SIXTH FIVE-YEAR REVIEW REPORT FOR JACKSON LANDFILL SUPERFUND SITE BURLINGTON COUNTY, NEW JERSEY

Prepared by

U.S. Environmental Protection Agency
Region 2
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LIST OF ABBREVIATIONS & ACRONYMS

CFR	Code of Federal Regulations
1,1-DCA	1,1-dichloroethane
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
MCL	Maximum Contaminant Level
MW	Monitoring Wells
NJDEP	New Jersey Department of Environmental Protection
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable Unit
PRP	Potentially Responsible Parties
RAO	Remedial Action Objectives
RD	Remedial Design
RI	Remedial Investigation
ROD	Record of Decision
RPM	Remedial Project Manager
SVOCs	Semi-volatile organic compounds
TAL	Target Analyte List
TBC	To be considered
TCL	Target Compound List
UU/EE	Unlimited use and unrestricted exposure
VISL	Vapor Intrusion Screening Level
VOCs	Volatile Organic Compounds
µg/l	Micrograms/liter

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 Section 121, consistent with the National Oil and Hazardous Substances Pollution Contingency Plan (40 CFR Section 300.430(f)(4)(ii)) and considering EPA policy.

This is the sixth FYR for the Jackson Township Landfill Superfund Site (Site). The triggering action for this statutory review is the fifth FYR for the Site completed on May 22, 2020. This 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 one remedial phase, or operable unit (OU), which is being addressed in this FYR.

The Site's sixth FYR team included Michelle Granger, EPA (remedial project manager), Sabrina Gonzalez, EPA (hydrogeologist); Ula Filipowicz, EPA (human health risk assessor); Julie McPherson, EPA (ecological risk assessor); Pat Seppi, EPA (community involvement coordinator); and Ross Hull, NJDEP (case manager). This is a state-lead site. The local government officials were notified of the initiation of the FYR. The review began on 8/7/2024.

Site Background

The Site (see Figure 1) is located off Lakehurst Avenue in Jackson Township, Ocean County, New Jersey. The landfill is situated on 135 acres of land in a regional reserve known as the New Jersey Pine Barrens, or Pinelands. Approximately 20 of the 135 acres were previously used for the disposal of various liquid, semi-liquid, and solid wastes.

Glidden Corporation owned the property comprising the Site and conducted surface mining operations within the property limits from 1961 to 1972 to recover the mineral ilmenite. In 1972, Glidden Corporation sold the property to Jackson Township. Jackson Township then began accepting municipal wastes at the landfill under a State permit to receive sewage sludge, septic tank wastes and solid wastes. Landfill operations commenced in the western portion of the property with the landfill accepting bulk liquid and semi-liquid coffee wastes, household refuse, tree stumps, construction debris, junked cars and liquid septage. Much of the liquid waste disposed of in the landfill contained volatile organic contaminants (VOCs) such as methylene chloride.

In 1977, there were multiple complaints associated with the use of area groundwater. Subsequent analysis of area groundwater ordered by the New Jersey Department of Environmental

Protection (NJDEP) concluded that a portion of the Cohansey aquifer and several domestic wells had been contaminated by the landfill. Contaminants detected in monitoring wells and potable wells included benzene, chloroform, methylene chloride and 1,1,1-trichloroethane. In 1978, NJDEP ordered Jackson Township to stop disposing of liquid wastes at the landfill. In 1980, the landfill was closed by order of the Superior Court of New Jersey. Furthermore, in 1980, a citizens lawsuit resulted in a municipal water system extension to residents affected or potentially affected by the landfill. The Site was proposed to be included on the National Priorities List (NPL) on December 30, 1982 and was included on the NPL on September 8, 1983.

For more details related to the Site background, physical characteristics, geology/hydrogeology, and land/resource please see the documents found in the Site repositories or at https://www.epa.gov/superfund/jackson-township-landfill (see section on webpage titled Site Documents and Data).

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: JACKSON TOWNSHIP LANDFILL SUPERFUND SITE		
EPA ID: NJD980505283		
Region: 2	**State:** NJ	**City/County:** Jackson Township, Ocean County

SITE STATUS	
NPL Status: Deleted	
Multiple OUs? No	**Has the site achieved construction completion?** Yes

REVIEW STATUS
Lead agency: State, NJDEP
Author name (Federal or State Project Manager): Michelle Granger
Author affiliation: United States Environmental Protection Agency
Review period: 8/7/2024 – 2/10/2025
Date of site inspection: 11/26/2024
Type of review: Statutory
Review number: 6
Triggering action date: 5/22/2020
Due date *(five years after triggering action date)*: 5/22/2025

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

A Remedial Action Master Plan (RAMP) for the Site was completed by EPA in November 1984. The RAMP concluded that since no soil, surface water, sediment or biota sampling had been conducted at the Site, and because of discrepancies in groundwater sample handling procedures and sample handling methods, additional investigation of the Site was necessary.

In 1988, the NJDEP and Jackson Township entered into a Judicial Consent Order (JCO). Pursuant to this JCO, Jackson Township was required to conduct further Site investigation and remediation of the landfill, as necessary. In 1989 and 1990, Jackson Township conducted a remedial investigation (RI) at the Site. The Final RI Report was approved by NJDEP and EPA in 1991. Results of the RI indicated that groundwater contaminant levels exceeded NJ Ground Water Quality Standards (NJGWQS) and that the levels had declined significantly since the 1980 landfill closure.

In addition, Jackson Township performed a risk assessment. The final risk assessment report was approved by NJDEP and EPA in July 1993. It determined that the Site did not present an unacceptable threat to human health. An ecological risk assessment was also conducted and indicated that the contaminant concentrations found at the Site were below levels of concern.

Response Actions

In the September 1994 ROD, the NJDEP, with EPA's concurrence, selected the "No Further Action with Maintenance and Monitoring" remedy for the Jackson Township Landfill Site. Based on the findings of the RI and risk assessment, the NJDEP and EPA determined that conditions at the Site posed no current or potential threat to human health and the environment.

Pursuant to the 1988 JCO, the final landfill closure would be conducted in a manner consistent with the NJDEP Solid Waste Landfill requirements, thereby satisfying all necessary regulatory requirements for the Site. Actions necessary to comply with NJDEP Solid Waste Landfill Closure requirements included: installation of a soil cap and surface water detention basins and post-closure groundwater and air monitoring.

Status of Implementation

In June 1995, Jackson Township's consultant, GeoSystems, Inc., submitted the Jackson Township Landfill Closure Plan to the NJDEP, pursuant to the NJDEP's landfill closure requirements and 1988 JCO. In February 1996, NJDEP approved the Closure Plan. The Landfill Closure Plan included, but was not limited to, the design and implementation of the following:

- installation of final cover;
- a soil-erosion and sediment-control plan;
- groundwater monitoring;
- landfill-gas monitoring;
- a methane gas-venting or evacuation system;

- installation of a facility access control system (i.e., fence); and
- post-closure operation and maintenance activities.

The Township implemented the closure plan. On September 13, 1995, the Site was deleted from the NPL.

Systems Operation/Operations and Maintenance (O&M)

As part of the NJDEP Landfill Closure Plan, Jackson Township is responsible for conducting O&M activities at the Site, under oversight of the NJDEP. Since 1995, the Township has conducted landfill post-closure maintenance activities which include visually inspecting the cap and runoff drainage channels, inspecting locks and casings of monitoring wells, clearing vegetation from the cap and drainage channels, and performing sampling and analysis for the long-term groundwater and methane-gas monitoring program. Monthly Site inspection reports are submitted to the State pursuant to the 1988 JCO.

Site inspections are conducted by the Township's contractor and/or Township personnel to ensure that the fence is in good repair and to look for signs of trespass. Any deficiencies which may be noted, such as plant growth requiring clearing and grubbing or removal of debris and minor fence repair, are addressed quickly by the Township.

Landfill Gas Monitoring

As part of the 1995 Landfill Closure Plan, permanent monitoring locations were constructed to monitor methane gas which could migrate laterally from the landfill. If landfill gas is detected off-site at or above 25% of the lower explosive limit (LEL), then a corrective action plan, including a timetable for implementation, shall be implemented.

In accordance with the closure plan, since 1995, Jackson Township's consultant has been performing quarterly monitoring of methane levels at monitoring well locations around the perimeter of the landfill. Around 2000, the concentrations of methane gas in the southwest corner of the Site increased. As a result, in 2003, NJDEP directed Jackson Township to perform quarterly off-site surveys to monitor methane gas migration, and, in 2004, to upgrade the passive landfill gas collection system to include both an active landfill collection system and a passive collection system. This upgrade also included two (solar-powered) landfill gas flares and a 400 linear foot trench between one of the flares (Flare No. 1) and the adjacent property line to minimize potential off-site migration of methane. Quarterly off-site surveys continued in 2006. Since 2008, the active on-site landfill gas collection system has been operational.

In 2018, NJDEP issued a Modified Sanitary Landfill Closure and Post-Closure Plan that required methane gas surveys be continued around the southwestern perimeter of the landfill on a quarterly basis. These methane gas surveys include 15 permanent monitoring points and the area immediately adjacent to the two landfill gas vent flares. If methane is detected at a monitoring location, additional monitoring is conducted at 25-foot intervals in all compass directions. Monitoring continues at these 25-foot intervals until values of 0% of the lower explosive limit are obtained. In accordance with the 2018 modification, Jackson Township’s consultant has been performing quarterly methane gas surveys as specified in the modified closure plan.

Remedy Resilience

Potential Site impacts from severe weather have been assessed (Appendix C), and the performance of the remedy is currently not at risk due to these effects in the region and near the Site.

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.

Protectiveness Determinations/Statements from the 2020 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The remedy at the Jackson Township Landfill Site is protective of human health and the environment.
Sitewide	Protective	The remedy at the Jackson Township Landfill Site is protective of human health and the environment.

There were no issues and recommendations in the last FYR.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

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

In addition to this notification, the EPA Community Involvement Coordinator, or CIC for the Site, Pat Seppi, posted a public notice on the EPA site webpage https://www.epa.gov/superfund/jackson-township-landfill and provided the notice to the Jackson Township by email March 12, 2025 with a request that the notice be posted in municipal offices and on the town webpages. This notice indicated that a FYR would be conducted at the Site to ensure that the cleanup at the Site continues to be protective of people's health and the environment. Once the FYR is completed, the results will be made available at the following repositories: Jackson Township Municipal Building, 95 West Veterans Highway, Jackson, New Jersey, and the EPA Region 2 Offices, 290 Broadway, New York, New York 10007-1866. In addition, the final report will be posted on the following website: https://www.epa.gov/superfund/jackson-township-landfill. Efforts will be made to reach out to local public officials to inform them of the results.

Data Review

As part of NJDEP's Solid Waste Landfill Closure Requirements, groundwater sampling events were conducted by the Township at the Site in 2020, 2021, 2022, 2023, and 2024. Samples were collected from four groundwater monitoring wells (see Figure 2) on an annual basis. The four monitoring wells (MW) sampled were MW-202A (upgradient), WD-1A (downgradient), 101R (on-site), and 105R (on-site). The results of these sampling events were submitted to NJDEP and EPA.

The groundwater underneath the Jackson Township Landfill falls into the category of Class I Groundwater of Special Ecological Significance since it is in the Pinelands Protection Area. The designated use of this Class I groundwater is the maintenance of special ecological resources and, therefore, these waters are non-degradation waters. To ensure protectiveness, concentrations of constituents in the upgradient well (202A) were compared with the on-site monitoring wells (101R, 105R) and WD-1A, the downgradient well.

VOCs were only detected above their NJ GWQS of 1 microgram per liter (µg/L) in monitoring wells 101R and 105R located on the landfill. The VOCs detected were benzene and chlorobenzene (Table 1). Benzene was detected at a maximum concentration of 2.2 µg/L in monitoring well 101R during the 2020 sampling event. Historically, monitoring well 101R has had benzene concentrations ranging from 2 to 3.5 µg/L. During this review period, benzene was also detected in well 105R (1.2 µg/L) during the 2020 sampling event. None of the other monitoring wells have detectable levels of benzene suggesting that the benzene is not migrating to downgradient wells. Chlorobenzene was detected above the NJGWQS (50 µg/L) at monitoring well 105R during the 2020 sampling event (maximum concentration of 55 µg/L). Historically, monitoring well 105R has had chlorobenzene concentrations ranging from 1.25 to 40 µg/L. Targeted VOCs and SVOCS were either not detected above the laboratory reporting limit or not detected above the applicable GWQS for any of the wells during sampling events in 2022 through 2024.

Aluminum concentrations have been consistently elevated. Levels in the upgradient well, 202A, have been fluctuating from 2020 through 2024. The Class II NJGWQS for aluminum is 200 µg/L. The detected concentrations in those last five years have been 2,140 µg/L, 2,420 µg/L, 1,670 µg/L, 1,690 µg/L, and 1,620 µg/L, respectively. The downgradient well, WD-1A has reported aluminum concentrations of 1,500 µg/L in 2020, 575 µg/L in 2021, 796 µg/L in 2022, 581 µg/L in 2023, and 546 µg/L in 2024. Aluminum values are elevated and fluctuating in both the upgradient and downgradient wells, suggesting that these aluminum concentrations are not likely to be Site-related.

Iron concentrations have been consistently elevated within the landfill area. Iron has a Class II NJGWQS of 300 µg/L. The maximum iron concentration was measured in Well 105R as 101,000 µg/L in 2020. This magnitude of concentration has not been observed in the upgradient and downgradient wells although the levels do fluctuate. The upgradient well, 202A, has exhibited concentrations fluctuating from 37.5 µg/L in 2023 to 424 µg/L in 2020. The same variability can be found in the downgradient well. Iron concentrations in WD-1A were

measured as 1,270 µg/L, 75.7 µg/L, 590 µg/L, 43.5 µg/L and 150 µg/L from 2020 through 2024, respectively. Although the fluctuations are greater in the downgradient well, they also occur in the upgradient well suggesting that these fluctuations are likely naturally occurring.

Manganese concentrations in the on-site well 101R ranged from 130.7 µg/L in 2022 to 294.8 µg/L with the maximum concentration detected in 2021. Manganese concentrations in on-site well 105R ranged from 43.5 µg/L in 2024 to 85.9 µg/L with the maximum concentration detected in 2020. Manganese concentrations have remained stable in well 101R but dropped below the Class II NJGWQS (50 µg/L) in well 105R during 2021 and 2024. Manganese was not observed at elevated concentrations in the upgradient or downgradient wells, indicating it is limited to the site.

A single chromium exceedance was seen in well MW-101R in 2024. Chromium was detected at 104.9 ug/L, which exceeds the Class II NJGWQS of 70 ug/L. However, chromium has not been detected in this well above the (Maximum Contaminant Level) MCL since sampling began in 2007 and no exceedances were noted in the downgradient well.

Landfill Gas Monitoring

Since the last reporting period, landfill gas sampling results indicate an increasing number of on-site locations (along the southwestern perimeter) where methane gas was in excess of its 25% LEL. There were 4 on-site gas monitoring locations with methane exceedances in 2019 and a maximum of 7 on-site gas monitoring locations with methane exceedances within this current FYR period. The most recent sampling results in 2024 showed 6 (1st Quarter) and 4 (2nd Quarter) on-site gas monitoring wells in excess of 25% LEL.

Off-site landfill gas samples were collected in 25-foot intervals from the on-site locations where methane levels were detected above the LEL. Based on the quarterly surveys performed to date, methane gas does not appear to be migrating off-site. NJDEP will continue to monitor quarterly landfill gas sampling data and will coordinate with the Township to ensure protection of human health and the environment. The Township will continue to vent and conduct landfill gas surveys per the NJDEP Modified Sanitary Landfill Closure and Post-Closure Plan issued in 2018.

Site Inspection

The inspection of the Site was conducted on November 26, 2024. In attendance were Michelle Granger (EPA), Ula Filipowicz (EPA), Julie McPherson (EPA) and Jinnie Hanlee (EPA). The purpose of the inspection was to assess the protectiveness of the remedy. A fence is present around the perimeter of the Site to restrict unauthorized access. There is a soil and washed gravel cap which covers the Site. Although not part of the selected remedy, these protective measures serve to minimize the potential for exposure to any contaminants which may remain at the Site.

The southwest corner of the Site has a solar array consisting of 10,080 panels. Initial construction activities for the solar array started March 2021. The solar array was completed and functional in October 2021.

No issues were observed during the site visit.

V. TECHNICAL ASSESSMENT

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

The 1994 ROD called for no further action with maintenance and monitoring. Additionally, the ROD provided for the closure of the Jackson Township Landfill as required by New Jersey regulations. Actions necessary to comply with NJDEP Solid Waste Landfill Closure requirements included the following: installation of a soil cap and surface detention basins, and post-closure groundwater and air monitoring. These actions have been taken. A fence is present around the perimeter of the Site to restrict unauthorized access. There is a soil and washed gravel cap which covers the Site. These protective measures comply with the NJDEP regulations governing solid waste and serve to minimize the potential for exposure to any contaminants which may remain at the Site. The NJDEP regulations require regular groundwater monitoring. Residences in the vicinity of the Site are supplied by the public water system. Groundwater data has been collected and analyzed from 2020 through 2024. The groundwater monitoring over the past five years indicates that the landfill is not contributing significantly to off-site groundwater contamination. No Site-related contaminants were found in the downgradient monitoring well above the NJGWQS or background levels. Landfill gas monitoring has been conducted from 2020 through 2024. Recent quarterly on-site gas sampling results continue to indicate exceedances of methane gas still exist along the southwestern perimeter of the landfill. However, elevated methane concentrations have not been observed off-site. Both the active and the passive systems are operating as intended.

QUESTION B: Are the exposure assumptions, toxicity data, cleanup levels, and remedial action objectives (RAOs) used at the time of the remedy selection still valid?

There have been no physical changes to the Site that would adversely affect the protectiveness of the remedy. Land use assumptions, exposure assumptions and pathways considered in the decision document followed the Risk Assessment Guidance for Superfund used by the Agency and remain valid. Although specific parameters may have changed since the time the risk assessment was completed, the process that was used remains valid. Remedial action objectives were not identified in the ROD, and hence they could not be evaluated in this review.

As a result of the soil/washed gravel cap covering the landfill and perimeter security fencing restricting access to the Site, the potential for direct contact with residual contamination with Site soils has been minimized. Since the last five-year review, solar panels now cover the capped portion of the landfill, and fences surround the perimeter of the paneled area providing additional security and restricting access. Exposure to contaminated groundwater beneath the Site also continues to be an incomplete pathway as all residents in the vicinity of the Site are currently connected to the public water supply.

With the permission of Jackson Township, a model airplane club currently utilizes a small area in the southern corner of the landfill cover for its aero modeling activities. As concluded previously, the use of this portion of the landfill cover is consistent with the selected remedy.

The subsurface vapor intrusion (VI) into indoor air pathway is evaluated when soils and/or groundwater are known or suspected to contain volatile organic compounds (VOCs). To ensure protectiveness, the Site's maximum detections of benzene (2.2 µg/L) and chlorobenzene (55 µg/L) were compared to their respective risk-based groundwater vapor intrusion screening levels (VISLs). The results of the analysis indicate that the benzene and chlorobenzene detections continue to fall below or within an acceptable risk and hazard range. Moreover, there are currently no buildings in the vicinity of monitoring well 101R and 105R. Based on these considerations, the vapor intrusion pathway remains incomplete and additional vapor intrusion investigations are not necessary at this time. To ensure protectiveness, this pathway will continue to be assessed during future FYRs.

An environmental assessment was conducted during the remedial investigation for the Site to determine ecological impacts. Surface water samples were collected and it was determined that the concentrations were below their respective criteria at the time. Sediment samples were collected and it was determined that the constituents detected were consistent with background. In order to determine if the conclusions continue to be valid, concentrations of constituents detected in the surface water were compared to the current NJDEP Surface Water Quality Standards (2023) and are confirmed to remain below standards. In addition, the landfill is capped, which interrupts exposure to any ecological receptors.

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

No new information has called into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

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

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: OU1	*Protectiveness Determination:* Protective
Protectiveness Statement: The remedy at the Jackson Township Landfill Superfund Site is protective of human health and the environment.	

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

VIII. NEXT REVIEW

The next five-year review report for the Jackson Township Landfill Superfund Site is required five years from the completion date of this review.

APPENDIX A – Tables

TABLE 1:

SUMMARY ANALYTICAL RESULTS FOR GROUNDWATER (2020 TO 2024)

GWQC	Well ID	101R					105R				
(µg/L)	Year	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024
	VOCs										
1	Benzene	**2.2**	**1.3**	0.39	0.5U	0.5U	**1.2**	0.5U	0.14	0.5U	0.5U
0.4	1,4-dioxane	---	---	---	---	---	---	---	---	---	---
50	Chlorobenzene	45	27	11	8.8	0.5U	**55**	7.8	8.5	5.3	3.3
	SVOCs										
3	bis(2-Ethylhexyl)phthalate	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
	Target Analyte List										
200	Aluminum	9.39	12.5	13.3	11.9	**222**	5.36	6.58	8.13	4.7	18
300	Iron	**75,800**	**90,000**	**83,000**	**68,700**	**89,800**	**101,000**	**75,500**	**86,900**	**70,900**	**50,200**
50	Manganese	**161.3**	**294.8**	**130.7**	**141**	**147.1**	**85.91**	45.97	**68.46**	**66.32**	43.55

GWQC	Well ID	202A					WD-1A				
(µg/L)	Year	2020	2021	2022	2023	2024	2020	2021	2022	2023	2024
	VOCs										
1	Benzene	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
0.4	1,4-dioxane	---	---	---	---	---	---	---	---	---	---
50	Chlorobenzene	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
	SVOCs										
3	bis(2-Ethylhexyl)phthalate	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U	0.5U
	Target Analyte List										
200	Aluminum	**2,140**	**2,420**	**1,670**	**1,690**	**1,620**	**1,500**	**575**	**796**	**581**	**546**
300	Iron	**424**	225	101	37.5	**364**	**1,270**	75.7	**590**	43.5	150
50	Manganese	40.63	30.78	24.1	28.02	26.71	18.48	17.58	16.01	21.38	15.49

µg/L = micrograms per liter, --- = not analyzed for this compound, U = non-detect, J = estimated below the reporting limit, GWQC = groundwater quality criteria, VOC = volatile organic compound, SVOC = semi-volatile organic, **BOLD** = exceeds GWQS

1. Only contaminants that exceed their maximum contamination limited are listed.

APPENDIX B – Figures

FIGURE 1 – Jackson Township Landfill Site Map

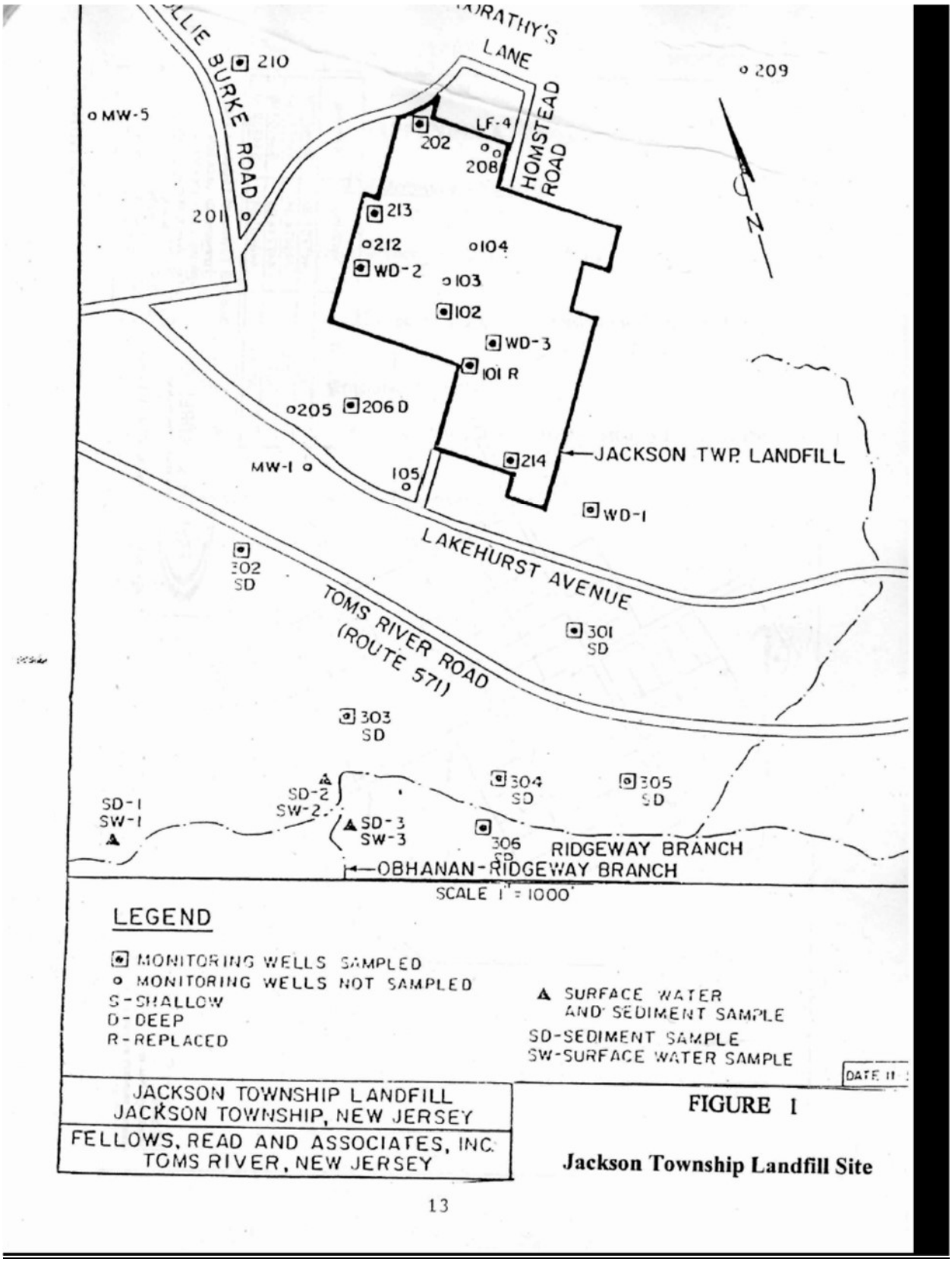


FIGURE 2 – Monitoring Well Location Map

APPENDIX C – Remedy Resilience Assessment

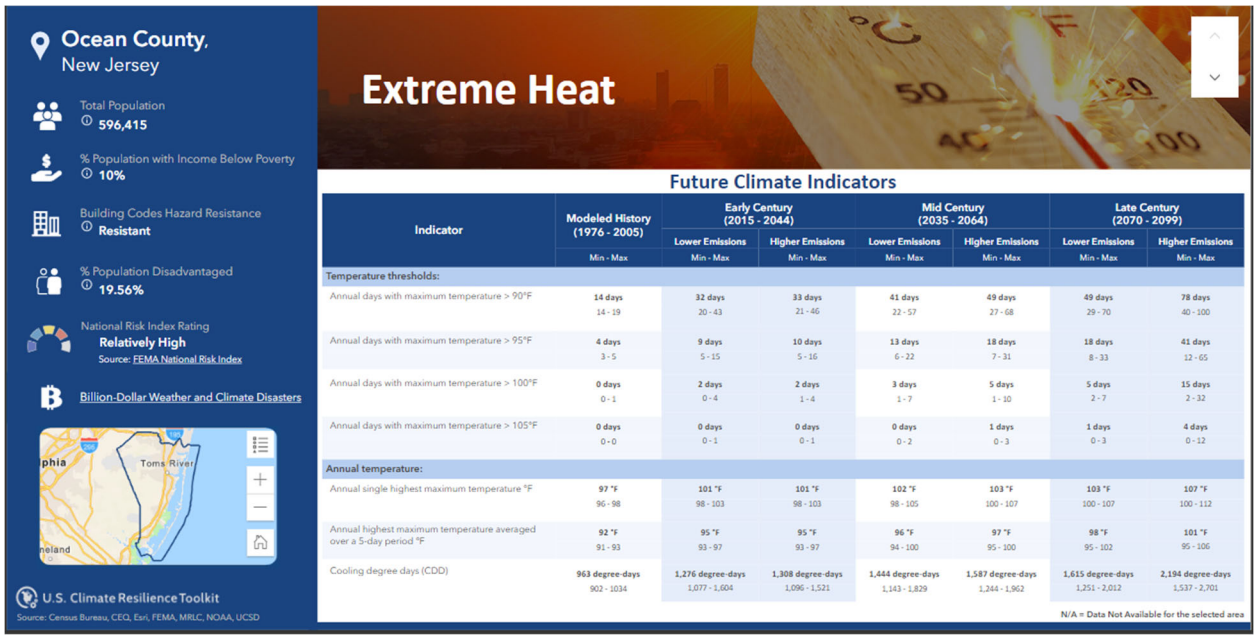
Two tools were considered appropriate to assess the Jackson Township Landfill Site. For the purpose of this analysis, the following address was used to screen the site: 649 Homestead Road, Jackson Township, New Jersey 08527. Screenshots from each of the tools assessed are included below (Figures E-1 through E-7).

The first tool is the Temperature/Precipitation/Drought/Wildfire/Flooding – CMRA Run for Ocean County in Jackson Township, NJ. The second tool is called the *NOAA Sea Level Rise Viewer*. The CMRA Assessment Tool was used to examine five hazards for the county the Site falls within. According to this tool, the National Risk Index Rating for extreme heat is "Relatively High." The projected increase of days per year with maximum temperatures >100°F is shown in Figure E- 1. The risk for drought is relatively low (Figure E-2), for wildfire is relatively moderate (Figure E-3), for flooding is relatively high (Figure E-4) and for coastal inundation very high (Figure E-5). However, even though the risk for coastal inundation within Ocean County is very high, the NOAA Sea Level Rise Viewer shows that the site is not near the coast and will not be affected by a potential sea level rise of 10 feet (Figures E-6 and E-7).

The remedy consists of groundwater monitoring, which involves taking samples from the existing monitoring well network. All remaining contamination is underground and is, thus, unlikely to be significantly affected by storms, flood, drought, or fire. Currently, the sampling is performed by Jackson Township once a year and during each event the condition of the Site is reported on.

Based on the information above, potential Site impacts from severe weather have been assessed, and the site is not currently at risk due to these effects in the region and near the Site.

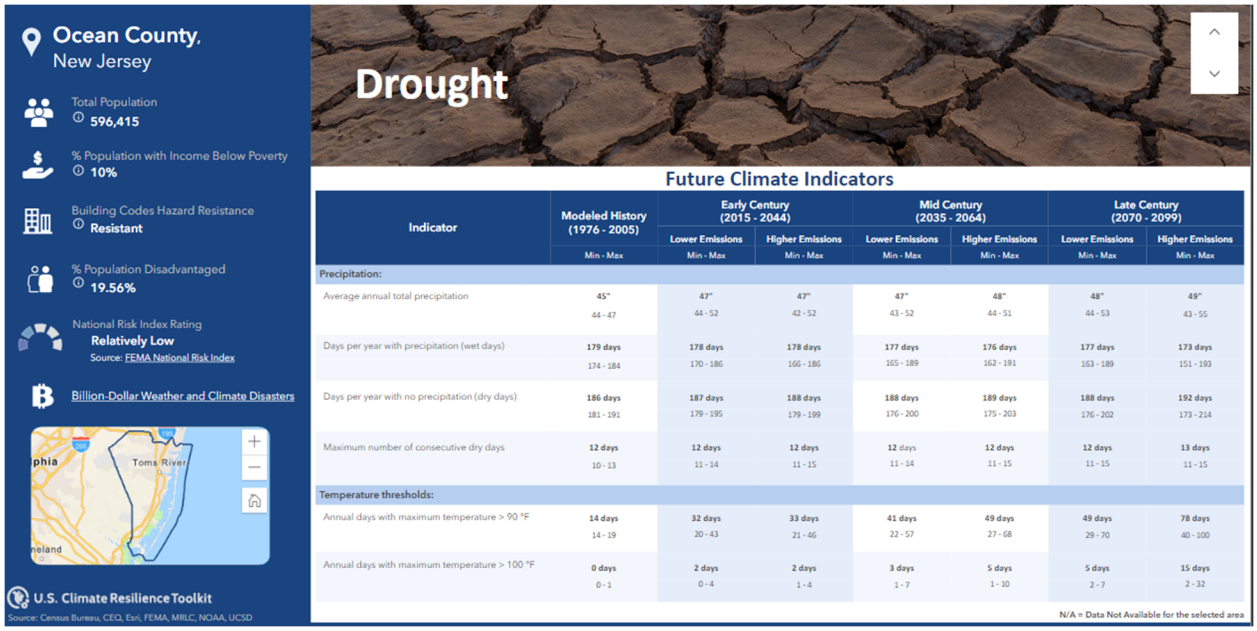
Figure E-1: Extreme Heat



Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Temperature thresholds:							
Annual days with maximum temperature > 90°F	14 days (14 - 19)	32 days (20 - 43)	33 days (21 - 46)	41 days (22 - 57)	49 days (27 - 68)	49 days (29 - 70)	78 days (40 - 100)
Annual days with maximum temperature > 95°F	4 days (3 - 5)	9 days (5 - 15)	10 days (5 - 16)	13 days (6 - 22)	18 days (7 - 31)	18 days (8 - 33)	41 days (12 - 65)
Annual days with maximum temperature > 100°F	0 days (0 - 1)	2 days (0 - 4)	2 days (1 - 4)	3 days (1 - 7)	5 days (1 - 10)	5 days (2 - 7)	15 days (2 - 32)
Annual days with maximum temperature > 105°F	0 days (0 - 0)	0 days (0 - 1)	0 days (0 - 1)	0 days (0 - 2)	1 days (0 - 3)	1 days (0 - 3)	4 days (0 - 12)
Annual temperature:							
Annual single highest maximum temperature °F	97 °F (96 - 98)	101 °F (98 - 103)	101 °F (98 - 103)	102 °F (98 - 105)	103 °F (100 - 107)	103 °F (100 - 107)	107 °F (100 - 112)
Annual highest maximum temperature averaged over a 5-day period °F	92 °F (91 - 93)	95 °F (93 - 97)	95 °F (93 - 97)	96 °F (94 - 100)	97 °F (95 - 100)	98 °F (95 - 102)	101 °F (95 - 106)
Cooling degree days (CDD)	963 degree-days (902 - 1034)	1,276 degree-days (1,077 - 1,604)	1,308 degree-days (1,096 - 1,521)	1,444 degree-days (1,143 - 1,829)	1,587 degree-days (1,244 - 1,962)	1,615 degree-days (1,251 - 2,012)	2,194 degree-days (1,537 - 2,701)

N/A = Data Not Available for the selected area

Figure E-2: Drought



Indicator	Modeled History (1976 - 2005)	Early Century (2015 - 2044)		Mid Century (2035 - 2064)		Late Century (2070 - 2099)	
		Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions	Lower Emissions	Higher Emissions
	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max	Min - Max
Precipitation:							
Average annual total precipitation	45" (44 - 47)	47" (44 - 52)	47" (42 - 52)	47" (43 - 52)	48" (44 - 51)	48" (44 - 53)	49" (43 - 55)
Days per year with precipitation (wet days)	179 days (174 - 184)	178 days (170 - 186)	178 days (166 - 186)	177 days (165 - 189)	176 days (162 - 191)	177 days (163 - 189)	173 days (151 - 193)
Days per year with no precipitation (dry days)	186 days (181 - 191)	187 days (179 - 195)	188 days (179 - 199)	188 days (176 - 200)	189 days (175 - 203)	188 days (176 - 202)	192 days (173 - 214)
Maximum number of consecutive dry days	12 days (10 - 13)	12 days (11 - 14)	12 days (11 - 15)	12 days (11 - 14)	12 days (11 - 15)	12 days (11 - 15)	13 days (11 - 15)
Temperature thresholds:							
Annual days with maximum temperature > 90 °F	14 days (14 - 19)	32 days (20 - 43)	33 days (21 - 46)	41 days (22 - 57)	49 days (27 - 68)	49 days (29 - 70)	78 days (40 - 100)
Annual days with maximum temperature > 100 °F	0 days (0 - 1)	2 days (0 - 4)	2 days (1 - 4)	3 days (1 - 7)	5 days (1 - 10)	5 days (2 - 7)	15 days (2 - 32)

N/A = Data Not Available for the selected area

Figure E-3: Wildfire

Figure E-4: Flooding

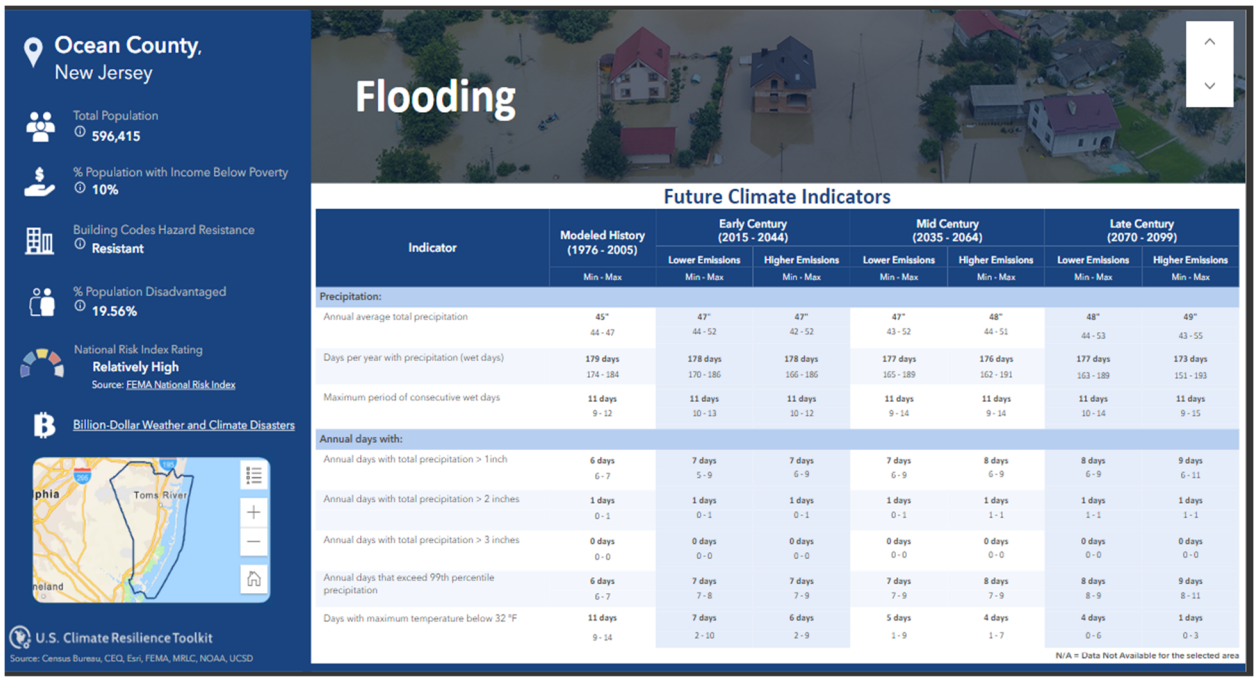


Figure E-5: Coastal Inundation

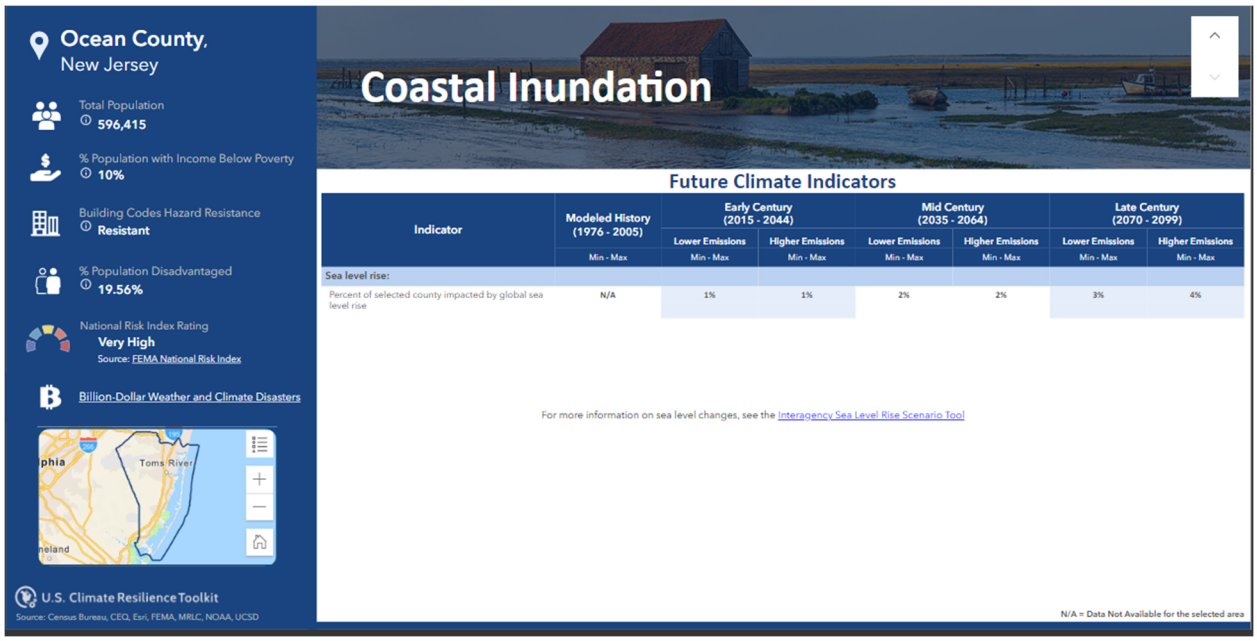


Figure E-6: NOAA Baseline

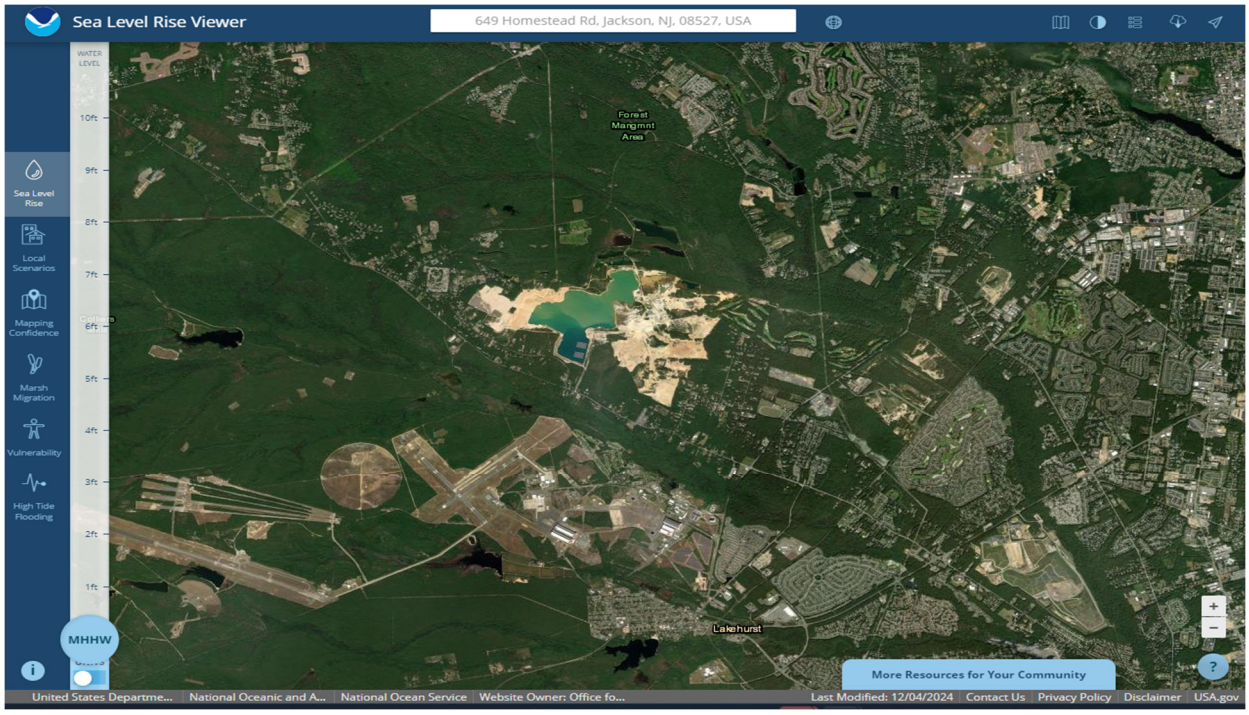


Figure E-7: NOAA 10 Feet