FIFTH FIVE-YEAR REVIEW REPORT FOR JIS LANDFILL SUPERFUND SITE MIDDLESEX COUNTY, NEW JERSEY

Prepared by

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

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November 18, 2024

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Date

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LIST OF ABBREVIATIONS & ACRONYMS

AO	Administrative Order
ARAR	Applicable or Relevant and Appropriate Requirement
BEE	Baseline Ecological Evaluation
CEA	Classification Exemption Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	Contaminant of Concern
EPA	United States Environmental Protection Agency
FYR	Five-Year Review
ICs	Institutional Controls
MNA	Monitored Natural Attenuation
MW	Monitoring Well
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NJDEP	New Jersey Department of Environmental Protection
NJGWQS	New Jersey Groundwater Quality Standards
NPL	National Priorities List
O&M	Operation and Maintenance
OU	Operable unit
PRP	Potentially Responsible Party
RAWP	Remedial Action Work Plan
RAO	Remedial Action Objectives
ROD	Record of Decision
RPM	Remedial Project Manager
SLERA	Screening Level Ecological Risk Assessment
SMP	Site Management Plan
TBC	To be considered
TCE	Trichloroethylene
UU/UE	Unlimited Use and Unrestricted Exposure
VI	Vapor Intrusion
WRA	Well Restriction Area

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 review pursuant to the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) Section 121, consistent with the National Contingency Plan (NCP)(40 CFR Section 300.430(f)(4)(ii)), and considering EPA policy.

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

The Site consists of one operable unit (OU) which will be addressed in this FYR. OU1 addresses groundwater contamination through the capping of the landfill and an active groundwater remedy.

The Site FYR was led by EPA: Ashley Similo (remedial project manager), Damian Duda (supervisor), William Yeung (hydrogeologist), Abbey States (risk assessor), Abigail DeBofsky (ecological risk assessor), and Shereen Kandil (community involvement coordinator). The JIS Performing Parties Group (PRPs or potentially responsible parties) (a.k.a., the JIS Group), comprised of American Standard, Inc., BASF Corporation, Bristol-Meyers Squibb Company, Columbian Chemicals Company, Glenn Springs Holding, Inc., Shell Oil Company, and Textron, Inc., was notified of the initiation of the FYR. The review began on May 2, 2024.

Site Background

The Site covers approximately 24 acres, which includes a 7.8-acre landfill and the former JIS facility and waste transfer operation located on Cranbury South River Road (Route 535) in South Brunswick Township, Middlesex County, New Jersey (See **Appendix A, Figure 1**), as well as a downgradient plume. The Site also includes a stormwater basin and a newly constructed commercial warehouse owned by Bridge Acquisition LLC (Bridge). The north and south sides of the Site adjoin commercial warehouses. Additional agricultural fields, a commercial warehouse, as well as residential areas of Monroe Township and the Borough of Jamesburg, are located downgradient and east of the Site.

Landfilling at the Site began in 1955. The JIS facility accepted a wide variety of chemical, municipal and industrial wastes which allegedly contained hazardous substances. According to the New Jersey Department of Environmental Protection (NJDEP), these wastes included broken battery casings, paint sludges, solvents, pesticide impregnated plastics, oil sludges, and 55-gallon drums. This activity continued until 1976, at which point the disposal of additional chemical and/or hazardous wastes was prohibited. Disposal of other materials continued until 1985, when the landfill was closed.

The Site is situated in the northeastern part of the New Jersey Coastal Plain. Two major aquifers underlie the Site, the Old Bridge Sand Aquifer and the underlying Farrington Sand Aquifer, which are the major sources of potable water in Middlesex County. Groundwater flows in an east-southeasterly direction. Manalapan Brook is a discharge point for shallow groundwater, while the majority of the groundwater continues to flow to the east beneath the Brook.

The Site (including the JIS property and those properties above the primary and secondary plumes) is mostly commercial and agricultural in nature, with some sparse residential population associated mostly with the secondary plume. The area is serviced by a muncipal water supply. Water usage for any new construction within the area above the primary and secondary plumes will be controlled through the NJDEP's Classification Exemption Area (CEA), which is part of the selected remedy of the 2009 Record of Decision (ROD) Amendment and was approved in May 2013. **Appendix B, Table 1** summarizes the documents utilized to prepare this FYR.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: JIS Landfill Site		
EPA ID: NJD97400998		
Region: 2	**State:** NJ	**City/County:** South Brunswick/Middlesex 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): Ashley Similo		
Author affiliation: EPA		
Review period: 5/2/2024-10/10/2024		
Date of site inspection: 07/10/2024		
Type of review: Statutory		
Review number: 5		
Triggering action date: 11/19/2019		
Due date *(five years after triggering action date)*: 11/19/2024		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

Groundwater contamination related to the Site was first detected in 1975. Contaminants of concern (COCs) are migrating away from the JIS Landfill in a "primary" plume and a "secondary" plume. COC concentrations have historically been much higher in the primary plume. The primary plume includes contaminated groundwater which originates beneath the landfill and extends in an easterly direction approximately 5,000 feet to monitoring well MW-20. The secondary plume extends beyond MW-20.

The COCs exist in a relatively narrow band of contaminated groundwater no wider than 1,000 feet in both plumes. The Site COCs for groundwater include antimony, benzene, chromium, 1,2-dichloroethylene, ethylbenzene, lead, methylene chloride, toluene, trichloroethylene (TCE), vinyl chloride and xylenes. The COCs for soils include arsenic, chromium, lead, 1,1,1-trichloroethane, di-n-butylphthalate, phenanthrene, pyrene, bis-2-ethylhexylphthalate, aroclor 1260, 4,4-DDE and 4,4-DDT.

The RI/FS evaluated human health and ecological risks. The human health risk assessment evaluated the following groundwater exposure pathway: ingestion of groundwater by residents and inhalation of volatiles in the groundwater by residents using tapwater. The risk analysis indicated that the combined cancer risk for adults and children is 6.9×10^{-3}, which is above the EPA acceptable risk range. The risk was primarily driven by exposure to benzene.

A Baseline Ecological Evaluation (BEE) and a Screening Level Ecological Risk Assessment (SLERA) were performed at the Site. Both evaluations focused on the downgradient surface water discharge areas associated with the secondary plume. These evaluations concluded that there were no significant ecological effects caused by the plume's discharge to the surface water or wetland areas.

As a result of monitoring performed since the ROD, several of the contaminants, identified as COCs in groundwater during the RI/FS, were determined to no longer pose a health concern, while additional COCs were identified and added to the list. The present accounting of COCs for groundwater for the Site is included in **Appendix B, Table 2** of this document.

Response Actions

From 1980 to 1985, JIS installed a solid waste cap over portions of the landfill. Installation of this cap did not satisfy NJDEP's requirements for Site closure, as the cap did not comply with the conditions specified in a State court order.

EPA used its removal action authority to provide bottled water to homes with impacted groundwater wells from June 1989 until February 1992, when connections to a municipal water system were completed. Since that time the JIS Group has connected additional homes to the municipal water supply system to prevent ingestion of contaminated groundwater from private wells.

EPA issued the ROD for the JIS Landfill on August 15, 1995. The following remedial action objectives (RAOs) were established and identified in the ROD:

Source Control

- Prevent or reduce further migration of contaminants from the landfill into the groundwater.

Groundwater

- Prevent human exposure to contaminated groundwater;
- Prevent further migration of contaminated groundwater off-Site;
- Prevent the migration of contaminated groundwater into the underlying aquifers; and
- Reduce contaminant concentrations in the Old Bridge Aquifer to levels which do not exceed applicable Federal and State water quality standards.

To address these RAOs, the ROD's selected remedy identified a number of remedial actions to mitigate exposures and restore the environment. The major elements of the 1995 remedy are presented below:

- Provide an alternative water supply for residents with contaminated drinking water wells
- Upgrade the existing landfill cap to consist of:
    - 24 inches vegetated topsoil
    - 12 inches soil drainage layer
    - 30-mil textured synthetic material layer
    - 12 inches clay with maximum 1 x 10^{-7} cm/sec permeability
- Extract contaminated groundwater from the primary plume underlying the Site
- Treat the contaminated groundwater in a facility to be constructed on the Site
- Dispose the treated groundwater on the Site by a recharge trench
- Implement a groundwater monitoring program to monitor the primary and secondary plumes, and to ensure the effectiveness and protectiveness of the remedy

Additionally, the 1995 ROD stated NJDEP will place well-use restrictions on new well permits to prevent the installation of new wells in the contaminated portion of the Old Bridge Aquifer, and appropriate land-use restrictions will be required for the landfill.

Several of the components of the 1995-selected remedy were implemented, such as the installation of the upgraded cap in 2000, the provision of alternative water supply to affected residents, and the monitoring program for the primary and secondary plumes. EPA permitted the PRPs to test an alternative technology to the extraction and treatment system selected; the alternative technology consisted of biosparge treatment on or immediately adjacent to the JIS property. Biosparging involves the controlled injection of oxygen (either pure or as a component of air) directly into the groundwater allowing natural microorganisms to biodegrade the organic COCs. The injection of oxygen also causes inorganic compounds (primarily manganese and iron) to precipitate out of solution, thereby reducing the mobility of some inorganic COCs as well. A full scale in-situ biosparge treatment system has been operating for the treatment of the primary plume since 2005. In September 2009, a ROD Amendment was signed which formally replaced the extraction and treatment system selected in the 1995 ROD with the operational biosparge system.

The 1995 ROD's RAOs were updated to specifically address the primary plume in the 2009 ROD Amendment, as follows:

- Prevent unacceptable exposure of human receptors to COCs through ingestion, direct contact or inhalation of COCs in the primary plume of groundwater; and
- Restore the Old Bridge Aquifer to groundwater conditions that are consistent with the contemplated use of the Aquifer within a reasonable period of time.

COCs and Remediation Goals can be found in **Appendix B, Table 2**.

The 2009 ROD Amendment changed the major elements of the selected remedy for the primary plume. The extraction and treatment system selected in the 1995 ROD was superseded by the following remedial actions:

- Continued operation of the biosparge treatment system, consisting of the injection of oxygen/air directly into the groundwater allowing natural microorganisms to biodegrade the COCs by creating an aerobic treatment zone in the near-field portion of the primary plume;
- Monitored natural attenuation (MNA) of the far-field portion of the primary plume;
- A long-term groundwater monitoring program, with both hydraulic and water quality monitoring, to continue to evaluate the effectiveness of remedial actions in restoring groundwater quality;
- Institutional Controls to restrict contaminated groundwater usage, as well as a recommended strategy for addressing the potential for soil vapor intrusion in new construction.

Based upon the monitoring data collected for the secondary plume, the ROD Amendment made no changes to this part of the 1995 ROD.

Status of Implementation

As noted above, connection to the municipal water supply was provided to affected/potentially affected residences. This work was initially performed between 1989 and 1992, before the ROD was signed. Although, in 2003/2004, a few other homes further downgradient of the Site that were threatened by the groundwater contamination were connected to the water supply after the ROD was signed. From August 1999 to June 2000, the JIS Group performed a small-scale biosparging pilot study at the Site to evaluate its potential effectiveness for remediating groundwater contamination at the Site. Design of the 1995 ROD's extraction and treatment remedy moved forward at the same time and was completed in March 2002.

Design of the cap augmentation was completed in early 2000 to upgrade the existing cap to meet New Jersey standards. The main construction effort, including the installation of the perimeter fence, was completed in the fall of 2000. However, the surface water control aspects of the design, including surface water collection and discharge systems, were not fully implemented until late in 2004. In January 2005, the construction effort was certified as complete.

At the request of the JIS Group, implementation of the extraction and treatment design was then delayed to allow for a full-scale biosparge pilot study, as directed in the 2004 Administrative Order

(AO). The biosparge injection system is comprised of 40 well nests located along the eastern, *i.e.*, hydraulically downgradient, boundary of the former JIS Landfill property. The system uniformly distributes oxygen across the width and depth of the primary plume, thereby creating an aerobic treatment zone to facilitate degradation of the COCs in this plume. The full-scale pilot began operation in April 2005. Subsequent monitoring studies showed that COC concentrations in the near-field primary plume were decreasing, and, as a result, the extraction and treatment remedy was changed to the application of full-scale biosparge technology in the 2009 ROD Amendment.

The ROD also indicated that the far-field portion of the primary plume, or the portion of the primary plume located beyond the aerobic treatment zone created by the operation of the biosparge treatment system, as well as the secondary plume, located to the east of the primary plume, approximately 5,000 ft downgradient of the JIS Landfill property and extending towards Manalapan Brook, would be monitored to determine the effectiveness of natural attenuation processes. Since 1998, regular groundwater monitoring events have been performed which provide water quality data on and around the Site, including throughout the primary and secondary plumes. Additional monitoring wells were installed to determine the limits of the secondary plume. Existing data from this monitoring well network suggests that overall concentrations of the most significant COCs have declined in both the far-field portion of the primary plume as well as the secondary plume.

In September 2010, EPA approved the JIS Group's Remedial Action Work Plan (RAWP) for continued O&M of the Site remedies. The RAWP addresses all remaining remedial activities, including O&M of the biosparge treatment facility, groundwater monitoring, and the institutional control measures that were discussed in the ROD and ROD Amendment. The former JIS Landfill property was redeveloped in 2023/2024 to include a 291,000 ft^2 (square feet) commercial/industrial warehouse. An interim soil management plan was approved in April 2023 which was implemented during the warehouse construction. A revised deed notice is anticipated to be filed once construction is complete which will update the engineering controls at the Site to include capped areas, such as the paved asphalt, the concrete building footprint, and landscaped areas. A Site Management Plan (SMP) will also be finalized and attached to the updated deed notice. Well modifications have been reviewed and approved, accordingly, to accommodate Site redevelopment.

All of the remedial actions for the Site have been constructed and implemented, in compliance with the 1995 ROD and the 2009 ROD Amendment. EPA has determined that no further remedial action is necessary other than long-term operation of the biosparge treatment system and monitoring of the groundwater. The JIS Group continues to perform O&M of the biosparge treatment plant and to conduct groundwater monitoring.

IC Summary Table

Table 1: Summary of Planned and/or Implemented ICs

Media, engineered controls, and areas that do not support UU/UE based on current conditions	ICs Needed	ICs Called for in the Decision Documents	Impacted Parcel(s)	IC Objective	Title of IC Instrument Implemented and Date (or planned)
Groundwater	Yes	Yes	JIS Landfill Property and downgradient plume	Restrict contaminated groundwater usage	- Classification Exemption Area and Well Restriction Area (May 2013, updated biennially)
Soil Vapor	Yes	Yes	JIS Property and downgradient plume	A strategy for addressing the potential for soil vapor intrusion in new construction	- Vapor Intrusion Sampling Plan (August 2011) - Letter to local officials (2011, 2017)
Land Use	Yes	Yes	JIS Property	Restrict land use on the property to remain non-residential	- Deed Notice for JIS Property (July 2012, rev. June 2017)

Systems Operations/Operation & Maintenance

The primary activities described in the RAWP include the following:

- Continued operation of the in-situ biosparge treatment system;
- Monitoring the effectiveness of the biosparge treatment system;
- Monitoring the effectiveness of natural attenuation in the far-field primary and secondary plume areas downgradient of the biosparge system;
- Inspection and maintenance of the landfill cap;
- Other on-Site control measures, including implementing deed restrictions, and
- Development of institutional controls to protect property owners on and adjacent to the Site and the Site's groundwater plume until such time as they are no longer needed.

A VI Sampling Plan was also developed and is included in the O&M of the remedy.

Appendix B, Table 3 presents the EPA-approved routine groundwater sampling programs, including the monitoring wells sampled and frequency of sampling. Routine groundwater sampling is grouped into three monitoring programs: 1) semi-annual groundwater monitoring, 2) annual groundwater monitoring, and 3) biennial CEA monitoring. The monitoring wells in the core of the JIS plume (located between wells MW-53 and MP-6R) are sampled semi-annually; the remainder of the wells in the biosparge monitoring network are sampled annually. The samples from the wells that are on the annual cycle are collected in the Spring of each year to coincide with the timing of the biennial sampling of the downgradient plume that is used for the CEA certification.

The monitoring program focuses on tracking VOC concentrations in the groundwater. The key VOCs are benzene, chlorobenzene, 1,4-dichlorobenzene, xylene, and 1,2,4-trichlorobenzene. The most

prevalent VOC at the Site is benzene. Although naturally occurring, arsenic and manganese are also compounds of interest based on historical detections. Pursuant to the NJDEP's July 25, 2019, email request, beginning in 2020, the JIS Group also samples for 1,4-dioxane.

In 2015, EPA approved a change in the frequency with which the monitoring wells were required to be sampled. Further changes to the groundwater monitoring program for the Site during this FYR period were the result of the development of several properties, including the former JIS Landfill property, as well as the KRE and Dallenbach (Lennar) properties located on the east side of Cranbury South River Road. The development changes included the following:

- In October-November 2020, MW-22R and MW-23R well triplets (Shallow (S), Intermediate (I) and Deep (D)) were installed on the Lennar property as a result of the abandonment of wells MW-22 and MW-23 during development of the former Dallenbach property on the east side of Cranbury South River Road.
- The property located to the east of the Site, immediately east of Cranbury South River Road, has been developed by KRE Group, who finished the construction of a warehouse on that property in 2020. The warehouse was built in an area where downgradient groundwater monitoring wells were located. Several wells were abandoned and re-located on this property. As per the EPA-approved Work Plan, KRE wells MW-7S, MW-7I, MW-10I, MW-18S, and MW-18I were re-installed during the first quarter of 2020. The EPA was notified prior to the well abandonment and replacement activities on this property.
- As of 2020, well triplets (S, I and D) MW-47, MW-48, MW-49, MW-49V, MW-67S and MW-67V have been abandoned on the property located on the east side of Cranbury South River Road owned by Kana Retail, affected by the widening of Cranbury-South River Road. The MW-47 and MW-48 triplets will not be replaced. The MW-49 triplet, MW-49V, MW-67S, and MW-67V are anticipated to be replaced after development implementation.

The former JIS Landfill property was sold to Bridge in May 2022. Site redevelopment plans included construction of a 291,000 ft^2 warehouse, expansion and relocation of the stormwater detention basin, as well as grading and asphalt paving across the property. Bridge began Site redevelopment in the second quarter of 2023, and the construction was completed in Summer 2024. Bridge has developed an Interim Soil Management Plan that was followed for site redevelopment activities. EPA and the NJDEP approved the plan on April 21, 2023. The building was leased to THF Publications (Nylabone) for warehousing and distribution on September 1, 2024.

As per the Site redevelopment plans, the following changes to the monitoring well network were made with the approval of EPA.

- From May 9 through June 9, 2023, Bridge's environmental consultant, Roux Associates, Inc. (Roux) oversaw the abandonment of the following nine monitoring wells by Advance Drilling: MW-3, MW-4, MP-6SR, MP-6IR, MP-6D, MW-16, MW-53S, MW-53I, MW-53D. Replacement monitoring well clusters MW-53RR & MP-6RR were installed. All replacement wells were finished to flush-mount wells.
- From May 9 through June 9, 2023, Roux oversaw the raising of the PVC monitoring well riser and stickup steel casing for thirty-eight (38) wells by Advance Drilling. The wells are protected with traffic grade vaults.
- From May 16 through June 7, 2023, Roux oversaw the raising/lowering of the biosparge well risers and all fittings and connections for 120 wells in 40 well vaults by Northstar Environmental

(NSE). The wells were raised or lowered, depending on the final grade of the Site, and were then reattached to the biosparge system. The terminal vault with additional unconnected airlines was demolished. The airlines were all extended, capped and moved five feet northwest to what will be a median in the proposed roadway.

- During the September 20 through 26, 2023 mobilization, it was determined that the following wells needed repairs made to couplings, valves and lines: A-1, A-3, A-5, A-8, A-10, A-11, A-12, A-13, A-14, A-15, A-16, A-17, A-18, A-20, A-22, A-23, A-24, A-25, A-26, A-27, A-29, A-31, A-32, A-34. See Appendix A **Figure 2** for well locations. Repairs were made and documented by NSE over the course of that mobilization.

During quarterly O&M measurements of air flow (in cubic feet per minute [CFM]) at the biosparge wells on October 9, 2023, 21 biosparge wells had a decrease from generally 1 CFM to zero CFM. This change was assumed to correspond with the recent earthwork activities completed as part of Site redevelopment activities. Bridge believed that iron precipitate settled to the bottom of the wells and was pushed into the well screens reducing the ability to deliver air through the well screens to the aquifer. As a result, Roux cleaned the biosparge wells from October 31 through November 16, 2023. Previously, iron precipitate build-up was observed in the biosparge wells, and, in 2012 and 2015, GHD performed maintenance consisting of the following: brushing the inside of the wells and air lifting the water, injection of a biodegradable acid wash, and finally cleaning the well screens to rehabilitate specific wells. This same methodology was applied to clean the 21 biosparge wells that were experiencing buildup. After cleaning, 18 of the 21 wells had the same or greater air flow rates than those established prior to redevelopment activities.

Three of the 21 biosparge wells could not be brought back online. An obstruction was identified in all three A-22 wells at approximately 12.5 feet below the top of casing. The area surrounding the wells was excavated down to 12.5 feet below ground surface (bgs) but no damage was identified to the exterior of the 1" PVC casing that would explain the blockage in the wells. Roux attempted to use a downhole camera to identify the damage to the casing, but the diameter of the camera was too wide to reach the 12.5-bgs depth. It was determined that the reinstallation of the three wells at A-22 was the most viable solution to maintain the long-term integrity of the biosparge system. The preexisting A-22 cluster was disconnected from the biosparge system and abandoned in place in December 2023. The three replacement wells were installed in January 2024.

Sampling for per- and polyfluroalkyl substances (PFAS) has not been performed at this Site. In April 2024, EPA established MCLs for several PFAS compounds such as perfluorooctanoic acid (PFOA) and perfluorooctane sulfonate (PFOS). The Site's historic operations included accepting municipal and industrial waste for landfilling. PFAS is commonly associated with landfills as a result of the variety of wastes disposed in them. PFAS may also be associated with the wastes accepted by the landfill while in operation which included battery casings, paint sludges, solvents, pesticide impregnated plastics, oil sludges, and 55-gallon drums. PFAS should be evaluated in the next FYR period.

The landfill cap is inspected annually and is shown to be in good condition. There are no signs of erosion and the vegetative cover is healthy.

Annual assessments for the potential for vapor intrusion (VI), in accordance with the 2011 "Vapor Intrusion Sampling Plan" at any nearby structures has been conducted at the Site. If groundwater contamination in excess of the vapor-based groundwater screening level is located within 100 ft (non-petroleum hydrocarbons) or 30 ft (petroleum hydrocarbons) of an occupied structure, a VI assessment is

required. The former JIS building previously met the criteria and was subject to VI sampling. However, the JIS building was demolished in 2023. Therefore, the sampling of the indoor and outdoor air within and near the JIS building was discontinued.

As related to groundwater sampling results during the reporting period, the JIS Group requested to collect sub-slab vapor samples from a) the residence/auto body shop located to the southeast of the intersection of Cranbury South River Road and Docks Corner Road, b) the residence on Cranbury South River Road located just north of the property (Kaler Property), and c) at the KRE warehouse located on Docks Corner Road. Permission to perform this sampling has not been provided by any of the respective owners of the properties at any point during the last five years. Consequently, the planned sub-slab sampling has not been performed. However, the KRE warehouse was constructed with a vapor barrier. Residences constructed on the Dallenbach property were also constructed with a vapor barrier and/or a vapor mitigation system, depending on proximity to the groundwater plume. A vapor mitigation system has also been installed beneath the new warehouse constructed by Bridge on the JIS Property. VI samples will be collected from the new warehouse during the upcoming heating season to ensure the system is working properly.

There is a deed restriction on the entire former JIS Landfill property which prevents residential use. The deed restriction is anticipated to be revised post-completion of the redevelopment project to include the current Site conditions and update the engineering controls in place. A SMP is also expected to be prepared and attached to the revised deed restriction.

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

III. PROGRESS SINCE THE LAST REVIEW

Table 3: Protectiveness Determinations/Statements from the 2019 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Protective	The remedy at OU1 is protective of human health and the environment.
Sitewide	Protective	The remedy is protective of human health and the environment.

During the previous FYR, there were no issues that required recommendations and follow-up actions identified. However, the 2019 FYR did identify a concern in the "Other Findings" section which stated:

- "Concentrations of TCE (14,000 µg/L), identified in August 2018, at TWSP-3 outside the capped landfill represent DNAPL concentrations and a potential source area. Although contaminated groundwater is being addressed by the downgradient biosparge treatment system, it is recommended that the JIS Group further investigate this area to determine if possible alternative active remedies (*i.e.*, in-situ) to augment groundwater remediation in this localized area is warranted."

Discussions have been ongoing with the JIS Group regarding the results from the temporary well point TWSP-3 in 2018. Investigations were performed from 2019 to 2023 in response to the elevated TCE concentrations on the JIS property. Historically, TCE concentrations remained below 5 µg/L, but numerous groundwater samples throughout this review period have yielded elevated TCE concentrations as further described under Data Review. Nevertheless, the concentrations identified were orders of magnitude lower than those of the previous review period and TCE at MW-5 in 2022 and 2023 was non-detect. Therefore, it was determined to be likely that a slug of TCE migrated and attenuated along the downgradient plume axis. Furthermore, the sample with significantly elevated TCE from TWSP-3 in 2018 was collected from an undeveloped well which may have been compromised by soil or debris particles. Historically, there has also been no evidence of a deep TCE plume throughout the Site. Additionally, during construction of the warehouse, soil was disturbed and reused on the property while following sampling protocol identified in the interim soil management plan. No soil samples collected during redevelopment activities identified elevated VOC concentrations. Based on this information, no further investigation related to the 2018 detection at TWSP-3 is considered necessary at this time.

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

On August 7, 2024, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at Superfund sites in New York, New Jersey, and Puerto Rico, including the JIS 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 (CIC) for the Site, Shereen Kandil, posted a public notice on the EPA site webpage https://www.epa.gov/superfund/jis-landfill and provided the notice to the Town of South Brunswick by email on October 7, 2024 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 JIS Landfill Superfund site to ensure that the cleanup at the Site continues to be protective of human health and the environment. Once this FYR is completed, the results will be made available at the following repository: U.S. EPA Records Center, 290 Broadway, 18th floor, New York, New York. In addition, the final report will be posted on the following website: https://www.epa.gov/superfund/jis-landfill. Efforts will be made to reach out to local public officials to inform them of the results.

No interviews were conducted during the FYR process.

Data Review

Figure 1 shows the location of the JIS Landfill, monitoring wells, and an aerial view of the contaminant plume based on most recent sampling events in all three aquifer intervals. The contaminant plume from the JIS Landfill is primarily composed of benzene and is limited to a relatively narrow band emanating from the landfill, towards the area of MW-5 and moving downgradient between on-property wells MW-53 and MP-6. The biosparge injection system is located immediately downgradient of MW-53 and MP-6 and it provides treatment of the groundwater before it migrates further downgradient beyond the property boundary.

Contaminant concentrations in groundwater have been regularly monitored since the ROD was issued in 1995. In general, both contaminant concentrations and extent of the plume have continued to decrease during the past five years, as they have since the closure of the landfill and installation of the modified RCRA cap in 2000. In accordance with a 2009 ROD Amendment and 2010 approved RAWP, a biosparge system and monitoring program was implemented. In addition, there is a biennial groundwater monitoring program that consists of the collection and analysis of groundwater samples from wells in the JIS plume downgradient of the Site to delineate the extent of the plume and to inform the extent of the CEA. The groundwater samples collected for the biennial plume program are analyzed for VOCs, 1,4-dioxane, arsenic, and manganese.

Metals Results

Arsenic levels in the shallow, intermediate and deep groundwater samples have occasional detections exceeding MCLs/NJGWQSs; however, there is some uncertainty as to whether the source is Site-related or due to the natural occurrence of this mineral in the soils in the region. The biosparging (oxygen enhancement) treatment of groundwater from the Site also reduces the arsenic levels. Manganese concentrations in groundwater also exceed the secondary MCLs and NJGWQS but are at levels that do not present a risk to human health. Sampling of wells for both arsenic and manganese will continue in accordance with the monitoring plan.

VOC Results

Sampling events throughout this review period have shown sporadic increases in benzene concentrations at MW-5. The benzene detections in excess of its NJGWQS of 1 microgram per liter (µg/L) in the shallow aquifer were limited to the JIS Landfill source area and primary plume. The highest benzene concentration of 8,600 µg/L was detected at MW-5 during the November 2021 sampling event, but concentrations in the plume rapidly decreased to 4.2 µg/L at MW-7, located approximately 200 feet downgradient of the property boundary and biosparge system as shown on **Figure 1**. As the JIS plume migrates downgradient from the landfill, it also attenuates and migrates vertically toward the bottom of the aquifer which is on the order of 100 feet bgs.

In 2018, an effort was made to determine if additional source material was present outside the cap. Soil borings and temporary monitoring wells were installed in the vicinity of MW-5, based on the sporadic increases in benzene observed in this well, and several soil and groundwater samples were collected and analyzed. The results of the investigation indicate that there is not additional source material near MW-5, but rather the sporadic spikes of contamination could be attributed to variable groundwater flow paths from the upgradient landfill source. Benzene concentrations at MW-5 continue to be monitored on a semi-annual basis.

As discussed in Other Findings above, during this investigation at MW-5, TCE was detected outside of the capped landfill at temporary well TWSP-3 at a concentration of 14,000 µg/L which represents possible DNAPL concentrations. Though the groundwater migrating from MW-5 is being treated by the biosparge system, the location itself is outside of the landfill cap. Therefore, the previous FYR suggested this area should be further investigated. Investigations were performed from 2019 to 2023 in response to elevated concentrations of TCE on the JIS property. Historically, TCE concentrations remained below 5 µg/L, but numerous groundwater samples throughout this review period have yielded elevated TCE concentrations. Examples of these include monitoring wells located in the vicinity of the biosparge air injection wells; MW-53IRR with a concentration of

68 µg/L for the December 2023 sampling event, MW-45I with a concentration of 59 µg/L for the December 2023 sampling event, and MW-42S with a concentration of 48 µg/L for the November 2022 sampling event. The results of the sampling and investigation yielded concentrations that were orders of magnitude lower than those of the previous review period. The conclusion was that a slug of TCE migrated and attenuated along the downgradient plume axis. Sampling events conducted in 2022 and 2023 for MW-5 have shown non-detect concentrations. Meanwhile, TCE concentrations continue to be monitored and contaminated groundwater migrating downgradient from the landfill area is being treated by the biosparge system.

Both the intermediate and deep aquifer zones have a primary plume of VOCs above NJGWQS on the JIS property, and two secondary plumes beginning 2,500 feet downgradient, as shown on **Figure 1**. The highest benzene concentrations in both zones during this review period are located on the JIS property at MW-70I in the intermediate zone (150 µg/L) during the September 2019 sampling event and MW-6DR in the deep zone (450 µg/L) during the May 2022 sampling event. Downgradient of the property, concentrations of VOCs in both zones include TCE (maximum concentration of 7.2 µg/L at deep well MW-22DR in May 2023) and benzene (maximum concentration of 13 µg/L at deep well MW-30D in May 2023) which slightly exceed their NJGWQS of 1 µg/L each. With few exceptions, the biosparge system has been effectively treating the contaminant plume emanating from the landfill and preventing further migration offsite; the downgradient plume extent continues to decrease in both size and concentration as shown on the biosparge trends in **Figure 3**. Groundwater will continue to be monitored, and it is expected that concentrations of VOCs will continue to decline as a result of continued operation of the biosparging system.

1,4-Dioxane Results

1,4-Dioxane has been sampled for in a limited number of vapor points most recently throughout the review period. There were no detections in the vapor samples for 1,4-dioxane during the sampling events for this review period.

Groundwater samples for 1,4-dioxane have been collected throughout the site. Concentrations in MW-5, the MP-6 well cluster, MW-7SR, MW-10IR, MW-18SR, the MW-20 well cluster, the MW-21 well cluster, MW-22I, MW-22IR, MW-22DR, MW-23D, MW-23DR, MW-25D, the MW-30 well cluster, MW-32I, MW-42S, MW-43S, MW-44S, MW-45I, MW-45D, MW-50S, MW-50I, MW-51I, MW-52I, MW-53S, MW-53SRR, MW-60D, the MW-68 well cluster, the MW-69 well cluster, and the MW-70 well cluster have exceeded the NJGWQS (0.4 µg/L) for 1,4-dioxane when sampled. Of these wells, MW-5, the MP-6 well cluster, MW-43S, MW-44S, MW-45D, MW-50S and MW-501 were sampled regularly through this review period. The remaining wells were sampled intermittently.

Although elevated, the detected concentrations have remained stable throughout this review period, and the most elevated concentrations were identified on the JIS property. The highest concentration detected was 58 µg/L at MW-50I in April 2020. During the most recent sampling events in 2023, the highest result upgradient of the biosparge system was 28 µg/L in MP-6SR within the shallow zone. The intermediate and deep zone wells upgradient of the biosparge system also contained slightly less, but comparable, concentrations of 1,4-dioxane. Overall, the concentrations of 1,4-dioxane in monitoring wells downgradient of the biosparge system have had lower concentrations than the monitoring wells located on-site, with occasional fluctuations. Therefore, the biosparge system appears to be effective in reducing the concentration of 1,4-dioxane and monitoring in both the upgradient and downgradient

monitoring wells will continue to ensure concentrations continue to decline.

Site Inspection

The inspection of the Site was conducted on July 10, 2024. In attendance were Ashley Similo and William Yeung (EPA), Ashish Joshi (NJDEP), Steve Pozza (Bridge), Haley Kmetz and Peter Downham (Roux), Samantha Southall (PRP Group Counsel), Ian Richardson (PRP Group Technical Coordinator), John Garges and Matt Alfonse (GHD), Rose Wilson and Nicole Sullivan (BASF), and Teresa Jordan and Abhi Acharya (GSH). The purpose of the inspection was to assess the protectiveness of the remedy, as well as tour the Site. No issues were observed during the Site inspection. The Site's engineering control, a chain link fence, protects the landfill and is in apparent good repair. The landfill cap was observed to be in good condition. The biosparge treatment facility appeared to be well-maintained, in sound structural condition, and operational, with the exception of twelve biosparge wells which were affected by the warehouse construction. Subsequent to the Site inspection, on August 21-22, 2024, the twelve biosparge wells were redeveloped, as well as clearing obstructions from four monitoring wells. The materials handling operations previously occurring at the property have ceased. A 291,000 ft^2 commercial warehouse has been constructed on the property, along with a newly constructed stormwater detention basin. Much of the property outside of the landfill has been paved with asphalt. A commercial warehouse has also been constructed adjacent to the site on the KRE property in the area of the downgradient plume.

V. TECHNICAL ASSESSMENT

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

The remedy is functioning as intended by the ROD and ROD amendment. The source control remedy selected in the 1995 ROD consisted of upgrading the existing landfill cap, an extraction and treatment system to remediate the portion of the groundwater plume closer to the landfill and monitored natural attenuation for the secondary plume. The 2009 ROD amendment formally replaced the extraction and treatment system selected in the 1995 ROD with the in-situ biosparge system operating at the Site.

The biosparge treatment system, in combination with monitoring and natural attenuation, is expected to restore the groundwater to federal and state standards. The remedy continues to prevent direct contact with the contaminated groundwater and soils and inhibit the spread of contamination throughout the groundwater. All groundwater sampling points downgradient of the biosparge injection points with COCs above MCLs display a general decreasing trend during the FYR period. All samples containing the maximum COCs measured during the FYR period were collected upgradient of the treatment system. The contaminants of concern in groundwater and respective cleanup goals are shown in **Appendix B, Table 2**.

Based on the review of the recent groundwater monitoring data, the only exceedances in the shallow groundwater are within 200 feet of the Site. The shallow groundwater discharges into the Manalapan Brook which is approximately two miles east of the Site. Historic data shows that the surface water was not impacted. Therefore, the remedy is functioning as intended for ecological purposes.

Institutional controls restricting future use of the Site were implemented in 2013 in the form of a CEA/Well Restriction Area (WRA) filed with the Middlesex County Registry which will be biannually certified by NJDEP. The September 2010 RAWP outlines institutional controls in place to ensure sufficient notification of future property owners within the shallow groundwater plume to address the potential for vapors to impact new homes constructed over the plume. Following the Site's VI Sampling Plan, the potential for VI at structures located within 100 ft of shallow groundwater contamination exceeding NJGSWLs is assessed annually. Also, in letters dated May 22, 2017 and June 8, 2017, EPA notified the township of potential VI concerns for any structures to be built above or near the plume. The letter recommended that future structures located in the area of groundwater contamination be built with a vapor barrier or VI mitigation system. Additionally, a revised site-wide Deed Notice was placed on the entire JIS Landfill Property in 2017. An interim soil management plan was finalized on April 21, 2023 and followed throughout the construction of the commercial warehouse. The deed notice is expected to be revised based on the final construction plans of the commercial warehouse located on the property. The new deed notice will update the engineering controls at the Site to include areas of the property capped with asphalt, the concrete building footprint, and landscaped areas; however, the existing deed notice maintains land use restrictions consistent with current and anticipated site use. A SMP will also be finalized and attached to the deed notice.

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

There are no changes in the physical conditions of the Site or Site uses that would affect the protectiveness of the selected remedy. The land use considerations and potential exposure pathways considered in the baseline human health risk assessment are still valid. The exposure assumptions and the toxicity values that were used during the risk assessments to support the 1995 ROD and 2009 ROD Amendment followed EPA guidance at the time and are still valid. Although specific parameters and toxicity values may have changed since that time, the risk assessment process that was used is still consistent with current practice and the need to implement a remedial action remains valid.

The RAOs of preventing human exposure to contaminated groundwater, preventing contaminant migration, and reducing contaminant concentrations in the Old Bridge Aquifer to below applicable federal and state standards remain valid. Several VOCs in groundwater, as well as arsenic and manganese, exceed NJGWQS both in the source area and downgradient of the treatment system. Since there are no drinking water wells in the contaminated area, there is no human exposure. A Deed Notice and CEA/WRA are currently in place to restrict future use of site groundwater. However, sampling for PFAS has not been performed at this site. While operating, the landfill accepted waste from a variety of municipal and industrial entities which may be associated with these contaminants. The site's historic operations included accepting municipal and industrial waste for landfilling. PFAS is commonly associated with landfills due to the variety of wastes disposed in them. PFAS specifically has been linked to a variety of potential sources including various types of battery production, paints, industrial solvents, pesticides, plastics among many others which are associated with the wastes accepted by the landfill while in operation.[1] Since EPA promulgated

[1] L. Gaines. "Historical and current usage of per- and polyfluoroalkyl substances (PFAS): A literature review", *American Journal of Industrial Medicine*.

PFAS MCLs in early 2024 and the Site groundwater has not been sampled for them, it is recommended that PFAS compounds be added to the analyte list for future rounds of sampling.

The indirect exposure pathway of migration of vapors from contaminated groundwater could not be assessed because access for VI sampling was requested for the three properties adjacent to the JIS property during the review period, but the property owners were not responsive. Shallow groundwater samples taken from the JIS property during this FYR period continue to exceed residential VI screening levels (VISLs) set at a cancer risk of 10^{-4} and hazard of 1 for benzene, chlorobenzene, TCE, 1,1,2,2-tetrachloroethane and 1,2-dichloropropane. VOC exceedances were also detected in shallow groundwater immediately downgradient of the JIS property and source area at MW-7SR. One of the three properties, the KRE warehouse, was constructed in 2020 using a vapor barrier to meet township requirements; however, no confirmation sampling has been conducted. Access should continue to be attempted for the neighboring properties during the next FYR period. Additionally, due to the proximity to groundwater contamination and the EPA's recommendation to the town regarding VI and newly built structures, the new warehouse constructed on the JIS property in 2024 contains a VI system. VI sampling will be performed during the upcoming heating season to confirm that this system is working as intended.

As noted in previous FYRs, contamination gets deeper as it travels further downgradient; therefore, VI is not a concern over the secondary plume as vapors are not expected to migrate through clean water and into nearby homes. A residential development was constructed during the FYR period adjacent to the lateral area of the plume and vapor mitigation measures were incorporated into all building designs to ensure protectiveness in accordance with the Monroe Township Planning Board Resolution PB#1184-16 which states "Passive vapor systems shall be installed per specifications in the NJDEP VI Technical Guidance. In order to meet the specifications in the NJDEP VITG, applicant shall upgrade the 6-mil vapor barrier to a 40 mil HDPE vapor barrier in all homes within 100' of the groundwater contamination plume. The vapor barriers shall be installed so that any penetrations, such as utility penetrations and sumps, are sealed. In addition, the barrier should be adequately sealed to the building foundation. Within this group of homes, Lennar shall also install perforated piping beneath each concrete slab that connects to the vent pipes, to better facilitate venting beneath the slab." Groundwater, particularly the shallow interval near the landfill source area, must continue to be carefully monitored to ensure that contamination in the shallow groundwater is not posing a VI concern.

Although the ecological risk assessment screening and toxicity values used to support the 1995 ROD may not necessarily reflect the current values, the landfill cap eliminates any potential risk from surface soil contaminants to terrestrial receptors. As noted in the ROD and ROD Amendment, sediment and surface water samples collected from the Manalapan Brook did not contain any measurable contamination. Additionally, a SLERA was conducted in 2009 for downgradient surface water discharge areas associated with the secondary plume. The SLERA concluded that there are no significant ecological effects in these discharge areas. Consequently, the exposure assumptions remain appropriate and thus the remedy remains protective of ecological resources.

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

Based on the evaluation of the potential human exposures at the site there is no further information that could call into question the protectiveness of this remedy.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations				
Issues and Recommendations Identified in the Five-Year Review:				
OU(s): 1	**Issue Category: Monitoring**			
	Issue: EPA promulgated PFAS MCLs in early 2024 and the Site groundwater has never been sampled for them. Historic use of the site indicates waste disposed at the landfill may have contained PFAS material.			
	Recommendation: Add PFAS compounds to the analyte list for future rounds of groundwater sampling.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA	3/30/2025

OTHER FINDINGS

Access for VI sampling has been requested for three properties adjacent to the JIS annually, but the property owners have not been responsive. One of the properties includes the KRE warehouse, which was constructed with a vapor barrier in 2020 to meet township requirements. However, confirmation sampling was not performed. Since shallow groundwater samples taken from the JIS property during this FYR period continue to exceed residential VISLs set at a cancer risk of 10^{-4} and hazard quotient of 1 for benzene, chlorobenzene, TCE, 1,1,2,2-tetrachloroethane and 1,2-dichloropropane, efforts to obtain access for sampling should be continued. The new warehouse on the JIS property, which was constructed with a vapor mitigation system in 2024, will also be sampled during the upcoming heating season to ensure the system is working as intended.

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: 1	*Protectiveness Determination:* Short-Term Protective
Protectiveness Statement: The remedy at OU1 is protective of human health and the environment in the short term because the biosparge system continues to operate as intended for the site COCs, ICs are in place, and there is no exposure to groundwater. To be protective in the long-term, sampling for PFAS in groundwater needs to be performed.	

Sitewide Protectiveness Statement
Protectiveness Determination: Short-Term Protective
Protectiveness Statement: The remedy is protective of human health and the environment in the short term because the biosparge system continues to operate as intended for the site COCs, ICs are in place, and there is no exposure to groundwater. To be protective in the long-term, sampling for PFAS in groundwater needs to be performed.

VIII. NEXT REVIEW

The next FYR report for the JIS Landfill Superfund site is required five years from the completion date of this review.

APPENDIX A - FIGURES

Figure 1

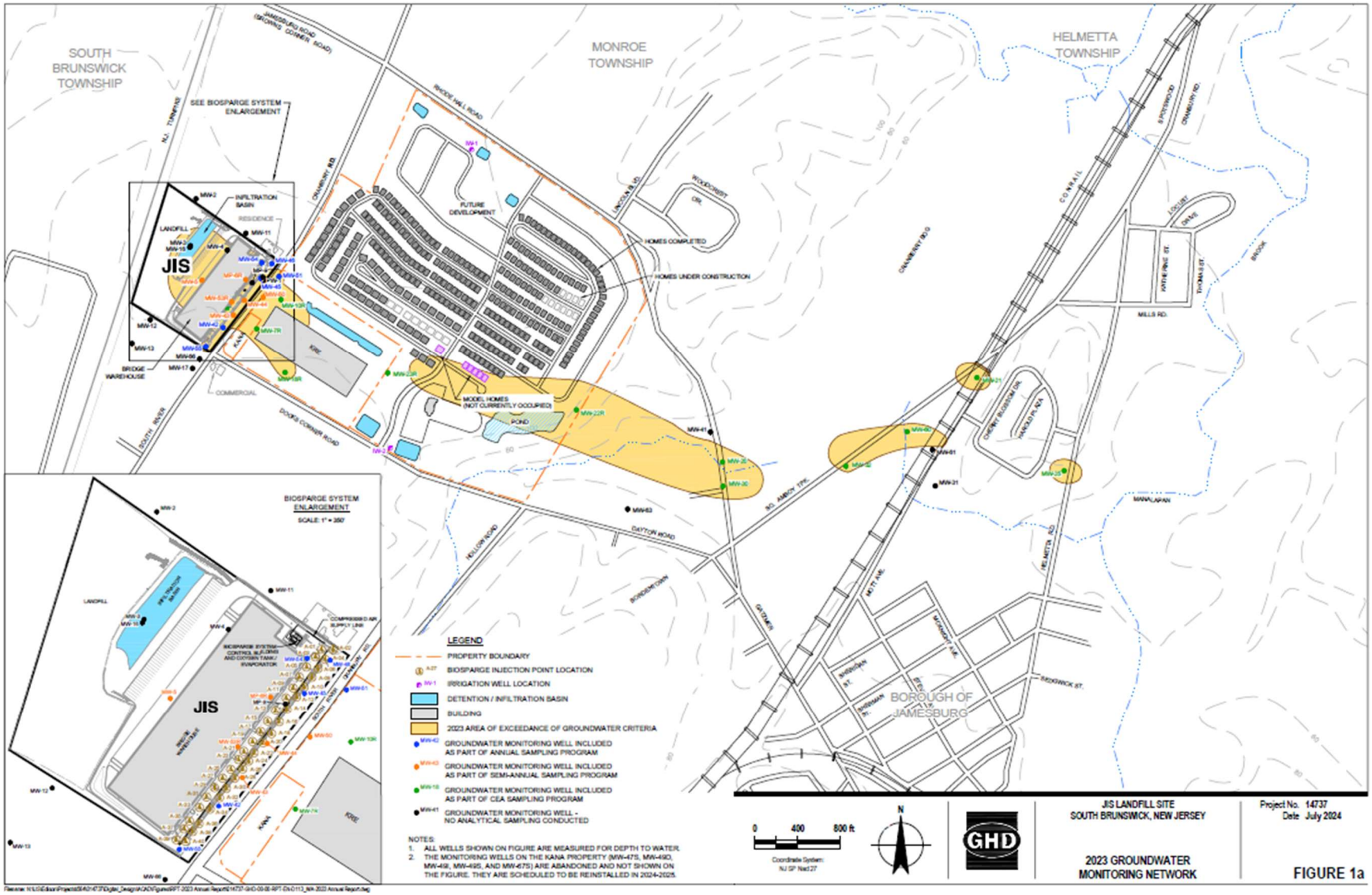

SOUTH BRUNSWICK TOWNSHIP
MONROE TOWNSHIP
HELMETTA TOWNSHIP
BOROUGH OF JAMESBURG
JIS
SEE BIOSPARGE SYSTEM ENLARGEMENT
FUTURE DEVELOPMENT
HOMES COMPLETED
HOMES UNDER CONSTRUCTION
MODEL HOMES (NOT CURRENTLY OCCUPIED)
POND
BIOSPARGE SYSTEM ENLARGEMENT
SCALE: 1" = 350'
LEGEND
PROPERTY BOUNDARY
BIOSPARGE INJECTION POINT LOCATION
IRRIGATION WELL LOCATION
DETENTION / INFILTRATION BASIN
BUILDING
2023 AREA OF EXCEEDANCE OF GROUNDWATER CRITERIA
GROUNDWATER MONITORING WELL INCLUDED AS PART OF ANNUAL SAMPLING PROGRAM
GROUNDWATER MONITORING WELL INCLUDED AS PART OF SEMI-ANNUAL SAMPLING PROGRAM
GROUNDWATER MONITORING WELL INCLUDED AS PART OF CEA SAMPLING PROGRAM
GROUNDWATER MONITORING WELL - NO ANALYTICAL SAMPLING CONDUCTED
NOTES:
1. ALL WELLS SHOWN ON FIGURE ARE MEASURED FOR DEPTH TO WATER.
2. THE MONITORING WELLS ON THE KANA PROPERTY (MW-47S, MW-49D, MW-49I, MW-49S, AND MW-67S) ARE ABANDONED AND NOT SHOWN ON THE FIGURE. THEY ARE SCHEDULED TO BE REINSTALLED IN 2024-2025.
0 400 800 ft
Coordinate System: NJ SP Nad27
N
GHD
JIS LANDFILL SITE
SOUTH BRUNSWICK, NEW JERSEY
2023 GROUNDWATER MONITORING NETWORK
Project No. 14737
Date July 2024
FIGURE 1a

Figure 2

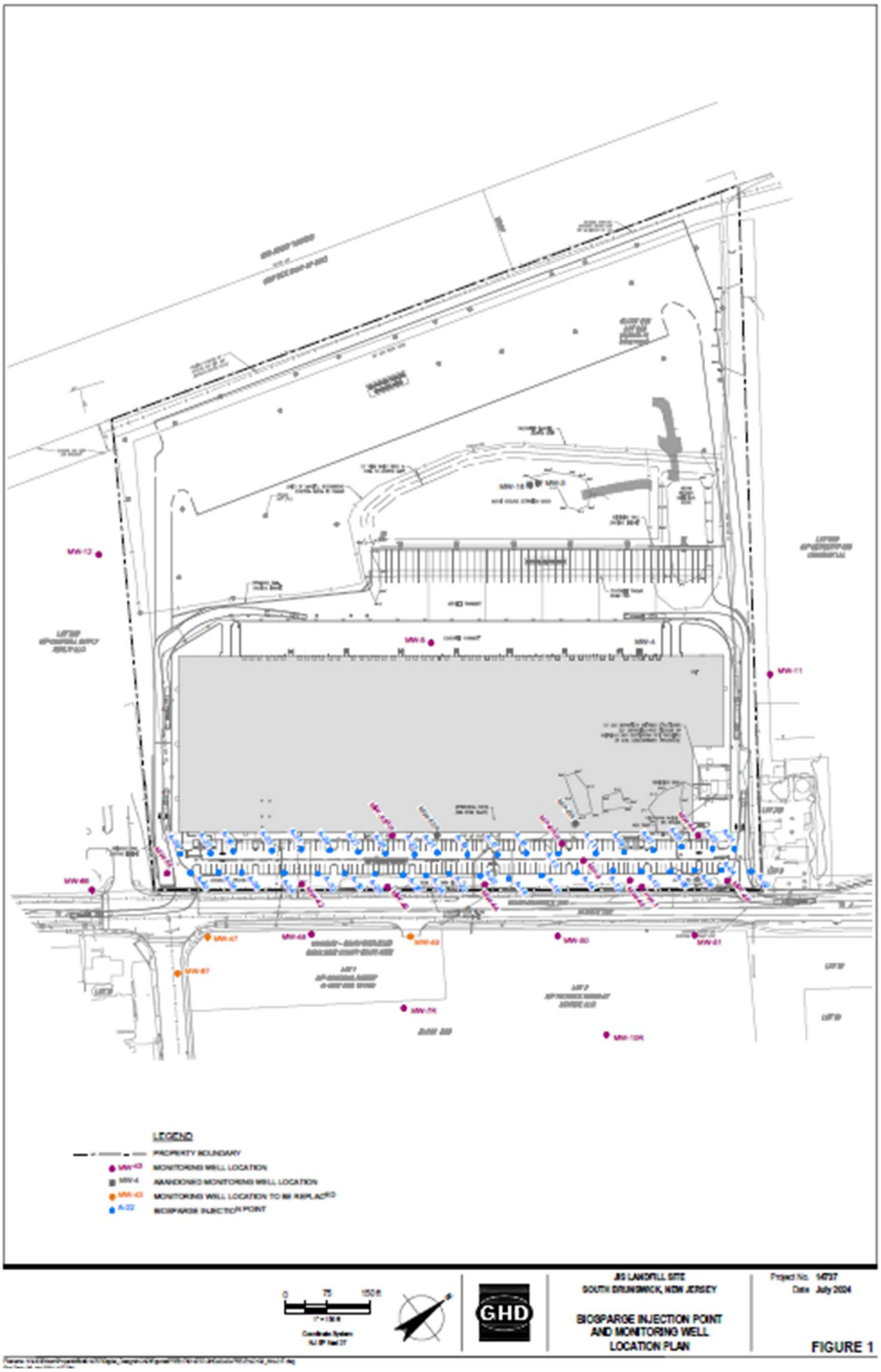
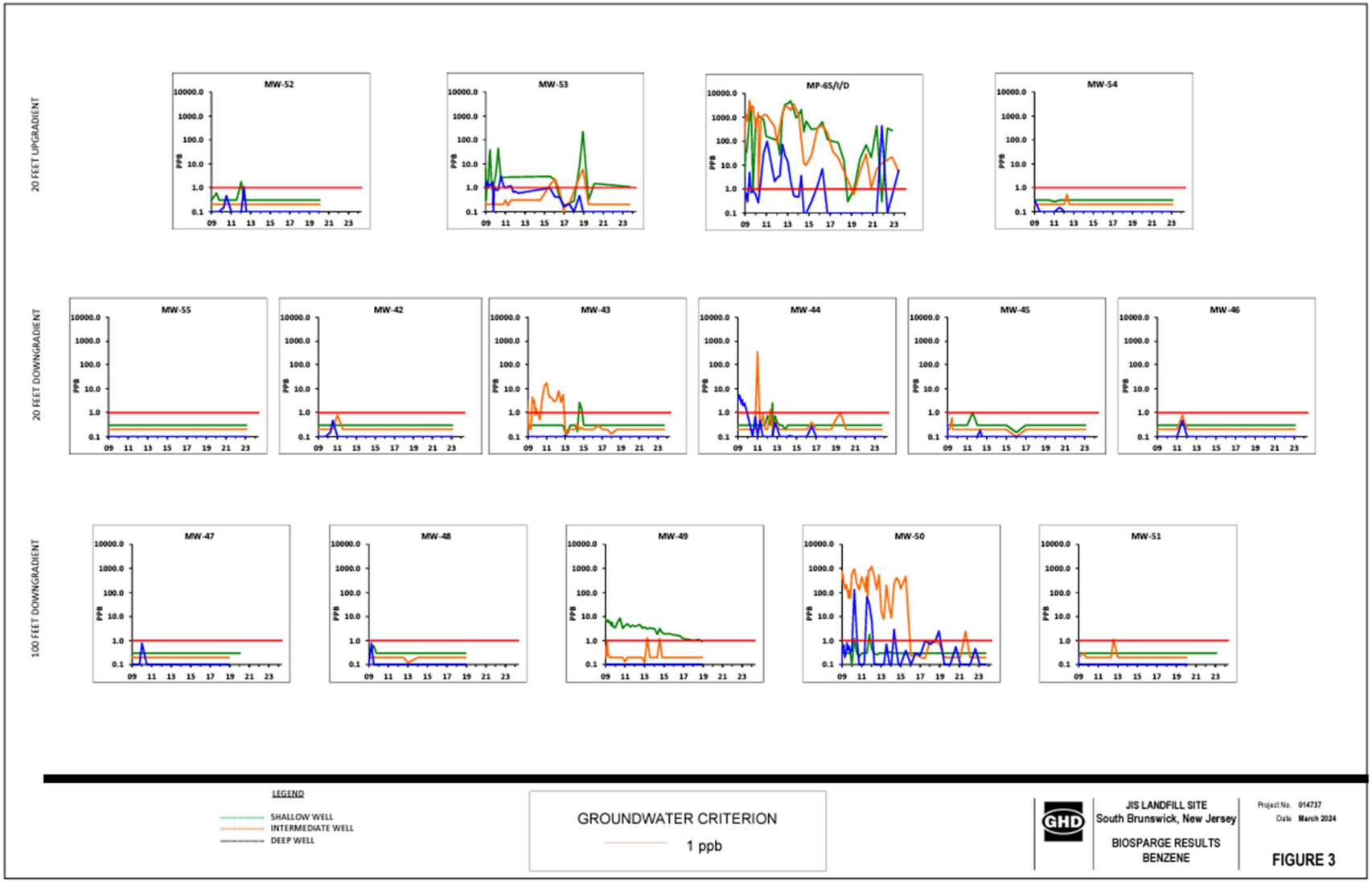

LEGEND
PROPERTY BOUNDARY
MONITORING WELL LOCATION
ABANDONED MONITORING WELL LOCATION
MONITORING WELL LOCATION TO BE REPLACED
BIOSPARGE INJECTION POINT
0
75
150 ft
GHD
JIS LANDFILL SITE
SOUTH BRUNSWICK, NEW JERSEY
BIOSPARGE INJECTION POINT AND MONITORING WELL LOCATION PLAN
Project No. 14737
Date July 2024
FIGURE 1

Figure 3


20 FEET UPGRADIENT
MW-52
MW-53
MP-6S/I/D
MW-54
20 FEET DOWNGRADIENT
MW-55
MW-42
MW-43
MW-44
MW-45
MW-46
100 FEET DOWNGRADIENT
MW-47
MW-48
MW-49
MW-50
MW-51
PPB
10000.0
1000.0
100.0
10.0
1.0
0.1
09 11 13 15 17 19 21 23
LEGEND
SHALLOW WELL
INTERMEDIATE WELL
DEEP WELL
GROUNDWATER CRITERION
1 ppb
GHD
JIS LANDFILL SITE
South Brunswick, New Jersey
BIOSPARGE RESULTS
BENZENE
Project No. 014737
Date March 2024
FIGURE 3

APPENDIX B - TABLES

Table 1
Reference List

Administrative Consent Order with NJDEP	June 1987
Administrative Order of Consent addenda	December 1989, October 1991, June 1997
Remedial Investigation / Risk Assessment for the JIS Landfill	July 1992
Record of Decision for the JIS Landfill	August 1995
Landfill Cap Design and the Operation and Maintenance Plan	September 1999
Detailed Report	November 2000
Administrative Consent Order	August 2004
Chemical Concentration Trends Report	May 2005
Remedial Investigation Addendum, Secondary Plume Area	July 2009
Record of Decision Amendment	September 2009
Preliminary Close Out Report	September 2009
Remedial Action Work Plan	September 2010
Unilateral Administrative Order	September 2010
Annual reports from GHD	2019-2023
Annual Vapor Intrusion Reports	2019-2023
Results of Landfill Liner and MW-5 Soil Boring Investigations Memo	October 2018
JIS Landfill Superfund Site previous FYR	2019

Table 2
COC's and Remediation Goals

Parameter	Groundwater Criteria[1] (ppb)
Volatile Organic Compounds	
1,3-dichlorobenzene	600
1,1-dichloroethane	50
1,2-dichlorobenzene	600
1,1,1-trichloroethane	30
4-methyl-2-pentanone	100
1,1-dichloroethene	1
Ethylbenzene	700
Acetone	6,000
1,4-dichlorobenzene	75
Vinyl chloride	1
Trans-1,2-dichloroethene	100
Chloroform	70
1,2-dichloroethane	2
Xylene (total)	1,000
1,1,2,2-tetrachloroethane	1
Cis-1,2-dichloroethene	70
1,2-dichloropropane	1
Tetrachloroethene	1
Methylene chloride	3
Toluene	600
Chlorobenzene	50
Trichloroethene	1
Benzene	1
Semi-Volatile Organic Compounds	
Nitrobenzene	6
1,2,4-trichlorobenzene	9
Metals	
Barium	2,000
Barium, dissolved	200
Chromium, dissolved	70
Copper	1,300
Copper, dissolved	1,300
Nickel	100
Nickel, dissolved	100
Zinc	2,000
Zinc, dissolved	2,000
Antimony, dissolved	6

Chromium (total)	70
Lead, dissolved	5
Antimony	6
Cadmium, dissolved	4
Cadmium	4
Lead	5
Arsenic, dissolved	3
Arsenic	3
Manganese, dissolved	50
Manganese	50

[1] Groundwater cleanup criteria is the lower value of the NJGWQS or USEPA MCL.

Table 3
Groundwater Monitoring Network

Biannual Biosparge Monitoring	Biennial CEA	Annual Monitoring
MW-5	MW-7IR	MW-5
MP-6DRR	MW-7SR	MP-6DRR
MP-6IRR	MW-10IR	MP-6IRR
MP-6SRR	MW-18IR	MP-6SRR
MW-43D	MW-18SR	MW-42D
MW-43I	MW-21D	MW-42I
MW-43S	MW-21I	MW-42S
MW-44D	MW-22DR	MW-43D
MW-44I	MW-22IR	MW-43I
MW-44S	MW-22SR	MW-43S
MW-50D	MW-23DR	MW-44D
MW-50I	MW-23IR	MW-44I
MW-50S	MW-23SR	MW-44S
	MW-25D	MW-45D
	MW-25I	MW-45I
	MW-30D	MW-45S
	MW-30I	MW-46D
	MW-32D	MW-46I
	MW-32I	MW-46S
	MW-60D	MW-50D
	MW-20I	MW-50I
	MW-20D	MW-50S
		MW-51S
		MW-53DRR
		MW-53IRR
		MW-53SR
		MW-54D
		MW-54I
		MW-54S
		MW-55D
		MW-55I
		MW-55S

APPENDIX C
Climate Change Analysis

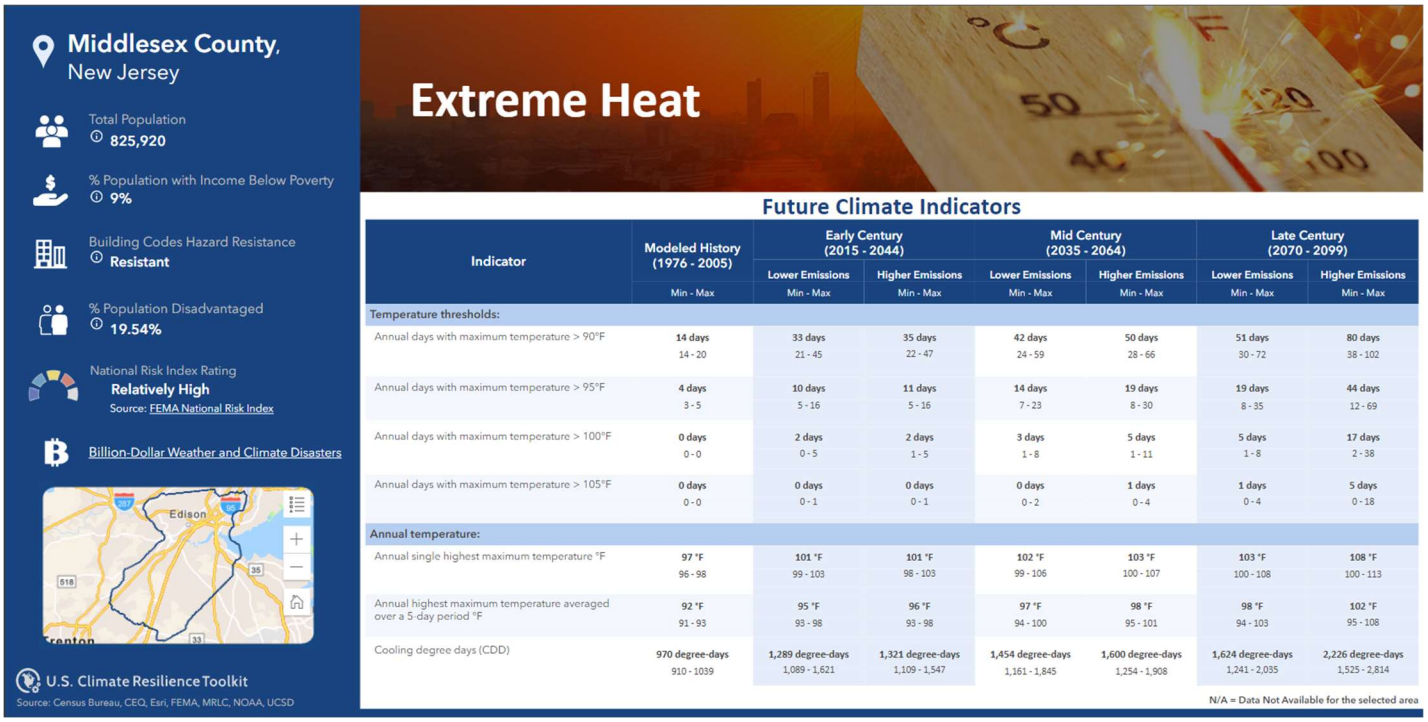
In accordance with Region 2 practice, three climate change tools were utilized to assess the JIS Landfill Site. Screenshots from each of the tools assessed are shown below.

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. According to this tool, the National Risk Index Rating for extreme heat is "Relatively High." There is a projected increase of days per year with maximum temperatures >100°F, as shown in Figure C-1. However, increases in heat are not anticipated to impact the landfill cap or air sparge system in the near future. Two other climate hazards evaluated by this tool – drought and flooding, have a National Risk Index Rating of "Relatively Low." Figures C-2 and C-3 show a slight increase in average annual total precipitation and a decrease in days per year with precipitation. Figure C-4 shows a "Relatively High" national risk index rating for flooding potential with an increase in annual days with precipitation over one inch. Flooding has not historically impacted the site or components of the remedy. As shown in Figure C-5, the percent of the county impacted by global sea level rise is 2% through the late century.

The second tool utilized is called Sea Level Rise. South Brunswick, New Jersey is not at risk of severe flooding due to sea level rise or high tide flooding and is not considered to be socially vulnerable (Figure C-6).

The final tool utilized is called the USGS U.S. Landslide Inventory. As shown by Figure C-7, there have been no landslides recorded in the vicinity of the site.

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.



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 - 20	33 days 21 - 45	35 days 22 - 47	42 days 24 - 59	50 days 28 - 66	51 days 30 - 72	80 days 38 - 102
Annual days with maximum temperature > 95°F	4 days 3 - 5	10 days 5 - 16	11 days 5 - 16	14 days 7 - 23	19 days 8 - 30	19 days 8 - 35	44 days 12 - 69
Annual days with maximum temperature > 100°F	0 days 0 - 0	2 days 0 - 5	2 days 1 - 5	3 days 1 - 8	5 days 1 - 11	5 days 1 - 8	17 days 2 - 38
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 - 4	1 days 0 - 4	5 days 0 - 18
Annual temperature:							
Annual single highest maximum temperature °F	97 °F 96 - 98	101 °F 99 - 103	101 °F 98 - 103	102 °F 99 - 106	103 °F 100 - 107	103 °F 100 - 108	108 °F 100 - 113
Annual highest maximum temperature averaged over a 5-day period °F	92 °F 91 - 93	95 °F 93 - 98	96 °F 93 - 98	97 °F 94 - 100	98 °F 95 - 101	98 °F 94 - 103	102 °F 95 - 108
Cooling degree days (CDD)	970 degree-days 910 - 1039	1,289 degree-days 1,089 - 1,621	1,321 degree-days 1,109 - 1,547	1,454 degree-days 1,161 - 1,845	1,600 degree-days 1,254 - 1,908	1,624 degree-days 1,241 - 2,035	2,226 degree-days 1,525 - 2,814

Figure C-1

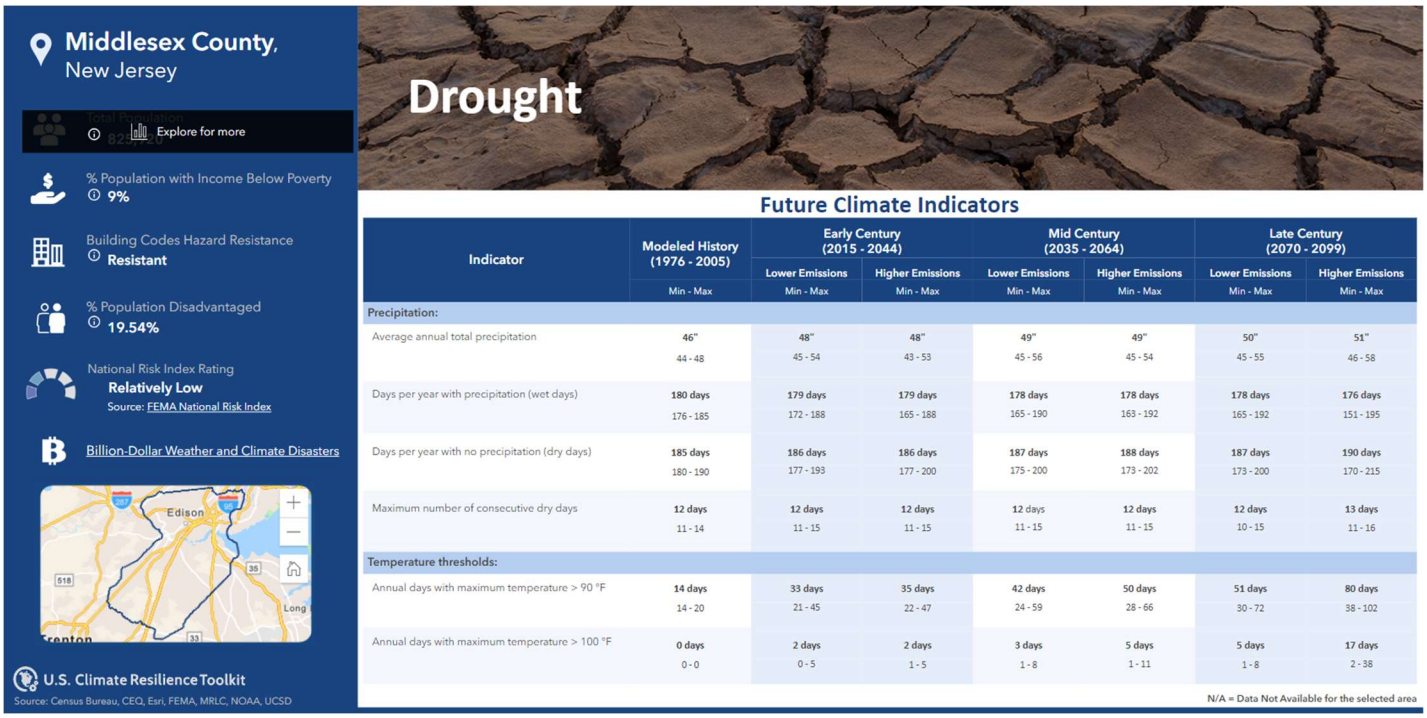


Figure C-2

Figure C-3

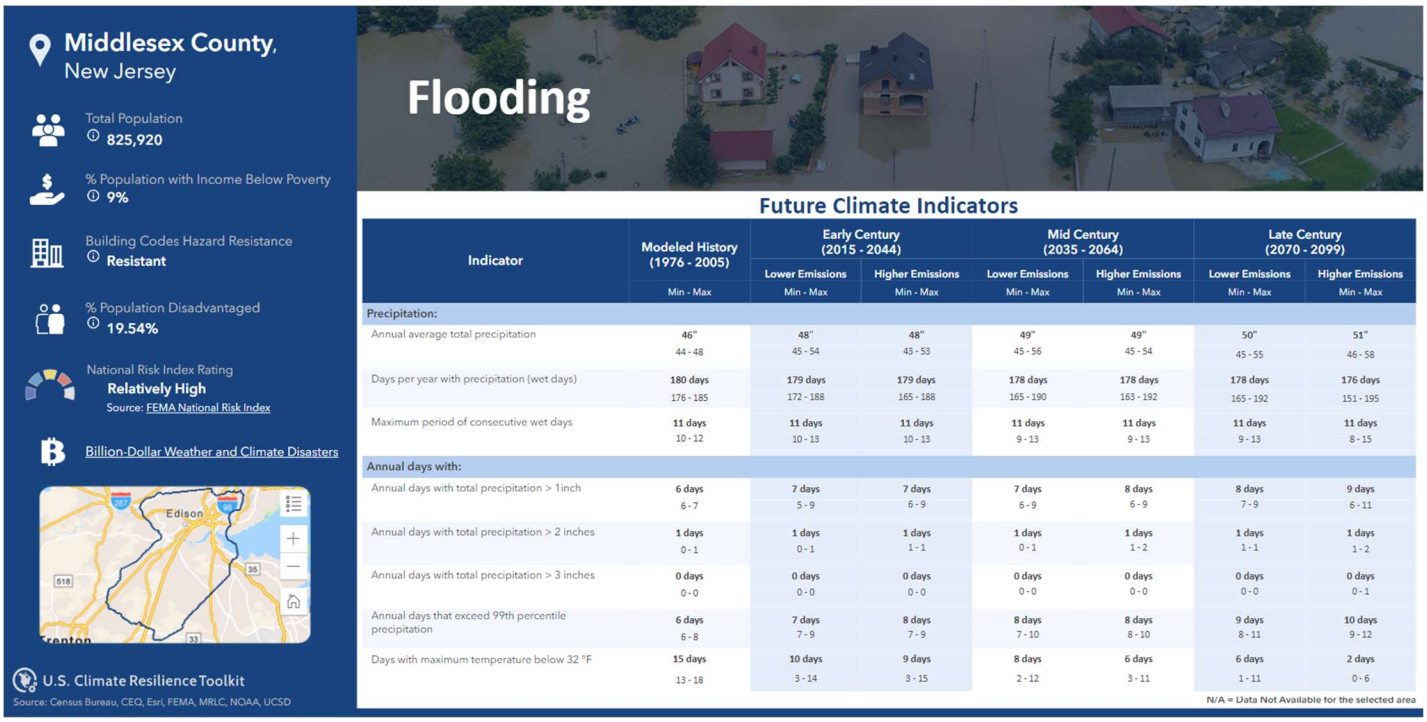


Figure C-4

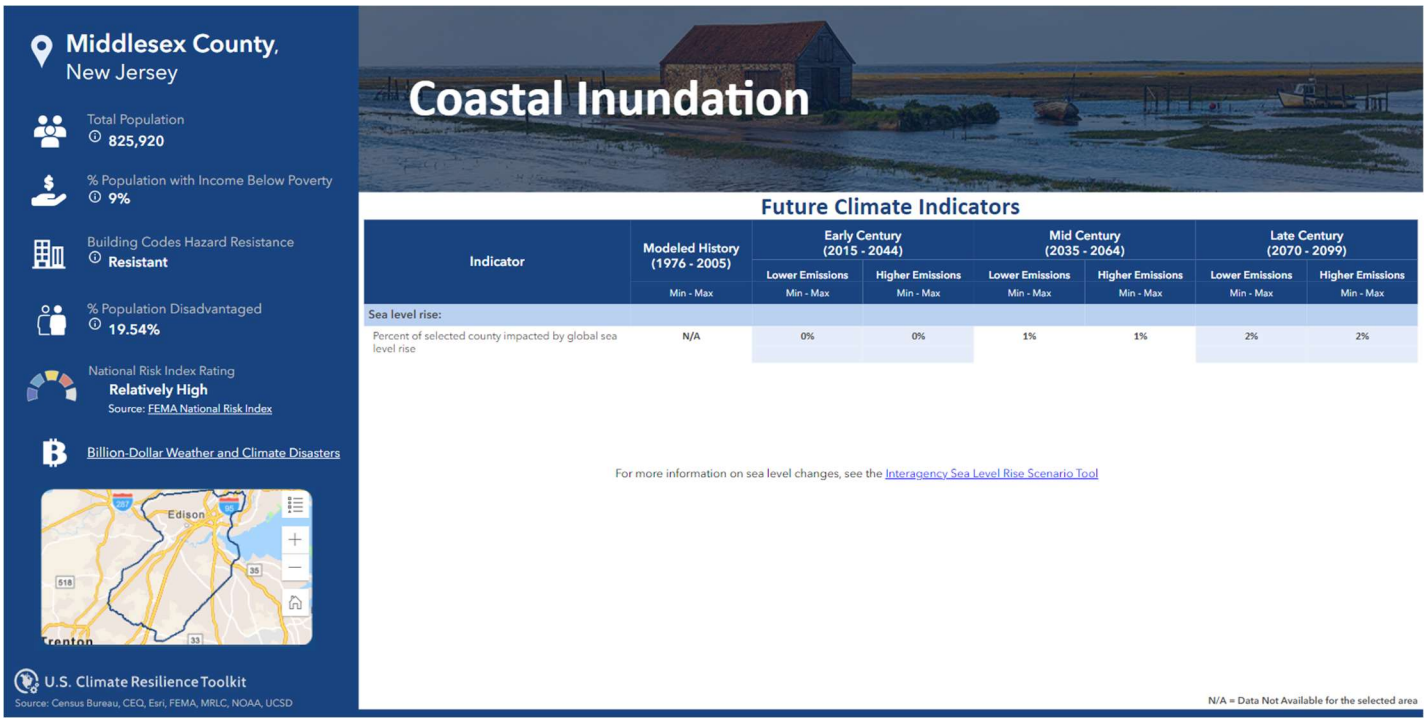


Figure C-5

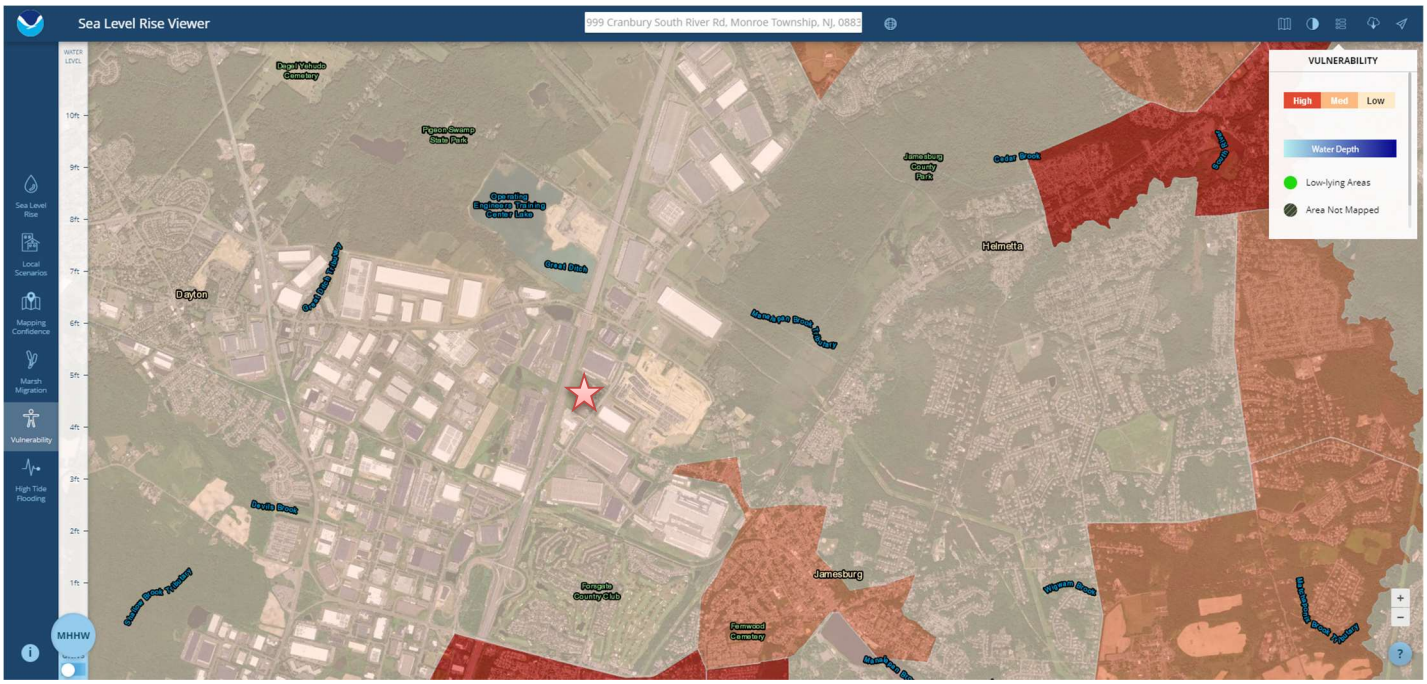


Figure C-6

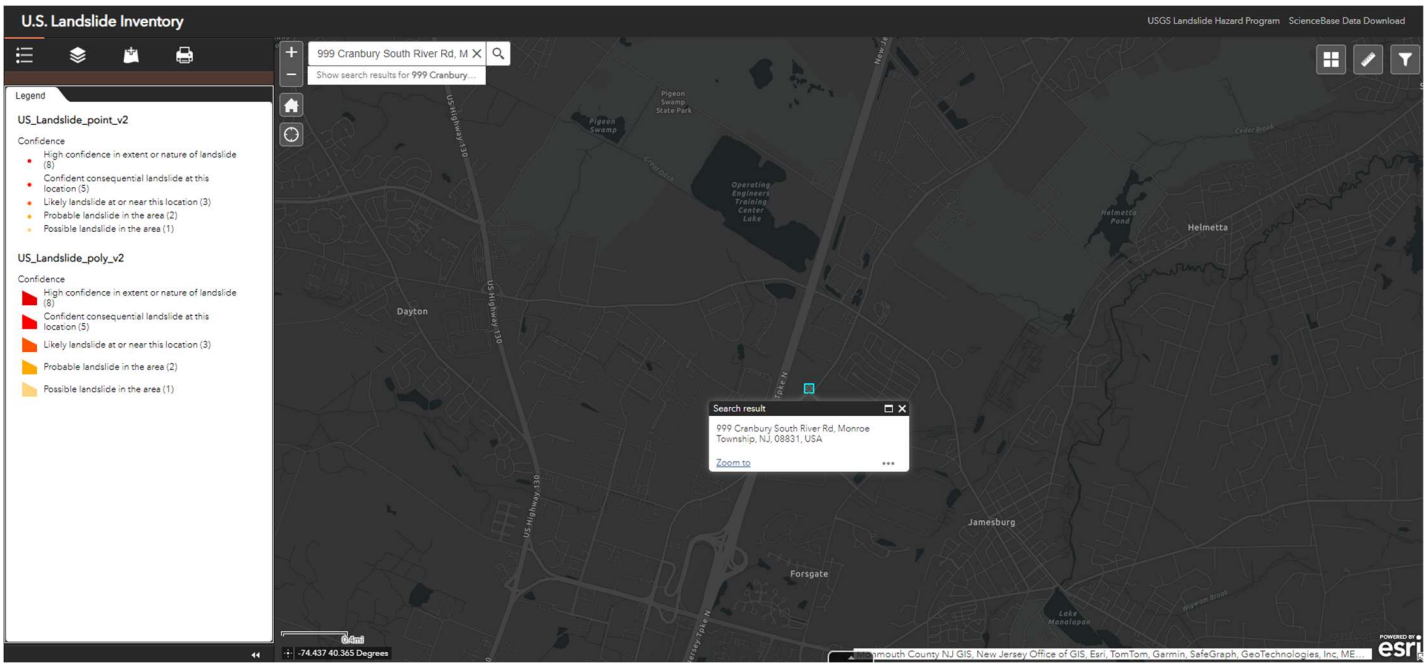


Figure C-7