SIXTH FIVE-YEAR REVIEW REPORT FOR DIAMOND ALKALI SUPERFUND SITE ESSEX COUNTY, NEW JERSEY

Prepared by

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

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December 30, 2025

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Date

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Contents

LIST OF ABBREVIATIONS & ACRONYMS

AOC	Administrative Orders on Consent
ARAR	Applicable or Relevant and Appropriate Requirement
Bgs	below ground surface
CAG	Community Advisory Group
CD	Consent Decree
CEA/WRA	Classification Exception Area/Well Restriction Area
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLH	Chemical Land Holdings
DASS	Diamond Alkali Superfund Site
DDT	p,p'-dichlorodiphenyltrichloroethane
EPA	United States Environmental Protection Agency
FS	Feasibility Study
FYR	Five-Year Review
GWTS	Groundwater Treatment System
GWWS	Groundwater Withdrawal System
ICs	Institutional Controls
LPR	Lower Passaic River
LPRSA	Lower Passaic River Study Area
µg/L	micrograms/liter
NBSA	Newark Bay Study Area
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NJ	New Jersey
NJDEP	New Jersey Department of Environmental Protection Agency
NJPDES	New Jersey Pollutant Discharge Elimination System Discharge to Surface Water Permit Equivalent
NPL	National Priorities List
NRRB	National Remedy Review Board
NY	New York
OCC	Occidental Chemical Corporation
OU	Operable Unit
O&M	Operation and Maintenance
PAL	Project Action Limit
PCBs	polychlorinated biphenyls
pg/L	picograms per liter
ppb	parts per billion
QAPP	Quality Assurance Project Plan
RA	Remedial Actions
RAO	Remedial Action Objectives
RCRA	Resource Conservation and Recovery Act
RER	Remedy Evaluation Report
REWP	Remedy Evaluation Work Plan
RI/FS	Remedial Investigation and Feasibility Study
ROD	Record of Decision
RPM	Remedial Project Manager
TBC	To be considered
TCDD	2,3,7,8-tetrachlorodibenzo-*p*-dioxin
TSI	Tierra Solutions, Inc.
UU/UE	Unlimited use and Unrestricted exposure
VOCs	Volatile Organic Compounds

I. INTRODUCTION

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

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

This is the sixth FYR for the Diamond Alkali Superfund Site (Site or DASS). The triggering action for this statutory review is the completion date of the previous FYR on December 22, 2020. 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).

Diamond Alkali consists of four operable units (OUs) as listed below and OU1 will be addressed in this FYR:

- OU1 includes the 80-120 Lister Avenue properties;
- OU2 includes the sediment of the lower 8.3 miles of the Lower Passaic River (LPR);
- OU3 includes the Newark Bay Study Area (NBSA); and
- OU4 includes the 17-mile Lower Passaic River Study Area (LPRSA)

The three OUs that are not addressed in this FYR have not started remedial action. EPA selected a remedy for OU2 in 2016. The remedial design was prepared by Occidental Chemical Corporation[1] (OCC) under EPA oversight and was approved by EPA in 2024. OU3 is in the FS phase. In September 2021, EPA selected an interim cleanup plan for the upper 9 miles of the LPRSA (OU4) that calls for addressing specific areas of sediment that serve as sources of contamination to the rest of the river and to the food chain. The OU4 cleanup is intended to complement the OU2 cleanup plan, the two working together to address the human and ecological risk posed by Site-related contamination in the Lower Passaic River. The OU4 remedy is in design. The OU1 remedy did not address deep groundwater at the OU1 properties as it was meant to address groundwater in the fill material above the organic silt layer, and anticipated that the deeper sand groundwater aquifer could be an additional OU at some time in the future.

The Diamond Alkali Superfund Site FYR was led by the EPA Remedial Project Manager (RPM) Eugenia Naranjo. Additional EPA participants included: Rachel Griffiths (hydrogeologist), Tara Bhat (Human Health Risk Assessor), Detbra Rosales (Ecological Risk Assessor), and Drew Curtis (Community Involvement Coordinator). Representatives from the New Jersey Department of Environmental Protection (NJDEP) included: Joe Nowak, Dana Galbreath, and David VanEck. The relevant entities such

[1] In an October 2, 2025 press release, Occidental Petroleum Corporation announced a corporate reorganization and Berkshire Hathaway Inc.'s acquisition of Occidental Chemical Corporation.

as OCC and its affiliate Glenn Springs Holdings, Inc. were notified of the initiation of the FYR. The review began on 5/29/2025.

Site Background

OU1 of the Site consists of two properties located at 80 and 120 Lister Avenue comprising approximately 5.8 acres adjacent to the Passaic River in the Ironbound neighborhood of Newark, New Jersey (see Appendix A Figure 1). Newark is a city of more than 300,000 residents, located in Essex County, and the Ironbound is a neighborhood of approximately 50,000 residents, located in the East Ward of Newark. The Ironbound covers approximately four square miles and is home to a sizeable population of Portuguese-American and Brazilian-American ethnicity. OU1 is bounded by industrial properties and the Passaic River.

Although several properties in the area have been redeveloped since the last five-year review, the immediate area continues to be zoned for industrial use and will continue to be so designated, according to the 2023 Newark Zoning Maps. However, the surrounding area is also densely populated with residences, including Newark Public Housing. Due to the number of former manufacturing facilities in the area, and the fact that the adjacent properties are also industrial, there are area-wide groundwater contamination issues, but they are being investigated under cleanup programs overseen by the NJDEP. The groundwater aquifer underlying OU1 is currently not used as a drinking water source. The City of Newark supplies public water throughout the City.

Since Site-related contamination extends beyond the OU1 property boundaries into the Passaic River, the Site also includes the sediment of the lower 8.3 miles of the Lower Passaic River (OU2), the NBSA (OU3), the LPRSA (OU4) and the areal extent of contamination. The LPRSA flows through Essex, Hudson, Passaic and Bergen Counties. The Passaic River is used for recreational activities such as rowing and fishing. The NBSA is a 6.3-square-mile enclosed embayment on the western side of the New York/New Jersey (NY/NJ) Harbor Estuary. The Hackensack and Passaic Rivers flow into the Bay on its northern side. On its southern side, the Bay is connected to New York Harbor (NY) and Raritan Bay (NJ) through two tidal straits: the Kill Van Kull and Arthur Kill, respectively.

The facility located at 80 Lister Avenue was used for manufacturing by numerous industrial companies for over 100 years. From the mid-1940s to 1969, activities at 80 Lister Avenue included chemical and pesticides manufacturing. All manufacturing operations at OU1 ceased in 1983. The OU1 properties are currently fenced and have an electronic, automated security system. Contaminated soils and debris are contained within the fenced area under an impermeable cap. Current use of the property includes ongoing operations and maintenance activities associated with the interim remedy.

FIVE-YEAR REVIEW SUMMARY FORM

SITE IDENTIFICATION		
Site Name: Diamond Alkali Company		
EPA ID: NJD980528996		
Region: 2	**State:** NJ	**City/County:** Bergen County, Passaic County, Essex County, Union County, Hudson County (NJ); Richmond County (NY)
SITE STATUS		
NPL Status: Final		
Multiple OUs? Yes	**Has the site achieved construction completion?** No	
REVIEW STATUS		
Lead agency: EPA		
Author name (Federal Project Manager): Eugenia Naranjo		
Author affiliation: EPA		
Review period: 5/29/2025 - 12/1/2025		
Date of site inspection: 7/29/2025		
Type of review: Statutory		
Review number: 6		
Triggering action date: 12/22/2020		
Due date *(five years after triggering action date)*: 12/22/2025		

II. RESPONSE ACTION SUMMARY

Basis for Taking Action

The Site Evaluation Reports for OU1 completed in 1985 showed that the 80 and 120 Lister Avenue properties were contaminated by a large number of hazardous substances including dioxin, semi-volatile compounds, VOCs, herbicides, pesticides, PCBs and metals. The contamination was widespread and affected most media, including soils, groundwater, ambient air, surface water and building structures. The chemicals that were determined to present the greatest risks due to their toxicities and concentrations were dioxin (or 2,3,7,8-TCDD), and DDT. The greatest potential human health risk was to the worker from exposure to dioxin through direct contact with surface soils. Other routes of exposure to the hazardous substances included migration of hazardous substances to the Passaic River, migration of hazardous substances to deeper aquifers, and migration of airborne hazardous substances. A quantitative evaluation of direct on-site risks was not performed since these risks had been controlled

by the initial response actions that had already been taken. The total risks from exposure to groundwater were quantified for dioxin and DDT and the total combined risks exceeded the risk range of 10^{-4} to 10^{-6} (one in ten thousand to one in one million) identified in the NCP. The 2025 OU1 final ROD clarified the COCs for the site as shown below.

COC Name	PRG
Soil[1] – units in mg/kg	
2,3,7,8-TCDD	0.00081
4,4'-DDT	9.5
Hexachlorobenzene	2.3
Fill Unit Groundwater – units in µg/L	
2,3,7,8-TCDD	0.00001
4,4'-DDT	0.1
Antimony (Total)	6
Benzene	1
Chlorobenzene	50
1,2-Dichlorobenzene (ortho)	600
1,3- Dichlorobenzene (meta)	600
1,4-Dichlorobenzene (para)	75
1,2,4- Trichlorobenzene	9
1,2-Dichloroethane	2
1,2-Dichloroethylene (cis)	70
Hexachlorobenzene	0.02
Toluene	600
Trichloroethylene	1
Vinyl Chloride	1
Arsenic (Total)	3
Lead (Total)	5
Mercury (Total)	2

1: Ingestion-dermal pathway value

Response Actions

Initial Response

The discovery of dioxin in 1983 led EPA and NJDEP to take several emergency response actions in 1983-1984 to control and limit access to the Lister Avenue properties. The properties at 80 and 120 Lister Avenue were secured by a fence and by 24-hour security guard service. Exposed soils on the property were covered with geofabric to prevent potential migration of contamination. At other vicinity properties, dioxin-contaminated soils and debris were removed by excavation, vacuuming, and other means, and were transferred to 120 Lister Avenue for storage. EPA proposed the Site for the National Priorities List (NPL) in September 1983, and it was finalized on the NPL on September 21, 1984. Also in 1984, NJDEP issued two Administrative Consent Orders (ACOs) to Diamond Shamrock Chemicals Company, the first for the investigations and immediate response work at 80 Lister Avenue and the second for investigations and response work at 120 Lister Avenue. The results of these studies are detailed in the 1985 Site Evaluation Reports for 80 and 120 Lister Avenue and the 1985 Feasibility Study (FS) Report. On August 1, 1987, EPA published a notice of completion of the investigations and feasibility study and of the Proposed Plan identifying EPA's preferred interim remedy.

OU1 Interim Remedy

The 1985 Feasibility Study[2] identified the following remedial action objectives (RAOs) for OU1:

[2] The 1987 ROD did not include the RAOs identified in the 1985 Feasibility Study

- Eliminate, to the maximum extent practicable, exposures to surface soils.
- Reduce mass transport of chemicals in the groundwater to potential concentration levels less than 5 x 10^{-5} micrograms/liter (µg/l) for dioxin and 0.23 µg/l for DDT at the nearest off-site well at some time in the future. [These values were identified at the time of the 1987 ROD as recommended exposure levels for ingestion of water.]
- Remove the source of potential particulate dioxin emissions associated with existing buildings.
- Reduce mass transport of chemicals from [OU1 of] the site to the Passaic River.
- Implement remediation without significant risk to site workers and off-site populations.

An interim remedy for OU1 was selected and documented in the September 30, 1987 ROD. The components of the interim remedy described in the 1987 ROD consisted of the following:

- Construction of a slurry trench cutoff wall to encircle the Lister Avenue properties and tie into the silt layer underlying the properties at its bottom.
- Construction of a flood wall to protect the properties from the 100-year flood.
- Disassembly and decontamination of all non-porous permanent structures and materials to the maximum extent practicable for off-site reuse, recycling or disposal.
- Transportation off-site for treatment or disposal of drums containing hazardous substances but containing less than 1 part per billion (ppb) of dioxin.
- Demolition of all remaining structures on-site and securing all materials contaminated above 1 ppb of dioxin (2,3,7,8-TCDD) on-site. Secured materials shall be segregated to the maximum extent practicable to afford access to and facilitate removal of the more highly contaminated materials, should such removal be selected as a remedy at a later date.
- Stabilization and immobilization of the contents of the remaining drums of dioxin-contaminated materials.
- Location and plugging of inactive underground conduits and reroute active systems.
- Hauling, emptying, spreading and compacting the contaminated materials presently stored at 120 Lister Avenue, and decontamination of the shipping containers for off-site reuse, recycling or disposal.
- Installation, operation, and maintenance of a groundwater withdrawal system designed to maintain a hydraulic gradient preventing the migration of groundwater from the volume contained within the slurry wall.
- Installation, operation, and maintenance of a treatment system for groundwater and other aqueous liquids.
- Construction of a surficial cap consisting of suitable materials designed to meet the requirements of the Resource Conservation and Recovery Act (RCRA).
- Implementation of suitable monitoring, contingency, operation and maintenance, and site security plans to ensure the protection of human health and the environment during and after the installation of the selected alternative.
- On-site placement and capping of all sludge generated from the wastewater treatment processes until such time that an alternative method of sludge management is approved.
- Perform a Feasibility Study every 24 months following the installation of the selected interim remedy to develop, screen and assess remedial alternatives and to assess the performance of the selected remedy.

The 1987 remedy was identified as an interim action because of the limited options available at the time the OU1 ROD was issued for disposal of dioxin-contaminated wastes that are classified as listed hazardous wastes under RCRA, which had been generated by the manufacturing operations at OU1. In addition, strong opposition was voiced by the community to either treating the listed dioxin wastes on-site or permanently disposing of them at 80-120 Lister Avenue.

OU1 Final Remedy

EPA issued a Record of Decision (ROD) on January 17, 2025 documenting the final remedy for OU1. The final remedy for OU1 consists of an optimized containment remedy that upgrades the interim remedy selected in the 1987 ROD. The major components of the selected final remedy include:

- Replacing groundwater extraction wells (EWs) EW-1 through EW-6, located along the floodwall bordering the Lower Passaic River, to position the well screens more accurately in the fill layer beneath the multi-layered cap and improve their effectiveness in achieving hydraulic containment;
- Replacing existing constant head pumps in the extraction wells with variable speed pumps and controls.
- Reactivating extraction well EW-9 on the south side of OU1;
- Redesigning and replacing portions of the groundwater conveyance system, as needed;
- Upgrading the Groundwater Withdrawal System (GWWS) and Groundwater Treatment System (GWTS), as needed;
- Investigating the integrity of the existing multi-layered cap via a site-wide electrical resistivity survey and performance of subsequent repairs, as needed;
- Installing additional groundwater monitoring wells, as needed, including Point of Compliance (POC) wells.
- Removing dense nonaqueous phased liquids (DNAPL), as needed.
- Maintaining the OU1 cap, the GWWS and GWTS, other engineering controls, and performing long-term Site monitoring in perpetuity; and
- Maintaining institutional controls as necessary to protect the integrity of the remedial components and to also protect against releases and human exposures.

The RAOs were adjusted from the 1987 FS and included the following:

- Soil RAO:
    - Prevent exposure (via ingestion, dermal contact, and inhalation) of human receptors (onsite and offsite commercial/industrial workers, construction/utility workers, and trespassers) to contaminated soil at concentrations exceeding remedial goals within the waste management area.

- Groundwater RAOs:
    - Prevent exposure (via ingestion, dermal contact, and inhalation) to Site-related contaminants in groundwater in the waste management area at concentrations greater than the applicable federal and state standards.
    - Prevent the migration of Site-related DNAPL beyond the point of compliance (POC).

- Prevent the migration of Site-related contamination in groundwater that exceeds the applicable federal and state standards beyond the POC.

For OU1, the waste management area is defined as the area bounded by the slurry walls and floodwall, above the naturally occurring organic silt layer and capped by the multilayer cap. The POC for meeting ARARs is defined by the outside faces of the slurry walls, the riverside face of the floodwall located between the OU1 properties and the Lower Passaic River, and the bottom of the organic silt deposit that underlies 80 and 120 Lister Avenue (see Appendix A Figure 2). The material within the waste management area includes contaminated soil, stabilized drum and tank contents, debris from the demolition of structures, disassembled shipping containers, asbestos-containing material, and phosphorous-containing material which had been allowed to react with the atmosphere before placement in a vault.

Status of Implementation

In 1989, EPA and NJDEP entered into a judicial consent decree (CD) with OCC and Chemical Land Holdings, Inc. (CLH), requiring OCC to perform the interim remedy selected for OU1. At that time, CLH, later renamed Tierra Solutions, Inc. (TSI) held title to the OU1 properties and also performed remedial activities on behalf of OCC. The CD provided further details governing implementation of the OU1 interim remedy, The U.S. District Court approved the CD on November 19, 1990. OCC is a successor to the Diamond Alkali Company, Diamond Shamrock Corporation and Diamond Shamrock Chemical Company. Therefore, OCC is a potentially responsible party for the Site.

During development of the remedial design plans, OCC performed certain initial components of the remedy. These actions included removal of the steel pile from 120 Lister Avenue (structural material from the warehouse demolition, steel tanks and miscellaneous steel). This steel pile was sampled and material that met the EPA criteria for off-site disposal was disposed of at an off-site facility. Any material that was not deemed acceptable by the receiving facility was placed on-site at the 80 Lister Avenue property for final disposal during subsequent construction activities. In addition, of the 635 drums at OU1, EPA determined that the contents of 261 drums were not listed dioxin wastes. The contents were processed through the temporary treatment plant and disposed of off-site. The empty drums were returned to the warehouse, cut in half and staged. Disposal of these drums was addressed during construction activities. The contents of the remaining 374 drums were considered listed dioxin waste. These drums were grouped into water-soluble liquids, non-aqueous liquids and solids/sludges and stored at the warehouse for disposal during a subsequent stage of activities.

As required under the CD with EPA and the NJDEP, OCC submitted remedial design plans for construction of the interim remedy of OU1. Prior to approving the design plans, EPA, at the request of the Community Advisory Group (CAG), explored the potential for implementing an alternative to the interim remedy selected in 1987. EPA considered innovative technologies as well as on-site and off-site thermal treatment options. EPA met with the CAG extensively during the summer of 1998. Due to the nature of the waste material (listed dioxin waste), EPA concluded that the new innovative technologies were inappropriate and that no off-site disposal option was available.

On September 23, 1999, EPA and NJDEP approved the Final Modified (100%) Remedial Design Report, and OCC began construction of the interim remedy in the spring of 2000. The flood wall and slurry trench cutoff wall were constructed. The warehouse and other structures were demolished. The contents of the drums and shipping containers were stabilized and immobilized and then placed in the containment area. The empty drums and shipping containers were either recycled or crushed and placed in the containment area. The surficial cap, the stormwater management system, the groundwater withdrawal system and the groundwater treatment plant were constructed in accordance with the approved remedial design plans. The construction of the flood wall and groundwater withdrawal system achieved the RAO of reducing mass transport of chemicals from OU1 of the site to the Passaic River.

On August 23, 2001, representatives from the New Jersey Division of Criminal Justice visited OU1 to inform OCC of a high pH problem with water being discharged from the stormwater drainage channels to the Passaic River. TSI promptly took corrective measures to stop the discharge and, based upon an investigation, determined that contact of drainage water with the sand layer portion of the cap was causing the increase in pH. To resolve the situation, TSI, on behalf of OCC, proposed a design modification to the surficial cap, which would restrict stormwater from percolating through the sand layer thereby reducing the volume of site drainage with elevated pH levels (see Appendix A Figure 3). EPA and NJDEP approved the proposal and implementation of the design modification was completed on September 13, 2002. Additionally, OCC implemented two phases of additional stormwater management controls to further segregate stormwater draining from the sand layer under the cap to prevent its flow into the drainage channels.

In November 2001, elevated zinc concentrations were found in treated effluent water from the groundwater treatment system. Again, OCC took corrective measures to reduce the zinc concentrations. It was determined that ferrous sulfate powder, a chemical used to adjust the pH of the treated groundwater, contained elevated concentrations of zinc. Therefore, OCC replaced the powder with a ferrous sulfate solution with low zinc concentrations which corrected the zinc exceedance problem.

In February 2002, the 24-hour security guard was replaced with an electronic, automated security system. In November 2003, OCC submitted the Supplemental Hydraulic Performance Evaluation Progress Report documenting the attainment of hydraulic gradients preventing the migration of groundwater from the materials contained within the slurry trench cutoff wall and the flood wall and the establishment of inward hydraulic gradients, in accordance with the CD. EPA agreed with the conclusions reached in this report at a May 12, 2004 meeting with TSI, on behalf of OCC, thereby triggering OCC's notification to EPA of the completion of all construction activities at OU1 required by the CD. OCC submitted this notification on June 2, 2004.

The 1990 judicial consent decree governing the cleanup, under which OCC carried out the interim remedy, calls for a periodic reevaluation of the remedy, the primary purpose of which was to develop, screen, and assess remedial alternatives, and to assess the performance of the selected remedy, until a final remedy could be selected for OU1. A Remedy Evaluation Work Plan (REWP), was developed in 2015 to guide the required evaluation of the interim remedy. As a result of the remedy evaluation work in 2018 and 2019, EPA determined that: 1) the groundwater extraction system at OU1 was not inducing sufficient drawdown in the northeast corner of the property, resulting in poor inward/upward gradients; and 2) existing extraction wells EW-7 and EW-8, which were installed in the northeast corner of the OU1 properties during construction of the current remedy, were installed with their screens within and below

the confining organic silt layer. This was likely due to an incorrect identification of the top elevation of the silt in this area in historical soil borings. As a result, extraction wells EW-7 and EW-8 were not extracting water from the groundwater unit targeted by the remedy. Based on these findings, the extraction system was optimized through the idling and replacement of extraction wells EW-7 and EW-8. Replacement extraction wells (EW-7R and EW-8R), and associated vaults and piping were installed between July and October 2021. Activation of the replacement extraction wells occurred on November 4, 2021. The performance of the replacement extraction wells was evaluated over a 6-month period from November 2021 through April 2022 and was determined to be operating as designed.

OCC submitted several iterations of a Remedy Evaluation Report (RER) to EPA by January 2021. Following EPA review of the January 2021 Draft RER, EPA determined that the January 2021 Draft RER satisfied the consent decree requirement to perform a remedy evaluation and that it should be revised into a feasibility study (FS) to comparatively evaluate remedial alternatives, which led to the submission of the 2024 FS Report and subsequent documentation of the final remedy in the January 2025 ROD. The remedy selected in the January 2025 ROD has not yet been designed or implemented and therefore is not evaluated in this FYR.

IC Summary Table

Table 1: Summary of 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 & Soil	Yes	Yes	80 and 120 Lister Avenue	Deed notice that allows for only industrial/commercial use of the property and a NJDEP CEA/WRA, an institutional control established under NJ law documenting an area where water quality standards cannot be met and which limits installation of groundwater extraction wells	Deed notice filed on June 27, 2007. CEA/WRA established in 2021

Systems Operations/Operation & Maintenance

On April 27, 2017, EPA received a letter identifying a change in ownership of the OU1 properties from TSI to a corporation affiliated with OCC, Mariana Properties, Inc. Responsibility for managing OU1 transferred to Glenn Springs Holdings, Inc. (GSH), another OCC affiliate.

GSH, on behalf of OCC, is conducting long-term monitoring and maintenance activities according to the Operations and Maintenance Plan approved by EPA on September 23, 1999, and the interim update Operations and Maintenance Quality Assurance Project Plan approved by EPA on April 30, 2013. The

required inspection and monitoring activities include performance of the following activities on a monthly basis unless noted otherwise:

- Inspection of the surface of the surficial cap.
- Inspection of the perimeter and interior drains.
- Inspection of the floodwall, curb wall and fencing along curb wall.
- Inspection of the paved and gravel roadways.
- Inspection of the entrance gate and perimeter fencing.
- Inspection of the piezometers, gas vents and extraction wells.
- Inspection of the interior rooms inside the groundwater treatment building.
- Inspection of the automated security system.
- Methane gas monitoring of the 14 gas vents.
- Groundwater depth measurements.

These efforts are documented in monthly progress reports submitted to EPA and NJDEP by GSH on behalf of OCC. Four annual groundwater monitoring events have been performed since completion of the previous FYR in 2020. Each included the collection of groundwater elevations and analysis of samples for VOCs, metals, and 2,3,7,8-TCDD.

When the groundwater treatment system began operation, all treated effluent and process water was batched into storage tanks at the OU1 properties and tested to confirm the treatment process achieved the effluents limits consistent with the New Jersey Pollutant Discharge Elimination System (NJPDES) as identified in a Discharge to Surface Water (DSW) Permit Equivalent dated May 2, 2000. If the validated data confirmed the NJPDES DSW Permit Equivalent levels were met, the stored water was discharged to the Passaic River. Starting April 1, 2014, treatment system effluent was directly discharged into the Passaic River, with testing conducted on a monthly basis to confirm compliance with the NJPDES DSW Permit Equivalent levels. Also, in accordance with the NJPDES DSW Permit Equivalent, a Discharge Monitoring Report is submitted monthly to both NJDEP and EPA.

To further evaluate the effectiveness of the groundwater withdrawal system, groundwater levels are measured and recorded monthly using piezometers at OU1. Due to variability in observed monthly water level elevations, annual average water level elevations are calculated to observe long-term trends that are not subject to short-term changes. An annual update report is provided to EPA and NJDEP, detailing the groundwater level measurements, extraction rates, and extraction volumes associated with the groundwater withdrawal system.

As a result of the ongoing monitoring of system operations, several updates have been made to the system over time. In an effort to further control the pH problems encountered with the water drained from the sand layer under the cap, OCC/TSI implemented a pilot study including the use of a carbon dioxide pH adjustment system in the collection tank from October 2004 through January 2005. The results of the pilot were evaluated and it was determined to be effective; therefore, the final carbon dioxide pH adjustment system was installed and began full-time operations in January 2007. Because site conditions may change over time, monitoring of the system continues to evaluate its effectiveness.

As part of a non-time critical removal action (Phase I Removal Action) performed by OCC in the Passaic River adjacent to OU1, a limited survey of the OU1 properties was conducted in August 2009. This survey found that the elevations of certain benchmarks, extraction wells, and piezometers had changed since the original 2001 survey, and it is expected that this condition occurred primarily due to natural settlement of the surficial cap. Four of the existing vibrating wire piezometers (IP-1 through IP-4) were no longer useable to monitor monthly groundwater levels because the measuring point elevations of these piezometers were inaccessible and could not be resurveyed. The remaining piezometers continued to perform adequately, providing accurate and reliable data.

In June 2011, OCC made repairs to the GWTS of the sand layer drainage collection system. The GWWS was shut down in October 2011 and resumed normal operations in November 2011 during the installation of tiebacks along the floodwall needed for the Phase 1 Removal Action. After OCC completed the Phase 1 Removal Action, a video inspection was performed of three piezometers along the floodwall, concluding that the inner casings were intact but that the steel outer casings needed to be straightened. In October 2012, the three casings were straightened and re-sealed to the cap with bentonite. A second video inspection concluded that both the inner and outer casings were then in good condition. In April 2013, OCC performed well redevelopment activities and replaced the extraction well pumps at eight of the GWWS extraction wells.

Beginning in June 2013, in accordance with the Waste Characterization Quality Assurance Project Plan submitted by OCC and approved by EPA, OCC established procedures under which residuals generated at OU1 are characterized and disposed of at off-site treatment and/or disposal facilities, as needed. Prior to disposal, the residual materials are placed in U.S. Department of Transportation-approved 55-gallon drums and stored in the groundwater treatment system warehouse storage.

The stratigraphy in the northeast portion of OU1 includes two water-bearing zones consisting of fill and an underlying glaciofluvial sand unit. An organic silt layer forms a confining unit that separates the two water-bearing zones. The silt layer is approximately 1 to 2 feet thick in the location where two existing extraction wells (EW-7 and EW-8) were installed. These two existing extraction wells were installed, along with eight other extraction wells, in November/December 2001 during implementation of the OU1 interim remedy. The wells were designed to extract groundwater from the fill water-bearing zone. After a series of data collections and evaluations conducted by OCC in 2018 and 2019 (*Site Evaluation Report Addendum*), it was determined that EW-7 and EW-8 were not extracting water from the correct hydraulic unit (i.e., the fill) and thus were not achieving the desired inward and upward hydraulic gradients in the northeast corner of OU1 during the periods of low tide in the river.

In 2021, two replacement wells were installed to improve groundwater capture in the northeastern portion of OU1 in accordance with recommendations presented in the *Site Evaluation Report Addendum*. Replacement extraction wells (EW-7R and EW-8R), and associated vaults and piping were installed between July and October 2021. To correct the deficiencies in capture noted in the vicinity of EW-7 and EW-8, replacement wells EW-7R and EW-8R were installed with their screens entirely within the fill unit to extract groundwater from the fill unit. Activation of the replacement extraction wells occurred on November 4, 2021. The performance of the replacement extraction wells was evaluated over a 6-month period from November 2021 through April 2022. Additional optimization is called for in final remedy selected in the 2025 ROD.

Potential site impacts from severe weather events have been assessed, and the performance of the remedy is generally not at risk due to these expected effects. See Appendix B. The 2025 ROD includes development of a severe weather preparedness plan that will further improve the remedy's resilience.

III. PROGRESS SINCE THE LAST REVIEW

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

Table 2: Protectiveness Determinations/Statements from the 2020 FYR

OU #	Protectiveness Determination	Protectiveness Statement
1	Short-term Protective	The interim remedy at OU1 currently protects human health and the environment in the short term because all exposure pathways are addressed by engineering and access controls. However, in order for the remedy to be protective in the long-term, a plan to implement the recommendations resulting from the review of the 2021 Remedy Evaluation Report needs to be developed.

Table 3: Status of Recommendations from the 2020 FYR

OU #	Issue	Recommendation	Current Status	Current Implementation Status Description	Completion Date (if applicable)
1	Pursuant to the Consent Decree, an evaluation of the interim remedy is expected to be completed in January 2021. However, next steps have not yet been identified	Complete the review of the Remedy Evaluation Report (RER) with the Partner Agencies (New Jersey Department of Environmental Protection, National Oceanic and Atmospheric Administration, U.S. Fish and Wildlife Service), and develop a plan to implement recommendations.	Completed	A RER Report was submitted in 2021 and reviewed by EPA. Following EPA recommendations, the 2021 RER was expanded into a full FS. The FS Report was finalized in 2025, and EPA issued a ROD in 2025. The final remedy (as discussed above) is comprised of the interim remedy with upgrades and improvements to ensure achievement of RAOs. The final remedy has not yet been implemented.	1/15/2025

IV. FIVE-YEAR REVIEW PROCESS

Community Notification, Involvement & Site Interviews

A new Community Involvement Plan (CIP) was prepared for OU1. New community interviews were conducted to gain an understanding of key community concerns regarding OU1 for inclusion in the plan. The new CIP was released in July 2024 and is available at https://semspub.epa.gov/src/document/02/704638.

On July 21, 2025, 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 the U.S. Virgin Islands, including the Diamond Alkali 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, Drew Curtis, posted a public notice on the EPA site webpage http://www.epa.gov/superfund/diamond-alkali and provided the notice to the City of Newark, NJ by email on 10/1/2025 with a request that the notice be posted in municipal offices and on the city webpages. This notice indicated that a FYR would be conducted at the Diamond Alkali Site to ensure that the cleanup at the Site continues to be protective of human health and the environment. Once the FYR is completed, EPA will make the results available at the following repository: Newark Public Library, Van Buren Branch, 140 Van Buren Street, Newark, NJ 07105. In addition, EPA will post the final report on the following websites: http://www.epa.gov/superfund/diamond-alkali and http://www.ourPassaic.org. The CIC will make efforts to reach out to local public officials to inform them of the results.

Data Review

The documents, data and information which were reviewed in completing this five-year review are summarized in Table 5.

Groundwater Hydraulic Data

The 1987 ROD states that the groundwater withdrawal and treatment system was designed to maintain a hydraulic gradient preventing the migration of groundwater from the volume contained within the slurry wall. Extraction (with treatment) of the groundwater was intended to lower groundwater levels within the wall and establish inward hydraulic gradients. Since the slurry wall was tied into the confining organic silt layer, separating the non-indigenous fill from the underlying sand layer, groundwater gradients have been measured both horizontally across the slurry wall and vertically through the silt layer.

The combined annual withdrawal of the individual extraction wells since 2002 (when full-time pumping began) has ranged from 671,696 to 1,375,455 gallons per year, which is an overall average flow rate of about 1.278 to 2.617 gallons per minute. The annual maximum total withdrawal of 1,375,455 gallons per

year (2.617 gallons per minute) occurred in 2019. The combined annual withdrawal has exceeded 1,000,000 gallons per year consistently since 2017.

Extraction rates, groundwater elevations, and hydraulic gradients indicate that replacement extraction wells EW-7R and EW-8R are performing as intended. The replacement wells have drawn down groundwater in the fill in the northeast corner of the OU1 properties. The increased drawdown has resulted in satisfying the project's objective of inducing a consistent upward hydraulic gradient across the organic silt layer in the northeast corner of the OU1 properties, achieving this condition between 96 and 100 percent of the time each month. Prior to activation of the replacement wells, gradients were consistently downward in the northeast corner.

Horizontal gradients across the floodwall are net inward in the northeast corner of the OU1 properties, with inward gradients maintained between 54 and 75 percent of the time each month. Prior to activation of the replacement wells, gradients were net outward in the northeast corner. Occasional periods of outward gradients across the floodwall are associated with the Passaic River's tidal fluctuations, particularly during low tide. The slurry wall is considered effective in minimizing potential migration of groundwater because it continues to separate the hydraulic systems inside and outside the wall. This is demonstrated by differences in tidal responses -- groundwater in wells outside the slurry wall exhibit a much greater response to the tidal fluctuations in the Passaic River than wells inside the slurry wall, which exhibit much steadier water levels. During high tide conditions, horizontal head differences in groundwater outside the cell reach their maximum values and are directed inward along the entire OU1 perimeter (i.e., slurry wall and floodwall). During low tide conditions, horizontal head differences in groundwater outside the cell achieve their minimum values and are directed outward along much of the OU1 perimeter, but remain inward along approximately 400 feet of perimeter in the southeastern quadrant of OU1.

Since the confining silt layer is expected to reduce the hydraulic connection between the fill unit and the underlying glacial sand layer, vertical hydraulic gradients in the fill unit and sand layer wells have been monitored at five paired well clusters along the northern and southern boundaries of OU1. On an annual average basis during 2022, vertical head differences between the fill and underlying glaciofluvial sand were upward into the fill in the northwest and north-central portions of OU1 but were downward into the glaciofluvial sand elsewhere beneath OU1. The vertical hydraulic gradients along the northern boundary (Passaic River) of OU1, where the organic silt layer is thin, change direction with the tidal fluctuations, and the sand layer exhibits a greater response than the minor fluctuations in the fill unit.

During high tide conditions in the glaciofluvial sand, vertical head differences are largest and are directed upward into the fill in the northern portion of OU1 and much of the interior. However, vertical head differences remain downward into the sand in southwestern and southeastern portions of OU1 even under high tide conditions. The organic silt layer is thickest in the southern portion of OU1. During low tide conditions in the glaciofluvial sand, vertical head differences achieve their minimum values and are downward into the sand throughout OU1 except for a very small area near the north-central part.

Groundwater Chemical Data

Groundwater quality samples were collected annually in 2020, 2021, 2022, 2023, and 2024 from site monitoring wells (see Appendix A Figure 4). The most frequently observed VOC was chlorobenzene, and

other commonly detected VOCs included benzene, toluene, 1,2-dichlorobenzene, 1,3-dichlorobenzene, 1,4-dichlorobenzene, and 1,2,4-trichlorobenzene. Dioxin, specifically 2,3,7,8-TCDD, was also observed in groundwater at several wells. The following data review focuses on exceedances of the 2025 remedial goals for dioxin (10 picograms/liter [pg/L], equivalent to 0.00001 micrograms/L [µg/L]) and chlorobenzene (50 µg/L), which is the predominant VOC in site groundwater and present at the highest concentrations.

The groundwater data in this five-year review were evaluated separately for monitoring wells inside the slurry wall and wells outside the slurry wall, as well as separately for the fill unit and the sand unit.

Fill unit inside the slurry wall

Between 2020 and 2024, nine monitoring wells screened in the fill unit inside the slurry wall were sampled as part of the annual groundwater sampling program. During the review period, VOCs were observed in groundwater within the fill unit inside the slurry wall at wells DGW-2, DGW-6, GCP-3-3, GCP-5-1, GCP-6-1, and GCP-9-1. VOCs have never been detected at wells GCP-4-1 or GCP-8-1, and were not detected in GCP-7-1 during the review period. Chlorobenzene concentrations in most wells have exhibited decreasing trends over the last five years. Monitoring well DGW-6 exhibited the highest chlorobenzene concentrations during the review period, ranging from a low of 4,540 µg/L in December 2020 to a high of 7,520 in December 2024.

Dioxin has been detected within the fill unit inside the slurry wall at wells DGW-2, DGW-6, GCP-3-3, GCP-4-1, GCP-7-1, and GCP-9-1. Dioxin has never been detected at GCP-5-1, and only once at GCP-6-1 and GCP-8-1. During the review period, monitoring well DGW-2 exhibited the highest dioxin concentration of 424,000 pg/L in December 2020, though concentrations in this well decreased to 60,000 pg/L as of December 2024. Similarly elevated dioxin concentrations were observed in DGW-6, ranging from a low of 8,260 pg/L in December 2021 to a high of 44,000 pg/L in December 2023, but the concentrations in other wells tended to be less than 200 pg/L and closer to non-detect.

Fill unit outside the slurry wall

Between 2020 and 2024, six monitoring wells screened in the fill unit outside the slurry wall were sampled as part of the annual groundwater sampling program. During the review period, VOCs were observed in four fill unit wells just outside the slurry wall (GCP-5-2, GCP-6-3, GCP-8-2, and GCP-9-2) and were not detected in GCP-4-2 and GCP-7-2. Chlorobenzene concentrations generally were lower outside the slurry wall at wells GCP-5-2 and GCP-9-2 than at their adjacent wells inside the wall GCP-5-1 and GCP-9-1. However, chlorobenzene concentrations at wells GCP-6-3 and GCP-8-2 (outside the slurry wall) were higher than at their adjacent wells inside the wall GCP-6-1 and GCP-8-1. Well GCP-6-3 had the highest VOC concentrations in the fill unit outside the slurry wall, with maximum detections of chlorobenzene (3,070 µg/L in December 2024), benzene (838 µg/L in December 2024), 1,4-dichlorobenzene (25,300 µg/L in December 2020), and 1,3-dichlorobenzene (5,450 µg/L in December 2020). VOC concentrations in this location did not exhibit any apparent trend during the review period.

Dioxin was generally observed in fill wells outside the slurry wall at low concentrations (generally less than 20 pg/L) or was not detected. The highest concentrations were observed in well GCP-6-3, which decreased from a maximum of 118 pg/L in January 2020 to non-detectable concentrations in December 2024, and well GCP-9-2, which had a concentration of 265 pg/L as of December 2024.

In general, concentrations of COCs in groundwater in fill wells outside the slurry wall/floodwall boundary are stable or decreasing and EPA expects implementation of the final remedy to improve the groundwater conditions because it will further prevent migration of contaminants from the waste management area. Residual contaminated fill material that remains outside the slurry wall is covered by the cap or by pavement that extends beyond the slurry wall to the OU1 boundary, and is therefore not available for exposure.

Below the Fill - Silt layer and Sand Unit

A total of seven monitoring wells screened in the upper and lower glaciofluvial sand units are sampled as part of the annual groundwater monitoring program. During the review period, VOCs were observed in several Glacial Sand Unit wells. Well DGW-7 (97 feet deep) in the lower part of the sand unit had the highest chlorobenzene concentration of 75,700 µg/L in December 2020, but decreased during the review period to a low of 7,170 µg/L in December 2024. Monitoring well GCP-1-2, in the upper sand unit in the vicinity of DGW-7, also had high chlorobenzene concentrations that decreased during the review period from from a maximum of 46,300 µg/L in January 2020 to 30,000 µg/L in December 2024. Several Sand Unit wells (especially GCP-1-2, GCP-3-2, GCP-8-3) had higher concentrations of chlorobenzene (and other VOCs) than the adjacent shallower wells screened in the fill unit or shallow part of the sand unit at the same cluster. The opposite condition was observed at sand unit well GCP-6-2 where VOC concentrations were lower than at the nearby fill unit wells GCP-6-1 and GCP-6-3.

Dioxin has been observed at elevated concentrations consistently at wells GCP-1-2 and GCP-2-2 along the northern floodwall. Concentrations in GCP-1-2 are typically the highest, ranging between a minimum of 126 pg/L in December 2022 and a maximum of 16,200 pg/L in January 2020. Dioxin concentrations in other sand unit wells throughout the review period are typically less than 100 pg/L.

Groundwater Hydraulic and Chemical Data Summary

Based on the data and observed trends, operations of the groundwater withdrawal system have resulted in a decrease in groundwater levels within the slurry wall since remedy construction was completed, generally inward horizontal gradients across the slurry wall, and a separation of hydraulic systems inside and outside of the slurry wall. Installation and operation of replacement extraction wells EW-7R and EW-8R in 2021 have resulted in improved hydraulic capture and decreasing contaminant trends in both the fill and sand units both inside and outside of the slurry wall. As the interim remedy is optimized in line with the 2025 ROD, the extraction system will consistently extract groundwater from the fill unit and is expected to improve hydraulic gradients and overall containment.

Site Inspection

The inspection of OU1 was conducted on 7/29/2025. In attendance were Eugenia Naranjo, Detbra Rosales, Tara Bhat, Rachel Griffiths, and Drew Curtis from EPA Region 2 and Brian Mikucki and Enrique Castro from GSH. The purpose of the inspection was to assess the protectiveness of the remedy. During the site inspection, the cap was observed to be well-maintained, with no obvious areas requiring repair. Additional observations include that the security fence was intact with no breaches, and the monitoring wells were in good shape and locked.

V. TECHNICAL ASSESSMENT

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

The review of documents listed in Table 5, the inspection of OU1 and the review of the existing data indicate that the remedy is functioning as intended by the 1987 ROD. The interim remedy is designed to provide protection of human health and the environment through the on-site containment of wastes. The remedy is functioning as intended and has eliminated potential human health and ecological exposure to on-site soils and dioxin releases from buildings and structures. OU1 is also being kept secure under the remedy, and the potential for transport of chemicals in the groundwater out of the containment area to adjacent properties and the Passaic River has been significantly reduced via engineering controls including the surficial cap, the slurry trench cutoff wall and the flood wall around the properties, and the groundwater withdrawal and treatment system.

Operation and maintenance activities, with routine evaluation and modification as needed, have been effective. Monthly inspections ensure that any issues are timely noted and equipment updated as necessary. The cap and the surrounding area are undisturbed and the fence and security around the OU1 properties have been repaired and are intact and these combined activities prevent potential exposures. Additionally, institutional controls prohibiting any future disturbance of the remedy are in place and effective.

The hydraulic and chemical groundwater data demonstrate that there are separate hydraulic systems inside and outside the slurry wall, as shown by the tidal responses, and that the horizontal gradients across the wall are generally inward. While data do indicate that the inward gradient has not been fully established in the northeast and northwest corners of the slurry wall, the overall trend is inward. On an annual average basis during 2024, vertical head differences between the fill and underlying glaciofluvial sand were upward into the fill in the northwest and north-central portions of OU1 but were downward into the glaciofluvial sand elsewhere beneath the OU1 properties. Since the slurry wall was tied into the confining organic silt layer, separating the non-indigenous fill from the underlying sand layer, groundwater gradients represent hydraulic potentials, but do not indicate active communication between the fill and the glaciofluvial sand. Therefore, the combination of the slurry wall, flood wall, and groundwater extraction system continue to be effective in minimizing potential migration of the groundwater from the volume contained within the slurry wall. Implementation of the final remedy included in the 2025 ROD will improve hydraulic gradients and overall containment.

The City of Newark supplies public water throughout the City. There are no drinking water supply wells located in the vicinity of the OU1 properties. The NJDEP requires approval of drinking water supply wells through the established CEA and will not allow groundwater, which has been contaminated by this Site, to be used as a drinking water supply. The deed notice also requires any use of the OU1 properties to allow for the continued operations and maintenance of the groundwater withdrawal and treatment systems.

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?

Human Health

There have been no changes in the physical conditions of OU1 over the past five years that affect the protectiveness of the remedy. The interim remedy for OU1 addressed risks related to on-site and off-site exposure to chemicals of concern (COCs) including 2,3,7,8-TCDD- and DDT-contaminated debris, material, and soil by containment. Remedial actions addressed exposures to dioxin-contaminated buildings and particulate emissions from the buildings; ingestion of contaminated groundwater; and transport of contaminants from OU1 to the Lower Passaic River. The remedial actions mitigate migration of COCs to the Passaic River and deeper aquifers through groundwater transport and surface water runoff by capturing the runoff and pumping and treating the groundwater. The surficial cap covers the soils to prevent potential exposures and the deed notice restricts use of the OU1 properties to industrial and/or commercial uses. The 2025 ROD updated the RAOs and RGs for OU1, as part of the final remedy selection, which remain valid.

Changes in Standards and To Be Considered

The risk assessment developed in 1985 evaluated direct human exposure to dioxin (2,3,7,8-TCDD) in soils. The concentration in soil for 2,3,7,8-TCDD of 1 ppb developed by the Centers for Disease Control (CDC) and the New Jersey Department of Health was applied. The remedial actions at OU1, including the surficial cap, are preventing potential exposures. There have been no updates to the toxicity data for dioxin since the oral reference dose (RfD) for 2,3,7,8-TCDD was updated in 2012, and dioxin is not currently listed on Agency toxicity databases for updates (e.g., the Integrated Risk Information System [IRIS] or Provisional Peer Review Toxicity Values [PPRTV]). The industrial concentration at a Hazard Quotient = 1 is 7.2×10^{-4} ppm or 0.72 ppb, which is lower than the 1 ppb concentration applied in 1985. However, the capping of the facility property has prevented direct exposures to the soil.

The 2025 ROD identified cleanup levels for OU1 COCs in soil and groundwater within the fill unit based on the NJ Groundwater Quality Standards for Class II-A aquifers, with consideration of national primary maximum contaminant levels, and cleanup levels for soil based on the NJDEP Non-residential Soil Remediation Standards for the Ingestion-Dermal Pathway identified in N.J.A.C. 7:26D, Appendix 1 for hexachlorobenzene, 2,3,7,8-TCDD and 4,4'-DDT. The cleanup goals included in the 2025 ROD remain valid.

Ecological

A screening-level ecological risk assessment was not conducted as part of the remedy selection leading to the 1987 ROD. The Lister Avenue properties and surrounding areas consist of 18 industrial properties. The industrial nature of OU1 and surrounding properties significantly limits the amount of available ecological habitat and influences the quality of that habitat. Further, EPA and NJDEP concluded that remediation of OU1 was unlikely to remove or alter any potential existing ecological resources. Given that the primary terrestrial ecological issue is contaminated surface soil, no ecological risk evaluation was required, since the remedial alternatives that were evaluated to address the human health risk would also address the soils likely to contribute to ecological risk and be protective of potential ecological receptors.

The remedial investigation indicated hazardous substances were being released from OU1 to the Passaic River through the routes of groundwater migration and surface runoff of stormwater. These pathways have been eliminated through implementation of the interim remedy. The water that is pumped from the groundwater withdrawal system is treated in the on-site facility and is monitored to ensure that it meets current permitting requirements, which are protective of ecological receptors, prior to being discharged to the Passaic River. Ecological risks from contaminated media in the Lower Passaic River are evaluated under other Diamond Alkali OUs.

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

There is no additional information that calls into question the protectiveness of the remedy.

VI. ISSUES/RECOMMENDATIONS

Issues/Recommendations
OU(s) without Issues/Recommendations Identified in the Five-Year Review:
None

Issues and Recommendations Identified in the Five-Year Review:

OU(s): 1	Issue Category: Remedy Performance			
	Issue: The interim remedy will not achieve the RAOs for the final remedy documented in the 2025 ROD.			
	Recommendation: Complete design and implementation of the final remedy.			
Affect Current Protectiveness	**Affect Future Protectiveness**	**Party Responsible**	**Oversight Party**	**Milestone Date**
No	Yes	PRP	EPA/State	12/1/2027

VII. PROTECTIVENESS STATEMENT

Protectiveness Statement(s)	
Operable Unit: 1	*Protectiveness Determination:* Short-term Protective
The interim remedy at OU1 currently protects human health and the environment in the short-term because all exposure pathways are addressed by engineering and access controls. For the remedy to be protective in the long-term, the final remedy needs to be implemented.	

VIII. NEXT REVIEW

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

Table 4: Chronology of Site Events

Event	Date(s)
Manufacturing facility at 80 Lister Avenue, Newark, NJ began producing chemicals and pesticides.	1940s
Diamond Alkali Company (subsequently known as Diamond Shamrock Corporation and Diamond Shamrock Chemicals Company) owned and operated a pesticides manufacturing facility at 80 Lister Avenue. In 1960 an explosion occurred.	1951-1969
80 Lister Avenue went through a series of new ownerships and production processes.	1970-1983
NJDEP and EPA collected dioxin samples at the Site; dioxin detected in the Passaic River and at 80 Lister Avenue. Diamond Alkali proposed by EPA for listing on the Superfund NPL. NJDEP instituted fish consumption advisories for the Passaic River and Newark Bay.	1983
Pre-NPL responses taken to restrict access to the Site and the contaminants	1983
Final NPL listing	1984
NJDEP and Diamond Shamrock Chemicals Company entered into two AOCs for investigation and immediate response work at 80 and 120 Lister Avenue, including excavation and vacuuming of dioxin-contaminated soils from nearby properties and securing exposed on-site soils under geofabric.	1984
Remedial Investigation/Feasibility Study complete	1987
EPA selected an interim remedy for the 80 and 120 Lister Avenue portion of the Site, documented in a ROD.	1987
Federal court approved a CD among OCC, CLH, EPA and NJDEP to implement the ROD.	1990
Remedial design start	1993
EPA, at the request of the CAG, explored the potential for implementing an alternative to the interim remedy selected in the ROD. An alternative was not found.	1996-1999
Remedial design complete.	1999
On-site remedial action construction start.	2000
RA Construction completion date.	2004
EPA issues Proposed Plan for a final remedy at OU1	2024
Final Feasibility Study	2025
EPA issues Record of Decision	2025
Previous five-year reviews	2001, 2006, 2011, 2016, 2020

Table 5: Documents, Data and Information Reviewed in Completing the Five-Year Review

Document Title, Author	Date
Record of Decision for the Diamond Shamrock Superfund Site, Newark, NJ, EPA	1987
Consent Decree (Civil Action No. 89-5064 (JWB)), United States District Court District of New Jersey	1990
Final Report for Remedial Construction, Diamond Alkali Superfund Site, Newark, NJ, TSI/BBL	2004
Remedy Evaluation Work Plan, Diamond Alkali Superfund Site, Newark, NJ, TSI	2015
Monthly Progress Reports, Diamond Alkali Superfund Site, Newark, NJ, TSI	2011-2015
Discharge Monitoring Reports, Diamond Alkali Superfund Site, Newark, NJ, TSI	2011-2015
Current Groundwater Level Graphs and Extraction Rates Memos, Diamond Alkali Superfund Site, Newark, NJ, TSI	2011-2015
Final Quality Assurance Project Plan, Groundwater Quality Monitoring Program, Diamond Alkali Superfund Site, Newark, NJ, TSI/EDS	2008
Groundwater Sampling Event Reports, Diamond Alkali Superfund Site, Newark, NJ, TSI/ARCADIS	2011-2014
Operations and Maintenance Quality Assurance Project Plan, Diamond Alkali Superfund Site, Newark, NJ, TSI/EDS	2012
Remedy Evaluation Work Plan	2014
Site Evaluation Work Plan Addendum and QAPP	2018
Waste Disposal Tech Memo	2018
Analytical Recommendation Memo	2019
Site Evaluation Report Addendum	2020
Technical Memorandum: EW-7R and EW-8R Optimization Evaluation	2022
DASS OU-1 Annual Groundwater Report, Groundwater Sampling Event No. 12	2021
DASS OU-1 Annual Groundwater Report, Groundwater Sampling Event No. 13	2022
DASS OU-1 Annual Groundwater Report, Groundwater Sampling Event No. 14,	2023
DASS OU-1 Annual Groundwater Report, Groundwater Sampling Event No. 15	2024
Feasibility Study Report: Diamond Alkali Superfund Site (DASS) Operable Unit 1 (OU-1)	2025
RECORD OF DECISION:80 and 120 Lister Avenue Diamond Alkali Superfund Site – Operable Unit 1	2025

APPENDIX A – FIGURES

Figure 1: Site Location Maps

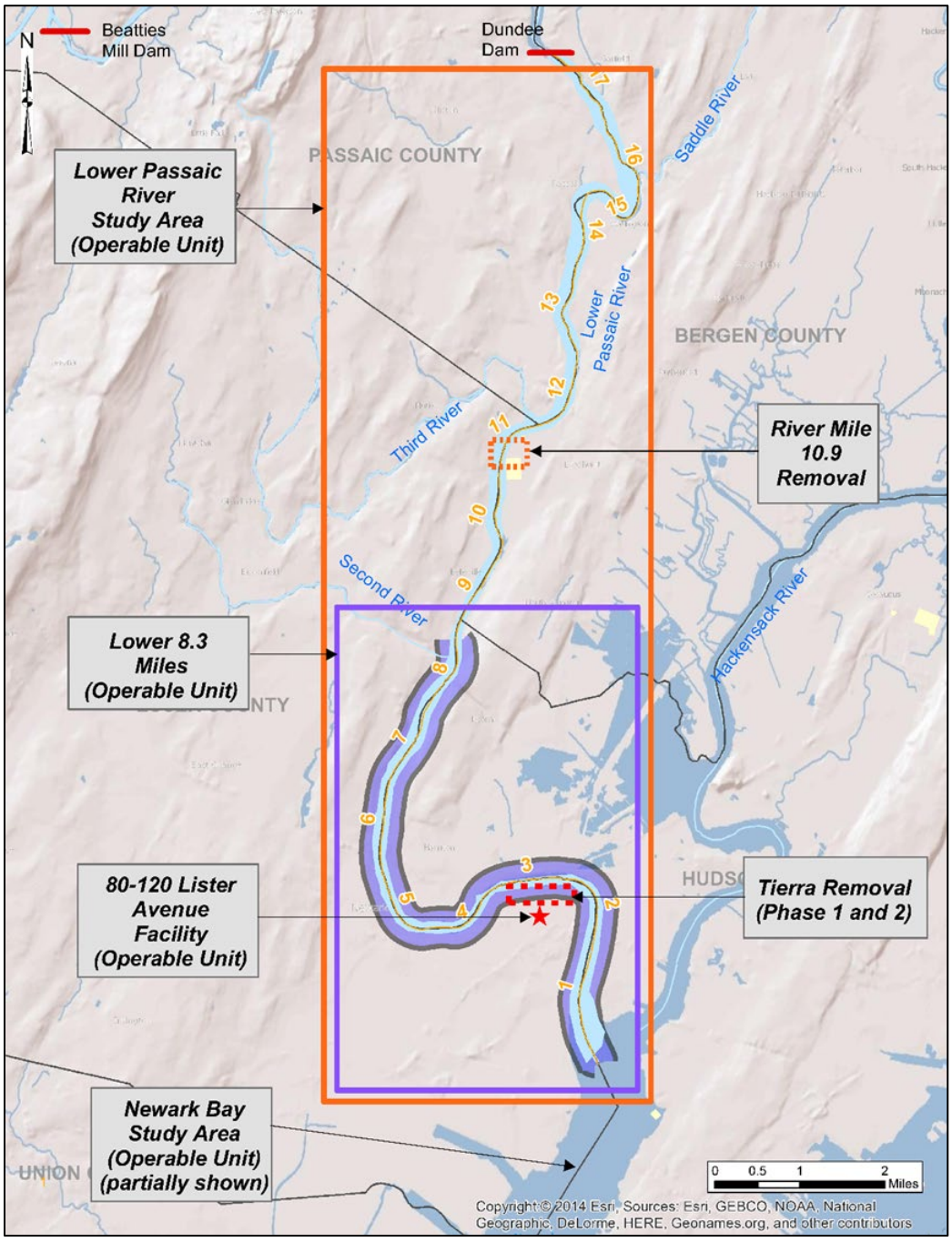


Figure 2: Point of Compliance

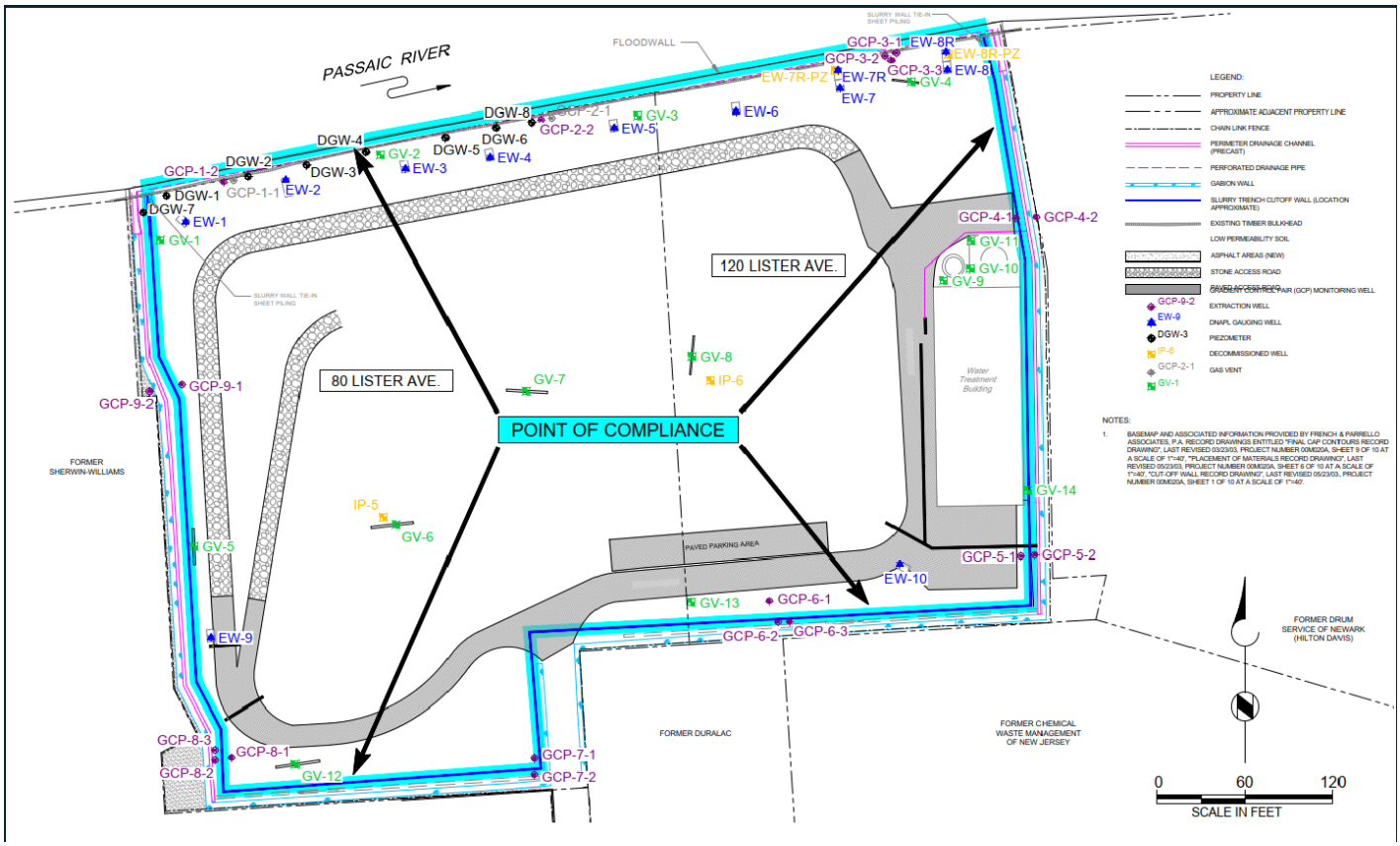


Figure 3: Engineered Cap Detail

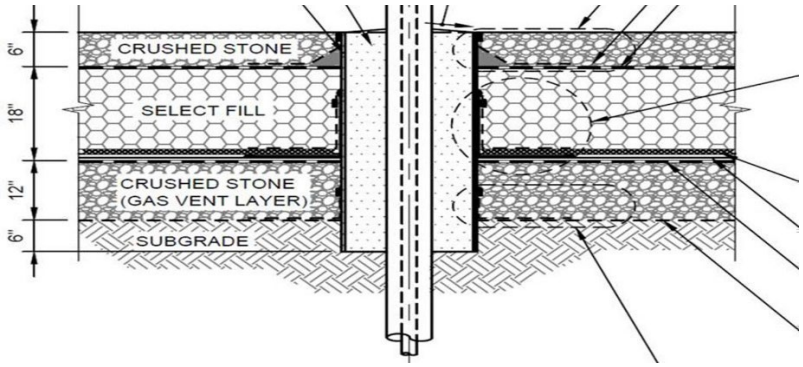
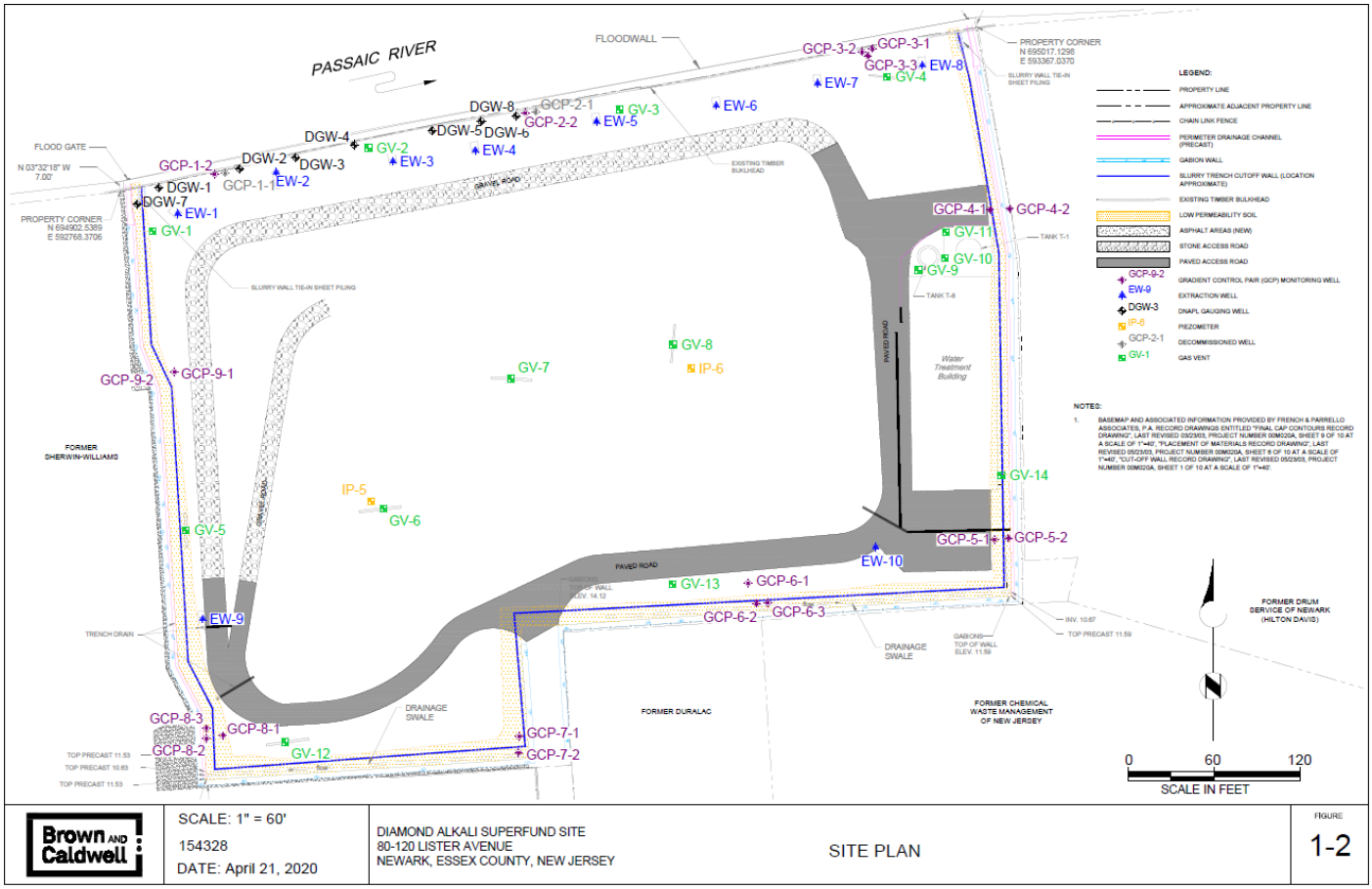


Figure 4: Site Plan



APPENDIX B: REMEDY RESILIENCE

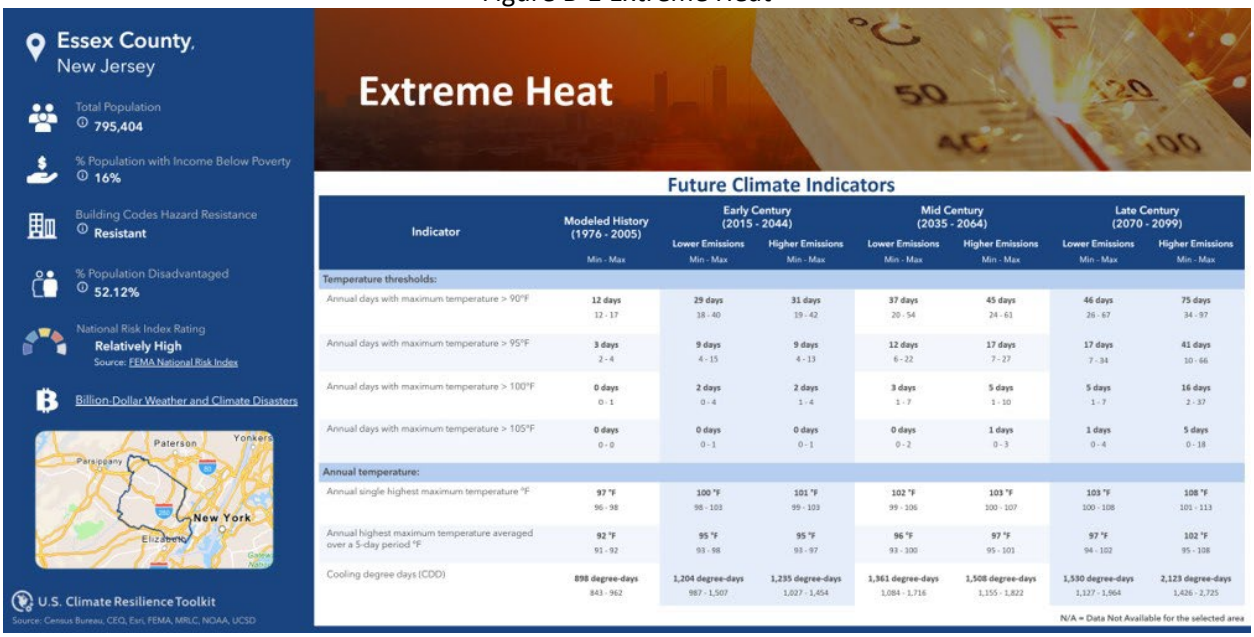
In line with regional practice, three tools were utilized to assess the remedy resilience of Diamond Alkali OU1. The first tool used to assess OU1 was the CMRA. The tool examined five hazards for Essex county, NJ. According to this tool, the National Risk Index Rating for extreme heat is "Relatively High." There is a projected increase of days per year with maximum temperatures >100°F, as shown in Figure B-1. Increases in heat are not expected to impact the remedy, as it does not rely on vulnerable materials like asphalt or vegetation that could be negatively affected by heat. Drought and Wildfire have a National Risk Index Rating of "Very Low." Figures B-2 and B-3 show an increase in average annual total precipitation and an increase in days per year with precipitation. Flooding and Coastal Inundation have a National Risk Rating of "Relatively Moderate". Figure B-4 shows an increase in annual days with precipitation over one inch. As shown in Figure B-5, the percent of the county impacted by global sea level rise is predicted to be less than 1%.

Flooding and coastal inundation were further evaluated using the NOAA Sea Level Rise Viewer. Diamond Alkali OU1 is located next to the Passaic River. Figure B-6 shows OU1 at current conditions (designated by the orange star). According to a 2019 Rutgers University report, it is likely (meaning at least a 66% chance) that New Jersey will experience sea level rise of 0.5 to 1.1 feet between 2000 and 2030, and 0.9 to 2.1 feet between 2000 and 2050. Based on this information, Figure B-7 shows a rise in sea level up to 3 feet. Figure B-8 highlights the shallow coastal flooding areas prone to high tide flooding. Each of these figures show that sea level rise to this degree is unlikely to significantly affect OU1 and its operations. Furthermore, the existing floodwall and backup systems are expected to protect key components. Vulnerability may exist in the treatment building during severe storm surges (e.g., 500-year floods), such that a shutdown might be necessary, but operations would resume relatively quickly after repairs. In addition, the cap structure could withstand a temporary inundation and would shed the water away from OU1 as the flood waters receded, due to its sloped design. If the storm surge was accompanied by a power outage lasting for days or weeks following the storm, the remediation systems at OU1 could be powered by the backup generator already present at OU1, if needed, that is connected to the existing natural gas supply to the property. Potential damage to OU1 would likely be limited to scouring of the surficial gravel layer of the cap and/or damage to ground level equipment in the treatment building, both of which could be repaired easily.

The final tool utilized is called the USGS U.S. Landslide Inventory & Susceptibility Map. As shown by Figures 9 and 10, there have been no landslides recorded in the vicinity of OU1 and this area is likely not susceptible to landslide activity in the future.

Based on this information, potential site impacts from severe weather events have been assessed, and the performance of the remedy is generally not at risk due to these expected effects as shown in the figures below. The 2025 ROD includes development of a severe weather preparedness plan that will further improve the remedy's resilience.

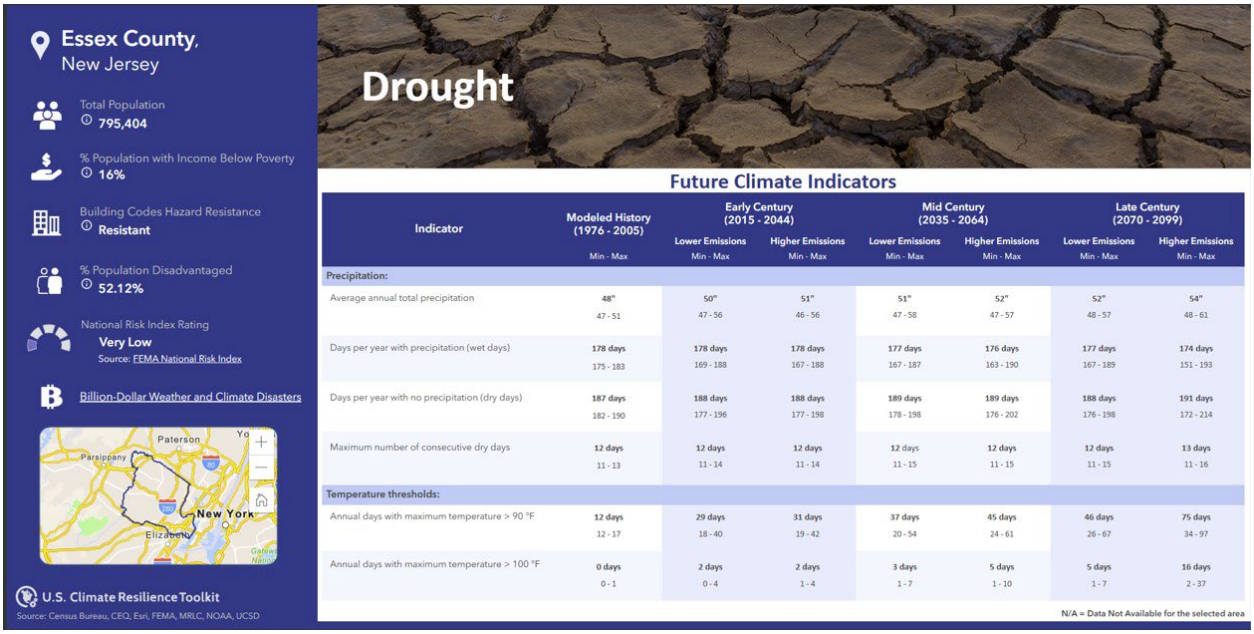
Figure B-1 Extreme Heat



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	12 days 12 - 17	29 days 18 - 40	31 days 19 - 42	37 days 20 - 54	45 days 24 - 61	46 days 26 - 67	75 days 34 - 97
Annual days with maximum temperature > 95°F	3 days 2 - 4	9 days 4 - 15	9 days 4 - 13	12 days 6 - 22	17 days 7 - 27	17 days 7 - 34	41 days 10 - 66
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 1 - 7	16 days 2 - 37
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 - 4	5 days 0 - 18
Annual temperature:							
Annual single highest maximum temperature °F	97 °F 96 - 98	100 °F 98 - 103	101 °F 99 - 103	102 °F 99 - 106	103 °F 100 - 107	103 °F 100 - 108	108 °F 101 - 113
Annual highest maximum temperature averaged over a 5-day period °F	92 °F 91 - 92	95 °F 93 - 98	95 °F 93 - 97	96 °F 93 - 100	97 °F 95 - 101	97 °F 94 - 102	102 °F 95 - 108
Cooling degree days (CDD)	898 degree-days 843 - 962	1,204 degree-days 987 - 1,507	1,235 degree-days 1,027 - 1,454	1,361 degree-days 1,084 - 1,716	1,508 degree-days 1,155 - 1,822	1,530 degree-days 1,127 - 1,964	2,123 degree-days 1,426 - 2,725

N/A = Data Not Available for the selected area

Figure B-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	48" 47 - 51	50" 47 - 56	51" 46 - 56	51" 47 - 58	52" 47 - 57	52" 48 - 57	54" 48 - 61
Days per year with precipitation (wet days)	178 days 175 - 183	178 days 169 - 188	178 days 167 - 188	177 days 167 - 187	176 days 163 - 190	177 days 167 - 189	174 days 151 - 193
Days per year with no precipitation (dry days)	187 days 182 - 190	188 days 177 - 196	188 days 177 - 198	189 days 178 - 198	189 days 176 - 202	188 days 176 - 198	191 days 172 - 214
Maximum number of consecutive dry days	12 days 11 - 13	12 days 11 - 14	12 days 11 - 14	12 days 11 - 15	12 days 11 - 15	12 days 11 - 15	13 days 11 - 16
Temperature thresholds:							
Annual days with maximum temperature > 90 °F	12 days 12 - 17	29 days 18 - 40	31 days 19 - 42	37 days 20 - 54	45 days 24 - 61	46 days 26 - 67	75 days 34 - 97
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 1 - 7	16 days 2 - 37

N/A = Data Not Available for the selected area

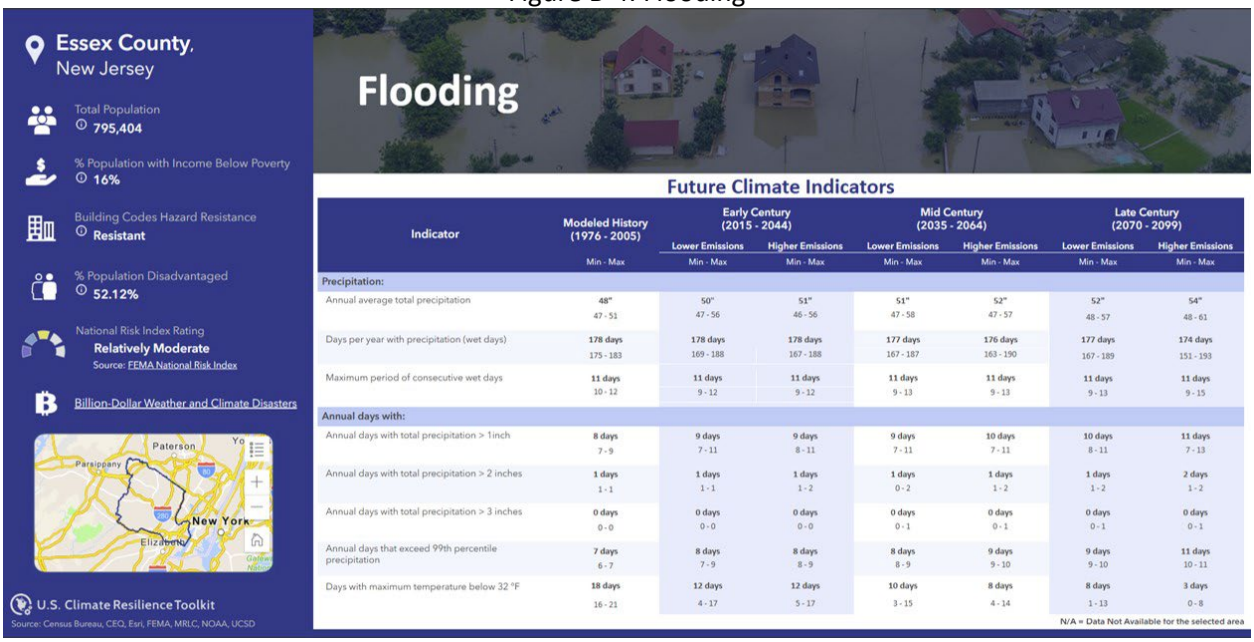
Figure B-3: Wildfire

Future Climate Indicators

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:							
Days per year with no precipitation (dry days)	187 days 182 - 190	188 days 177 - 196	188 days 177 - 198	189 days 178 - 198	189 days 176 - 202	188 days 176 - 198	191 days 172 - 214
Maximum number of consecutive dry days	12 days 11 - 13	12 days 11 - 14	12 days 11 - 14	12 days 11 - 15	12 days 11 - 15	12 days 11 - 15	13 days 11 - 16
Days per year with precipitation (wet days)	178 days 175 - 183	178 days 169 - 188	178 days 167 - 188	177 days 167 - 187	176 days 163 - 190	177 days 167 - 189	174 days 151 - 193
Temperature thresholds:							
Annual days with maximum temperature > 90°F	12 days 12 - 17	29 days 18 - 40	31 days 19 - 42	37 days 20 - 54	45 days 24 - 61	46 days 26 - 67	75 days 34 - 97
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 1 - 7	16 days 2 - 37

N/A = Data Not Available for the selected area

Figure B-4: Flooding



Future Climate Indicators

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:							
Annual average total precipitation	48" 47 - 51	50" 47 - 56	51" 46 - 56	51" 47 - 58	52" 47 - 57	52" 48 - 57	54" 48 - 61
Days per year with precipitation (wet days)	178 days 175 - 183	178 days 169 - 188	178 days 167 - 188	177 days 167 - 187	176 days 163 - 190	177 days 167 - 189	174 days 151 - 193
Maximum period of consecutive wet days	11 days 10 - 12	11 days 9 - 12	11 days 9 - 12	11 days 9 - 13	11 days 9 - 13	11 days 9 - 13	11 days 9 - 15
Annual days with:							
Annual days with total precipitation > 1inch	8 days 7 - 9	9 days 7 - 11	9 days 8 - 11	9 days 7 - 11	10 days 7 - 11	10 days 8 - 11	11 days 7 - 13
Annual days with total precipitation > 2 inches	1 days 1 - 1	1 days 1 - 1	1 days 1 - 2	1 days 0 - 2	1 days 1 - 2	1 days 1 - 2	2 days 1 - 2
Annual days with total precipitation > 3 inches	0 days 0 - 0	0 days 0 - 0	0 days 0 - 0	0 days 0 - 1	0 days 0 - 1	0 days 0 - 1	0 days 0 - 1
Annual days that exceed 99th percentile precipitation	7 days 6 - 7	8 days 7 - 9	8 days 8 - 9	8 days 8 - 9	9 days 9 - 10	9 days 9 - 10	11 days 10 - 11
Days with maximum temperature below 32 °F	18 days 16 - 21	12 days 4 - 17	12 days 5 - 17	10 days 3 - 15	8 days 4 - 14	8 days 1 - 13	3 days 0 - 8

N/A = Data Not Available for the selected area

Figure B-5: Coastal Inundation

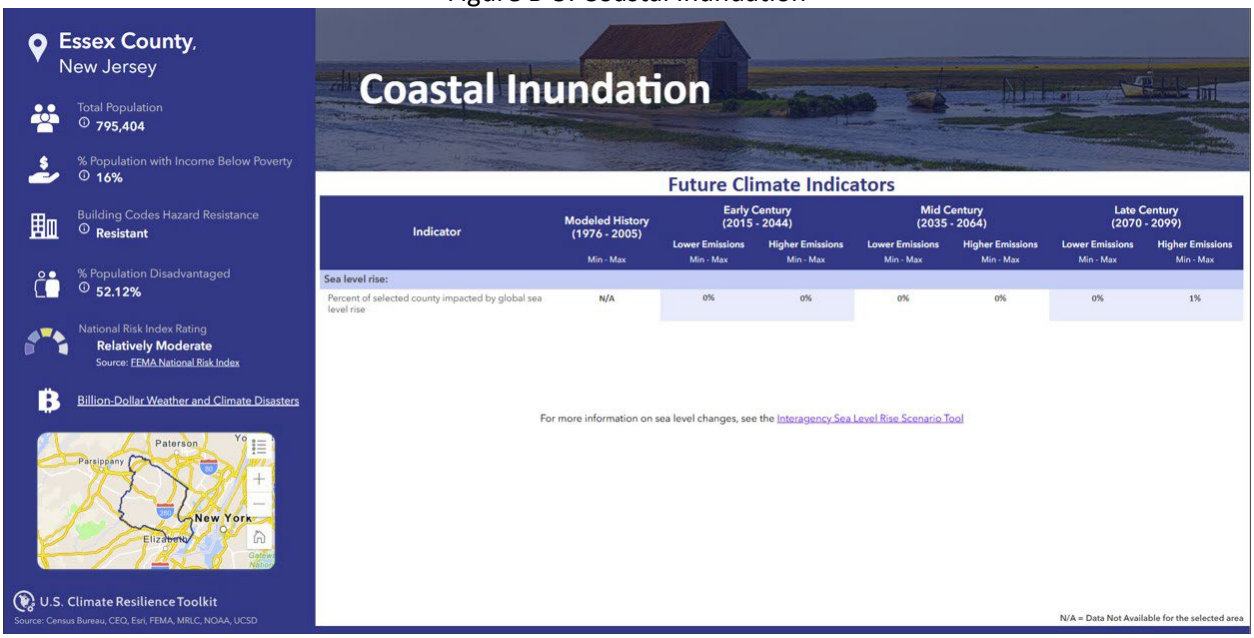


Figure B-6: Sea level rise at current conditions

Figure B-7: Sea level rise is 3 feet

Figure B-8: High tide flooding areas

Figure B-9: Landslide Inventory & Susceptibility Map

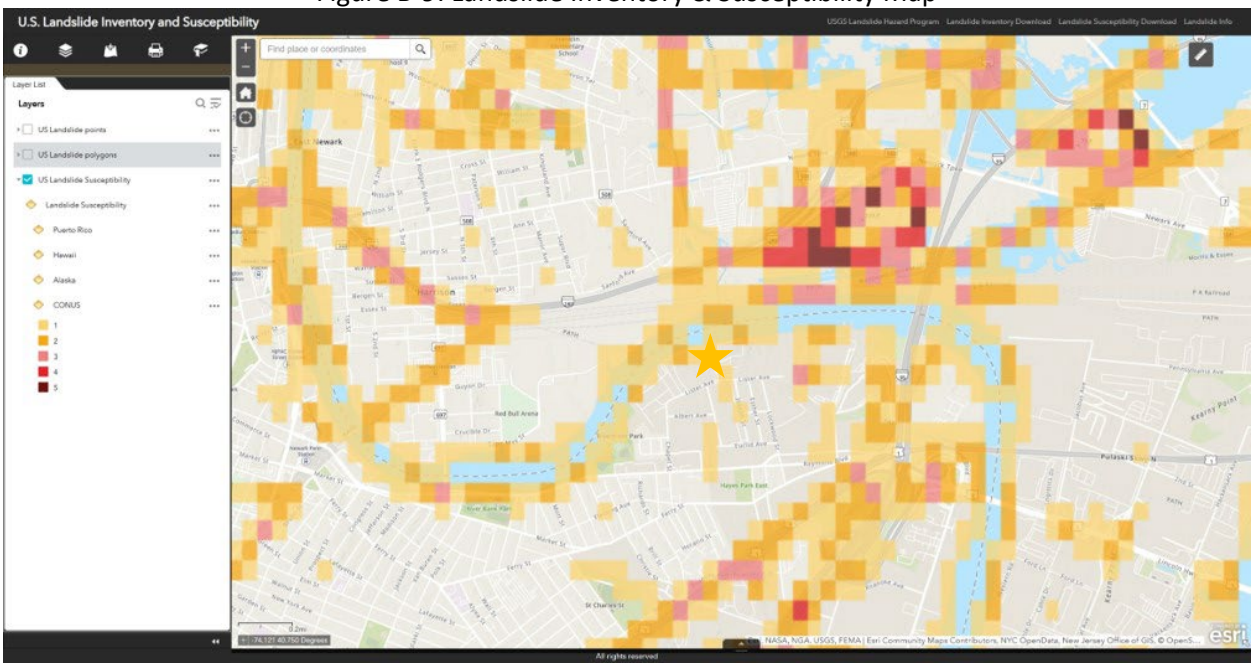


Figure B-10: Landslide Inventory & Susceptibility Map