FIFTH FIVE-YEAR REVIEW REPORT FOR ROEBLING STEEL SUPERFUND SITE BURLINGTON COUNTY, NEW JERSEY

Prepared by

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

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April 30, 2024

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Date

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LIST OF ABBREVIATIONS & ACRONYMS

ARAR	Applicable or Relevant and Appropriate Requirement
BLL	Blood Lead Level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
FFS	Focused Feasibility Study
FYR	Five-Year Review
GWQS	Ground Water Quality Standards
ICs	Institutional Controls
mg/kg	Milligram per kilogram
µg/dL	Microgram per deciliter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PAHs	Polycyclic Aromatic Hydrocarbons
PCBs	Polychlorinated Biphenyls
RA	Remedial Action
RAO	Remedial Action Objectives
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SVOCs	Semi-volatile Organic Compounds
TBC	To Be Considered
TCE	Trichloroethylene
UU/UE	Unlimited Use and Unrestricted Exposure
VOCs	Volatile Organic Compounds

I. INTRODUCTION

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

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

This is the fifth FYR for the Roebling Steel Superfund Site (site). The triggering action for this statutory review is the completion date of the previous FYR. The FYR has been prepared due to the fact that hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE).

The site consists of five operable units (OUs), some of which are addressed in this FYR. The remedies for OU1 and OU2 have been completed and will not be addressed in this FYR. The remedies for OU3, OU4 and OU5 are not yet fully implemented or are in long-term operation and maintenance. These OUs are the subject of this FYR. A description of each OU is provided below:

- OU1 addressed the removal of drums, transformers, tanks, baghouse dust, chemical piles, tires, and contaminated park soil.
- OU2 addressed contaminated soil in another park.
- OU3 includes the cleanup of the slag area by installing a soil cap that will support a stormwater management system and shoreline stabilization.
- OU4 includes removal and disposal of underground storage tanks, above-ground tanks, pits, sumps, underground piping, process dust, friable asbestos abatement, decontamination and demolition of buildings, and the restoration of the historic Main Gate House.
- OU5 includes the remediation of site-wide soils, river and creek sediments, and groundwater.

The Roebling Steel Superfund Site FYR was led by Tamara Rossi, EPA Remedial Project Manager (RPM). EPA participants included: Perry Katz (Section Chief), Paul Zarella, (hydrogeologist), Abbey States (human health risk assessor), Abigail DeBofsky (ecological risk assessor) and Patricia Seppi (community involvement coordinator). The review began on 8/1/2023.

Site Background

The site is a 200-acre inactive steel manufacturing facility that was used from 1906 until 1982, primarily for the production of steel products. The site is located in Florence Township, Burlington County, New Jersey and is bordered by the residential areas of the Village of Roebling on the west and southwest, and the Delaware River and Crafts Creek on the north and east, respectively (Figure 1). A New Jersey transit station and a shared-use railroad track (light rail and freight) are adjacent to the southeastern boundary of the site. The site topography is essentially flat, except for a hill on the southern boundary of the slag disposal area that rises to Riverside Avenue and drops down a steep slope down to the banks of the Delaware River. The site is situated between 15 and 35 feet above mean sea level, in the Delaware River drainage basin, and is mostly above the 100-year flood plain.

There were approximately 70 buildings on-site connected by paved and unpaved access roads and railroad tracks throughout the facility. Steel production resulted in the generation of significant quantities of waste materials in both liquid and solid forms. The former facility contributed substantial tax revenues to Florence Township. The site is currently inactive except for portions of the property that have been remediated and redeveloped. Projected future land use of the site includes mixed commercial and recreational uses. In 2001, Florence Township, the owner of the property, through the Burlington County Land Use Planning Office, completed a reuse conceptual plan for redevelopment of the property.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Roebling Steel		
EPA ID: NJD073732257		
Region: 2	**State:** NJ	**City/County:** Florence Township/Burlington County
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal or State Project Manager): Tamara Rossi		
Author affiliation: EPA Region 2		
Review period: 8/1/2023 - 4/3/2024		
Date of site inspection: 3/4/2024		
Type of review: Statutory		
Review number: 5		
Triggering action date: 4/3/2019		
Due date *(five years after triggering action date)*: 4/3/2024		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

EPA conducted field investigations in multiple phases from 1985 to 1998. The purpose of these investigations was to determine the nature and extent of contamination of the entire site. The investigation results were finalized in the reports listed below and defined the following OUs:

- OU1 Focused Feasibility Study (FFS) was completed in January 1990.
- OU2/OU3 FFS was completed in June 1991.
- OU4 FFS was completed in July 1996.

- OU3/OU5 Remedial Investigation (RI) was completed in May 2002.
- OU3/OU5 Feasibility Study (FS) was completed in July 2002.

On-site buildings contained liquid and solid wastes, process dust and exposed asbestos. Site-wide surface and subsurface soils were contaminated with inorganics (antimony, arsenic, cadmium, chromium, and lead). River and creek sediments were contaminated with inorganics (arsenic, chromium, copper, iron, lead, and nickel) and polycyclic aromatic hydrocarbons (PAHs). Groundwater data showed sporadic concentrations of inorganics (arsenic, lead and zinc) which exceeded drinking water standards in a small number of wells.

Based upon the investigation results, baseline risk assessments were conducted to estimate the risks associated with current and future site conditions. The baseline risk assessment estimates the human health and ecological risk which could result from the contamination at the site in the absence of any actions to control or mitigate the contamination under current and future land uses. A qualitative assessment was performed for lead in addition to a quantitative risk assessment. The Human Health Risk Assessments found elevated risk for trespassers from dermal contact and inhalation exposures to drums, process dusts, tanks and building materials, as well as ingestion of contaminated soil by recreational children. These risks lead to the remediation of site drums, tanks and debris, and soils in the nearby recreational parks. There was also unacceptable risk to current off-site and future off-site child residents, future on-site adult residents, and future construction workers; these risks were primarily due to dermal contact and ingestion of manganese, antimony, and arsenic in soils, ingestion of trichloroethylene (TCE) and arsenic in groundwater, and ingestion of mercury and copper from fish in Crafts Creek. Lead was also found to contribute to unacceptable health risks, with surface soil concentrations averaging 7,161 milligrams per kilogram (mg/kg), and subsurface concentrations averaging 1,838 mg/kg.

The ecological risk assessment evaluated the contaminants associated with the site in conjunction with the site-specific biological species/habitat information. The primary areas of concern were Crafts Creek and the Delaware River Back Channel, which support a diverse aquatic and wetlands community. Results of the ecological risk assessment determined that arsenic, chromium, copper, iron, lead, manganese, nickel and PAHs in the sediments are impacting or pose risks to ecological receptors in these environments. Additionally, a qualitative ecological risk assessment in support of the 1991 OU2/OU3 Record of Decision (ROD) indicated potential risk from slag material in terrestrial areas to burrowing animals such as squirrels and rabbits and that stressed vegetation was apparent in the slag area.

Response Actions

The remedial design/remedial action (RD/RA) was conducted in conformance with the RODs for the various OUs and implemented in a phased approach (Figure 2). EPA has completed major removal and remedial actions at the site, thereby significantly reducing the potential for exposure to hazardous materials on or off the site.

Initial Response

The site was proposed for the National Priorities List (NPL) in December 1982 and finalized on

the NPL in September 1983. In May 1985, EPA began a remedial investigation and feasibility study (RI/FS) to characterize the nature and extent of the contamination present at the site. Interim measures were taken to maintain control of the site through fencing and warning signs, site security, and early response actions to stabilize the site. In December 1985, the State of New Jersey removed picric acid and other explosive chemicals from one of the on-site laboratories. EPA performed a removal action between October 1987 and November 1988 that included the removal of lab pack containers and drums containing corrosive and toxic materials, acid tanks, and compressed gas cylinders.

OU1

The first ROD (OU1 ROD) for the site was signed in March 1990 and was the first of several anticipated remedial actions that continued the removal or remediation of contaminated source areas. The major components of the selected remedy for OU1 included the removal and off-site treatment and disposal of remaining drums, transformers containing oil contaminated with polychlorinated biphenyls (PCBs), the contents of exterior abandoned tanks, a baghouse dust pile, chemical piles, tire piles, and contaminated soil at the Northwest Park. The remedy also addressed lead-contaminated soil in Roebling Park adjacent to the Roebling Steel site. The residential cleanup level for lead applied to the park soils at that time was 250 mg/kg. Upon completion, the OU1 remedy would not require a five-year review.

OU2 and OU3

A second ROD was signed in September 1991. The remedial action objectives (RAOs) of the OU2 and OU3 ROD are:

- Reduce exposure risks through incidental ingestion, inhalation and dermal contact with the slag material and contaminated park soil.

- Minimize the potential migration of contaminants into the air, groundwater and surface water.

The major components of the selected remedy included the Southeast Park (OU2) and Slag Area (OU3). The selected remedy for OU2 included excavation of approximately 160 cubic yards of contaminated soil; off-site disposal of the contaminated soil; and backfilling and revegetation of the excavated area. Upon completion, the OU2 remedy would not require a five-year review. The selected remedy for OU3 included treatment of slag material; capping and vegetation of the 34-acre Slag Area; shoreline stabilization and stormwater management system; and long-term monitoring and institutional controls (ICs) to ensure the effectiveness of the remedy. The 1991 remedy for the OU3 Slag Area was later amended in the September 2003 ROD (further described below).

OU4

A third ROD was signed in September 1996 to address the remediation of all the buildings at the site, remediation and restoration of the Main Gate House, and other historic preservation

mitigation measures (OU4). The RAOs of the OU4 ROD are:

- Prevent human exposure (through ingestion, inhalation, and/or dermal contact) to contaminants in dusts and on building surfaces, where chemical concentrations exceed risk-based remediation goals.

- Removal of contamination sources to prevent further migration of contaminants to other media including soil and/or sediments, surface water and/or groundwater via precipitation run-off and/or percolation. This includes contaminated buildings (and contents from the tanks, pits, sumps, and underground piping) that are in danger of deterioration and collapse, thereby posing a threat of migration of contaminants into the environment.

- Ensure that remedial actions are undertaken with due regard for the historic and cultural resource protections that apply under federal and State historic preservation laws and regulations.

The major components of the selected remedy for OU4 include the following:

- Primary (gross) decontamination, demolition, and on-site management of selected demolition debris for contaminated buildings that are structurally unsound (Group A Buildings), and decontamination of contaminated buildings that are structurally sound (Group B Buildings).

- Removal and off-site disposal of contaminated process dust, and liquid and solid wastes from the equipment, aboveground tanks, pits, and sumps. Removal and decontamination of equipment, tanks, and scrap metal prior to recycling.

- Abatement of friable asbestos in all buildings.

- Closure of contaminated underground storage tanks and drainage of underground piping systems.

- Historic preservation mitigation measures for the buildings, machinery, and curation of archives.

- Implementation of ICs to ensure the effectiveness of the remedy, such as deed restrictions to limit future uses of the buildings that remain.

<u>OU3 Amended Remedy and OU5</u>

A fourth ROD was signed in September 2003 to address remediation of site-wide soil, sediments in the Delaware River and Crafts Creek, and groundwater. This ROD also amended the 1991 OU3 remedy. The RAOs for the ROD are:

Soils:

- Prevent human exposure to contaminated site-wide soils and slag material based on current

and anticipated future uses.

- Reduce risk to ecological receptors from exposure to contaminated soils and slag material to acceptable levels.

- Minimize contaminant migration from the soils and slag material to the groundwater and surface waters to levels that ensure the beneficial reuse of these resources.

- Comply with Applicable or Relevant and Appropriate Requirements (ARARs) and To-Be-Considered (TBCs) guidelines consistent with current and anticipated future use, or request waivers.

Sediments:

- Reduce risk to ecological receptors from exposure to contaminated sediments to acceptable levels.

- Comply with ARARs and TBCs consistent with current and anticipated future use, or request waivers.

Groundwater:

- Restore the groundwater to drinking water standards within a reasonable time frame and reduce further contamination of groundwater.

While the RAO was to restore the aquifer to drinking water quality, EPA Region 2 has determined that it is technically impracticable to restore the groundwater to meet ARARs and invoked a technical impracticability waiver for this site.

The major components of the selected remedy for OU5, which took into consideration the amendment of the OU3 remedy, included:

Soils:

- Capping of site-wide contaminated soil, including the Slag Area. Two distinct capping options were considered based on the physical characteristics of different portions of the site, and the current and potential future uses of each portion: Option (a) soil/asphalt, and Option (b) soil only.

- The cap will support a stormwater management system and erosion controls along the shoreline.

- Implementation of a long-term maintenance and monitoring program to ensure the integrity of the capped areas.

- ICs to restrict future excavations through the soil cap and limit future land uses.

Sediments:

- Dredging of the contaminated sediments found in the Delaware River and Crafts Creek.
- Dewatering and capping of the dredged sediments on-site.
- Backfill by placement of a sandy loam soil with organic matter and restoration of dredged areas by re-establishing wetlands.

Groundwater:

- Implementation of a long-term groundwater sampling and analysis program to monitor the contaminant concentrations in the groundwater at the site, to assess the migration and attenuation of these contaminants in the groundwater over time.
- ICs to restrict the installation of wells and the use of contaminated groundwater in the vicinity of the site.

Status of Implementation

A removal action was conducted between October 1987 and November 1988. The total quantity of material removed off-site for treatment, disposal, and/or recycling was the following: 300 lab pack containers of chemicals; 3,200 full and empty drums; 120 cubic yards of crushed and emptied drums; three pounds of metallic mercury; over 35 tons of baghouse dust; one drum of hazardous waste-containing cyanide; 10 compressed gas cylinders; 3,000 gallons of sulfuric acid and 2,150 gallons of phosphoric acid; and 239,000 pounds of base neutral solids in drums.

OU1

The OU1 RA was completed in September 1991 and continued the removal of contaminated source areas. The total quantity of material removed off-site for treatment, disposal, and/or recycling was the following: 263 overpacked drums and 663 crushed drums; 45,864 gallons of transformer oil and 860,709 pounds of transformer carcasses; 266,843 gallons of tank liquids and 1,351 tons of tank sludges; 800 tons of baghouse dust; 251 tons of chemical piles and asbestos; 126 tons of burnt tires; 261 tons of recyclable tires; and excavation of park soil (640 cubic yards).

OU2

The OU2 RA was completed in March 1995. Approximately 640 cubic yards of park soil contaminated with inorganics was excavated to residential soil levels that allow for unrestricted use. The park area was restored with clean soil and vegetation.

OU3

The OU3 RA was completed in December 2014 and the Remedial Action Report was completed

in September 2015. Construction activities included capping and vegetation of the 34-acre Slag Area, installation of 3,000 linear feet of revetment to stabilize the shoreline and construction of a stormwater drainage system to manage and treat the stormwater from the Village of Roebling. As part of OU5, sediments from Crafts Creek and the Delaware River Back Channel were dredged, dewatered and placed on-site in the Slag Area prior to capping with a two-foot soil cap consisting of 18-inches of common fill and 6-inches topsoil and vegetation. Capping activities were completed, and the Slag Area was transformed into a new riverfront park with paved pathways for passive recreational uses and water views in historic Roebling.

OU4

Buildings

The OU4 RA for the buildings and sources of contamination was completed in May 2011. A total of 67 buildings and structures were demolished, including demolition of concrete building foundations and equipment footings, segregating demolition debris, recycling steel debris, and disposal of all wastes generated from the construction activities. Sources of contamination removed included friable pipe insulation, underground oil and chemical lines, underground storm sewer piping, an underground water tunnel and oil-contaminated soil. Work conducted between 1998 and 2008 related to demolition of 48 buildings and remediation of sources of contamination is described in the 2008 OU4 Remedial Action Report. Work conducted between 2009 and 2011 related to demolition of 19 buildings and remediation of sources of contamination is described in the 2013 Addendum to the OU4 Remedial Action Report.

Since the last FYR in 2019, additional design activities supporting further building remediation work was completed. The OU4 RDs for the remaining building decontamination, demolition and historic preservation mitigation measures were completed in September 2021 and field construction is anticipated to begin in 2025. The OU4 RDs address decontamination and demolition of buildings, on-site management of selected demolition debris, removal and off-site disposal of contaminated materials, remediation of soil in areas of concern (AOCs) related to contamination sources, historic mitigation measures for treatment of historic artifacts, building stabilization and preservation, and construction of a new structure for historic machinery and equipment.

Main Gate House

The OU4 RA includes restoration of the Main Gate House and Ambulance Garage consistent with the National Historic Preservation Act. The OU4 RA consisted of three main components: rehabilitation of the exterior structures to create a weather-tight building and demolition of non-historic buildings; rehabilitation of the interior such that it would support a functioning museum and the construction of connector structures that link the buildings; and remediation of the surrounding soils within the area of the future museum. The contaminated soil would be covered with two feet of soil, sidewalks and a parking area. The OU4 RA also included the repair and stabilization of the gantry crane and flagpole, and the installation of selected artifacts on foundations. Construction work on the Main Gate House and soil capping seven acres around the Main Gate House was conducted between December 2005 and June 2009. Restoration of the

historic Main Gate House turned the former gateway to the Roebling Mill into part of the Roebling Museum. The museum provides 7,000 square feet of exhibit space documenting the community's social and industrial history.

OU5

Soils

The OU5 RA for the soil component has been completed in two areas of the site. Soil capping of five acres and construction of the New Jersey Transit River Line station at Roebling was completed in June 2005. Soil capping of six acres, stabilization of 1,300 linear feet of shoreline, and habitat restoration activities at the Isolated Parcel were completed in March 2012. The Isolated Parcel is located on the eastern end of the site.

Since the last FYR in 2019, the following design activities were completed:

The RD for soil capping of a 14-acre parcel adjacent to the Roebling Museum and riverfront park was completed in September 2019 and field construction is anticipated to begin in 2025. This phase provides a two-foot soil cap with storm water drainage features and an access road for use by emergency vehicles between the Roebling Museum and OU3 riverfront park, two areas already in reuse. The design includes capping along the shoreline revetment with habitat restoration within the riparian zone of the Delaware River.

Additionally, the RD for soil capping in the remaining portion of the main plant area consisting of 95 acres is in progress. The main plant area is currently uncapped and available for redevelopment.

Sediments

The OU5 RA for the sediment component was completed in December 2014 and the Remedial Action Report was completed in September 2015. The dredging of Crafts Creek and the Delaware River Back Channel sediments involved delineating contamination above cleanup levels, dredging, transporting, dewatering and on-site placement of approximately 240,000 cubic yards of contaminated sediments. These dredged areas were backfilled with sandy soil and replanted with vegetation. The wetland areas in Crafts Creek and the Delaware River Back Channel have been restored. The shoreline was graded and stabilized with revetment rock to prevent shoreline erosion and recontamination of restored river and creek sediment areas.

Groundwater

Two rounds of baseline groundwater sampling were conducted in November 2023 and December 2023. The scope of the baseline sampling was to collect two rounds of water level measurements and groundwater samples to help assess the current extent of contamination at the site since the OU5 RI samples were collected between 1990 and 1998. The monitoring network consisted of 23 existing monitoring wells (Figure 3). Samples were analyzed for volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) and metals.

Comprehensive chemical monitoring data will be collected as part of the groundwater component of OU5 RA and will include sampling for contaminants in the groundwater and potential off-site migration to the nearby surface water and remediated sediment areas in Crafts Creek and the Delaware River Back Channel. The OU5 RD for the groundwater long-term monitoring program was completed in September 2016. Regular sampling of groundwater (beyond the baseline events described above) is expected to begin in 2025. The groundwater remedy includes long-term monitoring and ICs, and there is a technical impracticability waiver for site-wide groundwater.

IC Summary Table

ICs for OU3, OU4 and OU5 will be completed when the remedial actions are fully implemented. ICs include filing a deed notice by the property owner and a classification exception area and well restriction area (CEA/WRA) with the New Jersey Department of Environmental Protection (NJDEP).

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	Sitewide	Limits land use to non-residential use and maintains engineering controls.	Deed restrictions are planned
Groundwater	Yes	Yes	Sitewide	Restricts installation of groundwater wells and groundwater use.	CEA/WRA is planned

Although site-wide deed restrictions for soil are not currently in place, land use that is inconsistent with the completed portions of the OU3 and OU5 soil remedies is by Florence Township, who is the landowner.

System Operations/Operation and Maintenance

Operation and maintenance (O&M) requirements will be necessary for several components of the remedy upon completion and will be implemented through different plans. These will include long-term monitoring and maintenance of soil capped areas, shoreline revetment, wetland restoration in Crafts Creek and the Delaware River Back Channel, and groundwater. New Jersey Transit maintains the soil cap at the River Line Roebling station and Florence Township's Roebling Museum maintains the Main Gate House building and adjacent soil-capped area. In

June 2015, Florence Township assumed responsibility for maintenance of the OU3 riverfront park soil cap and stormwater bioretention basin.

Climate Change

Potential site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate changes in the region and near the site. The climate change analysis is provided in Appendix D.

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 2019 FYR

OU #	Protectiveness Determination	Protectiveness Statement
3	Protective	The OU3 remedy is protective of human health and the environment.
4	Will be Protective	The remedy for OU4 is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.
5	Will be Protective	The remedy for OU5 is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.

There were no issues or recommendations from the last FYR.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement and Site Interviews

On August 7, 2023, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, Puerto Rico, and the U.S. Virgin Islands, including the Roebling Steel 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, Pat Seppi, will post a public notice on the EPA website (https://www.epa.gov/superfund/roebling-steel) and provide the notice to the Florence Township by email, with a request that the notice be posted in municipal offices and on the township's webpages. This notice will indicate that a FYR has been conducted at the Roebling Steel 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:

Roebling Public Library	Florence Township Municipal Building
1350 Hornberger Avenue	711 Broad Street
Roebling, New Jersey 08554	Florence, New Jersey 08518

In addition, the final report will be posted on the website. Efforts will be made to reach out to local public officials to inform them of the results.

EPA routinely coordinates with Florence Township, the property owner, during all remedial activities at the site. Over the years, EPA has discussed potential redevelopment opportunities that may exist for the vacant land available at the site.

Data Review

Groundwater sampling was conducted in November and December 2023 to support evaluation of the OU3, OU4 and OU5 remedies. No other chemical data were collected during the review period. Samples were analyzed for VOCs, SVOCs and metals. During Groundwater Sampling Round 1 (between November 8th and 17th), 23 of the planned 24 monitoring wells were sampled. Subsequently, between December 11th and 15th, the same 23 monitoring wells were sampled for Groundwater Sampling Round 2. MW15 was dry and was not sampled during either round. Potentiometric surface contour maps for the upper sand aquifer were created using synoptic water level data collected during high and low tides during both sampling rounds. The contours indicate that groundwater flows from south to north across the Slag Area towards the Delaware River Main Channel and radially from the Main Plant Area towards Crafts Creek and the Delaware River Back Channel.

The analytical results were screened against the New Jersey Groundwater Quality Standards (GWQS). There were no exceedances of VOCs and a few exceedances of SVOCs. 1,4-Dioxane was detected in MW12 up to 2.5 µg/L, above the GWQS of 0.4 µg/L. Bis(2-ethylhexyl) phthalate was detected in MW04 (17 µg/L), MW21 (7.7 µg/L) and MW37 (15 µg/L) above the GWQS of 3 µg/L.

The analytical results indicate that metals contamination continues to be present above the GWQS at the site and are summarized below:

- Total (T) arsenic concentrations above the GWQS of 3 µg/L ranged up to 41.8 µg/L at MW41, where dissolved (D) arsenic was 2.6 µg/L. Arsenic was consistently detected above the GWQS in most of the monitoring wells.
- Beryllium (D) was detected above the GWQS of 1 µg/L at MW24D ranging up to 3.5 µg/L. Beryllium (T) was also detected a 1 µg/L at MW12.
- Chromium (T) concentrations above the GWQS of 70 µg/L ranged up to 107 µg/L at MW04 and 108 µg/L at MW19.

- Copper (T) concentrations above the GWQS of 1,300 µg/L ranged up to 2,400 µg/L in MW21. Copper (D) ranged up to 2,100 µg/L in MW21.
- Lead (T) was detected at concentrations above the GWQS of 5 µg/L in several wells: MW04 (6.5 µg/L), MW06 (17 µg/L), MW09 (7.6 µg/L), MW20 (6.8 µg/L), MW24S (14 µg/L), MW25 (7.2 µg/L), MW27 (15 µg/L), MW37 (184 µg/L), MW40 (400 µg/L) and MW41 (5.3 µg/L). Lead (D) was detected above the GWQS in MW05D (5.2 µg/L), MW25 (5 µg/L), MW37 (120 µg/L), and MW40 (56 µg/L).
- Zinc concentrations above the GWQS of 2,000 µg/L ranged up to 8,700 µg/L (T) and 8,000 µg/L (D) in MW24D, and up to 2,000 µg/L (T) in MW40.

Additionally, aluminum, iron, and manganese concentrations were detected above the GWQSs. These metals are known to be widespread and naturally occurring in the regional aquifer; however, they were also used in the site manufacturing process.

- Aluminum (T) concentrations above the GWQS of 200 µg/L ranged up to 10,600 µg/L. Total and dissolved aluminum were consistently detected above the GWQS in most of the monitoring wells.
- Iron (T) concentrations above the GWQS of 300 µg/L ranged up to 110,000 µg/L. Total and dissolved iron were consistently detected above the GWQS in most of the monitoring wells.
- Manganese (T) concentrations above the GWQS of 50 µg/L ranged up to 2,880 µg/L. Total and dissolved manganese were consistently detected above the GWQS in most of the monitoring wells.

Evaluation of the groundwater sample analytical results from the investigations conducted between 1990 and 1998 indicated that widespread, generally low-level inorganic metals contamination is present in groundwater at the site, with some areas of metals contamination exceeding the GWQS. In general, the 2023 groundwater sampling results support the RI findings. In 2023, there was no VOC groundwater contamination and limited detections of SVOCs. Some metal detections above the GWQS are widespread with maximum concentrations of metals generally detected in and around the Slag Area.

In some wells, select metal concentrations have decreased since the RI. For example, during the 1990 RI, dissolved antimony was 38.5 micrograms per liter (µg/L) and 37.1 µg/L in MW06 and MW29, respectively, but was non-detect in 2023. However, some 2023 metals concentrations remained stable or increased compared to the RI. For example, dissolved arsenic in MW37 ranged from 4.9 µg/L to 6.8 µg/L in 2023 compared to 6.2 µg/L in 1996. Lead was also detected at MW37 in 1996 at 54 µg/L (T) and 4.7 µg/L (D). Lead concentrations detected during the 2023 sampling events appear to have increased since the RI. During the November 2023 sampling event, lead was 120 µg/L (D) and 0.39 (T). For the December 2023 sampling, lead was 184 µg/L (T), and non-detect less than 20 µg/L (D). For metals analysis, it is generally expected that the unfiltered, “total" sample result will be greater than or equal to the filtered, “dissolved” sample for any given metal. The November 2023 lead results for MW37 may indicate that a sample labeling error occurred in the field and future sampling events will provide confirmation.

Groundwater sampling for polyfluoroalkyl substances (PFAS) was not conducted during the review period, but is anticipated to be further evaluated during the groundwater remedial action.

The documents, data and information which were reviewed in completing this FYR are summarized in Appendix B.

Site Inspection

The inspection of the site was conducted on March 4, 2024. The participants in attendance were Tamara Rossi (RPM) and Perry Katz (Section Chief) of EPA. The purpose of the inspection was to assess the protectiveness of the remedies.

The site inspection consisted of a physical inspection of the entire site, including on-site drainage and capped areas, shoreline revetment, wetland restoration of dredged areas, monitoring wells and site fencing. There were no issues found during the site inspection. The site areas were in good condition and working as intended. The on-site drainage and capped areas were properly maintained. Shoreline revetment and wetland restoration areas were observed during low tide and found to be in good condition. Monitoring well locations were inspected and found to be in good working order except for one monitoring well inspected which was capped, but not locked. The perimeter security fencing was secure, however, damage to the interior fencing around Buildings 92 and 93 was observed due to trespassers. EPA has tasked its contractor with re-inspecting all the monitoring well locations to ensure the caps are locked and repairing the damaged interior fencing.

V. TECHNICAL ASSESSMENT GET TECHNICAL

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

The OU3 soil remedy was fully implemented and functioning as intended. The remedies for OU4 and OU5 are not fully implemented, even though some components of the remedies have been completed. EPA anticipates that these remedies will function as intended once they have been fully implemented. Additionally, ICs to limit land use, maintain engineering controls, and restrict installation of groundwater wells and groundwater use will be completed for impacted parcels of the site as described in the IC Summary Table.

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 are no changes in the physical conditions of the site that would affect the protectiveness of the selected remedies. The land use assumptions, exposure assumptions and pathways evaluated in the RI/FS and considered in the decision documents remain valid. Although the risk assessment process has been updated in recent years and specific parameters and toxicity values have changed, the process used is consistent with current practice and the need to implement a remedial action remains valid.

Potential risks from exposure to site soils are driven by lead. In January 2024, EPA released new guidance for lead in residential soils, “Updated Residential Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities,” which establishes residential remedial screening

levels of 200 mg/kg for sites where there are no other known sources of lead, and 100 mg/kg for sites impacted by other sources of lead (e.g., lead-based paint). The site property itself (included under OUs 3, 4 and 5) will be limited to non-residential purposes and site-wide capping will protect human health and the environment from these potential risks. Capping and vegetation of the OU3 Slag Area has been completed, which eliminates the potential for human exposure to contamination in this area. Once the remedies for OU4 and OU5 have been fully implemented and all ICs are put in place, the potential for human contact with remaining contaminated soils on-site will be eliminated. In addition, nine soil samples were collected from eight nearby residential lots in 1990. The samples were collected from the top two inches of soil. In eight of the nine soil samples, lead concentrations were less than 3 mg/kg. In one sample, lead was identified at 591 mg/kg. The result from this property, however, was considered anomalous since the property was located furthest from the site with no gradient of lead concentrations suggesting connection to any site-related source. Therefore, the residential properties were not included in the remediation of the site. Remediation of Roebling Park was completed as part of OU1 and is no longer considered in the FYR because it was restored to the residential cleanup level at the time, which was 250 mg/kg. While this is slightly higher than EPA's current screening level of 200 mg/kg, the impacted soil was removed as part of the OU1 remedy. Considering the screening levels included in the updated Agency guidance and the concentrations identified in the residential areas, along with the removal of impacted soils at Roebling Park, the remedies for the site remain protective of residential receptors.

Since it has been determined that it is technically impracticable to achieve drinking water standards and groundwater is not likely to be restored to potable use, groundwater ARARs are not applicable. Residents in the vicinity of the contaminated groundwater use a municipal water supply, and ICs will prevent the installation of wells, ensuring future protectiveness. The evaluation of the groundwater pathway in this FYR focused on the potential for vapor intrusion if buildings were to be constructed over contaminated groundwater once the site is redeveloped, which was not evaluated in the original risk assessment. During the 2023 sampling events, no VOCs exceeded groundwater standards and metals remain the primary site-related contaminants in groundwater. Few VOCs were detected and maximum groundwater concentrations from sampling conducted also did not exceed EPA's residential vapor intrusion screening levels set at a cancer risk of 10^{-6} and a hazard index of 1. Therefore, it is unlikely that vapor intrusion will be a concern with future construction on-site.

While the ecological risk screening values used to support the ROD might not necessarily reflect the current values for terrestrial or aquatic receptors, the exposure assumptions remain appropriate. As a result of excavation of contaminated surface soil and sediment, capping, and the placement of clean fill in these areas, exposures via these pathways are now incomplete. Therefore, there are no complete exposure pathways to ecological receptors.

The remedial action objectives developed for OU3, OU4 and OU5 remain protective.

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

At this time there is no information that could call into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

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

No Issues/Recommendations were identified during this FYR period.

OTHER FINDINGS

None.

VII. PROTECTIVNESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: OU3	*Protectiveness Determination:* Protective
Protectiveness Statement: The OU3 remedy is protective of human health and the environment.	
Protectiveness Statement(s)	
Operable Unit: OU4	*Protectiveness Determination:* Will be Protective
Protectiveness Statement: The OU4 remedy is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.	
Protectiveness Statement(s)	
Operable Unit: OU5	*Protectiveness Determination:* Will be Protective
Protectiveness Statement: The OU5 remedy is expected to be protective of human health and the environment upon completion. In the interim, remedial activities completed to date have adequately addressed all exposure pathways that could result in unacceptable risks in these areas.	

VIII. NEXT REVIEW

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

APPENDIX A – Chronology of Site Events

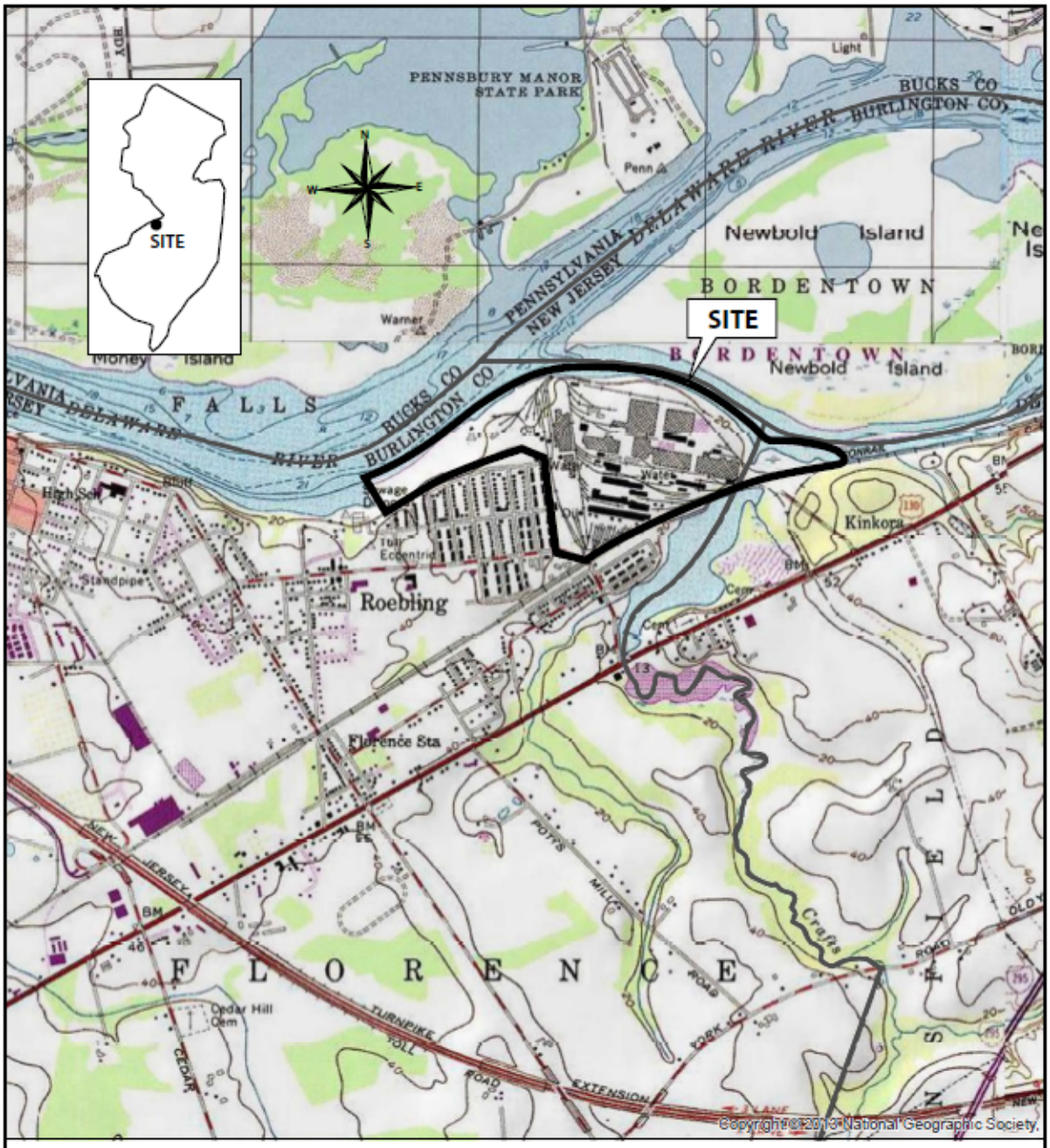
Chronology of Events	Date(s)
Facility operated for production of steel products	1906-1982
Final listing on EPA National Priorities List	1983
NJDEP removal action	1985
Completion of EPA removal action 1 (source removal)	1989
OU1 Record of Decision (source removal and northwest park soil)	1990
Completion of OU1 remedial action (source removal)	1992
Completion of EPA removal action 2 (OU1 northwest park soil)	1991
OU2 ROD (southeast park soil)	1991
OU3 ROD (Slag Area)	1991
Completion of OU2 remedial action (southeast park soil)	1995
OU4 ROD (buildings and Main Gate House)	1996
Start of OU4 remedial action for building demolition and removal of contamination sources associated with the buildings	1999
Completion of EPA removal action 3 (OU4 asbestos mitigation)	1999
OU5 ROD (soil, sediment and groundwater) and amendment to OU3 ROD	2003
Completion of the initial five-year review	2004
Start of OU4 remedial action for the Main Gate House and the remediation of the surrounding soil	2005
Start of OU3 remedial action for shoreline stabilization at the Slag Area	2006
Start of OU5 remedial action for remediation of soils and shoreline stabilization at the Isolated Parcel	2008
Completion of the second five-year review	2009
Completion of OU4 remedial action for the Main Gate House and the remediation of the surrounding soil	2009

Start of OU3 remedial action for remediation of soils at the Slag Area	2010
Start of OU5 remedial action for remediation of river and creek sediments	2010
Completion of OU4 remedial action for building demolition and removal of contamination sources associated with the buildings	2011
Completion of OU5 remedial action for remediation of soils and shoreline stabilization at the Isolated Parcel	2012
Completion of the third five-year review	2014
Completion of OU5 remedial action for remediation of river and creek sediments	2014
Completion of OU3 remedial action for remediation of soils at the Slag Area	2014
Completion of the fourth five-year review	2019

APPENDIX B – Reference List

Documents, Data and Information Reviewed in Completing the Five-Year Review	
Document Title, Author	**Submittal Date**
OU1 Record of Decision, EPA	March 1990
OU2 and OU3 Record of Decision, EPA	September 1991
OU4 Record of Decision, EPA	September 1996
OU5 Record of Decision and OU3 ROD Amendment, EPA	September 2003
Five-Year Review Report, EPA	January 2004
OU3 Revetment Report, WRS	January 2008
Second Five-Year Review Report, EPA	January 2009
OU4 Addendum Sampling Trip Report, Tank Farm Storage AOC, Weston	March 2009
OU4 Removal of Oil-Contaminated Soil at the Former Bldg No. 115A AOC, Weston	November 2010
OU5 Final Isolated Parcel Remedial Action Report, Weston	April 2012
OU4 Landfill AOC Investigation and Sampling Report, Weston	May 2012
OU4 Former Bldg No. 2/ Pad 2 AOC Investigation and Sampling Report, Weston	May 2012
OU4 Removal of the Underground Water Tunnel, Weston	September 2012
OU4 Addendum to the Removal of Storm Sewer Outfall No. 4, Weston	September 2012
OU4 Addendum to Remedial Action Report, Weston	March 2013
Third Five-Year Review Report, EPA	February 2014
OU5 Back Channel Sediments Remedial Action Report, CDM	August 2015
OU5 Crafts Creek Sediments Remedial Action Report, CDM	September 2015
OU3 Remedial Action Report, CDM	September 2015
OU5 Groundwater Long-Term Monitoring Plan, CDM	September 2016
OU5 Groundwater Predesign Investigation Report, CDM	April 2017
Fourth Five-year Review Report, EPA	April 2019
Draft Groundwater Data Summary Report	February 2024

APPENDIX C – Figures



1,000 500 0 1,000 2,000 Feet

SOURCE:
USGS TOPOGRAPHIC 7½ MINUTE SERIES QUADRANGLES
TRENTON WEST, NJ. BRISTOL, PA. TRENTON EAST, NJ.

U.S ENVIRONMENTAL PROTECTION AGENCY
Roebling Steel Superfund Site
CDM Smith
FIGURE 1
SITE LOCATION MAP


Delaware River - Main Channel
Flow
Former Wharf Area
OUTFALL #7
Delaware River - Boat Channel
OUTFALL #6
OUTFALL #5
OUTFALL #4
OUTFALL #3
Newbold Island
Slag Area
Soil cap design complete (to be constructed)
Roebling Park
Main Plant Area
OUTFALL #2
Isolated Parcel
OUTFALL #1
Griffin Creek Channel
Bioretention Basin
Roebling Museum Area
NJ Transit Station
Railroad Avenue Playground
Griffin Creek (tidal marsh/wetland area)
Proposed Main Plant Area Soil Cap
Soil Cap Design Complete (to be constructed)
Soil Cap Completed
Park or Playground
Former Wharf Area
OU3 Slag Area Soil Cap Completed and OU5 Sediment Placement Area
FEMA Floodway
FEMA Zone AE: 1% Annual Chance Flood
FEMA Zone X: 0.2% Chance Annual Flood (or Minimal Flood Hazard)
0 200 400 800
Feet
Figure 2
Extent of Soil Capping
Roebling Steel Superfund Site
Florence Township, New Jersey
CDM Smith

Figure 3

Groundwater Sampling Locations
Roebling Steel Superfund Site, OU5
Florence Township, New Jersey
Date Modified: 1/5/2024

CDM Smith

APPENDIX D – Climate Change Analysis

In accordance with the Region 2 Guidance for Incorporating Climate Change Considerations in Five Year Reviews, three climate change tools were utilized to assess the Roebling Steel Superfund Site. Screenshots from each of the tools assess are included below.

The first tool used to assess Florence Township was *The Climate Explorer*. According to this tool, annual counts of intense rainstorms are projected to have between a 1% decrease and a 5% increase. As can be seen from Figure D-1, there is a slight increase in days with precipitation > 3". As can be seen in Figure D-2, there is a projected increase of days per year with maximum temperatures > 100 °F. A summary of the Top Climate Concerns from the tool can be seen as Figure D-3.

The second tool utilized is called the *Risk Factor (*formerly *Flood Factor)*. According to this assessment tool, the Roebling Steel site has a minimal risk of inland flooding over the next 30 years. As can be seen in Figure D-4, the *Risk Factor* tool also assesses risk from wildfires, tropical storm winds, poor air quality and days over a heat index. The tool states that wildfire is a minimal risk, tropical storm winds is a major risk, air quality is a major risk and heat is a severe risk. However, tropical storm winds, air quality, and heat are not expected to impact the selected remedies for the site.

The final tool utilized is called *Sea Level Rise*. The Roebling Steel site and surrounding residential area are somewhat vulnerable to sea level rise due to its close proximity to the Delaware River and Crafts Creek; however, the site is situated between 15 and 35 feet above mean sea level (MSL) and is mostly above the 100-year flood plain. Figure D-5 shows the site at current conditions. The tool projects a sea level rise between 2.4-6.59 feet, depending on four different scenarios. Figure D-6 shows the site with a 6.59-foot sea level rise projected by 2100. Even though a small portion of the site may be affected by a sea level rise, it is unlikely due to the shoreline revetment that was constructed as part of the remedial action. Figure D-7 shows the shallow coastal flooding areas limited to the shoreline revetment and the remediated wetlands areas of the Delaware River and Crafts Creek.

Based on a review of the screening tools identified above, 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.

Figure D-1 - Climate Explorer Projected Precipitation Rise for Burlington County, New Jersey

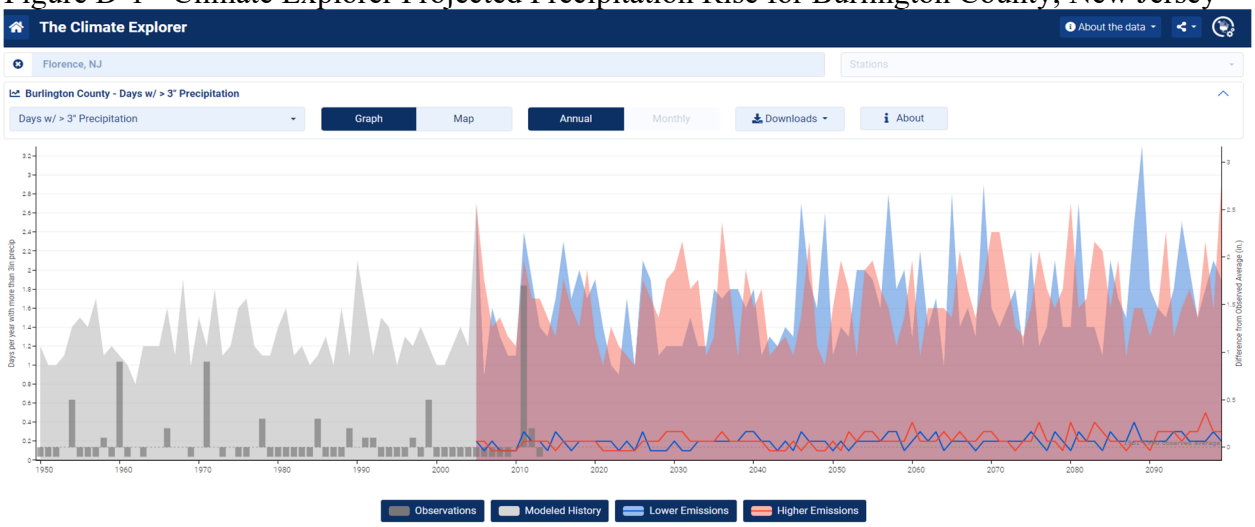


Figure D-2 - Climate Explorer Projected Temperature Rise for Burlington County, New Jersey

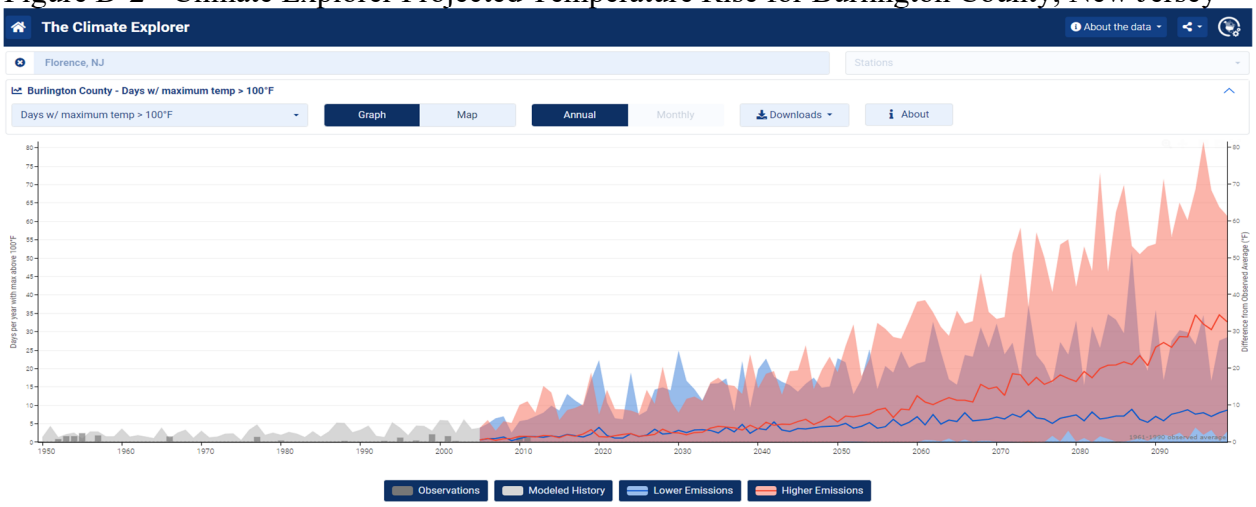


Figure D-3 - Climate Explorer Top Climate Concerns for Burlington County, New Jersey

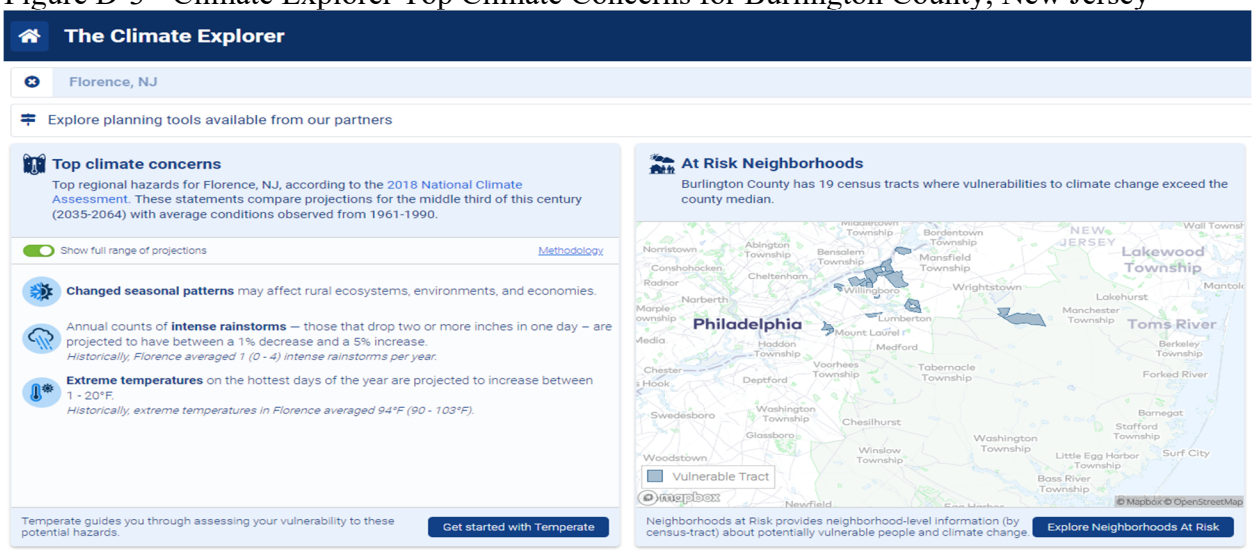


Figure D-4 – Risk Factor for the Roebling Steel Site, Roebling, New Jersey

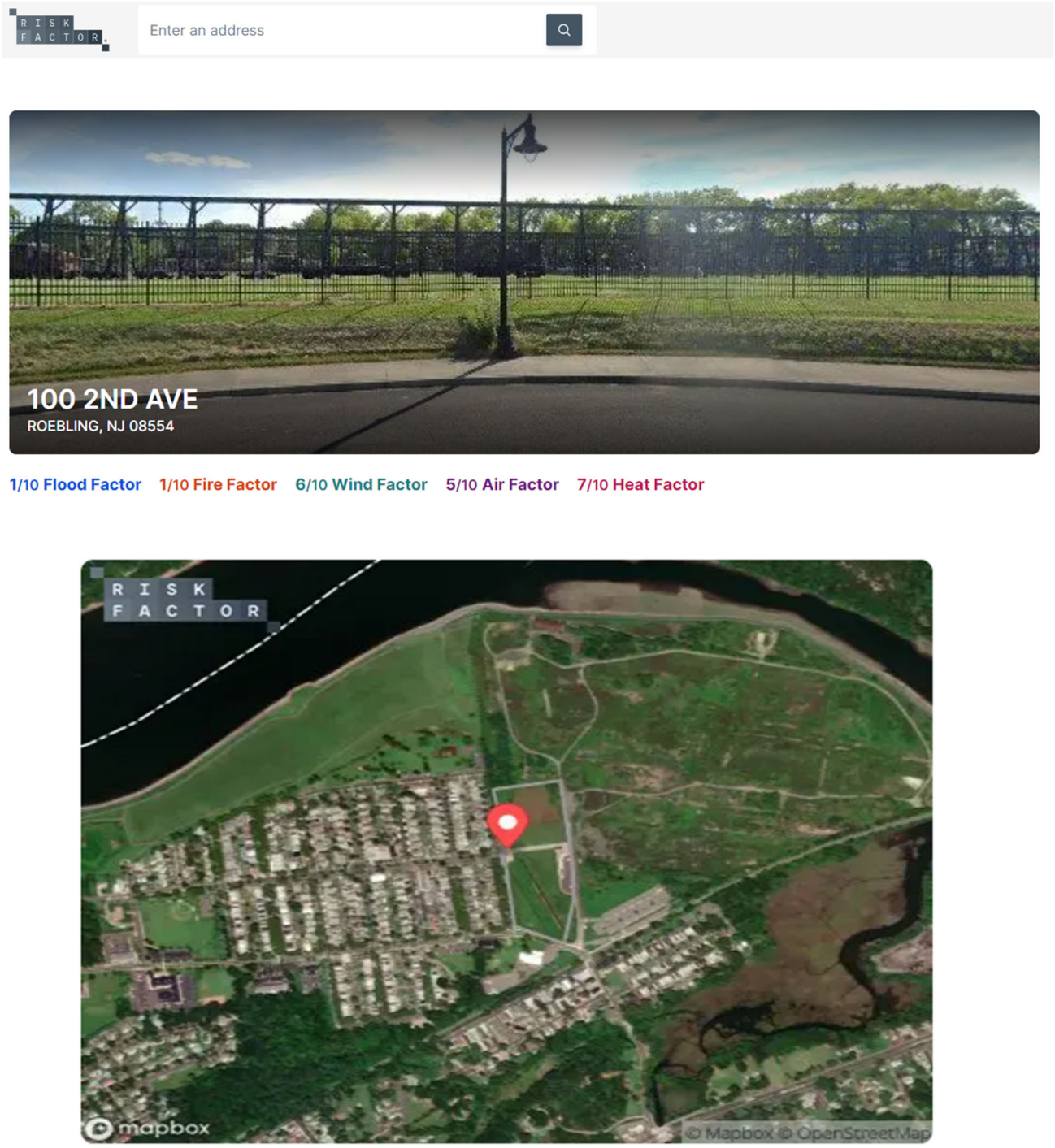


Figure D-5 – NOAA Sea Level Rise Viewer (Current Conditions)

Figure D-6 – NOAA Sea Level Rise Viewer (Projected Conditions in 2100)

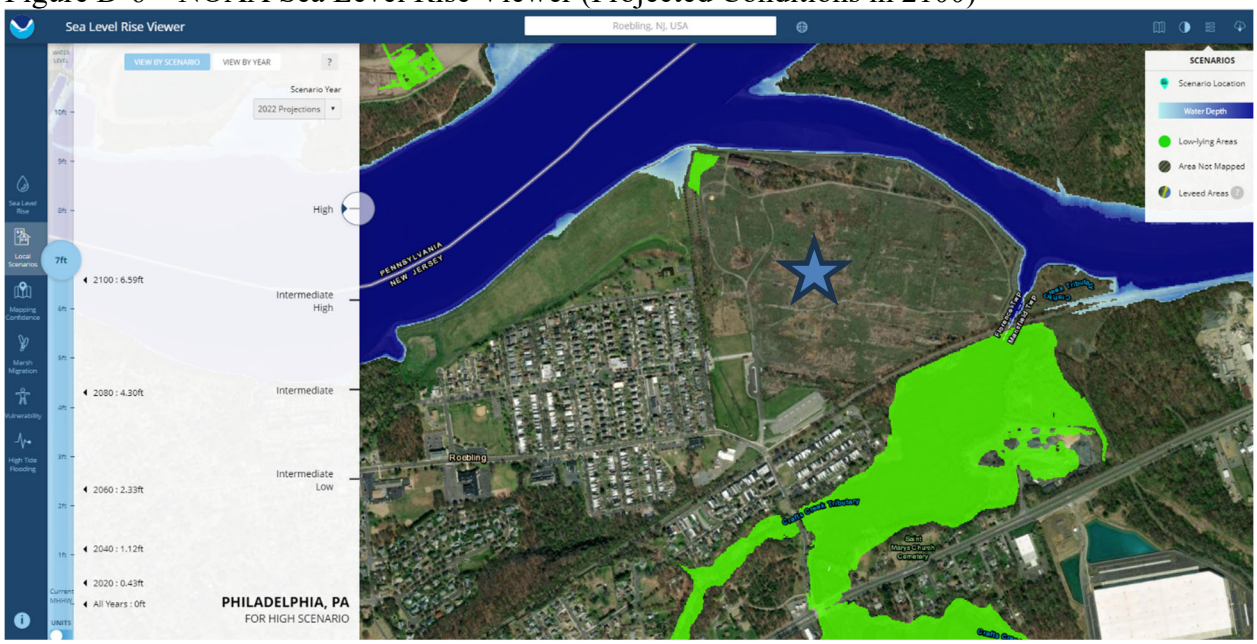


Figure D-7 – NOAA Sea Level Rise Viewer (Shallow Coastal Flooding Areas)


Sea Level Rise Viewer
Roebling, NJ, USA
FLOOD FREQUENCY
Tide Gauges
Shallow Coastal Flooding Areas
Area Not Mapped
Leveed Areas
Sea Level Rise
Local Scenarios
Mapping Confidence
Marsh Migration
Vulnerability
High Tide Flooding
PENNSYLVANIA
NEW JERSEY
Roebling
Crosswicks Creek Tributary
Crosswicks Creek Tributary
Delaware River Tributary
Old St. Mary's Church Cemetery