FOURTH FIVE-YEAR REVIEW REPORT FOR SHARKEY LANDFILL SUPERFUND SITE PARSIPPANY-TROY-HILLS, MORRIS COUNTY, NEW JERSEY

Prepared by

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

Evangelista, Pat Digitally signed by Evangelista, Pat Date: 2024.09.04 14:39:27 -04'00'

September 4, 2024

Pat Evangelista, Director
Superfund and Emergency Management Division

Date

704702

Table of Contents

LIST OF ABBREVIATIONS & ACRONYMS

CD	Consent Decree
CEA/WRA	Classification Exception Area/Well Restriction Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
EPA	United States Environmental Protection Agency
ESD	Explanation of Significant Differences
FYR	Five-Year Review
ICs	Institutional Controls
MCLs	Maximum Contaminant Level
µg/L	Micrograms per Liter
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NJDEP	New Jersey Department of Environmental Protection
NJGWQS	New Jersey Groundwater Quality Standards
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PRP	Potentially Responsible Party
RA	Remedial Action
RAO	Remedial Action Objectives
RCA	Recycled Concrete Aggregate
RD	Remedial Design
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
SOW	Statement of Work
SVOCs	Semi-Volatile Organic Compounds
TBC	To Be Considered
TCL	Target Compound List
VOCs	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 fourth FYR for the Sharkey Landfill Superfund Site (Site). The triggering action for this statutory review is the September 30, 2019, signature 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.

The Site consists of one operable unit (OU1) which will be addressed in this FYR. OU1 addresses the landfill and groundwater remediation.

The Site FYR was led by Pamela J. Baxter, Ph.D., PMP, BCEEM, CHMM, Remedial Project Manager. Participants included Michael Scorca (Hydrogeologist), Abbey States (Risk Assessor), Detbra Rosales, Ph.D. (Ecological Risk Assessor) and Pat Seppi (Community Involvement Coordinator). The review began on October 3, 2023.

Site Background

The Site is located in the Townships of Parsippany-Troy Hills and East Hanover, in Morris County, New Jersey. The Site is bounded by Route 46, New Road, the Rockaway River, and extends south beyond Interstate Route 280 between Troy Meadows and the Hatfield Swamp.

During the 1930s, the Site was used as a pig farm. In 1945, landfill operations began, and the Site accepted municipal waste material until September 1972. During that time, the landfill also accepted commercial, industrial, and hazardous waste materials. Records indicate that various organic compounds were disposed of at the Site, including toluene, benzene, chloroform, dichloroethylene, and methylene chloride, as well as other "liquid and/or chemical wastes" described as cesspool-type wastes. Although there have been allegations of waste disposal after 1972, the Site is believed to have been generally inactive after that date. Some excavation and on-Site relocation of fill material occurred during the expansion of the Parsippany-Troy Hills wastewater treatment plant.

The Site is approximately 90 acres in size and is divided into five separate landfill areas (Fill Areas): North Fill, South Fill, Northwest-North Fill (NW-N), Northwest-South Fill (NW-S), and the Southwest Fill. The North Fill is an approximately 26-acre island in the Rockaway River and is located at the northern end of Sharkey Road in Parsippany-Troy Hills. The South Fill is an approximately 32-acre area adjacent to the Rockaway and Whippany Rivers and the Parsippany-

Troy Hills wastewater treatment plant. The NW-N and NW-S Fills are about 11 and 15 acres in size, respectively, and were originally one Fill Area. The two Fill Areas were created as a result of the construction of Interstate 280. The Southwest Fill is an approximately 9-acre area located along the Whippany River southeast of Ridgedale Avenue in East Hanover, which received fill material excavated during the construction of Interstate 280. See attached Site map (Figure 1).

The Site is located in the Piedmont Physiological Province. It is characterized by a swampy lowland with a few surrounding ridges and isolated hills rising above the plain. Most of the area lies between the elevations of 170 to 440 feet above mean sea level. Rocks underlying Pleistocene era and younger unconsolidated deposits in this area are predominately of the Brunswick Formation consisting of red shale and sandstone. Also present in this area, and forming the topographic relief of the Watchung Mountains, are Triassic-age basalt flows.

The general area in which the Fill Areas are located can be described as residential and light industrial to the north and west of the Whippany River, and considerable swamp land to the east and south. Approximately eight miles downstream, the Passaic River is used as a source of drinking water by the Passaic Valley Water Commission.

Five-Year Review Summary Form

SITE IDENTIFICATION		
Site Name: Sharkey Landfill		
EPA ID: NJD980505762		
Region: 2	**State:** NJ	**City/County:** Parsippany-Troy Hills, Morris 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): Pamela J. Baxter, Ph.D., PMP, BCEEM, CHMM		
Author affiliation: EPA		
Review period: October 3, 2023 – August 30, 2024		
Date of Site inspection: December 20, 2023		
Type of review: Statutory		
Review number: 4		
Triggering action date: September 30, 2019		
Due date *(five years after triggering action date)*: September 30, 2024		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

On September 8, 1983, the Site was included on the National Priorities List (NPL). The New Jersey Department of Environmental Protection (NJDEP) was the lead agency at the Site from December 1983 to April 1994. A remedial investigation and feasibility study (RI/FS) was conducted by NJDEP from December 1983 to September 1986 to determine the nature and extent of contamination and to develop alternatives for remediation.

The results of the RI/FS indicated the presence of low concentrations of organic compounds, pesticides, and inorganic compounds in soils, and low levels of organic and inorganic compounds in the shallow groundwater beneath the Site. The primary contaminants of concern include volatile organic compounds (VOCs) such as trichloroethene, among other organic and inorganic chemicals (i.e., heavy metals).

The analytical results of samples from the shallow aquifer monitoring wells indicated low levels of organic contamination with only benzene and trichloroethene exceeding drinking water standards. Inorganic chemicals, primarily heavy metals, were also detected in the shallow aquifer. Some of these contaminants were also found in excess of drinking water standards in both rivers near the landfill. However, a short distance downstream, the contaminant levels were below drinking water standards. The overall adverse effects of the Fill Areas on the water quality of the Rockaway and Whippany Rivers appeared to be minimal. Also, the closest surface water intake, for the purpose of public consumption, is approximately eight miles downstream of the Site: thus, any contaminants from the Site would be diluted before reaching the intake.

The analytical results of the samples of the deeper aquifer revealed the presence of cadmium, lead, chromium, iron, manganese, mercury, and nickel at concentrations in excess of drinking water standards, indicating that the landfill impacted the aquifer. The analyses of the lower aquifer also found one organic compound, benzene, in one well at a concentration of 13 micrograms per liter (µg/L). However, this detection is believed to be an isolated occurrence which did not indicate significant organic contamination in the lower aquifer.

No human health or ecological risk assessments were performed during the RI; however, because groundwater exceeded drinking water standards for several organic and inorganic contaminants, there was a need to take an action to prevent further impacts.

Response Actions

Based on the results of the RI, EPA and NJDEP established cleanup goals and objectives for the Site. The goals and objectives were to minimize the potential for migration of the low levels of groundwater contamination and minimize the risks to the public from exposure to waste and contaminated soil on the Site. To accomplish these goals and objectives, EPA selected a remedy which was described in a Record of Decision (ROD) signed on September 29, 1986.

The ROD included the following elements:

- Capping of the landfill in accordance with relevant Resource Conservation and Recovery Act requirements, including the appropriate grading of Fill Areas;
- A venting system for landfill gases;
- Extraction and treatment of shallow groundwater and leachate;
- Surface water controls to accommodate seasonal precipitation and storm runoff as well as erosion control for river banks;
- Security fencing to restrict Site access; and
- An environmental monitoring program to ensure the effectiveness of the remedial action.

On October 4, 1993, EPA issued an Explanation of Significant Differences (ESD) to change the capping requirement in the ROD to limited capping, and to modify the cap material. EPA determined that only the portions of the North Fill and South Fill Areas that exhibit slopes of less than or equal to three horizontal to one vertical (3:1) would be capped since the slopes greater than 3:1 would allow a significantly higher amount of precipitation to run off. Capping was considered less necessary on the steeply sloped areas than on the mildly sloped areas, since one of the primary reasons for installing a cap was to reduce the infiltration of rainwater into the waste material.

The 1993 ESD also modified the requirement for liner material. Since the steep slopes were not to be capped under the modified remedy, the use of a synthetic liner was determined to be appropriate on the North Fill and South Fill Areas.

The ESD also required a groundwater monitoring program to be implemented for all Fill Areas in addition to a surface water monitoring program for the Rockaway and Whippany Rivers. Provision for a groundwater extraction system was made in each of the Fill Areas to provide hydraulic containment and prevent migration of contaminants out of each Fill Area when operating at design capacity. In 2023, EPA issued an ESD to incorporate institutional controls (ICs), i.e., a deed notice and classification exception area (CEA), into the remedy for all the Fill areas.

Status of Implementation

EPA reached a settlement with a group of potentially responsible parties (PRPs) in which they agreed to perform the remedial design (RD) and the remedial action (RA). A consent decree (CD) under which the PRP group (the Group) agreed to perform the RD and RA was entered in federal district court on December 4, 1994. The Group completed the RD on May 9, 2000. On June 5, 2000, the Group solicited bids for construction, and construction activities began on September 5, 2000. Remedial construction activities at the Site were substantially completed on December 29, 2003, and EPA issued a Preliminary Close Out Report on March 9, 2004.

A PRP independent of the Group that is also a party to the CD, HMAT Associates, Inc. (HMAT), owns and is responsible for the NW-N Fill Area. According to the 1994 CD, HMAT's responsibilities included Site management planning, as well as the installation of soil cover, drainage controls, erosion protection, and other related work at the NW-N Fill Area. HMAT began remedial action activities at the NW-N Fill Area in May 2002 and awarded a construction contract to American Environmental Assessment Corporation. A pre-construction meeting was held on August 28, 2002, and construction activities commenced on September 3, 2002. EPA inspected the Site and observed that remediation activities were substantially completed on October 4, 2002.

Institutional Controls

ICs were not included as part of the selected remedy. On September 28, 2023, EPA issued a second ESD to include ICs in the form of deed notices for all five Fill Areas to prevent usage of the Site that is inconsistent with the remedy, e.g., the deed notices preclude installation of drinking water wells through the cap. Additionally, a classification exception area/well

restriction area (CEA/WRA), which is an IC under New Jersey law documenting an area where water quality standards cannot be met and which limits installation of drinking water wells, will be considered for all five Fill Areas. The CEA/WRA would be established if groundwater is being impacted by Site-related contaminants at concentrations above applicable water quality standards. Fencing has also been installed around the perimeter of the Site. Since the Site has a landfill designation, development is restricted by NJDEP. See Table 1 which represents the status of ICs as of the 2023 ESD.

Table 1: Summary of Planned ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	**ICs Needed**	**ICs Called for in the Decision Documents**	**Impacted Parcel(s)**	**IC Objective**	**Title of IC Instrument Implemented and Date (or planned)**
Groundwater	Yes	Yes	Landfill	Restrict installation of groundwater wells and groundwater use.	CEA Dates to be determined pending whether groundwater is being impacted by Site related contaminants at concentrations above water quality standards per 2023 ESD
Deed Notice	Yes	Yes	Fill Areas	Deed Notice/ Restriction: A notification added to the title of a property when contamination will remain above NJDEP's residential/ unrestricted soil remediation standards, N.J.A.C. 7:26D. A Deed Notice requires a property owner's concurrence and specifies the location and concentration of all contaminants and how they must be controlled, maintained, or monitored.	Deed Notice for all five fill areas projected by 2025

Systems Operations/Operation and Maintenance

The Township of Parsippany-Troy Hills is responsible for the inspection of the landfill areas; operation of the groundwater extraction system; and maintenance of the cap cover, access road, surface water management system, riverbank erosion protection, passive gas vents, and groundwater extraction and monitoring system. The Group is responsible for monitoring the piezometer levels, groundwater monitoring and well sampling, surface water sampling, and analytical testing and reporting for all Fill Areas. In 2014, EPA approved the PRP's request to shut down the extraction system to determine whether it was still needed. HMAT is responsible for O&M activities for the NW-N Fill Area.

On October 10, 2023, the Group submitted the eighth Operations and Maintenance Report for the Long-Term Phase of the North and South Fill Areas. This report contains a summary of monitoring events for groundwater and surface water at the North and South Landfill that were conducted in May 2023. This long-term monitoring program consists of sampling, laboratory analysis, data validation, and reporting of results.

Groundwater and surface water monitoring are required by the Statement of Work (SOW) under the CD during O&M. There are separate criteria for groundwater versus surface water, and the North and South Fills versus the Small Fills. The SOW also divides the O&M into the different phases of work (First Baseline, 5-Year Pump and Treat, Second Baseline, and Long-Term) and these are described below for the North and South Fills and the Small Fills. The SOW also lists the required analyses during the O&M phases and the Well and River Trigger Levels that are used to evaluate the effectiveness of the remedy.

During recent Site inspections, EPA observed conditions which indicated that the North and South Landfills were not being inspected/maintained (e.g., mowing grass, overgrowth of vegetation) pursuant to the O&M Plan required by the SOW. EPA has been working with the Township to address these issues and requested an assessment be conducted to evaluate the integrity of the landfill cap as well as provide an implementation schedule for the Township's assessment.

Between March and May 2024, EPA inspected the small Fill Areas and had conversations with NJDEP regarding maintenance issues on the NW-N and SW Fill Areas. Issues (described in more detail below) regarding the NW-N Fill Area were resolved and on June 10, 2024, NJDEP issued a Sanitary Landfill Major Disruption Approval Project Closeout letter to HMAT. There were no issues observed in the NW-S Fill Area.

Regarding the SW Fill area, owned by Wildlife Preserves, Inc., the observed maintenance issues and changed Site conditions to the physical condition of the SW Fill area include Site clearing/grubbing of the entry way, installation of a berm that included planting of trees on the top of the berm, ruts in areas covered by the soil cap, gravel cover placed on the soil cap, and installation of fencing with a locked gate (which prevents the Township from having access to perform its operation and maintenance activities on the SW Fill Area and EPA/NJDEP from

performing any inspections). Neither EPA nor NJDEP were given prior notification of these changes and NJDEP will be addressing these issues with the property owner.

Well Trigger Levels

The three specific trigger conditions defined in the SOW, i.e., the Type A Trigger, the Type B Trigger, and the Type C Trigger, were designed to identify when contaminants are migrating out of one or more Fill Areas at levels which would necessitate activation of the groundwater extraction system at one or more of the Fill Areas (or portions thereof as approved in writing by EPA).

A Type A Trigger would occur when any analysis of any sample taken from any groundwater monitoring well at the Site indicates that the concentration of any Well Chemical (as defined in the CD) is greater than or equal to two times the Well Trigger Level set for that Well Chemical. There were exceedances of the Type A Trigger levels for arsenic and VOCs during the previous and current 5-year review period. However, the concentrations did not exceed two times those levels. Under the CD, a Well Trigger Level is the allowable concentration listed in the CD for any Well Chemical.

A Type B Trigger would occur whenever a) the concentration of a River Chemical at any station located within one-quarter mile downstream from any of the Fill Areas or portion thereof ("the downstream location") in either the Whippany River or the Rockaway River exceeds the River Trigger Level for that chemical and either of the following exists: b.1) the concentration of the River Chemical at that upstream location is less than the River Trigger Level; or b.2) the concentration of a River Chemical at both the upstream and downstream locations are above the River Trigger Level, but the downstream concentration is statistically greater than the upstream concentration. The statistical analysis to be used to determine if "the downstream concentration is statistically greater than the upstream concentration" stated in b.2, above, shall be a methodology selected by EPA (or a methodology proposed by the Settling Defendants and consistent with 40CFR 264.90 through 264.99, approved by EPA). There were no Type B Trigger Level exceedances during the Second Baseline Phase or Long-Term Phase.

A Type C Trigger would occur, for the purposes of the SOW, whenever the concentration of any Well Chemical in groundwater, averaged over the groundwater monitoring wells in any groundwater extraction zone, is equal to or greater than its respective Well Trigger Level.

North and South Fills

- The first Baseline Phase for the North and South Fills was conducted in 2002.
- The Five-Year Pump and Treat Phase for the North and South Fills was conducted from 2003 to 2007.
- On August 18, 2014, EPA approved the Group's request to shut off the system.
- The Second Baseline Phase for the North and South Fills was conducted from October 2014 to August 2015.
- The Long-Term Phase for the North and South Fills began in November 2015, after the completion of the Second Baseline phase.

- On May 2, 2017, EPA approved a request to reduce the frequency of the North and South Fills groundwater and Whippany and Rockaway Rivers surface water sampling. The monitoring is currently conducted on an annual basis.

Small Fills (NW-N and NW-S)

- The first Baseline Phase for the Small Fills was conducted in 2003.
- The Long-Term Phase for the Small Fills began in 2004.
    - On July 20, 2005, EPA approved groundwater and surface water sampling events to be conducted annually.
    - On December 12, 2012, EPA approved an additional modification to biennially conduct (until 2016) groundwater and surface water monitoring for the Small Fills.
    - On May 2, 2017, EPA approved the Group's request to discontinue sampling of the monitoring wells associated with the Small Fills.

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 change in the region and near the Site. Appendix A provides the climate change analysis.

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 status of those recommendations.

Table 2: Protectiveness Determinations/Statements from the 2019 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The OU1 remedy currently protects human health and the environment in the short term because all exposure pathways have been addressed by the engineered remedy. However, in order to be protective in the long term, deed notices restricting future use of the property need to be put in place, groundwater data that evaluates migration of contaminants from the landfill needs to be evaluated and unauthorized material needs to be removed from the NW-N Fill.
Sitewide	Short-term Protective	The implemented remedy currently protects human health and the environment in the short term because all exposure pathways have been addressed by the engineered remedy. However, in order to be protective in the long term, deed notices restricting future use of the property need to be put in place, groundwater data that evaluates migration of contaminants from the landfill needs to be evaluated and unauthorized material needs to be removed from the NW-N Fill.

Table 3: Status of Recommendations from the 2019 FYR

OU #	Issue	Recommendations	Current Status	Current Implementation Status Description	Completion Date (If applicable)
1	The PRP for the NW-N Fill Area has been placing unauthorized fill material (crushed concrete and asphalt millings) on top of the existing cap cover remedy.	Remove the unauthorized materials from the NW-N Fill Area and inspect the cap for damage. If there is damage to the cap, repairs, along with groundwater sampling may be required.	Completed	See text below	April 2023
1	Due to the proximity of the monitoring well network to the boundaries of the Large Fills, it is difficult to interpret data that show arsenic, total VOCs and 1,4-dixoane at concentrations significantly above groundwater quality standards and MCLs. Specific conductance is also high in several wells, indicating impacts from the landfills.	Additional wells outside the landfill boundaries are necessary to determine the extent of landfill impacts to the aquifer.	Ongoing	See text below	
1	The landfills need deed notices to prevent future uses that are incompatible with the remedies.	Deed notices need to be established to limit potential development options.	Ongoing	See text below	

Progress on Recommendations:

The 2019 third FYR identified three issues and made recommendations to address them.

Issue #1 Status: The PRP for the NW-N Fill Area has been placing unauthorized material (crushed concrete and asphalt millings) on top of the existing cap cover remedy.

Recommendation: Remove the unauthorized materials from the NW-N Fill Area and inspect the cap for damage. If there is damage to the cap, repairs, along with groundwater sampling may be required.

Status: In April 2023, HMAT's crew excavated the drainage ditches along the perimeter of the Site. Excavation activities, photographs, and a photoionization detector were used to screen excavated soil for hydrocarbon vapors. Excavated soil and fill were placed along the southeast corner of the Site where it will be used to construct the Site's retention basin. The excavated soil and fill used for construction of the retention basin was later covered with clean fill which was staged on Site. During the week of April 24, 2023, construction activities started on the south parking lot entrance. This work was conducted outside of the of landfill area.

The recycled concrete aggregate (RCA) is mixed in with gravel. The 4,000 square feet gravel/RCA parking area is in the northeast corner of the Site. The gravel/RCA parking area is approximately 6 inches thick and there is about 74 cubic yards of material on-Site. In June 2023, NJDEP allowed HMAT to utilize the RCA and gravel during construction. The existing asphalt piles were stored in the parking area and reused during construction activities.

Issue #2: Due to the proximity of the monitoring well network to the boundaries of the Large Fills, it is difficult to interpret data that show arsenic, total VOCs and 1,4-dioxane at concentrations significantly above groundwater quality standards and MCLs. Specific conductance is also high in several wells, indicating impacts from the landfills.

Recommendation: Additional wells outside the landfill boundaries are necessary to determine the extent of landfill impacts to the aquifer.

Status: In a March 9, 2021 letter, EPA directed the Group to develop and submit a workplan to conduct off-Site groundwater monitoring well repair and redevelopment, install off-Site groundwater monitoring wells, and conduct groundwater sampling activities to collect groundwater quality data outside of the landfill boundaries. This information will be used to determine if landfill contamination is migrating from the landfill and to assess the protectiveness of the remedy in future FYRs.

By July 5, 2023, after obtaining the required access agreements, the Group started scheduling off-Site monitoring well activities. A Site survey was conducted, and a landfill disruption permit was filed. On September 11, 2023, well drilling activities began. However, in late September 2023, well drilling activities stopped because the well drill rig became stuck trying to access the well locations and it needed to be pulled out by a wrecker. Well installation activities resumed during the week of December 18th. Currently, except for the well to be installed on the East Hanover property, the other off-Site wells have either been installed or were redeveloped. Sampling activities commenced in February 2024 on most of these off-Site wells. See Table A. The second round of sampling of the off-Site wells occurred during the week of May 6, 2024.

Issue #3 : The landfills need deed notices to prevent future uses that are incompatible with the remedies.

Recommendation: Deed notices needed to be established to limit potential development options.

Status: A deed notice was filed for the NW-N Fill Area on September 24, 2018. A CEA was resubmitted to NJDEP for the NW-N landfill area. On September 28, 2023, EPA issued an ESD that incorporates ICs as part of the remedy, specifically deed notices for all five Fill Areas. The 2023 ESD also included a CEA/WRA into the remedy. A CEA/WRA is an IC under New Jersey law documenting an area where water quality standards cannot be met and which limits installation of drinking water wells and will be considered for all five areas. The CEA/WRA would be established in the event groundwater is being impacted by Site-related contaminants at concentrations above applicable water quality standards.

Regarding the NW-S landfill area, EPA has been in contact with legal counsel representing CDMG Realty about the need for a deed notice and CEA. It has conveyed to EPA by legal counsel that the establishment of a deed notice and CEA is in progress by the property owner.

On December 28, 2023, EPA sent an email to Wildlife Preserves, Inc., the owner of the SW Fill Area, notifying it that implementing ICs is required on the SW landfill area. On February 15, 2024, EPA had a meeting with Wildlife Preserves, Inc. to explain the process of implementing institutional controls on the SW Fill Area. EPA will continue discussions with Wildlife Preserves, Inc., regarding establishing institutional controls.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & 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 Sharkey Landfill 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 for the Site, Pat Seppi, posted a public notice on the EPA site webpage at https://www.epa.gov/superfund/sharkey-landfill and provided the notice to the Parsippany-Troy Hills, Township by email on March 8, 2024 with a request that the notice be posted in municipal offices and on the village/town webpages. This notice indicated that a FYR would be conducted at the Sharkey Landfill 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 repository: The Parsippany-Troy Hills Public Library located at 449 Halsey Road, Parsippany, New Jersey 07054. In addition, the final report will be posted on the following website: https://www.epa.gov/superfund/sharkey-landfill. Efforts will be made to reach out to local public officials to inform them of the results.

Data Review

On-Site Groundwater

In May 2017, a revised monitoring program was put in place:

- Monitor North and South Fills groundwater annually for the following parameters:
    - Target Compound List (TCL) VOCs.
    - SVOCs – Well Chemicals (i.e., Bis(2-ethylhexyl)phthalate and Nitrosodiphenylamine) and 1,4-dioxane.
    - Metals – Well Chemicals only (i.e., arsenic, barium, cadmium, chromium, lead, silver, selenium, and mercury).

During the current FYR period, 16 groundwater monitoring wells were sampled at the Large Fills; nine wells at the South Fill and seven wells were sampled at the North Fill. The groundwater monitoring program associated with the Small Fills was discontinued after 2018. Groundwater analytical results are compared with the New Jersey Ground Water Quality Standards (NJGWQS) or Well Trigger Levels established in the CD and discussed above.

The groundwater analytical results indicated that arsenic levels exceeded the NJGWQS of 3 µg/L in most wells and ranged from 3.1 µg/L (well M-3) to a maximum of 53 µg/L in well M-13, which is above the well trigger level of 50 µg/L. Arsenic also remained elevated at well M-11, with a concentration of 51 µg/L in May 2023. Arsenic concentrations at well M-6 have declined from 37.9 µg/L in 2020 to 23 µg/L in 2023. Barium was commonly detected in the groundwater samples but did not exceed the well trigger level or the groundwater quality standards. The other metals that were analyzed had concentrations below the trigger levels, with the exception of one well (M-4) that had one result for chromium of 51 µg/L with a trigger level of 50 µg/L in 2023. Despite these trigger level exceedances, none were above two times those levels which would initiate a type A trigger response (e.g., extraction system activation).

Concentrations of 1,4-dioxane were commonly detected in the groundwater samples and ranged from 0.039 µg/L (M-2 in May 2022, 19 feet deep) to as high as 580 µg/L in May 2023 (at well M-4 on the west side of the North Fill, 46 feet below ground surface). Although no well trigger level was developed for 1,4-dioxane at the Site, the NJGWQS is 0.4 µg/L.

Commonly detected VOCs in the groundwater samples included chlorobenzene, benzene, isopropylbenzene, and xylene. Total VOC concentrations in groundwater samples in 2023 did not exceed 1,000 µg/L, which is the Well Trigger Level for VOCs.

Measurements of specific conductance (which is an indicator of dissolved solids in water and indicates likely impacts from the landfill) were highest in well M-4. Other wells that had notably elevated values during the 2022 sampling event included M-1, M-6, M-12, M-13, M-14, M-16, and M-27. All the samples had negative reduction-oxidation (redox) potential, which indicates chemically reducing conditions. All the samples (except one; M-27) had dissolved-oxygen concentrations of less than 1 µg/L, which also indicates chemically reducing conditions. Values of pH ranged from 6.34 (well M-9A) to 8.04 (well M-12).

Off-Site Groundwater

The groundwater extraction system at the Site was shut down on August 18, 2014. The network of monitoring wells prior to 2024 was located very close to the boundaries of the Large Fills. Thus, the groundwater results from these wells were indicative of leached water within the landfill rather than that of the surrounding groundwater. In order to evaluate potential migration of contamination in groundwater, the well network needed to be expanded outside the boundaries of the Large Fills and sampled to compare concentrations to the groundwater beneath the landfills. The installation of new groundwater monitoring wells located near, but outside of the large landfill areas, commenced in September 2023 and except for the well to be installed on the East Hanover property, the other off-Site wells have either been installed or redeveloped. Two limited rounds of sampling have occurred in February and in May 2024 on most of these off-Site

wells (see Table A). Sampling results indicate that there is some Site contamination located in the off-Site wells (see Table B).

Eight of the 10 wells that were recently installed in nearby areas off the landfill property were sampled in February 2024 and the remaining two wells were sampled in May 2024. Results indicated that three wells contained some low detections of acetone and 1,4-dioxane. All but one well had concentrations of these chemicals below the groundwater criteria. The one off-Site property well that had 1,4-dioxane concentrations above the criterion of 0.4 µg/L was well MW-28S, with a concentration of 30 µg/L. Well MW-28S is located about 250 feet southeast of the North Fill and also had some trace levels of 1,1-Dichloroethane (1.2 µg/L) and dichlorodifluoromethane (0.71 µg/L).

Several of the 10 off-Site property wells (M-30S, M-30I, M-31S, M-32S, and WS-1) had notably elevated measurements of specific conductance (greater than 1 milliSiemens/cm). The maximum measurement was 2.28 milliSiemens/cm at well WS-1, which is located to the east of the North Fill.

Five of the off-Site property wells had detections of arsenic above the groundwater criterion of 3 µg/L, with a maximum concentration of 25 µg/L in well MW-32I. The six wells with detections of chromium and the two wells with detections of lead had concentrations below groundwater criteria. The arsenic detections, along with the elevated 1,4-dioxane level at M-28S, and the specific conductance levels in several off-Site property wells indicate that some off-Site area groundwater could be affected by the migration of leachate from the landfill and that the current network of off-Site wells may not fully delineate groundwater contamination.

Surface Water

Surface water samples are collected at four locations on the Rockaway River and six locations on the Whippany River. The most commonly detected chemicals in surface water samples in May 2023 were toluene, barium, 1,4-dioxane, and acetone. Surface water data are compared with River Trigger Levels as the primary metric for remedy effectiveness, although EPA MCLs are also used to evaluate the data. No VOCs, metals, or other chemicals were detected in exceedance of the established River Trigger Levels in May 2023, but arsenic and lead did exceed MCLs at W1 in 2022. During the previous FYR period, bromodichloromethane surface water concentrations slightly exceeded the River Trigger Level of 0.27 µg/L. During this monitoring period, levels of bromodichloromethane were below the River Trigger Levels. Overall, contaminants did not exceed River Trigger Levels, suggesting that the remedies in place are working as intended.

Site Inspection

A Site inspection was conducted on December 20, 2023. In attendance were EPA's RPM, Pamela J. Baxter, Ph.D., PMP, BCEEM, CHMM, and John Rolfe, de maximis, Inc (Group's representative). Various Site-related issues were discussed relating to operations and maintenance schedules, drilling activities, and sampling activities. The Site is secured by fencing.

No interviews were conducted for this FYR. EPA has ongoing discussions with the Group's representative and the Township's Engineer regarding Site activities.

V. TECHNICAL ASSESSMENT

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

Although the concentrations of most chemicals are below their respective Well Trigger Levels in the CD (with arsenic as the primary exception), the extraction system is no longer operating and potential migration from the landfill to surrounding areas or greater depth was not being evaluated with the current monitoring well network because all the existing wells were located within or directly adjacent to the landfill. New wells at locations near, but outside, the landfill were installed in 2023-2024 and sampled in February 2024 and May 2024. Preliminary analysis in the absence of water level information and field parameter data shows that there were no exceedances of well trigger levels, however, 1,4-dioxane was detected at 30 µg/L southeast of the North Fill at M-28S. Arsenic was detected at several of the off-Site wells to the west of the North and South Fill at concentrations in between the NJGWQS and the trigger level. These analytical results, in conjunction with elevated specific conductance levels in several off-Site wells, suggest that some off-Site area groundwater could be affected by the migration of leachate from the landfill and that the current network of off-Site wells may not fully delineate groundwater contamination. However, additional rounds of analytical data from the on- and off-Site monitoring wells, as well as further evaluation of on- and off-Site monitoring well water levels and field parameter data are needed. Based on the conclusions of further data review, additional wells may be necessary to determine the extent of arsenic and 1,4-dioxane contamination that appears to be emanating from the Large Fills. Restarting the extraction system may also need to be considered.

Question B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives used at the time of the remedy still valid?

The following RAOs established for the Site in the ROD are still valid:

- minimize the potential for migration of the low levels of groundwater contamination; and
- minimize the risk to the public from exposure to waste and contaminated soil.

There are no changes in the physical conditions of the Site or Site uses that would affect the protectiveness of the selected remedy. The cap is considered intact throughout the Fill Areas, preventing exposure to contaminated material remaining on-Site. The maintenance issues as well as physical changes to the Site conditions (e.g., ruts in areas covered by the soil cap in the SW Fill Area) will be addressed by NJDEP with the property owner. Deed restrictions on the Fill Areas are still needed to ensure long-term protectiveness.

A quantitative risk assessment was not performed during the original 1986 RI and risk-based remediation goals were not selected. The 1994 Consent Decree's SOW set specific contaminant triggers for groundwater extraction and diversion to Parsippany-Troy Hills Sewage Treatment

Plant (PTH STP) for treatment and disposal. Well Trigger Levels and state groundwater MCLs are qualitatively compared in Table 4; the trigger levels are above NJ MCLs with the exception of chromium, silver, selenium, and barium.

Table 4: Comparison of Well Trigger Levels and NJ MCLs

Contaminant of Concern	Well Trigger Level (µg/L)	NJ MCL (µg/L)
Total VOCs	1,000	-
Benzene	50	1
N-nitrosodiphenylamine	10	-
Bis(2-ethylhexyl)phthalate	100	6
Arsenic	50	5
Cadmium	10	5
Chromium	50	100
Lead	50	15
Mercury	2	2
Silver	50	100
Selenium	10	50
Barium	1,000	2,000

Trigger levels were exceeded for arsenic and chromium during the FYR period and MCLs were exceeded for arsenic and benzene. Standards were also exceeded for 1,4-dioxane and chlorobenzene, chemicals which were not specifically included on the contaminant of concern list. The contaminant 1,4-dioxane was present at concentrations exceeding both the NJ groundwater quality standard of 0.4 µg/L as well as EPA's Removal Management Level of 46 µg/L for residential tap water (set at a cancer risk of 10^{-4} and a hazard quotient of 1) in multiple monitoring wells in each sampling round during the FYR period. Area residents are connected to the municipal water supply. Therefore, there is no direct exposure to groundwater contamination and the remedy remains protective despite continued exceedances of drinking water standards. The Site institutional controls that have been and will be implemented to restrict the installation of new wells will ensure long-term protectiveness.

Groundwater VOC results from the FYR period were also compared to EPA's vapor intrusion screening levels (VISLs) to determine the potential for the intrusion of vapors into buildings should they be constructed above the most contaminated groundwater on the Site. Benzene

concentrations were within EPA's residential risk range (10^{-6} to 10^{-4} and hazard quotient <1) and all other VOCs were below risk thresholds, indicating the potential for unacceptable risk to Site residents due to vapor intrusion is unlikely if future homes were constructed at the Site.

Surface water monitoring data collected in 2019 to 2023 from Whippany River and Rockaway River were reviewed in this FYR. No concentrations of VOCs, SVOC and metals exceeded River Trigger Levels, suggesting that the remedies in place are working as intended to protect the environment, but arsenic and lead did exceed MCLs at W1 in 2022. However, any surface water extracted from these rivers for potable purposes is treated prior to distribution. In addition, the detections of metals, such as lead and arsenic, in surface water are sporadic and relatively low; therefore, ecological receptors are not likely to be adversely affected.

Although the ecological risk assessment screening and toxicity values used to support the ROD may not necessarily reflect the current values, the landfill cap eliminates any potential risk from surface soil contaminants to terrestrial receptors. The remedy remains protective of ecological resources.

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

At this time there is no additional 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:				
None				
Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 1	**Issue Category: Monitoring**			
	Issue: Potential migration of landfill contaminants in the shallow aquifer immediately downgradient of the large Fill Areas.			
	Recommendation: Continue to evaluate groundwater data collected in the newly installed off-Site groundwater monitoring wells, as well as the on-Site monitoring wells, in addition to field parameter data and groundwater elevation levels to confirm whether leachate is migrating from the landfill. Pending the results of this evaluation, the installation of additional off-Site wells and/or restarting the extraction system may need to be considered.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2025
OU(s): 1	**Issue Category: Institutional Controls**			
	Issue: The Fill Areas need deed notices and may need CEAs.			
	Recommendation: Deed notices will need to be established for all of the Fill Areas to limit land use of the property to minimize human exposure to contaminants and to protect the integrity of the remedy. A CEA/WRA will continue to be considered for all five Fill Areas and would be established in the event groundwater is being impacted by Site-related contaminants at concentrations that exceed applicable water quality standards.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	9/30/2025

OTHER FINDINGS

In addition, the following has been identified during the FYR and may improve performance of the remedy, but does not affect current and/or future protectiveness:

- During recent Site inspections, EPA observed conditions which indicated that the North and South Landfills were not being inspected/maintained (e.g., mowing grass, overgrowth of vegetation) pursuant to the O&M Plan required by the SOW. EPA has been working with the Township to address these issues and requested an assessment be conducted to evaluate the integrity of the landfill cap as well as provide an implementation schedule for the Township's assessment.

- Regarding the SW Fill area, owned by Wildlife Preserves, Inc., the observed maintenance issues and changed Site conditions to the physical condition of the SW Fill area include Site clearing/grubbing of the entry way, installation of a berm that included planting of trees on the top of the berm, ruts in areas covered by the soil cap, gravel cover placed on the soil cap, and installation of fencing with a locked gate (which prevents the Township from having access to perform its operation and maintenance activities on the SW Fill Area and EPA/NJDEP from performing any inspections). Neither EPA nor NJDEP were given prior notification of these changes and NJDEP will be addressing these issues with the property owner.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit:	*Protectiveness Determination:*
OU1	Short-term Protective
Protectiveness Statement: The OU1 remedy currently protects human health and the environment in the short-term because all exposure pathways have been addressed by the engineered remedy. However, to be protective in the long term, institutional controls in the form of deed notices restricting future use of the property must be established to minimize human exposure to contaminants at the Site as well as protect the integrity of the remedy. A CEA/WRA will continue to be considered, pending additional data collection and assessment. In addition, groundwater data from on- and off-Site monitoring wells needs to be further evaluated to confirm whether leachate is migrating from the landfill, if additional monitoring wells are needed to delineate off-Site contamination and if the extraction system should be restarted to prevent further migration.	

Site-wide Protectiveness Statement(s)
Protectiveness Determination: Short-term Protective
Protectiveness Statement: The OU1 remedy currently protects human health and the environment in the short-term because all exposure pathways have been addressed by the engineered remedy. However, to be protective in the long term, institutional controls in the form of deed notices restricting future use of the property must be established to minimize human exposure to contaminants at the Site as well as protect the integrity of the remedy. A CEA/WRA will continue to be considered, pending additional data collection and assessment. In addition, groundwater data from on- and off-Site monitoring wells needs to be further evaluated to confirm whether leachate is migrating from the landfill, if additional monitoring wells are needed to delineate off-Site contamination and if the extraction system should be restarted to prevent further migration.

VIII. NEXT REVIEW

The next FYR for the Sharkey Landfill Superfund Site is required five years from the completion date of this review. A Site Chronology is provided in Appendix B - Table C.

Figure 1 – Site Map

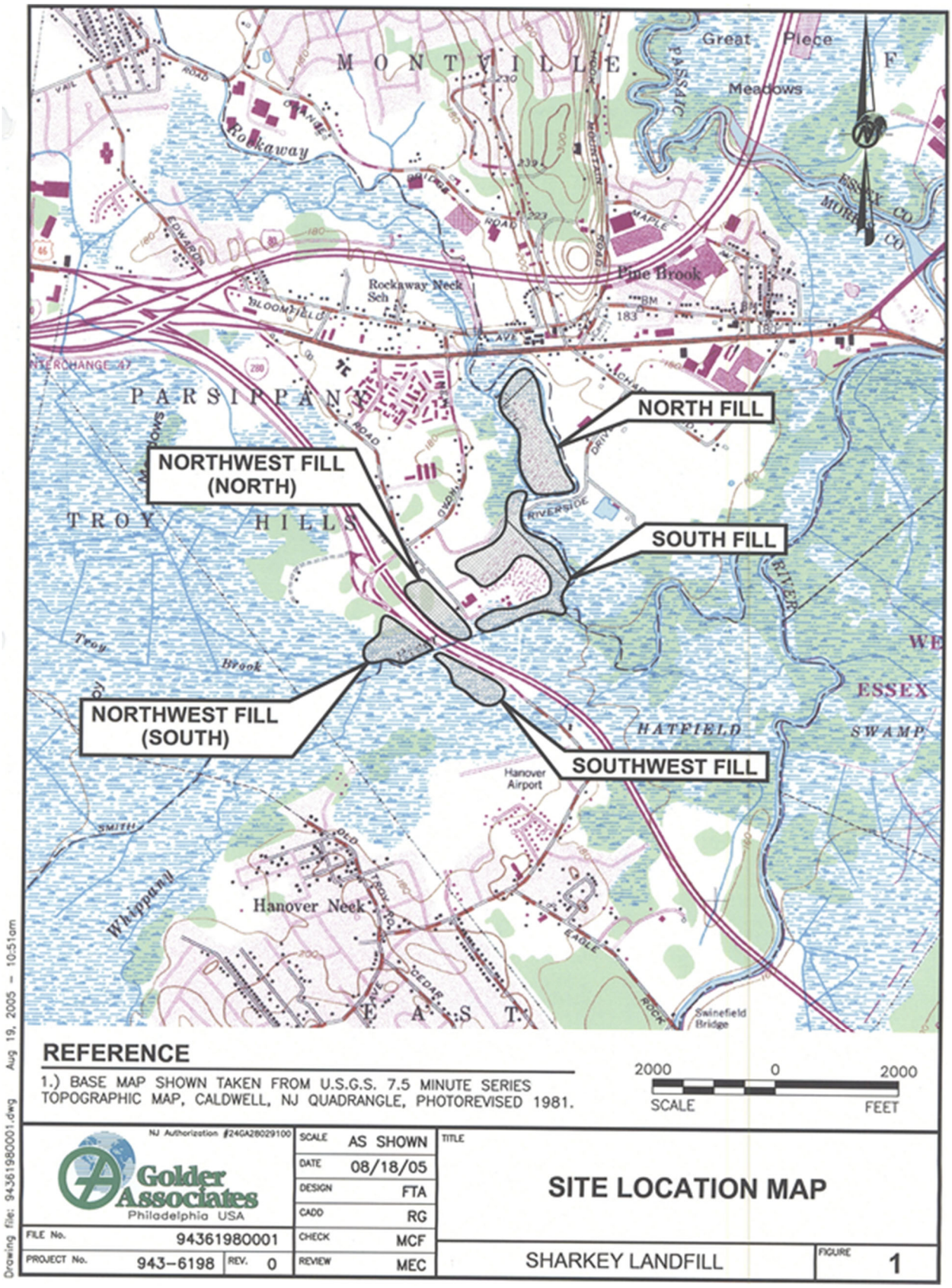

Figure 2 – Monitoring Well Locations

Table A

Off-Site Monitoring Well Construction Information
Sharkey Landfill Superfund Site
Morris County, New Jersey

EXISTING OFF-SITE HISTORIC MONITORING WELLS[1]						
Well ID	**Block**	**Lot**	**Well Diameter (Inches)**	**Screened Interval (FT BGS)**	**Well Depth (FT BGS)**	**Sampling Parameters[3]**
WS-1	182	7	4	7.0-17.0	18	TCL VOCs, SVOCs, and Inorganics
WS-14	182	2.1	4	7.0-17.0	18	TCL VOCs, SVOCs, and Inorganics
NEW OFF-SITE MONITORING WELLS[4]						
Well ID	**Block**	**Lot**	**Well Diameter (Inches)**	**Screened Interval (FT BGS)**	**Well Depth (FT BGS)**	**Sampling Parameters[3]**
M-30S	770	3	2	15-25	25	TCL VOCs, SVOCs, and Inorganics
M-30I	770	3	2	55-65	65	TCL VOCs, SVOCs, and Inorganics
M-31S	770	7	2	6-16	16	TCL VOCs, SVOCs, and Inorganics
M-31I	770	7	2	60-70	70	TCL VOCs, SVOCs, and Inorganics
M-32S	770	12	2	14-24	24	TCL VOCs, SVOCs, and Inorganics
M-32I	770	12	2	62-72	72	TCL VOCs, SVOCs, and Inorganics
PROPOSED OFF-SITE MONITORING WELLS[2,4]						
Well ID	**Block**	**Lot**	**Well Diameter (Inches)**	**Proposed Screened Interval (FT BGS)**	**Proposed Well Depth (FT BGS)**	**Sampling Parameters[3]**
M-28S	184	7.1	2	30-40	40	TCL VOCs, SVOCs, and Inorganics
M-28I	184	7.1	2	65-75	75	TCL VOCs, SVOCs, and Inorganics
M-29	1	1	2	20-30	30	TCL VOCs, SVOCs, and Inorganics

Notes:

1) Off-Site historic monitoring well information based upon historic well information obtained from the Remedial Investigation and Feasibility Study (July 1986).

2) Final screened interval and well depth to be determined in the field during drilling. Screened interval for shallow wells to be set above the top of varved clay unit.

3) Sampling parameters will include Target Compound List (TCL) Volatile Organic Compounds (VOCs), Semivolatile Organic Compounds (SVOCs; 1,4-dioxane, bis(2-ethylhexyl)phthalate, and N-nitrosodiphenylamine only), and Inorganics (arsenic, barium, cadmium, chromium, lead, mercury, silver, and selenium only) in accordance with the Revised Off-Site Groundwater Monitoring Work Plan (Golder, 2021).

4) Monitoring wells M-30S, M-30I, M-31S, M-31I, M-32S, and M-32I were installed during 2023. Monitoring wells WS-1, M-28S, and M-28I were installed during 1Q2024, and M-29 is tentatively scheduled for installation pending Site conditions.

Table B – Summary of Validated Data

June 2024

Summary of Validated Data
Detected Analytical Results
Off Site Groundwater Monitoring
Sharkey Landfill

GLA9436198004.0944

				Sample ID	M-28I			M-28S			M-30I			M-30S			M-31I			M-31S			M-32I			M-32S			M-32S		
				Sample Date	5/9/2024			5/9/2024			2/27/2024			2/27/2024			2/27/2024			2/27/2024			2/28/2024			2/28/2024			2/28/2024		
				N=Normal, FD=Field Duplicate	N			N			N			N			N			N			N			N			FD		
Parameter	Unit	GW Well Trigger	NJ GWQS		Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL	Result	Qual	RL
Volatile Organic Compounds																															
1,1-Dichloroethane	ug/L	NS	50					1.2	J	5																					
Dichlorodifluoromethane	ug/L	NS	1000					0.71	J	5																					
Acetone	ug/L	NS	6000								17		10	7.7	J	10							18		10						
Semivolatile Organic Compounds																															
1,4-Dioxane	ug/L	NS	0.4		0.041	J	0.2	30		2	0.047	J	0.2	0.044	J	0.2				0.25		0.19	0.051	J	0.19						
Inorganics																															
Arsenic	ug/L	50	3					7.1	J	10	4.2	J	10	6.7	J	10	12		10				25		10						
Barium	ug/L	1000	6000		73	J	200	46	J	200	120	J	200	120	J	200	91	J	200	49	J	200	55	J	200	100	J	200	110	J	200
Chromium	ug/L	50	70								4.1	J	10	2.4	J	10	14		10	1.2	J	10	3.8	J	10						
Lead	ug/L	50	5											2.4	J	10	3.6	J	10												

				Sample ID	WS-1			WS-14		
				Sample Date	2/28/2024			2/28/2024		
				N=Normal, FD=Field Duplicate	N			N		
Parameter	Unit	GW Well Trigger	NJ GWQS		Result	Qual	RL	Result	Qual	RL
Volatile Organic Compounds										
1,1-Dichloroethane	ug/L	NS	50							
Dichlorodifluoromethane	ug/L	NS	1000							
Acetone	ug/L	NS	6000							
Semivolatile Organic Compounds										
1,4-Dioxane	ug/L	NS	0.4							
Inorganics										
Arsenic	ug/L	50	3							
Barium	ug/L	1000	6000		220	J+	200	49	J	200
Chromium	ug/L	50	70					8.5	J	10
Lead	ug/L	50	5							

Notes:
1) Well Triggers are from the Sharkey Landfill Statement of Work (SOW), Exhibit B. There were no exceedances of Well Triggers.
2) NJ GWQS- New Jersey Groundwater standards are provided by the NJDEP, exceedances are shaded.

Qualifiers:
J: Estimated Result
J+: Estimated Result, Biased High

Abbreviations:
NS - No Well Trigger Level Available
Qual - Interpreted Qualifier
ug/L - Micrograms per Liter

Prepared by: JKC 5/9/24
Reviewed by: SHL 5/9/24

Site Photos

Installation of Monitoring Well 31 I – 12/20/23

North Landfill Area – 12/20/23

South Landfill Area – 12/20/23

Facing North Fill Area – 5/7/24

South Fill Area/Parsippany-Troy Hills Wastewater Treat Plant – 5/7/24

South Fill Area – 5/7/24

Northwest-North Fill Area – 12/20/23

Northwest-North Fill Area – 12/20/23

Northwest-North Fill Area – 5/7/24

Appendix A – Climate Change Analysis

In line with regional practice, two climate change tools were utilized to assess the Sharkey Landfill Superfund Site. Screenshots from each of the tools assessed are included below. The first tool used to assess the Site was the Climate Mapping for Resilience and Adaptation (CMRA) Assessment Tool. The tool examined five climate hazards for the county the Site falls within (Morris County). According to this tool, the National Risk Index Rating for extreme heat is "Relatively Moderate." There is a projected increase of days per year with maximum temperatures >100°F, as show in Figure A-1. The other climate hazards evaluated by this tool were drought, wildfire, flooding, and coastal flooding, and each indicated a National Risk Index Rating of "Relatively Low", "Very Low", and "Relatively High", respectively. No risk index was provided for coastal flooding. Figures A-2 and A-3 show an increase in average annual total precipitation and an increase in days per year with precipitation. Figure A-4 shows an increase in annual days with precipitation over one inch. As shown in Figure A-5, the percent of the county impacted by global sea level rise is 0%.

The second tool utilized is called NOAA Sea Level Rise Viewer. The Site is located inland and although the CRMA tool indicated a "Relatively High" risk index related to flooding since it is located near the Rockaway and Whippany Rivers, there have been no known incidences of the Site flooding. Figure 6 shows the Site at current baseline conditions and Figure 7 shows the Site with a 10-foot sea level rise, which shows the Site is unaffected.

Based on this information, 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.

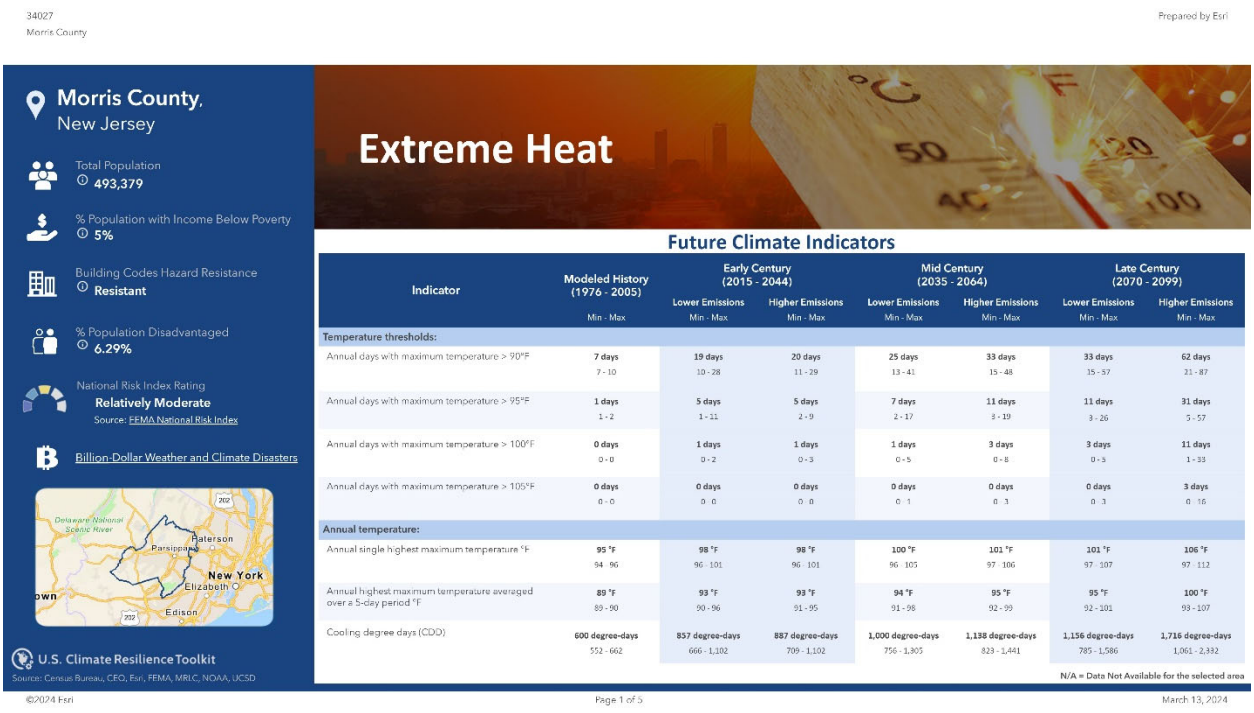

Figure A-1

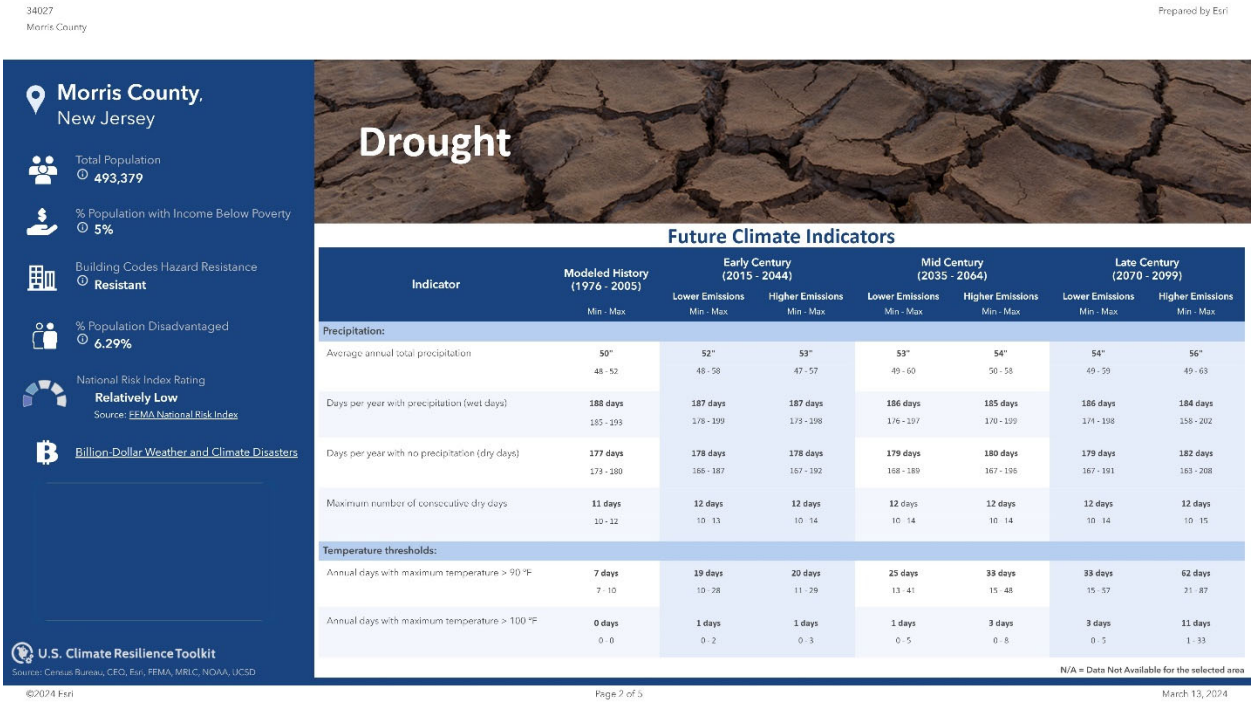

Figure A-2

Figure A-3

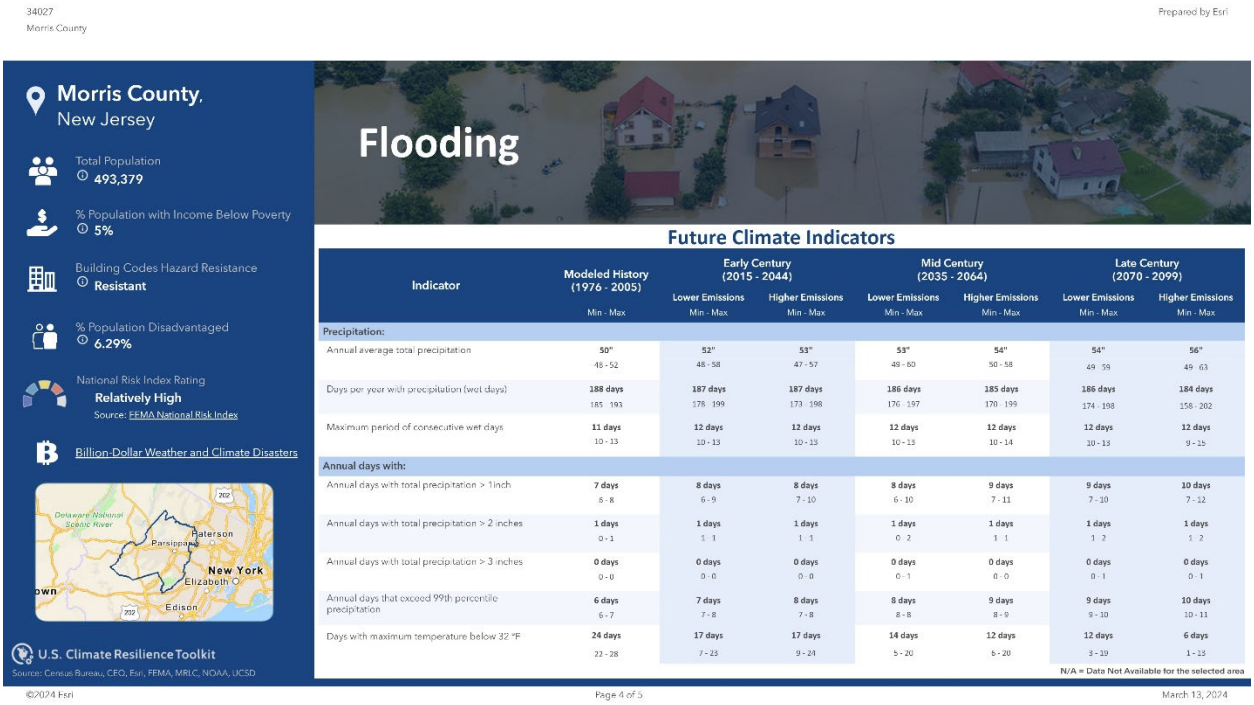

Figure A-4

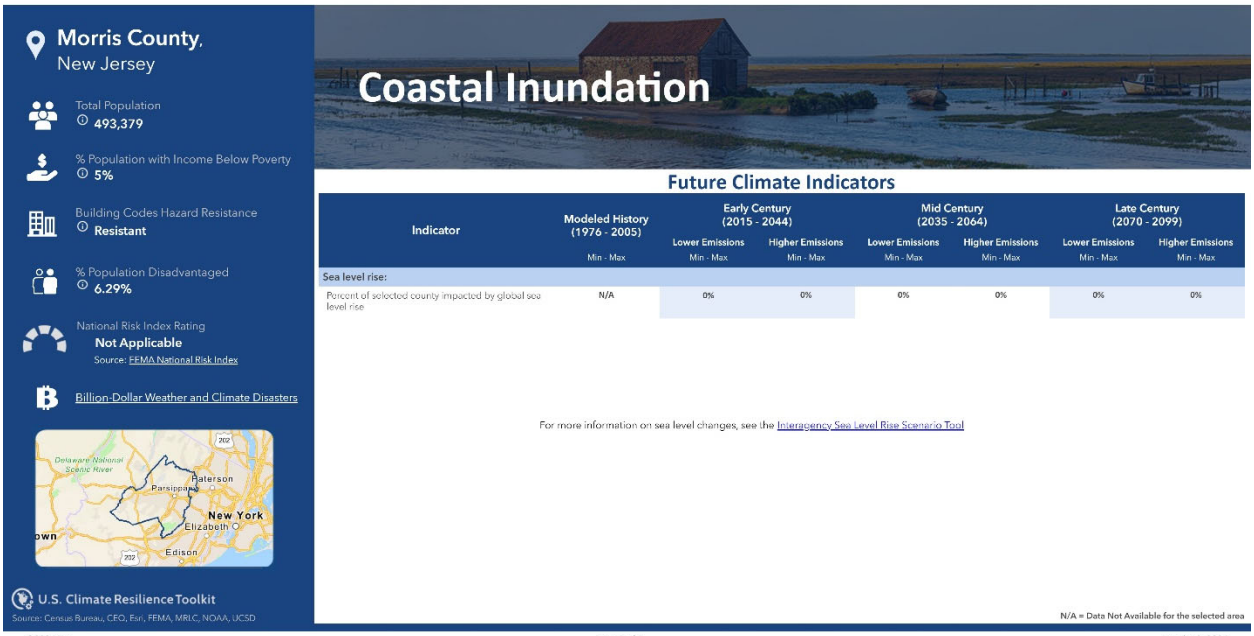

Figure A-5

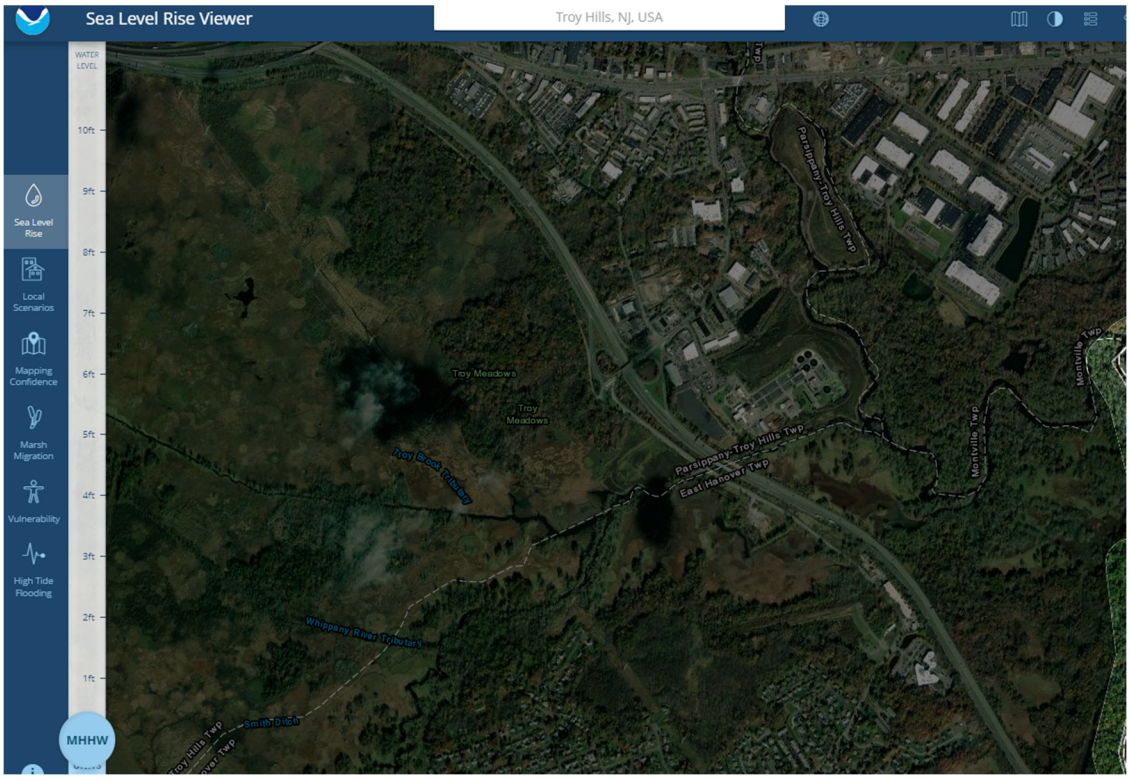

Figure A-6

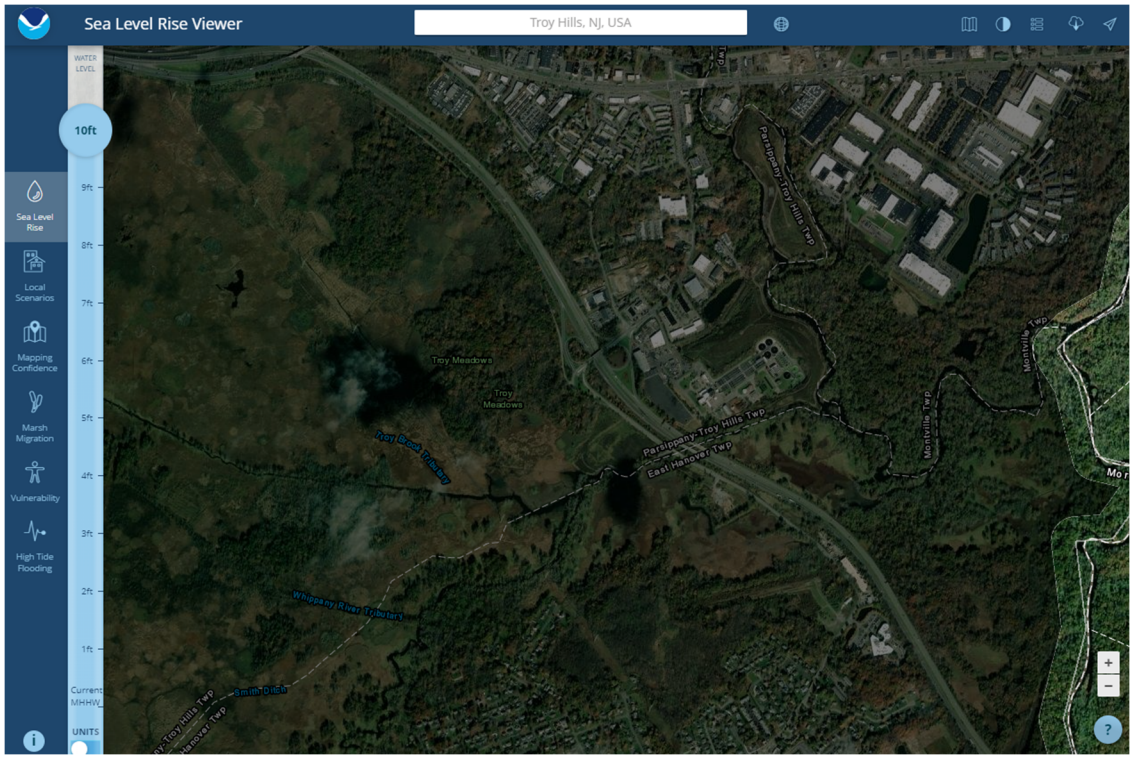
Sea Level Rise Viewer
Troy Hills, NJ, USA
WATER LEVEL
10ft
9ft
8ft
7ft
6ft
5ft
4ft
3ft
2ft
1ft
Current MHHW
UNITS
Sea Level Rise
Local Scenarios
Mapping Confidence
Marsh Migration
Vulnerability
High Tide Flooding
Troy Meadows
Troy Meadows
Troy Brook Tributary
Parsippany-Troy Hills Twp
East Hanover Twp
Montville Twp
Whippany River Tributary
Smith Ditch

Figure A-7

Appendix B – Table C - Site Chronology

Event	Date(s)
The Sharkey Farm Landfill Site (Site) was used as a pig farm	1930s
Landfilling operations began	1945
The landfill began accepting hazardous waste from the Ciba-Geigy Company	1962 – 1969
Approximately 25,700 tons of non-chemical wastes and approximately 1,160 tons of liquid and/or chemical wastes were deposited at the Site.	April 13, 1972 – May 10, 1972
The Site ceased landfill operations	September 9, 1972
It was reported that about three million gallons of wastewater of unknown composition were taken to Sharkey Disposal-Pine Brook	1972 – 1974
The Site remained inactive until excavation began for the expansion of the Parsippany-Troy Hills Sewer Treatment Plant	1979
The expansion project was completed	1981
The Site was included on the National Priorities List	September 8, 1983
A remedial investigation and feasibility study was conducted by various contractors for the New Jersey Department of Environmental Protection (NJDEP)	December 19–3 - September 1986
EPA selected a remedy which was described in the ROD	September 29, 1986
NJDEP initiated the Remedial Design in March 1987	March 1987 – April 1994
EPA issued an ESD to change the capping requirement to limited capping and to modify the cap material	October 4, 1993
EPA became the lead agency for the Site	April 1994
A consent decree was issued to the Potential Responsible Parties (PRP aka the Group)	December 4, 1994
EPA approved the Revised Final 100% Design Report	May 9, 2000
The Group solicited bids to hire a construction company	June 5, 2000
The Haseley Construction Company, Inc. was awarded the contract	June 29, 2000
EPA approved the remedial action work plan	July 21, 2000
Site mobilization activities began	August 7, 2000
A pre-construction meeting was held	August 9, 2000
Construction activities began	September 5, 2000

Event	Date(s)
The Haseley's contract was terminated by the Group because of financial difficulties and poor work performance	August 27, 2001
HMAT Associates, Inc., PRP responsible for the Northwest-North Fill (NWN) area, started remedial action activities	May 2002
Sevenson Environmental Services was hired as an interim contractor to complete construction activities at the Site	May 29, 2002
EPA approved the technical specifications and revised grading plans, referred to as the Remedial Design for the Northwest-North Fill Area	August 15, 2002
A pre-construction meeting was held and HMAT awarded a construction contract to American Environmental Assessment for the Northwest-North Fill Area	August 28, 2002
The Group performed baseline groundwater sampling	August and September 2002
Construction activities commenced at the NWN Fill Area	September 3, 2002
EPA and the Group conducted a Site inspection	September 27, 2002
EPA inspected the NW-N Fill Area and observed that remediation activities were substantially completed	October 4, 2002
Substantial completion of remediation activities appeared to have been achieved	October 24, 2002
Proposal for Classification Exception Area Equivalency submittal for the Site	January 14, 2003
EPA requested a corrective action plan, since it was determined that substantial repair work would be required to restabilize some of the slopes and drainage channels	January 29, 2003
EPA conducted a second pre-final Site inspection following a rainstorm event	September 19, 2003
A Site visit confirmed that the cap repairs appeared to be effective. Remedial construction activities at the Site were substantially completed	December 29, 2003
EPA issued the Preliminary Close Report	March 9, 2004
The Remedial Action Certification Report was approved	September 29, 2005
Commencement of Five-year review	October 2008
First FYR Issued	May 26, 2009
Second FYR Site Visit	April 24, 2014
NW-S and NW-N Site visit	July 17, 2014
Second FYR Issued	September 29, 2014
Third FYR Site Visit	October 17, 2018
Third FYR Issued	September 30, 2019

Event	Date(s)
PRPs submitted revised Off-Site Groundwater Monitoring Work Plan	2021
Obtained access agreements for Off-Site Well Installation	2021 - 2023
Groundwater and Surface Water sampling activities	May 2023
Commencement of installation of off-site wells	September 11, 2023
EPA issued an ESD to include institutional controls	September 28, 2023
4th FYR Kickoff Meeting	October 3, 2023
Fourth FYR Site Visit	December 20, 2023