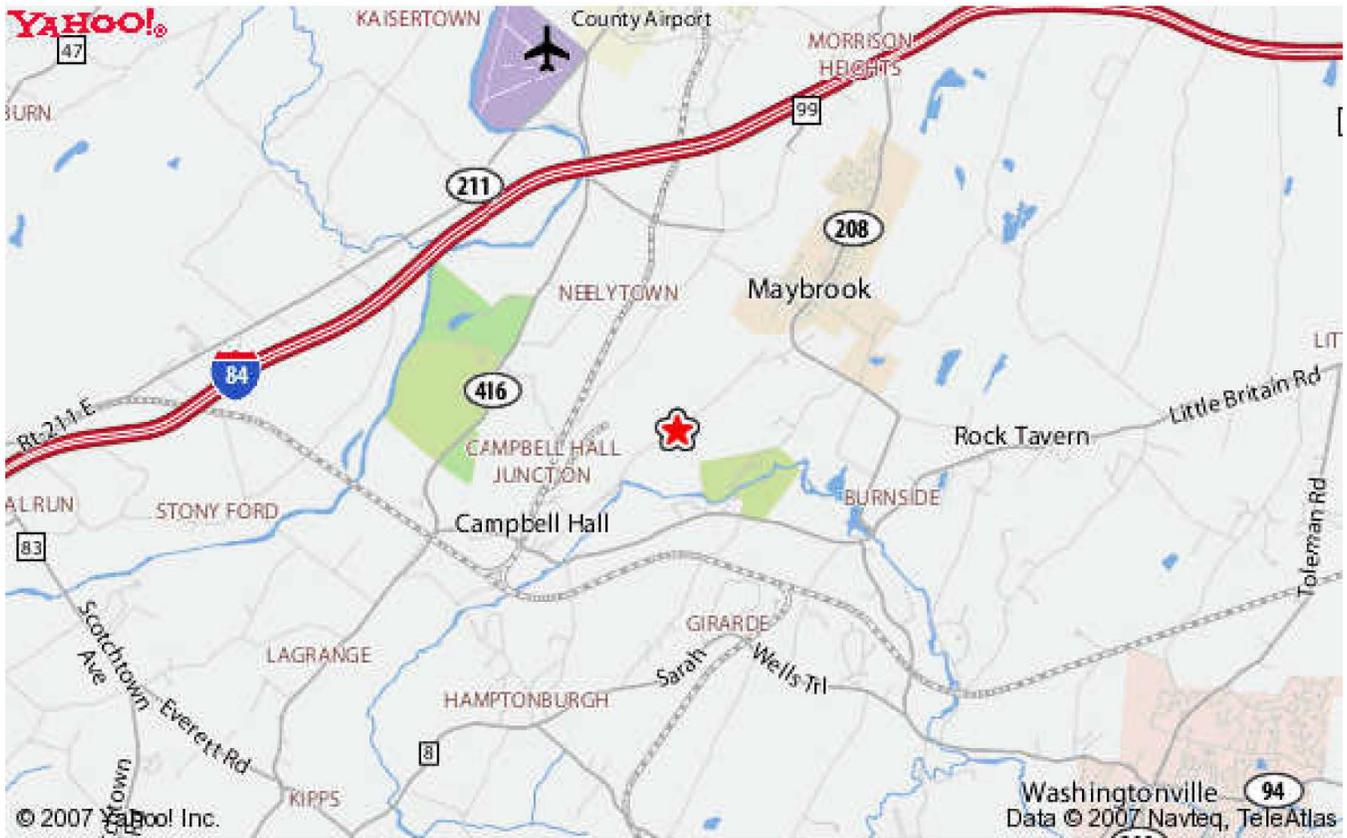
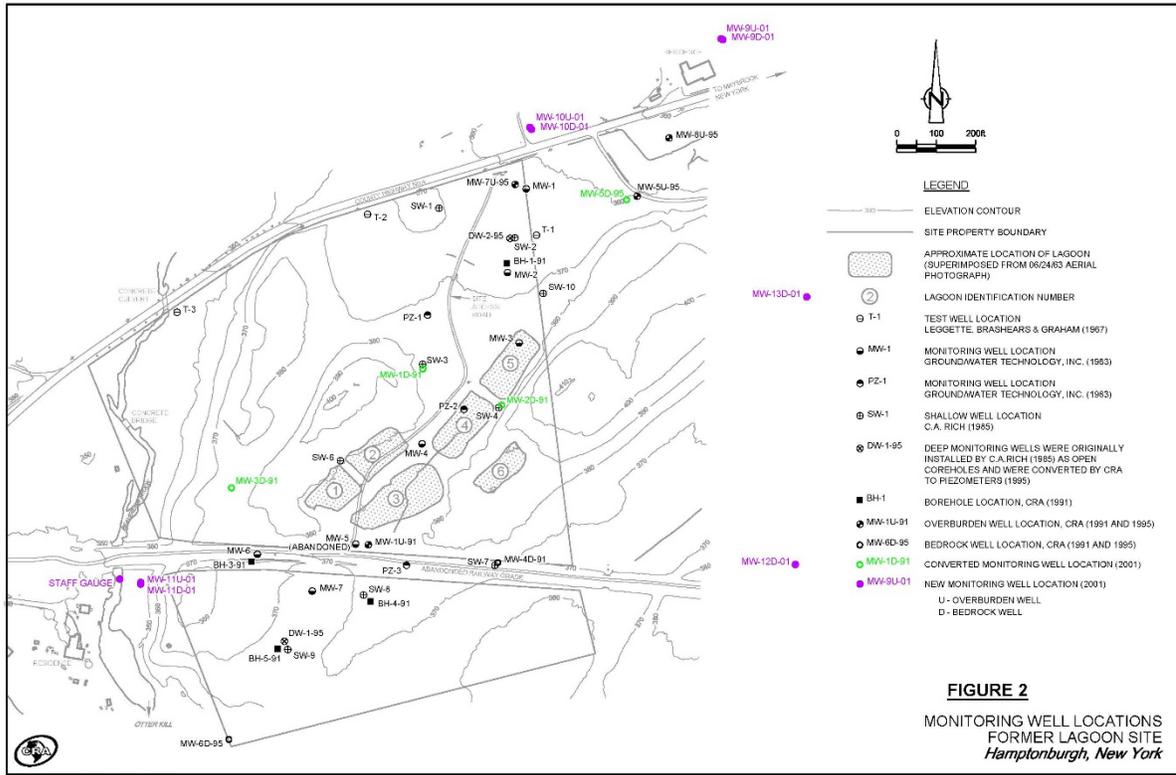
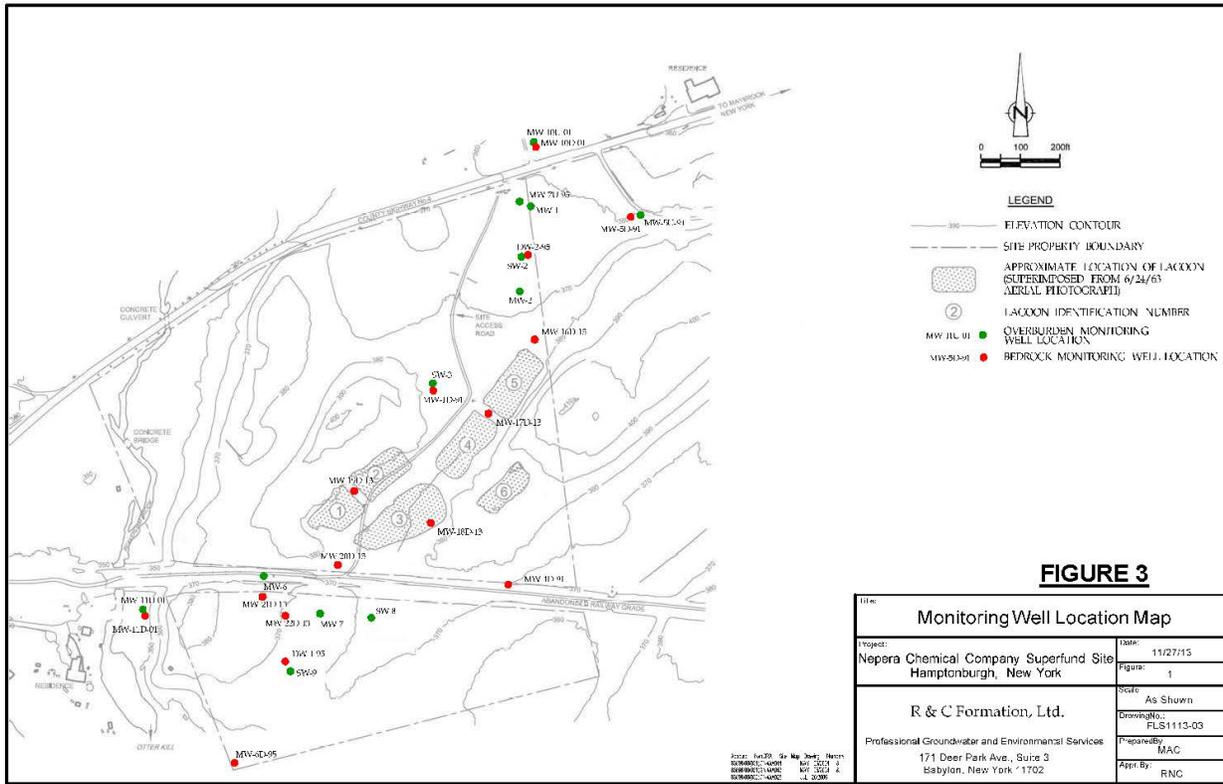


FIGURE 1





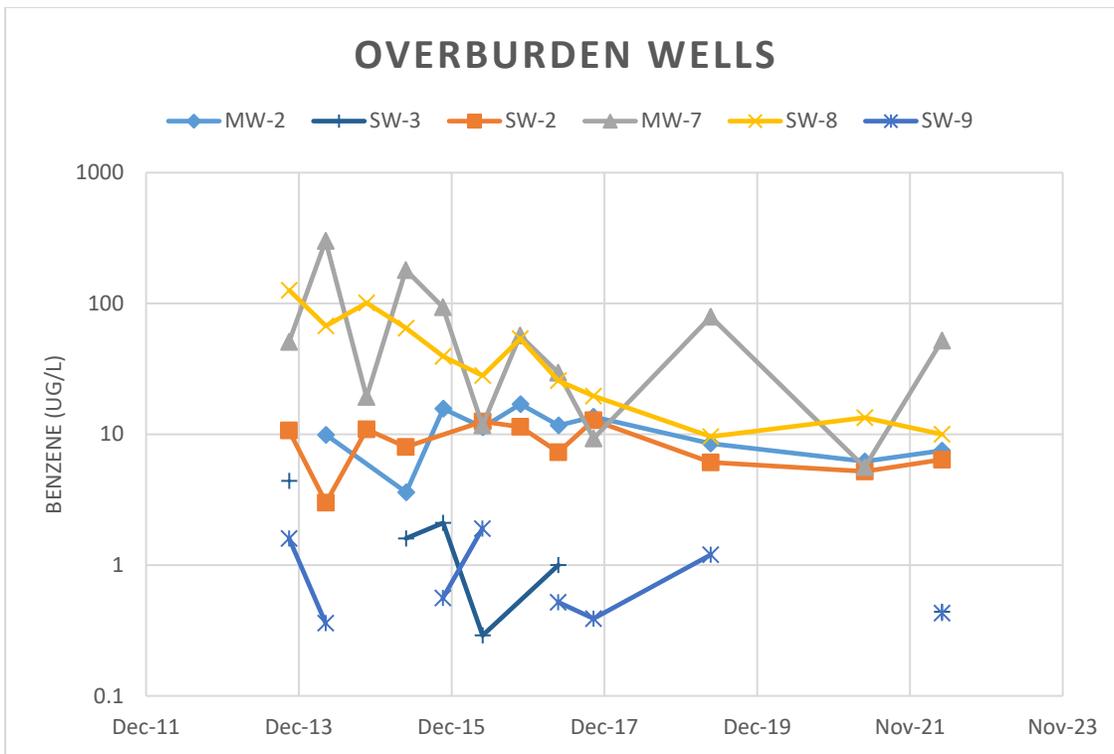


Figure 4a. Benzene concentrations in overburden monitoring wells.

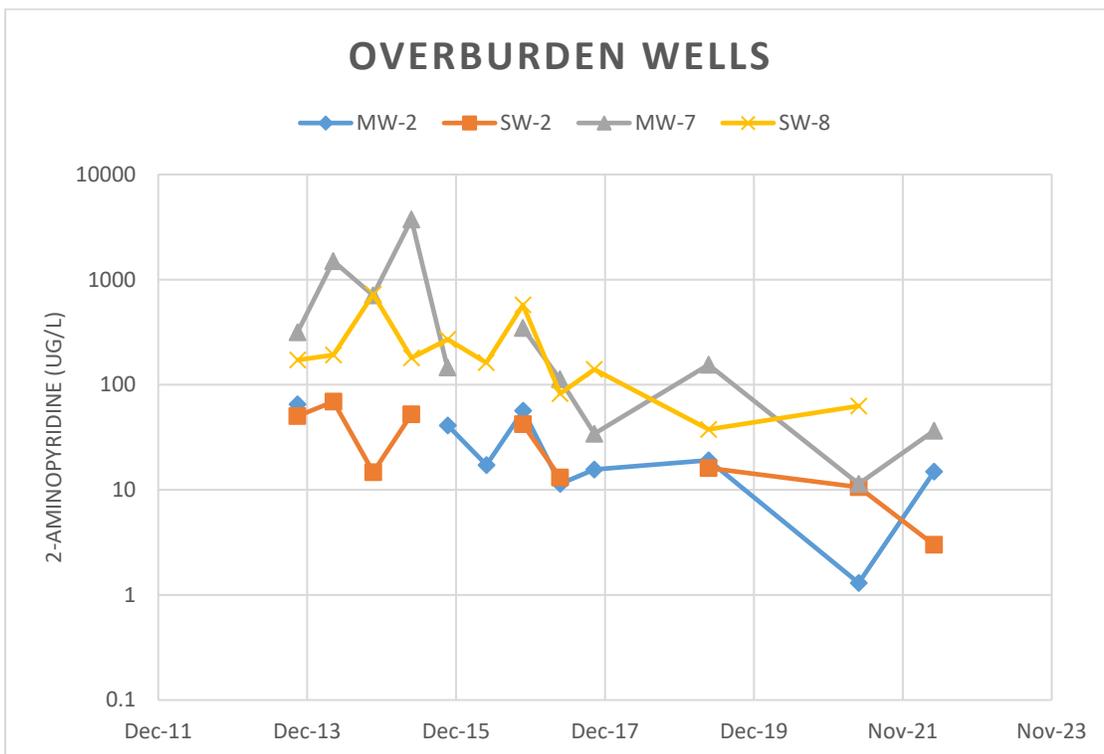


Figure 4b. 2-aminopyridine concentrations in overburden monitoring wells.

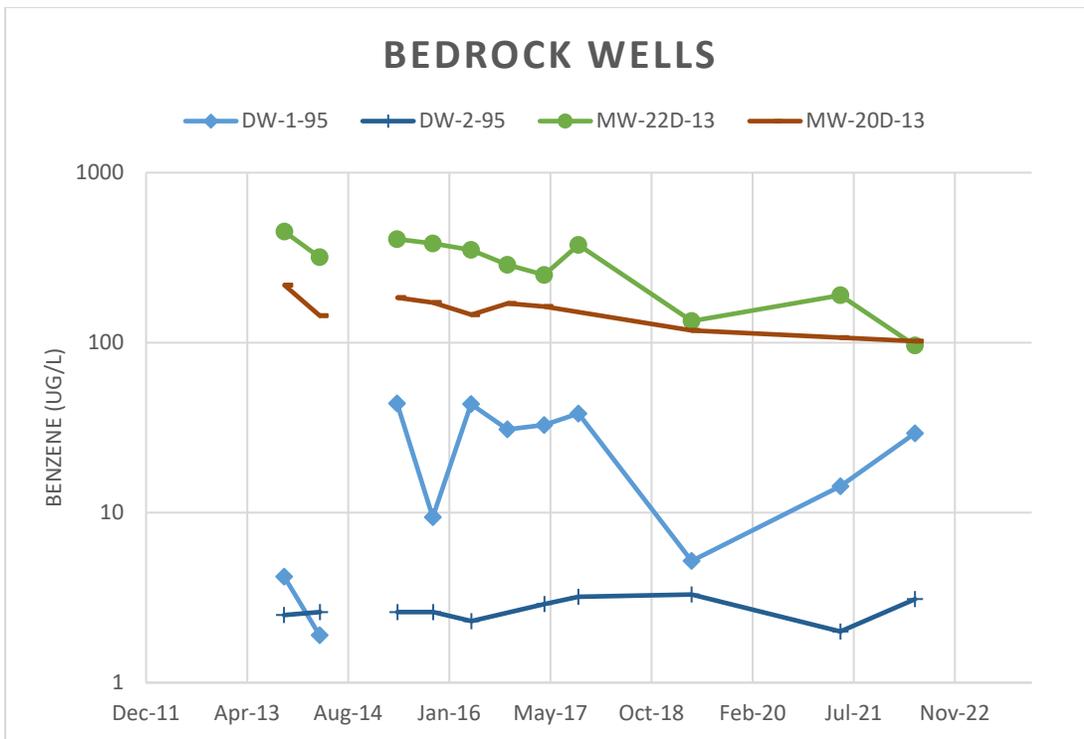


Figure 4c. Benzene concentrations in bedrock monitoring wells.

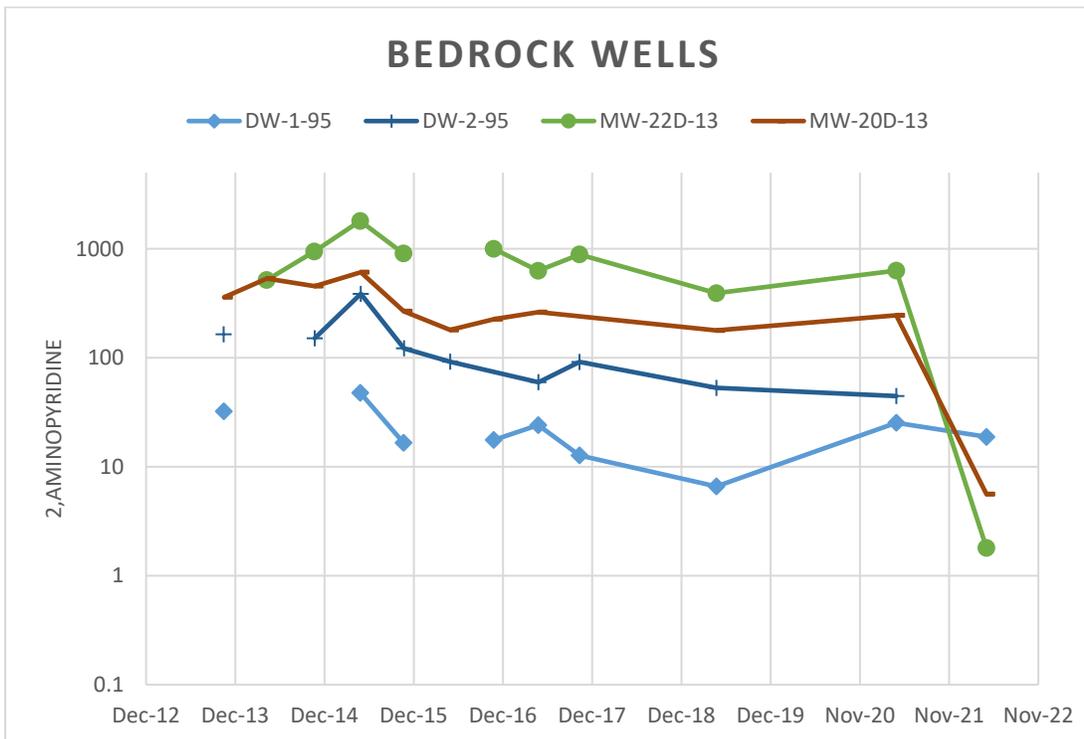


Figure 4d. 2-aminopyridine concentrations in bedrock monitoring wells.

APPENDIX C – CLIMATE CHANGE ASSESSMENT

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

The first tool utilized to assess the Nepera Chemical Site is called *The Climate Explorer*. According to this tool, Hamptonburgh is projected to face an increase of extreme temperatures on the hottest days of the year by 7°F. As seen in **Figure 1**, there is a projected increase in days per year with a maximum temperature > 100° F. **Figure 2** displays an increase in potential drought conditions due to a slight increase in the “dry days” per year with no precipitation. As seen in **Figure 3** there is a projected increase in the number of days with precipitation > 3 inches, which may impact the flood risk of the area. A summary of the Top Climate Concerns from the tool can be seen in **Figure 4**.

The second tool utilized is called *Risk Factor (formerly Flood Factor)*. According to this tool, Hamptonburgh has a major risk of flooding over the next 30 years, as seen in **Figure 5**. A storm resulting in severe flooding has a 26% chance of affecting the area over the life of a 30-year mortgage. As seen in **Figure 6**, there are many bodies of water around Hamptonburgh which exhibit potential for high depth of flooding.

The final tool utilized is called *Sea Level Rise*. According to this tool, Hamptonburgh is not located near the ocean and is at little risk for effects of sea level rise. As seen in **Figure 7**, Hamptonburgh would be unaffected by high tidal flooding due to its distance from the Hudson River.

Potential site impacts from climate change have been assessed, and the performance of the remedy is not currently at risk to due the expected effects of climate change in the region. Any potential flood risks, discussed above, would not apply to the Site since surface contamination no longer exists at the Site and any flooding would not affect the current Site conditions. Remedial actions, which included the treatment and/or removal of impacted soil and groundwater, were completed in 2013. Remedial activities are now limited to semi-annual groundwater monitoring events only. No equipment or operating systems remain onsite.

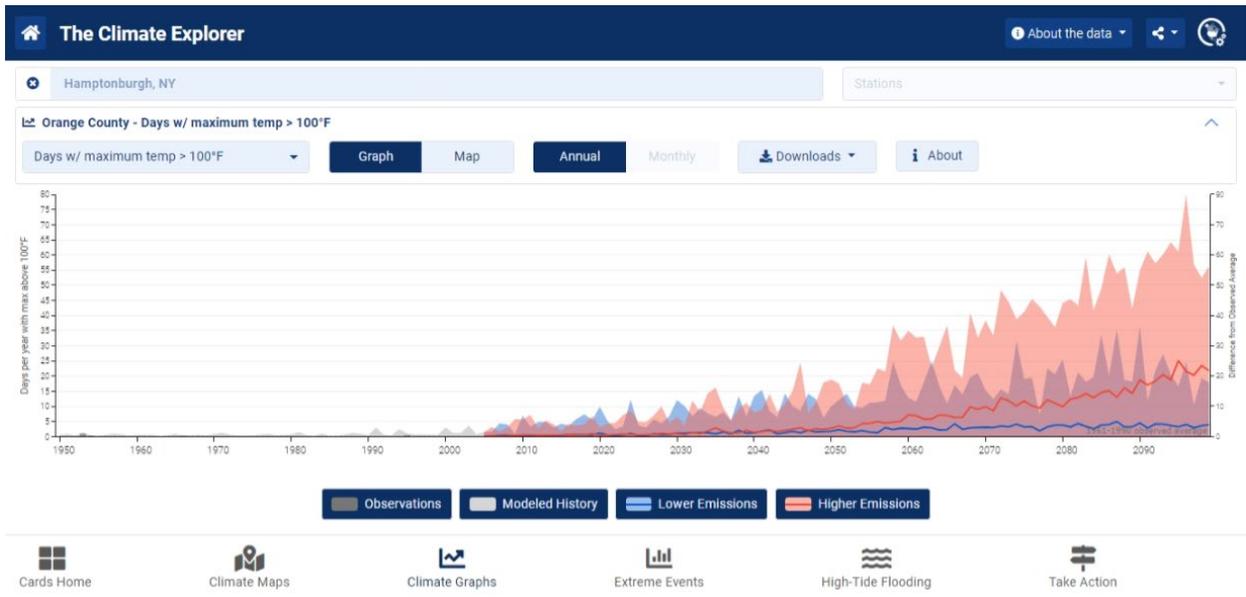


Figure 1

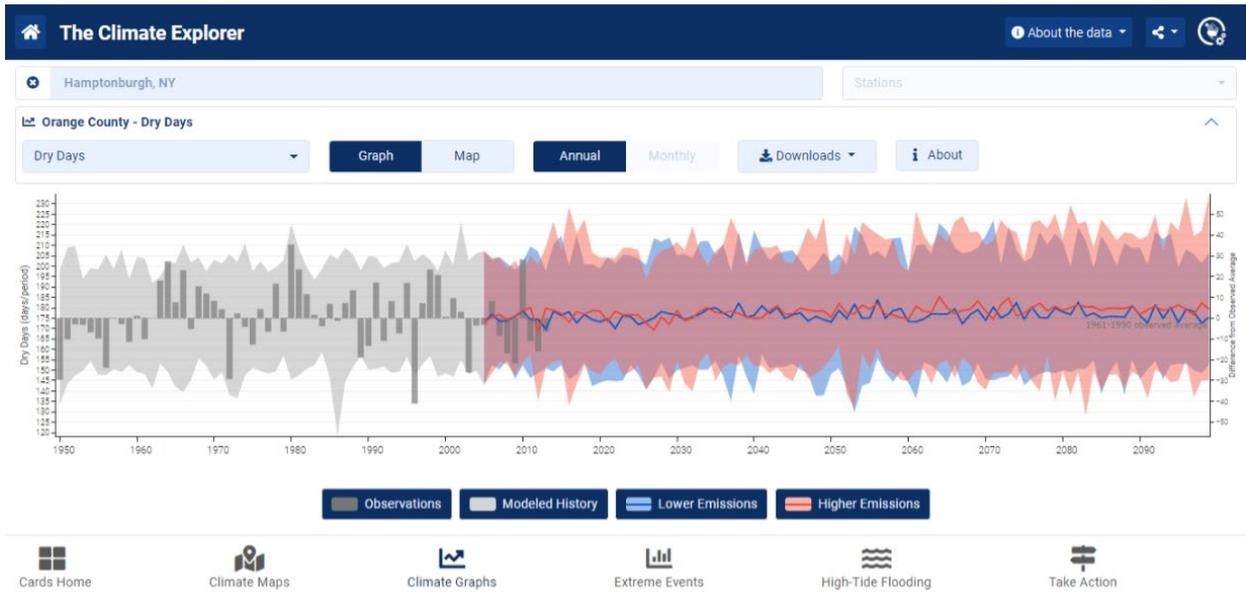


Figure 2



Figure 3

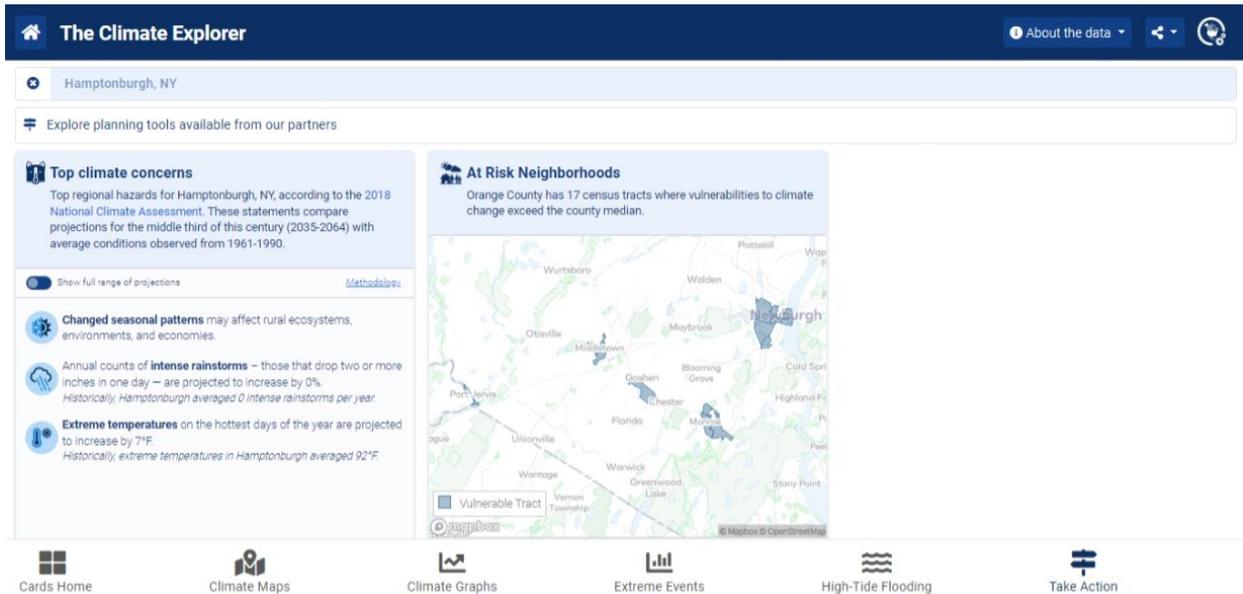


Figure 4

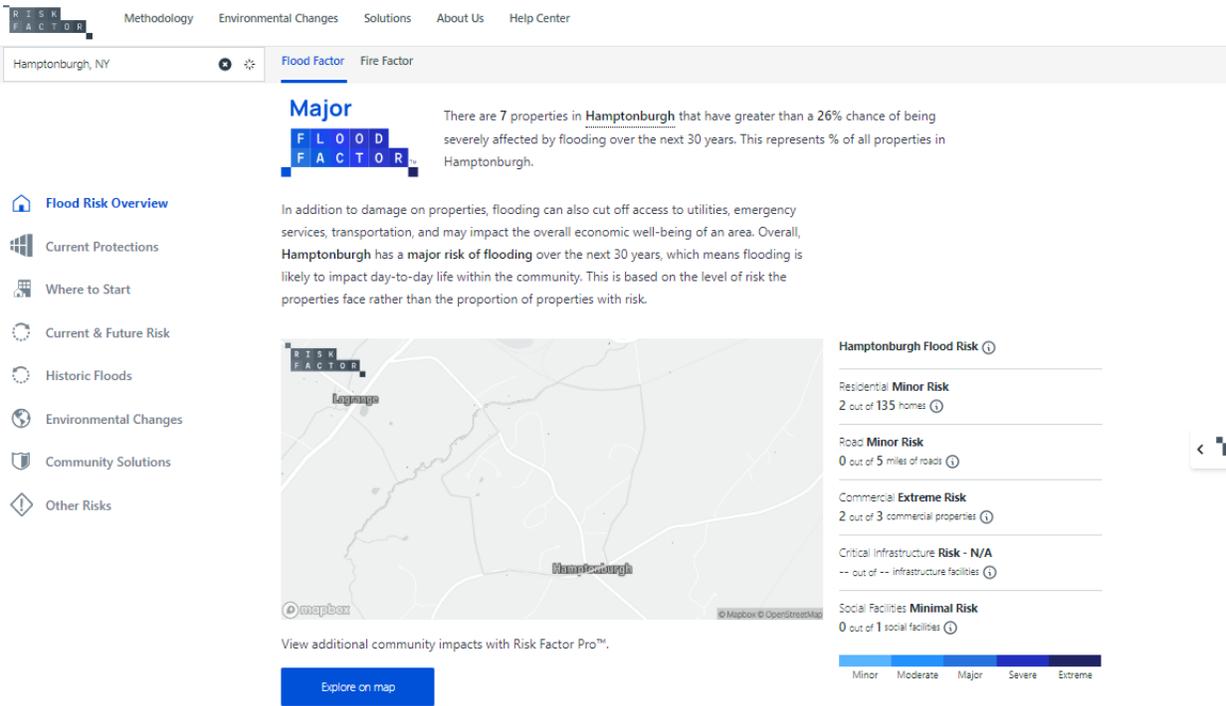


Figure 5

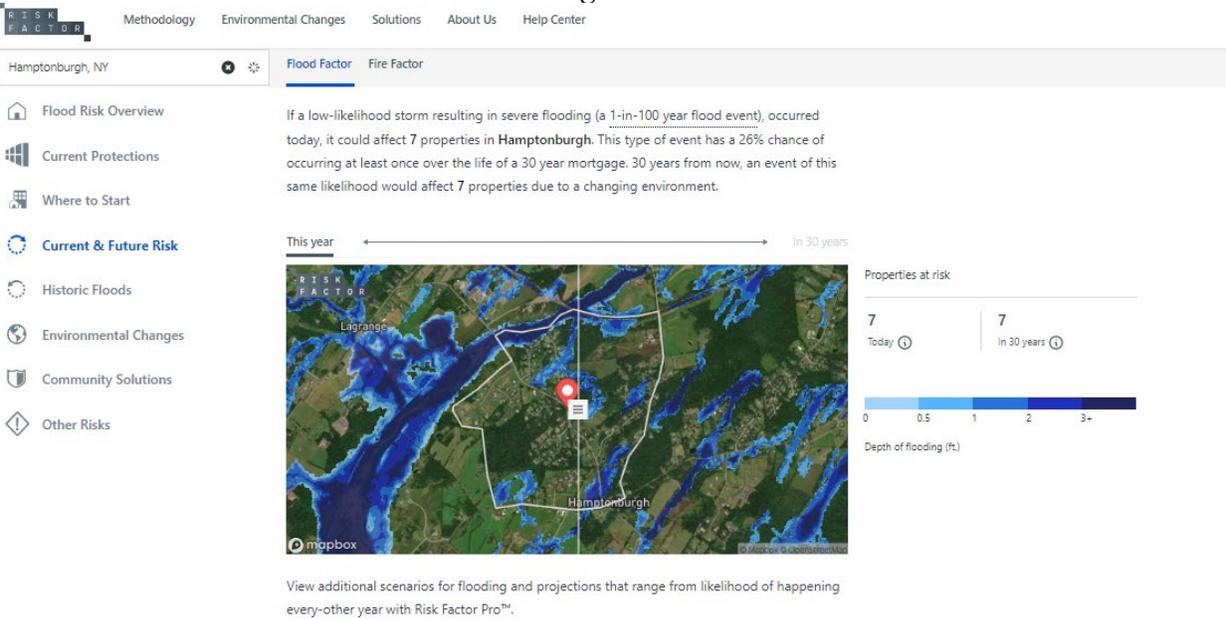


Figure 6

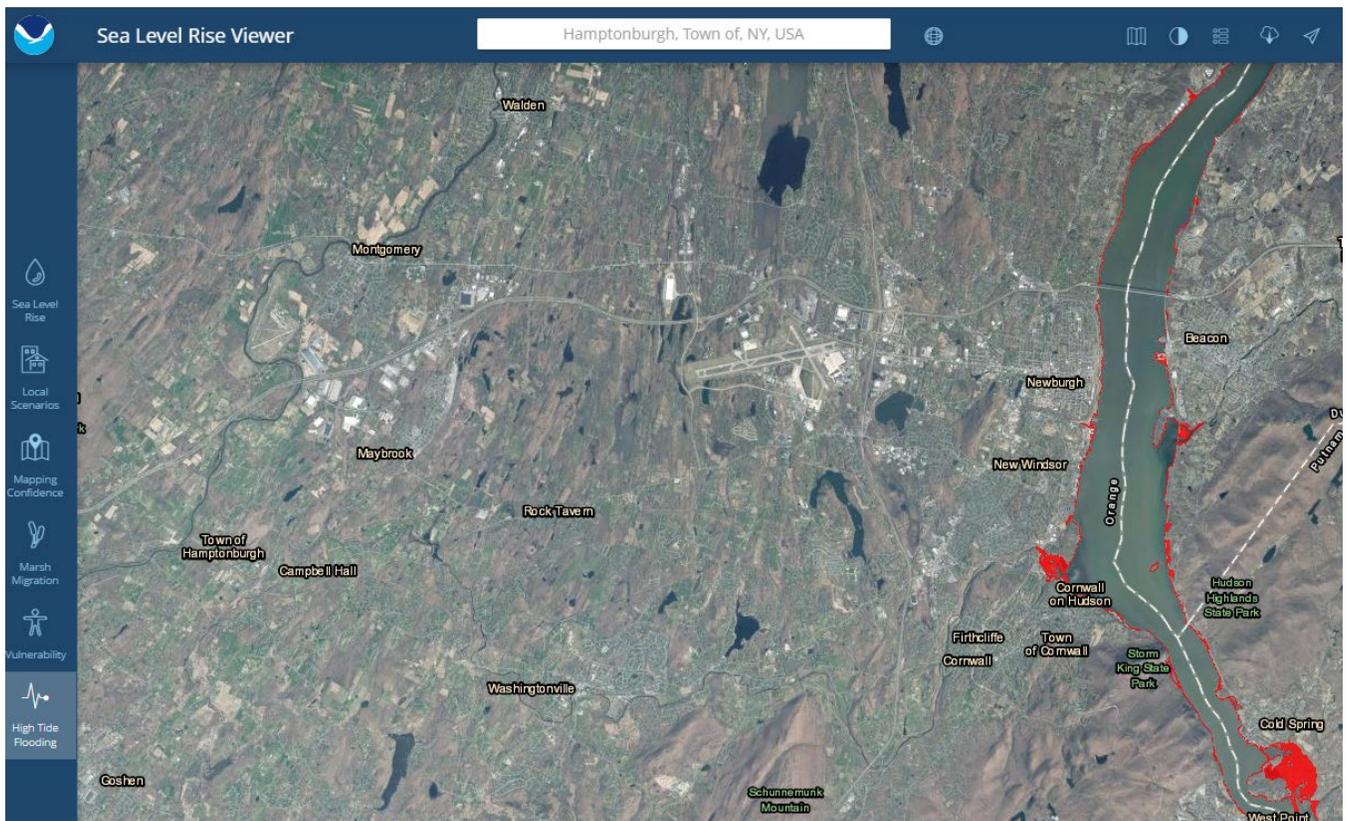


Figure 7