RECORD OF DECISION

STANDARD CHLORINE CHEMICAL COMPANY, INC.

TOWN OF KEARNY

HUDSON COUNTY, NEW JERSEY

U.S. Environmental Protection Agency

Region 2

September 2016

393188

DECLARATION FOR THE RECORD OF DECISION

Record of Decision

FACILITY NAME AND LOCATION

Standard Chlorine Chemical Company, Inc. Site
1025-1035 Belleville Turnpike
Kearny, New Jersey

EPA Superfund Site Identification Number NJD002175057

STATEMENT OF BASIS AND PURPOSE

This Record of Decision (ROD) documents the U.S. Environmental Protection Agency's (EPA's) selection of a remedy for contamination at the Standard Chlorine Chemical Company, Inc. Site (SCCC Site), chosen in accordance with the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§ 9601-9675, and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. This decision document explains the factual and legal basis for selecting the remedy. The Administrative Record Index (see Appendix 3) identifies the items that comprise the Administrative Record upon which the selected remedy is based.

The State of New Jersey was consulted on the proposed remedy in accordance with CERCLA Section 121(f), 42 U.S.C § 9621(f). The State of New Jersey concurs with EPA's selection of Alternative III for remediation of the SCCC Site. The State of New Jersey does not fully concur on the ROD, however, as stated its September 26, 2016 letter, because the current property owners have not agreed to the required institutional controls. Moreover, The State of New Jersey stated that it continues to object to EPA's exclusion of the Hackensack River as an operable unit of the SCCC Site (see Appendix 4).

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances, pollutants, or contaminants from the SCCC Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy in this ROD is the first and only planned remedial phase or operable unit for the SCCC Site. The selected remedy addresses contaminated soil, surface water, groundwater, and dense non-aqueous phase liquids (DNAPL). In addition to the remedy components already in place as a result of early actions at the Site, including a fully enclosed perimeter barrier wall

system, hydraulic control groundwater extraction and treatment systems, existing surface covers, and stormwater management facilities, the selected remedy requires the following components:

- Placement of targeted cap/cover in specific locations within Area 1 that are not capped/covered, including stone and vegetative cover areas and wetlands areas. The existing stone cover areas would be overlain by a more permanent cover such as asphalt paving. This alternative would also include repairing the existing covers (e.g., repairing the asphalt) as necessary. Stormwater management enhancements, including wetland restoration, would be incorporated into the remedial design;

- DNAPL recovery in Area 1 and Area 2;

- Institutional controls (ICs), such as deed notices, Classification Exception Areas/Well Restriction Areas (CEAs/WRAs), soil management and health and safety deed notice protocols, requirements for vapor barriers installed in any new building construction, and/or other ICs to restrict future use of the SCCC Site to commercial/industrial uses and prohibit residential use, to prohibit groundwater use in Area 1 and Area 2, and to prevent potential adverse exposures;

- Demolition of the Thomas A. Edison, Inc. Emark Battery Corporation (Edison) buildings; and

- Continued operation, maintenance, and monitoring (O&M) of remedial components, including the fully enclosed perimeter barrier wall system, hydraulic control groundwater extraction and treatment systems, existing surface covers, and stormwater management facilities.

These actions are considered the final remedy for the SCCC Site. Early response actions taken at the SCCC Site addressed, in whole or in part, the lagoons, the drainage ditches, septic tank contents, releases from certain buildings, and exposure to contaminated soil. The barrier wall system installation along the adjacent Hackensack River that encompasses a portion of the SCCC Site and the adjacent Diamond Shamrock property addressed groundwater migration, DNAPL migration, stormwater runoff, and nearshore sediments along the river frontage. The barrier wall currently prevents any further discharge of SCCC Site-related constituents to the Hackensack River. With respect to historic releases from the SCCC Site to the Hackensack River, additional investigation of the river is under consideration by EPA and NJDEP as a separate matter.

The principal threat wastes remaining at the SCCC Site are industrial fill with chromite ore processing residue and DNAPL. The selected remedy addresses the industrial fill principal threat waste through cap/cover systems and institutional controls to prevent exposure to the industrial fill materials and prevent transport by erosion and runoff or wind. The selected remedy addresses the DNAPL principal threat waste through recovery and off-site disposal of the DNAPL to the extent practicable, which will reduce its mass in the subsurface and prevent its migration into areas without DNAPL contamination.

The environmental benefits of the selected remedy may be enhanced by consideration, during remedy design or implementation, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Energy Policy.

The estimated 30-year present worth cost of the selected remedy, with a seven percent discount factor, is $11,246,000.

DECLARATION OF STATUTORY DETERMINATIONS

The selected remedy meets the requirements for remedial actions set forth in CERCLA Section 121, 42 U.S.C. § 9621, and the NCP at 40 CFR Section 300.430(f)(1)(ii) because it: 1) is protective of human health and the environment; 2) meets a level or standard of control of hazardous substances, pollutants, and contaminants which at least attains the legally applicable or relevant and appropriate requirements under federal and state laws or justifies a waiver; 3) is cost-effective; and 4) utilizes permanent solutions and alternative treatments (or resource recovery) technologies to the maximum extent practicable.

The selected remedy does not satisfy the statutory preference for treatment of principal threat waste as a principal element of the remedy. The selected remedy addresses the principal threat wastes through cap/cover systems on the industrial fill materials and recovery and off-site disposal of the DNAPL because neither the industrial fill material nor the DNAPL liquid waste are suitable for treatment. SCCC Site-specific factors regarding the principal threat wastes, including the extensive nature of the industrial fill waste (38 acres with an average depth of eight feet) and the substantial quantities of DNAPL in the subsurface at numerous locations that cannot be readily identified due to their settling into troughs in a substantial clay layer at depth below the industrial fill, the meadow mat and a sand unit, make treatment technologies impracticable.

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, EPA will conduct a review as required by CERCLA within five years after initiation of the remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

ROD DATA CERTIFICATION CHECKLIST

The ROD contains the remedy selection information noted below. More details may be found in the attached Decision Summary and the Administrative Record file for the SCCC Site.

- Chemicals of concerns (COCs) and their respective concentrations (see Appendix 2, Tables 1A through 1C);

- Objectives for the cleanup and the basis for invoking a technical impracticability waiver for groundwater standards for COCs (see ROD section "Remedial Action Objectives");

- Baseline risks presented by the COCs (see ROD section "Summary of Site Risks" and Table 5);

- How source materials constituting principal threats will be addressed (see ROD section "Principal Threat Wastes" and "Statutory Determinations – Preference for Treatment as a Principal Element");

- Current and reasonably anticipated future land use assumptions and current and potential future beneficial uses of groundwater considered in the baseline risk assessment and ROD, including potential land and groundwater uses that will be available at the SCCC Site as a result of the Selected Remedy (see ROD section "Current and Potential Future Land and Resource Uses");

- Estimated capital, annual operation and maintenance, and present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (see ROD sections "Summary of Remedial Alternatives" and "Comparative Analysis of Alternatives – Cost" with embedded table of costs); and,

- Key factors used in selecting the remedy, i.e., how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria, highlighting criteria key to the decision (see ROD section "Selected Remedy").

AUTHORIZING SIGNATURE

Walter E. Mugdan, Director
Emergency & Remedial Response Division

September 30, 2016
Date

DECISION SUMMARY

Standard Chlorine Chemical Company, Inc. Site
Kearny, New Jersey

U.S. Environmental Protection Agency
Region 2
September 2016

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SITE NAME, LOCATION AND DESCRIPTION

The Standard Chlorine Chemical Company, Inc. Site (SCCC Site), U.S. Environmental Protection Agency (EPA) Superfund Site Identification Number NJD002175057, is located at 1025-1035 Belleville Turnpike in Kearny, New Jersey, along the Hackensack River (Appendix 1, Figure 1). EPA is the lead agency and the New Jersey Department of Environmental Protection (NJDEP) is the support agency.

The SCCC Site consists of approximately 42 acres in an industrial area of the Town of Kearny, Hudson County, New Jersey. It includes the 25-acre former SCCC property located at 1025-1035 Belleville Turnpike and a 13-acre portion of the adjacent Seaboard Hudson County Improvement Authority (HCIA) property commonly referred to as the Seaboard property. Together, the SCCC property and 13-acre portion of the Seaboard property are designated as Area 1 of the SCCC Site. The SCCC Site also includes 3.8 acres that consist primarily of the Belleville Turnpike, Newark Turnpike, and associated right-of-ways and steep embankments, which are designated as Area 2 of the SCCC Site (Appendix 1, Figure 2). The Seaboard property adjacent to the south of the SCCC Site is a New Jersey brownfields site, and the Diamond Shamrock property adjacent to the north of the SCCC Site is also a New Jersey brownfields site.

SITE HISTORY AND ENFORCEMENT ACTIVITIES

The area of the SCCC Site originally consisted of marshlands bordering the Hackensack River. In the first half of the 20th century, industrial fill materials were placed in the coastal marshlands of this region to create property for industrial/commercial development. The SCCC Site is relatively flat, with elevations ranging from about three to 15 feet above sea level.
Since 1916, various forms of industrial manufacturing, chemical refining, blending/mixing, and/or processing have occurred on the different parcels that make up the SCCC property. Activities have included naphthalene refining and product formulation, lead-acid battery manufacturing, formulation of drain cleaner, dye-carrier production, and distillation/purification of various chlorinated benzenes. Buildings, production areas, ditches, and lagoons were constructed to support these historic operations. Two lagoons (east lagoon and west lagoon) were located on the eastern portion of the SCCC Site. The lagoons drained into a ditch that ran along the southern property boundary (southern ditch) and into the Hackensack River. The historical SCCC Site arrangement, along with the lot numbers, is shown in Appendix 1, Figure 3.

Early response actions were previously completed at the SCCC Site with oversight by EPA and/or NJDEP. At the current time, SCCC Site access is restricted. The surface of the SCCC property is currently either paved, covered with coarse gravel, or vegetated. Most of the buildings have been demolished and several concrete slabs are all that remain of the other former structures. The only original structures remaining are the five dilapidated buildings associated with the Thomas A. Edison, Inc. Emark Battery Corporation (Edison). A newly built structure houses the hydraulic control system and groundwater treatment plant. On the eastern portion of the SCCC Site, a mounded Consolidation Area was constructed with an engineered cover. A number of dense non-aqueous phase liquid (DNAPL) recovery wells, groundwater extraction wells, and piezometers are

present at the SCCC Site for operation, maintenance, and monitoring (O&M) of the early response actions. The current SCCC Site arrangement is shown in Appendix 1, Figure 4.

The SCCC Site is located within the 100-year floodplain of the Hackensack River, with the exception of limited areas that have been raised due to certain early response actions. Surface water runoff at the SCCC Site previously was channeled into surface ditches that emanated eastward toward the Hackensack River or into on-site lagoons. Currently, no flowing surface waters are present on the SCCC Site. A new subsurface stormwater collection piping system manages the stormwater runoff. Approximately 1.28 acres of man-made freshwater wetlands exist across the SCCC Site.

Property Ownership History

The northern portion of the SCCC Site (Block 287, Lots 48 and 49) was originally sold to the White Tar Company of New Jersey in 1916. White Tar Company was eventually acquired by the Koppers Company and successors. In 1946, Koppers acquired Lots 51, 52, and 52R from Edison, and by 1962 sold all of its properties to Standard Naphthalene Products Company, Inc., a wholly-owned subsidiary of SCCC. Standard Naphthalene and/or SCCC continued operations on Lots 48, 49, 51, and 52 until 1981.

The southern portion (Lots 50, 51, and 52) was acquired by Thomas A. Edison in 1917 and 1918 and, through a number of related party transfers, was owned by Edison by 1929, and used for lead acid battery production up to 1953. Lot 50 continued to be owned by Edison until December 1953, when the property was sold to Crown Rubber Products and then to Keaton Rubber Company. For the period between 1954 and 1963, Tanatex Chemical Corporation leased space in Building 3 on Lot 50 for its operations. For some of that period it also leased space in Building 1 on Lot 50. By 1962, Lot 50 was sold to SCCC. SCCC and its subsidiary Cloroben Chemical Corporation continued operating facilities at the SCCC Site until 1982 and 1993, respectively. On October 10, 2010, the Town of Kearny, New Jersey completed a tax foreclosure on Lots 48, 49, 50, 51, 52, and 52R and is now the owner of these parcels. Lot 52R, also known as 52.01, is a riparian parcel outboard of the barrier wall and is not considered part of the SCCC Site.

Lot 32.01 is approximately 25 feet wide and bisects the SCCC property in a roughly north/south direction. Lot 32.01 formerly contained working rail lines associated with the New York and Greenwood Lake Railroad and was used for transportation until use was discontinued at an unknown time. Prior to 1993, Lot 32.01 was acquired by HCIA, which still owns this portion of the SCCC Site today. HCIA also owns the Seaboard property, and thus is the owner of the 13-acre portion of Area 1 on the SCCC Site that is part of the Seaboard property.

Regulatory History

In 1982, a NJDEP inspection of the SCCC property revealed the presence of chromite ore processing residue-impacted fill materials, hexavalent chromium in surface waters, and spillages of naphthalene and dichlorobenzene on the ground surface. The inspection also disclosed that the lagoon system at the SCCC Site was previously used for waste disposal by Koppers Company.

Groundwater samples collected from a monitoring well on the Diamond Shamrock property adjacent to the SCCC property's northern border revealed the presence of naphthalene, dichlorobenzene, and trichlorobenzene in the groundwater, which NJDEP suspected to have migrated from the SCCC property. Subsequent sampling undertaken by SCCC and NJDEP from 1983 until 1987 demonstrated the presence of hazardous substances in groundwater and soil throughout the SCCC Site. In October 1989, SCCC entered into an Administrative Consent Order with NJDEP to conduct a remedial investigation and perform a remedial action at the SCCC Site. In April 1990, Occidental Chemical Corporation (OCC) and Chemical Land Holdings, Inc. (now Tierra Solutions, Inc.) entered into a separate Administrative Consent Order to address the chromite ore processing residue-impacted fill materials at the SCCC Site, which were generated at the adjacent Diamond Shamrock property. NJDEP was the lead agency during these initial investigations and early response actions. In December 2001, NJDEP referred the SCCC Site to EPA for proposed inclusion on the National Priorities List (NPL). On April 30, 2003, EPA proposed adding the SCCC Site to the NPL. The SCCC Site was subsequently listed on the NPL on September 19, 2007.

Enforcement History

In April 2008, EPA sent a general notice letter to SCCC, OCC, Beazer East, Inc. (Beazer), and Tierra Solutions, Inc. (Tierra) advising each party of its potential responsibility for cleanup of the SCCC Site under Section 107(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. § 9607(a), including all costs incurred by EPA in responding to releases at the SCCC Site. EPA sent a similar general notice letter to Cooper Industries, LLC (Cooper) in July 2009 and to Apogent Transition Corp. (Apogent) in December 2012. In July 2010, EPA contacted SCCC, Beazer, OCC, Tierra, and Cooper, inviting each party to enter into a settlement with EPA to conduct Remedial Investigation and Focused Feasibility Study (RI/FFS) activities at the SCCC Site. Later, EPA contacted Apogent to enter into the settlement. The RI/FFS was conducted pursuant to the May 2013 Administrative Settlement Agreement and Order on Consent entered into between EPA and Apogent, Beazer, Cooper, and OCC. Tierra participated in the RI/FFS on behalf of OCC.

EARLY INVESTIGATIONS AND EARLY RESPONSE ACTIONS

Early Investigations (1983 to 2009)

Major investigations and activities completed prior to the RI/FFS are listed below. These included investigations of impacts to soil, groundwater, surface water, and sediment, as well as an asbestos and lead paint survey of the Edison buildings, a wetlands delineation, an aerial topographic survey, waste classification requests, off-site disposal of demolition debris, numerical groundwater modeling, and sampling and analysis of vault contents.

Pre-RI/FFS Investigations and Surveys dating back to the early 1980s		
Date	Investigation	Company
1983-1984	Hydrogeologic Investigation	Roy F. Weston, Inc.
1985	Phase II Dioxin Investigation	E.C. Jordan, Inc.
1987	Stage 1 Dioxin Investigation	Roy F. Weston, Inc.
1988	Stage 2 and 3 Dioxin Investigations	Roy F. Weston, Inc.
1991	Chromium Delineation	French & Parrello Associates
1990-1993	Remedial Investigation/Supplemental RI	Roy F. Weston, Inc.
1996-1997	Focused Remedial Investigation	ERM, Inc.
1997-1999	Supplemental Remedial Investigation	Key Environmental, Inc.
2000	Soil/Sediment Sampling and Analysis	Enviro-Sciences, Inc.
2000	Characterization of Containerized Materials	Enviro-Sciences, Inc.
2002	Surface Water and Sediment Sampling	EPA Technical Assistance Team
2004	Asbestos and Lead Based Paint Survey	Omega Environmental
2008-2009	Interim Response Actions Pre-Design Investigation	Key Environmental, Inc.
2008-2009	Phase II Supplemental RI	Key Environmental, Inc.

Interim Remedial Measures (1990s to 2008)

Since the early 1990s, various interim remedial measures were completed at the SCCC Site with NJDEP oversight as follows:

- Installation of security fencing surrounding a former production area and lagoons to prevent unauthorized access;
- Addition of soil to the lagoon berm to increase its height and prevent potential overflows;
- Placement of stabilizing geotextile and rip rap along the Hackensack River shoreline in the vicinity of the lagoons;
- Removal of the contents of five aboveground storage tanks and repackaging of asbestos-containing material removed from the former distillation building;
- Installation of an asphalt pavement overlay on traffic areas where existing deteriorated asphalt pavement was present;
- Installation of geotextile fabric/aggregate/ asphalt cover in all remaining traffic areas where total chromium concentrations exceeded the NJDEP criterion in effect at the time (75 milligrams per kilogram);
- Placement of geotextile/geomembrane liner or aggregate cover construction in non-traffic areas west of a railroad right-of-way;
- Installation of a dust fence barrier along the railroad right-of-way and north fence line of the northeast process area; and,

- Improvements to the existing stormwater sewer located between the SCCC Site and the Diamond Shamrock property.

Work related to the SCCC Site with NJDEP as the lead agency continued through NPL listing in 2007, when EPA took over lead agency responsibilities.

Interim Response Actions and Non-Time Critical Removal Action (2009 to 2011)

In 2009, EPA approved an Engineering Evaluation/ Cost Analysis (EE/CA) for a non-time critical removal action under CERCLA that corresponded with an interim response action approved by NJDEP in 2008. EPA designated NJDEP as the lead agency for implementation of the EE/CA. Activities conducted pursuant to the EE/CA and the NJDEP interim response action include the following engineering controls and containment measures:

- Construction of a *barrier wall containment system*, a 1,230 foot long steel sheet pile wall along the Hackensack River and a 6,880 foot long barrier wall with cement bentonite slurry two feet in width. The barrier wall is keyed a minimum of three feet into the underlying varved clay, which contains the area inside the barrier wall from the surrounding subsurface. The barrier wall system was initially designed to contain contamination on the SCCC property and Diamond Shamrock property, and was expanded prior to construction to also enclose 13 acres of Seaboard property when groundwater and subsurface soil data showed that SCCC Site-related DNAPL had migrated onto Seaboard property.

- A *DNAPL recovery system* consisting of sixteen 18-inch diameter high-density polyethylene recovery wells with 10-foot deep sumps within the barrier wall system; as of June 30, 2016, 6,330 gallons of DNAPL have been recovered at the SCCC Site for off-site disposal;

- A *hydraulic control system and groundwater treatment plant* to maintain hydraulic control of groundwater within the barrier wall and to treat impacted groundwater pursuant to a New Jersey Pollutant Discharge Elimination System (NJPDES) Permit No. NJ0155438, with treated effluent meeting discharge permit limits and then discharging to the Hackensack River;

- *Lagoon dewatering and solidification*. Historic analytical results confirmed the lagoons as a significant source area. Lagoon solids were found to consist of 77 percent naphthalene with the remainder consisting largely of chlorinated benzenes, methylnaphthalene, phenols, 2,3,7,8-tetrachlorodibenzo-p-dioxin, arsenic, lead, and hexavalent chromium. The accumulated liquids in the former lagoons were collected and treated on-site and the solids were stabilized primarily with Portland cement and encapsulated in place;

- Construction of a *Consolidation Area and surface cover* in the vicinity of the former lagoons. Soft soils in the south ditch were found to contain chlorinated benzenes (1,4-dichlorobenzene most frequently), naphthalene and other polycyclic aromatic

hydrocarbons (PAHs), and to a lesser extent polychlorinated biphenyls (PCBs) and dioxin/furans, chromium, and lead. The south ditch soft soils were excavated, stabilized with Portland cement, and placed in the Consolidation Area. Materials generated during the barrier wall construction and nearshore river sediment impacted by chlorobenzenes, naphthalene and other PAHs, dioxins, and metals, including chromium, were removed, stabilized, and placed in the Consolidation Area. The Consolidation Area was covered with a multi-layer cover system consisting of a 60-mil linear low density polyethylene liner, geosynthetic drainage layer, structural fill, and top soil;

- *Treatment and disposal of septic tank contents*. Six septic tanks were sampled and analyzed to determine appropriate disposal methods and requirements. The tank solids contained benzene, various chlorobenzenes, naphthalene and other PAHs, PCBs, and several metals. Solids were removed and disposed of off-site. Liquids were removed and treated in a temporary on-site treatment facility, and discharged through the NJPDES outfall. The tanks were then filled with a flowable concrete grout; and,

- *Process area surface cover and stormwater controls*. A liner and gravel surface cover was installed in the former process area located to the north of the former lagoons. Existing surface cover materials across the SCCC Site were repaired as needed. Stormwater conveyance piping, catch basins, and manholes were installed to convey stormwater historically carried by the south ditch. The newly installed stormwater system is approximately 2,980 feet long and extends from the northwestern corner of the SCCC Site to the Hackensack River.

CERCLA Removal Action (2010)

In June 2010, SCCC and Beazer entered into an Administrative Order on Consent for a Removal Action with EPA that required sealing the openings in the former process area buildings and the maintenance, and replacement as necessary, of the existing fencing surrounding the eastern portion of the SCCC Site and the warning signs along the fencing. These activities are summarized in the December 2010 Final Report, Closure of Building Openings, Northeastern Area, Standard Chlorine Chemical Company Superfund Site, which is included in the Administrative Record for the Site (see Appendix 3).

HIGHLIGHTS OF COMMUNITY PARTICIPATION

The public has been informed of the progress on the RI/FFS and other Superfund actions through community notification flyers, presentations, and updates in accordance with the *2014 Community Involvement Plan* developed for the SCCC Site. In 2010, EPA published a public notice and established a 30-day public comment period on the EE/CA for the non-time critical removal action described above.

The local community has provided input to EPA regarding SCCC Site progress. EPA representatives also received input regarding the reasonably anticipated future land use of the SCCC Site. The Town of Kearny's conditionally designated developer, the Sitex Group, LLC,

provided information to EPA regarding its plans to construct an 850,000 square foot warehouse and distribution center on the SCCC property and adjacent Diamond Shamrock property. Morris Kearny Associates, LLC, with which HCIA has entered into a purchase and sale agreement for the adjacent Seaboard property, also provided EPA with plans for redevelopment of the Seaboard property, including the 13-acre portion of the Seaboard property included within Area 1 of the SCCC Site. The Seaboard redevelopment plan includes the construction of four new industrial warehouse buildings totaling approximately 2.1 million square feet and related infrastructure.

The Proposed Plan for the SCCC Site was released for public comment on July 27, 2016. The Proposed Plan and other SCCC Site-related documents were made available to the public in the administrative record file maintained at the Kearny Public Library in Kearny, New Jersey, and at the EPA Region 2 Superfund Records Center located at 290 Broadway, New York, New York (Appendix 3). The notice of availability of these documents was published in *The Observer*, a Kearny newspaper, on July 27, 2016. A public comment period was held from July 27, 2016, to August 26, 2016.

A public meeting was held on August 16, 2016, at Kearny Town Hall – Council Chambers, 402 Kearny Avenue, Kearny, New Jersey, to discuss the findings of the RI/FFS and to present EPA's Proposed Plan to the community. At this meeting, EPA representatives answered questions about the RI/FFS and the remedial alternatives. Comments that were received by EPA at the public meeting and in writing during the public comment period are summarized and addressed in the Responsiveness Summary (see Appendix 5).

SCOPE AND ROLE OF RESPONSE ACTION

The SCCC Site is being addressed as a single operable unit. The RI/FFS was completed for all SCCC-Site related constituents of interest, environmental media, and exposure pathways of concern.

Early response actions taken at the SCCC Site addressed, in whole or in part, the lagoons, the drainage ditches, septic tank contents, releases from certain buildings, and exposure to contaminated soil. The barrier wall system installation along the adjacent Hackensack River that encompasses a portion of the SCCC Site and the adjacent Diamond Shamrock property, addressed groundwater migration, DNAPL migration, stormwater, and nearshore sediments along the river frontage and currently prevents any further discharge of SCCC Site-related constituents to the Hackensack River. With respect to historic releases from the SCCC Site to the Hackensack River, additional investigation of the river is under consideration by EPA and NJDEP as a separate matter in light of the many potential sources of contamination along the 45-mile river. EPA has released a September 2015 Preliminary Assessment of the Lower Hackensack River, Bergen and Hudson Counties (which is available online at https://www.epa.gov/nj/hackensack_river_preliminary_assessment_report).

SITE CHARACTERISTICS

A Site Characterization Summary Report (March 2013) and Site Characterization Summary Report Addendum (March 2014) were prepared to summarize the investigations and the early response actions that were conducted at the SCCC Site prior to the RI/FFS. These reports also identified data gaps requiring further investigation during the RI. The RI Report and RI Addendum Report combine information from the Site Characterization Summary Reports and the RI field work to characterize the SCCC Site.

Remedial Investigation (2013 to 2015)

To supplement the pre-RI/FFS investigations conducted from 1983 to 2009, the first phase of RI field investigation focused on obtaining data necessary to evaluate the risks posed to human health and the environment and to support the evaluation of remedial alternatives in the FFS. The main data gaps included surface soil evaluation, DNAPL delineation, and verifying the continuity of the varved clay. Appendix 1, Figure 5 shows sample locations. The RI investigations confirmed that the thick and continuous varved clay unit located below the industrial fill, the original meadow layer, and a sand unit, is an effective barrier to vertical migration of dissolved phase groundwater constituents and DNAPL. The original meadow layer has been compressed (i.e., into a meadow mat unit) and was found to effectively mitigate and impede the downward migration of hexavalent chromium by reducing it to insoluble trivalent chromium.
Details are summarized in the March 2015 RI Report. A brief summary of the RI Report is presented below.

Geology and Hydrology

Hudson County lies within the Piedmont Physiographic Province of New Jersey. It is mainly underlain by slightly folded and faulted sedimentary rocks of Triassic and Jurassic age (240 to 140 million years old) and igneous rocks of Jurassic age. At the surface, the Piedmont is a low rolling plain divided by a series of higher ridges that slope gently toward sea level in Newark Bay.

The area originally consisted of marshlands bordering the Hackensack River. In the first half of the 20th century, industrial fill materials were placed in the coastal marshlands of this region to create property for industrial/commercial development. At the SCCC Site, the industrial fill materials (fill unit) are two to 10 feet thick and include chromite ore processing residue generated at the adjacent Diamond Shamrock property. The marsh surface below the fill unit is two to eight feet thick and consists of silt, humus, and peat (meadow mat). Beneath the meadow mat is a sand unit generally less than 10 feet thick and a continuous varved clay unit estimated at greater than 40 feet thick across the SCCC Site. Below the clay unit is glacial till and bedrock.

The fill unit and the sand unit are separate shallow groundwater bearing units. The fill unit is unconfined and the depth to groundwater is typically three to four feet below existing ground surface. The meadow mat is compacted into a semi-confining unit. Decomposition of the organic matter in the meadow mat has used up the available oxygen so that it is now a chemically reducing environment. The varved clay unit has low permeability and is an effective aquitard hydraulically

separating the sand unit above and the glacial till and bedrock below. Prior to installation of the barrier containment wall system, groundwater flow was generally from north to south across the SCCC Site, except in the eastern portion near the lagoons where groundwater flow radiated away from the lagoons in the fill unit and was eastward towards the Hackensack River in the sand unit. With the completion of the barrier wall system in 2011, all groundwater within the wall is contained and a gradient differential is maintained across the barrier wall.

The SCCC Site is located within the 100-year floodplain of the Hackensack River with the exception of limited areas that have been raised due to certain early response actions (e.g., construction of the ground water treatment plant). Surface water runoff at the SCCC Site previously was channeled into surface ditches that emanated eastward toward the Hackensack River or into on-site lagoons. Currently, no flowing surface waters are present on the SCCC Site, and thus no surface water is discharging from the SCCC Site to the Hackensack River. A new subsurface stormwater collection piping system manages the stormwater runoff. Approximately 1.28 acres of man-made freshwater wetlands exist across the SCCC Site.

DNAPL

DNAPL is an immiscible fluid with a density greater than water that migrates through the subsurface and leaves behind a residual that is difficult to remediate. The DNAPL at the SCCC Site contains chlorinated benzenes, naphthalene, PCBs, and dioxins/furans, which are associated with naphthalene and chlorinated benzene refining and other processing activities conducted at the SCCC Site.

DNAPL in the fill unit is present in the former lagoon area and near Building 4 on Lot 50. DNAPL in the sand unit extends beyond the SCCC property onto the Seaboard property (Appendix 1, Figure 6). The DNAPL is considered to be an ongoing source of groundwater impacts in both the fill unit and the sand unit.

Surface and Subsurface Soil

Impacts to surface and subsurface soil extend across the SCCC Site due to the placement of the historical fill and historical manufacturing/processing activities. Constituent groups detected include chlorinated benzenes, PAHs (including naphthalene), PCBs, dioxins/furans (or polychlorinated dibenzodioxin/polychlorinated dibenzofuran (PCDD/PCDF)), and metals, including lead and hexavalent chromium. Chlorinated benzenes were found in soil in both the eastern and western portions of the SCCC Site, generally near former chlorinated benzene distillation, purification, storage, and/or handling areas and the lagoons. Chlorinated benzene concentrations were generally highest in soil at depth in the sand unit due to their accumulation as DNAPL on top of the underlying varved clay.

Naphthalene and other PAHs, and to a lesser extent PCBs and PCDD/PCDF, were found in the eastern SCCC Site soil and lagoons. Naphthalene and other PAHs were also found in the western SCCC Site soil within areas of fill. The highest concentrations were associated with the lagoons and DNAPL beneath or near the former lagoons and extending west. Chromium was found in the

western, eastern, and southern portions of the SCCC Site. Hexavalent chromium was found primarily within the upper 10 feet of the fill unit. Lead was found in the eastern and western portions of the SCCC Site.

Groundwater

Investigations of shallow groundwater within the fill unit found SCCC Site-related constituents in groundwater, including chlorinated benzenes, several volatile organic compounds, naphthalene and other PAHs, phenols, PCBs, lead, and chromium. The highest concentrations of chlorinated benzenes and PAHs were found in the former lagoon area, although chlorinated benzenes were also found in the groundwater in the fill unit in the western portion of the SCCC Site near Building 2.

A similar suite of constituents was found in the sand unit groundwater, with the exception of hexavalent chromium due to the reducing influence of the overlying meadow mat, an organic rich layer that reduces hexavalent chromium to trivalent chromium. Impacts of organic constituents in the sand unit were found to be laterally extensive and vertically limited due to the underlying varved clay acting as a barrier to downward migration.

Surface Water

Historical data indicated impacts to surface water in drainage ditches from chlorinated benzenes, naphthalene and other PAHs, lead, and total chromium. Surface water in the former lagoon representing accumulated precipitation in contact with lagoon solids contained dichlorobenzene, phenols, total chromium, and lead. The stagnant nature of surface water in the ditches appeared to have limited surface water impacts, and no significant impacts to Hackensack River surface water were identified during several historical sampling events.

Remedial Investigation Addendum (2015 to 2016)

Following the RI conducted from 2013 to 2015, a second phase of RI field work was initiated to determine whether SCCC Site-related DNAPL had migrated to the west beyond the limits the barrier wall prior to its construction. The area investigated in this second phase of RI field investigation became known as Area 2 of the SCCC Site (the area within the barrier wall was then Area 1). The data necessary to delineate SCCC Site-related DNAPL impacts to subsurface soils and groundwater in Area 2 of the SCCC Site are summarized in the January 2016 RI Addendum Report. A brief summary of the RI Addendum Report is presented below.

- The geologic profile within Area 2 is the same as Area 1. Surficial materials in Area 2 are comprised of (in descending order) fill unit, meadow mat, sand unit, and varved clay. The higher elevation in Area 2 is consistent with a thicker fill in Area 2 associated with road construction. The varved clay unit is continuous beneath Area 2.

- Area 2 is located hydraulically downgradient of Area 1. A northward component of groundwater flow south of Area 2 limits dissolved constituent migration to the south.

- SCCC Site-related impacts in Area 2 are limited to subsurface soil and groundwater within the sand unit. The horizontal extent of SCCC Site-related impacts in the sand unit appears to end at the vegetated highway median between the westbound lane of the Belleville Turnpike and the Newark Turnpike.

- The configuration of the upper surface of the varved clay appears to have some control on the distribution of DNAPL in Area 2. DNAPL was observed in a localized broad depression in the varved clay surface. The clay surface elevation rises slightly to the south and west, preventing further DNAPL movement laterally to the south and west. Based upon evidence from Area 1, the varved clay is an effective barrier to vertical migration of DNAPL beneath Area 2.

- Significant reductions in dichlorobenzene concentrations in subsurface soil and groundwater occur within a short distance of DNAPL impacted areas, indicating that migration of dissolved phase groundwater impacts is limited.

- A DNAPL that is believed not to be SCCC Site-related was encountered south of Area 2. This DNAPL has a different chemical signature than the DNAPL encountered at the SCCC Site, which is predominantly dichlorobenzene, and was found at a shallower depth than where the SCCC Site-related DNAPL was found. The findings related to this non-SCCC Site-related DNAPL are presented in the RI Addendum and have been made available to NJDEP for further evaluation. Further investigation of this non-SCCC Site-related DNAPL, however, was beyond the scope of the RI/FFS.

CULTURAL RESOURCES AND EDISON BUILDINGS

Activities conducted under CERCLA are required to comply with Section 106 of the National Historic Preservation Act of 1966, as amended, 54 U.S.C. § 306108, and its implementing regulations (36 CFR Part 800). Archaeological and architectural surveys and related efforts were completed as part of the RI/FFS to address the possible presence of pre-European contact cultural resources and to document the historic Edison buildings in compliance with the requirements of the National Historic Preservation Act. A summary of these reports follows:

- *Phase IA Cultural Resource Survey for the Standard Chlorine Chemical Company Site, Interim Response Action Work Plan – Town of Kearny, Hudson County, New Jersey (August 2009)* – This document was developed prior to the installation of the barrier wall to assess the presence or absence of cultural resources and the potential impacts on those resources. This report concluded that there was a low to moderate potential for deep archaeological deposits and that the activities would have only a temporary adverse effect on the historic buildings.

- *Phase IB Archaeological Survey During Slurry Wall Construction (May 2011)* – Samples were collected from the sand unit (approximately nine to 17 feet below grade) during the barrier wall construction to evaluate potential evidence of pre-European contact. Possible

artifacts were recovered primarily where the barrier wall extends along the Hackensack River. A recommendation for conducting potential additional archaeological surveying was included in the report if other deep excavation activities were to be implemented.

- *Historic American Buildings Survey (HABS) (October 2015)* – This document provides details on the architectural aspects of the Edison buildings. It includes information on the Emark plant and the chronology of its operation. This document includes numerous photographs and copies of some original architectural drawings and meets the Secretary of the Interior's Standards for Architectural and Engineering Documentation.

- *This is the Story of Emark – A Product of Thomas A. Edison, Inc. (October 2015)* – This document is a public information bulletin to promote public understanding and appreciation of the SCCC Site's historic significance.

- *This is the Story of Emark: Learning from New Jersey History – Teacher's Guide and Lesson Plans Grade 4 (October 2015)* – This document was prepared to fulfill specific standards and goals of the New Jersey Core Curriculum Content Standards for Social Studies and Science and to foster local interest and pride.

A Memorandum of Agreement pursuant to the National Historic Preservation Act was signed in 2016 by representatives of the EPA and New Jersey State Historic Preservation Office. The Memorandum of Agreement documents the measures that have been implemented to mitigate planned adverse effects to the cultural resources (i.e., demolition of the Edison buildings). Although the buildings have historic significance, they contain asbestos and lead and are dilapidated beyond repair. The sampling conducted in 2004 established the buildings as having regulated asbestos-containing material (one percent or greater asbestos content) which requires removal prior to the onset of demolition, and lead based paint up to 11 percent by weight. Further sampling was not undertaken during the RI/FFS for physical safety reasons due to the deteriorated condition of the buildings. EPA has determined that the Edison buildings constitute a release or threat of release of hazardous substances to the environment. The cultural resource surveys have documented the historic significance of the Edison buildings in advance of demolition.

CURRENT AND POTENTIAL FUTURE LAND AND RESOURCE USES

Land Use

The SCCC Site is currently vacant and access to it is restricted. The SCCC Site and the surrounding areas were historically used for industrial and commercial activities.

The RI/FFS considered the reasonably anticipated future uses of the SCCC Site. In 2012, the Town of Kearny, which owns the majority of the SCCC Site, petitioned the New Jersey Meadowlands Commission (now the New Jersey Sports and Exposition Authority) to designate the SCCC property and adjoining properties as a redevelopment area. In 2013, the New Jersey

Meadowlands Commission adopted a redevelopment plan for the area that allows for certain commercial or industrial uses and prohibits residential use. The Town of Kearny recently adopted a resolution (Resolution 2016-250) conditionally designating the Sitex Group, LLC (Sitex) as the redeveloper of the SCCC property and the adjacent Diamond Shamrock property owned by Tierra. Sitex is planning to construct an 850,000 square foot warehouse and distribution center on the SCCC property and adjacent Diamond Shamrock property.

Plans for redevelopment of the Seaboard property are also underway. According to information provided to EPA by HCIA, HCIA has entered into a Purchase and Sale Agreement with Morris Kearny Associates, LLC (Morris) to develop the Seaboard property, including the 13-acre portion of the Seaboard property included within Area 1 of the SCCC Site. In 2016, the HCIA/Morris development for the entire 175-acre Seaboard property was designated a "Vital Project" by the New Jersey Sports and Exposition Authority. Morris's redevelopment plan for the portion of the Seaboard property in the vicinity of the barrier wall includes the construction of four new industrial warehouse buildings totaling approximately 2.1 million square feet, along with paved parking lots, paved roads, and utility infrastructure.

Most of Area 2 consists of a New Jersey Department of Transportation (NJDOT) right-of-way for Belleville Turnpike and Newark Turnpike and is occupied by highway and associated steep embankments. It is reasonably anticipated that the future use will remain consistent with this current use.

The remedial alternatives were developed to be compatible with the commercial/industrial future uses of the SCCC Site while remaining protective of human health and the environment.

Groundwater Use

The SCCC Site is subject to NJDEP classification exception area/well restriction areas (CEA/WRAs) established prior to the RI/FFS. A CEA serves as an institutional control (IC) by providing notice that groundwater quality standards are not or will not be met in a localized area due to natural water quality or anthropogenic influences (for example, impacted sites), and that aquifer uses are restricted in the affected area for the duration of the CEA.

In 2003, Tierra, on behalf of OCC, established a CEA/WRA that covers certain chromite ore processing residue sites on the Kearny Peninsula, including the SCCC property. The constituents listed in CEA/WRA for the chromite ore processing residue sites include total chromium, hexavalent chromium, total dissolved solids, and chloride.

In 2013, Beazer established a CEA/WRA that addresses the 13 acres of the Seaboard property included in Area 1 of the SCCC Site and enclosed within the barrier wall system. The constituents of interest listed in the CEA/WRA for the Seaboard property include various volatile organic compounds, semi-volatile organic compounds, and metals.

SUMMARY OF SITE RISKS

A site-specific baseline risk assessment was conducted to estimate the current and future effects of contaminants on human health and the environment. A baseline risk assessment is an analysis of the potential adverse human health and ecological effects of releases of hazardous substances from a site in the absence of any actions or controls to mitigate such releases, under current and future land uses. The baseline risk assessment includes a baseline human health risk assessment and a baseline ecological risk assessment. The results of the human health risk assessment are provided in the December 2014 baseline human health risk assessment. The results of the ecological risk assessment are provided in the September 2014 screening level ecological risk assessment. A summary of the human health risk assessment is shown in Appendix 2, Table 5.

Human Health Risk Assessment

A four-step human health risk assessment process was used for assessing site-related cancer risks and non-cancer health hazards. The four-step process is comprised of:

Hazard Identification: In this step, the chemicals of concern at the SCCC Site in the various media (groundwater, soil, sediment, and surface water) are identified based on factors such as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentration of the contaminants in specific media, mobility, persistence, and potential for bioaccumulation. Chemicals of concern include chlorinated benzenes, several volatile organic compounds, naphthalene and other PAHs, phenols, PCBs, and hexavalent chromium (Appendix 2, Table 1A through 1C).

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the chemicals of concern in the various media identified in the previous step are identified. The exposure areas include the western area, located west of the railroad right-of-way that parallels the Hackensack River, and the eastern area, located between the railroad right-of-way and the riverbank. Examples of exposure pathways include incidental ingestion and dermal contact with contaminated groundwater. Factors relating to the exposure assessment include, but are not limited to, the concentrations in specific media that people might be exposed to and the frequency and duration of the exposure. Using these factors, a reasonably maximum exposure scenario is calculated, which is an appropriate mix of values that reflect averages (for example, adult body weight) and 95^{th} percentile distributions that together portray the highest level of human exposure that could reasonably be expected to occur. The exposure pathways evaluated are presented in Appendix 2, Table 2. The conceptual site models for Area 1 and Area 2 are shown in Appendix 1, Figures 7 and 8, respectively, and depict an evaluation of potential exposure pathways for each area.

Toxicity Assessment: In this step, the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure (dose) and severity of adverse effects (response) are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or non-cancer health hazards, such as changes in the

normal function of organs within the body (e.g., changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health hazards. The toxicity values that were used to evaluate non-cancer health hazards are presented in Appendix 2, Table 3A and Table 3B. The toxicity values that were used to evaluate cancer risk are presented in Appendix 2, Table 4A and Table 4B.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of SCCC Site-related risks for all chemicals of concern. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a one-in-ten-thousand excess lifetime cancer risk, or one additional cancer may be seen in population of 10,000 as a result of exposure to SCCC Site contaminants under the conditions identified in the exposure assessment. Superfund regulations for exposures identify the range for determining whether remedial action is necessary as an excess lifetime cancer risk of 10^{-4} to 10^{-6}, corresponding to a one-in-ten-thousand to one-in-a-million excess cancer risk. For non-cancer health effects, a hazard index (HI) is calculated. An HI represents the sum of the individual non-carcinogenic exposure levels compared to their corresponding reference doses. The key concept for a non-cancer HI is that a threshold exists below which non-cancer health hazards are not expected to occur (an HI of one or less would indicate that the threshold is not exceeded and a non-cancer health hazard is not expected). These acceptable risk levels are defined in the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) at 40 CFR Section 300.430(e)(2)(I)(A). Chemicals that contribute to a cancer risk that exceeds 10^{-4} or an HI to a specific target that exceed one are typically those that will require remedial action at a site.

The baseline human health risk assessment was conducted to evaluate the potential human health risks associated with current exposure to an on-site visitor, an on-site operator of the hydraulic control and treatment system, an outdoor worker, a utility worker, and future exposure to an indoor worker. Exposure media are surface soil, subsurface soil, surface water, air, and groundwater. The risk characterization summaries for non-cancer and cancer health effects are presented in Appendix 2, Table 5.

Under current conditions, there are no known complete human exposure pathways. The early response actions conducted at the SCCC Site have addressed the current known pathways that may result in human exposure to SCCC Site-related contaminants.

Under future use scenarios, there are estimated cancer risks and non-cancer health hazards that are above acceptable levels in the absence of a remedial action. The main potential future exposure pathway is associated with disturbance of the impacted soil located beneath clean cover materials. Human receptors that could be involved in surface or subsurface soil disturbance are future construction or utility workers, or possibly full-time outdoor employees and on-site visitors. Exposure routes to these potential future receptors are inhalation of fugitive dust, and dermal contact with and incidental ingestion of impacted soil, such as potential exposures during or after SCCC Site redevelopment. The baseline risk assessment requires that additional controls, such as

health and safety measures and fugitive dust suppression, are assumed to be absent. Exposure to groundwater and disturbance of the cover materials and exposure to the underlying soils results in unacceptable risks to most receptors (calculated cancer risk up to 1×10^{-2} and non-cancer HI up to 21,189). In addition, the future construction of industrial or commercial structures without vapor mitigation systems was found to potentially result in an unacceptable inhalation risk to future occupants due to the potential for intrusion of vapors originating from impacted soil and groundwater at the SCCC Site. Therefore, future development, including buildings, will require further project-specific analysis of this pathway and/or the use of construction techniques to mitigate the potential for intrusion of vapors into buildings or other measures to address this pathway.

Furthermore, sampling and analysis conducted in the Edison buildings identified the presence of asbestos and lead in the building materials. As described earlier, these buildings are at risk of collapse and cannot be safely entered. The mechanisms for past, present and future releases to the environment include the effects of weathering of these contaminants in building materials existing on the SCCC Site. Asbestos fibers and lead-contaminated dust can travel in air when disturbed by natural wind events or man-made disruption. The most significant human exposure pathway for asbestos is the inhalation of respirable asbestos fibers. Once released, asbestos fibers can remain in suspension for long periods and can be transported long distances. Wind traveling over the Site may cause asbestos fibers to be entrained in the air increasing the likelihood of being carried off-property. Given the likelihood of building collapse, this condition is expected to worsen over time.

Uncertainties

The procedures and inputs used to assess risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty include:

- Environmental chemistry sampling and analysis;
- Environmental parameter measurement;
- Fate and transport modeling;
- Exposure parameter estimation; and,
- Toxicological data.

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the media sampled. Consequently, there could be significant uncertainty as to the actual levels present. However, during the RI, areas of suspected contamination were included in the sampling so the uncertainty associated with uneven distribution would have erred on the side of overestimating concentrations. Environmental chemistry-analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled. The use of standard methods and quality assurance protocols help mitigate this source of uncertainty. Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come into contact with the chemicals of concern, the period of time over which such exposure would occur, and in the models used to estimate the concentrations of the chemicals of concern at the point of exposure. Upper-bound estimates were used in the

assessment which present a conservative estimate of exposure. Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals.

These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk assessment provides upper-bound estimates of the risks to populations at the SCCC Site, and is highly unlikely to underestimate actual risks related to the SCCC Site.

More specific information concerning public health risks, including a quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in the December 2014 baseline human health risk assessment.

Ecological Risk Assessment

The SCCC Site is located in a highly industrialized area and the conceptual site model identified that, under current and future SCCC Site conditions, there are no known completed exposure pathways for the potential ecological receptors identified for the SCCC Site. A screening level ecological risk assessment was conducted, which concluded that no potentially complete exposure pathways exist. Therefore, chemicals of potential ecological concern were not identified, the ecological risks were determined to be negligible, and further baseline ecological risk assessment work was not required.

Detailed information regarding the ecological risk can be found in the September 2014 Screening Level Ecological Risk Assessment.

Basis for Action

The results of the baseline risk assessment provide the basis for taking action and identify the contaminants and exposure pathways that need to be addressed by the remedial action. The baseline human health risk assessment indicates that exposure to groundwater and soil at the SCCC Site results in unacceptable risks to most receptors (calculated cancer risk up to 1×10^{-2} and non-cancer HI up to 21,189). In addition, the future construction of industrial or commercial structures without vapor mitigation systems was found to result in an unacceptable inhalation risk to future occupants due to the potential for intrusion of vapors originating from contaminants in soil and groundwater at the SCCC Site. The baseline ecological risk assessment consisted of a screening level ecological risk assessment which concluded that no potentially complete exposure pathways exist at the SCCC Site and thus the present SCCC Site conditions pose no unacceptable risks to ecological receptors.

Based on the results of the quantitative, SCCC Site-specific human health risk assessment, EPA has determined that actual or threatened releases of hazardous substances, pollutants, or contaminants from the SCCC Site, if not addressed by the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare or the environment.

REMEDIAL ACTION OBJECTIVES

Remedial action objectives (RAOs) are identified following completion of the baseline risk assessment and describe what the proposed cleanup is expected to accomplish. These objectives are based on available information and standards, such as applicable or relevant and appropriate requirements (ARARs), to-be-considered guidance, and SCCC Site-specific risk-based levels, if applicable. The following RAOs were developed for the SCCC Site:

- Eliminate human exposure to impacted surface soil and subsurface soil via direct contact, incidental ingestion, and inhalation.
- Eliminate the transport of impacted surface soil by erosion and runoff or wind.
- Prevent human exposures to SCCC Site-related impacted groundwater via direct contact, incidental ingestion, and inhalation.
- Prevent the migration of impacted groundwater into unimpacted groundwater, surface water, and wetlands.
- Prevent the migration of SCCC Site-related DNAPL into areas without DNAPL impacts.
- Reduce the mass of SCCC Site-related DNAPL in the subsurface to the extent practicable.
- Eliminate the release or threat of release of asbestos and lead into the environment from the dilapidated Edison buildings.
- Prevent future unacceptable risks due to vapor intrusion into new buildings.

As explained further below (see section "Selected Remedy"), the response action identified in this ROD satisfies the RAOs by addressing the risks identified in the baseline risk assessment.

Groundwater Restoration and Technical Impracticability Waiver

As stated in the NCP, EPA expects to restore usable groundwater to its beneficial use wherever practicable, within a timeframe that is reasonable given the particular circumstances at a site. When restoration of groundwater to beneficial uses is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction.

The groundwater in the vicinity of the SCCC Site is categorized as Class II, currently or potentially a source for drinking water. The state and federal drinking water standards (e.g., maximum contaminant levels, or MCLs) are chemical-specific ARARs for groundwater at the SCCC Site.

Hydrogeologic factors, contaminant-related factors, and SCCC Site-specific implementation factors were evaluated to determine the practicability of remediating the groundwater to MCLs in Area 1 and Area 2. The technical impracticability (TI) evaluation established that it is technically impracticable to remediate groundwater to drinking water standards. The chromite ore processing residue fill materials in Area 1 will continue to be a source of contaminants to the groundwater within the barrier wall for the foreseeable future. Hydrogeologic factors include diffusion of the DNAPL into the upper surface of the alternating clay and sand seams of the varved clay, which would pose a significant challenge to remediation. Contaminant factors include the high density and low viscosity of the DNAPL, which allow it to easily migrate extensively in the subsurface. While some portion of the DNAPL can be recovered in wells, residual DNAPL will remain trapped in subsurface voids. This residual DNAPL will dissolve slowly into the groundwater over many decades, making it technically impracticable to achieve groundwater standards in the micrograms per liter (ug/l), or part per billion, rang (e.g., 0.2 ug/l for benzene). The estimated timeframe for dissolution of the SCCC Site-related DNAPL is 150 years or more. In addition, land use considerations, including the NJDOT right-of-way and steep embankments, make remediation in that part of Area 2 impracticable.

For the reasons discussed above, restoration of groundwater to MCLs is not technically practicable and groundwater restoration is not an RAO for the SCCC Site.

CERCLA Section 121(d), 42 U.S.C. § 9621(d), specifies that a remedial action must require a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA Section 121(d)(4), 42 U.S.C. § 9621(d)(4). EPA is hereby invoking a TI waiver in the ROD. Consistent with the NCP, the RAOs for the SCCC Site include preventing further migration of the groundwater plume, preventing exposure to the contaminated groundwater, and further reducing risks by preventing the migration of DNAPL and preventing vapor intrusion of contaminants into new buildings which may be constructed during SCCC Site redevelopment.

Detailed information on the chemical-specific groundwater standards being waived and the area of the TI Waiver (i.e., TI zone) as well as other technical information in support of the TI Waiver is presented in the FFS Report and in the September 30, 2016 Technical Memorandum added to the Administrative Record. The ARARs being waived are listed in Appendix 2, Table 6 of this ROD.

SUMMARY OF REMEDIAL ALTERNATIVES

CERCLA Section 121(b)(1), 42 U.S.C. § 9621(b)(1), mandates that remedial actions be protective of human health and the environment, be cost effective, and use permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which use, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. As noted above, CERCLA Section 121(d), 42 U.S.C. § 9621(d), specifies that a remedial action must require a level or standard of

control of the hazardous substances, pollutants, and contaminants which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA Section 121(d)(4), 42 U.S.C. § 9621(d)(4).

Based on the RAOs listed above, technologies were identified and screened during the FFS based on overall implementability, effectiveness, and cost. Remedial alternatives consisting of one or more technologies were assembled and evaluated in detail. Remedial alternatives for the SCCC Site are summarized below and presented in detail in the July 2016 FFS Report. Capital costs are those expenditures that are required to construct a remedial alternative. O&M costs are those post-construction costs necessary to ensure or verify the continued effectiveness of a remedial alternative and are estimated on an annual basis. Present worth costs reflect the amount of money which, if invested in the current year, would be sufficient to cover all the costs over time associated with a project, calculated using a discount rate of seven percent and a 30-year time interval. Construction time is the time required to construct and implement the alternative and does not include the time required to design the remedy, negotiate performance of the remedy with the responsible parties, or procure contracts for design and construction.

Remedial Alternatives	
Alternative	**Description**
I	No Action
II	DNAPL Recovery, Barrier Wall, ICs, Building Demolition
III	Targeted Cap/Cover, DNAPL Recovery, Barrier Wall, ICs, Building Demolition
IV	Site-wide Engineered Cap/Cover, DNAPL Recovery, Barrier Wall, ICs, Building Demolition

Alternative I: NO ACTION

Capital Cost	$0
Annual O&M Cost	$0
Present Worth Cost	$0
Construction Time	0 months

The No Action alternative is required by the NCP as a baseline with which to compare other remedial action alternatives. Alternative I is not protective of human health and the environment because it does not meet any of the RAOs.

Alternative II: CONTINUED DNAPL RECOVERY IN AREA 1, BARRIER WALL SYSTEM, DNAPL RECOVERY IN AREA 2, INSTITUTIONAL CONTROLS, AND BUILDING DEMOLITION

Capital Cost	$1,392,000
Annual O&M Cost	$541,000
Present Worth Cost	$9,759,000
Construction Time	3 months

This alternative would include the barrier wall system and continued DNAPL recovery in Area 1, construction of a new DNAPL recovery system in Area 2, ICs, such as deed notices and CEAs/WRAs, demolition of the Edison buildings, and O&M.

The DNAPL recovery technology planned for Alternative II is continuing the passive DNAPL recovery already in place in Area 1 and passive DNAPL recovery in Area 2. The recovered DNAPL would be collected periodically and disposed of off-site. Use of the hydraulic control and groundwater treatment system would continue, with treatment consisting of chromium reduction, metals precipitation, carbon adsorption, oil separation, and solids management prior to discharge to the Hackensack River in compliance with effluent limits established under NJPDES Permit No. NJ0155438. The existing Area 1 O&M procedures would be implemented as described in the existing O&M Manuals and updated as appropriate. Additional recovery wells would be installed in Area 1 if needed. In Area 2, new large-diameter DNAPL recovery wells would be installed. Following initial well placement, the DNAPL removal procedures would be optimized, and additional recovery wells installed if needed.

ICs would prevent potentially adverse exposure by restricting or prohibiting future activities at and uses of the SCCC Site that could result in exposure to subsurface contamination. ICs, such as deed notices and CEAs/WRAs, will: (i) prohibit groundwater use; (ii) establish specific requirements to be adhered to for any activity which may result in disturbance of the existing Consolidation Area; (iii) prohibit intrusive activities below the SCCC Site ground surface unless appropriate health and safety measures (including personal protective equipment requirements), emission control measures, and SCCC Site restoration activities are employed; (iv) prohibit residential use of the SCCC Site and limit future use of the SCCC Site to commercial/industrial purposes; and (v) require the use of vapor control barriers for any new building construction to prevent vapors from infiltrating future structures on the SCCC Site. The existing CEAs/WRAs would be reviewed and updated as necessary, and a new and separate CEA/WRA request covering the entire SCCC Site would be established for Areas 1 and 2. A groundwater monitoring plan would be developed and implemented as part of O&M.

Demolition of the existing Edison buildings would be completed as part of this alternative. The building foundations would be left in place. Fill will then be added within the building footprints, as necessary, to bring the surface to grade. Non-hazardous debris resulting from the building demolition would be consolidated within the building footprint to the extent practical. The final surface would be graded to promote positive stormwater drainage.

Alternative III: TARGETED CAP/COVER, AREA 1 CONTINUED DNAPL RECOVERY IN AREA 1, BARRIER WALL SYSTEM, DNAPL RECOVERY IN AREA 2, INSTITUTIONAL CONTROLS, AND BUILDING DEMOLITION

Capital Cost	$4,618,000
Annual O&M Cost	$396,000
Present Worth Cost	$11,246,000
Construction Time	6 months

Alternative III would include placement of targeted cap/cover in specific locations within Area 1 that are not capped/covered, including stone and vegetative cover areas and wetlands areas. The existing stone cover areas would be overlain by a more permanent cover such as asphalt paving. This alternative would also include repairing the existing covers (i.e., repairing the asphalt) as necessary. Stormwater management enhancements would be incorporated into the remedial design. Alternative III would include the same DNAPL recovery in Area 1 and Area 2, ICs, including prohibitions on groundwater use and residential use of the SCCC Site as well as requirements for the use of vapor control barriers in any future buildings, demolition of the Edison buildings, and O&M as described in Alternative II.

The detailed specifications for Alternative III would be developed during remedial design. The conceptual locations for the new DNAPL recovery wells in Area 2 and the conceptual targeted cap/cover system details for Area 1 are shown on Appendix 1, Figure 9. The stone covered and vegetated areas are assumed to be covered with an asphalt cover system consisting of two inches of wearing course, two inches of asphalt binder course, four inches of granular subgrade, and capillary break as necessary. The proposed cap/cover systems would be retrofitted into the existing cap/cover systems. Low lying areas of the existing asphalt or areas observed to be in disrepair would be lined with additional asphalt to facilitate positive stormwater drainage and reduce infiltration. The wetlands areas would be covered with a geomembrane cap consisting of a 10 ounce per square yard (oz/sy) geotextile, a 60-mil capillary break geomembrane (or other capillary break component as needed), a 10 oz/sy geotextile, and one foot of wetlands planting substrate and revegetation. Proposed topsoil composition, planned plant species, and post-restoration monitoring requirements would be determined during the remedial design. The wetlands planting substrate is assumed to consist of a silty organic soil followed by wetlands plants; the list of plants would be determined during the design phase and likely would be consistent with existing restoration efforts for freshwater emergent wetlands which included the planting of salt meadow cordgrass, spike grass, prairie cord grass, black grass, swamp mallow, big cordgrass, seaside goldenrod, salt marsh bulrush, switch grass, and groundsel bush. It is assumed that the seed mixture to establish first year coverage would consist of annual rye, fall panicum, switch grass, coastal panic grass, and lady's thumb. A freshwater emergent wetlands restoration monitoring plan would be prepared as part of the remedial design. The plan would include invasive species management, post-construction monitoring (growing seasons one and two), specifications, and a final wetlands monitoring report.

Alternative IV: SITE-WIDE ENGINEERED CAP/COVER, CONTINUED DNAPL RECOVERY IN AREA 1, BARRIER WALL SYSTEM, DNAPL RECOVERY IN AREA 2, INSTITUTIONAL CONTROLS, AND BUILDING DEMOLITION

Capital Cost	$13,456,000
Annual O&M Cost	$231,000
Present Worth Cost	$17,299,000
Construction Time	12 months

Alternative IV would include a new engineered cap/cover system on the SCCC property for all but the Consolidation Area, which already has a geosynthetic liner overlain by a vegetative cover, and a wetland area cap/cover (as in Alternative III). Alternative IV also includes the option to relocate existing wetlands to other areas of the SCCC Site or to utilize the wetlands banking option and purchase wetland credits off-site. The capillary break cap/cover components and the stormwater management enhancements associated with Alternative III would be installed as part of Alternative IV. Alternative IV also would include the same DNAPL recovery in Area 1 and Area 2, ICs, including prohibitions on groundwater use and residential use of the SCCC Site as well as requirements for the use of vapor control barriers in any future buildings, demolition of the Edison buildings, and O&M as described in Alternative II.

The detailed specifications for Alternative IV would be developed during remedial design. Because the engineered cap/cover would encompass essentially the entire SCCC property (with the exception of the Consolidation Area and the wetlands areas), no repair of the existing covers would be necessary. The engineered cap/cover would extend over the prepared surface of the Edison building footprints. For conceptual planning and cost estimating, the SCCC property areas are assumed to be covered with an engineered cap/cover system consisting of a 10 oz/sy non-woven geotextile layer, a 60-mil geomembrane, another 10 oz/sy non-woven geotextile layer, approximately 33 inches of general fill (including a capillary break as needed), approximately three inches of topsoil, and seeding and mulching of the topsoil. The existing wetlands on-site that would be capped/covered include freshwater emergent wetlands that were formed as a result of stormwater runoff. The proposed Alternative IV cap/cover to be installed in the wetlands would be the same as that for the wetlands cover in Alternative III. If the existing wetlands are relocated on the SCCC Site, the relocation area would compensate for the loss of the existing wetlands, with the location and extent of the area to be determined during remedial design. No wetlands cap/cover would be required on-site if the wetlands banking and off-site wetlands credit purchase option were to be utilized. The relocated wetlands would be constructed in the same manner as the cap/cover installation methods in the freshwater emergent wetlands described in Alternative III and their location and areal extent would be determined during the remedial design.

Common Elements of Each Alternative

Alternatives II, III, and IV all include the barrier wall system; continued DNAPL recovery in Area 1; construction of a new DNAPL recovery system in Area 2; ICs, including prohibitions on groundwater use and residential use of the SCCC Site as well as requirements for the use of vapor

control barriers in any future buildings and health and safety measures for workers performing intrusive activities; demolition of the Edison buildings; and O&M. Alternative II does not include any placement of a cap/cover on the SCCC property. Alternative III includes placement of a targeted cap/cover in specific locations within Area 1 that are not adequately capped/covered, and Alternative IV includes placement of a cap/cover on the entire SCCC property except for the Consolidation Area. Both Alternatives III and IV would include the same capillary break cap/cover components and the stormwater management enhancements. Alternative IV also includes the same freshwater emergent wetlands restoration plan as Alternative III, but with the option to relocate existing non-permitted pre-interim remedial action wetlands to other areas on the SCCC Site or to utilize the wetland banking option and purchase wetland credits off-site. Alternatives II, III, and IV all would allow the reasonably anticipated future industrial/commercial use of the SCCC Site. There are no common elements between Alternative I and Alternatives II, III, and IV.

Comparative Analysis of Alternatives

In selecting a remedy, EPA considered the factors set forth in Section 121 of CERCLA, 42 U.S.C. § 9621, by conducting a detailed evaluation of the remedial alternatives pursuant to the NCP, 40 CFR Section 300.430(e)(9). During the detailed evaluation of remedial alternatives, each alternative was assessed against nine evaluation criteria, which consist of two threshold criteria (overall protection of human health and the environment, compliance with ARARs), five balancing criteria (long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, short-term effectiveness, implementability, and cost), and two modifying criteria (state acceptance and community acceptance). The comparative analysis of the four remedial alternatives based upon the nine evaluation criteria is summarized below.

1. Overall Protection of Human Health and the Environment

Overall protection of human health and the environment addresses whether or not an alternative provides adequate protection and describes how risk posed through each exposure pathway (based on a reasonable maximum exposure scenario) are eliminated, reduced or controlled through treatment, engineering controls, or ICs.

Alternative I would not provide overall protection of human health and the environment. This no action alternative does not prevent or eliminate human exposure and does not reduce the mass of SCCC Site-related DNAPL, and so Alternative I would not address the RAOs for the SCCC Site. Alternatives II, III, and IV would all offer some level of protection of human health and the environment. Alternative II does not involve placement of cap/covers, and thus provides less protection of human health and the environment than Alternatives III and IV. The placement of additional cap/cover systems (Alternatives III and IV) would provide additional overall protection of human health and the environment due to the further reduction in exposure and reduction in transport of impacted soil. The additional protection is considered similar for both Alternatives III and IV. The release or threat of release of asbestos and lead into the environment would be addressed by Alternatives II, III, and IV via demolition of the dilapidated Edison buildings.

2. Compliance with ARARs

Compliance with ARARs addresses whether or not an alternative will meet all of the applicable or relevant and appropriate requirements of other federal and state environmental statutes and requirements or provides grounds for invoking a waiver.

The chemical-specific ARARs that apply to all the alternatives include groundwater quality standards and soil standards. State and federal drinking water standards (Appendix 2, Table 6) would be waived in Area 1 and Area 2 due to the technical impracticability of attaining those standards in groundwater under all the alternatives. Appendix 1, Figure 10 shows the areal extent of the TI waiver zone. Alternatives II, III, and IV would comply with chemical-specific soil ARARs through ICs and cap/covers (Appendix 2, Table 7).

Location-specific ARARs include requirements for floodplains and wetlands areas. Alternative I would not comply with these ARARs. Alternatives II, III, and IV would comply with the location-specific ARARs including potential excavation and filling activities in wetland or floodplain areas.

Action-specific ARARs are not relevant for Alternative I, which is the no action alternative. Action-specific ARARs for Alternatives II, III, and IV include erosion and sedimentation control/stormwater management regulations and hazardous and solid waste management regulations. Alternatives II, III, and IV would comply with action-specific ARARs.

In sum, Alternative I does not meet the threshold criteria of overall protection of human health and the environment and compliance with ARARs. Accordingly, it is not considered further in assessing the five balancing criteria in the comparative analysis. Alternatives III and IV offer greater overall protection of human health and the environment than Alternative II. Alternatives II, III, and IV comply with ARARs.

3. Long-Term Effectiveness and Permanence

Long-term effectiveness and permanence refers to the ability of an alternative to maintain reliable protection of human health and the environment over time, once cleanup levels have been met. It also addresses the magnitude and effectiveness of the measures that may be required to manage the risk posed by treatment residuals and/or untreated wastes.

Alternatives II, III, and IV are each anticipated to have both long-term effectiveness and permanence, as all three alternatives include monitoring and maintenance to ensure that the remedies remain protective.

4. Reduction of Toxicity, Mobility, or Volume through Treatment

Reduction of toxicity, mobility, or volume of contaminants through treatment is the anticipated performance of the treatment technologies, with respect to these parameters, which an alternative may employ.

The reduction of toxicity and volume of chemicals of concern in impacted media would continue for Alternatives II, III, and IV by virtue of the continued O&M of the hydraulic control and treatment system. However, other than treating groundwater in compliance with the surface water discharge permit, Alternatives II, III, and IV would not utilize treatment to reduce the toxicity, mobility, or volume of chemicals of concern.

5. Short-Term Effectiveness

Short-term effectiveness addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period until cleanup goals are achieved.

The construction activities associated with Alternatives II, III, and IV would generally be surficial with the exception of the Area 2 DNAPL well drilling/installation, and only relatively small quantities of impacted SCCC Site media would need to be managed during the active construction. Therefore, the short-term human risks resulting from these actions are considered to be minimal.

The potential short-term risks for Alternative IV would be greater than Alternatives II and III due to the larger volumes of fill soil to be transported and placed and longer duration of construction activities.

The estimated timeframe is approximately three months to complete Alternative II. The estimated timeframes are approximately six months to construct Alternative III, and approximately one year to complete construction of Alternative IV. The sequentially longer timeframes are due to more extensive construction requirements. These construction schedules are within typical and expected remedial construction timeframes.

6. Implementability

Implementability is the technical and administrative feasibility of the alternative, including the availability of materials and services needed to implement the alternative.

The technical and administrative issues increase progressively for Alternatives II, III, and IV. However, the cap/cover alternatives have commonly been utilized at similar sites, including previously at the SCCC Site. Implementation of Alternatives II, III, and IV would require specialized contractors and equipment which are readily available. The clearing and grubbing requirements would be most significant for Alternative IV versus Alternative III; however, the difference is not significant. Management of impacted media and DNAPL required for Alternatives II, III, and IV is readily implementable. Alternatives II, III, and IV are considered to be equivalent with respect to implementability.

7. Cost

Cost includes estimated capital and O&M costs, and present worth costs.

A summary of the total estimated cost for each remedial alternative is provided in this section for comparative analysis. The total estimated present worth costs (including the applicable capital and O&M costs) range from $0 for Alternative I to $17,299,000 for Alternative IV as shown in the table below.

Alternative	Capital Cost	Annual O&M	Total Present Worth Cost
I	$ 0	$ 0	$ 0
II	$ 1,392,000	$ 541,000	$ 9,759,000
III	$ 4,618,000	$ 396,000	$11,246,000
IV	$13,456,000	$ 231,000	$17,299,000

Total estimated present worth costs for Alternative II and Alternative III are somewhat similar, with Alternative III being more expensive than Alternative II. The estimated capital cost of Alternative IV is substantially higher than the capital costs of Alternatives II and III. The costs for all alternatives do not include the more than $14,000,000 associated with construction of the early response actions implemented at the SCCC Site from 2009 to 2011.

8. State Acceptance

State acceptance indicates whether or not the State of New Jersey concurs with the selected remedy.

The State of New Jersey concurs with EPA's selection of Alternative III for remediation of the SCCC Site. The State of New Jersey does not fully concur on the ROD, however, as stated its September 26, 2016 letter, because the current property owners have not agreed to the required institutional controls. Moreover, the State of New Jersey stated that it continues to object to EPA's exclusion of the Hackensack River as an operable unit of the SCCC Site (see Appendix 4).

9. Community Acceptance

Community acceptance refers to the public's general response to the results of the RI and the alternatives described in the FS Report and the Proposed Plan.

Comments received during the public comment period indicate that the public generally supports the selected remedy and development of the SCCC Site for commercial/industrial reuse. Oral comments were recorded from attendees at the public meeting held on August 16, 2016. Written comments were received at the public meeting and during the public comment period (July 27 to August 26, 2016) from 11 commenters. The Responsiveness Summary addresses all comments received during the public comment period (see Appendix 5).

PRINCIPAL THREAT WASTES

The NCP establishes the expectation that EPA will use treatment to address the principal threat posed by a site wherever practicable (NCP at 40 CFR Section 300.430(a)(1)(iii)(A)). The principal threat concept is applied to the characterization of source materials at a Superfund site. A source material is material that includes or contains hazardous substances, pollutants, or contaminants and acts as a reservoir for migration of impacts to groundwater, surface water, or air, or acts as a source for direct exposure.

The principal threat wastes at the SCCC Site are the industrial fill with chromite ore processing residue, and the DNAPL liquid waste. Site-specific factors regarding the principal threat wastes, including the extensive nature of the industrial fill waste (38 acres with an average depth of eight feet) and the substantial quantities of DNAPL in the subsurface at numerous locations that cannot be readily identified due to their settling into troughs in a substantial clay layer at depth below the industrial fill, the meadow mat and a sand unit, make treatment technologies impracticable. Accordingly, EPA has determined that it is not practicable to address these principal threat wastes using treatment. Alternative I would not address either of these principal threat wastes. Alternative II would address the DNAPL but not exposure to the industrial fill. After implementation of Alternative III and Alternative IV, principal threat wastes would be effectively covered and contained, protecting human and environmental health.

SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the results of SCCC Site investigations, the detailed analysis of the alternatives, and the public comments, EPA has determined that Alternative III (Targeted Cap/Cover, Continued DNAPL Recovery in Area 1, Barrier Wall System, DNAPL Recovery in Area 2, Institutional Controls, and Building Demolition) satisfies the requirements of CERCLA Section 121, 42 U.S.C. § 9621, and provides the best balance of tradeoffs among the remedial alternatives with respect to the NCP's nine evaluation criteria at 40 CFR Section 300.430(e)(9). In addition to the remedy components already in place as a result of early actions at the Site, including a fully enclosed perimeter barrier wall system, hydraulic control groundwater extraction and treatment systems, existing surface covers, and stormwater management facilities, this remedy requires the following components:

- Placement of targeted cap/cover in specific locations within Area 1 that are not capped/covered, including stone and vegetative cover areas and wetlands areas. The existing stone cover areas would be overlain by a more permanent cover such as asphalt paving. This alternative would also include repairing the existing covers (e.g., repairing the asphalt) as necessary. Stormwater management enhancements, including wetland restoration, would be incorporated into the remedial design;

- DNAPL recovery in Area 1 and Area 2;

- ICs, such as deed notices, CEA/WRAs, soil management and health and safety deed notice protocols, requirements for vapor barriers installed in any new building construction, and/or other ICs to restrict future use of the SCCC Site to commercial/industrial uses and

prohibit residential use, to prohibit groundwater use in Area 1 and Area 2, and to prevent potential adverse exposures;

- Demolition of the Edison buildings; and

- Continued operation, maintenance, and monitoring (O&M) of remedial components, including the fully enclosed perimeter barrier wall system, hydraulic control groundwater extraction and treatment systems, existing surface covers, and stormwater management facilities.

The rationale for selecting this remedy is as follows:

The selected remedy satisfies the two threshold criteria of overall protection of human health and the environment, and compliance with ARARs (or justifying a waiver). The selected remedy achieves the best combination of the five balancing criteria of the comparative analysis. It addresses all of the RAOs established for the SCCC Site. The placement of additional cap/cover systems provides additional protection to human health and the environment due to the additional reduction in exposure potential and reduction in transport of impacted soil. The release or threat of release of asbestos and lead into the environment is addressed via demolition of the dilapidated Edison buildings.

The environmental benefits of the selected remedy may be enhanced by consideration, during remedy design or implementation, of technologies and practices that are sustainable in accordance with EPA Region 2's Clean and Green Energy Policy.

The selected remedy will be designed to reasonably accommodate the commercial/industrial redevelopment plans for the SCCC Site, while at the same time maintaining the environmental protectiveness provided by the remedy. EPA recognizes that redevelopment plans, when finalized, may also require modification to accommodate existing components of the selected remedy. In such cases, the proposed design for any such modification must be reviewed and approved by EPA in advance to ensure that the remedy remains protective of human health and the environment.

The total present cost worth of the selected remedy is $11,246,000. A detailed list of itemized costs for the selected remedy is presented in Table 5-2 of the 2016 FFS Report. The costs estimates are expected to be within +50 to -30 percent of the actual cost of the project.

STATUTORY DETERMINATIONS

Under CERCLA Section 121, 42 U.S.C. § 9621, and the NCP, 40 CFR Section 300.430(f)(1)(ii), the lead agency must select remedies that are protective of human health and the environment, comply with ARARs (unless a waiver is justified), are cost-effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1), 42 U.S.C. § 9621(b)(1), also establishes a preference for remedial actions which employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, or contaminants at a site. For the

reasons discussed below, EPA has determined that the selected remedy meets these statutory requirements.

Protection of Human Health and the Environment

The selected remedy is expected to be protective of human health and the environment. It will meet the RAOs through placement of additional cap/cover systems, DNAPL recovery, ICs, and demolition of the dilapidated Edison buildings.

Compliance with ARARs

The selected remedy invokes a technical impracticability waiver of chemical-specific ARARs in groundwater based on SCCC Site-specific conditions. The selected remedy will comply with the chemical-specific, location-specific, and action-specific ARARs and other criteria, advisories, or guidance for Alternative III presented in Appendix 2, Table 7.

Cost-Effectiveness

A cost-effective remedy is one whose costs are proportional to its overall effectiveness (NCP at 40 CFR Section 300.430(f)(1)(ii)(D)). Overall effectiveness is based on the evaluation of the following: long-term effectiveness and permanence; reduction in toxicity, mobility, or volume through treatment; and short-term effectiveness. Costs for each alternative were evaluated in detail. Capital and annual O&M costs were estimated and used to develop present worth costs. In the present worth costs, annual O&M costs were calculated for the life of the alternative using a seven percent discount rate and a 30-year interval. Based on the comparison of overall effectiveness to cost, the selected remedy meets the statutory requirement that Superfund remedies be cost-effective. The selected remedy is the least costly alternative that will achieve the RAOs. The estimated capital cost of the selected remedy is $4,618,000. The annual O&M cost is $396,000. The present worth cost is $11,246,000.

Utilization of Permanent Solutions and Alternative Treatment Technologies

The selected remedy provides the best balance of tradeoffs among the alternatives with respect to the balancing criteria set forth in the NCP at 40 CFR Section 300.430(f)(1)(i)(B), such that it represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the SCCC Site. The selected remedy will use the existing hydraulic control and groundwater treatment system (chromium reduction, metals precipitation, carbon adsorption, oil separation, and solids management) to permanently treat the contaminated groundwater collected in connection with DNAPL recovery, and ICs, including CEA/WRAs, will remain in effect in perpetuity.

Preference for Treatment as a Principal Element

EPA's statutory preference for treatment of principal threat wastes has been considered in selecting this remedy. The selected remedy does not satisfy the statutory preference for treatment of principal threat waste as a principal element of the remedy. The principal threat wastes at the

SCCC Site are the industrial fill with chromite ore processing residue, and the DNAPL liquid waste. Neither the industrial fill material nor the DNAPL liquid waste are suitable for treatment. Site-specific factors regarding the principal threat wastes, including the extensive nature of the industrial fill waste (38 acres with an average depth of eight feet) and the substantial quantities of DNAPL in the subsurface at numerous locations that cannot be readily identified due to their settling into troughs in a substantial clay layer at depth below the industrial fill, the meadow mat and a sand unit, make treatment technologies impracticable. The selected remedy instead addresses the principal threat wastes through cap/cover systems on the industrial fill materials and recovery and off-site disposal of the DNAPL.

Five-Year Review Requirements

Because this remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, EPA will conduct a review within five years after the initiation of the remedial action for the SCCC Site to ensure that the remedy is, or will be, protective of human health and the environment.

DOCUMENTATION OF SIGNIFICANT CHANGES

The Proposed Plan identified Alternative III (Targeted Cap/Cover, Continued DNAPL Recovery in Area 1, Barrier Wall System, DNAPL Recovery in Area 2, Institutional Controls, and Building Demolition), as the preferred alternative for the SCCC Site. Upon review of all comments submitted during the public comment period from July 27, 2016, to August 26, 2016, and at the public meeting on August 16, 2016, EPA has determined that no significant changes to the selected remedy, as it was presented in the Proposed Plan, are warranted.

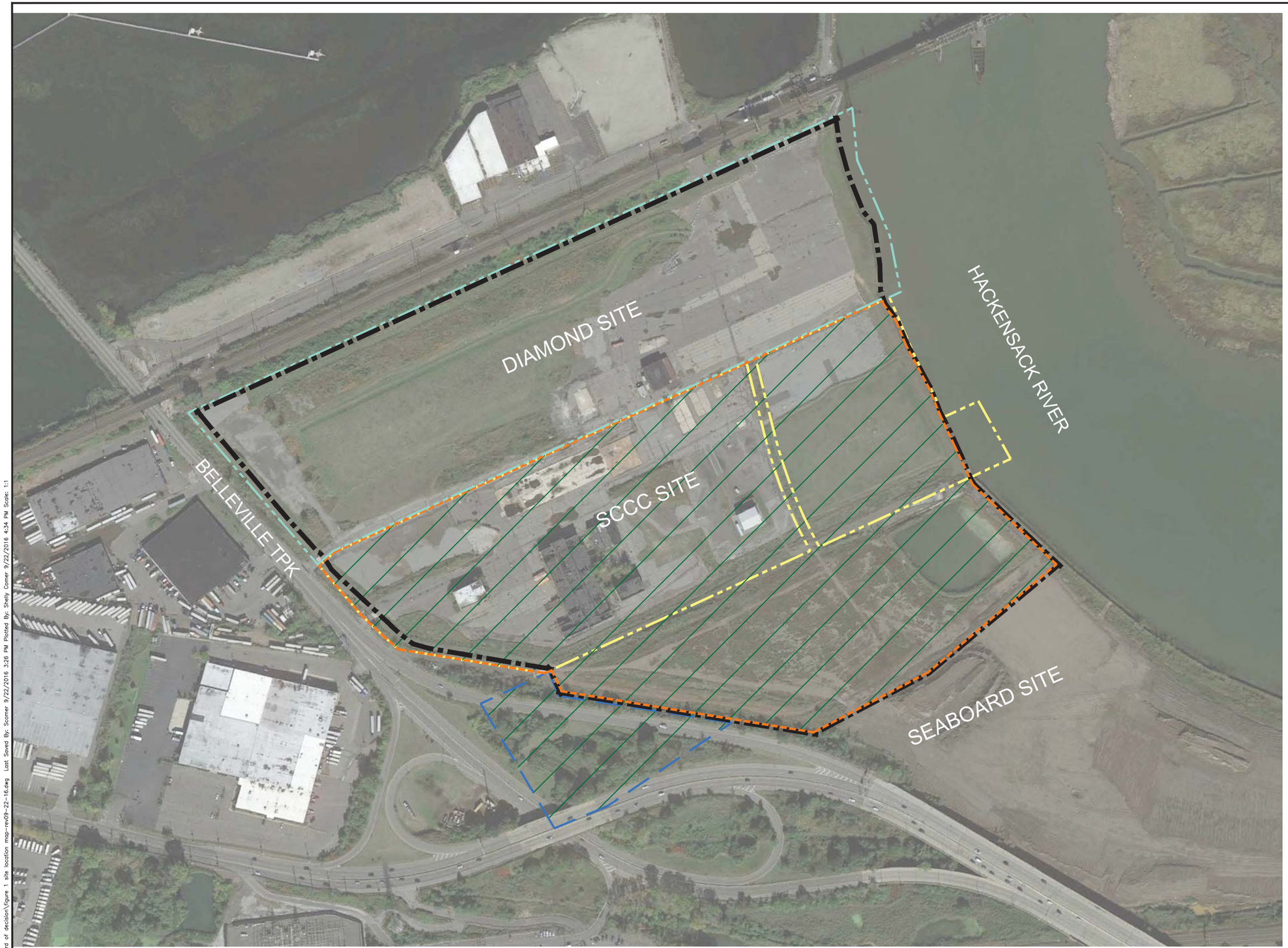
The selected remedy is compatible with the reasonably anticipated future land use of the SCCC Site for commercial/industrial use. As stated in the Proposed Plan, when practicable and cost-effective, the remedial alternative selected in the ROD will be designed to reasonably accommodate the commercial/industrial redevelopment plans underway for Area 1, while at the same time maintaining the environmental protectiveness provided by the remedy. In response to public comments regarding the compatibility of the selected remedy with the current plans for redevelopment of the SCCC Site, EPA has further stated in this ROD that the Agency recognizes that redevelopment plans, when finalized, may also require modification to accommodate existing components of the selected remedy. In such cases, the proposed design for any such modification must be reviewed and approved by EPA in advance to ensure that the remedy remains protective of human health and the environment.

The list of groundwater standards proposed to be waived in the Proposed Plan has been reduced. The final list of groundwater standards being waived is presented in Appendix 2, Table 6 of this ROD.

SCCC SITE

RECORD OF DECISION

APPENDIX 1 FIGURES



N

LEGEND

- SCCC SITE PROPERTY BOUNDARY
- DIAMOND SITE PROPERTY BOUNDARY
- AREA 1 LIMITS
- AREA 2 LIMITS
- SCCC SITE AREA
- SLURRY WALL

0 300 600 FEET

PERFORMING PARTIES GROUP

DRWN: SCC	DATE: 09/09/16
CHKD:	DATE:
APPD:	DATE:
SCALE: AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

RECORD OF DECISION
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

SITE LOCATION MAP

PROJECT NO: 201601-01
FIGURE 1

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

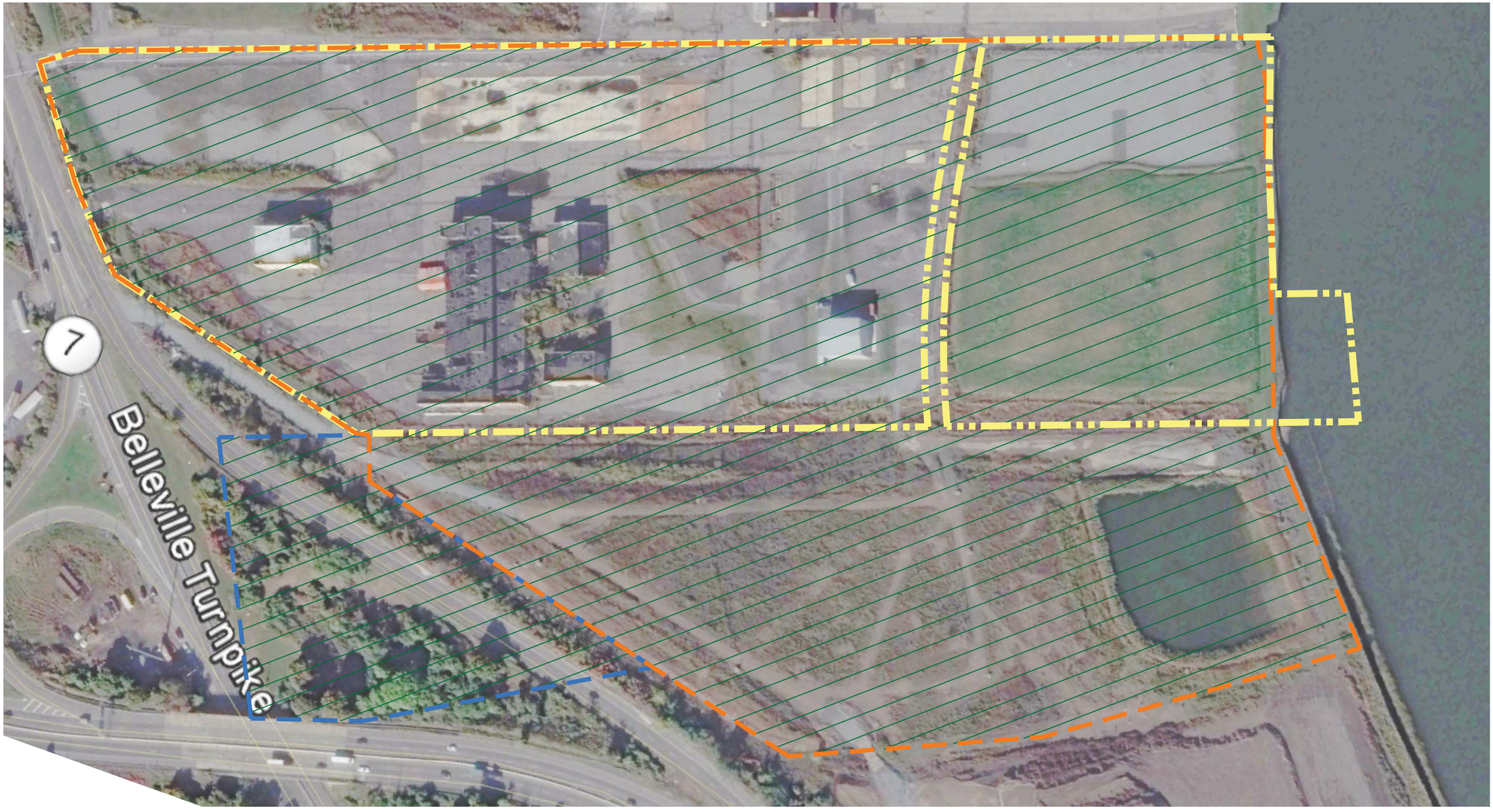
REFERENCE:

1. PROPERTY BOUNDARY SHOWN HEREON FROM SHEET 1 OF 1 TITLED "SURVEY OF PROPERTY, TAX LOTS 32.02, 46, 47 & 47R, BLOCK 287, TAX LOTS 48, 49, 50, 51, 52 AND 52R, BLOCK 287, TOWN OF KEARNY, HUDSON COUNTY, NEW JERSEY," DATED JULY 1, 2009 (REVISION 2: JULY 29, 2009), PREPARED BY DYKSTRA ASSOCIATES, PC.
2. IMAGE PROVIDED BY GOOGLE EARTH DATED OCTOBER, 2015.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

y:\06civil\kearny\record of decision\figure 1 site location map--rev09-22-16.dwg Last Saved By: Scomer 9/22/2016 3:28 PM Plotted By: Shelly Comer 9/22/2016 4:34 PM Scale: 1:1



LEGEND

SCCC PROPERTY
AREA 1
AREA 2
SCCC SITE

0 150 300 FEET

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCE:

1. PROPERTY BOUNDARY SHOWN HEREON FROM SHEET 1 OF 1 TITLED "SURVEY OF PROPERTY, TAX LOTS 32.02, 46, 47 & 47R, BLOCK 287, TAX LOTS 48, 49, 50, 51, 52 AND 52R, BLOCK 287, TOWN OF KEARNY, HUDSON COUNTY, NEW JERSEY," DATED JULY 1, 2009 (REVISION 2: JULY 29, 2009), PREPARED BY DYKSTRA ASSOCIATES, PC.
2. IMAGE PROVIDED BY GOOGLE EARTH DATED OCTOBER, 2015.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PERFORMING PARTIES GROUP

DRWN: SCC	DATE: 06/15/16
CHKD:	DATE:
APPD:	DATE:
SCALE: AS SHOWN	

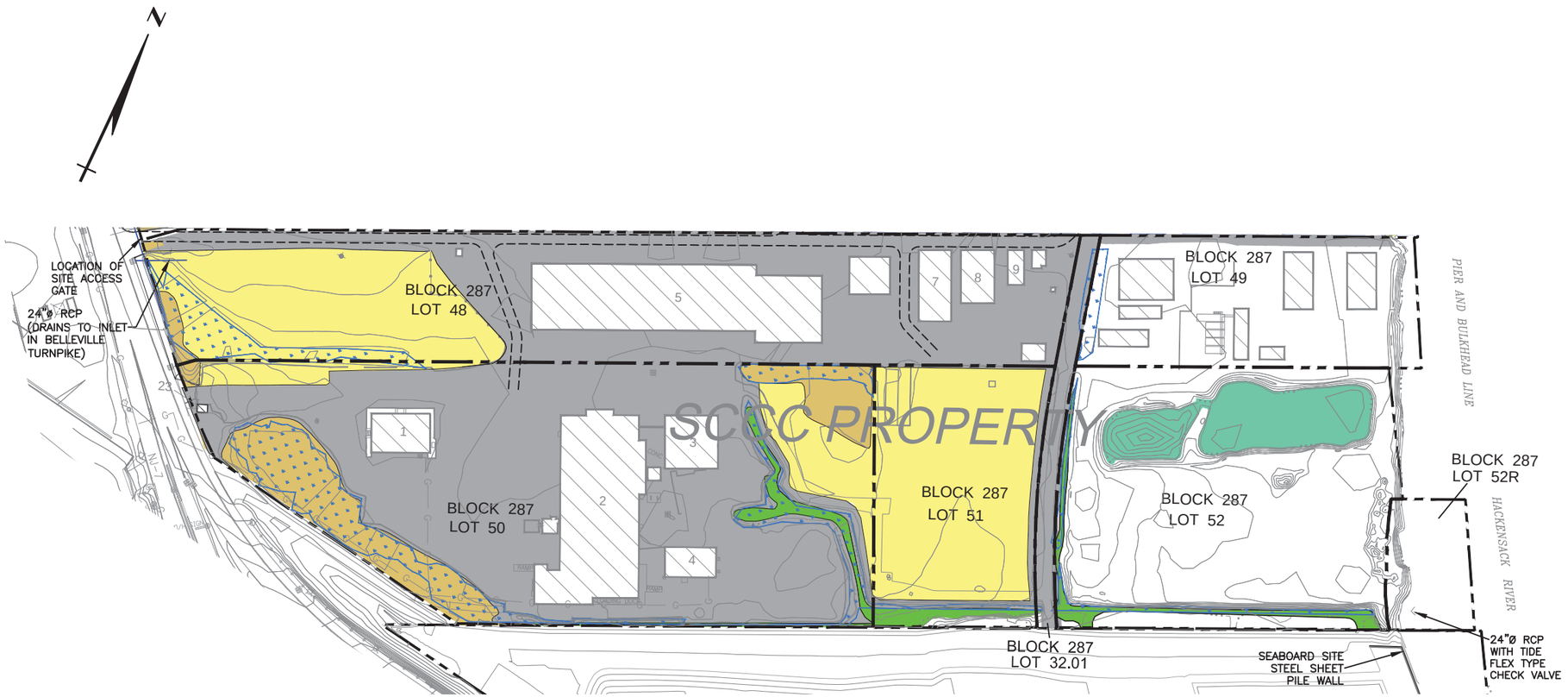
KEY ENVIRONMENTAL INCORPORATED

RECORD OF DECISION
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

SITE PLAN

PROJECT NO: 201501-05
FIGURE 2

y:\06civil\kearny\record of decision\figure 2.dwg Last Saved By: Scomer 6/17/2016 7:58 AM Plotted By: Shelly Comer 8/26/2016 1:37 PM Scale: 1:1



LEGEND

- PROPERTY BOUNDARY
- EXISTING GROUND SURFACE ELEVATION
- RIVER/CHANNEL
- SURFACE COVER IRM COMPRISED OF ASPHALTIC CONCRETE
- SURFACE COVER IRM COMPRISED OF SOIL
- SURFACE COVER IRM COMPRISED OF GEOMEMBRANE OVERLAIN WITH AGGREGRATE
- EAST AND WEST LAGOONS
- SOUTH DITCH
- WETLANDS
- 5 BUILDING
- INTERNAL ACCESS ROUTES
- BLOCK AND LOT LINE

REV #	DATE	DESCRIPTION	APPD
3			
2			
1			

REFERENCE:

1. EXISTING GROUND SURFACE CONTOURS PER AIR SURVEY, DULLES, VIRGINIA, APRIL 14, 2001. HORIZONTAL REFERENCE: NEW JERSEY STATE PLANE COORDINATES (NAD 1927), VERTICAL REFERENCE:NATIONAL GEODETIC VERTICAL DATUM (NGVD 1929).
2. PROPERTY BOUNDARY SHOWN HEREON FROM SHEET 1 OF 1 TITLED "SURVEY OF PROPERTY, TAX LOTS 32.02, 46, 47 & 47R, BLOCK 287, TAX LOTS 48, 49, 50, 51, 52 AND 52R, BLOCK 287, TOWN OF KEARNY, HUDSON COUNTY, NEW JERSEY," DATED JULY 1, 2009 (REVISION 2: JULY 29, 2009), PREPARED BY DYKSTRA ASSOCIATES, PC.
3. EXISTING WETLANDS PER WETLAND DELINEATION BY PRINCETON HYDRO, LLC FOR KEY ENVIRONMENTAL, INC. PERFORMED IN MARCH 2009.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PERFORMING PARTIES GROUP

DRWN:	SCC	DATE:	11/10/15
CHKD:	MJV	DATE:	03/01/16
APPD:	JSZ	DATE:	03/01/16
SCALE:	AS SHOWN		

KEY ENVIRONMENTAL INCORPORATED

RECORD OF DECISION
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

HISTORICAL SITE ARRANGEMENT

PROJECT NO: 201501-05

FIGURE 3

y:\DOcivil\kearny\record of decision\figure 3 historical site arrangement.dwg Last Saved By: Scomer 6/9/2016 3:58 PM Plotted By: Shelly Comer 8/26/2016 1:37 PM Scale: 1:1

DIAMOND SITE

AREA 1
(REFER TO NOTE 3)

SCCC PROPERTY

SEABOARD SITE

HACKENSACK RIVER

SLURRY WALL

PIPE CROSSING #1

FORMER SCCC PROCESS AREA

DRWL-2

HCWU-12

HCWU-13

HCWU-14

DRWU-4

DRWL-1

OUTFALL 003

DRWL-4

DRWU-1

DRWL-5

DRWU-2

HC-PZ-14L

HCWU-15

DRWL-3

HCWU-16

HCWU-17

HCWU-18

SLURRY WALL

SC-MW-16L

HC-PZ-14U

HC-PZ-15U

LAGOON

DRWU-3

DRWL-6

DRWL-7

HCWU-19

GROUNDWATER TREATMENT BUILDING

ACCESS RAMP

PIPE CROSSING #4

SCCC CONSOLIDATION AREA

HCWU-20

HCWU-21

TRENCH

INTERIM SURFACE COVER

DRWL-8

PIPE CROSSING #3

HC-PZ-13U

HC-PZ-13L

HC-PZ-12U

HC-PZ-12L

DRWL-9

PIPE CROSSING #5

OUTFALL 001

HCWU-22

HCWU-23

HCWU-24

D-31

D-30

D-29

D-28

MW-D-28

DRWL-11

DRWL-10

D-33

APPROXIMATE INFERRED LOCATION OF AREA 2 (REFER TO NOTE 2)

D-32

D-42

D-36

D-35

MW-D-35

D-34

D-40

D-41

HCWU-25

HCWU-26

HC-PZ-10U

HC-PZ-11U

HC-PZ-10L

HC-PZ-11L

HC-PZ-8U

HC-PZ-8L

HC-PZ-9L

HC-PZ-9U

MW-D-37/D-37

MW-D-39/D-39

MW-D-38/D-38

NEWARK TURNPIKE

LEGEND

- PROPERTY BOUNDARY
- SPOT ELEVATION (FEET–MSL)
- SLURRY WALL LOCATION
- STEEL SHEET PILE WALL LOCATION
- EXISTING GROUND SURFACE ELEVATION
- RIVER/CHANNEL
- EXISTING BUILDING
- FORMER BUILDING FOUNDATION/SLAB
- GROUNDWATER CONVEYANCE PIPING TRENCH ALIGNMENT
- FILL UNIT GROUNDWATER EXTRACTION (HYDRAULIC CONTROL) WELL LOCATION
- FILL UNIT DNAPL RECOVERY WELL LOCATION
- SAND UNIT DNAPL RECOVERY WELL LOCATION
- LAGOON DEWATERED AND BACKFILLED
- NEAR–SHORE SEDIMENT REMOVAL
- DRAINAGE DITCH REMEDIATION (EXCAVATED AND BACKFILLED)
- INTERIM SURFACE COVER
- TREATED GROUND WATER PERMITTED DISCHARGE PIPE
- STORM DRAIN (48" DIA. PIPE)
- STORM WATER DRAIN (PIPE DIA. VARIES)
- DROP INLET
- DROP INLET
- RIPRAP OUTFALL
- POWER AND PHONE LINES (OVERHEAD)
- WATER LINE TO TREATMENT BUILDING
- HC–PZ–9U HYDRAULIC CONTROL PIEZOMETER UPPER ZONE
- HC–PZ–9L HYDRAULIC CONTROL PIEZOMETER LOWER ZONE
- SEMI–DEEP ANODE WELL LOCATION
- SUPPLEMENTAL RI DNAPL DELINEATION BORING LOCATION
- SUPPLEMENTAL RI CONTINGENCY BORING LOCATION
- MONITORING WELL LOCATION
- LOCATION OF AREA 1
- APPROXIMATE INFERRED LOCATION OF AREA 2

0 100 200 FEET

NOTE:

1. AS–BUILT DRAWING WAS PREPARED BASED ON THE CORRESPONDING INTERIM RESPONSE ACTION CIVIL ENGINEERING DESIGN DRAWING. THIS AS–BUILT DRAWING DEPICTS MAJOR CHANGES TO OR DEVIATIONS FROM THE DESIGN DRAWING, AS DOCUMENTED BY FIELD INSPECTION BY KEY'S CQA PERSONNEL. AS–BUILT DIMENSIONS OR MEASUREMENTS MAY VARY SLIGHTLY FROM THOSE DEPICTED ON THIS AS–BUILT DRAWING.
2. THE AREA 2 LIMITS WILL BE ESTABLISHED DURING REMEDIAL DESIGN.
3. AREA 1 INCLUDES THE PROPERTY WITHIN THE EXISTING SLURRY WALL.

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCE: EXISTING GROUND SURFACE CONTOURS PER AIR SURVEY, DULLES, VIRGINIA, APRIL 14, 2001. HORIZONTAL REFERENCE: NEW JERSEY STATE PLANE COORDINATES (NAD 1927). VERTICAL REFERENCE: NATIONAL GEODETIC VERTICAL DATUM (NGVD 1929).

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PERFORMING PARTIES GROUP

DRWN: SCC	DATE: 11/10/15	KEY ENVIRONMENTAL INCORPORATED
CHKD: MJV	DATE: 03/01/16	
APPD: JSZ	DATE: 03/01/16	
SCALE: AS SHOWN		

RECORD OF DECISION
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

EXISTING SCCC SITE CONDITIONS

PROJECT NO: 201501–05

FIGURE 4

G:\Projects\Kearny\record of decision\figure 4 existing site conditions.dwg Last Saved By: Scomer 9/29/2016 6:18 AM Plotted By: Shelly Comer 9/29/2016 6:19 AM Scale: 1:2

LEGEND

- SITE BOUNDARY
- FENCELINE
- EXISTING BUILDING/STRUCTURES
- FORMER BUILDING/STRUCTURES
- BUSH/TREELINE
- RIVER/CHANNEL/LAGOON
- EXISTING GROUND SURFACE ELEVATION
- UTILITY POLE
- GUARD RAIL
- STORM DRAIN
- RAILROAD LINE
- 8 SURFACE SOIL SAMPLE LOCATION (WESTON–1985)
- SS–1 SURFACE SOIL SAMPLE LOCATION (WESTON–1987)
- TSS–1 TANK AREA SURFACE SOIL SAMPLE LOCATION (WESTON–1990)
- TA–SS01 TRANSFORMER AREA SURFACE SOIL SAMPLE LOCATION (KEY–1998)
- TA–CC01 TRANSFORMER AREA CONCRETE CHIP SAMPLE LOCATION (KEY–1998)
- 001 SURFACE SOIL SAMPLE LOCATION (FRENCH AND PARRELLO–1991)
- SB–1 SOIL BORING LOCATION (SAMPLE COLLECTED)(ERM–1996)
- SB–2 SOIL BORING LOCATION (VISUAL/FIELD SCREENING)(ERM–1996)
- SB–2A/B SOIL BORING LOCATION (WESTON–1992)
- SB–15 SOIL BORING LOCATION (KEY–1998)
- LP–5 LAGOON PERIMETER SOIL BORING LOCATION (WESTON–1985)
- R–25 ROST BORING LOCATION (KEY–1998)
- B, LD–1, WL2, ELS LAGOON SAMPLES (WESTON–1985, 1987, 1991)
- TP–1 TEST PIT SUBSURFACE SOIL SAMPLE LOCATION (WESTON–1993)
- SC–PZ–1U SHALLOW (FILL) ZONE PIEZOMETER LOCATION (WESTON–1983)
- SC–PZ–1D SAND ZONE PIEZOMETER LOCATION (WESTON–1983)
- TPZ–1 TEMPORARY PIEZOMETER LOCATION (WESTON–1992)
- MW–11U SHALLOW (FILL) ZONE MONITORING WELL LOCATION (WESTON–1990)
- MW–11L SAND ZONE MONITORING WELL LOCATION (WESTON–1990; KEY–1998)
- SW–1 SURFACE WATER SAMPLE LOCATION (ERM–1996)
- SSW–1 / SSW–SED–1 SURFACE WATER AND SEDIMENT SAMPLE LOCATION (WESTON–1991)
- SC–SED–04 / SC–SW–04 SURFACE WATER AND SEDIMENT SAMPLE LOCATION (USEPA–2002)
- S–1 SEDIMENT SAMPLE LOCATION (WESTON–1991)
- SED–A1,A2,A3,A4 SEDIMENT SAMPLE LOCATION (ERM–1996)
- TPS–A1,A2,A3 SEDIMENT SAMPLE LOCATION (ESI–2000)
- D–12 DNAPL DELINEATION BORINGS (KEY–2009)
- CR–15 CHROMIUM DELINEATION BORING (KEY–2009)
- SC–SS–06 SURFACE SOIL SAMPLE LOCATION (KEY–2009)
- VC–5 VARVED CLAY SAMPLE LOCATION (KEY–2013)
- D–25 DNAPL DELINEATION BORINGS (KEY–2013)

0 150 300 FEET

REV #	DATE	DESCRIPTION	APPD
3			
2			
1			

REFERENCE:

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PERFORMING PARTIES GROUP

DRWN: SCC	DATE: 06/26/15
CHKD: AH	DATE: 06/26/15
APPD: JSZ	DATE: 07/21/15
SCALE: AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

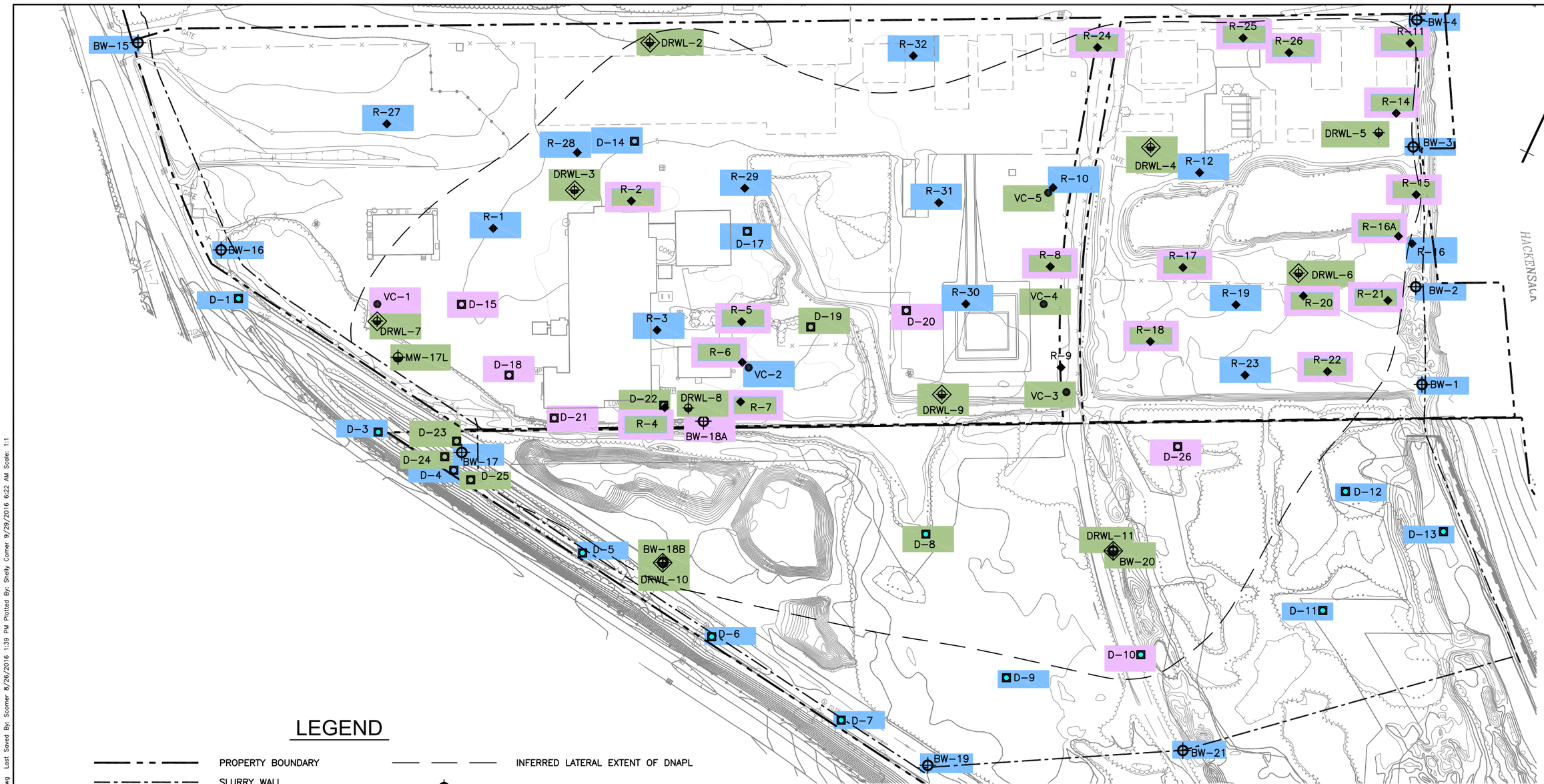
RECORD OF DECISION
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY NEW JERSEY

SAMPLE LOCATION MAP

PROJECT NO: 201501–02

FIGURE 5

y:\00civil\kearny\record of decision\figure 5 sample locations.dwg Last Saved By: Scomer 9/26/2016 1:38 PM Plotted By: Shelly Comer 9/29/2016 6:22 AM Scale: 1:2



LEGEND

- PROPERTY BOUNDARY
- SLURRY WALL
- EXISTING GROUND SURFACE ELEVATION CONTOURS
- EXISTING STREAM, POND AND RIVER BANK
- EXISTING VEGETATION
- EXISTING ACCESS ROAD
- EXISTING FENCE
- EXISTING STRUCTURES
- FORMER STRUCTURE
- EXISTING UTILITY POLES
- INFERRED LATERAL EXTENT OF DNAPL
- BARRIER WALL GEOTECHNICAL BORING
- DNAPL RECOVERY WELL LOCATION
- PREVIOUS RI DNAPL DELINEATION BORING
- RI DNAPL DELINEATION BORINGS
- RI VARVED CLAY SAMPLE LOCATION
- ROST BORING LOCATION

DNAPL OBSERVED IN SAND UNIT

- POSSIBLE FREE-PHASE DNAPL
- POSSIBLE RESIDUAL DNAPL
- POSSIBLE FREE-PHASE/RESIDUAL DNAPL (LASER INDUCED FLORESCENCE TEST DATA)
- NO DNAPL OBSERVED

0 150 300 FEET

REV #	DATE	DESCRIPTION	APPD
3			
2			
1			

REFERENCE:

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PERFORMING PARTIES GROUP

DRWN: SCC	DATE: 07/19/16
CHKD: AEF	DATE: 07/26/16
APPD: JSZ	DATE: 07/26/16
SCALE: AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

RECORD OF DECISION
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

AREA 1 INFERRED DNAPL LIMITS

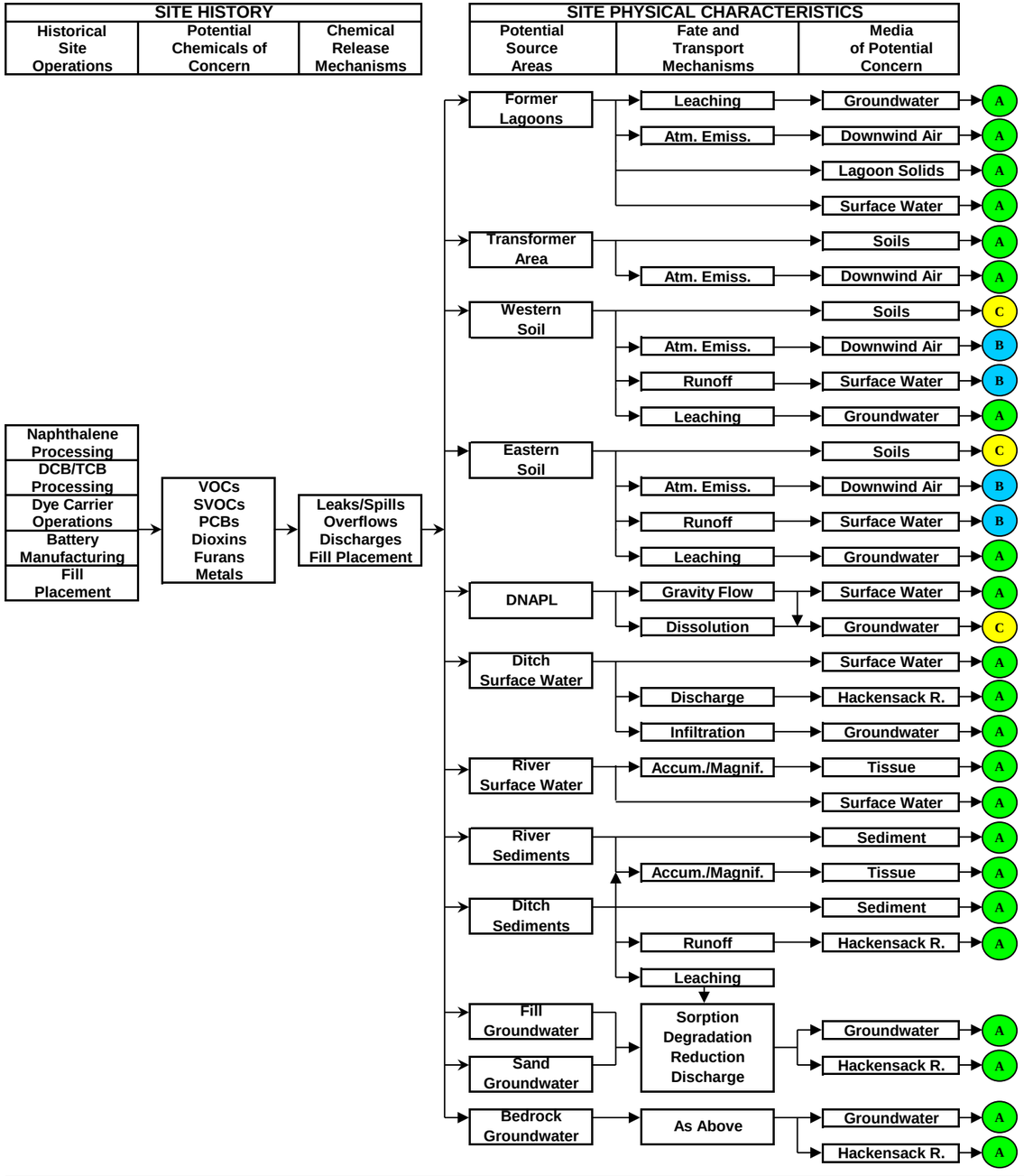
PROJECT NO: 2015-01

FIGURE 6

y:\00civil\kearny\record of decision\figure 6 delineation borings dnapl observation.dwg Last Saved By: Scomer 8/26/2016 1:39 PM Plotted By: Shelly Comer 9/29/2016 6:22 AM Scale: 1:1

FIGURE 7

AREA 1 CONCEPTUAL SITE MODEL
SCCC SITE - KEARNY, NEW JERSEY



RECEPTORS												
Potential Exposure Pathways	ONSITE/OFFSITE HUMAN				OFFSITE HUMAN				BIOTA			
	On-site Workers	Occasional Visitors	Construction Workers	Utility Workers	Residential Receptors	Industrial Worker	Recreational Users	Sport Fisherman	Benthic Community	Fish	Aquatic Birds	Feeding Mammals
Scenario A - Pathways are Incomplete (Current Conditions)												
Ingestion												
Dermal												
Inhalation												
Scenario B - Pathways are Potentially Complete but Insignificant (Current Conditions)												
Ingestion												
Dermal												
Inhalation												
Scenario C - Pathways are Potentially Complete and Potentially Significant (Future Conditions)												
Ingestion												
Dermal												
Inhalation												

Pathway is incomplete at present as a result of implementation of IRMs and IRA and is expected to remain so in the future.

All direct onsite groundwater exposure pathways (no groundwater use).
All potential exposure pathways associated with the lagoons (capped).
Discharge of DNAPL to the south ditch or Hackensack River (barrier walls in place).
Discharge of all groundwater to the Hackensack River (barrier walls in place).
Direct contact with transformer area soils eliminated via removal.
Atmospheric emission of dust from transformer area eliminated via removal.
Potential for direct contact with surface water in the South Ditch eliminated via removal and new stormwater management system.
Discharge of surface water from the South Ditch (will be noncontact surface water, sediments removed).
All potential nongroundwater exposures associated with the south ditch (impacted sediment removed).
Direct contact with eastern area soils by outdoor site workers and visitors (cover placed).
Direct contact with Hackensack River surface water (does not consider other sources).
Accumulation and magnification of Hackensack River constituents in surface water (does not consider other sources).
Human and ecological receptor direct contact with Hackensack River sediments (sediments removed).
Accumulation and magnification of Hackensack River constituents in sediments (does not consider other sources - river sediments removed).

Pathway may be complete after IRA implementation but is expected to be insignificant.

Infrequent exposures to surface soils by visitors, workers, or terrestrial ecological receptors could occur if cover materials are not maintained.
Atmospheric emission of volatiles or fugitive dust from non-remediated areas (monitoring data during active remediation showed no risk).
Runoff of western area soil to receiving surface waters (western soils relatively unimpacted) and eastern area soil (stormwater management, capping and revegetation in place). Under a future disturbance scenario, residents, recreators, and fishermen could experience low risk as a result of erosion and runoff of particulates. Surface covers are in place to prevent such releases. Stormwater monitoring has shown that such releases are not occurring under current conditions. Institutional controls will be implemented to preclude such releases in the future.

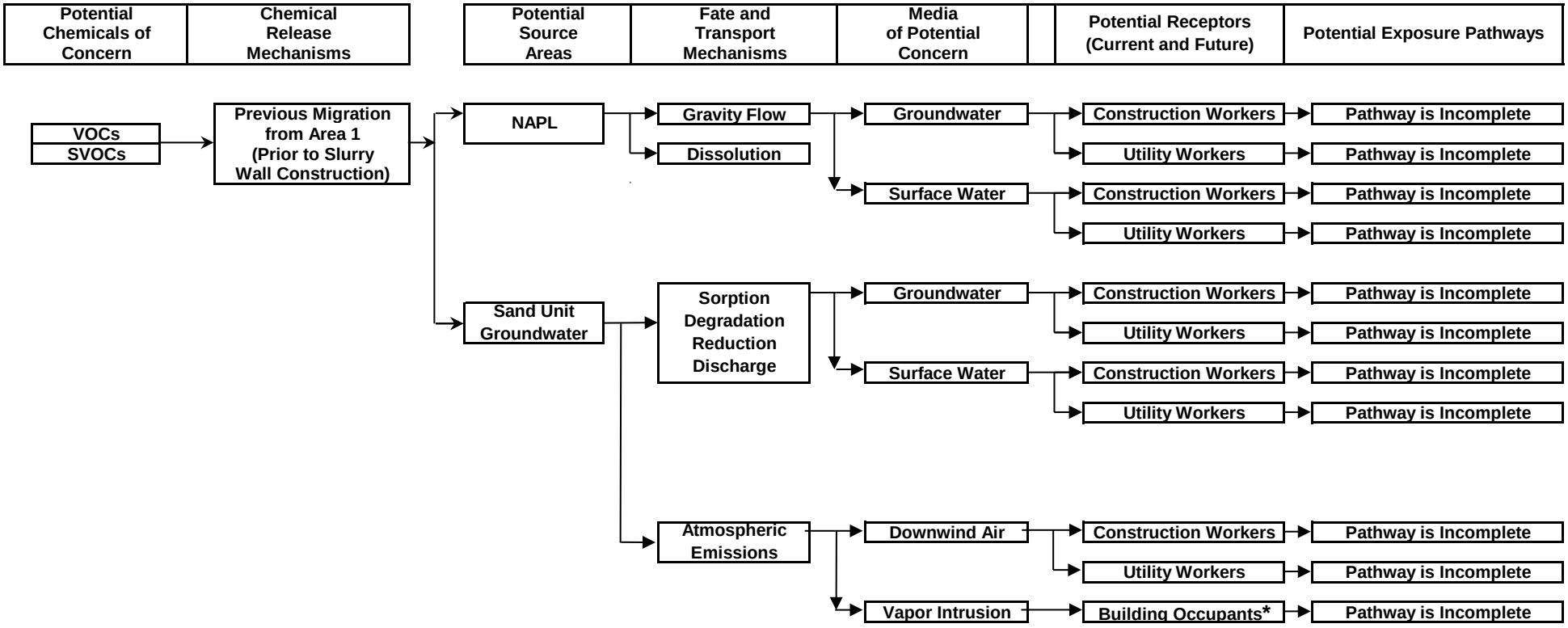
Pathway is potentially complete after IRA implementation and may be significant for humans and ecological receptors.

Potential for direct contact with western area soils and groundwater by utility workers and construction workers exists under a future scenario.
Potential for direct contact with eastern area soils and groundwater by utility workers and construction workers exists under a future scenario.
Potential for direct contact with shallow groundwater by utility workers and construction workers exists under a future scenario.
Potential for exposure via vapor intrusion into future buildings

Notes: Potential exposures associated with the Hackensack River are being addressed in a broader context. Potential site releases to the Hackensack River from the SCCC Site have been mitigated and impacted sediments have been excavated from the river.

FIGURE 8

AREA 2 CONCEPTUAL SITE MODEL
SCCC SITE - KEARNY, NEW JERSEY



* Potential future receptor scenario only. No buildings currently exist in Area 2.

PROPOSED ASPHALT CAP/COVER (TYPICAL) 4-2/1

PROPOSED VEGETATION AREA CAP/COVER (TYPICAL) 4-2/1

PROPOSED WETLANDS AREA CAP/COVER (TYPICAL) (SEE NOTE 4) 4-2/2

DIAMOND SITE

SCCC PROPERTY

HCIA PROPERTY (FORMER KOPPERS SEABOARD SITE)

HACKENSACK RIVER

EXISTING SCCC CONSOLIDATION AREA

IMPROVE ASPHALT AS NEEDED (SEE NOTES 1 & 2) 4-2/1

HC-PZ-13L

DRWL-12

MW-D-35

DRWL-13

HC-PZ-11L

MW-D-37

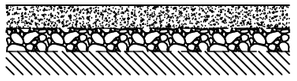
MW-D-39

MW-D-38

NEWARK TURNPIKE

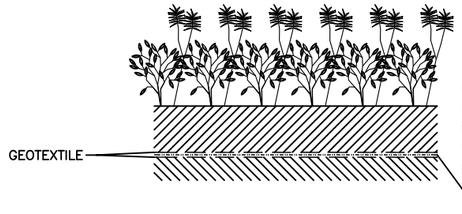
LEGEND

- PROPERTY BOUNDARY
- EXISTING FENCE
- EXISTING GROUND SURFACE ELEVATION
- EXISTING RIVER/CHANNEL
- EXISTING SLURRY WALL
- EXISTING STORM DRAIN (48" DIA. PIPE)
- EXISTING STORM WATER DRAIN (PIPE DIA. VARIES)
- EXISTING DROP INLET
- EXISTING DROP INLET
- EXISTING BUILDING
- FORMER BUILDING FOUNDATION/SLAB (EXISTING)
- EXISTING WETLANDS
- EXISTING NON-PERMITTED PRE-IRAW WETLANDS AREAS
- EXISTING WETLANDS UNDERLAIN BY GEOSYNTHETIC LINER IRM
- EXISTING VEGETATION
- EXISTING VEGETATIVE COVER UNDERLAIN WITH GEOSYNTHETIC LINER IRM
- EXISTING STONE COVER IRM
- EXISTING ASPHALT IRM
- EXISTING GEOMEMBRANE OVERLAIN WITH AGGREGATE IRM
- PROPOSED TARGETED WETLANDS AREA CAP/COVER 4-2/2
- PROPOSED ASPHALT CAP/COVER FOR TARGETED VEGETATION AND STONE COVER AREAS 4-2/1
- PROPOSED PASSIVE DNAPL RECOVERY WELL
- PROPOSED TI ZONE MONITORING LOCATIONS
- PROPOSED SECURITY FENCE
- LOCATION OF AREA 1
- APPROXIMATE INFERRED LOCATION OF AREA 2



NOTE:
GRANULAR SUBBASE MAY BE DESIGNED TO FUNCTION AS A CAPILLARY BREAK IF NECESSARY.

4-2/1 PROPOSED ASPHALT CAP/COVER FOR TARGETED VEGETATION AND STONE AREA



4-2/2 PROPOSED TARGETED AREA CAP/COVER ABOVE EXISTING WETLANDS AREAS
N.T.S

NOTES:

1. EXISTING ASPHALT SURFACE COVER WILL BE INSPECTED AND IMPROVED AS NEEDED TO ENHANCE STORMWATER RUNOFF TO THE EXISTING STORMWATER DITCHES AND CATCH BASINS. BROKEN ASPHALT, DEPRESSED OR LOW LYING AREAS IN THE ASPHALT COVER WOULD RECEIVE AN ADDITIONAL LAYER OF ASPHALT AS NECESSARY TO IMPROVE STORMWATER RUNOFF AND PREVENT LOCALIZED PONDING. EXISTING ASPHALT SUBGRADE/BASE LAYER TO BE REPAIRED AS REQUIRED.
2. CRACKS IN ASPHALT WILL RECEIVE A HOT TAR CRACK SEAL TO PROTECT ASPHALT SURFACE FROM DETERIORATION AND PREVENT STORMWATER FROM INFILTRATING THROUGH THE CRACKS.
3. THE DESIGN APPROACH WILL BE PREPARED TO ACCOMMODATE THE CAP/COVER SYSTEM INSTALLATION WITH OR WITHOUT POTENTIAL BUILDING DEMOLITION.
4. ASSUME THE WETLANDS WILL BE RECONSTRUCTED WITHIN THE APPROXIMATELY EXISTING WETLANDS FOOTPRINT (ABOVE THE PROPOSED CAP/COVER).
5. IT WAS ESTIMATED THAT FORMER AND EXISTING BUILDING FOUNDATIONS/SLAB MEET OR EXCEED THE REQUIREMENTS OF THE ASPHALT CAP/COVER.

0 100 200 FEET

PERFORMING PARTIES GROUP

DRWN: SCC	DATE: 11/12/15	KEY ENVIRONMENTAL INCORPORATED
CHKD: MJV	DATE: 03/01/16	
APPD: JSZ	DATE: 03/01/16	
SCALE: AS SHOWN		

RECORD OF DECISION
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

ALTERNATIVE III
TARGETED (AREA 1) CAP/COVER AND AREA 2 DNAPL RECOVERY PLAN

PROJECT NO: 201501-05
FIGURE 9

REV #	DATE	DESCRIPTION	APPD
0			
1			
2			

REFERENCE:

1. EXISTING GROUND SURFACE CONTOURS PER AIR SURVEY, DULLES, VIRGINIA, APRIL 14, 2001. HORIZONTAL REFERENCE: NEW JERSEY STATE PLANE COORDINATES (NAD 1927). VERTICAL REFERENCE:NATIONAL GEODETIC VERTICAL DATUM (NGVD 1929).
2. PROPERTY BOUNDARY SHOWN HEREON FROM SHEET 1 OF 1 TITLED "SURVEY OF PROPERTY, TAX LOTS 32.02, 46, 47 & 47R, BLOCK 287, TAX LOTS 48, 49, 50, 51, 52 AND 52R, BLOCK 287, TOWN OF KEARNY, HUDSON COUNTY, NEW JERSEY," DATED JULY 1, 2009 (REVISION 2: JULY 29, 2009), PREPARED BY DYKSTRA ASSOCIATES, PC.
3. EXISTING WETLANDS PER WETLANDS DELINEATION BY PRINCETON HYDRO, LLC FOR KEY ENVIRONMENTAL, INC. PERFORMED IN MARCH 2009.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

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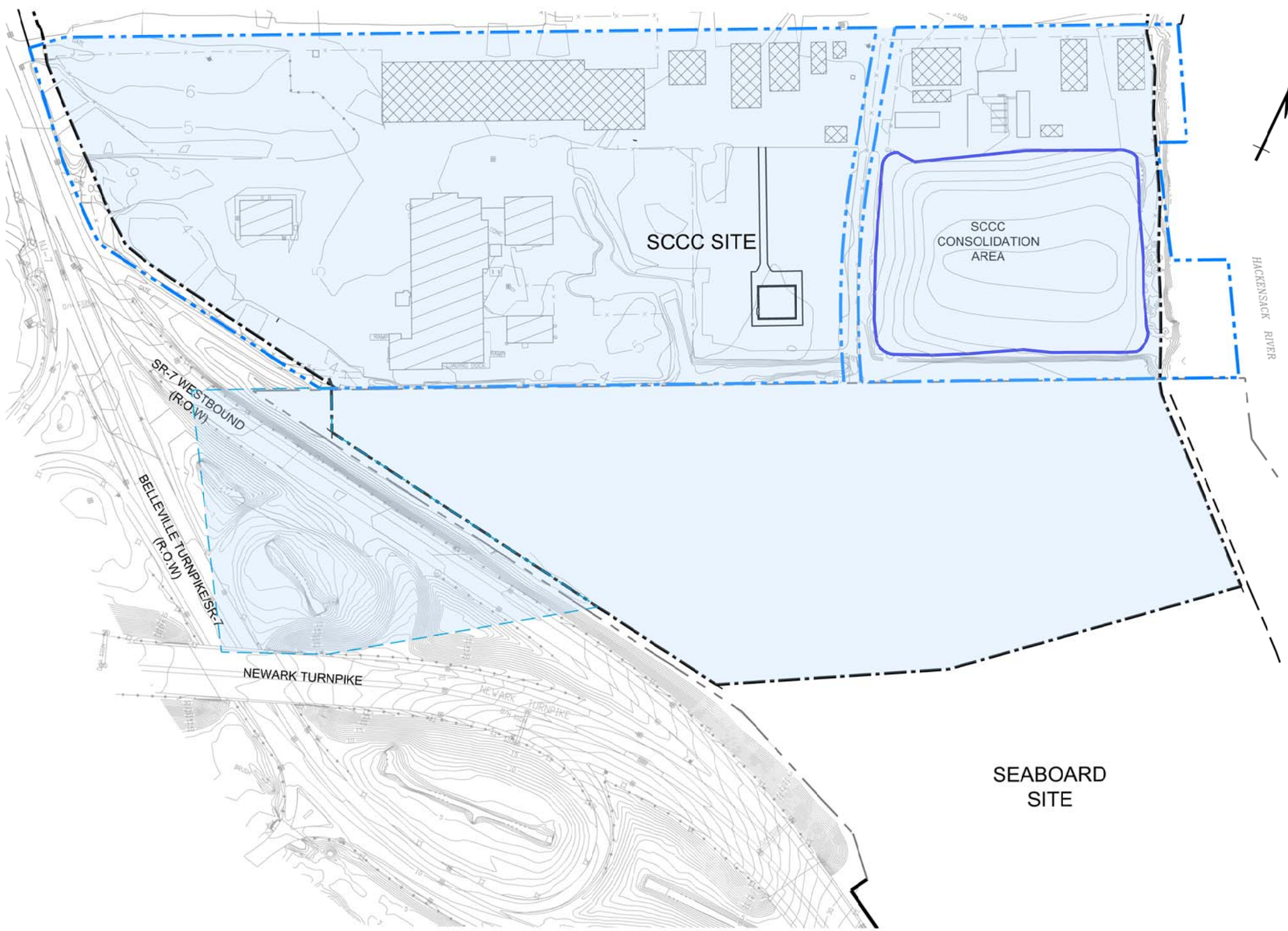

LEGEND

- STANDARD CHLORINE SITE BOUNDARY
- SEABOARD SITE BOUNDARY
- SLURRY WALL LOCATION
- EXISTING BUILDING
- FORMER BUILDING FOUNDATION/SLAB
- PROPOSED TI ZONE

NOTE:
CURRENT TOPOGRAPHY FOR THE SEABOARD SITE IS NOT AVAILABLE.

0 100 200 FEET

REV #	DATE	DESCRIPTION	APPD
3			
2			
1			

REFERENCE: EXISTING GROUND SURFACE ELEVATION CONTOURS PER BORBAS SURVEYING & MAPPING, LLC.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PERFORMING PARTIES GROUP

DRWN: SCC	DATE: 07/19/16	KEY ENVIRONMENTAL INCORPORATED
CHKD: AEF	DATE: 07/25/16	
APPD: JSZ	DATE: 07/25/16	
SCALE: AS SHOWN		

RECORD OF DECISION
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

ESTIMATED EXTENT OF PROPOSED TI ZONE

PROJECT NO: 201601-03

FIGURE 10

y:\00civil\kearny\record of decision\figure 10.dwg Last Saved By: Scorner 9/22/2016 4:33 PM Plotted By: Shelly Corner 9/29/2016 6:23 AM Scale: 1:1

SCCC SITE

RECORD OF DECISION

APPENDIX 2 TABLES

TABLE 1A
CHEMICALS OF CONCERN- SURFACE SOIL
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Scenario Timeframe:	**Current/Future**
Medium:	**Surface Soil (0-2 feet bgs)**
Exposure Medium:	**Surface Soil (0-2 feet bgs)**
Exposure Point:	**Onsite Surface Soil Particulates Volatile Emission**

Chemical	Minimum Concentration		Maximum Concentration		Concentration Units	Detection Frequency		Exposure Point Concentration (EPC)	EPC Units	Statistical Measure	
						Detected	Total				
WESTERN AREA											
1,2,3-Trichlorobenzene	0.29	J	210		mg/kg	2	13	253	mg/kg	Maximum	
1,2,4-Trichlorobenzene	0.00079	J	480		mg/kg	3	15	106	mg/kg	KM (t)	95% UCL
1,4-Dichlorobenzene	0.0015	J	360		mg/kg	8	18	78.5	mg/kg	KM (t)	95% UCL
Benzene	7.8	J	7.8	J	mg/kg	1	14	7.8	mg/kg	Maximum	
Benzo(a)pyrene	0.03	J	1.6		mg/kg	15	18	1.11	mg/kg	KM (Ch)	95% UCL
Benzo(b)fluoranthene	0.068		2.2		mg/kg	17	18	1.78	mg/kg	KM (Ch)	95% UCL
Dibenz(a,h)anthracene	0.01	J	0.45		mg/kg	14	17	0.2	mg/kg	KM (t)	95% UCL
PCB-1260	0.022		4.2		mg/kg	5	16	0.86	mg/kg	KM (t)	95% UCL
2,3,7,8-TCDD	9.9174E-06		0.00114525		mg/kg	13	21	3.08E-04	mg/kg	KM(BCA)	95% UCL
Antimony	2.9		202		mg/kg	5	14	52.6	mg/kg	KM (t)	95% UCL
Arsenic	3.4		17.7		mg/kg	7	14	8.32	mg/kg	KM (t)	95% UCL
Cobalt	2.2	J	221		mg/kg	12	13	138	mg/kg	KM (t)	95% UCL
Iron	7060		198000		mg/kg	13	13	103000	mg/kg	Stud. t	95% UCL
Lead	18.5		57300		mg/kg	14	14	48400	mg/kg	Cheb	95% UCL
Vanadium	12.9		1670		mg/kg	13	13	949	mg/kg	Stud. t	95% UCL
Zinc	22.5		45300		mg/kg	14	14	38200	mg/kg	Cheb	95% UCL
Chromium, hexavalent	0.54		3390		mg/kg	25	35	1270	mg/kg	KM (Ch)	95% UCL
EASTERN AREA											
1,2,4-Trichlorobenzene	6.36		200000		mg/kg	11	11	150000	mg/kg	Maximum	
1,2-Dichlorobenzene	3.78		6470		mg/kg	10	11	4560	mg/kg	KM(Ch)	95% UCL
1,3-Dichlorobenzene*	6.4		1550		mg/kg	10	11	1140	mg/kg	KM(Ch)	95% UCL
1,4-Dichlorobenzene	15		4840		mg/kg	9	11	1681	mg/kg	KM(Ch)	95% UCL
Benzo(a)anthracene	0.17		22		mg/kg	6	18	6.9	mg/kg	KM(t)	95% UCL
Benzo(a)pyrene	0.17		37		mg/kg	12	18	20.4	mg/kg	KM(BCA)	95% UCL
Benzo(b)fluoranthene	0.42		65.8		mg/kg	13	18	22.4	mg/kg	KM(t)	95% UCL
Dibenz(a,h)anthracene	0.029	J	8.8		mg/kg	8	18	3.1	mg/kg	KM(t)	95% UCL
Hexachlorobenzene	0.95		359		mg/kg	11	18	83.2	mg/kg	KM(BCA)	95% UCL
Indeno(1,2,3-cd)pyrene	0.31		35.9		mg/kg	13	18	13	mg/kg	KM(t)	95% UCL
Naphthalene	0.11		448		mg/kg	14	17	189	mg/kg	KM(Ch)	95% UCL
PCB-1248	0.1		2.5		mg/kg	5	7	1.43	mg/kg	KM(t)	95% UCL
PCB-1254	0.042	PG	1		mg/kg	7	7	0.56	mg/kg	Stud. t	95% UCL
2,3,7,8-TCDD	NA		0.00052		mg/kg	1	10	0.00052	mg/kg	Maximum	
Chromium, hexavalent	0.39		195		mg/kg	2	4	195	mg/kg	Maximum	

* = Screened using value for a similar compound

(1) J = Estimated value
B = Reported value is between Contract Required Detection Limit and Instrument Detection Limit
PG = Percent difference between columns >25%

(2) Statistical Measures:
Maximum = maximum detected concentration
KM(t) = UCL based on Kaplan-Meier estimates using the Student's t-distribution cutoff value.
KM(Ch) = UCL based on Kaplan- Meier estimates using the Chebyshev inequality
KM(BCA) = UCL based on Kaplan-Meier estimates using the bias-corrected bootstrap method
Stud. t = UCL based on the Student's t test.
Cheb = UCL based on estimates using the Chebyshev inequality

(3) Rationale for selection of appropriate EPC:
The best fit, based on multiple goodness of fit tests performed by ProUCL 5.0, is selected as the EPC.
When the UCL concentration determined by ProUCL 5.0 exceeded the maximum detected concentration, the maximum concentration is used as the EPC.
Maximum detction is used for low sample sizes.

TABLE 1B
CHEMICALS OF CONCERN- SUBSURFACE SOIL
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Scenario Timeframe:	**Future**
Medium:	**Subsurface Soil (0-10 feet bgs)**
Exposure Medium:	**Subsurface Soil (0-10 feet bgs)**
Exposure Point:	**Onsite Subsurface Soil Particulates Volatile Emissions**

Chemical	Minimum Concentration		Maximum Concentration		Concentration Units	Detection Frequency		Exposure Point Concentration (EPC)	EPC Units	Statistical Measure	
						Detected	Total				
WESTERN AREA											
1,2,3-Trichlorobenzene	0.29	J	210		mg/kg	2	15	210	mg/kg	Maximum	
1,2,4-Trichlorobenzene	0.00079	J	1300		mg/kg	7	29	161	mg/kg	KM(t)	95% UCL
1,2-Dichlorobenzene	0.0012	J	3300		mg/kg	16	29	606	mg/kg	KM(BCA)	95% UCL
1,3-Dichlorobenzene*	0.00096	J	3300		mg/kg	17	29	631	mg/kg	KM(BCA)	95% UCL
1,4-Dichlorobenzene	0.0015	J	5200		mg/kg	16	29	730	mg/kg	KM(BCA)	95% UCL
Benzene	0.00071	J	110	J	mg/kg	29	61	25.3	mg/kg	KM(Ch)	95% UCL
Chlorobenzene	0.0012		630		mg/kg	43	61	189	mg/kg	KM(Ch)	95% UCL
Ethylbenzene	0.00048	J	450		mg/kg	14	57	95	mg/kg	KM(Ch)	95% UCL
m,p-Xylenes	1700		1700		mg/kg	1	15	1700	mg/kg	Maximum	
o-Xylene	600		600		mg/kg	1	15	600	mg/kg	Maximum	
1,1'-Biphenyl	0.063	J	22		mg/kg	9	19	17.4	mg/kg	KM(Ch)	95% UCL
1,2,4,5-Tetrachlorobenzene*	0.097	J	210		mg/kg	8	15	44.4	mg/kg	KM(BCA)	95% UCL
Benzo(a)anthracene	0.073		87		mg/kg	23	29	40.2	mg/kg	KM(Ch)	95% UCL
Benzo(a)pyrene	0.03	J	82		mg/kg	22	29	35.8	mg/kg	KM(Ch)	95% UCL
Benzo(b)fluoranthene	0.041		58		mg/kg	25	29	27.5	mg/kg	KM(Ch)	95% UCL
Dibenz(a,h)anthracene	0.01	J	4.9		mg/kg	17	25	0.79	mg/kg	KM(BCA)	95% UCL
Indeno(1,2,3-cd)pyrene	0.032	J	54		mg/kg	21	29	23.4	mg/kg	KM(Ch)	95% UCL
Naphthalene	0.04		110		mg/kg	22	29	45.4	mg/kg	KM(Ch)	95% UCL
PCB-1254	0.034		0.82		mg/kg	3	25	0.42	mg/kg	KM(Ch)	95% UCL
PCB-1260	0.022		4.2		mg/kg	6	25	0.55	mg/kg	KM(t)	95% UCL
2,3,7,8-TCDD	2.0107E-06		4.150E-03		mg/kg	19	27	1.27E-03	mg/kg	KM(Ch)	95% UCL
Antimony	2.9		202		mg/kg	9	22	37.4	mg/kg	KM(t)	95% UCL
Arsenic	2.53		54.9		mg/kg	15	22	16.8	mg/kg	KM(BCA)	95% UCL
Cobalt	1.2	B	221		mg/kg	17	18	162	mg/kg	KM(Ch)	95% UCL
Iron	7060		198000		mg/kg	18	18	84800	mg/kg	Stud. t	95% UCL
Lead	18.5		57300		mg/kg	22	22	15800	mg/kg	Cheb	95% UCL
Thallium	0.87		1.7		mg/kg	3	21	1.39	mg/kg	KM(t)	95% UCL
Vanadium	10.3	B	1670		mg/kg	18	18	1080	mg/kg	AG	95% UCL
Zinc	22.5		45300		mg/kg	22	22	12500	mg/kg	Cheb	95% UCL
Chromium, hexavalent	0.54		11000		mg/kg	58	75	2280	mg/kg	KM(Ch)	95% UCL
EASTERN AREA											
1,2,4-Trichlorobenzene	0.007	J	200000	J	mg/kg	13	16	70200	mg/kg	KM(Ch)	95% UCL
1,2-Dichlorobenzene	3.78		6470		mg/kg	10	11	1860	mg/kg	KM(BCA)	95% UCL
1,3-Dichlorobenzene*	6.4		1550		mg/kg	10	11	484	mg/kg	KM(BCA)	95% UCL
1,4-Dichlorobenzene	0.55		4840		mg/kg	10	16	1200	mg/kg	KM(BCA)	95% UCL
Benzo(a)anthracene	0.14	J	22		mg/kg	9	23	4.9	mg/kg	KM(t)	95% UCL
Benzo(a)pyrene	0.14	J	37		mg/kg	16	23	16.2	mg/kg	KM(Ch)	95% UCL
Benzo(b)fluoranthene	0.22	J	65.8		mg/kg	17	23	27.1	mg/kg	KM(Ch)	95% UCL
Dibenz(a,h)anthracene	0.029	J	8.8		mg/kg	10	23	2.3	mg/kg	KM(t)	95% UCL
Hexachlorobenzene	0.95		359		mg/kg	11	23	61.2	mg/kg	KM(t)	95% UCL
Indeno(1,2,3-cd)pyrene	0.074	J	35.9		mg/kg	16	23	10	mg/kg	KM(t)	95% UCL
Naphthalene	0.11		2000		mg/kg	19	22	1100	mg/kg	KM(Ch)	95% UCL
PCB-1248	0.052		2.5		mg/kg	6	12	0.85	mg/kg	KM(t)	95% UCL
PCB-1254	0.042	PG	1		mg/kg	7	12	0.34	mg/kg	KM(t)	95% UCL
2,3,7,8-TCDD	1.788E-07		0.00052		mg/kg	6	15	1.58E-04	mg/kg	KM(t)	95% UCL
Arsenic	6.5		9.8	B	mg/kg	2	5	9.8	mg/kg	Maximum	
Cobalt	8	B	126		mg/kg	5	5	120	mg/kg	Stud. t	95% UCL
Iron	22300		72100		mg/kg	5	5	65200	mg/kg	Stud. t	95% UCL
Thallium	4.5		9.4		mg/kg	4	5	9.3	mg/kg	KM(t)	95% UCL
Vanadium	38.6		1390		mg/kg	5	5	1000	mg/kg	Stud. t	95% UCL
Chromium, hexavalent	0.39		3820		mg/kg	6	9	2250	mg/kg	KM(t)	95% UCL

* = Screened using value for a similar compound

(1) J = Estimated value

B = Reported value is between Contract Required Detection Limit and Instrument Detection Limit

PG = Percent difference between columns >25%

(2) Statistical Measures:

Maximum = maximum detected concentration

KM(t) = UCL based on Kaplan-Meier estimates using the Student's t-distribution cutoff value.

KM(Ch) = UCL based on Kaplan- Meier estimates using the Chebyshev inequality

KM(BCA) = UCL based on Kaplan-Meier estimates using the bias-corrected bootstrap method

Stud. t = UCL based on the Student's t test.

Cheb = UCL based on estimates using the Chebyshev inequality

AG = Adjusted gamma 95% UCL

(3) Rationale for selection of appropriate EPC:

The best fit, based on multiple goodness of fit tests performed by ProUCL 5.0, is selected as the EPC.

When the UCL concentration determined by ProUCL 5.0 exceeded the maximum detected concentration, the maximum concentration is used as the EPC.

Maximum detction is used for low sample sizes.

TABLE 1C
CHEMICALS OF CONCERN- GROUNDWATER
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Scenario Timeframe:	**Future**
Medium:	**Groundwater**
Exposure Medium:	**Groundwater**
Exposure Point:	**Groundwater**

Chemical	Minimum Concentration		Maximum Concentration		Concentration Units	Detection Frequency		Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
						Detected	Total			
WESTERN AREA										
1,2,4-Trichlorobenzene	NA		0.00089	J	mg/L	2	4	0.00089	mg/L	Maximum
1,2-Dichlorobenzene	0.00065	J	0.01		mg/L	3	4	0.01	mg/L	Maximum
1,3-Dichlorobenzene*	0.0026	J	0.0034	J	mg/L	2	4	0.0034	mg/L	Maximum
1,4-Dichlorobenzene	0.001	J	0.0044	J	mg/L	3	4	0.0044	mg/L	Maximum
Benzene	0.0015	J	0.085		mg/L	3	4	0.085	mg/L	Maximum
Chlorobenzene	0.0024	J	0.32		mg/L	3	4	0.32	mg/L	Maximum
Ethylbenzene	NA		0.01		mg/L	1	4	0.01	mg/L	Maximum
Xylene (total)	NA		0.039		mg/L	1	4	0.039	mg/L	Maximum
1,1'-Biphenyl	NA		0.028		mg/L	1	4	0.028	mg/L	Maximum
2-Methylnaphthalene	0.0012	J	0.59		mg/L	2	4	0.59	mg/L	Maximum
Acenaphthene	0.0012	J	0.061		mg/L	3	4	0.061	mg/L	Maximum
Naphthalene	0.0021	J	5		mg/L	2	4	5	mg/L	Maximum
Aluminum	0.055	B	1.75		mg/L	4	4	1.75	mg/L	Maximum
Antimony	NA		0.0044	B	mg/L	1	4	0.0044	mg/L	Maximum
Arsenic	0.003		0.016		mg/L	2	4	0.016	mg/L	Maximum
Barium	NA		0.352	J	mg/L	4	4	0.352	mg/L	Maximum
Cadmium	NA		0.00067	B	mg/L	1	4	0.00067	mg/L	Maximum
Chromium	0.0031	B	4.69		mg/L	4	4	4.69	mg/L	Maximum
Cobalt	NA		0.0028	B	mg/L	1	4	0.0028	mg/L	Maximum
Iron	0.0334	B	46.1		mg/L	4	4	46.1	mg/L	Maximum
Lead	0.0032		0.0377		mg/L	2	4	0.0377	mg/L	Maximum
Manganese	0.0242		0.701		mg/L	3	4	0.701	mg/L	Maximum
Mercury	0.000076	B	0.00012	B	mg/L	2	4	0.00012	mg/L	Maximum
Thallium	NA		0.0036	BJ	mg/L	1	4	0.0036	mg/L	Maximum
Vanadium	0.0013	BJ	0.0487		mg/L	3	4	0.0487	mg/L	Maximum
Zinc	0.107		1.94		mg/L	3	4	1.94	mg/L	Maximum
Chromium, hexavalent	NA		4.07		mg/L	1	4	4.07	mg/L	Maximum
EASTERN AREA										
1,2,4-Trichlorobenzene	NA		0.0041	J	mg/L	1	1	0.0041	mg/L	Maximum
1,2-Dichlorobenzene	NA		0.0042	J	mg/L	1	1	0.0042	mg/L	Maximum
1,4-Dichlorobenzene	NA		0.0044	J	mg/L	1	1	0.0044	mg/L	Maximum
Chlorobenzene	NA		0.017		mg/L	1	1	0.017	mg/L	Maximum
Benzo(a)anthracene	NA		0.0023	J	mg/L	1	1	0.0023	mg/L	Maximum
Benzo(a)pyrene	NA		0.0022	J	mg/L	1	1	0.0022	mg/L	Maximum
Benzo(b)fluoranthene	NA		0.0038	J	mg/L	1	1	0.0038	mg/L	Maximum
Indeno(1,2,3-cd)pyrene	NA		0.0017	J	mg/L	1	1	0.0017	mg/L	Maximum
Naphthalene	NA		0.021		mg/L	1	1	0.021	mg/L	Maximum
Aluminum	NA		2.91	J	mg/L	1	1	2.91	mg/L	Maximum
Cadmium	NA		0.002	B	mg/L	1	1	0.002	mg/L	Maximum
Chromium	NA		3.65		mg/L	1	1	3.65	mg/L	Maximum
Cobalt	NA		0.0066	B	mg/L	1	1	0.0066	mg/L	Maximum
Iron	NA		6.55		mg/L	1	1	6.55	mg/L	Maximum
Lead	NA		15.5		mg/L	1	1	0.0155	mg/L	Maximum
Manganese	NA		0.071		mg/L	1	1	0.071	mg/L	Maximum
Mercury	NA		0.00011	B	mg/L	1	1	0.00011	mg/L	Maximum
Nickel	NA		0.0317	B	mg/L	1	1	0.0317	mg/L	Maximum
Vanadium	NA		0.135		mg/L	1	1	0.135	mg/L	Maximum
Zinc	NA		5.35		mg/L	1	1	5.35	mg/L	Maximum
Chromium, hexavalent	NA		0.453		mg/L	1	1	0.453	mg/L	Maximum

Scenario Timeframe:	**Future**
Medium:	**Groundwater**
Exposure Medium:	**Indoor Air**
Exposure Point:	**Indoor Air**

Chemical	Minimum Concentration		Maximum Concentration		Concentration Units	Detection Frequency		Exposure Point Concentration (EPC)	EPC Units	Statistical Measure
						Detected	Total			
EASTERN AND WESTERN AREAS										
Benzene	0.0015	J	0.085		mg/L	3	5	0.085	mg/L	Maximum
Chlorobenzene	0.0024	J	0.32		mg/L	4	5	0.32	mg/L	Maximum
2-Methylnaphthalene	0.0012	J	0.59		mg/L	3	5	0.59	mg/L	Maximum
Naphthalene	0.0021	J	5		mg/L	3	5	5	mg/L	Maximum

* = Screened using value for a similar compound

(1) J = Estimated value
B = Reported value is between Contract Required Detection Limit and Instrument Detection Limit
PG = Percent difference between columns >25%

(2) Statistical Measures:
Maximum = maximum detected concentration

(3) Rationale for selection of appropriate EPC:
Low number of samples. Maximum used for EPC.

TABLE 2 (RAGS Part D Table 1)
SELECTION OF EXPOSURE PATHWAYS
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Current	Onsite Groundwater	COPCs in onsite groundwater may enter a potable water well and be available for exposure	Tap water from wells installed inside the barrier wall	Onsite Industrial User	Adult	Ingestion Inhalation Dermal Contact	Qual	**Excluded**. Groundwater is not used for potable purposes. Properties supplied with municipal water. Classification Exception Area is is in effect for the Site and surrounding area to eliminate this exposure (See Appendix A).
Current/Future	Onsite Surface Soil	COPCs in onsite surface soil may volatilize or be transferred to airborne particulates and carried offsite, becoming available for exposure	Wind may carry airborne COCs to offsite properties	Offsite Resident	Adult	Inhalation	Qual	**Excluded**. Monitoring data collected for onsite workers during implementation of interim response actions showed no unacceptable levels of either volatile organics or particulates in air monitoring samples collected to date. It is assumed that offsite exposures would be lower. The site surface is either paved, covered with gravel or vegetated.
					Child	Inhalation		
				Offsite Industrial Worker	Adult	Inhalation		
Current/Future	Onsite Surface Soil	COPCs in onsite surface soil are available for exposure	If soil cover is disturbed for any reason, direct exposure may occur to soil and to COCs transferred to airborne particulates	Visitor HCTS Operator	Adult	Ingestion Inhalation Dermal Contact	Quan	**Included**. Occasional visitors to the property may be exposed to surface soils during time spent on site, if the existing soil cover materials are disturbed. HCTS operators are onsite daily and perform some duties outdoors. Inhalation not addressed, based on air monitoring data collected during implementation of intgerim response actions
Current/Future	Offsite Surface Soil	COPCs in surface soil are available for exposure	Direct exposure may occur to offsite soil and to COCs transferred to airborne particulates	Offsite Visitor	Adult	Ingestion Inhalation Dermal Contact	Quan	**Included**. Visitors to the Seaboard Site may be exposed to surface soils that are not covered by asphalt, gravel or vegetation.
Future	Onsite and Offsite Surface and Subsurface Soil to Groudnwater	COPCs in soils may be transferred to groundwaters (within the slurry wall)	Exposure may occur during construction activities conducted below the water table	Construction Worker Utility Worker	Adult	Ingestion Inhalation Dermal Contact	Qual	**Included**. Construction workers could come into contact with shallow groundwater. However, best management practices in areas of shallow groundwater include dewatering of the excavations, thereby minimizing contact with waters. In addition, the most prevalent COPCs in soil (PAHs, PCBs and dioxins) are not found in the groundwater at significant concentrations, nor are these compounds readily soluble and able to pass through the skin during an intermittent exposure. Shallow groundwater at the Site does not contain high concentrations of organic chemicals outside the limits of the Consolidation Area.
Future	Offsite Surface and Subsurface Soil to Offsite Groundwater	COPCs in soils outside the barrier wall may be transferred to groundwater, enter a potable well, and be available for contact (outside the slurry wall)	Tap water from future potential wells installed outside the barrier wall	Offsite Industrial User	Adult	Ingestion Inhalation Dermal Contact	Qual	**Excluded.** No domestic or industrial water supply wells are located on the property or in the immediate Site vicinity. The Town of Kearny uses surface water supplies. Future installation of a potable well either on-site or off-site is considered to be highly unlikely, Groundwater use is prohibited via a Classification Exception Area (see Appendix A)/Well Restriction Area. Future potential use of groundwater both within the barrier wall and outside the barrier wall will be addressed qualitatively in the risk assessment.
Future	Onsite and Offsite Surface Soil	COPCs in surface soil are available for exposure	Exposure may occur to soil and to COCs transferred to airborne particulates	Outdoor Industrial Worker	Adult	Ingestion Inhalation Dermal Contact	Quan	**Included**. Under future site conditions, the property may be redeveloped for industrial use. Outdoor workers such as groundskeepers may be employed.
Future	Onsite and Offsite Surface and Subsurface Soil / Groundwater to Air	COPCs in surface and subsurface soil are available for exposure via vapor intrusion into a building	Exposure may occur via vapor intrusion through future building floors	Indoor Industrial Worker	Adult	Ingestion Inhalation Dermal Contact	Quan	**Included**. Under future site conditions, a building could be constructed on the Site. Indoor workers could be affected by volatile emissions from soils and groundwater beneath a structure.

TABLE 2 (RAGS Part D Table 1)
SELECTION OF EXPOSURE PATHWAYS
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Scenario Timeframe	Medium	Exposure Medium	Exposure Point	Receptor Population	Receptor Age	Exposure Route	Type of Analysis	Rationale for Selection or Exclusion of Exposure Pathway
Future	Onsite and Offsite Surface and Subsurface Soil to Air	COPCs in surface and subsurface soil are available for exposure in outdoor air	Exposure may occur to soil and to COCs transferred to airborne particulates	Construction Worker Utility Worker	Adult	Ingestion Inhalation Dermal Contact	Quan	**Included**. Construction/utility workers may come into direct contact with surface/subsurface soil during activities that result in soil disturbance.
Future	Onsite and Offsite Surface and Subsurface Soil to Surface Water	COPCs in surface and subsurface soil could be transported to surface waters via runoff during construction activities	Exposure may occur via ingestion of fish through bioaccumulation or via dermal contact/ingestion during recreation	Offsite Resident	Adult	Ingestion Dermal Contact	Qual	**Excluded**. Best management practices during construction, installation of cover materials and storm sewers, and prior removal of soft soils from the South Ditch preclude potential exposures to Site-related constituents in surface water or fish.
Future	Groundwater	COPCs in shallow (fill unit) groundwater are available for exposure	Exposure may occur during construction or excavation activities conducted below the water table	Construction Worker Utility Worker	Adult	Ingestion Dermal Contact	Quan	**Included**. Shallow (fill unit) groundwater may be contacted by construction or utility workers during excavation.

TABLE 3A
NON-CANCER TOXICITY DATA - ORAL/DERMAL
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Chemical of Concern	Chronic/ Subchronic [1]	Oral RfD		Oral Absorption Efficiency for Dermal [2]	Absorbed RfD for Dermal [2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s)
Volatile Organics										
1,2,4,5-Tetrachlorobenzene	C	3E-04	mg/kg/day	1	3E-04	mg/kg/day	kidney	1000	IRIS [3]	02/10/14
	SC	3E-05	mg/kg/day	1	3E-05	mg/kg/day	thyroid	300	PPRTV [4]	02/10/14
1,2,3-Trichlorobenzene	C	8E-04	mg/kg/day	1	8E-04	mg/kg/day	body weight	10	PPRTV	02/10/14
	SC	8E-03	mg/kg/day	1	8E-03	mg/kg/day	body weight/liver	1000	PPRTV	02/10/14
1,2,4-Trichlorobenzene	C	1E-02	mg/kg/day	1	1E-02	mg/kg/day	adrenal	1000	IRIS	02/10/14
	SC	9E-02	mg/kg/day	1	9E-02	mg/kg/day	liver	100	PPRTV	02/10/14
1,2-Dichlorobenzene	C	9E-02	mg/kg/day	1	9E-02	mg/kg/day	liver	1000	IRIS	02/10/14
	SC	6E-01	mg/kg/day	1	6E-01	mg/kg/day	liver	NA [5]	RAIS [6]	02/10/14
1,3-Dichlorobenzene [7]	C	9E-02	mg/kg/day	1	9E-02	mg/kg/day	liver	1000	IRIS	02/10/14
	SC	6E-01	mg/kg/day	1	6E-01	mg/kg/day	liver	NA	PPRTV	02/10/14
1,4-Dichlorobenzene	C	7E-02	mg/kg/day	1	7E-02	mg/kg/day	liver	NA	RSL [8]	11/01/13
Benzene	C	4E-03	mg/kg/day	1	4E-03	mg/kg/day	blood	300	IRIS	02/10/14
	SC	1E-02	mg/kg/day	1	1E-02	mg/kg/day	blood	100	RAIS	02/10/14
Chlorobenzene	C	2E-02	mg/kg/day	1	2E-02	mg/kg/day	liver	1000	IRIS	02/10/14
	SC	7E-02	mg/kg/day	1	7E-02	mg/kg/day	liver	300	PPRTV	02/10/14
Ethylbenzene	C	1E-01	mg/kg/day	1	1E-01	mg/kg/day	liver/kidney	1000	IRIS	02/10/14
	SC	5E-02	mg/kg/day	1	5E-02	mg/kg/day	liver	1000	PPRTV	02/10/14
Xylenes	C	2E-01	mg/kg/day	1	2E-01	mg/kg/day	body weight	1000	IRIS	02/10/14
	SC	4E-01	mg/kg/day	1	4E-01	mg/kg/day	whole body	100	PPRTV	2/10/2014
Semivolatile Organics										
1,1'-Biphenyl	C	5E-01	mg/kg/day	1	5E-01	mg/kg/day	kidney	30	IRIS	02/10/14
	SC	1E-01	mg/kg/day	1	1E-01	mg/kg/day	fetus	100	PPRTV	02/10/14
2-Methylnaphthalene	C	4E-03	mg/kg/day	0.13	5E-04	mg/kg/day	lung	1000	IRIS	11/10/14
	SC	4E-03	mg/kg/day	0.13	5E-04	mg/kg/day	lung	1000	IRIS	11/10/14
Benzo(a)anthracene	NA	NA	NA	0.13	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	0.13	NA	NA	NA	NA	IRIS	02/26/14
Benzo(b)fluoranthene	NA	NA	NA	0.13	NA	NA	NA	NA	IRIS	02/26/14
Dibenz(a,h)anthracene	NA	NA	NA	0.13	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	C	8E-04	mg/kg/day	0.1	8E-05	mg/kg/day	liver	100	IRIS	02/26/14
	SC	1E-05	mg/kg/day	0.1	1E-06	mg/kg/day	reproductive	300	PPRTV	02/26/14
Indeno(1,2,3-cd)pyrene	NA	NA	NA	0.13	NA	NA	NA	NA	NA	NA
Naphthalene	C	2E-02	mg/kg/day	0.13	3E-03	mg/kg/day	body weight	3000	IRIS	02/26/14
PCBs										
Aroclor 1248	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1254	C	2E-05	mg/kg/day	0.14	3E-06	mg/kg/day	eyes/immune	300	IRIS	02/26/14
Aroclor 1260	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dioxin										
TCDD	C	7E-10	mg/kg/day	0.03	2E-11	mg/kg/day	reproductive	30	IRIS	02/26/14

TABLE 3A
NON-CANCER TOXICITY DATA - ORAL/DERMAL
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Chemical of Concern	Chronic/ Subchronic (1)	Oral RfD		Oral Absorption Efficiency for Dermal (2)	Absorbed RfD for Dermal (2)		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfD:Target Organ(s)	
		Value	Units		Value	Units			Source(s)	Date(s)
Metals										
Aluminum	C	1E+00	mg/kg/day	1.00	1E+00	mg/kg/day	CNS	1E+02	PPRTV	02/26/14
Antimony	C	4E-04	mg/kg/day	0.15	6E-05	mg/kg/day	lifespan/blood	1000	IRIS	02/26/14
	SC	4E-04	mg/kg/day	0.15	6E-05	mg/kg/day	whole body	1000	PPRTV	02/26/14
Arsenic	C	3E-04	mg/kg/day	0.03	9E-06	mg/kg/day	skin	3	IRIS	02/26/14
Barium	C	2E-01	mg/kg/day	0.07	1E-02	mg/kg/day	kidney	300	IRIS	02/26/14
Cadmium	C	1E-03	mg/kg/day	0.03	3E-05	mg/kg/day	kidney	10	IRIS	02/26/14
Chromium	C	1.5E+0	mg/kg/day	0.13	2E-01	mg/kg/day	blood	1000	IRIS	02/26/14
Chromium, hexavalent	C	3E-03	mg/kg/day	0.025	8E-05	mg/kg/day	blood	900	IRIS	02/26/14
Cobalt	C	3E-04	mg/kg/day	1	3E-04	mg/kg/day	thyroid	3000	PPRTV	02/26/14
	SC	3E-03	mg/kg/day	1	3E-03	mg/kg/day	thyroid	300	PPRTV	02/26/14
Iron	C	7E-01	mg/kg/day	1	7E-01	mg/kg/day	gastrointestinal	1.5	PPRTV	02/26/14
	SC	7E-01	mg/kg/day	1	7E-01	mg/kg/day	gastrointestinal	1.5	RAIS	02/26/14
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	C	1E-01	mg/kg/day	1	1E-01	mg/kg/day	central nervous	1	IRIS	02/26/14
Mercury	C	2E-04	mg/kg/day	1E+00	2E-04	mg/kg/day	GI/kidney	NA	RAIS	07/17/14
Nickel (11)	C	2E-02	mg/kg/day	1	2E-02	mg/kg/day	body weight	300	IRIS	02/26/14
Thallium (11)	C	1E-05	mg/kg/day	1	1E-05	mg/kg/day	hair,eyes	3000	IRIS	02/26/14
	SC	4E-05	mg/kg/day	1	4E-05	mg/kg/day	hair,eyes	1000	PPRTV	02/26/14
Vanadium	C	9E-03	mg/kg/day	0.03	2E-04	mg/kg/day	hair	100	PPRTV	02/26/14
	SC	7E-04	mg/kg/day	0.03	2E-05	mg/kg/day	kidney	300	RAIS	02/26/14
Zinc	C	3E-01	mg/kg/day	1	3E-01	mg/kg/day	low copper status	3	IRIS	02/26/14

(1) In the absence of subchronic toxicity values, the chronic value is used to be conservative.
(2) USEPA, 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). EPA/540/R/99/005 - chapter 4.
See Section 6.2.2 of the text.
(3) Integrated Risk Information System (IRIS) - USEPA, February 2014. <http://cfpub.epa.gov/ncea/iris/index.html>
(4) Provisional Peer Reviewed Toxicity Values for Superfund (PPRTV) - USEPA, 2014. http://hhpprtv.ornl.gov/
(5) NA - Not available
(6) Risk Assessment Information System (RAIS) - Oak Ridge National Laboratory - 2014. <http://rais.ornl.gov>
(7) Toxicity values for 1,2-dichlorobenzene are used for 1.3-dichlorobenzene
(8) Regional Screening Table (RSL) - USEPA, November 2013 <http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm>
(9) CNS - Central nervous system
(10) NOAEL - No Observed Adverse Effect Level
(11) Value presented for soluble salts

TABLE 3B
NON-CANCER TOXICITY DATA - INHALATION
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Chemical of Concern	Chronic/ Subchronic [1]	Inhalation RfC		Extrapolated RfD [2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s)
Volatile Organics									
1,2,4,5-Tetrachlorobenzene	NA [3]	NA	NA	NA	NA	NA	NA	NA	NA
1,2,3-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
1,2,4-Trichlorobenzene	C	2E-03	mg/m^3	5.71E-04	mg/kg-day	liver	100	PPRTV [4]	2/10/2014
	SC	2E-02	mg/m^3	5.71E-03	mg/kg-day	liver	300	PPRTV	2/10/2014
1,2-Dichlorobenzene	C	2E-01	mg/m^3	5.71E-02	mg/kg-day	liver	NA	RSL [5]	11/01/13
	SC	2E+00	mg/m^3	5.71E-01	mg/kg-day	liver	NA	RAIS [6]	2/10/2014
1,3-Dichlorobenzene [7]	C	2E-01	mg/m^3	5.71E-02	mg/kg-day	liver	NA	RSL	11/01/13
	SC	2E+00	mg/m^3	5.71E-01	mg/kg-day	liver	NA	RAIS	2/10/2014
1,4-Dichlorobenzene	C	8E-01	mg/m^3	2.29E-01	mg/kg-day	liver	100	IRIS [8]	2/10/2014
Benzene	C	3E-02	mg/m^3	8.57E-03	mg/kg-day	blood	300	IRIS	2/10/2014
	SC	8E-02	mg/m^3	2.29E-02	mg/kg-day	liver	100	RAIS	2/10/2014
Chlorobenzene	C	5E-02	mg/m^3	1.43E-02	mg/kg-day	liver	1000	IRIS	2/10/2014
	SC	5E-01	mg/m^3	1.43E-01	mg/kg-day	liver	100	PPRTV	2/10/2014
Ethylbenzene	C	1E+00	mg/m^3	2.86E-01	mg/kg-day	developmental	300	IRIS	2/10/2014
	SC	9E+00	mg/m^3	2.57E+00	mg/kg-day	ear	100	PPRTV	2/10/2014
Xylenes	C	1E-01	mg/m^3	2.86E-02	mg/kg-day	coordination	300	IRIS	2/10/2014
	SC	4E-01	mg/m^3	1.14E-01	mg/kg-day	whole body	100	PPRTV	2/10/2014
Semivolatile Organics									
1,1'-Biphenyl	C	4E-04	mg/m^3	1.14E-04	mg/kg-day	edema	NA	IRIS	2/10/2014
	SC	4E-03	mg/m^3	1.14E-03	mg/kg-day	edema	NA	PPRTV	2/10/2014
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(a)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Benzo(b)fluoranthene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dibenz(a,h)anthracene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Hexachlorobenzene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Indeno(1,2,3-cd)pyrene	NA	NA	NA	NA	NA	NA	NA	NA	NA
Naphthalene	C	3E-03	mg/m^3	8.57E-04	mg/kg-day	respiratory	3000	IRIS	2/26/2014
PCBs									
Aroclor 1248	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1254	NA	NA	NA	NA	NA	NA	NA	NA	NA
Aroclor 1260	NA	NA	NA	NA	NA	NA	NA	NA	NA
Dioxin									
TCDD	C	4E-08	mg/m^3	1.14E-08	mg/kg-day	reproductive	NA	RSL	11/01/13

TABLE 3B
NON-CANCER TOXICITY DATA - INHALATION
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Chemical of Concern	Chronic/ Subchronic [1]	Inhalation RfC		Extrapolated RfD[2]		Primary Target Organ(s)	Combined Uncertainty/Modifying Factors	RfC : Target Organ(s)	
		Value	Units	Value	Units			Source(s)	Date(s)
Metals									
Aluminum	C	5E-03	mg/m^3	1.43E-03	mg/kg-day	neuro	NA	PPRTV	2/26/2014
Antimony	NA	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	C	1.5E-05	mg/m^3	4.29E-06	mg/kg-day	respiratory	NA	RSL	11/01/13
Barium	C	5E-04	mg/m^3	1.43E-04	mg/kg-day	developmental	NA	RSL	11/01/13
Cadmium	C	1E-05	mg/m^3	2.86E-06	mg/kg-day	respiratory/kidney	NA	RSL	11/01/13
Chromium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Chromium, hexavalent	C	1E-04	mg/m^3	2.86E-05	mg/kg-day	respiratory	300	IRIS	2/26/2014
Cobalt	C	6E-06	mg/m^3	1.71E-06	mg/kg-day	respiratory	300	PPRTV	2/26/2014
	SC	2E-05	mg/m^3	5.71E-06	mg/kg-day	respiratory	100	PPRTV	2/26/2014
Iron	NA	NA	NA	NA	NA	NA	NA	NA	NA
Lead	NA	NA	NA	NA	NA	NA	NA	NA	NA
Manganese	C	5E-05	mg/m^3	1.43E-05	mg/kg-day	central nervous	1000	IRIS	2/26/2014
Mercury	C	3E-04	mg/m^3	8.57E-05	mg/kg-day	central nervous	30	IRIS	2/26/2014
Nickel [5,6]	C	9E-05	mg/m^3	2.57E-05	mg/kg-day	respiratory	NA	IRIS	2/26/2014
Thallium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Vanadium	NA	NA	NA	NA	NA	NA	NA	NA	NA
Zinc	NA	NA	NA	NA	NA	NA	NA	NA	NA

(1) In the absence of subchronic toxicity values, the chronic value is used to be conservative.
(2) RfD (mg/kg-day) = RfC (mg/m^3) x 20 (m3/day) / 70 (kg)
(3) NA - Not available
(4) Provisional Peer Reviewed Toxicity Values for Superfund (PPRTV) - USEPA, 2014. http://hhpprtv.ornl.gov/
(5) Regional Screening Table (RSL) - USEPA, November 2013 <http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm>
(6) Risk Assessment Information System (RAIS) - Oak Ridge National Laboratory - 2014. <http://rais.ornl.gov>
(7) Toxicity values for 1,2-dichlorobenzene are used for 1.3-dichlorobenzene
(8) Integrated Risk Information System (IRIS) - USEPA, February 2014. <http://cfpub.epa.gov/ncea/iris/index.html>

TABLE 4A
CANCER TOXICITY DATA -- ORAL/DERMAL
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Chemical of Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal [1]	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s)
Volatile Organics								
1,2,4,5-Tetrachlorobenzene	NA [3]	NA	1	NA	NA	Inadequate Information	PPRTV[2]	02/10/14
1,2,3-Trichlorobenzene	NA	NA	1	NA	NA	Inadequate Information	PPRTV	02/10/14
1,2,4-Trichlorobenzene	2.9E-02	kg-day/mg	1	2.90E-02	kg-day/mg	D - Not Classifiable	PPRTV	02/10/14
1,2-Dichlorobenzene	NA	NA	1	NA	NA	D - Not Classifiable	IRIS[4]	02/10/14
1,3-Dichlorobenzene	NA	NA	1	NA	NA	NA	NA	NA
1,4-Dichlorobenzene [5]	5.4E-03	kg-day/mg	1	5.40E-03	kg-day/mg	C- Possible Human Carcinogen	RSL [6]	11/01/13
Benzene	5.5E-02	kg-day/mg	1	5.50E-02	kg-day/mg	A - Known Human Carcinogen	IRIS	02/10/14
Chlorobenzene	NA	NA	1	NA	NA	D - Not Classifiable	IRIS	02/10/14
Ethylbenzene [5]	1.0E-02	kg-day/mg	1	1.00E-02	kg-day/mg	D - Not Classifiable	IRIS	02/10/14
Xylenes	NA	NA	1	NA	NA	Inadequate Information	IRIS	02/10/14
Semivolatile Organics								
1,1'-Biphyenyl	8.0E-03	kg-day/mg	1	8.00E-03	kg-day/mg	Suggestive Evidence of Carcinogenicity	IRIS	02/10/14
2-Methylnaphthalene	NA	NA	0.13	NA	NA	Inadequate Information	IRIS	11/10/14
Benzo(a)anthracene	7.3E-01	kg-day/mg	0.13	9.49E-02	kg-day/mg	B2 - Probable Human Carcinogen	RSL	11/01/13
Benzo(a)pyrene	7.3E+00	kg-day/mg	0.13	9.49E-01	kg-day/mg	B2 - Probable Human Carcinogen	IRIS	02/26/14
Benzo(b)fluoranthene	7.3E-01	kg-day/mg	0.13	9.49E-02	kg-day/mg	B2 - Probable Human Carcinogen	RSL	11/01/13
Dibenz(a,h)anthracene	7.3E+00	kg-day/mg	0.13	9.49E-01	kg-day/mg	B2 - Probable Human Carcinogen	RSL	11/01/13
Hexachlorobenzene	1.6E+00	kg-day/mg	0.1	1.60E-01	kg-day/mg	B2 - Probable Human Carcinogen	IRIS	02/26/14
Indeno(1,2,3-cd)pyrene	7.3E-01	kg-day/mg	0.13	9.49E-02	kg-day/mg	B2 - Probable Human Carcinogen	RSL	11/01/13
Naphthalene	NA	NA	0.13	NA	NA	C - Possible Human Carcinogen	IRIS	02/26/14
PCBs								
Aroclor 1248 [5]	2.0E+00	kg-day/mg	0.14	2.80E-01	kg-day/mg	NA	RSL	11/01/13
Aroclor 1254 [5]	2.0E+00	kg-day/mg	0.14	2.80E-01	kg-day/mg	B2 - Probable Human Carcinogen	RSL	11/01/13
Aroclor 1260 [5]	2.0E+00	kg-day/mg	0.14	2.80E-01	kg-day/mg	B2 - Probable Human Carcinogen	RSL	11/01/13

TABLE 4A
CANCER TOXICITY DATA -- ORAL/DERMAL
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Chemical of Concern	Oral Cancer Slope Factor		Oral Absorption Efficiency for Dermal [1]	Absorbed Cancer Slope Factor for Dermal		Weight of Evidence/ Cancer Guideline Description	Oral CSF	
	Value	Units		Value	Units		Source(s)	Date(s)
Dioxin								
TCDD [5]	1.5E+05	kg-day/mg	0.03	4.50E+03	kg-day/mg	Probable Human Carcinogen	HEAST [7]	07/01/97
Metals								
Aluminum	NA	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA	NA
Arsenic	1.5E+00	kg-day/mg	0.03	4.50E-02	kg-day/mg	A - Known Human Carcinogen	IRIS	02/26/14
Barium	NA	NA	NA	NA	NA	NA	NA	NA
Cadmium	NA	NA	NA	NA	NA	B1 - Probable Human Carcinogen	IRIS	02/26/14
Chromium	NA	NA	NA	NA	NA	D - Not Classifiable	IRIS	02/26/14
Chromium, hexavalent [5]	5.0E-01	kg-day/mg	0.025	1.25E-02	kg-day/mg	A - Known Human Carcinogen	RSL	11/01/13
Cobalt	NA	NA	NA	NA	NA	Likely to be Carcinogenic	PPRTV	02/26/14
Lead	NA	NA	NA	NA	NA	B2 - Probable Human Carcinogen	IRIS	02/26/14
Nickel	NA	NA	NA	NA	NA	NA	IRIS	02/26/14
Thallium	NA	NA	1	NA	NA	Inadequate Information	IRIS	02/26/14
Vanadium	NA	NA	1	NA	NA	Inadequate Information	PPRTV	02/26/14
Zinc	NA	NA	0.001	NA	NA	NA	IRIS	02/26/14

(1) USEPA, 2004. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment). EPA/540/R/99/005 - chapter 4.
(2) Provisional Peer Reviewed Toxicity Values (PPRTV) for Superfund - USEPA, 2014. http://hhpprtv.ornl.gov/
(3) NA - Not available
(4) Integrated Risk Information System (IRIS) - USEPA, February 2014. <http://cfpub.epa.gov/ncea/iris/index.html>
(5) USEPA has no toxicity value for this compound. Value presented is from the California EPA or other source and may not be supported by the literature.
(6) Regional Screening Table (RSL) - USEPA, November 2013 <http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm>
(7) Health Effects Assessment Summary Tables - FY 1997 Update (HEAST) - USEPA July 1997

TABLE 4B
CANCER TOXICITY DATA -- INHALATION
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Chemical of Concern	Unit Risk		Inhalation Cancer Slope Factor[1]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s)
Volatile Organics							
1,2,4,5-Tetrachlorobenzene	NA [2]	NA	NA	NA	Inadequate Information	IRIS [3]	02/10/14
1,2,3-Trichlorobenzene	NA	NA	NA	NA	Inadequate Information	PPRTV [4]	02/10/14
1,2,4-Trichlorobenzene	NA	NA	NA	NA	NA	NA	NA
1,2-Dichlorobenzene	NA	NA	NA	NA	D - Not Classifiable	IRIS	02/10/14
1,3-Dichlorobenzene	NA	NA	NA	NA	NA	NA	NA
1,4-Dichlorobenzene	1.1E-02	m^3/mg	3.85E+01	mg/kg-day	C - Possible Human Carcinogen	RSL [5]	11/01/13
Benzene	7.8E-03	m^3/mg	2.73E+01	mg/kg-day	A - Known Human Carcinogen	IRIS	02/10/14
Chlorobenzene	NA	NA	NA	NA	NA	NA	NA
Ethylbenzene [6]	2.5E-03	m^3/mg	8.75E+00	mg/kg-day	D - Not Classifiable	RSL	11/01/13
Xylenes	NA	NA	NA	NA	Inadequate Information	IRIS	02/10/14
Semivolatile Organics							
1,1-Biphenyl	NA [2]	NA	NA	NA	NA	NA	NA
2-Methylnaphthalene	NA	NA	NA	NA	NA	NA	NA
Benzo(a)anthracene	1.1E-01	m^3/mg	3.85E+02	mg/kg-day	B2 - Probable Human Carcinogen	RSL	11/01/13
Benzo(a)pyrene	1.1E+00	m^3/mg	3.85E+03	mg/kg-day	B2 - Probable Human Carcinogen	RSL	11/01/13
Benzo(b)fluoranthene	1.1E-01	m^3/mg	3.85E+02	mg/kg-day	B2 - Probable Human Carcinogen	RSL	11/01/13
Dibenz(a,h)anthracene	1.2E+00	m^3/mg	4.20E+03	mg/kg-day	B2 - Probable Human Carcinogen	RSL	11/01/13
Hexachlorobenzene	4.6E-01	m^3/mg	1.61E+03	mg/kg-day	B2 - Probable Human Carcinogen	IRIS	02/26/14
Indeno(1,2,3-cd)pyrene	1.1E-01	m^3/mg	3.85E+02	mg/kg-day	B2 - Probable Human Carcinogen	RSL	11/01/13
Naphthalene	3.4E-02	m^3/mg	1.19E+02	mg/kg-day	C - Possible Human Carcinogen	RSL	11/01/13

TABLE 4B
CANCER TOXICITY DATA -- INHALATION
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Chemical of Concern	Unit Risk		Inhalation Cancer Slope Factor[(1)]		Weight of Evidence/ Cancer Guideline Description	Unit Risk : Inhalation CSF	
	Value	Units	Value	Units		Source(s)	Date(s)
PCBs							
Aroclor 1248 [(6)]	5.7E-01	m^3/mg	2.00E+03	mg/kg-day	NA	RSL	11/01/13
Aroclor 1254 [(6)]	5.7E-01	m^3/mg	2.00E+03	mg/kg-day	B2 - Probable Human Carcinogen	RSL	11/01/13
Aroclor 1260 [(6)]	5.7E-01	m^3/mg	2.00E+03	mg/kg-day	B2 - Probable Human Carcinogen	RSL	11/01/13
Dioxin							
TCDD [(6)]	3.8E+04	m^3/mg	1.33E+08	mg/kg-day	NA	RSL	11/01/13
Metals							
Aluminum	NA	NA	NA	NA	NA	NA	NA
Antimony	NA	NA	NA	NA	NA	NA	NA
Arsenic	4.3E+00	m^3/mg	1.51E+04	mg/kg-day	A - Known Human Carcinogen	IRIS	02/26/14
Barium	NA	NA	NA	NA	D - Not Classifiable	IRIS	02/26/14
Cadmium	1.8E+00	m^3/mg	6.30E+03	mg/kg-day	B1 - Probable Human Carcinogen	IRIS	02/26/14
Chromium	NA	NA	NA	NA	D - Not Classifiable	IRIS	02/26/14
Chromium, hexavalent	1.2E-01	m^3/mg	4.20E+02	mg/kg-day	A - Known Human Carcinogen	IRIS	02/26/14
Cobalt	9.0E-02	m^3/mg	3.15E+02	mg/kg-day	Likely to be Carcinogenic	PPRTV	02/26/14
Iron	NA	NA	NA	NA	Inadequate Information	IRIS	02/26/14
Lead	NA	NA	NA	NA	B2 - Probable Human Carcinogen	IRIS	02/26/14
Nickel [(5,6)]	2.6E-01	m^3/mg	9.10E+02	mg/kg-day	NA	RSL	11/01/13
Thallium	NA	NA	NA	NA	Inadequate Information	IRIS	02/26/14
Vanadium	NA	NA	NA	NA	Inadequate Information	PPRTV	02/26/14
Zinc	NA	NA	NA	NA	NA	NA	NA

(1) Inhalation Cancer Slope Factor (kg-day/mg) = Inhalation Unit Risk (ug/m^3) x 70 (kg) x 1000 (ug/mg) / 20 (m^3/day)
(2) NA - Not available
(3) Integrated Risk Information System (IRIS) - USEPA, February 2014. <http://cfpub.epa.gov/ncea/iris/index.html>
(4) Provisional Peer Reviewed Toxicity Values (PPRTV) for Superfund - USEPA, 2014. http://hhpprtv.ornl.gov/
(5) Regional Screening Table (RSL) - USEPA, November 2013 <http://www.epa.gov/reg3hwmd/risk/human/rb-concentration_table/index.htm>
(6) USEPA has no toxicity value for this compound. Value presented is from the California EPA or other source, or similar compound and may not be supported by the literature.

TABLE 5
SUMMARY OF HUMAN HEALTH RISK ASSESSMENT
STANDARD CHLORINE CHEMICAL COMPANY, INC. SITE
KEARNY, NEW JERSEY

Receptor	Current Land Use with Interim Remedies [1]		Current Land Use with Interim Remedies Disturbed [2]		Future Land Use with Interim Remedies Disturbed [3]	
	RME Risk/HI	CT Risk/HI	RME Risk/HI	CT Risk/HI	RME Risk/HI	CT Risk/HI
Western Area						
On-Site Visitor	0 / 0	0 / 0	2E-4 / 4	4E-7 / 0	NA	NA
HCTS Operator	0 / 0	0 / 0	2E-4 / 4	1E-6 / 1	NA	NA
Outdoor Worker	0 / 0	0 / 0	4E-4 / 6	2E-6 / 1	NA	NA
Constr. Worker	0 / 0	0 / 0	NA	NA	4E-4 / 21189	4E-5 / 2433
Utility Worker	0 / 0	0 / 0	NA	NA	2E-4 / 6535	2E-5 / 811
Indoor Worker[4]	0 / 0	0 / 0	NA	NA	1E-3 / 187	1E-4 / 184
Eastern Area						
On-Site Visitor	0 / 0	0 / 0	4E-3 / 17	2E-5 / 1	NA	NA
HCTS Operator	0 / 0	0 / 0	1E-2 / 37	7E-5 / 6	NA	NA
Outdoor Worker	0 / 0	0 / 0	1E-2 / 38	8E-5 / 6	NA	NA
Constr. Worker	0 / 0	0 / 0	NA	NA	2E-2 / 3141	1E-3 / 64
Utility Worker	0 / 0	0 / 0	NA	NA	4E-4 / 31	3E-4 / 21
Indoor Worker[4]	0 / 0	0 / 0	NA	NA	1E-3 / 147	2E-4 / 142

1. With interim remedies in place (i.e., pavement, gravel, vapor barrier in HCTS building) and no groundwater use, both risks and HIs are zero. No current exposures.
2. Current risks are hypothetical. No complete exposure pathways at present due to the interim remedies in use. These risks assume that the cover materials are disturbed such that persons may be exposed to the underlying surficial soil/fill material.
3. Future scenarios involve disturbance of interim remedies and potential exposure to soils and shallow groundwater by construction and utility workers.
4. Future risks to indoor workers are associated with construction of a building at the Site with no vapor barriers, etc.
5. RME = Reasonable Maximum Exposure; HI = Hazard Index; CT = Central Tendency; HCTS = Hydraulic Control Treatment System

TABLE 6
GROUNDWATER ARAR WAIVERS
STANDARD CHLORINE CHEMICAL COMPANY INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

AREA 1 FILL AND SAND UNITS			
Constituent	**ARAR**	**Standard**	**Units**
Volatile Organics			
1,2,4-Trichlorobenzene	NJGWQS	9	ug/L
1,2-Dichlorobenzene	MCL	600	ug/L
1,3-Dichlorobenzene	NJGWQS	600	ug/L
1,4-Dichlorobenzene	MCL	75	ug/L
Benzene	NJGWQS	0.2	ug/L
Chlorobenzene	NJGWQS	50	ug/L
Semivolatile Organics			
2,4,6-Trichlorophenol	NJGWQS	1	ug/L
2,4-Dichlorophenol	NJGWQS	20	ug/L
2,4-Dimethylphenol	NJGWQS	100	ug/L
Benzo(a)anthracene	NJGWQS	0.05	ug/L
Benzo(a)pyrene	NJGWQS	0.005	ug/L
Benzo(b)fluoranthene	NJGWQS	0.05	ug/L
Hexachlorobenzene	NJGWQS	0.02	ug/L
Indeno(1,2,3-cd)pyrene	NJGWQS	0.05	ug/L
Naphthalene	NJGWQS	300	ug/L
Phenol	NJGWQS	2000	ug/L
Polychlorinated biphenyls	MCL	0.5	ug/L
Metals			
Aluminum	NJGWQS	200	ug/L
Antimony	MCL	6	ug/L
Arsenic	NJGWQS	0.02	ug/L
Beryllium	NJGWQS	1	ug/L
Cadmium	NJGWQS	4	ug/L
Chromium (Total)	NJGWQS	70	ug/L
Iron	NJGWQS	300	ug/L
Lead	NJGWQS	5	ug/L
Manganese	NJGWQS	50	ug/L
Mercury	MCL	2	ug/L
Nickel	NJGWQS	100	ug/L
Thallium	NJGWQS	0.5	ug/L
Zinc	NJGWQS	2000	ug/L
Pesticides			
Heptachlor	NJGWQS	0.008	ug/L
Heptachlor epoxide	NJGWQS	0.004	ug/L
Lindane	NJGWQS	0.03	ug/L
AREA 2 SAND UNIT			
Constituent	**ARAR**	**Standard**	**Units**
Volatile Organics			
1,2,4-Trichlorobenzene	NJGWQS	9	ug/L
1,2-Dichlorobenzene	MCL	600	ug/L
1,3-Dichlorobenzene	NJGWQS	600	ug/L
1,4-Dichlorobenzene	MCL	75	ug/L
Benzene	NJGWQS	0.2	ug/L
Chlorobenzene	NJGWQS	50	ug/L
Semivolatile Organics			
Benzo(a)anthracene	NJGWQS	0.005	ug/L
Naphthalene	NJGWQS	300	ug/L

Notes:

1. New Jersey Ground Water Quality Standards (NJGWQS) and National Primary Drinking Water Standards Maximum Contaminant Limits (MCLs) were considered. NJGWQS for Class IIA standards were considered. The most stringent ARAR standard has been identified in this table. The federal MCL is identified when both state and federal standards are the same.

TABLE 7
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
STANDARD CHLORINE CHEMICAL COMPANY INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

CHEMICAL-SPECIFIC ARARs				
Source	**Legal Citation**	**Classification**	**Summary of the Requirement**	**Additional Comments**
Groundwater Regulations				
National Primary Drinking Water Standards (Safe Drinking Water Act)	40 CFR Part 141	ARAR Applicable	Establishes drinking water standards (maximum contaminant levels [MCLs]).	Comparison to these benchmarks establishes the need for institutional controls such as a Well Restriction Area and Classification Exception Area.
New Jersey Ground Water Quality Standards (NJ GWQS)	N.J.A.C. § 7:9C	ARAR Applicable	Establishes the water quality standards for State's ground waters based on the type of groundwater use including narrative and constituent-specific standards.	Comparison to these benchmarks establishes the need for institutional controls such as a Well Restriction Area and Classification Exception Area.
Soil Regulations				
New Jersey Remediation Standards	N.J.A.C. § 7:26D	ARAR Applicable	Establishes the standards for soil remediation by instituting the non- residential direct contact soil remediation standards.	Attainment of the NJDEP remediation standards will be obtained through the use of engineering controls (pathway elimination), and administrative and institutional controls.
USEPA Regional Screening Levels (SLs)	None	TBC	Screening Levels are generic screening values. Site-specific risk based remediation goals can be derived using the Site Baseline Risk Assessment results.	The SLs could be used as guidance in the case where a NJ non-residential standard is not available for a particular constituent of concern.
LOCATION-SPECIFIC ARARs				
Wetlands and Floodplain Regulations				
New Jersey Freshwater Wetland Protection Act Rules	N.J.S.A. § 13:9B-1 N.J.A.C. § 7:7A	ARAR Applicable	Regulates construction or other activities (including remedial action) that will have an impact on wetlands.	Any impacts to wetlands on Site would be mitigated by restoration or relocation, including a monitoring plan and consideration of a wetland banking option.
Clean Water Act Section 404 Requirements	40 CFR Parts 230-233	ARAR Applicable	Under this requirement, no activity that adversely affects a wetland is permitted if a practicable alternative that does not affect wetlands is available. If no other practicable alternative exists, impacts on wetlands must be mitigated.	Remedial actions should meet the guidelines for Specification of Disposal Sites for Dredge or Fill Material set forth in this policy.
Clean Water Act Section 404 Requirements	33 CFR Parts 320-330	ARAR Applicable	Administration of 40 CFR Part 230 by U.S. Army Corps of Engineers regulations. Regulatory policies and permit requirements for the discharge of dredged or fill material to waters of the US including wetlands.	Any remedial action that impacts a wetland will require permit equivalency performance.
New Jersey Flood Hazard Control Act Standards	N.J.S.A. § 58:16A-50 N.J.A.C. § 7:13	ARAR Applicable	Regulates activities (including remedial action) within flood hazard areas that will impact stream carrying capacity or flow velocity to avoid increasing impacts of flood waters, to minimize degradation of water quality, protect wildlife and fisheries and protect and enhance public health and welfare.	Applicable to remedial actions that could cause flooding within the flood hazard area or impact vegetation within the riparian zone of a regulated water.

TABLE 7
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
STANDARD CHLORINE CHEMICAL COMPANY INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

Source	Legal Citation	Classification	Summary of the Requirement	Additional Comments
Executive Order 11988, Floodplain Management	40 CFR Part 6 Appendix A and 40 CFR Part 9	TBC	Directs federal agencies to evaluate the potential effects of actions that may be taken in a floodplain and to avoid, to the extent possible, long-term and short-term adverse effects associated with the occupancy and modification of floodplains, and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative.	Applies to federally funded projects. A floodplain assessment will be completed as part of remedial design activities prior to remedial action implementation.
Executive Order 13690, Flood Risk Management	E.O. 11988 Amendment	TBC	Manage to the extent possible the potential short-term and long-term adverse impacts associated with the occupancy and modifications to floodplains.	Applies to federally funded projects. Superfund projects are considered critical actions. A floodplain assessment would be completed as part of remedial design activities prior to remedial action implementation.
Executive Order 11990, Protection of Wetlands	40 CFR Part 6 Appendix A and 40 CFR Part 9	TBC	Directs that activities conducted by federal agencies avoid, to the extent possible, long-term and short-term adverse effects associated with the modification or destruction of wetlands. Federal agencies are to avoid direct or indirect support of new construction in wetlands when there are practical alternatives; harm to wetlands must be minimized when there is no practical alternative available. These considerations are applicable to any remedial work in wetlands.	Applies to federally funded projects and federal property. Any impacts to wetlands on-site would be mitigated by restoration or relocation, including a monitoring plan and consideration of a wetland banking option.
EPA's 1985 Policy, Floodplain/Wetlands Assessments for CERCLA	OSWER Directive 9280.0-02	TBC	Superfund actions should meet the substantive requirements of E.O. 11988, E.O. 11990 and Appendix A of 40 CFR Part 6.	For remedial actions, a floodplain/wetlands assessment should be included with the remedial action planning.
Coastal Zone Regulations				
Coastal Zone Management Program	N.J.A.C. § 7:7E	Applicable	This program establishes standards for use and development of coastal resources in coastal waters to the limit of tidal influence.	Applicable to remedial action that occurs in the 100-year floodplain, impacts wetlands, riparian zones, or outfalls, such as the placement of caps/covers. N.J.A.C. § 7:7E-5 requirements for impervious cover and vegetative cover for generalland areas. N.J.A.C. § 7:7E-3 requirements for riparian zones, wetlands, flood hazard areas (applies to areas delineated by A or V Zones defined by FEMA) and outfalls and intakes.
Coastal Permit Program Rules	N.J.A.C. § 7:7	ARAR Applicable	Establishes the standards for waterfront area development within any part of the Hackensack Meadowland Development District and includes any tidal waterway and all lands lying thereunder, up to and including the mean high water line.	N.J.A.C. § 7:7-6.11 provides substantive requirements of a general permit for investigation, cleanup, removal, or remediation of hazardous substances within the Hackensack Meadowland Development District.

TABLE 7
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
STANDARD CHLORINE CHEMICAL COMPANY INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

Source	Legal Citation	Classification	Summary of the Requirement	Additional Comments
Wildlife Protection Regulations				
Migratory Bird Treaty Act	16 U.S.C. § 703	Potentially Applicable	Requires that federal agencies consult with USFWS during remedial design and remedial construction to ensure that cleanup of the Site does not unnecessarily impact migratory birds.	Consultation with USFWS would occur during remedial design.
Endangered Species Act of 1973	16 USC § 1531 et seq. 50 CFR Part 17	Potentially Relevant and Appropriate	The act establishes rules to protect and recover species of fish, wildlife and plants that are threatened or endangered in the U.S. or elsewhere.	No endangered species are currently present in the Site vicinity. Substantive requirements would apply if endangered species are confirmed to exist in the vicinity of the Site (50 CFR §§ 17.11 & 17.12 list current endangered and threatened wildlife and plants).
Other				
Federal National Historic Preservation Act	16 USC § 470 et seq. 36 CFR Part 800	Applicable	This requirement requires federal agencies to take into account the effects of any federally assisted undertaking on any district, site, building, structure or object included in, or eligible for inclusion in, the National Register of Historic Places. If the undertaking results in adverse effects, the agency must consult with the New Jersey Historic Preservation Office and other parties to develop ways to avoid, reduce, minimize, or mitigate any adverse impacts to those identified properties.	Historic structures (buildings associated with Thomas Edison) exist at the property. The Site has been subject to several cultural resource investigations. A Memorandum of Agreement pursuant to NHPA has been signed by representatives of EPA and NJSHPO, outlining measures that have been implemented to mitigate planned adverse effects.
New Jersey Register of Historic Places Rules	N.J.A.C. § 7:4	Applicable	If federally assisted undertaking on any district, site, building, structure or object included in, or eligible for inclusion in, the National Register of Historic Places results in adverse effects, the agency must consult with the New Jersey Historic Preservation Office and other parties to develop ways to avoid, reduce, minimize, or mitigate any adverse impacts to those identified properties.	Historic structures (buildings associated with Thomas Edison) exist at the property. The Site has been subject to several cultural resource investigations. A Memorandum of Agreement pursuant to NHPA has been signed by representatives of EPA and NJSHPO, outlining measures that have been implemented to mitigate planned adverse effects.
ACTION-SPECIFIC ARARs				
Well Regulations				
Well Construction and Maintenance; Sealing of Abandoned Wells	N.J.A.C. § 7:9D	Applicable	Establishes requirements and procedures for the construction, installation, operation and maintenance of wells.	Substantive requirements of these regulations will be attained if additional groundwater monitoring wells, groundwater extraction wells or DNAPL recovery wells are installed or abandoned.
Erosion and Sediment Control / Stormwater Management				
New Jersey Pollutant Discharge Elimination System (NJPDES)	N.J.A.C. § 7:14A	Applicable	Establishes effluent discharge standards to protect water quality. N.J.A.C. § 7:14, Subchapter 12, Appendix B identifies effluent standards (for specified constituents) for remediation projects.	An NJPDES permit is in place for the existing HCTS. The State of New Jersey has primacy for administration of the NJPDES program.

TABLE 7
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
STANDARD CHLORINE CHEMICAL COMPANY INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

Source	Legal Citation	Classification	Summary of the Requirement	Additional Comments
New Jersey Stormwater Management	N.J.A.C. § 7:8	Potentially Applicable	Contains general requirements for stormwater management plans and stormwater control ordinances. Provides the content requirements and procedures for the adoption and implementation of regional stormwater management plans and municipal stormwater management plans.	Establishes design and performance standards for stormwater management measures and establishes safety standards for stormwater management basins. May be applicable if low permeability cap/covers are installed or existing stormwater features are modified.
New Jersey Standards for Soil Erosion and Sediment Control	N.J.S.A. § 4:24-30 N.J.A.C. § 2:90-1.3	Applicable	Regulates construction that will potentially result in erosion of soils and sediment: requires preparation of stormwater pollution prevention plan, designation of construction waste collection site, and preparation site plan for construction related erosion.	Technical criteria and control measures applicable to land disturbance activities involving greater than 5,000 square feet.
Hazardous and Solid Waste Management Regulations				
Discharges of Petroleum and Other Hazardous Substances Rules	N.J.A.C. § 7:1E	Relevant and Appropriate	These rules set forth guidelines and procedures to be followed by all persons in the event of a discharge of a hazardous substance.	Applies to temporary storage of recovered DNAPL in drums on Site prior to disposal.
Pollution Prevention Program Rules	N.J.A.C. § 7:1K	Relevant and Appropriate	Establishes rules regarding the use and release of hazardous substances and the generation of hazardous substances as non-product output by industrial facilities and establishes guidelines and procedures for the development of Pollution Prevention Plans, Pollution Prevention Plan Summaries and Pollution Prevention Plan Progress reports.	Applies to DNAPL recovered and temporary storage on site.
New Jersey Solid Waste Management Act Regulations	N.J.S.A. § 13:1E-1 et seq. N.J.A.C. § 7:26	Relevant and Appropriate	Establishes standards and procedures pertaining to, among other things, the management, treatment and disposal of solid wastes. Also includes requirements for Beneficial Use Determinations. On September 14, 1998, EPA granted New Jersey full program determination of adequacy for all areas of its municipal solid waste landfill program. New Jersey hazardous waste management rules incorporate RCRA regulations by reference, with few significant differences. There are no disposal facilities located in New Jersey licensed to accept hazardous waste (RCRA Subtitle C).	Applicable to solid wastes generated and managed both on and off-site. Beneficial Use Determination may be applicable if placement of fill is considered for the site. Applicable to demolition debris. Also applicable given the generation of filter cake from groundwater treatment.
New Jersey Hazardous Waste Management Regulations	N.J.A.C. § 7:26G	Applicable	Procedure for identifying and listing hazardous wastes. Applies to any person who generates, transports, stores, treats or disposes of a hazardous waste. Establishes standards for disposal of hazardous wastes generated during remediation and the requirements for waste transporters, manifesting, and recordkeeping.	Applies if any materials at, or transported from, the Site are hazardous waste. Recovered DNAPL from the site is currently being managed as hazardous waste.

TABLE 7
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
STANDARD CHLORINE CHEMICAL COMPANY INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

Source	Legal Citation	Classification	Summary of the Requirement	Additional Comments
New Jersey Transportation of Hazardous Materials	N.J.A.C. § 16:49	Potentially Applicable	Governs the transportation of hazardous materials in NJ and regulates the shipping, packaging, marking, labeling, placarding, handling, and transportation of hazardous materials and waste, and, to the maximum extent practicable, conforms to the requirements of the regulations issued by the United States Department of Transportation.	Applies if any materials at, or transported from, the Site are classified as hazardous waste. Recovered DNAPL from the Site is currently being managed as hazardous waste.
Hazardous Materials Transportation Act	49 U.S.C. §§ 5101-5128 49 CFR Parts 107, 171-177	Potentially Applicable	Regulates the transportation of hazardous materials, and includes the procedures for the packaging, labeling, manifesting, and transporting of hazardous waste to a licensed off-site disposal facility.	Applies if any materials at, or transported from, the Site are classified as hazardous waste. Recovered DNAPL from the Site is currently being managed as hazardous waste.
Resource Conservation and Recovery Act (RCRA)	42 U.S.C. § 6921 et seq.	Relevant and Appropriate	RCRA establishes requirements for generators, transporters and facilities that manage non-hazardous solid waste and hazardous waste.	
RCRA Hazardous Waste Management System	40 CFR Part 260	Potentially Applicable	Sets forth rules EPA uses in making information available to the public and requirements that generators and transporters must follow to assert claims of business confidentiality with respect to information that is submitted to EPA.	Applies if any materials at, or transported from, the Site are classified as hazardous waste. Recovered DNAPL from the Site is currently being managed as hazardous waste.
RCRA Identification and Listing of Hazardous Wastes	40 CFR Part 261	Applicable	Describes methods for identifying hazardous wastes and lists known hazardous wastes, including solid wastes containing lead concentrations of 5.0 mg/L (261.24).	Provides detailed information regarding identification of characteristic or listed hazardous wastes that must be managed under RCRA.
RCRA Standards Applicable to Generators of Hazardous Wastes	40 CFR Part 262	Applicable	Describes standards applicable to generators of hazardous wastes, including registration, manifesting, packaging, recordkeeping and accumulation time, e.g.: 1) 262.30 - pre-transportation packaging requirements; 2) 262.31 - pre-transportation labeling requirements; 3) 262.32 - pre transportation marking requirements; and 4) 262.33 - pre transportation placarding requirements.	The current generator status for the Site is Large Quantity Generator (LQG).
RCRA Standards Applicable to Transporters of Hazardous Waste	40 CFR Part 263	Applicable	Establishes standards for hazardous waste transporters, including transfer facility requirements, the requisite manifest system and recordkeeping procedures, and protocols in case of hazardous waste discharges in transport.	Applies if any materials transported from the Site are classified as hazardous waste. Recovered DNAPL from the Site is currently being managed as hazardous waste.
RCRA Land Disposal Restrictions	40 CFR Part 268	Potentially Applicable	This regulation identifies hazardous wastes restricted for land disposal and provides treatment standards for land disposal.	Criteria to be considered in the event that materials subject to land disposal are generated.

TABLE 7
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
STANDARD CHLORINE CHEMICAL COMPANY INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

Source	Legal Citation	Classification	Summary of the Requirement	Additional Comments
RCRA Hazardous Waste Permit Program	40 CFR Part 270	Relevant and Appropriate	This regulation establishes provisions covering basic EPA permitting requirements.	The USEPA ID Number (NJD 002 175 057) satisfies the permit requirements for management of hazardous waste.
National Emission Standard for Asbestos	42 U.S.C. § 7401 et seq. Section 112, 40 CFR Part 61, Subpart M.	Applicable	Establishes emission standards for asbestos.	Provides standards for asbestos emission control during, and disposal after, demolition, including: 1) Part 61.145 - inspection, notification, and asbestos emission control procedures; 2) Part 61.150 - protocols for disposal of asbestos following demolition; and 3) Part 61.152 - protocols to be followed when using air cleaning devices during demolition.
Health and Safety / Air Monitoring Regulations				
New Jersey Air Pollution Control Act Standards	N.J.S.A. § 26:2C et seq. N.J.A.C. § 7:27	Applicable	Describes requirements and procedures for obtaining air permits and certificates; rules that govern the emission of contaminants into the ambient atmosphere from stationary and mobile sources. Prohibits air pollution, particle emissions and toxic VOC emissions.	Emissions from the on-Site HCTS are subject to regulation under the CAA and an air permit is in place. May be applicable if construction activities with the potential for particulate emissions are undertaken (cap/cover construction).
Clean Air Act (CAA) -- National Primary and Secondary Ambient Air Quality Standards (NAAQs)	40 CFR Part 50	Applicable	Provides air quality standards for particulate matter, lead, NO_2, SO_2, CO, and volatile organic matter. Standard for lead set at 1.5 micrograms per cubic meter, maximum arithmetic mean averaged over a calendar quarter (40 CFR § 50.12).	Emissions from the on-Site HCTS are subject to regulation under the CAA and an air permit is in place.
Standards of Performance for New Stationary Sources	40 CFR Part 60	Applicable	Sets the general requirements for air quality.	Emissions from the on-Site HCTS are subject to regulation under the CAA and an air permit is in place.
National Emission Standards for Hazardous Air Pollutants	40 CFR Part 61	Applicable	Provides air quality standards for hazardous air pollutants.	Emissions from the on-Site HCTS are subject to regulation under the CAA and an air permit is in place.
Safety and Health Regulations for Construction	29 CFR § 1926.1101	Applicable	Regulates asbestos exposure during building demolition.	
Noise Control	N.J.S.A. § 13:1g-1 et seq. N.J.A.C. § 7:20	Relevant and Appropriate	Regulates noise levels for certain types of activities and facilities such as commercial, industrial, community service and public service facilities. Relevant and appropriate for establishing allowable noise levels.	

TABLE 7
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
STANDARD CHLORINE CHEMICAL COMPANY INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

Source	Legal Citation	Classification	Summary of the Requirement	Additional Comments
Asbestos and Lead Regulations				
New Jersey Asbestos Containing Material (ACM) Generator and Transporter Requirements	N.J.A.C. § 7:26-1 et seq.	Potential ARAR	This requirement establishes the generator and transporter requirements for the management, transportation and disposal of ACM.	This ARAR is not applicable to current SCCC Site conditions because no threat of current or potential future release of asbestos and lead has been documented. This ARAR would be applicable as part of the building demolition.
New Jersey Lead Hazard Evaluation and Abatement Code	N.J.A.C. § 5:17	Potential ARAR	This code provides the certification requirements for any company offering to perform lead hazard evaluation or abatement in New Jersey.	This ARAR is not applicable to current SCCC Site conditions because no threat of current or potential future release of asbestos and lead has been documented. This ARAR would be applicable as part of the building demolition.
New Jersey Asbestos Control and Licensing Act (ACLA) and Regulations	N.J.S.A. § 34:5A-32 et seq. N.J.A.C. § 12:120	Potential ARAR	Requires that asbestos abatement work involving the application, enclosure, repair, removal and encapsulation of asbestos be performed by State certified companies and individuals.	This ARAR is not applicable to current SCCC Site conditions because no threat of current or potential future release of asbestos and lead has been documented. This ARAR would be applicable as part of the building demolition.
New Jersey Asbestos Control and Licensing Act	N.J.S.A. § 34:5A-32 et seq. N.J.A.C. § 8:60 N.J.A.C. § 12:120	Potential ARAR	These regulations provide for: a standardized training course for all asbestos workers; licensing of asbestos abatement contractors; and issuing asbestos worker performance permits for asbestos abatement workers.	This ARAR is not applicable to current SCCC Site conditions because no threat of current or potential future release of asbestos and lead has been documented. This ARAR would be applicable as part of the building demolition.
New Jersey Uniform Construction Code Act and Asbestos Hazard Abatement Subcode	N.J.S.A. § 52:27D-119 et seq. N.J.A.C. § 5:23-8	Potential ARAR	This code and subcode requires that where asbestos was used originally to satisfy fire code requirements, it shall not be removed unless it is replaced, as part of the project, with material or assembly which has equivalent fire resistive or heat resistive characteristics.	This ARAR is not applicable to current SCCC Site conditions because no threat of current or potential future release of asbestos and lead has been documented. This ARAR would be applicable as part of the building demolition.
New Jersey Disposal of Asbestos Containing Waste Materials (ACWM) Generator Requirements	N.J.A.C. § 7:26-2.12	Potential ARAR	Requires that generators of ACWM shall comply with the standards for waste disposal at 40 C.F.R. 61.149 and 40 C.F.R. 61.150 and reporting requirements of the following agencies: United States Environmental Protection Agency, at 40 CFR §§ 61.145 - 61.155; the New Jersey Department of Community Affairs, at N.J.A.C. § 5:23-8; the New Jersey Department of Labor and Workforce Development, at N.J.A.C. § 12:120-7.2; and the New Jersey Department of Health and Senior Services, at N.J.A.C. § 8:60-7.2.	This ARAR is not applicable to current SCCC Site conditions because no threat of current or potential future release of asbestos and lead has been documented. This ARAR would be applicable as part of the building demolition.
Hazardous Materials Transportation Act	49 USC §§ 5101-5128 49 CFR Parts 171-172	Potential ARAR	Sets standards that apply to the transport of hazardous waste including asbestos. Transportation of asbestos waste requires waste containment and shipping papers.	This ARAR is not applicable to current SCCC Site conditions because no threat of current or potential future release of asbestos and lead has been documented. This ARAR would be applicable as part of the building demolition.

TABLE 7
APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS
STANDARD CHLORINE CHEMICAL COMPANY INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

Other				
Worker and Community Right to Know Regulation	N.J.A.C. § 7:1G	Relevant and Appropriate	This requirement establishes the information that the community has the right to know and establishes the procedures for notifying the community.	Project updates are prepared to inform the community, local officials and other interested parties of the status of activities at the Site and as specified in the site Community Involvement Plan.
Licensing of Water Supply and Wastewater Treatment System Operators	N.J.A.C. § 7:10A	Applicable	Rules governing the eligibility, examining and licensing of Industrial Wastewater Treatment System Operators.	Applicable to the HCTS operators.
General Site Remediation				
Administrative Requirements for the Remediation of Contaminated Sites	N.J.A.C. § 7:26C	TBC	Establishes the administrative procedures and requirements for the remediation of contaminated sites.	Many provisions of this rule are not applicable for CERCLA sites, however institutional controls for soil (Deed Notice) and groundwater (CEA) will be required assuming impacted soils and groundwater at levels above the most restrictive standards remain on site. Biennial protectiveness certifications will be submitted to case manager.
District Zoning Regulations	N.J.A.C. § 19:4	TBC	The NJMC Master Plan sets policies that guide development in the District by setting forth development in a floodplain and Site plan requirements.	Applicable for Remedial Actions such as importing fill or modifications to stormwater features, vegetated cover systems, zoning approval, changes or occupancy of HCTS.
New Jersey Technical Requirements For Site Remediation	N.J.A.C. § 7:26E	Relevant and Appropriate	Sets forth technical requirements for site remediation including preliminary assessments, remedial investigations, remedial action work plans, remediation, post remediation monitoring and institutional controls.	Substantive requirements are relevant and appropriate to Remedial Action.
NJDEP SRP Technical Guidance on the Capping of Sites Undergoing Remediation	N/A	TBC	Technical guidance pertaining to capping remedies given site conditions and the evaluation of a capillary break.	IRM/IRA covers and capillary breaks currently exist on a portion of the Site.

Acronyms
TBC: To be considered
HCTS: Hydraulic Control Treatment System
N/A: Not Available

SCCC SITE

RECORD OF DECISION

APPENDIX 3 ADMINISTRATIVE RECORD INDEX

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395955	9/30/2016	ADMINISTRATIVE RECORD INDEX FOR OU1 FOR THE STANDARD CHLORINE SITE	10	ARI / Administrative Record Index		R02: (US ENVIRONMENTAL PROTECTION AGENCY)
337393	5/1/2002	AERIAL PHOTOGRAPHIC ANALYSIS OF THE STANDARD CHLORINE CHEMICAL CORPORATION SITE	71	RPT / Report	R02: (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Mack, Webster (LOCKHEED MARTIN TECHNOLOGY SERVICES)
337361	1/27/2009	REMOVAL SITE EVALUATION FOR THE STANDARD CHLORINE SITE	5	RPT / Report		R02: Magriples, Nicholas (US ENVIRONMENTAL PROTECTION AGENCY)
110459	12/29/2010	REMOVAL ADMINISTRATIVE RECORD INDEX FOR THE STANDARD CHLORINE SITE	2	LST / List/Index		R02: (US ENVIRONMENTAL PROTECTION AGENCY)
116012	4/1/2011	REMEDIAL ACTION REPORT FOR THE DEMOLITION OF BUILDINGS 16, 19 AND 20 FOR STANDARD CHLORINE CHEMICAL COMPANY	399	RPT / Report	R02: (PENINSULA RESTORATION GROUP)	R02: (KEY ENVIRONMENTAL INC)
116014	12/1/2011	INTERIM RESPONSE ACTION REPORT FOR STANDARD CHLORINE CHEMICAL COMPANY	7494	RPT / Report	R02: (PENINSULA RESTORATION GROUP)	R02: (KEY ENVIRONMENTAL INC)
116020	12/28/2011	CIVIL ENGINEERING AS-BUILT DRAWINGS SCCC AND DIAMOND SITES	55	FIG / Figure/Map/ Drawing		
116021	12/28/2011	PROCESS ENGINEERING AS-BUILT DRAWINGS SCCC AND DIAMOND SITES	52	FIG / Figure/Map/ Drawing		
250829	3/30/2012	DEMOLITION REMEDIAL ACTION REPORT FOR BUILDING 15,17,18 AND 21 - SRP PI NO.G000001583 AND G000008790 FOR THE STANDARD CHLORINE SITE	1199	RPT / Report	R02: Nickerson, Jay (NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)

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420301	4/1/2012	ARCHAEOLOGICAL MONITORING REPORT DURING CONSTRUCTION OF THE SLURRY WALL FOR THE STANDARD CHLORINE SITE	102	RPT / Report	R02: (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Audin, Michael (LANGAN ENGINEERING AND ENVIRONMENTAL SERVICES)
420302	4/11/2012	CONSTRUCTION COMPLETION REPORT - MITIGATION FOR THE STANDARD CHLORINE SITE	38	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Sawchuck, Peter, W (KEY ENVIRONMENTAL INCORPORATED)
420307	6/24/2012	BILL OF SALE AND CONVEYANCE FOR 0.225 WETLAND MITIGATION CREDITS FOR THE STANDARD CHLORINE SITE	5	LTR / Letter	R02: Sawchuck, Peter, W (KEY ENVIRONMENTAL INCORPORATED)	R02: Holt, James (EVERGREEN ENVIRONMENTAL)
420308	6/27/2012	EVERGREEN MR13 MITIGATION BANK CREDIT LEDGER UPDATE FOR THE STANDARD CHLORINE SITE	4	LTR / Letter	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Cantilli, John (US ENVIRONMENTAL PROTECTION AGENCY)
420317	1/9/2013	NJDEP APPROVAL OF THE SITE CHARACTERIZATION SUMMARY REPORT FOR THE STANDARD CHLORINE SITE	2	LTR / Letter	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Nickerson, Jay (NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION)
178369	3/27/2013	FINAL SITE CHARACTERIZATION SUMMARY REPORT FOR THE STANDARD CHLORINE SITE	297	RPT / Report	R02: (COOPERATING PARTIES GROUP)	R02: (KEY ENVIRONMENTAL INC)
333145	4/1/2013	2012 WETLAND MITIGATION MONITORING REPORT FOR THE STANDARD CHLORINE CHEMICAL COMPANY AND DIAMOND SITE FOR THE STANDARD CHLORINE SITE	49	RPT / Report	R02: (KEY ENVIRONMENTAL INC)	R02: (PRINCETON HYDRO LLC)
420332	4/12/2013	MONTHLY PROGRESS REPORT - FEBRUARY 2013 FOR THE STANDARD CHLORINE SITE	1	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)

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420343	5/31/2013	MONTHLY PROGRESS REPORT - MARCH 2013 FOR THE STANDARD CHLORINE SITE	1	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
420341	5/31/2013	MONTHLY PROGRESS REPORT - APRIL 2013 FOR THE STANDARD CHLORINE SITE	10	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
420348	6/14/2013	MONTHLY PROGRESS REPORT - MAY 2013 FOR THE STANDARD CHLORINE SITE	2	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
396014	7/12/2013	MONTHLY PROGRESS REPORT - JUNE 2013 FOR THE STANDARD CHLORINE SITE	2	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
436163	8/12/2013	BIENNIAL CERTIFICATION FORM-GROUND WATER AND REVISED CLASSIFICATION EXCEPTION AREA / WELL RESTRICTION AREA (CEA/WRA) FACT SHEET REGARDING THE FORMER KOPPERS SEABOARD SITE	109	FRM / Form	R02: (NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION)	
420356	8/15/2013	MONTHLY PROGRESS REPORT - JULY 2013 FOR THE STANDARD CHLORINE SITE	11	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
420359	8/26/2013	NJDEP APPROVAL REGARDING THE FINAL REMEDIAL INVESTIGATION / FOCUSED FEASIBILITY STUDY WORK PLAN FOR THE STANDARD CHLORINE SITE	1	EML / Email	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Nickerson, Jay (NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION)
284864	9/1/2013	FINAL REMEDIAL INVESTIGATION / FOCUSED FEASIBILITY STUDY WORK PLAN FOR THE STANDARD CHLORINE SITE	718	WP / Work Plan	R02: (PERFORMING PARTIES GROUP)	R02: (KEY ENVIRONMENTAL INC)

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420371	9/13/2013	MONTHLY PROGRESS REPORT - AUGUST 2013 FOR THE STANDARD CHLORINE SITE	1	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
420373	10/14/2013	MONTHLY PROGRESS REPORT - SEPTEMBER 2013 FOR THE STANDARD CHLORINE SITE	1	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
420377	11/14/2013	MONTHLY PROGRESS REPORT - OCTOBER 2013 FOR THE STANDARD CHLORINE SITE	11	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
420379	12/13/2013	MONTHLY PROGRESS REPORT - NOVEMBER 2013 FOR THE STANDARD CHLORINE SITE	2	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
420381	1/14/2014	MONTHLY PROGRESS REPORT - DECEMBER 2013 FOR THE STANDARD CHLORINE SITE	1	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
284865	2/1/2014	COMMUNITY INVOLVEMENT PLAN FOR THE STANDARD CHLORINE SITE	35	WP / Work Plan	R02: (US ENVIRONMENTAL PROTECTION AGENCY)	R02: (KEY ENVIRONMENTAL INC)
420383	2/13/2014	MONTHLY PROGRESS REPORT - JANUARY 2014 FOR THE STANDARD CHLORINE SITE	10	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
420385	3/13/2014	MONTHLY PROGRESS REPORT - FEBRUARY 2014 FOR THE STANDARD CHLORINE SITE	2	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
284616	3/28/2014	SITE CHARACTERIZATION SUMMARY REPORT ADDENDUM FOR THE STANDARD CHLORINE SITE	113	RPT / Report	R02: (PERFORMING PARTIES GROUP)	R02: (KEY ENVIRONMENTAL INC)

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420394	4/1/2014	PATHWAY ANALYSIS REPORT FOR THE STANDARD CHLORINE SITE	154	RPT / Report	R02: (PERFORMING PARTIES GROUP)	R02: (KEY ENVIRONMENTAL INCORPORATED)
420389	4/14/2014	MONTHLY PROGRESS REPORT - MARCH 2014 FOR THE STANDARD CHLORINE SITE	2	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
436159	4/15/2014	CLASSIFICATION EXCEPTION AREA / WELL RESTRICTION AREA FORM FOR VARIOUS LOCATIONS IN KEARNY, NJ REGARDING THE STANDARD CHLORINE SITE	5	FRM / Form		R02: (NEW JERSEY STATE DEPARTMENT OF ENVIRONMENTAL PROTECTION)
420399	5/15/2014	MONTHLY PROGRESS REPORT - APRIL 2014 FOR THE STANDARD CHLORINE SITE	18	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
420406	6/5/2014	NJDEP COMMENTS AND RECOMMENDATIONS REGARDING THE SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT FOR THE STANDARD CHLORINE SITE	2	LTR / Letter	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Nickerson, Jay (NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION)
420410	6/10/2014	NJDEP COMMENTS ON THE APRIL 2014 MONTHLY PROGRESS REPORT FOR THE STANDARD CHLORINE SITE	2	LTR / Letter	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Nickerson, Jay (NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION)
420412	6/13/2014	MONTHLY PROGRESS REPORT - MAY 2014 FOR THE STANDARD CHLORINE SITE	1	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
420413	6/13/2014	NOAA'S COMMENTS REGARDING THE SLERA (SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT) FOR THE STANDARD CHLORINE SITE	2	EML / Email	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Mehran, Reyhan (NOAA-NATIONAL OCEANIC AND ATMOSPHERIC ADMINISTRATION)
420417	7/14/2014	MONTHLY PROGRESS REPORT - JUNE 2014 FOR THE STANDARD CHLORINE SITE	2	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)

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333152	7/28/2014	NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION'S COMMENTS ON REVISED SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT, DATED 07/09/2014 FOR THE STANDARD CHLORINE SITE	2	LTR / Letter	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Nickerson, Jay (NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION)
333153	8/14/2014	MONTHLY PROGRESS REPORT, 07/2014 FOR THE STANDARD CHLORINE SITE	18	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
333157	9/1/2014	FINAL SCREENING LEVEL ECOLOGICAL RISK ASSESSMENT FOR THE STANDARD CHLORINE SITE	393	RPT / Report	R02: (PERFORMING PARTIES GROUP)	R02: (INTEGRAL CONSULTING INCORPORATED), R02: (KEY ENVIRONMENTAL INCORPORATED)
333159	9/15/2014	MONTHLY PROGRESS REPORT, 08/2014 FOR THE STANDARD CHLORINE SITE	3	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
333160	10/14/2014	MONTHLY PROGRESS REPORT, 09/2014 FOR THE STANDARD CHLORINE SITE	2	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
333168	10/21/2014	NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION'S COMMENTS ON BASELINE HUMAN HEALTH RISK ASSESSMENT REPORT, DATED 09/2014 FOR THE STANDARD CHLORINE SITE	2	LTR / Letter	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Nickerson, Jay (NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION)
333161	11/13/2014	MONTHLY PROGRESS REPORT, 10/2014 FOR THE STANDARD CHLORINE SITE	17	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
333011	12/1/2014	2014 WETLAND MITIGATION MONITORING REPORT FOR THE STANDARD CHLORINE CHEMICAL COMPANY AND DIAMOND SITES FOR THE STANDARD CHLORINE SITE	58	RPT / Report	R02: (KEY ENVIRONMENTAL INC)	R02: (PRINCETON HYDRO LLC)
333172	12/1/2014	BASELINE HUMAN HEALTH RISK ASSESSMENT FOR THE STANDARD CHLORINE SITE	624	RPT / Report	R02: (PERFORMING PARTIES GROUP)	R02: (KEY ENVIRONMENTAL INCORPORATED)

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333162	12/9/2014	MONTHLY PROGRESS REPORT, 11/2014 FOR THE STANDARD CHLORINE SITE	3	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
333174	12/19/2014	NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION'S COMMENTS ON 12/2014 BASELINE HUMAN HEALTH RISK ASSESSMENT FOR THE STANDARD CHLORINE SITE	2	LTR / Letter	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Nickerson, Jay (NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION)
333163	1/12/2015	MONTHLY PROGRESS REPORT, 12/2014 FOR THE STANDARD CHLORINE SITE	3	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
333164	2/13/2015	MONTHLY PROGRESS REPORT, 01/2015 FOR THE STANDARD CHLORINE SITE	19	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
396048	3/9/2015	SITEX GROUP'S CONCEPT PLAN A - KEARNY FOR THE STANDARD CHLORINE SITE	1	FIG / Figure/Map/ Drawing		
333165	3/14/2015	MONTHLY PROGRESS REPORT, 02/2015 FOR THE STANDARD CHLORINE SITE	3	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
333166	4/14/2015	MONTHLY PROGRESS REPORT, 03/2015 FOR THE STANDARD CHLORINE SITE	3	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
436161	7/30/2015	CORRESPONDENCE REGARDING THE NEW JERSEY STATE HISTORIC PRESERVATION OFFICE AND US EPA CONCURRENCE ON ADVERSE AFFECTS ON FIVE BUILDINGS RELATED TO THE STANDARD CHLORINE SITE	2	LTR / Letter	R02: Saunders, Daniel, D (NEW JERSEY STATE HISTORIC PRESERVATION OFFICE)	R02: Ferreira, Steven, J (US ENVIRONMENTAL PROTECTION AGENCY)
376289	8/1/2015	COMMUNITY UPDATE ON CLEANUP ACTIVITIES AT THE STANDARD CHLORINE SITE	4	RPT / Report		R02: (US ENVIRONMENTAL PROTECTION AGENCY)
396015	8/14/2015	MONTHLY PROGRESS REPORT - JULY 2015 FOR THE STANDARD CHLORINE SITE	18	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)

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396016	9/14/2015	MONTHLY PROGRESS REPORT - AUGUST 2015 FOR THE STANDARD CHLORINE SITE	2	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
351495	10/1/2015	REMEDIAL INVESTIGATION REPORT FOR JULY 2015, REVISED OCTOBER 2015 FOR THE STANDARD CHLORINE SITE	1173	RPT / Report	R02: (PERFORMING PARTIES GROUP)	R02: (KEY ENVIRONMENTAL INC)
436153	10/9/2015	US EPA APPROVAL OF THE REMEDIAL INVESTIGATION REPORT FOR THE STANDARD CHLORINE SITE	1	LTR / Letter	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)
436154	10/12/2015	REMEDIAL INVESTIGATION REPORT FOR THE STANDARD CHLORINE SITE	1173	RPT / Report		R02: (KEY ENVIRONMENTAL INCORPORATED)
396017	10/14/2015	MONTHLY PROGRESS REPORT - SEPTEMBER 2015 FOR THE STANDARD CHLORINE SITE	2	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
396045	10/22/2015	CULTURAL RESOURCES SUBMITTED OCTOBER 2015 REGARDING THE STANDARD CHLORINE SITE	339	RPT / Report		
396018	11/16/2015	MONTHLY PROGRESS REPORT - OCTOBER 2015 FOR THE STANDARD CHLORINE SITE	18	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
396019	12/14/2015	MONTHLY PROGRESS REPORT - NOVEMBER 2015 FOR THE STANDARD CHLORINE SITE	2	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
396020	1/14/2016	MONTHLY PROGRESS REPORT - DECEMBER 2015 FOR THE STANDARD CHLORINE SITE	1	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
396021	2/12/2016	MONTHLY PROGRESS REPORT - JANUARY 2016 FOR THE STANDARD CHLORINE SITE	16	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)

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FINAL
09/30/2016

REGION ID: 02

Site Name: STANDARD CHLORINE
CERCLIS ID: NJD002175057
OUID: 01
SSID: 02RM
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
436160	2/12/2016	ASBESTOS SURVEYS FOR BUILDINGS 1-4 AND LEAD PAINT SURVEYS FOR BUILDINGS 1, 2, AND 4 FOR THE STANDARD CHLORINE SITE	33	RPT / Report		R02: (KEY ENVIRONMENTAL INCORPORATED)
436156	3/1/2016	US EPA APPROVAL OF THE REMEDIAL INVESTIGATION REPORT ADDENDUM FOR THE STANDARD CHLORINE SITE	1	LTR / Letter	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)
436157	3/3/2016	FINAL REVISED REMEDIAL INVESTIGATION REPORT ADDENDUM - AREA 2 INVESTIGATION FOR THE STANDARD CHLORINE SITE	4668	RPT / Report		R02: (KEY ENVIRONMENTAL INCORPORATED)
396022	3/14/2016	MONTHLY PROGRESS REPORT - FEBRUARY 2016 FOR THE STANDARD CHLORINE SITE	1	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
396013	4/4/2016	MEMORANDUM OF AGREEMENT BETWEEN US EPA AND NEW JERSEY STATE HISTORIC PRESERVATION OFFICE FOR THE STANDARD CHLORINE SITE	13	AGMT / Agreement		R02: Ferreira, Steven, J (US ENVIRONMENTAL PROTECTION AGENCY), R02: Saunders, Daniel, D (NEW JERSEY STATE HISTORIC PRESERVATION OFFICE)
396023	4/17/2016	MONTHLY PROGRESS REPORT - MARCH 2016 FOR THE STANDARD CHLORINE SITE	1	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
396047	4/18/2016	CORRESPONDENCE REGARDING THE HUDSON COUNTY IMPROVEMENT AUTHORITY REDEVELOPMENT REGARDING THE STANDARD CHLORINE SITE	13	LTR / Letter	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Guerra, Norman (HUDSON COUNTY IMPROVEMENT AUTHORITY)
396046	5/10/2016	RESOLUTION CONDITIONALLY DESIGNATING THE SITEX GROUP LLC AS REDEVELOPER OF THE FORMER STANDARD CHLORINE SITE AND THE FORMER DIAMOND SHAMROCK SITE	2	OTH / Other		R02: Carpenter, Patricia (CITY OF KEARNY)
396024	5/13/2016	MONTHLY PROGRESS REPORT - APRIL 2016 FOR THE STANDARD CHLORINE SITE	16	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)

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FINAL
09/30/2016

REGION ID: 02

Site Name: STANDARD CHLORINE
CERCLIS ID: NJD002175057
OUID: 01
SSID: 02RM
Action:

DocID:	Doc Date:	Title:	Image Count:	Doc Type:	Addressee Name/Organization:	Author Name/Organization:
396025	6/14/2016	MONTHLY PROGRESS REPORT - MAY 2016 FOR THE STANDARD CHLORINE SITE	1	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
396026	7/14/2016	MONTHLY PROGRESS REPORT - JUNE 2016 FOR THE STANDARD CHLORINE SITE	1	RPT / Report	R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Zubrow, James, S (KEY ENVIRONMENTAL INCORPORATED)
396044	7/26/2016	FOCUSED FEASIBILITY STUDY FOR THE STANDARD CHLORINE SITE	296	RPT / Report		
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451824	8/31/2016	CORRESPONDENCE FROM THE US SENATE REGARDING THE REMEDIATION PROCESS AT THE STANDARD CHLORINE SITE	1	LTR / Letter		R02: Menendez, Robert (UNITED STATES SENATE), R02: Booker, Cory, A (US SENATE)
451825	9/13/2016	CORRESPONDENCE FROM NJDEP REGARDING THE PROPOSED PLAN FOR THE STANDARD CHLORINE SITE	2	LTR / Letter	R02: Mugdan, Walter, E (US ENVIRONMENTAL PROTECTION AGENCY)	R02: Pedersen, Mark, J (NEW JERSEY DEPARTMENT OF ENVIRONMENTAL PROTECTION)
451827	9/30/2016	TECHNICAL MEMORANDUM REGARDING THE EVALUATION OF GROUNDWATER RESTORATION POTENTIAL FOR THE STANDARD CHLORINE CHEMICAL COMPANY SITE	173	MEMO / Memorandum		R02: Hess, Alison (US ENVIRONMENTAL PROTECTION AGENCY)

SCCC SITE

RECORD OF DECISION

APPENDIX 4 STATE LETTER

State of New Jersey
DEPARTMENT OF ENVIRONMENTAL PROTECTION
Site Remediation and Waste Management Program
Mail Code 401-406
P.O. Box 420
Trenton, New Jersey 08625-0420
Telephone: 609-292-1250

CHRIS CHRISTIE
Governor

KIM GUADAGNO
Lt. Governor

BOB MARTIN
Commissioner

September 26, 2016

Mr. Walter Mugdan, Director
Emergency and Remedial Response Division
U.S. Environmental Protection Agency Region II
290 Broadway
New York, NY 10007-1866

RE: Standard Chlorine Chemical Company Site
1015 To 1035 Belleville Turnpike
Town of Kearny, Hudson County
SRP PI# G000001583
Activity Number Reference: RPC000001

Dear Mr. Mugdan:

The New Jersey Department of Environmental Protection (Department) has completed its review of the Draft Record of Decision dated September 2016 for the Standard Chlorine Chemical Company Superfund (SCCC) Site. The Draft Record of Decision was prepared by the United States Environmental Protection Agency (USEPA). The SCCC Site is being addressed as a single operable unit and does not include SCCC impacts to the Hackensack River. This Draft Record of Decision describes the remedial alternatives considered for the SCCC Site and identifies the preferred remedial alternative along with the rationale for the preference.

The USEPA has selected Alternative III as the preferred remedy consisting of the following: targeted cap/cover; continued dense non-aqueous phase liquid (DNAPL) recovery in Area I; barrier wall system; DNAPL recovery in Area 2; Institutional Controls; building demolition of the Edison Buildings; operation, monitoring and maintenance (OMM); and Five-year reviews.

The Department concurs with the upland remediation of the SCCC Site as provided in Alternative III. However, the Department cannot fully concur with the USEPA's Draft Record of Decision because the current property owners have not agreed to the required Institutional Controls on the subject properties. The City of Kearny is the current owner of the 25-acre SCCC property and the Hudson County Improvement Authority is the current owner of the 13 acres of the SCCC Site that extends onto the Koppers - Seaboard property.

The Department continues to object to the USEPA's exclusion of the Hackensack River as an operable unit of the SCCC Site. This is contrary to the original concurrence letter dated April 10, 2003 in which then-Governor McGreevey specifically identified impacts to the Hackensack River as the impetus for

supporting the inclusion of the SCCC Site on the National Priorities List (NPL). In addition, the Hazard Ranking System score, which serves as the mechanism for evaluating sites for the NPL, identified the Surface Water Pathway as the only pathway of concern for the SCCC Site. A failure to fully address the SCCC Site's impacts to the Hackensack River in this Draft Record of Decision is inconsistent with the Department's expectations at the time the SCCC Site was nominated, and excluding the only receptor and the basis by which the site qualified for the NPL from the remedial action is inappropriate.

Should you wish to discuss this matter further, please feel free to contact me at (609) 292-1250.

Sincerely,

Mark J. Pedersen
Assistant Commissioner

CC: Steve Maybury, BCM, NJDEP
Jay Nickerson, BCM, NJDEP
Steve Byrnes, BEERA, NJDEP
David VanEck, BGWPA, NJDEP
Alison Hess, USEPA Region II

SCCC SITE
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APPENDIX 5 RESPONSIVENESS SUMMARY

RESPONSIVENESS SUMMARY

STANDARD CHLORINE CHEMICAL CO. INC. SUPERFUND SITE

RECORD OF DECISION

September 2016

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RESPONSIVENESS SUMMARY

FOR THE

RECORD OF DECISION
STANDARD CHLORINE CHEMICAL CO. INC. SUPERFUND SITE

TOWN OF KEARNY
HUDSON COUNTY, NEW JERSEY

INTRODUCTION

This Responsiveness Summary provides a summary of comments received during the public comment period related to the Proposed Plan for the Standard Chlorine Chemical Co. Inc. Superfund Site (SCCC Site) and provides the U.S. Environmental Protection Agency's (EPA) responses to those comments. All comments summarized in this document have been considered in EPA's final decision in the selection of a remedy to address the contamination at the SCCC Site.

SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

The public has been informed of the progress on the Remedial Investigation and Focused Feasibility Study (RI/FFS) and other Superfund actions relating to the SCCC Site through community updates in accordance with the *2014 Community Involvement Plan* developed for the SCCC Site. In 2010, EPA published a public notice and established a 30-day public comment period on the Engineering Evaluation and Cost Analysis (EE/CA) for the non-time critical removal action described in the Record of Decision (ROD) "Decision Summary" above.

The local community has provided input to EPA regarding SCCC Site progress. EPA representatives also received input regarding the reasonably anticipated future land use of the SCCC Site. The Town of Kearny's conditionally designated developer, the Sitex Group, LLC (Sitex), provided information to EPA regarding its plans to construct an 850,000 square foot warehouse and distribution center on the SCCC property and adjacent Diamond Shamrock property. Morris Kearny Associates, LLC (Morris), with which the Hudson County Improvement Authority (HCIA) has entered into a purchase and sale agreement for the adjacent Seaboard property currently owned by HCIA, also provided EPA with plans for redevelopment of the Seaboard property, including the 13-acre portion of the Seaboard property included within Area 1 of the SCCC Site. The Seaboard redevelopment plan includes the construction of four new industrial warehouse buildings totaling approximately 2.1 million square feet and related infrastructure.

The Proposed Plan for the SCCC Site was released for public comment on July 27, 2016. The Proposed Plan and other SCCC Site-related documents were made available to the public in the administrative record file maintained at the Kearny Public Library in Kearny, New Jersey, and at the EPA Region 2 Superfund Records Center located at 290 Broadway, New York, New York (Appendix 3). The notice of availability of these documents was published in *The Observer*, a

Kearny newspaper, on July 27, 2016. A public comment period was held from July 27, 2016, to August 26, 2016.

A public meeting was held on August 16, 2016, at Kearny Town Hall – Council Chambers, 402 Kearny Avenue, Kearny, New Jersey, to discuss the findings of the RI/FFS and to present EPA's Proposed Plan to the community. At this meeting, EPA representatives answered questions about the RI/FFS and the remedial alternatives. Comments that were received by EPA at the public meeting and in writing during the public comment period are summarized and addressed below.

The Proposed Plan is provided as Appendix 5-A. The public notice can be found in Appendix 5-B. The transcript of the public meeting can be found in Appendix 5-C. The written comments are contained in Appendix 5-D.

SUMMARY OF COMMENTS AND RESPONSES

Comments were received at the August 16, 2016 public meeting and in writing (letters and emails) during the public comment period. Written comments were received from Congressmember Albio Sires; from representatives of the Town of Kearny, HCIA, Morris, and the Standard Chlorine potentially responsible parties (PRP) group which conducted the RI/FFS; and from interested members of the community.

A summary of the comments received by EPA and EPA's responses is provided below.

REMEDIAL INVESTIGATION AND FOCUSED FEASIBILITY STUDY

Comment #1

A commenter asked which chemical most contaminates the SCCC Site, with the most parts per million.

EPA Response to Comment #1

Many contaminants of concern have been identified at the SCCC Site since environmental investigations began in the 1980s. Some of the highly contaminated materials were addressed during the early response actions undertaken from 2009 to 2011, such as lagoon solids (77% naphthalene) that were stabilized with Portland cement and covered with a multi-layer engineered cover within the consolidation area at the SCCC Site. As part of the RI/FFS, EPA has identified two principal threat wastes at the SCCC Site – (i) the industrial fill placed on top of the original meadowlands which contains chromite ore processing residue, and (ii) the dense non-aqueous phase liquid (DNAPL) waste in the subsurface that resulted from SCCC Site operations. In the industrial fill, the contaminant of concern with the highest concentration is hexavalent chromium (e.g., 3,390 mg/kg = 3,390 parts per million or 0.3% by weight). In the DNAPL, the contaminant of concern with the highest concentration is 1,4-dichlorobenzene (e.g., 520,000 mg/L = 520,000 parts per million or 52% by volume).

Comment #2

A commenter expressed concern about worker exposure to VOCs, DNAPL, and benzene.

EPA Response to Comment #2

Under current SCCC Site conditions, there are no known completed exposure pathways. The early response actions at the SCCC Site have addressed the current known pathways that may result in human exposure to SCCC Site-related contaminants. The baseline human health risk assessment, however, assumes the absence of any action to control or mitigate potential exposures in the future. Thus, under the future land use scenario, the exposure to future workers (construction worker, utility worker, and indoor worker) was calculated to be above acceptable levels for cancer risks and non-cancer health hazards.

The selected remedy will eliminate human exposure, including exposure to workers, to SCCC Site-related contaminants. The work required by the selected remedy will be performed in accordance with a SCCC Site-specific health and safety plan, which will require hazardous materials training and use of personal protective equipment. In addition, institutional controls, such as deed notices and the existing groundwater classification exception areas/well restriction areas, will prevent consumption of the contaminated groundwater and will require, among other things, appropriate management of activities and use of personal protective equipment during future commercial or industrial development, including building construction and utility work. The institutional controls will also protect the future indoor worker by requiring that future buildings be constructed to mitigate the potential for vapor intrusion.

Comment #3

A commenter stated that the FFS does not provide alternatives or measures to address and control potential vapor intrusion for future structures on the property owned by HCIA, also known as the Seaboard Site.

EPA Response to Comment #3

The FFS includes institutional controls to address future unacceptable exposure due to vapor intrusion at the entire SCCC Site, including the 13 acres of the SCCC Site located on the HCIA property. Alternatives or measures to address or control potential vapor intrusion on portions of the HCIA property not located on the SCCC Site are beyond the scope of the FFS for the SCCC Site. EPA understands that the Seaboard Site is currently undergoing remediation as part of the New Jersey state brownfields program.

Comment #4

Two commenters stated that the FFS does not include a Reuse Assessment, which is required to be completed as it evaluates information to develop assumptions about reasonably anticipated land use

EPA Response to Comment #4

A Reuse Assessment was not required at the SCCC Site. As provided in the 2013 Administrative Settlement Agreement and Order on Consent for the RI/FFS, Appendix A: Statement of Work (Section III.A.5), Respondents were to perform a Reuse Assessment at EPA's request. EPA did not request that the Respondents do so. The SCCC Site is located in a highly industrial setting and sufficient information was available for EPA to determine that the reasonably anticipated future land use of Area 1 would be commercial/industrial (and not residential or recreational), and that the future land use of Area 2 would remain the same as its current use, which is a New Jersey Department of Transportation right-of-way for Belleville Turnpike and Newark Turnpike.

ONGOING REMEDIAL ACTIONS

Comment #5

A commenter questioned the efficacy of the passive DNAPL recovery system currently operating at the SCCC Site and asserted that the system should be replaced by active extraction wells which may obviate the need for maintenance of the slurry wall.

EPA Response to Comment #5

The passive DNAPL recovery system is efficacious and functioning as intended. As of June 30, 2016, some 6,330 gallons of DNAPL have been recovered at the SCCC Site since it began operating in 2012 (see page 7 of the Proposed Plan). An active extraction system, whereby pumps are used to draw DNAPL to one or more wells, would entrain significantly more contaminated groundwater, which would then require treatment prior to discharge. An active extraction system would therefore require substantially more energy and greatly increase the cost of the system while resulting in a negligible, if any, incremental benefit over the passive DNAPL recovery system.

Comment #6

A commenter stated that the interim remedial actions are not temporary actions, noting that these response actions are called "interim" because investigation was ongoing and that this term merely reflects that fact that the remedy was not determined to be complete at that time. Further, this commenter stated that the slurry wall was intended to act as a permanent remedy with continued maintenance.

EPA Response to Comment #6

Comment acknowledged. EPA agrees that the slurry wall was intended as a permanent feature at the SCCC Site and has been maintained since installation. The 2013 Administrative Settlement Agreement and Order on Consent for the RI/FFS required reporting to EPA on the operation and maintenance of the interim remedial actions, including the slurry wall, the DNAPL recovery in Area 1, and the groundwater treatment plant.

REMEDIAL ACTION OBJECTIVES

Comment #7

Two commenters expressed support for EPA's remediation objective.

EPA Response to Comment #7

Comment acknowledged.

REMEDIAL ALTERNATIVES AND SELECTED REMEDY

Comment #8

Two commenters urged EPA to consider an alternative method of cleanup that would completely remove the contaminated soil from the SCCC Site, which, while more costly than a temporary cap, the commenters stated would be necessary to achieve the Remedial Action Objectives (RAOs) outlined in the Proposed Plan. Another commenter questioned why removal and disposal of contaminated soil was not included as part of the proposed remedy. Similarly, another commenter noted that money is a factor in what type of cleanup will be done and the only correct course of action is a total excavation of the contamination because barriers and capping are not a guaranteed way of containing dangerous chemicals as they can travel underground and poison other areas.

EPA Response to Comment #8

Superfund specifies that selected remedies provide for a cost-effective response. See 42 U.S.C. § 9621(a). A cost-effective remedy is one whose costs are proportional to its overall effectiveness. See NCP, 40 CFR § 300.430(f)(ii)(D). The selected remedy satisfies all of the RAOs for the SCCC Site and has a present worth cost of $11,246,000. An excavation and disposal approach was screened out given the nature and extent of contamination at the SCCC Site, including the large volume of impacted soils and their depth, which would result in substantially higher costs. Excavation and disposal would also take significantly longer to design and implement than the selected remedy, and thus would delay returning the SCCC Site to productive use. Moreover, excavation and disposal was deemed unnecessary in light of the efficacy of the interim remedial measures approved by EPA and New Jersey Department of Environmental Protection (NJDEP). The barrier wall that encloses contamination within Area 1 of the SCCC Site extends at depth into a confining unit consisting of a glacial clay that extends across the entire SCCC Site and is at least 40 feet thick. Monitoring data collected quarterly ensure that the barrier containment system is functioning properly and that a gradient is maintained across the wall, which further prevents migration of contaminants.

Comment #9

A commenter stated that Alternative III is the optimal remedy for the SCCC Site. The commenter noted that the Proposed Plan recognizes and leverages extensive prior investigation and remediation activities conducted under the oversight and approval of both NJDEP and EPA. This

commenter stated that the costs of implementing the interim remedial activities at the SCCC Site, including a hydraulic control and groundwater treatment system, on-site soils and sediments consolidation area, excavation and removal of near-shore sediments, installation of drainage features, and installation of caps and other measures totaled over $15 million.

EPA Response to Comment #9

Comment acknowledged. The selected remedy builds upon previously completed cleanup actions conducted at the SCCC with oversight by EPA and/or NJDEP (see page 1 of the Proposed Plan).

Comment #10

A commenter asked who owns the land that the Edison buildings are on. Another commenter asked where materials from demolition of the Edison buildings will go. A commenter representing the Town of Kearny stated that its redevelopment agreement with Sitex will include provisions for demolition of the remaining Standard Chlorine buildings by Sitex, and put forth that the Town of Kearny has no liability for remediation because it acquired the property by tax foreclosure.

EPA Response to Comment #10

The Edison buildings are located on the SCCC property, which is now owned by the Town of Kearny. The Town of Kearny acquired the property through a tax foreclosure completed in October 2010 (see page 4 of the Proposed Plan). The location(s) for disposal of demolition materials has not been identified at this time and will be determined as part of the remedial design. The comment regarding the redevelopment agreement between the Town of Kearny and Sitex is acknowledged.

Regarding the comment about the Town of Kearny's legal status under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. §§ 9601-9675, EPA acknowledges that Section 101(20)(d) of CERCLA, 42 U.S.C. § 9601(20)(d), provides an exception from "owner or operator" liability under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), for a unit of local government which acquired ownership or control of a facility involuntarily by virtue of its function as sovereign, such as through tax delinquency. This exclusion does not apply to a local government which has caused or contributed to the release or threatened release of a hazardous substance from a facility. However, the purpose of the Responsiveness Summary is to respond to public comments on the alternatives presented and evaluated in the RI/FFS and Proposed Plan, not to address questions of liability in any detail.

Comment #11

A commenter stated that a formal application for soil erosion and sediment control certification must be submitted to the Hudson-Essex-Passaic Soil Conservation District once plans are developed to ensure proper erosion control installations and timely capping and restabilization at the SCCC Site.

EPA Response to Comment #11

Agreed. The New Jersey Standards for Soil Erosion and Sediment Control is an action-specific applicable or relevant and appropriate requirement (ARAR) for the selected remedy, as shown on Table 7.

Comment #12

A commenter stated that HCIA has objected to any deed notice on the 13 acres of its property enclosed by the slurry wall that will be inconsistent with or more restrictive or limiting than the deed notice that the Seaboard Site Licensed Site Remediation Professional (LSRP) currently contemplates for the HCIA property.

EPA Response to Comment #12

Information was not provided by the commenter on the restrictions that the Seaboard Site LSRP contemplates for the deed notice on the HCIA property. The selected remedy for the SCCC Site calls for institutional controls to ensure environmental protectiveness, for example by prohibiting groundwater use, prohibiting residential land use and restricting future land use to commercial/industrial, ensuring proper management of intrusive activities and use of personal protective equipment, and requiring mitigation measures in future buildings to address vapor intrusion.

Comment #13

A commenter stated that capped sites will fail to protect human health and the environment because institutional controls do not work. Two commenters expressed concern about the effectiveness of a cap intended to prevent the spread of hazardous waste given the Hackensack's proneness to flooding.

EPA Response to Comment #13

The selected remedy does not rely on institutional controls to ensure cap integrity. Operation and maintenance of the remedial components, which includes inspection and maintenance of the caps/cover, is required as part of the selected remedy. An operation and maintenance plan will be developed during remedial design. In addition, the selected remedy will comply with location-specific ARARs that pertain to flooding. The New Jersey Flood Hazard Control Act is an ARAR, and Executive Order 11988: Floodplain Management and Executive Order 13690: Flood Risk Management are to-be-considered criteria, as listed in Table 7. A floodplain assessment will be completed as part of the remedial design phase. EPA is also required to conduct a review of the remedy at least once every five years after initiation of the remedial action for the SCCC Site to ensure that the remedy is, or will be, protective of human health and the environment.

TECHNICAL IMPRACTICABILITY WAIVER

Comment #14

A commenter stated that the issuance of a technical impracticability (TI) determination for Area 2, rather than effective remediation, is unacceptable and calls into question what benefit, if any, the slurry wall is providing for the 13 acres of the SCCC Site located on the HCIA property. This commenter requested that the selected remedy include a specific requirement that some form of appropriate remedial action, other than issuance of a TI, be required for Area 2. This commenter also stated the current owner of the SCCC Site, the Town of Kearny, is planning a redevelopment that will require a common access with HCIA/Morris through Area 2, and that the lack of a substantive remedial action for contamination in Area 2 critically impacts the access and planned utilities for the two planned redevelopment projects.

In contrast, a commenter stated that the proposed TI waiver for Area 2 does not impede development and that a "clean corridor" (a layer of clean fill material above contamination) is not necessary for access and the installation of utilities in Area 2. This commenter noted that the TI waiver for Area 2 is proposed for the groundwater contaminated by the presence of DNAPL at a depth of 15 feet or more below the ground surface. This commenter stated that it is highly unlikely that the future development at Area 2 will require excavation to that depth. Moreover, the commenter identified concerns that would arise with excavation in Area 2, including accessibility and safety issues and physical constraints posed by the Belleville Turnpike, and noted that any redevelopment plans for excavation in Area 2 would be subject to a soil management plan designed to reduce the risk to human health and the environment. Further, the commenter noted that no technical basis has been submitted to disagree with the conclusion of the TI Evaluation Report and Addendum submitted as part of the FFS. This commenter stated that the objections to a TI waiver for Area 2 amount to nothing more than self-serving conclusions that the TI waiver in Area 2 would be "unacceptable."

EPA Response to Comment #14

The selected remedy calls for DNAPL recovery in Area 2, which is a component of an effective and appropriate remedy for that portion of the SCCC Site. The DNAPL recovery in Area 2 will be designed to reasonably accommodate the commercial/industrial redevelopment plans for the SCCC Site, while at the same time maintaining the environmental protectiveness of the remedy. A TI waiver is appropriate for Area 2 (and Area 1) for the SCCC Site-specific reasons that have been presented in the FFS, the Proposed Plan, and the ROD.

REUSE AND REDEVELOPMENT

Comment #15

Several commenters expressed support for the redevelopment of the SCCC Site, the Diamond Shamrock Site, and the Seaboard Site, and noted that these projects are of critical importance to the local area.

EPA Response to Comment #15

Comment acknowledged. EPA recognizes the importance of these redevelopment projects both locally and regionally.

Comment #16

Several commenters stated that EPA should consider alternative remedies that accommodate the concerns in HCIA's July 8, 2016 letter so as to not unduly restrict or otherwise detrimentally affect future development of the HCIA property. A number of commenters submitted HCIA's July 8, 2016 letter as an attachment. Among other issues addressed elsewhere, in its July 8, 2016 letter, HCIA stated that it must insist that the final FFS include specific and pertinent responses to its April 18, 2016 letter regarding the redevelopment plans for the HCIA property in the vicinity of the 13 acres of its property enclosed by the slurry wall.

EPA Response to Comment #16

EPA does not agree that future development of the HCIA property is unduly restricted by the remedy for the SCCC Site. Many of the concerns raised in HCIA's April 18, 2016 and July 8, 2016 letters cannot be fully addressed until the Seaboard development plans, as they extend onto the 13 acres of the SCCC Site, are finalized. Nonetheless, the selected remedy is compatible with the reasonably anticipated future land use of the SCCC Site for commercial/industrial use. The selected remedy will be designed to reasonably accommodate the commercial/industrial redevelopment plans underway for the SCCC Site, including the 13-acre portion that is on the HCIA property, while at the same time maintaining the environmental protectiveness provided by the remedy (see page 4 of Proposed Plan). The Agency recognizes that when redevelopment plans are finalized, the property owners may propose modifications to existing components of the selected remedy. The proposed design for any such modifications of the remedy to accommodate redevelopment must be reviewed and approved by EPA in advance to ensure that the remedy remains protective of human health and the environment. Any remedy modifications must be made and documented in accordance with the CERCLA process and may require an Explanation of Significant Differences or an Amendment to the ROD, which are the administrative procedures provided by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP) and EPA guidance.

Comment #17

A commenter representing the Town of Kearny stated that the access road presented by the attorney for Morris at the hearing (i.e., August 16, 2016 public meeting) encumbered a significant

portion of the SCCC Site, and that the Town of Kearny planned to work with HCIA/Morris to arrive at a location for the road that works in conjunction with and minimizes the impact on the proposed redevelopment of the SCCC Site.

EPA Response to Comment #17

Comment acknowledged. The location of the access road affects both the Kearny/Sitex development and the HCIA/Morris development and is one of the many issues that remain to be resolved before the redevelopment plans for the two projects can be finalized.

Comment #18

A commenter stated that the presence of the slurry wall on the 13 acres of the HCIA property is not legally authorized, impedes the rights of HCIA and Morris as current property owner and contract purchaser, respectively, and constitutes a trespass and a taking. This commenter stated that permanency of the existing slurry wall is violative of a 2003 Settlement Agreement and Release between HCIA, the New Jersey Sports and Exposition Authority (NJSEA), Beazer East, Inc., and others, and a 2010 Access Agreement between HCIA and the parties remediating the SCCC Site regarding the parcel of land owned by HCIA that bisects the SCCC property. This commenter stated that the Standard Chlorine PRP group has no legal authority or consent of HCIA to remediate the 13 acres in a manner that limits or prohibits redevelopment and/or remediation, and that EPA cannot and should not endorse or approve a final remedy that includes the existing slurry wall in its current state and location without the property owner's express written consent.

In contrast, another commenter stated that the parties which implemented the interim remedial actions sought and received permission from HCIA to locate a portion of the barrier wall on the HCIA property, once in 2009 with the initial NJDEP permit application that was signed by HCIA, and subsequently in 2010 when the location of the portion of the barrier wall on the HCIA property was adjusted in response to NJDEP comments. This commenter stated that HCIA was already contemplating redevelopment of the HCIA property at that time but did not object to or comment on the location or the design of the barrier containment wall to be installed on its property in connection with the NJDEP permitting process. Further, this commenter noted that in 2010, EPA, under the Superfund program, published a public notice and established a 30-day public comment period on the EE/CA that described each of the interim remedial action components planned to be implemented on the SCCC Site, including the barrier wall configuration and inclusion of the 13-acre portion of the HCIA property, and that EPA did not receive any comments on the barrier wall configuration during the public comment period. This commenter stated that the terms of the 2010 Access Agreement do not affect EPA's authority under CERCLA regarding the barrier wall, and further, that HCIA is not exempt from this authority.

EPA Response to Comment #18

Consistent with the CERCLA's definition of "facility", the 13-acre portion of the HCIA property enclosed within the barrier wall system is included in the SCCC Site. See 42 U.S.C. § 9601(9). Further, the NCP at 40 CFR § 300.5 defines "on-site" to mean "the areal extent of contamination and all suitable areas in very close proximity to the contamination necessary for implementation

of the response action." Installation of the barrier wall was undertaken by a group of Standard Chlorine PRPs as a CERCLA response action to control the release or threat of release of hazardous substances from the SCCC Site, and the SCCC Site includes the 13-acre portion of the HCIA property. EPA understands that this response action is within the scope of the agreements entered into between HCIA and the Standard Chlorine PRP group granting access for certain specified purposes, including installation of the barrier wall.

Comment #19

A commenter stated that EPA cannot rely on the 2010 Access Agreement and 2003 Settlement Agreement to impose the proposed remedy, and thereby take private property of a non-remediating party where a responsible party can provide an alternative irrespective of its practicability and cost-effectiveness. This commenter further stated that EPA should require the Standard Chlorine PRP group to seek another remedial alternative and obtain proper legal authority for its implementation.

Another commenter stated that the current owner of the HCIA property and the strip of land that bisects the SCCC property are not "innocent landowners" with respect to the SCCC Site. This commenter stated that by the time HCIA purchased the properties in 1988 and later, NJDEP had commenced a comprehensive dioxin investigation of the entire Kearny Peninsula, including the SCCC Site and the Seaboard Site, and it was clear from the physical condition of the area that that there was significant risk that releases had migrated from the SCCC property onto the HCIA property. This commenter also stated that the planned developers of the HCIA property contracted with HCIA to purchase the HCIA property and the strip of land that bisects the SCCC property in 2015, when investigation and remediation of the Seaboard Site and SCCC Site were well underway; and by that time NJDEP had approved a remedial action work plan addendum contemplating HCIA would develop a plan to protect or augment the barrier wall before placing additional fill atop it. The commenter noted that the planned developer's knowledge of remediation efforts on the SCCC Site may disqualify it from innocent landowner status.

EPA Response to Comment #19

See Response to Comment #18. Further, the purpose of the Responsiveness Summary is to respond to public comments on the alternatives presented and evaluated in the R/FFS and Proposed Plan, not to address questions of funding or liability in any detail.

Comment #20

A commenter stated that the slurry wall, as built, cannot support the requisite fill and cap that is required to be placed on top of the slurry wall to meet NJDEP regulatory remediation requirements. Another commenter similarly stated that, based on review by its technical experts, it was determined that the existing cement bentonite slurry wall cannot support additional fill material which is necessary not only for the development of the HCIA property but also for the capping which is necessary for the remediation of the Seaboard Site by HCIA to comply with regulations that require any building in the flood hazard intended for human habitation to be constructed at least one foot above flood elevation. This commenter also stated, further, that in 2010 NJ Transit provided notice to Beazer East, Inc., with copies to NJDEP and EPA, of the structural deficiencies

of the then-proposed slurry wall and noted that the proposed wall as designed in 2010 could significantly interfere with any development of the HCIA property within the area of the slurry wall, and therefore NJ Transit recommended that the slurry wall be constructed of soil bentonite rather than cement bentonite. The 2010 NJ Transit letter to Beazer East, Inc. also was noted by another commenter. A commenter stated that HCIA has been filling the Seaboard Site to complete remediation of the Seaboard Site by elevating it out of the floodplain and enabling the final engineering control to be installed pursuant to the redevelopment plan, and that the slurry wall's location impacts the regulatory obligation to complete placement of fill and construction of the engineering controls (building foundation, parking, hardscape, impervious cap, etc.) required by NJDEP. Similarly, a commenter requested that the ROD require that the selected remedy be designed to accommodate the NJDEP-ordered remedy and appropriate adjustments, supplements, and modifications as may be required to complete the NJDEP-approved remedial action for the Seaboard Site while maintaining effectiveness to contain the DNAPL plume originating at the SCCC Site. This commenter stated that any proposed remedy for the 13 acres of the HCIA property included in the SCCC Site must be approved by the LSRP and be consistent with the NJDEP requirements.

In contrast, another commenter stated that the barrier wall does not prevent completion of the NJDEP-approved remedy for the Seaboard Site. This commenter stated that additional fill was not required by NJDEP to be placed on top of the slurry wall on the Seaboard Site; rather, the additional fill was a change to the NJDEP-approved remedy sought by the Seaboard Site property owner to enhance the opportunity for development of the property, to ensure compliance with anticipated increase in base flood elevations, and to receive tip fees for the upland disposal of the processed dredge materials. This commenter noted that the base flood elevations were not increased and thus the only reasons for placing the additional fill material appear to be enhancing the opportunity for development and receiving the tip fees.

EPA Response to Comment #20

The final engineering design for the barrier wall was approved by NJDEP, and construction of the barrier containment system was completed in 2011. To EPA's knowledge, the property owner (HCIA) did not raise objections when the engineering plans were being finalized. EPA notes that NJ Transit's August 2010 letter was submitted as part of the Access to the Region's Core (ARC) Tunnel Project, a development plan that was cancelled by the State of New Jersey in October 2010.

When a site is listed on the National Priorities List (NPL) and EPA oversees the investigation and cleanup as the lead agency, the investigation and remedy selection process proceeds according to CERCLA, the NCP, and EPA guidance. New Jersey has issued guidance to clarify that the LSRP program does not apply to certain types of remediation, including a federal-lead cleanup such as the SCCC Site. See http://www.nj.gov/dep/srp/srra/training/matrix/quick_ref/rcra_cercla_fed_facility_sites.pdf.

Throughout the RI/FFS, NJDEP has been involved as the support agency, and EPA provided NJDEP with an opportunity to review the July 2016 Proposed Plan and the draft ROD prior to issuance. Correspondence from NJDEP does not indicate that NJDEP would agree with the

comment that Alternative III for the SCCC Site will prevent or hinder successful implementation of the remediation of the Seaboard Site. Rather, in reviewing the Proposed Plan, NJDEP stated on September 13, 2016 that it concurs with the upland remediation of the SCCCC Site as provided in Alternative III.

The selected remedy is compatible with the reasonably anticipated future land use of the SCCC Site for commercial/industrial use and will be designed to reasonably accommodate the commercial/industrial redevelopment plans underway for the SCCC Site, including the 13-acre portion that is on the HCIA property, while at the same time maintaining the environmental protectiveness provided by the remedy. EPA recognizes that when redevelopment plans are finalized, the property owners may propose modifications to existing components of the selected remedy. The proposed design for any such modifications of the remedy to accommodate redevelopment must be reviewed and approved by EPA in advance to ensure that the remedy remains protective of human health and the environment. Any remedy modifications must be made and documented in accordance with the CERCLA process and may require an Explanation of Significant Differences or an Amendment to the ROD, which are the administrative procedures provided by the NCP and EPA guidance.

Comment #21

A commenter stated that presently, a wide valley exists where the slurry wall is located on the HCIA property because fill has not been placed in that area due to the lack of geotechnical integrity of the slurry wall to support the fill. The commenter stated that the LSRP for the Seaboard Site has generated a geotechnical report that confirms this condition and referred to additional confirmation by an independent geotechnical study. Another commenter stated that if the valley is not filled, it will allow stormwater to erode the cap placed on the 13 acres and the adjacent area and will compromise this part of the Seaboard Site remediation.

In contrast, another commenter stated that the valley on the Seaboard Site was created by HCIA and is not EPA's problem to solve. This commenter stated that the valley exists because HCIA chose to add processed dredge material as fill at the Seaboard Site on both sides of the slurry wall and, accordingly, the supposed threat to the Seaboard cap could be solved by removing some portion of the processed dredge materials that HCIA deposited adjacent to the slurry wall. This commenter stated that it would be improper for EPA to require the Standard Chlorine PRP group to address an environmental concern that was created by HCIA's voluntary actions on the Seaboard Site. This commenter also stated that Section 3.7 of the November 2013 Remedial Action Work Plan Addendum for the Seaboard Site prepared by HCIA states that, prior to placement of processed dredge material on the barrier wall, HCIA will perform a detailed analysis to determine the appropriate means to protect or augment the barrier wall, and that placement of processed dredge material cannot take place on the barrier wall without the prior approval of the Standard Chlorine PRP group. This commenter noted that to date, HCIA has not submitted any engineering/geotechnical analysis or proposal to protect or augment the barrier wall.

EPA Response to Comment #21

Although the Seaboard Site is undergoing remediation as part of the New Jersey state brownfields program, as explained in the Response to Comment #18, the 13 acres of the HCIA property enclosed within the barrier wall are part of the SCCC Site. See NCP, 40 CFR § 300.5. Accordingly, review and approval from EPA is necessary prior to any party taking action on that portion of the SCCC Site. Undertaking work without prior notice to EPA is not permitted and, should it occur, EPA will pursue all available enforcement options, including, but not limited to, possibly issuing a unilateral administrative order with penalty provisions under Section 106 of CERCLA, 42 U.S.C. § 9606. Unilateral administrative orders are enforceable in court and failure to comply triggers significant daily fines. See 42 U.S.C. § 9606(b).

Comment #22

A commenter stated that the FFS does not address the fact that the LSRP for the Seaboard Site needs to design a remedy for the 13 acre area within the slurry wall that will not render the property unusable for future redevelopment, for NJSEA development plans or for recreational use pursuant to N.J.S.A. § 58:10B-12(g)(1) and N.J.A.C. § 7:26C-6.4(b), and therefore must be revised.

EPA Response to Comment #22

The development and evaluation of remedial alternatives in the FFS considers the reasonably anticipated future land use of the SCCC Site, including the 13-acre portion of the HCIA property that is part of the SCCC Site. The FFS provides that when practicable and cost-effective, the selected remedy would be designed to accommodate commercial/industrial development on the 13-acre portion of the HCIA property while at the same time maintaining the protectiveness provided by the remedy. Therefore, EPA does not agree that the selected remedy requires the implementation of a remedial action that will "render the [HCIA] property unusable for future redevelopment or recreational use". Moreover, as explained in Responses to Comment #20 and #21, EPA is overseeing the investigation and cleanup of the SCCC Site under CERCLA, the NCP and EPA guidance, with NJDEP involved as support agency. Having reviewed the Proposed Plan, NJDEP stated on September 13, 2016 that it concurs with the upland remediation of the SCCC Site as provided in Alternative III.

Comment #23

A commenter stated that EPA has ignored the fact that there are alternative remedies that are equal to or better than the existing slurry wall to protect human health and the environment and have the added benefit of supporting both the remediation and redevelopment of the Seaboard Site. This commenter stated that the cost to construct an alternative remedy would be less expensive to construct than the substantial damages that HCIA and Morris would sustain if EPA includes the existing slurry wall as stated in the Proposed Plan as part of its final remedy for the SCCC Site.

Another commenter stated that HCIA and Morris have not supplied a tangible remedial alternative to the slurry wall, which the commenter found to be unsurprising given the many economic uncertainties surrounding the eventual viability of a redevelopment of this nature (e.g., appropriate financing, viable tenants, additional infrastructure, etc.). This commenter noted that without a

separate remedial alternative to consider, EPA has no basis to reject or modify its preferred Alternative III as requested by HCIA and Morris. This commenter also proposed that specific modifications to the barrier wall could be evaluated and included in a final remedial design, that the modifications can be reviewed and adopted with EPA's approval after the ROD is issued, and that the potential modifications would not change the preferred Alternative III remedy provided that any proposed specific barrier wall modifications achieved the stated RAOs of the ROD.

EPA Response to Comment #23

The selected remedy is compatible with the reasonably anticipated future land use of the SCCC Site for commercial/industrial use and will be designed to reasonably accommodate the commercial/industrial redevelopment plans underway for the SCCC Site, including the 13-acre portion of the HCIA property included in Area 1, while at the same time maintaining the environmental protectiveness provided by the remedy. EPA recognizes that when redevelopment plans are finalized, the property owners may propose modifications to existing components of the selected remedy. The proposed design for any such modifications of the remedy to accommodate redevelopment must be reviewed and approved by EPA in advance to ensure that the remedy remains protective of human health and the environment. Any remedy modifications must be made and documented in accordance with the CERCLA process and may require an Explanation of Significant Differences or an Amendment to the ROD, which are the administrative procedures provided by the NCP and EPA guidance.

Comment #24

A commenter noted that EPA's Proposed Plan states that when practicable and cost-effective, the remedial alternatives would be designed to accommodate other potential commercial/industrial development in Area 1, including the 13-acre portion of the HCIA property included in Area 1, while at the same time maintaining the protectiveness provided by the remedy. This commenter objected to the phrase "when practicable and cost-effective" as being "vague, ambiguous, undefined and completely subjective" and requested that the phrase be replaced with a clear and objective standard.

EPA Response to Comment #24

See Response to Comment #23. Further, EPA disagrees that "practicable" and "cost-effective" are "vague, ambiguous, undefined and completely subjective" terms. As explained in EPA's Response to Comment #8, "cost-effective" is a statutory term under CERCLA. See 42 U.S.C. § 9621(a). A cost-effective remedy is one whose costs are proportional to its overall effectiveness. See NCP, 40 CFR § 300.430(f)(ii)(D). In addition, accommodating future redevelopment whenever "practicable" is an important consideration under EPA's policy supporting reuse of sites on the NPL. Guidance articulating this policy provides that "[w]henever practicable, the Agency [] seeks to avoid response actions that might hinder or prevent site reuse consistent with the Agency's assumptions regarding reasonably anticipated future land use." See "Considering Reasonably Anticipated Future Land Uses and Reducing Barriers to Reuse at EPA-lead Superfund Remedial Sites" (OSWER Directive 9355.7-19; March 17, 2010), available at: https://semspub.epa.gov/work/HQ/175563.pdf, p.3. EPA's guidance, "Land Use and the Remedy

Selection Process" (OSWER Directive 9355.7-04, May 25, 1995), available at: https://www.epa.gov/sites/production/files/documents/landuse.pdf, further explains how EPA considers the reasonably anticipated future land use when selecting a remedy at Superfund sites, in the context of the NCP analysis. See also NCP, 40 CFR § 300.430(f) (discussing the criteria to be considered by EPA when selecting a remedy).

Comment #25

A commenter stated that Alternative III is incompatible with the redevelopment of the HCIA property because the slurry wall on the HCIA property materially interferes with redevelopment of the Seaboard Site. This commenter suggested that the slurry wall can be relocated and constructed of different materials without impact to remediation of the SCCC Site.

Another commenter stated that actions taken to improve the value of property or taken as part of redevelopment are the responsibility under CERCLA of the landowner or developer alone and not the obligation of the PRPs of the Superfund site. This commenter stated that while the FFS and Proposed Plan contemplate redevelopment of the SCCC Site for industrial/commercial use, and although the PRPs for the SCCC Site will continue discussions with others regarding their Superfund obligations pertaining to the redevelopment of the SCCC Site, the prospect of redevelopment does not give parties with a financial interest in the redevelopment the authority to hijack the Superfund process and demand remedies that are not focused on the protection of human health or the environment but are designed to maximize a return on investment by shifting redevelopment costs to the PRPs for the SCCC Site.

EPA Response to Comment #25

See Response to Comment #23.

HACKENSACK RIVER

Comment #26

A commenter stated that there are fish advisories in place, and the chemicals from the SCCC Site are having an impact on wildlife, especially fish and birds in which toxins can bioaccumulate and affect the entire food chain. Another commenter asked whether there was any evidence of contamination from the SCCC Site discharging into the Hackensack River. A commenter expressed concern that the selected remedy will not adequately remediate the contaminated waterway.

EPA Response to Comment #26

EPA acknowledges the comment that consumption advisories are in place for the Hackensack River and strongly recommends that people protect themselves and others by following the advisories. A full list of the advisories can be found at http://www.nj.gov/dep/dsr/fishadvisories/2016-fish-advisories.pdf. As noted on page 2 of the Proposed Plan, early response actions already taken at the SCCC Site prevent any further discharge of contaminants from the site to the adjacent

Hackensack River. With respect to historic releases from the SCCC Site to the Hackensack River, additional investigation of the Hackensack River is under consideration by EPA and NJDEP as a separate matter. EPA has released a September 2015 Preliminary Assessment of the Lower Hackensack River, Bergen and Hudson Counties, which is available online at https://www.epa.gov/nj/hackensack-river-preliminary-assessment-report.

SCCC SITE

RECORD OF DECISION

APPENDIX 5-A PROPOSED PLAN

Superfund Proposed Plan

U.S. Environmental Protection Agency

Standard Chlorine Chemical Co. Inc. Superfund Site

Kearny, New Jersey

July 2016

EPA ANNOUNCES PROPOSED PLAN

This Proposed Plan describes the remedial alternatives considered for the Standard Chlorine Chemical Co. Inc. (SCCC) Superfund Site and identifies the preferred remedial alternative along with the rationale for the preference.

The Proposed Plan was developed by the United States Environmental Protection Agency (EPA), the lead agency for the SCCC Site, in consultation with the New Jersey Department of Environmental Protection (NJDEP), the support agency. EPA is issuing this document as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act of 1980, as amended (CERCLA), 42 U.S.C. § 9617(a), and Section 300.430(f)(2) of the National Oil and Hazardous Substances Pollution Contingency Plan (NCP).

The nature and extent of the contamination at the SCCC Site and the remedial alternatives summarized in this Proposed Plan are described in detail in the October 2015 Remedial Investigation (RI) Report, the January 2016 RI Addendum Report, and the July 2016 Focused Feasibility Study (FFS) Report. The RI/FFS reports and other documents are part of the publicly available administrative record file (see text box on page 22 entitled, "For Further Information"). EPA encourages the public to review these reports for a comprehensive understanding of the RI/FFS conducted at the site.

EPA's preferred alternative builds upon previously completed cleanup actions conducted at the SCCC Site with oversight by EPA and/or NJDEP. Previously completed actions include installation of a barrier wall containment system, near-shore sediment removal, dense non-aqueous phase liquid (DNAPL) recovery and groundwater removal, treatment and discharge in accordance with NJDEP permitting regulations.

MARK YOUR CALENDAR

Public Comment Period - July 27 to August 26, 2016

EPA will accept written comments on the Proposed Plan during the public comment period. Written comments should be addressed to:

Alison Hess, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 19th Floor
New York, NY 10007
Fax: (212) 637-4866
Email: hess.alison@epa.gov

Public Meeting – August 16, 2016 at 7:00 PM

EPA will hold a public meeting to explain the Proposed Plan and all of the alternatives presented in the Focused Feasibility Study. Oral and written comments will also be accepted at the meeting. The meeting will be held at:

Council Chambers
Kearny Town Hall
402 Kearny Ave
Kearny, NJ 07032

EPA's website for the SCCC Site:
www.epa.gov/superfund/standard-chlorine

EPA's Proposed Plan:
https://semspub.epa.gov/src/document/02/396008

The preferred alternative also considers the reasonably anticipated future land use of the SCCC Site (commercial/industrial) and the redevelopment plans for the site as warehousing and distribution facilities.

The major components of the preferred alternative are targeted cap/cover; barrier wall system; DNAPL recovery; institutional controls (ICs); demolition of five dilapidated buildings; and operation, maintenance, and monitoring (O&M). The preferred alternative (as well as the other alternatives evaluated in detail) would result in contaminants remaining on the site above levels that allow for unlimited use and unrestricted exposure; therefore, a review of the site conditions would be conducted by EPA at least once every five years, as required by CERCLA.

The total present worth cost of the preferred alternative is approximately $11,250,000.

Community Role in the Selection Process

This Proposed Plan is being issued to inform the public of EPA's preferred alternative and to solicit public comments pertaining to the remedial alternatives evaluated, including the preferred alternative. Changes to the preferred alternative, or a change from the preferred alternative to another alternative, may be made if public comments or additional data indicate that such a change would result in a more appropriate remedial action. EPA is soliciting public comments on the alternatives considered in the Proposed Plan because EPA may select a remedy other than the preferred alternative. This Proposed Plan is available to the public for a public comment period that concludes on August 26, 2016.

A public meeting will be held during the public comment period to present the conclusions of the RI/FFS, elaborate further on the basis for identifying the preferred alternative, and receive public comments. The public meeting will include a presentation by EPA of the preferred alternative and the other evaluated alternatives. Information on the public meeting and submitting written comments can be found in the "Mark Your Calendar" text box on page 1.

Comments received at the public meeting and during the comment period will be documented in the responsiveness summary section of the Record of Decision (ROD). The ROD is the final decision document that EPA will issue after taking into consideration the public comments on the Proposed Plan. The ROD will explain the cleanup remedy that has been selected and the basis for its selection.

Scope and Role of the Action

The SCCC Site is being addressed as a single operable unit. The RI/FFS was completed for all contaminants, environmental media, and exposure pathways of concern under current site conditions.

Early response actions already taken at the SCCC Site prevent any further discharge of contaminants from the site to the adjacent Hackensack River. With respect to historic releases from the site to the Hackensack, additional investigation of the river is under consideration by EPA and NJDEP as a separate matter. EPA has released a September 2015 Preliminary Assessment of the Lower Hackensack River, Bergen and Hudson Counties (which is available online at https://www.epa.gov/nj/hackensack-river-preliminary-assessment-report) and river sampling is underway.

SITE BACKGROUND

Site Description

The SCCC Site consists of approximately 42 acres in an industrial area of the Town of Kearny, Hudson County, New Jersey. (Figure 1). It includes the 25-acre former SCCC property located at 1025-1035 Belleville Turnpike and a 13-acre portion of the adjacent Seaboard property (a New Jersey brownfields site). Together, the SCCC property and 13-acre portion of the Seaboard property are designated as Area 1 of the

SCCC Site. The site also includes 3.8 acres that consist primarily of the Belleville Turnpike, Newark Turnpike, and associated steep embankments, and which are designated Area 2 of the site. To the north of the site is the adjacent Diamond Shamrock property, which is also a New Jersey brownfields site.

The SCCC Site is relatively flat, with elevations ranging from about three to 15 feet above sea level. The surface of the SCCC property is currently either paved, covered with coarse gravel, or vegetated. Most of the buildings have been demolished and the only original structures remaining are the five dilapidated buildings associated with the Thomas A. Edison, Inc. Emark Battery Corporation (Edison).

Geology and Hydrology

Hudson County lies within the Piedmont Physiographic Province of New Jersey. It is mainly underlain by slightly folded and faulted sedimentary rocks of Triassic and Jurassic age (240 to 140 million years old) and igneous rocks of Jurassic age. At the surface, the Piedmont is a low rolling plain divided by a series of higher ridges that slope gently toward sea level in Newark Bay.

The area originally consisted of marshlands bordering the Hackensack River. In the first half of the 20th century, industrial fill materials were placed in the coastal marshlands of this region to create property for industrial/commercial development. At the SCCC Site, the industrial fill materials (fill unit) are two to 10 feet thick and include chromite ore processing residue (COPR) generated at the adjacent Diamond Shamrock property. The marsh surface below the fill unit is two to eight feet thick and consists of silt, humus, and peat (meadow mat). Beneath the meadow mat is a sand unit generally less than 10 feet thick and a continuous varved clay unit estimated at greater than 40 feet thick across the SCCC Site. Below the clay unit is glacial till and bedrock.

The fill unit and the sand unit are separate shallow groundwater bearing units. The fill unit is unconfined and the depth to ground water is typically three to four feet below existing ground surface. The meadow mat is compacted into a semi-confining unit. Decomposition of the organic matter in the meadow mat has used up the available oxygen so that it is now a chemically reducing environment. The varved clay unit has low permeability and is an effective aquitard hydraulically separating the sand unit above and the glacial till and bedrock below.

The site is located within the 100-year floodplain of the Hackensack River. Surface water runoff at the SCCC Site previously was channeled into surface ditches that emanated eastward toward the Hackensack River or into on-site lagoons. Currently, no flowing surface waters are present on the SCCC Site. A new subsurface stormwater collection piping system manages the stormwater runoff. Approximately 1.28 acres of man-made freshwater wetlands exist across the SCCC Site.

Site History

Since 1916, various forms of industrial manufacturing, chemical refining, blending/ mixing, and/or processing have occurred on the different parcels that make up the SCCC property. Activities have included naphthalene refining and product formulation, lead-acid battery manufacturing, formulation of drain cleaner, dye-carrier production, and distillation/ purification of various chlorinated benzenes. Buildings production areas, ditches, and lagoons were constructed to support these historic operations. Two lagoons (east lagoon and west lagoon) were located on the eastern portion of the site. The lagoons drained into a ditch that ran along the southern property boundary (southern ditch) and into the Hackensack River. The historical site arrangement is shown in Figure 2.

The northern portion of the SCCC Site (Block 287, Lots 48 and 49) was originally sold to the White Tar Company of New Jersey in 1916. White Tar Company was eventually acquired by the Koppers Company and successors. In 1946, Koppers acquired Lots 51, 52, and 52R from

Edison, and by 1962 sold all of its properties to Standard Naphthalene Products Company, Inc., a wholly-owned subsidiary of SCCC. Standard Naphthalene and/or SCCC continued operations on Lots 48, 49, 51, and 52 until 1981.

The southern portion (Lots 50, 51, and 52) was acquired by Edison in 1917 and 1918 and, through a number of related party transfers, was owned by Edison by 1929, and used for lead acid battery production up to 1953. Lot 50 continued to be owned by Edison until December 1953 when the property was sold to Crown Rubber Products and then to Keaton Rubber Company. For the period between 1954 and 1963, Tanatex Chemical Corporation leased space in Building 3 on Lot 50 for its operations. For some of that period it also leased space in Building 1 on Lot 50. By 1962, Lot 50 was sold to SCCC and its subsidiary Cloroben Chemical Corporation. Cloroben continued operating facilities at the site until 1993. On October 10, 2010, the Town of Kearny, New Jersey completed a tax foreclosure on Lots 48, 49, 50, 51, 52, and 52R and is now the owner of these parcels. Lot 52R, also known as 52.01, is a riparian parcel outboard of the barrier wall and is not considered part of the SCCC Site.

Lot 32.01 is approximately 25 feet wide and bisects the SCCC property in a roughly north-south direction. Lot 32.01 formerly contained working rail lines associated with the New York and Greenwood Lake Railroad and was used for transportation. Rail use was discontinued at some point, and prior to 1993, Lot 32.01 was acquired by the Hudson County Improvement Authority (HCIA). HCIA still owns this portion of the SCCC Site today. HCIA also owns the Seaboard property, and thus is the owner of the 13-acre portion of the site in Area 1.

Reasonably Anticipated Future Land Use and Site Redevelopment

The RI/FFS considered the reasonably anticipated future uses of the SCCC Site. In 2012, the Town of Kearny, which owns the majority of the SCCC Site, petitioned the New Jersey Meadowlands Commission (now the New Jersey Sports and Exposition Authority) to designate the SCCC property and adjoining properties as a redevelopment area. In 2013, the New Jersey Meadowlands Commission adopted a redevelopment plan for the area that allows for certain commercial or industrial uses and prohibits residential use. The Town of Kearny recently adopted a resolution (Resolution 2016-250) conditionally designating the Sitex Group, LLC (Sitex) as the redeveloper of the SCCC property and the adjacent Diamond Shamrock property owned by Tierra. Sitex is planning to construct an 850,000 square foot warehouse and distribution center on the SCCC property and adjacent Diamond Shamrock property. Plans for redevelopment of the Seaboard property are also underway. According to information provided by HCIA, HCIA has entered into a Purchase and Sale Agreement with Morris Kearny Associates, LLC (Morris) to develop the Seaboard property, including the 13-acre portion of the Seaboard property included within Area 1 of the SCCC Site. Morris's redevelopment plan for the Seaboard property includes the construction of four new industrial warehouse buildings totaling approximately 2.1 million square feet, along with paved parking lots, paved roads, and utility infrastructure.

Most of Area 2 consists of a New Jersey Department of Transportation (NJDOT) right-of-way for Belleville Turnpike and Newark Turnpike and is occupied by highway and associated steep embankments. It is reasonably anticipated that the future use will remain consistent with this current use.

The remedial alternatives were developed to be compatible with the commercial/industrial future uses of the SCCC Site. When practicable and cost-effective, the remedial alternative selected in the ROD would be designed to accommodate the commercial/ industrial redevelopment plans described above for Area 1, while at the same time maintaining the environmental protectiveness provided by the remedy.

Regulatory History

In 1982, a NJDEP inspection of the SCCC property revealed the presence of chromium-contaminated fill materials, hexavalent chromium in surface waters, and spillages of naphthalene and dichlorobenzene on the ground surface. The inspection also disclosed that the lagoon system at the site was previously used for waste disposal by Koppers Company. Groundwater samples collected from a monitoring well on the Diamond Shamrock property adjacent to the SCCC property's northern border revealed contamination with naphthalene, dichlorobenzenes, and trichlorobenzenes, which NJDEP suspected to have migrated from the SCCC property. Subsequent groundwater and soil sampling undertaken by SCCC and NJDEP from 1983 until 1987 demonstrated contamination of hazardous substances throughout the site.

In October 1989, SCCC entered into an Administrative Consent Order with NJDEP to conduct a remedial investigation and perform a remedial action at the site. In April 1990, Occidental Chemical Corporation (OCC) and Chemical Land Holdings, Inc. (now Tierra Solutions, Inc.) entered into a separate Administrative Consent Order to address the COPR fill materials at the SCCC Site that were generated at the adjacent Diamond Shamrock property. NJDEP was the lead agency during these initial investigations and early response actions. In December 2001, NJDEP referred the SCCC Site to EPA for proposed inclusion on the National Priorities List (NPL). On April 30, 2003, EPA proposed adding the SCCC Site to the NPL. The SCCC Site was subsequently listed on September 19, 2007.

Enforcement History

In April 2008, EPA sent a general notice letter to SCCC, OCC, Beazer East, Inc. (Beazer), and Tierra Solutions, Inc. (Tierra) advising each party of its potential responsibility under Section 107(a) of CERCLA, 42 U.S.C. § 9607(a), for cleanup of the SCCC Site, including all costs incurred by EPA in responding to releases at the site. EPA sent a similar general notice letter to Cooper Industries, LLC (Cooper) in July 2009 and to Apogent Transition Corp. (Apogent) in December 2012. In July 2010, EPA contacted SCCC, Beazer, OCC, Tierra, and Cooper, inviting each party to enter into a settlement with EPA to conduct RI/FFS activities at the site. Later, EPA contacted Apogent to enter into the settlement.

The RI/FFS was conducted pursuant to the May 2013 Administrative Settlement Agreement and Order on Consent entered into between EPA and Apogent, Beazer, Cooper, and OCC. Tierra participated in the RI/FFS on behalf of OCC.

EARLY INVESTIGATIONS AND EARLY RESPONSE ACTIONS

Early Investigations (1983 to 2009)

Major investigations completed prior to the RI/FFS are listed in Table 1. These investigations included an asbestos and lead paint survey, wetlands delineation, an aerial topographic survey, waste classification requests, off-site disposal of demolition debris, numerical groundwater modeling, and sampling and analysis of vault contents.

Table 1: Pre-RI/FFS Investigations and Surveys dating back to the early 1980s		
Date	Investigation	Company
1983-1984	Hydrogeologic Investigation	Roy F. Weston, Inc.
1985	Phase II Dioxin Investigation	E.C. Jordan, Inc.
1987	Stage 1 Dioxin Investigation	Roy F. Weston, Inc.
1988	Stage 2 and 3 Dioxin Investigations	Roy F. Weston, Inc.
1991	Chromium Delineation	French & Parrello Associates
1990-1993	Remedial Investigation/Supplemental RI	Roy F. Weston, Inc.
1996-1997	Focused Remedial Investigation	ERM, Inc.
1997-1999	Supplemental Remedial Investigation	Key Environmental, Inc.
2000	Soil/Sediment Sampling and Analysis	Enviro-Sciences, Inc.
2000	Characterization of Containerized Materials	Enviro-Sciences, Inc.
2002	Surface Water and Sediment Sampling	EPA Technical Assistance Team
2008-2009	IRA Pre-Design Investigation	Key Environmental, Inc.
2008-2009	Phase II Supplemental RI	Key Environmental, Inc.

Interim Remedial Measures (1990s to 2008)

Since the early 1990s, various interim remedial measures were completed at the site with NJDEP oversight as follows:

- installation of security fencing surrounding a former production area and lagoons to prevent unauthorized access;
- addition of soil to the lagoon berm to increase its height and prevent potential overflows;
- placement of stabilizing geotextile and rip rap along the Hackensack River shoreline in the vicinity of the lagoons;
- removal of the contents of five aboveground storage tanks and repackaging of asbestos containing material removed from the former distillation building;
- installation of an asphalt pavement overlay on traffic areas where existing deteriorated asphalt pavement was present;
- installation of geotextile fabric/aggregate/ asphalt cover in all remaining traffic areas where total chromium concentrations exceeded the NJDEP criterion in effect at the time (75 milligrams per kilogram (mg/kg));
- geotextile/geomembrane liner or aggregate cover construction in non-traffic areas west of a railroad right-of-way;
- installation of a dust fence barrier along the railroad right-of-way and north fence line of the northeast process area; and,
- improvements to the existing stormwater sewer located between the SCCC Site and the Diamond Shamrock property.

Interim Response Actions and Non-Time Critical Removal Action (2009 to 2011)

Work related to the site with NJDEP as the lead agency continued through NPL listing in 2007. In 2009, EPA approved an Engineering Evaluation/ Cost Analysis (EE/CA) for a non-time critical removal action under CERCLA that corresponded with the NJDEP-approved Interim Response Action. EPA designated NJDEP as the lead agency for implementation of the EE/CA.

Remedial activities conducted pursuant to the EE/CA and the NJDEP Interim Response Action (IRA) include engineering controls and containment measures. Individual tasks especially pertinent to the RI/FFS alternatives included:

- construction of a *Barrier Wall Containment System*, a 1,230 foot long steel sheet pile wall along the Hackensack River and a 6,880 foot long barrier wall with cement bentonite slurry two feet in width that encircles Area 1 of the SCCC Site (SCCC property and 13

acres of Seaboard property) as well as the adjacent Diamond Shamrock property. The barrier wall is keyed a minimum of three feet into the varved clay, and cuts off the area inside the barrier wall from the surrounding subsurface;

- a *DNAPL Recovery System* consisting of sixteen 18-inch diameter high-density polyethylene recovery wells with 10 foot sumps within the barrier wall system; as of June 30, 2016, 6,330 gallons of DNAPL have been recovered at the SCCC Site for off-site disposal;
- a *Hydraulic Control System and Groundwater Treatment Plant (HCTS)* to maintain hydraulic containment of groundwater within the barrier wall and to treat contaminated groundwater pursuant to a New Jersey Pollutant Discharge Elimination System (NJPDES) permit, with treated effluent meeting discharge permit limits discharged to the Hackensack River;
- *Lagoon Dewatering and Solidification*; historic analytical results confirmed the lagoons as a significant source area. Lagoon solids were found to consist of 77 percent naphthalene and the remainder largely chlorinated benzenes, methylnaphthalene, phenols, 2,3,7,8-tetrachlorodibenzo-p-dioxin, arsenic, lead, and hexavalent chromium. The accumulated liquids in the former lagoons were collected and treated on-site and the solids were stabilized primarily with Portland cement and encapsulated in place;
- construction of a *Consolidation Area and Surface Cover* in the vicinity of the former lagoons. Soft soils in the south ditch were found to contain chlorinated benzenes (1,4-dichlorobenzene most frequently), naphthalene and other polycyclic aromatic hydrocarbons (PAHs), and to a lesser extent polychlorinated biphenyls (PCBs) and dioxin/furans, chromium, and lead. The south ditch soft soils were excavated, stabilized with Portland cement, and placed in the Consolidation Area. Materials generated during the barrier wall construction and nearshore river sediment impacted by chlorobenzenes, naphthalene and other PAHs, dioxins, and metals, including chromium, were removed, stabilized, and placed in the Consolidation Area. The Consolidation Area was covered with a multi-layer cover system consisting of a 60-mil linear low density polyethylene liner, geosynthetic drainage layer, structural fill, and top soil;
- treatment and disposal of *septic tank contents*; six septic tanks were sampled and analyzed to determine appropriate disposal methods and requirements. The tank solids contained benzene, various chlorobenzenes, naphthalene and other PAHs, PCBs, and several metals. Solids were removed and disposed of off-site. Liquids were removed and treated in a temporary on-site treatment facility, and discharged through the NJPDES outfall. The tanks were then filled with a flowable concrete grout; and,
- *Process Area Surface Cover and Stormwater Controls*; A liner and gravel surface cover was installed in the former process area located to the north of the former lagoons. Existing surface cover materials across the SCCC Site were repaired as needed. Stormwater conveyance piping, catch basins, and manholes were installed to convey stormwater historically carried by the south ditch. The newly installed stormwater system is approximately 2,980 feet long and extends from the northwestern corner of the SCCC Site to the Hackensack River.

CERCLA Removal Action (2010)

In June 2010, SCCC and Beazer entered into a Removal Action Order with EPA that required the sealing of openings in the former process area buildings and the maintenance, and replacement as necessary, of the existing fencing surrounding

the eastern portion of the SCCC Site and the warning signs along the fencing. These activities are summarized in the December 2010 Final Report, Closure of Building Openings, Northeastern Area, Standard Chlorine Chemical Company Superfund Site.

Classification Exception Area/Well Restriction Areas (2003 and 2013)

The site is subject to NJDEP Classification Exception Area/Well Restriction Areas (CEA/WRAs) established prior to the RI/FFS. A CEA serves as an institutional control by providing notice that the constituent groundwater standards are not or will not be met in a localized area due to natural water quality or anthropogenic influences (for example, contaminated sites), and that aquifer uses are restricted in the affected area for the duration of the CEA. In 2003, Tierra, on behalf of OCC, established a CEA/WRA that covers certain COPR sites on the Kearny Peninsula, including the SCCC property. The constituents listed in CEA/WRA for the COPR sites include total chromium, hexavalent chromium, total dissolved solids, and chloride.

In 2013, Beazer established a CEA/WRA that addresses the 13 acres of the Seaboard property included in Area 1 of the site and enclosed within the barrier wall system. The constituents of interest listed in the CEA/WRA for the Seaboard property include various volatile organic compounds, semi-volatile organic compounds, and metals.

REMEDIAL INVESTIGATION

A Site Characterization Summary Report (March 2013) and Site Characterization Summary Report Addendum (March 2014) were prepared to summarize the investigations and the early response actions that were conducted at the SCCC Site prior to the RI/FFS. These reports also identified data gaps requiring further investigation during the RI. The RI Report and RI Addendum Report combine information from the site characterization summary reports and the RI field work to characterize the SCCC Site. The current site arrangement is shown in Figure 3.

Remedial Investigation (2013-2015)

The first phase of RI field investigation focused on obtaining data necessary to evaluate the risks posed to human health and the environment and to support the evaluation of remedial alternatives in the FFS. The main data gaps included surface soil evaluation, DNAPL delineation, and continuity of the varved clay. The RI investigations confirmed that the thick and continuous varved clay unit is an effective barrier to vertical migration of dissolved phase groundwater contamination and DNAPL. The meadow mat was found to effectively mitigate and impede the downward migration of hexavalent chromium by reducing it to insoluble trivalent chromium.

Details are summarized in the March 2015 RI Report. A brief summary of the RI Report is presented below.

DNAPL

DNAPL is an immiscible fluid with a density greater than water that migrates through the subsurface and leaves behind a residual that is difficult to remediate. The DNAPL associated with naphthalene formation and other processing activities at the SCCC Site contains chlorinated benzenes, naphthalene, PCBs, and dioxins/ furans.

DNAPL in the fill unit is present in the former lagoon area and near Building 4 on Lot 50. DNAPL in the sand unit extends beyond the SCCC property onto the Diamond Shamrock property and the Seaboard property. The barrier wall system that encircles the SCCC property, the Diamond Shamrock property, and 13 acres of the Seaboard property was constructed to enclose all of the then-known SCCC Site-related DNAPL. The DNAPL is considered to be an

ongoing source of groundwater contamination in both the fill unit and the sand unit.

Surface and Subsurface Soil

Impacts to surface and subsurface soil extend across the SCCC Site due to the placement of the COPR fill and historical activities. Constituent groups detected include chlorinated benzenes, PAHs (including naphthalene), PCBs, dioxins/furans (or polychlorinated dibenzodioxin/polychlorinated dibenzofuran (PCDD/PCDF)), and metals, including lead and hexavalent chromium. Chlorinated benzenes were found in soil in both the eastern and western portions of the SCCC Site, generally near former chlorinated benzene distillation, purification, storage, and/or handling areas and the lagoons. Chlorinated benzene concentrations were generally highest in soil at depth in the sand unit due to their accumulation as DNAPL on top of the underlying varved clay.

Naphthalene and other PAHs, and to a lesser extent PCBs and PCDD/PCDF, were found in the eastern SCCC Site soil and lagoons. Naphthalene and other PAHs were also found in the western SCCC Site soil within areas of fill. The highest concentrations were associated with the lagoons and DNAPL beneath or near the former lagoons and extending west. Chromium was found in the western, eastern, and southern portions of the SCCC Site. Hexavalent chromium was found primarily within the upper 10 feet of the fill unit. Lead was found in the eastern and western portions of the SCCC Site.

Groundwater

Investigations of shallow groundwater within the fill unit found SCCC Site-related constituents in groundwater, including chlorinated benzenes, several volatile organic compounds, naphthalene and other PAHs, phenols, PCBs, and chromium. The highest concentrations of chlorinated benzenes and PAHs were found in the former lagoon area, although chlorinated benzenes were also found in the groundwater in the fill unit in the western portion of the SCCC Site near Building 2.

A similar suite of chemical constituents was found in groundwater in the sand unit, with the exception of hexavalent chromium due to the reducing influence of the overlying meadow mat, an organic rich layer that reduces hexavalent chromium to trivalent chromium. Impacts of organic constituents in the sand unit were found to be laterally extensive and vertically limited due to the underlying varved clay acting as a barrier to downward migration.

Surface Water

Historical data indicated impacts to surface water in drainage ditches from chlorinated benzenes, naphthalene and other PAHs, and total chromium. Surface water in the former lagoon representing accumulated precipitation in contact with lagoon solids contained dichlorobenzene, phenols, total chromium, and lead. The stagnant nature of surface water in the ditches appeared to have limited surface water impacts, and no significant impacts to Hackensack River surface water were identified during several historical sampling events.

Remedial Investigation Addendum (2015 to 2016)

The second phase of RI field investigation focused on Area 2 and obtaining data necessary to delineate SCCC Site-related DNAPL impacts to subsurface soils and groundwater in that portion of the site. Details are summarized in the January 2016 RI Addendum Report. A brief summary of the RI Addendum Report is presented below.

- The geologic profile within Area 2 is the same as Area 1. Surficial materials in Area 2 are comprised of (in descending order) fill unit, meadow mat, sand unit, and varved clay. The higher elevation in Area 2 is consistent with a thicker fill for NJDOT purposes. The

varved clay unit is continuous beneath Area 2.

- Area 2 is located hydraulically downgradient of Area 1. A northward component of groundwater flow south of Area 2 limits dissolved constituent migration.
- SCCC Site-related impacts in Area 2 are limited to subsurface soil and groundwater within the sand unit. The horizontal extent of SCCC Site-related impacts in the sand unit appears to end at the vegetated highway median between the westbound lane of the Belleville Turnpike and the Newark Turnpike.
- The configuration of the upper surface of the varved clay appears to have some control on the distribution of DNAPL in Area 2. DNAPL was observed in a localized broad depression in the varved clay surface. The clay surface rises slightly to the south and west, preventing further DNAPL movement. Based upon evidence from Area 1, the varved clay is an effective barrier to vertical migration of DNAPL beneath Area 2.
- Significant reductions in dichlorobenzene concentrations in subsurface soil and groundwater occur within a short distance of DNAPL impacted areas, indicating that migration of dissolved phase groundwater impacts is limited.
- A DNAPL that is believed not to be SCCC Site-related was encountered south of Area 2. This DNAPL has a different chemical signature than the DNAPL encountered at the SCCC Site, which is predominantly dichlorobenzene, and was found at a shallower depth. Investigation of this non-site-related DNAPL was beyond the scope of the RI.

Principal threat wastes are considered source materials, i.e., materials that include or contain hazardous substances, pollutants, or contaminants that act as a reservoir for migration of contamination to ground water/surface water, or as a source for direct exposure. Contaminated groundwater generally is not considered to be a source material; however, DNAPLs in groundwater may be viewed as source material.

At the SCCC Site, principal threat wastes include the COPR fill materials and the DNAPL.

Cultural Resources

Archaeological and architectural surveys and related efforts were completed to address the possible presence of pre-European contact cultural resources and to document the historic Edison buildings, in compliance with the requirements of the National Historic Preservation Act. A summary of these reports follows:

- *Phase IA Cultural Resource Survey for the Standard Chlorine Chemical Company Site, Interim Response Action Work Plan – Town of Kearny, Hudson County, New Jersey (August 2009)* – This document was developed prior to the installation of the barrier wall to assess the presence or absence of cultural resources and the potential impacts on those resources. This report concluded that there was a low to moderate potential for deep archaeological deposits and that the activities would have only a temporary adverse effect on the historic buildings.
- *Phase IB Archaeological Survey During Slurry Wall Construction (May 2011)* – Samples were collected from the sand unit (approximately nine to 17 feet below grade) during the barrier wall construction to evaluate potential evidence of pre-contact use. Possible artifacts were recovered primarily where the barrier wall extends along the Hackensack River. A recommendation for conducting potential additional archaeological surveying was included in the report if other deep excavation activities were to be implemented.

- *Historic American Buildings Survey* (HABS) *(October 2015)* – This document provides details on the architectural aspects of the Edison buildings. It includes information on the Emark plant and the chronology of its operation. This document includes numerous photographs and copies of some original architectural drawings and meets the Secretary of the Interior's Standards for Architectural and Engineering Documentation.
- *This is the Story of Emark – A Product of Thomas A. Edison, Inc. (October 2015)* – This document is a public information bulletin to promote public understanding and appreciation of the SCCC Site's historic significance.
- *This is the Story of Emark: Learning from New Jersey History – Teacher's Guide and Lesson Plans Grade 4 (October 2015)* – This document was prepared to fulfill specific standards and goals of the New Jersey Core Curriculum Content Standards for Social Studies and Science and to foster local interest and pride.

A Memorandum of Agreement pursuant to the National Historic Preservation Act was signed in 2016 by representatives of the EPA and New Jersey State Historic Preservation Office. The Memorandum of Agreement documents the measures that have been implemented to mitigate planned adverse effects to the cultural resources (i.e., demolition of the Edison buildings). Although the buildings have historic significance, they contain asbestos and lead and are dilapidated beyond repair. EPA has determined that the Edison buildings constitute a release or threat of release of hazardous substances to the environment. The cultural resource surveys have documented the historic significance of the Edison buildings in advance of demolition.

SUMMARY OF SCCC SITE RISKS

As part of the RI/FFS, a baseline risk assessment approach was used to estimate potential current and future risks to human and ecological receptors posed by hazardous substances at the site in the absence of any actions to further control or mitigate potential exposures under existing conditions. The text box on page 12 entitled "What is Human Health Risk and How Is It Calculated?" presents information on the process EPA uses for human health risk assessments conducted under CERCLA. A similar approach is used for ecological risk assessments. Consistent with the NCP, the results of the baseline risk assessment are used to determine whether remediation is necessary and which pathways need to be remediated.

Human Health Risk Assessment

The results of the human health risk assessment are summarized in Table 2. Human exposure pathways were evaluated for constituents of potential concern identified for each medium by screening the maximum detected concentration of each analyte against the industrial EPA Regional Screening Levels that corresponded to a target cancer risk of 1×10^{-6} and a target Hazard Quotient of 0.1. Chemicals of potential concern include chlorinated benzenes, several volatile organic compounds, naphthalene and other PAHs, phenols, PCBs, and hexavalent chromium.

Under current conditions, there are no known completed exposure pathways. The interim remedial actions that have already been conducted at the site addressed the current known pathways that may result in human exposure to site contaminants.

Under future use scenarios, the cancer risks and non-cancer health hazards are above acceptable levels. The main exposure pathway is associated with disturbance of the impacted soil located beneath clean cover materials. Human receptors involved in surface or subsurface soil disturbance

are future construction or utility workers, or possibly full-time outdoor employees and on-site visitors. Exposure routes to these future receptors are inhalation of fugitive dust, and dermal contact with and incidental ingestion of impacted soil, such as potential exposures during or after site redevelopment. The baseline risk assessment requires that additional controls, such as health and safety measures and fugitive dust suppression, are assumed to be absent. Exposure to groundwater and disturbance of the cover materials and exposure to the underlying soils results in unacceptable risks to most receptors (calculated cancer risk up to 1 x 10^{-2} and non-cancer Hazard Index up to 21,189). In addition, the future construction of industrial or commercial structures without vapor mitigation systems was found to result in an unacceptable inhalation risk to future occupants due to the potential for intrusion of vapors originating from contaminants in soil and groundwater at the site. Therefore, future development, including buildings, would be expected to require the use of construction techniques to mitigate the potential for intrusion of vapors into buildings or other measures to address this pathway.

WHAT IS *HUMAN HEALTH* RISK AND HOW IS IT CALCULATED?

A Superfund baseline human health risk assessment is an analysis of the potential adverse health effects caused by hazardous substance releases from a site in the absence of any actions to control or mitigate these under current and future land uses. A four-step process is utilized to assess site-related human health risks for reasonable maximum exposure scenarios.

Hazard Identification: In this step, the chemicals of potential concern (COPCs) at a site in various media (*e.g.,* soil, surface water, and sediment) are identified based on such factors as toxicity, frequency of occurrence, fate and transport of the contaminants in the environment, concentrations of the contaminants in specific media, mobility, persistence, and potential for bioaccumulation.

Exposure Assessment: In this step, the different exposure pathways through which people might be exposed to the contaminants identified in the previous step are evaluated. Examples of exposure pathways include incidental ingestion of contaminated soil. Factors relating to the exposure assessment include, but are not limited to, the concentrations that people might be exposed to and the potential frequency and duration of exposure. Using these factors, a reasonable maximum exposure scenario, which portrays the highest level of human exposure that could reasonably be expected to occur, is calculated.

Toxicity Assessment*:* In this step, the types of adverse health effects associated with chemical exposures and the relationship between magnitude of exposure and severity of adverse effects are determined. Potential health effects are chemical-specific and may include the risk of developing cancer over a lifetime or other non-cancer health effects, such as changes in the normal functions of organs within the body (*e.g.*, changes in the effectiveness of the immune system). Some chemicals are capable of causing both cancer and non-cancer health effects.

Risk Characterization: This step summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site risks. Exposures are evaluated based on the potential risk of developing cancer and the potential for non-cancer health hazards. The likelihood of an individual developing cancer is expressed as a probability. For example, a 10^{-4} cancer risk means a one-in-ten-thousand excess cancer risk; or one additional cancer may be seen in a population of 10,000 people as a result of exposure to site contaminants under the conditions explained in the Exposure Assessment. Current guidelines for acceptable exposures are an individual lifetime excess cancer risk in the range of 10^{-4} to 10^{-6} (corresponding to a one-in-ten-thousand to a one-in-a-million excess cancer risk) with 10^{-6} being the point of departure. For non-cancer health effects, a hazard index (HI) is calculated. An HI represents the sum of the individual non-carcinogenic exposure levels compared to their corresponding reference doses. The key concept for a non-cancer HI is that a threshold level (measured as an HI of 1) exists below which non-cancer health effects are not expected to occur.

Table 2: Summary of Human Health Risk Assessment		
Receptor	**Current Land Use with Interim Remedies Disturbed**	**Future Land Use with Interim Remedies Disturbed**
	RME Risk/ HI	**RME Risk/HI**
Western Area		
On-Site Visitor	2E-4 / 4	NA
HCTS Operator	2E-4 / 4	NA
Outdoor Worker	4E-4 / 6	NA
Constr. Worker	NA	4E-4 / 21,189
Utility Worker	NA	2E-4 / 6,535
Indoor Worker(1)	NA	1E-3 / 187
Eastern Area		
On-Site Visitor	4E-3 / 17	NA
HCTS Operator	1E-2 / 37	NA
Outdoor Worker	1E-2 / 38	NA
Constr. Worker	NA	2E-2 / 3,141
Utility Worker	NA	4E-4 / 31
Indoor Worker(1)	NA	1E-3 / 147

1. Future risks to indoor workers are associated with construction of a building at the Site with no vapor barrier.

Detailed information regarding the human health risk assessment can be found in the December 2014 Baseline Human Health Risk Assessment.

Ecological Risk Assessment

The site is located in a highly industrialized area and the conceptual site model identified that, under current and future site conditions, there are no known completed exposure pathways for the potential ecological receptors identified for the SCCC Site. A Screening Level Ecological Risk Assessment was conducted, which concluded that no potentially complete exposure pathways exist. Therefore, contaminants of potential ecological concern were not identified, the ecological risks were determined to be negligible, and further baseline ecological risk assessment work was not required.

Detailed information regarding the ecological risk can be found in the September 2014 Screening Level Ecological Risk Assessment.

Risk Assessment Summary

EPA has determined that the preferred alternative identified in the Proposed Plan, or one of the other active measures considered in this Proposed Plan, is necessary to limit potential human health risks from actual or threatened releases of hazardous substances into the environment.

FOCUSED FEASIBILITY STUDY

The FFS is the mechanism for the identification and evaluation of remedial action alternatives. Remedial action objectives (RAOs) were developed for the Site, and then technologies were identified and screened based on overall implementability, effectiveness, and cost. Remedial alternatives consisting of one or more technologies were assembled and analyzed in detail with respect to seven of the nine criteria for remedy selection under CERCLA. The remaining two criteria, state acceptance and

community acceptance, will be addressed in the ROD following the public comment period.

Detailed information is contained in the July 2016 FFS Report. A brief summary of the FFS is presented below.

Remedial Action Objectives

RAOs describe what the proposed site cleanup is expected to accomplish. These objectives are based on available information and standards, such as Applicable or Relevant and Appropriate Requirements (ARARs), to-be-considered standards and guidance, and site-specific risk-based levels. The following RAOs were developed for the site:

- Eliminate human exposure to contaminants in surface soil and subsurface soil via direct contact, incidental ingestion, and inhalation.
- Eliminate the transport of impacted surface soil by erosion and runoff or wind.
- Prevent human exposures to site-related contaminated groundwater via direct contact, incidental ingestion, and inhalation.
- Prevent the migration of contaminated groundwater into uncontaminated groundwater, surface water, and wetlands.
- Prevent the migration of site-related DNAPL into areas without DNAPL contamination.
- Reduce the mass of site-related DNAPL in the subsurface to the extent practicable.
- Eliminate the release or threat of release of asbestos and lead into the environment from the dilapidated Edison buildings.
- Prevent future unacceptable risks due to soil vapor intrusion into new buildings.

Groundwater Restoration and Technical Impracticability Waiver

As stated in the NCP, EPA expects to restore usable groundwater to its beneficial use wherever practicable, within a timeframe that is reasonable given the particular circumstances at the site. When restoration of groundwater to beneficial uses is not practicable, EPA expects to prevent further migration of the plume, prevent exposure to the contaminated groundwater, and evaluate further risk reduction.

The groundwater in the vicinity of the site is categorized as Class II, currently or potentially a source for drinking water. The state and federal drinking water standards (e.g., maximum contaminant levels, or MCLs) are chemical-specific ARARs for groundwater at the site.

Hydrogeologic factors, contaminant-related factors, and site-specific implementation factors were evaluated to determine the practicability of remediating the groundwater to MCLs in Area 1 and Area 2. The TI evaluation established that it is technically impracticable to remediate groundwater to drinking water standards. The COPR fill materials in Area 1 will continue to be a source of contaminants to the groundwater within the barrier wall for the foreseeable future. Hydrogeologic factors include diffusion of the DNAPL into the upper surface of the alternating clay and sand seams of the varved clay, which would pose a significant challenge to remediation. Contaminant factors include the high density and low viscosity of the DNAPL, which makes it easy to migrate extensively in the subsurface. While some portion of the DNAPL can be recovered in wells, residual DNAPL will remain trapped in subsurface voids. This residual DNAPL will dissolve slowly into the groundwater over many decades, making it technically impracticable to achieve groundwater standards in the micrograms per liter (ug/l) or part per billion range (e.g., 0.2 ug/l for benzene). The estimated timeframe for dissolution of the

site-related DNAPL is 150 years or more. Land use considerations, including the NJDOT right-of-way and steep embankments, make remediation in that part of Area 2 impracticable. The groundwater at the site is subject to existing CEA/WRAs and is not being used for any purpose. Groundwater at the site, and in the area generally, has a high naturally occurring total dissolved solids (TDS) content. Data from the sand unit in Area 1 indicates TDS contents ranging from 315 to 21,700 milligrams per liter (mg/l). Water with a TDS above 500 mg/l exceeds EPA's secondary drinking water guidelines and is not recommended for use as drinking water due to aesthetic and technical effects such as water hardness and deposits, colored water, staining, and salty taste.

For the reasons discussed above, restoration of groundwater to MCLs is not technically practicable and groundwater restoration is not an RAO for the SCCC Site.

CERCLA Section 121(d), 42 U.S.C. § 9621(d), specifies that a remedial action must require a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA Section 121(d)(4), 42 U.S.C. § 9621(d)(4).

EPA intends to invoke a technical impracticability (TI) waiver in the ROD and the RAOs for the site include preventing further migration of the groundwater plume, preventing exposure to the contaminated groundwater, and further reducing risks by preventing the migration of DNAPL and preventing vapor intrusion of contaminants into new buildings which may be constructed during site redevelopment.

Detailed information on the chemical-specific groundwater standards proposed to be waived the area where the TI Waiver is sought (TI zone) as well as other technical information in support of the TI Waiver is presented in the FFS Report in Section 4.5: Justification of TI Waiver and Appendix A: Technical Impracticability Waiver Evaluation Report. The ARARs to be waived are listed in Table 3-1 of Appendix A.

Remedial Alternatives

CERCLA Section 121(b)(1), 42 U.S.C. § 9621 (b)(1), mandates that remedial actions be protective of human health and the environment, be cost effective, and use permanent solutions, alternative treatment technologies, and resource recovery alternatives to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions which use, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, and contaminants at a site. As noted above, CERCLA Section 121(d), 42 U.S.C. § 9621(d), specifies that a remedial action must require a level or standard of control of the hazardous substances, pollutants, and contaminants which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA Section 121(d)(4), 42 U.S.C. § 9621(d)(4).

Remedial alternatives for the site are summarized below. Capital costs are those expenditures that are required to construct a remedial alternative. O&M costs are those post-construction costs necessary to ensure or verify the continued effectiveness of a remedial alternative and are estimated on an annual basis. Present worth is the amount of money which, if invested in the current year, would be sufficient to cover all the costs over time associated with a project, calculated using a discount rate of seven percent and a 30-year time interval. Construction time is the time required to construct and implement the alternative and does not include the time required to design the remedy, negotiate performance of

the remedy with the responsible parties, or procure contracts for design and construction.

Remedial Alternatives	
Alternative	**Description**
I	No Action
II	DNAPL Recovery, Barrier Wall, ICs, Building Demolition
III	Targeted Cap/Cover, DNAPL Recovery, Barrier Wall, ICs, Building Demolition
IV	Site-wide Engineered Cap/Cover, DNAPL Recovery, Barrier Wall, ICs, Building Demolition

Alternative I: NO ACTION

Capital Cost	$0
Annual O&M Cost	$0
Present Worth Cost	$0
Construction Time	0 months

The No Action alternative is required by the NCP as a baseline with which to compare other remedial action alternatives. Alternative I is not protective of human health and the environment because it does not meet any of the RAOs.

Alternative II: CONTINUED DNAPL RECOVERY IN AREA 1, BARRIER WALL SYSTEM, DNAPL RECOVERY IN AREA 2, INSTITUTIONAL CONTROLS, AND BUILDING DEMOLITION

Capital Cost	$1,392,000
Annual O&M Cost	$541,000
Present Worth Cost	$9,759,000
Construction Time	3 months

This alternative would include the barrier wall system and continued DNAPL recovery in Area 1, construction of a new DNAPL recovery system in Area 2, ICs including a deed notice and the CEA/WRAs, demolition of the Edison buildings, and O&M.

The DNAPL recovery technology planned for Alternative II is continuing the passive DNAPL recovery already in place in Area 1 and passive DNAPL recovery in Area 2. The recovered DNAPL would be collected periodically and disposed of off-site. The existing Area 1 O&M procedures would be implemented as described in the existing O&M Manuals and updated as appropriate. Additional recovery wells would be installed in Area 1 if needed. In Area 2, new large-diameter DNAPL recovery wells would be installed. Following initial well placement, the DNAPL removal procedures would be optimized, and additional recovery wells installed if needed.

ICs would restrict future use of the SCCC Site, prohibit groundwater use, and include the administrative controls such as health and safety considerations regarding appropriate management of activities during intrusive work activities and personal protective equipment. Deed notices and/or other ICs to prohibit and limit potential future uses of the SCCC Site would be recorded in the Hudson County Registrar's office. In addition, the CEA/WRAs would be reviewed and updated as necessary. A groundwater monitoring plan would be developed and implemented as part of O&M.

Demolition of the existing Edison buildings would be completed as part of this alternative. The building foundations would be left in place. Fill will then be added within the building footprints, as necessary, to bring the surface to grade. Non-hazardous debris resulting from the building demolition would be consolidated within the building footprint to the extent practical. The final surface would be graded to promote positive stormwater drainage.

Alternative III: TARGETED CAP/COVER, AREA 1 CONTINUED DNAPL RECOVERY IN AREA 1, BARRIER WALL SYSTEM, DNAPL RECOVERY IN AREA 2, INSTITUTIONAL CONTROLS, AND BUILDING DEMOLITION

Capital Cost	$4,618,000
Annual O&M Cost	$396,000
Present Worth Cost	$11,246,000
Construction Time	6 months

Alternative III would include placement of targeted cap/cover in specific locations within Area 1 that are not capped/covered, including stone and vegetative cover areas and wetlands areas. The existing stone cover areas would be overlain by a more permanent cover such as asphalt paving. This alternative would also include repairing the existing covers (i.e., repairing the asphalt) as necessary. Stormwater management enhancements would be incorporated into the remedial design. Alternative III would include the same DNAPL recovery in Area 1 and Area 2, ICs, demolition of the Edison buildings, and O&M as described in Alternative II.

The detailed specifications for Alternative III would be developed during remedial design. The conceptual locations for the new DNAPL recovery wells and the conceptual targeted cap/cover system details are shown on Figure 4. The stone covered and vegetated areas are assumed to be covered with an asphalt cover system consisting of two inches of wearing course, two inches of asphalt binder course, four inches of granular subgrade, and capillary break as necessary. The proposed cap/cover systems would be retrofitted into the existing cap/cover systems. Low lying areas of the existing asphalt or areas observed to be in disrepair would be lined with additional asphalt to facilitate positive stormwater drainage and reduce infiltration. The wetlands areas would be covered with a geomembrane cap consisting of a 10 ounce per square yard (oz/sy) geotextile, a 60-mil capillary break geomembrane (or other capillary break component as needed), a 10 oz/sy geotextile, and one foot of wetlands planting substrate and revegetation. Proposed topsoil composition, planned plant species, and post-restoration monitoring requirements would be determined during the remedial design. The wetlands planting substrate is assumed to consist of a silty organic soil followed by wetlands plants; the list of plants would be determined during the design phase and likely would be consistent with existing restoration efforts for freshwater emergent wetlands which included the planting of salt meadow cordgrass, spike grass, prairie cord grass, black grass, swamp mallow, big cordgrass, seaside goldenrod, salt marsh bulrush, switch grass, and groundsel bush. It is assumed that the seed mixture to establish first year coverage would consist of annual rye, fall panicum, switch grass, coastal panic grass, and lady's thumb. A freshwater emergent wetlands restoration monitoring plan would be prepared as part of the remedial design. The plan would include invasive species management, post-construction monitoring (growing seasons one and two), specifications, and a final wetlands monitoring report.

Alternative IV: SITE WIDE ENGINEERED CAP/COVER, CONTINUED DNAPL RECOVERY IN AREA 1, BARRIER WALL SYSTEM, DNAPL RECOVERY IN AREA 2, INSTITUTIONAL CONTROLS, AND BUILDING DEMOLITION

Capital Cost	$13,456,000
Annual O&M Cost	$231,000
Present Worth Cost	$17,299,000
Construction Time	12 months

Alternative IV would include a new engineered cap/cover system on the SCCC property for all but the Consolidation Area, which already has a geosynthetic liner overlain by a vegetative cover, and a wetland area cap/cover (or relocation and

restoration). The capillary break cap/cover components and the stormwater management enhancements associated with Alternative III would be installed as part of Alternative IV. Alternative IV also would include the same DNAPL recovery in Area 1 and Area 2, ICs, demolition of the Edison buildings, and O&M as described in Alternative II.

The detailed specifications for Alternative IV would be developed during remedial design. Because the engineered cap/cover would encompass essentially the entire SCCC property (with the exception of the Consolidation Area and the wetlands areas), no repair of the existing covers would be necessary. The engineered cap/cover would extend over the prepared surface of the Edison building footprints. For conceptual planning and cost estimating, the SCCC property areas are assumed to be covered with an engineered cap/cover system consisting of a 10 oz/sy non-woven geotextile layer, a 60-mil geomembrane, another 10 oz/sy non-woven geotextile layer, approximately 33 inches of general fill (including a capillary break as needed), approximately three inches of topsoil, and seeding and mulching of the topsoil. The existing wetlands on-site that would be capped/covered include freshwater emergent wetlands that were formed as a result of stormwater runoff. The proposed Alternative IV cap/cover to be installed in the freshwater emergent and isolated wetlands would be the same as that for the wetlands cover in Alternative III. Based on the conceptual scenario provided for Alternative IV, the current hydrology would be minimally affected. There would be an increase in stormwater runoff draining to the wetlands due to the cap/cover improvements and increase in SCCC Site grades. The change in elevation of the wetlands would be consistent with the overall change in elevation of the SCCC Site, however, and the drainage area would be unchanged and therefore it is expected that the proposed cap/cover would not greatly affect the hydrology of the wetlands. In addition, the existing catch basins and stormwater structures would be modified to accommodate the addition of the cap/cover fill materials. Also, this alternative would include the option to relocate existing non-permitted pre-IRA wetlands to other areas on the SCCC Site or to utilize the wetland banking option and purchase wetland credits off-site. If the existing wetlands are relocated on the SCCC Site, the relocation area would compensate for the loss of the existing wetlands. The relocated wetlands would be constructed in the same manner as the cap/cover installation methods in the freshwater emergent wetlands described in Alternative III and their location and areal extent would be determined during the remedial design.

Alternatives II, III, and IV would result in contaminants remaining on the site above levels that would allow for unlimited use and unrestricted exposure. Therefore, a review of the SCCC Site conditions would be conducted by EPA at least once every five years, as required by CERCLA.

Comparative Analysis of Alternatives

This section includes a comparative analysis of the four alternatives developed for Area 1 and Area 2. Each alternative is compared relative to seven of the nine NCP criteria, with the remaining two (community acceptance and state acceptance) to be addressed in the ROD following the public comment period.

Overall Protection of Human Health and the Environment

Alternative I would not provide overall protection of human health and the environment. This no-action alternative does not prevent or eliminate human exposure and does not reduce the mass of site-related DNAPL, and so Alternative I would not address the RAOs for the site. Alternatives II, III, and IV would offer protection of human health and the environment.

The placement of additional cap/cover systems (Alternatives III and IV) would provide additional overall protection to human health and the environment due to the further reduction in exposure and reduction in transport of impacted soil. The additional protection is considered similar for both Alternatives III and IV. The release or threat of release of asbestos and lead into the environment would be addressed in Alternatives II, III, and IV via demolition of the dilapidated Edison buildings.

Compliance with ARARs

The chemical-specific ARARs for all the alternatives include groundwater quality standards and soil standards. Drinking water standards (MCLs) would be waived in Area 1 and Area 2 due to the technical impracticability of attaining those standards in groundwater under all alternatives. Alternatives II, III, and IV would comply with chemical-specific soil ARARs through ICs and cap/covers.

Location-specific ARARs include requirements for floodplains and wetlands areas. Alternative I would not comply with these ARARs. Alternatives II, III, and IV would comply with the location-specific ARARs including potential excavation and filling activities in wetland or floodplain areas.

No action-specific ARARs pertain to Alternative I, which is the no action alternative. Action-specific ARARs for Alternatives II, III, and IV include erosion and sedimentation control/ stormwater management regulations and hazardous and solid waste management regulations. Alternatives II, III, and IV would comply with action-specific ARARs.

EVALUATION CRITERIA FOR SUPERFUND REMEDIAL ALTERNATIVES

1. Overall Protection of Human Health and the Environment evaluates whether an alternative eliminates, reduces, or controls threats to public health and the environment through institutional controls, engineering controls, or treatment.

2. Compliance with ARARs evaluates whether the alternative meets federal and state environmental statutes, regulations, and other requirements that pertain to the site, or whether a waiver is justified.

3. Long-term Effectiveness and Permanence considers the ability of an alternative to maintain protection of human health and the environment over time.

4. Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment evaluates an alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contaminant present.

5. Short-term Effectiveness considers the length of time needed to implement an alternative and the risks the alternative poses to workers, the community, and the environment during implementation.

6. *Implementability* considers the technical and administrative feasibility of implementing the alternative, including factors such as the relative availability of goods and services.

7. *Cost* includes estimated capital and annual operation and maintenance costs, as well as present-worth cost. Present-worth cost is the total cost of an alternative over time in terms of today's dollar value. Cost estimates are expected to be accurate within a range of +50 to -30 percent.

8. *State Acceptance* considers whether the State agrees with EPA's analyses and recommendations, as described in the RI/FS and Proposed Plan.

9. *Community Acceptance* considers whether the local community agrees with EPA's analyses and preferred alternative. Comments received on the Proposed Plan are an important indicator of community acceptance.

In sum, Alternative I does not meet the threshold criterion of overall protection of human health and the environment. Accordingly, it is not considered further in assessing the five balancing criteria in the comparative analysis. Alternatives III and IV offer greater overall protection of human health and the environment than Alternative II. Alternatives II, III, and IV are considered equivalent with respect to the threshold criterion of compliance with ARARs.

Long-Term Effectiveness and Permanence

Alternatives II, III, and IV are each anticipated to have both long-term effectiveness and permanence, as all three alternatives include monitoring and maintenance to ensure that the remedies remain protective.

Reduction of Toxicity, Mobility, or Volume

The reduction of toxicity and volume of COPCs in impacted media would continue for Alternatives II, III, and IV by virtue of the continued O&M of the hydraulic control and treatment system. The additional cap/cover areas (Alternatives III and IV) would further reduce the infiltration of stormwater and the volume of impacted groundwater and provide enhanced direct contact protection. Alternative IV provides a slightly better reduction in infiltration due to the installation of a geomembrane that provides slightly improved reduction in mobility and volume.

Short-Term Effectiveness

The construction activities associated with Alternatives II, III, and IV would generally be surficial with the exception of the Area 2 DNAPL well drilling/installation, and only relatively small quantities of impacted SCCC Site media would need to be managed during the active construction. Therefore, the short-term human risks resulting from these actions are considered to be minimal.

The potential short-term risks for Alternative IV would be greater than Alternatives II and III due to the larger volumes of fill soil to be transported and placed and the longer duration of construction activities.

The estimated timeframe is approximately three months to complete Alternative II. The estimated timeframes are approximately six months to construct Alternative III, and approximately one year to complete construction of Alternative IV. The sequentially longer timeframes are due to more extensive construction requirements. These construction schedules are within typical and expected remedial construction timeframes.

Implementability

The technical and administrative issues increase progressively for Alternatives II, III, and IV. However, the cap/cover alternatives have commonly been utilized at similar sites, including previously at the SCCC Site. Implementation of Alternatives II, III, and IV would require specialized contractors and equipment which are readily available. The clearing and grubbing requirements would be most significant for Alternative IV versus Alternative III, however, the difference is not significant. Management of impacted media and DNAPL required for Alternatives II, III, and IV is readily implementable. Alternatives II, III, and IV are considered to be equivalent with respect to implementability.

Alternative	Capital Cost	Annual O&M	Total Present Worth Cost
I	$ 0	$ 0	$ 0
II	$ 1,392,000	$ 541,000	$ 9,759,000
III	$ 4,618,000	$ 396,000	$11,246,000
IV	$13,456,000	$ 231,000	$17,299,000

Cost

A summary of the total estimated cost for each remedial alternative is provided in this section for comparative analysis. The total estimated present worth costs (including the applicable capital and O&M costs) range from $0 for Alternative I to $17,299,000 for Alternative IV as shown in the table above.

Total estimated present worth costs for Alternative II and Alternative III are somewhat similar, with Alternative III being more expensive than Alternative II. The estimated capital cost of Alternative IV is substantially higher than the capital costs of Alternatives II and III.

State Acceptance

NJDEP is reviewing the proposed remedy.

Community Acceptance

Community acceptance of the preferred alternative will be assessed in the ROD following review of the public comments received on the Proposed Plan.

PREFERRED ALTERNATIVE

EPA's preferred alternative is Alternative III: TARGETED CAP/COVER, CONTINUED DNAPL RECOVERY IN AREA 1, BARRIER WALL SYSTEM, DNAPL RECOVERY IN AREA 2, INSTITUTIONAL CONTROLS, AND BUILDING DEMOLITION.

EPA is identifying Alternative III as the preferred alternative because it satisfies the two threshold criteria (protection of human health and the environment and compliance with ARARs) and provides the best balance of tradeoffs among the other alternatives with respect to the five balancing criteria (short-term effectiveness; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; implementability; and cost). The major components of the preferred alternative are as follows:

- placement of targeted cap/cover in specific locations within Area 1 that are not capped/covered, including stone and vegetative cover areas and wetlands areas. The existing stone cover areas would be overlain by a more permanent cover such as asphalt paving. This alternative would also include repairing the existing covers (e.g., repairing the asphalt) as necessary. Stormwater management enhancements would be incorporated into the remedial design;
- DNAPL recovery in Area 1 and Area 2;
- ICs in the form of deed notices, CEA/WRAs or other ICs to restrict future use of the SCCC Site to commercial/industrial uses and prohibit residential use, and to prohibit groundwater use in Area 1 and Area 2;
- demolition of the Edison buildings;
- O&M; and,
- Five-Year Reviews.

Alternative III is protective of human health and the environment. This alternative addresses all of the RAOs established for the SCCC Site. The placement of additional cap/cover systems provides additional protection to human health and the environment due to the additional reduction in exposure potential and reduction in transport of impacted soil. The release or threat of release of asbestos and lead into the environment is addressed via demolition of the dilapidated Edison buildings. When practicable and cost-effective, Alternative III would be designed to accommodate the commercial/industrial redevelopment plans for Area 1, while at the same time maintaining the environmental protectiveness provided by the remedy.

Alternative III addresses the principal threat wastes of DNAPL through recovery and off-site disposal of the liquid waste and the COPR fill materials through cap/cover systems.

Based on the information currently available, EPA believes the preferred Alternative III meets the threshold criteria and provides the best balance of tradeoffs among the other alternatives with respect to the balancing criteria. EPA expects the preferred Alternative III to satisfy the following statutory requirements of CERCLA Section 121(b), 42 U.S.C. § 9621(b): 1) be protective of human health and the environment; 2) comply with ARARs; 3) be cost effective; 4) utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable; and 5) satisfy the preference for treatment (via the existing groundwater treatment system) as a principal element. EPA will assess the two modifying criteria of state acceptance and community acceptance in the ROD to be issued following the close of the public comment period.

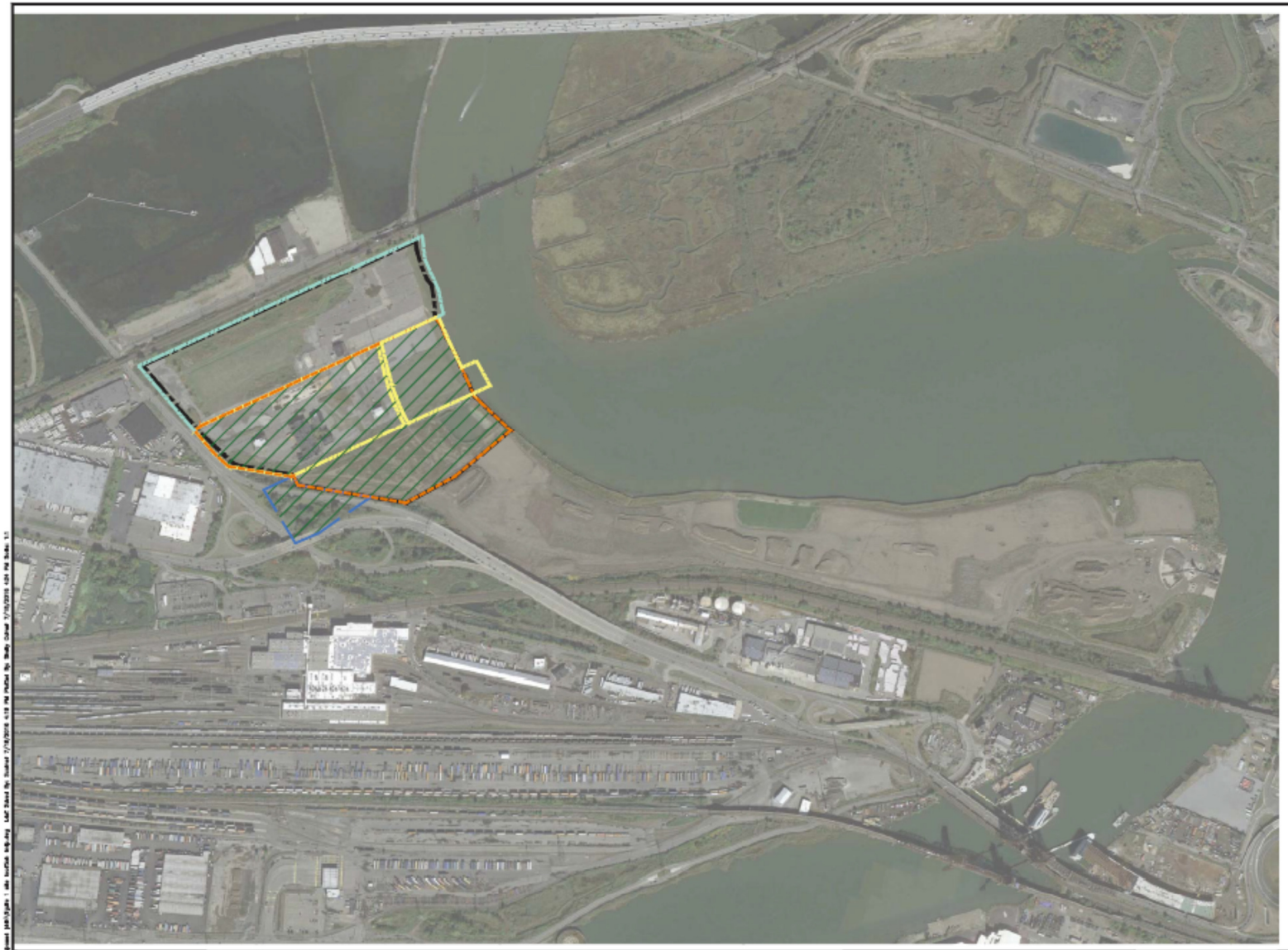
FOR FURTHER INFORMATION

The administrative record file, which contains copies of the Proposed Plan and supporting documentation, is available at the following locations:

Kearny Public Library
318 Kearny Ave
Kearny, NJ 07032
(201) 998-2666
Summer Hours: Monday, Thursday & Friday 9:30 a.m. - 6:00 p.m., Tuesday & Wednesday 9:30 a.m. - 8:00 p.m.,
Saturday and Sunday CLOSED

EPA Region 2 Superfund Records Center
290 Broadway, 18th Floor
New York, New York 10007-1866
(212) 637-4308
Hours: Mon – Fri, 9:00 AM-5:00 PM

In addition, select documents from the administrative record are available on-line at: https://semspub.epa.gov/src/collection/02/AR63968



N

LEGEND

- SCCC SITE PROPERTY BOUNDARY
- DIAMOND SITE PROPERTY BOUNDARY
- AREA 1 LIMITS
- AREA 2 LIMITS
- SCCC SITE AREA
- SLURRY WALL

0 700 1400 FEET

REV #	DATE	DESCRIPTION	APPD
0			
1			
2			

REFERENCE:
1. PROPERTY BOUNDARY SHOWN HEREON FROM SHEET 1 OF 1 TITLED SURVEY OF PROPERTY, TAX LOTS 23.03, 46, 47 & 47R, BLOCK 267, TAX LOTS 48, 49, 50, 51, 52 AND 52R, BLOCK 267, TOWN OF KEARNY, HUDSON COUNTY, NEW JERSEY," DATED JULY 1, 2009 (REVISION 2: JULY 28, 2009), PREPARED BY DIVISION ASSOCIATES, PC.
2. IMAGE PROVIDED BY GOOGLE EARTH DATED OCTOBER, 2015.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PERFORMING PARTIES GROUP

DRWN: SGC	DATE: 06/15/16
CHKD:	DATE:
APPD:	DATE:
SCALE:	AS SHOWN

PROPOSED PLAN
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

SITE LOCATION MAP

PROJECT NO. 201201-08

FIGURE 1

LEGEND

- PROPERTY BOUNDARY
- EXISTING GROUND SURFACE ELEVATION
- RIVER/CHANNEL
- SURFACE COVER IRM COMPRISED OF ASPHALTIC CONCRETE
- SURFACE COVER IRM COMPRISED OF SOIL
- SURFACE COVER IRM COMPRISED OF GEOMEMBRANE OVERLAIN WITH AGGREGRATE
- EAST AND WEST LAGOONS
- SOUTH DITCH
- WETLANDS
- BUILDING
- INTERNAL ACCESS ROUTES
- BLOCK AND LOT LINE

REFERENCE:
1. EXISTING GROUND SURFACE CONTOURS PER AIR SURVEY, DULLES, VIRGINIA, APRIL 14, 2001. HORIZONTAL REFERENCES NEW JERSEY STATE PLANE COORDINATES (NAD 1927). VERTICAL REFERENCE/DATUM: ASSUMED VERTICAL DATUM (NGVD 1929).
2. PROPERTY BOUNDARY SHOWN HEREON FROM SHEET 1 OF 1 TITLED "SURVEY OF PROPERTY, TAX LOTS 32.03, 46, 47 & 47R, BLOCK 287, TAX LOTS 48, 49, 50, 51, 52 AND 52R, BLOCK 287, TOWN OF KEARNY, HUDSON COUNTY, NEW JERSEY," DATED JULY 1, 2009 (REVISION 2: JULY 28, 2009), PREPARED BY DVIRKA ASSOCIATES, PC.
3. EXISTING WETLANDS PER WETLAND DELINEATION BY PRINCETON HYDRO, LLC FOR KEY ENVIRONMENTAL, INC. PERFORMED IN MARCH 2008.

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
300 TWIN AVENUE
CARNEGIE, PA 15106

PERFORMING PARTIES GROUP

DRWN: SCC	DATE: 09/24/18	KEY ENVIRONMENTAL INCORPORATED
CHKD:	DATE:	
APPD:	DATE:	
SCALE: AS SHOWN		

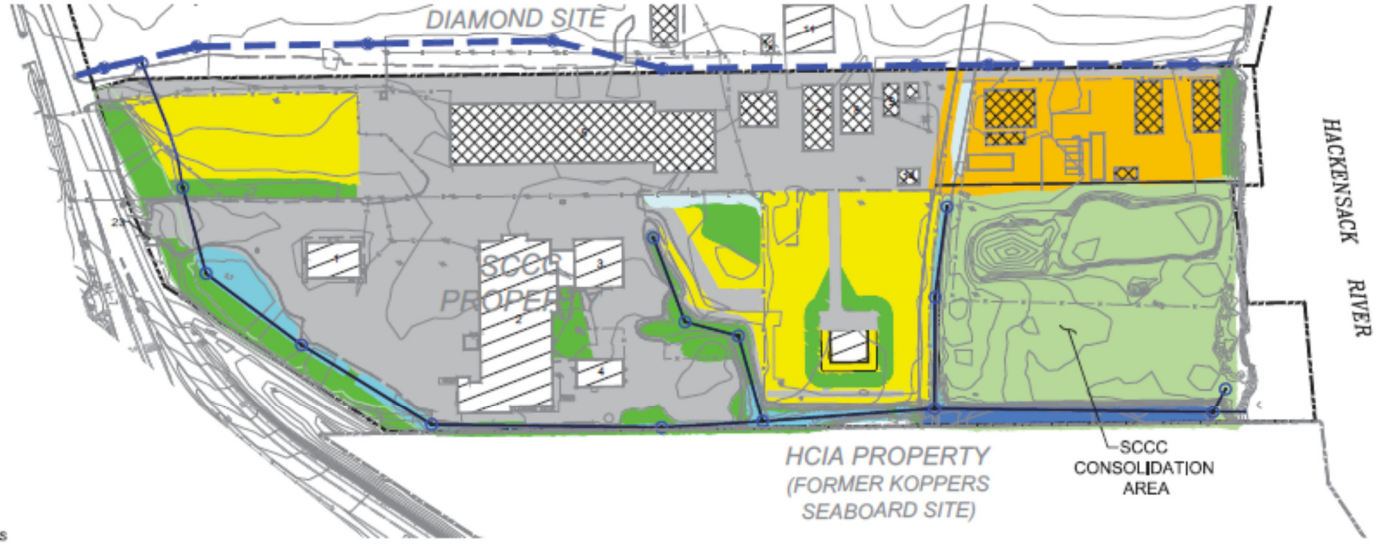
PROPOSED PLAN
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

HISTORICAL SITE ARRANGEMENT

PROJECT NO: 301501-05

FIGURE 2

J:\Jobs\Kearny\proposal plan\figure 2 historical site arrangement.dwg Last Saved By: Scanner 7/19/2018 3:55 PM Plotted By: Shelly Conner 7/19/2018 4:24 PM Scale: 1:1



LEGEND

- EXISTING ACCESS ROAD
- EXISTING NEW JERSEY TRANSIT RAILROAD (ACTIVE)
- EXISTING FENCE
- EXISTING STRUCTURES
- EXISTING UTILITY POLES
- EXISTING LIGHT STANDARD
- EXISTING OVERHEAD POWER LINE
- PROPERTY BOUNDARY
- EXISTING CONCRETE PAD
- EXISTING GROUND SURFACE ELEVATION CONTOURS
- EXISTING VEGETATION
- EXISTING STREAM, POND AND RIVER BANK
- EXISTING ELEVATION (FEET–MSL)
- EXISTING STORM DRAIN (48" PIPE)
- CULVERT(S)
- DROP INLET
- DROP INLET
- EXISTING BUILDING
- FORMER BUILDING FOUNDATION/SLAB
- WETLANDS
- NON–PERMITTED PRE–IRA WETLAND AREAS
- WETLAND UNDERLAIN BY GEOSYNTHETIC LINER
- VEGETATIVE COVER
- VEGETATIVE COVER UNDERLAIN WITH GEOSYNTHETIC LINER
- STONE COVER
- ASPHALT
- GEOMEMBRANE OVERLAIN WITH AGGREGATE

0 100 200 FEET

REV #	DATE	DESCRIPTION	APPD
1	11–07–13	LABELED BUILDING 23.	CAZ

REFERENCE:
1. EXISTING GROUND SURFACE CONTOURS FOR AIR SURVEY, DULLES, VIRGINIA, APRIL 14, 2001. HORIZONTAL REFERENCE: NEW JERSEY STATE PLANE COORDINATES (NAD 1927). VERTICAL REFERENCE/ADDITIONAL ACCURATE VERTICAL DATUM (NGVD 1929).
2. PROPERTY BOUNDARY SHOWN HEREON FROM SHEET 1 OF 1 TITLED "SURVEY OF PROPERTY, TAX LOTS 32.02, 48, 47 & 47B, BLOCK 287; TAX LOTS 48, 49, 50, 51, 52 AND 52B, BLOCK 287, TOWN OF KEARNY, HUDSON COUNTY, NEW JERSEY," DATED JULY 1, 2009 (REVISION 2: JULY 20, 2009), PREPARED BY DIVISTA ASSOCIATES, PC.
3. EXISTING WETLANDS PER WETLAND DELINEATION BY PRINCETON HYDRO, LLC FOR KEY ENVIRONMENTAL, INC. PERFORMED IN MARCH 2008.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
300 TWIN AVENUE
CANONSBURG, PA 15108

PERFORMING PARTIES GROUP

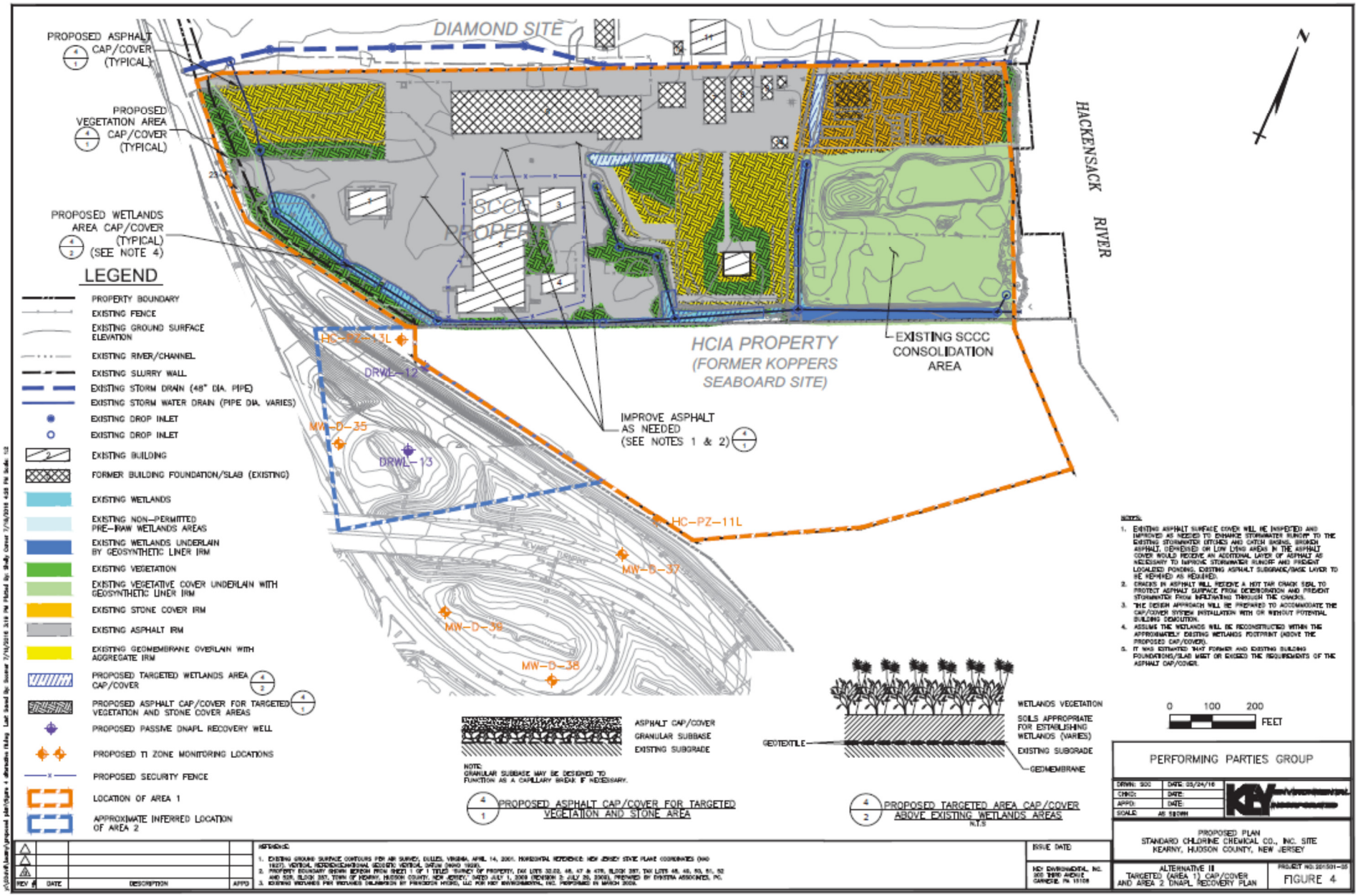
DRWN: SGC	DATE: 05/09/10
CHKD:	DATE:
APPD:	DATE:
SCALE: AS SHOWN	

PROPOSED PLAN
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY

CURRENT SITE ARRANGEMENT

PROJECT NO: 201501–05

FIGURE 3


DIAMOND SITE
PROPOSED ASPHALT CAP/COVER (TYPICAL)
PROPOSED VEGETATION AREA CAP/COVER (TYPICAL)
PROPOSED WETLANDS AREA CAP/COVER (TYPICAL) (SEE NOTE 4)
SCCC PROPERTY
HACKENSACK RIVER
N
HCIA PROPERTY
(FORMER KOPPERS SEABOARD SITE)
EXISTING SCCC CONSOLIDATION AREA
IMPROVE ASPHALT AS NEEDED (SEE NOTES 1 & 2)
HC-PZ-13L
DRWL-12
MW-D-35
DRWL-13
HC-PZ-11L
MW-D-37
MW-D-36
MW-D-38
LEGEND
PROPERTY BOUNDARY
EXISTING FENCE
EXISTING GROUND SURFACE ELEVATION
EXISTING RIVER/CHANNEL
EXISTING SLURRY WALL
EXISTING STORM DRAIN (48" DIA. PIPE)
EXISTING STORM WATER DRAIN (PIPE DIA. VARIES)
EXISTING DROP INLET
EXISTING DROP INLET
EXISTING BUILDING
FORMER BUILDING FOUNDATION/SLAB (EXISTING)
EXISTING WETLANDS
EXISTING NON-PERMITTED PRE-IRAW WETLANDS AREAS
EXISTING WETLANDS UNDERLAIN BY GEOSYNTHETIC LINER IRM
EXISTING VEGETATION
EXISTING VEGETATIVE COVER UNDERLAIN WITH GEOSYNTHETIC LINER IRM
EXISTING STONE COVER IRM
EXISTING ASPHALT IRM
EXISTING GEOMEMBRANE OVERLAIN WITH AGGREGATE IRM
PROPOSED TARGETED WETLANDS AREA CAP/COVER
PROPOSED ASPHALT CAP/COVER FOR TARGETED VEGETATION AND STONE COVER AREAS
PROPOSED PASSIVE DNAPL RECOVERY WELL
PROPOSED TI ZONE MONITORING LOCATIONS
PROPOSED SECURITY FENCE
LOCATION OF AREA 1
APPROXIMATE INFERRED LOCATION OF AREA 2
ASPHALT CAP/COVER
GRANULAR SUBBASE
EXISTING SUBGRADE
NOTE: GRANULAR SUBBASE MAY BE DESIGNED TO FUNCTION AS A CAPILLARY BREAK IF NECESSARY.
PROPOSED ASPHALT CAP/COVER FOR TARGETED VEGETATION AND STONE AREA
WETLANDS VEGETATION
SOILS APPROPRIATE FOR ESTABLISHING WETLANDS (VARIES)
GEOTEXTILE
EXISTING SUBGRADE
GEOMEMBRANE
PROPOSED TARGETED AREA CAP/COVER ABOVE EXISTING WETLANDS AREAS
N.T.S.
NOTES:
1. EXISTING ASPHALT SURFACE COVER WILL BE INSPECTED AND IMPROVED AS NEEDED TO ENHANCE STORMWATER RUNOFF TO THE EXISTING STORMWATER CATCHES AND CATCH BASINS. BROKEN ASPHALT, DEPRESSED OR LOW LYING AREAS IN THE ASPHALT COVER WOULD RECEIVE AN ADDITIONAL LAYER OF ASPHALT AS NECESSARY TO IMPROVE STORMWATER RUNOFF AND PREVENT LOCALIZED PONDING. EXISTING ASPHALT SUBGRADE/BASE LAYER TO BE REPAIRED AS REQUIRED.
2. CRACKS IN ASPHALT WILL RECEIVE A HOT TAR CRACK SEAL TO PROTECT ASPHALT SURFACE FROM DETERIORATION AND PREVENT STORMWATER FROM INFILTRATING THROUGH THE CRACKS.
3. THE DESIGN APPROACH WILL BE PREPARED TO ACCOMMODATE THE CAP/COVER SYSTEM INSTALLATION WITH OR WITHOUT POTENTIAL BUILDING DEMOLITION.
4. ASSUME THE WETLANDS WILL BE RECONSTRUCTED WITHIN THE APPROXIMATELY EXISTING WETLANDS FOOTPRINT (ABOVE THE PROPOSED CAP/COVER).
5. IT WAS ESTIMATED THAT FORMER AND EXISTING BUILDING FOUNDATIONS/SLAB MEET OR EXCEED THE REQUIREMENTS OF THE ASPHALT CAP/COVER.
0 100 200
FEET
PERFORMING PARTIES GROUP
DRWN: SGO DATE: 03/24/16
CHKD: DATE:
APPD: DATE:
SCALE: AS SHOWN
PROPOSED PLAN
STANDARD CHLORINE CHEMICAL CO., INC. SITE
KEARNY, HUDSON COUNTY, NEW JERSEY
ALTERNATIVE 1B
TARGETED (AREA 1) CAP/COVER AND AREA 2 DNAPL RECOVERY PLAN
PROJECT NO. 30150-35
FIGURE 4
REFERENCE:
1. EXISTING GROUND SURFACE CONTOURS FOR AIR SURVEY, DULLES, VIRGINIA, APRIL 14, 2001. HORIZONTAL REFERENCE: NEW JERSEY STATE PLANE COORDINATES (NAD 1927). VERTICAL REFERENCE/ADDITIONAL SECURITY VERTICAL DATUM (NAVD 1929).
2. PROPERTY BOUNDARY SHOWN HEREON FROM SHEET 1 OF 1 TITLED "SURVEY OF PROPERTY, TAX LOTS 32.02, 46, 47 & 47R, BLOCK 287, TAX LOTS 48, 49, 50, 51, 52 AND 52R, BLOCK 287, TOWN OF KEARNY, HUDSON COUNTY, NEW JERSEY," DATED JULY 1, 2009 (REVISION 2: JULY 20, 2009), PREPARED BY SYNSTRA ASSOCIATES, PC.
3. EXISTING WETLANDS PER WETLANDS DELINEATION BY PRINCETON HYDRO, LLC FOR KEY ENVIRONMENTAL, INC. PERFORMED IN MARCH 2008.
REV # DATE DESCRIPTION APPD
ISSUE DATE
KEY ENVIRONMENTAL, INC. 300 TERRY AVENUE CAMDEN, PA 19108

SCCC SITE

RECORD OF DECISION

APPENDIX 5-B PUBLIC NOTICE

Official OK granted to keep QPHS open

NORTH ARLINGTON –

Queen of Peace High School, which had been slated to close at the end of June because of declining enrollment and sagging finances in recent years, will now open for the 2016-2017 academic year, the Most Rev. John J. Myers, archbishop of Newark, announced Thursday, July 21.

The Rev. Michael Donovan, pastor of Queen of Peace Parish, which operates the high school, received the good news on the phone from the Archdiocese.

While the school announced several weeks ago it would reopen, the news did not become official until Myers gave his approval.

"I spoke with Archbishop Myers yesterday to bring him up to date on our efforts," Donovan said. "His Grace expressed his happiness over what we have accomplished. He also said that he has great hopes for our plan to be more financially stable and to grow enrollment over the next few years."

News of the announcement is being communicated to parents and interested stakeholders by the school's administration.

After the high school and Queen of Peace Parish communities were informed in May that QP was slated to close at the end of this academic year, students, parents, faculty, staff, alumni and friends undertook an extensive fundraising effort in a very short time frame to ensure there would be sufficient funds to keep the school open for the coming year.

Under the leadership of Donovan, a group of staff and volunteers, including prominent alumni, also began developing a series of long-term plans for tuition management, general financial support and management, enrollment and daily operations.

To date, the school has

Observer file photo

raised some $1.02 million to support the operation of the school for the coming year, and some 225 students are expected to enter the classrooms and begin the new school year this coming September.

As a result of the significant improvements to its fiscal management, recruitment efforts and development strategies, Myers believes Queen of Peace High School can have a viable future.

"I am extremely grateful to Father Donovan, the staff, volunteers, students and families of Queen of Peace High School, and the staff of the Archdiocesan Schools and Finance Offices for assuring that Queen of Peace High School can continue to be a vital part of Catholic secondary education," he said. "The entire QP family has worked diligently to create a roadmap for a solid financial foundation and student enrollment. I believe that everyone involved in the school's life now is committed fully to ensuring that this foundation of student growth and development of adequate finance resources becomes a long-term reality.

"While there still are hurdles to overcome in the months ahead — including how the parish will seek to resolve the outstanding debt that the high school's circumstances had created — I am confident that parish and school leadership will work with our staff here in the chancery to find a solution that benefits all."

Myers added: "In heraldry, QP's mascot, the Griffin, symbolizes someone with the qualities of strength, courage, intelligence and leadership. The results that the QP family has produced, and the new start they have created for this great school, clearly show that the Griffin has inspired them. I pray that they will continue to be inspired as they work to ensure the brightest of futures for Queen of Peace High School."

– Kevin Canessa Jr.

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EPA Invites Public Comment on Proposed Plan for Cleanup of the Standard Chlorine Chemical Company Superfund Site
Kearny, New Jersey

The U.S. Environmental Protection Agency has issued a Proposed Plan for the Standard Chlorine Chemical Company Superfund Site in Kearny, New Jersey. A 30-day public comment period on the Proposed Plan, which identifies the EPA's preferred cleanup plan and other cleanup options that were considered by the EPA, begins on July 27 and ends on August 26, 2016.

The EPA's preferred cleanup plan consists of: targeted cap/cover; barrier wall system; dense, non-aqueous phase liquid (DNAPL) recovery; institutional controls; demolition of five dilapidated buildings; and operation, maintenance, and monitoring.

During the public comment period, the EPA will hold a public meeting in Kearny, NJ to receive comments on the preferred cleanup plan and other options that were considered. The meeting will be held on Tuesday, August 16, 2016 at 7 PM at Kearny Town Hall – Council Chambers, 402 Kearny Avenue, Kearny, New Jersey 07032.

The Proposed Plan is available at www.epa.gov/superfund/standard-chlorine or by calling Cecilia Echols, EPA's Community Involvement Coordinator, at (212) 637-3678 and requesting a copy by mail.

Written comments on the Proposed Plan, postmarked no later than August 26, 2016, may be mailed to Alison Hess, EPA Project Manager, U.S. EPA, 290 Broadway, 19th floor, New York, NY 10007-1866 or emailed no later than August 26, 2016 to hess.alison@epa.gov.

The Administrative Record file containing the documents used or relied on in developing the alternatives and preferred cleanup plan is available for public review at the following information repositories:

Kearny Library located at 318 Kearny Ave, Kearny, NJ 07032

EPA Region 2 Superfund Records Center located at 290 Broadway, 18th Floor, New York, NY.10007.

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RECORD OF DECISION

APPENDIX 5-C PUBLIC MEETING TRANSCRIPT

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 2
- -x

STANDARD CHLORINE CHEMICAL Co. Inc. SUPERFUND SITE

PUBLIC MEETING

- -x

Kearny Town Hall
402 Kearny Avenue
Kearny, New Jersey

August 16, 2016
7:00 p.m.

P R E S E N T:

DAVID KLUESNER,
Community Involvement Coordinator

ALISON HESS,
Remedial Project Manager

MICHAEL SIVAK,
Chief, Special Projects Branch

KRISTA YACOVONE,
EPA Attorney

MR. KLUESNER: Good evening, folks. We're going to get started. Thank you so much for coming to this meeting. My name is David Kluesner. I'm with the U.S. Environmental Protection Agency out of our New York City office.

This meeting is to discuss EPA's proposal for the Standard Chlorine site here in Kearny. Again, I want to thank you for taking the time. You probably have other things you want to or could be doing, but I appreciate you coming tonight.

Let me sort of tell you how it's going to run and then we'll do some introductions.

We have about a 30- to 40-minute presentation by Project Manager Alison Hess. Essentially, what Alison is going to do is to explain our cleanup proposal and the other alternatives that were considered by the EPA. So, we're here to take comment on the other alternatives and the proposal that we're putting forth.

Now, we issued on July 27, and we are in the middle of, a comment period through August 26. So, when you came in, there was a copy of what we call a proposed plan. So, this is a hard copy. It is available online. It outlines our cleanup proposal and the other alternatives considered. There may be some copies out there, but it's online.

We're taking comment tonight and through August 26 through a number of ways. This is one important way to submit your comments. We have a stenographer, Linda Marino with Fink & Carney. So, Linda will be taking your comments and questions here tonight, so that's one way. We have the yellow comment cards that you can write down your comments and submit to EPA. We also have on the sign-in sheet this white piece of paper with information on how you can submit comments via e-mail or postal service to Alison, our project manager.

So, a number of different ways to

give comments. This is an important part of the cleanup process: Your input. Again, thanks for coming.

Let me introduce some folks you will hear from tonight. Alison Hess is our project manager; Michael Sivak is the Slide Advancer and also Chief of the Special Projects Branch for EPA; we have Krista Yacovone, right in front of me, with our regional counsel, EPA attorney.

Then we have a number of folks from the Town of Kearny. And I want to thank the Town for helping us organize this and helping out. So, here are Town Council members Susan McCurrie, Carol Jean Doyle, John Giordano, and Town Administrator Mike Martello. There may be some other folks as well, so feel free to introduce yourselves as we go along.

We will ask you to hold your comments and questions until we get done with the presentation. If you have a clarifying type of question, if you see something on the slide and there's a figure or something that's just really

need-to-know before we advance to the next slide, feel free to ask. But we'll ask you to hold your general comments and questions until the end.

Just a couple of things. Mute or turn off your cell phones, if you would. That would be appreciated.

I may ask for you to state your name. We would like to have your name for the record. It is not required, so you can certainly have that option as well. But if we need to get back to you with a specific question, it would be helpful to have your name.

If I see that Linda is not able to hear a question or a comment, if there's people talking over, I'll try to intervene and help out because we want to have an accurate transcript of tonight's proceedings.

With that, I'll turn it over to Alison.

MS. HESS: Thank you, David.

Thank you, everybody, for coming out. This is an exciting part of the

Superfund process, where we take public input. My purpose is to give an overview of 35 years or so of environmental work at the Standard Chlorine site. So, let's just get started right away.

The presentation has a number of different components. The site background, some of the early work, the early investigations, and the early response actions. So, those are our cleanup actions at the site.

Superfund was involved partway through that. And once Superfund was involved, we did a remedial investigation, which is a study of the site, and the focused feasibility study, and that's to look at various cleanup options.

And then I'll give a short explanation of the proposed plan, and that's the document that identifies what EPA believes at this point in time is our preferred cleanup alternative.

We may take a break depending on

how Linda is doing, and then we will invite you to submit public comment. And as David mentioned, that public comment period is open through August 26.

Next slide, please. Thank you, Michael.

Standard Chlorine is about a 25-acre property. I'm sure folks in the room are familiar with it. The Koppers Seaboard site is to the south, Hackensack River is to the east, Belleville Turnpike to the west, and Diamond Shamrock to the north.

The geology at the site is industrial fill at the top of the site, then the original marsh surface which was buried by that fill, a sand unit, and a clay unit that was a glacial clay layer unit, and then a glacial till, which is unsorted material and bedrock.

For 65 years, the Standard Chlorine facility was the site of active industrial processes, 1916 to 1981. And, so there are a number of different

processes that were there: Chemical refining; Thomas Edison had a lead-based battery operation there; dye carriers; naphthalene refining; these kind of things happened for 65 years at the property.

The production was in the northeast and the southwest areas, and there were a number of different -- there's a drainage ditch and an east lagoon and a west lagoon and a number of different process areas and buildings that were constructed at the site.

So, taking a look at what the site looked like in 1986 -- see if I can do this.

Here's the east lagoon, the west lagoon, the drainage ditch to the Hudson -- sorry, to the Hackensack River over here. And the other features that I mentioned; Diamond Shamrock, Koppers Seaboard, Belleville Turnpike over here. These are all a number of different buildings that supported the operations at the site.

So, some of the early

investigations, including -- included different sampling and analysis of material of surface soils, subsurface soil, groundwater, surface water. And these were done from 1983 to 2009.

They're on the slide as early investigations; in part, because they predate some of the EPA investigation. So, that's kind of just an EPA perspective. These investigations were carried out with New Jersey DEP as the oversight lead agency.

And there were also a number of different early response actions to go along with those investigations. And these are important for where we find ourselves today and what EPA is proposing as its proposed alternative.

There's security fencing and a number of buildings have been demolished. Currently there are remaining only five historical buildings that are there. These are Edison buildings that were built for the Emark Lead Battery Company that Thomas Edison

had. But during the demolition of the other buildings, historical buildings, there were 92,000 pounds of asbestos removed from the site.

Another piece of the work that was done early was an installation of a barrier wall, and that is a sheet pile along the Hackensack River and a -- well, you can envision it as sort of a bathtub, a slurry wall that surrounds the area of contamination and keeps it from entering into other areas, including the Hackensack River.

It is keyed into or tied into the continuous glacial clay layer that is present across the Standard Chlorine site. It is more than 40 feet thick. So, that was a big piece that was installed in 2011.

There's also a DNAPL recovery system. DNAPL is dense nonaqueous phase liquid. That is chemicals that were released during the operations and are in liquid form in the subsurface, so there's a series of wells that are on

the site to collect that material. And that's been very successful: Over 6,330 gallons have been recovered to date.

There's also a hydraulic control system and groundwater treatment plant. There is some contaminated groundwater that is recovered along with the DNAPL, and that is treated to meet New Jersey pollution elimination system standards and discharge to the Hackensack River.

Some of the other work was where the lagoons were that I showed you, the east lagoon and the west lagoon dewatering and solidifying of material, and a consolidation area. So, contamination from many areas were combined into one area approximately where the lagoons are and lined and covered.

The septic tanks contained material. They were emptied and the septic tanks themselves were filled with concrete. There are new surface covers for portions of the site and a new stormwater control system so that

stormwater does not run through material at the site but is directed from Belleville Turnpike to the Hackensack River without going through any of the Standard Chlorine materials.

Next slide.

Two other components that were put in were classification exception areas and well restriction areas. There are two of them that are in place right now for the site: One is for the Standard Chlorine property, and the other one is for the 13 acres of the Koppers Seaboard property that is enclosed within the slurry wall.

So, in these areas, there's a notice that is put formally with the property that the groundwater standards are not going to be met in that particular area and that groundwater use is restricted. So, these classification exception areas, well restriction areas, were also placed on the property during the time of New Jersey DEP oversight.

At some point, Superfund jumps

into the process here. In 2001, New Jersey DEP referred the site to the federal government, to the federal EPA, and requested that EPA consider listing the site on the National Priorities List. This is the list of the most contaminated sites in the Superfund program.

And, so, EPA proposed listing the site in 2003 -- again, this is a formal process -- and that was announced. And then in 2007, EPA formally placed the site on the National Priorities List.

In 2010, the responsible parties entered into an administrative order for a removal action, which was to seal up some of the buildings that remained at that time, and they have since been demolished.

In 2013, the responsible parties entered into a separate administrative order on consent with EPA, and that was for the performance of a remedial investigation and this focused feasibility study.

So, that was in May 2013. And since then, the remedial investigation has been conducted and the focused feasibility study has been conducted. And the culmination of that process is EPA issuing the proposed plan last month.

Next slide.

So, this is a slide just to show an aerial view of the site with the site conditions that existed at the time the Superfund program took over. This is 2015, but it's essentially the same as 2013, at the beginning of the remedial investigation.

I want to point out this location. Here are the former lagoons, and those have now been incorporated into this consolidation area where there is a cover on that. And in the areas that I showed before where all the buildings were, all of these buildings have been demolished.

So, the buildings that remain are the historic Edison buildings. There

are five buildings. And this is the new groundwater treatment plant building.

And then the sheet pile goes along the Hackensack River. The slurry wall also continues for this 13-acre portion to the Koppers property, and then encircles the entire Standard Chlorine and, actually, even the adjacent Diamond Shamrock property.

So, now we're just going to talk briefly about the remedial investigation under the Superfund program.

The first piece that we did was site characterization. So, that is sampling and analysis of the site. We looked at the characteristics of the dense nonaqueous phase liquid. It's a liquid that has a high density, with a specific gravity of 1.3, which means it sinks and then travels. It also has a low viscosity, so it's more watery than molasses-like and can travel very quickly and extensively in the subsurface.

We analyzed surface and subsurface

soils, groundwater, surface water, for a comprehensive set of data for the remedial investigation and utilizing some of the sampling that had already been conducted previously as well.

Now, the data are used for conducting baseline human health risk assessment and ecological risk assessment. These are called "baseline" because the conditions that are evaluated are without any kind of remediation.

So even though we have covers, for example, in some portions of the site, the baseline risk assessment assumes that those covers without maintenance could get disturbed and there would be the potential for exposure.

We combined both the exposure information we have from data and sampling with toxicity information we have about the particular chemicals of concern.

And then we also did a number of different investigations with respect to

cultural resources, and those include both pre-European contact resources as well as the historical buildings, and I'll talk about these a little bit more.

This is hard to read. I'm not expecting anyone to be able to see the data. This slide, though, is really just to show the comprehensive nature of the sampling effort and the data set that we have. The contaminants of concern include a number of different volatile organic compounds and semi-volatile organic compounds as well as the DNAPL, the dense nonaqueous phase liquid, and that has chlorobenzene, polychlorinated compounds, naphthalene, things like that.

So, that was comprehensive. We put those data into the baseline risk assessment. Again, this assumes no further remediation and, in fact, no maintenance of the remedial measures that are in place right now.

We found there was no unacceptable risk if the surface covers are

maintained, but there are unacceptable risks and hazards due to exposure to soil and groundwater. And also an unacceptable risk if there's exposure to groundwater vapors into new buildings.

We look at both a current scenario as well as a future use scenario. And, so, under a future scenario with buildings, then there was a calculated unacceptable risk due to groundwater vapors, and that meant that new building construction would require some vapor mitigation.

On the ecological -- I just want to say that the levels that we were calculated for the baseline human health risk assessment were 10, 100, 1,000 times above EPA's acceptable levels, which obviously meant we were sort of proceeding with the future steps of the work.

On the ecological risk assessment side, we basically did the same thing: We looked at receptors, we looked at toxicity. But we didn't have completed

exposure pathways. So, we did the first step, which was a screening level risk assessment, and the results of that were that we didn't need to go further, there was no completed exposure pathway, there would not be a concern for terrestrial organisms.

We'll talk next about the cultural resources. During the early response actions, there was some efforts for cultural resources, and there were actually archeological evaluations during the construction of the barrier wall.

Now, remember, a lot of that material is fill. It's been disturbed. We didn't really expect to find any cultural resources, pre-European contact cultural resources there. But at some of the greater depths, a few things were found that were indicative possibly of some pre-European contact.

The more extensive work that we've done with respect to cultural resources has been during the remedial

investigation and the focused feasibility study stage, and that has centered on the five Edison buildings that exist at the site.

They're historic buildings. EPA and Superfund projects comply with the National Historic Preservation Act. And as part of that work, we had the responsible parties prepare a number of different documents. And there's a historical American buildings survey which not only has information about the buildings themselves but also puts those buildings in context in terms of the history and their importance.

And then some other documents that were prepared based on that larger work; namely, a booklet, a teacher's guide, and some lesson plans around the fourth grade level, and then a traveling exhibit that could be available for different locations that want to have an exhibit about the Thomas Edison battery operations, Emark Battery Corporation.

And these -- there's also

coordination between EPA and the New Jersey Historic Preservation Office, and that was memorialized in a memorandum of agreement. So, you know, on the government side as well, we were making sure that there's good coordination between EPA and the state.

So, the remedial investigation results show that the area inside the slurry wall had been adequately characterized, we had sufficient samples to characterize the contaminated media inside the slurry wall. That's about 38 acres.

We also at the end determined that we had adequately characterized the human health and the ecological risk through our baseline risk assessment process. We determined that the clay unit is an effective aquitard.

So, the contaminants and the DNAPL are migrating through on -- have migrated through the subsurface and about six inches into that continuous clay layer. But, remember, it's 40 feet

thick or more. So that clay, which is a very tight formation, is preventing the contamination from going through the clay layer.

But we did find that there was an area that we need to do a little bit more sampling. So, what we have done so far, we named Area 1 and we did a second phase in the remedial investigation to cover Area 2.

So, this just shows on the photograph Area 1. It includes, again, the 25 acres of the Standard Chlorine property, the 13 acres in the Koppers property that's included within the slurry wall, and then this new area that we investigated.

So, again, a similar map that I was showing the sample locations, and just to indicate that the characterization was completed with a number of different soil borings and surface and subsurface characterizing and subsurface samples.

And we also installed some

groundwater monitoring wells to characterize the groundwater data. And this was an area that was suspected to have some DNAPL that originated at the Standard Chlorine property and had migrated out before the barrier wall was installed in 2011. And that's what we found to be the case.

So, we identified in this part of the investigation the limits of the dense nonaqueous phase liquid in Area 2 and confirmed that the characteristics of that DNAPL were the same as in Area 1 within the slurry wall.

And we also found that there was another DNAPL that was not related to site operations and had very different characteristic that was in that area as well.

So, with our remedial investigation complete, we continued on to the focused feasibility study. And it's called "focused" in this case because so much of the site had been the subject of prior investigations and

prior early response actions. So, we had some remedial components that were already in place.

But looking at this, we identified eight different remedial action objectives: Eliminating human exposure; eliminating the transport of impacted surface soil by erosion or runoff; preventing human exposure to contaminated groundwater; and preventing the migration of contaminated groundwater into areas that were not contaminated; preventing the migration of the DNAPL into areas that didn't have DNAPL contamination; reducing the mass of the DNAPL in the subsurface to the extent practical, and I'll talk about that in a little bit; eliminating the release or the threat of release of asbestos and lead that had been documented in the dilapidated Edison buildings, those five remaining buildings; and then, especially with respect to the future, preventing unacceptable risks due to vapor

intrusion into new buildings. So, those remedial action objectives come out of our risk assessment process.

What we did not have as a remedial action objective is to restore the groundwater to groundwater cleanup standards. And in both Area 1, within the slurry wall, and Area 2, that small portion outside, about four acres, we determined that the presence of the DNAPL and the site conditions and the setting made it not practical to restore the groundwater to, you know, drinkable, potable standards or other more stringent groundwater quality criteria.

This is something that EPA recognizes, and a comprehensive evaluation is required in order to assess whether there is or is not the basis for a technical impracticability waiver of those standards.

In this case, because of the nature of the DNAPL and the fact that it's much more dense than water and sinks but then flows like water and has

a low viscosity and can travel extensively, we were not going to be able to restore to the very low, stringent cleanup levels.

An example of one would be 0.2 micrograms per liter for benzene. So that's parts per billion. So, 0.2 parts per billion would be very, very stringent.

The estimate was that the DNAPL would continue to dissolve for 150 years. That's, you know, very slowly over many decades. So, for that reason, we did not propose having a remedial action objective to restore the groundwater.

We have nine evaluation criteria for the remedial alternatives.

Two are threshold criteria: The overall protection of human health and the environment; and compliance with applicable or relevant and appropriate requirements. And these can be location-specific, action-specific and they -- this is where the technical

impracticability waiver fits in. So, that's a proposal to waive those particular ARARs that are associated with the very stringent groundwater cleanup standards.

There are five balancing criteria and two modifying criteria.

The two modifying criteria. State acceptance. At this Standard Chlorine site, EPA is the lead agency and the New Jersey DEP is the support agency, and we've been coordinating closely with them. The proposed plan is under review with New Jersey.

And then the other modifying criteria is community acceptance, and that's the purpose, in part, of this public meeting and the public comment period: To receive public comment.

So, let's talk about the alternatives. It's a little small for me.

The No Action alternative is required by the NCP. That's an alternative that is used as a baseline

against which to judge the other alternatives.

Alternative 2 was the next one that was developed, and it's continued recovery of the DNAPL in Area 1 and the barrier wall system that are both in place at this time, and then a new DNAPL recovery for Area 2 which previously had not been identified, and then institutional controls.

We have the classification exception areas, well restriction areas, and then deed controls to restrict the use of the property.

Demolition of the five Edison buildings, which are dilapidated and beyond repair.

Operation and maintenance of those elements so that the covers that exist there right now will continue to be maintained.

And five-year reviews, which are reviews that EPA does based on the monitoring data that are collected throughout that time. And then it's a

review to ensure that the remedy remains protective of human health and the environment.

Another alternative that was developed, Alternative 3, is all of those components that were identified for Alternative 2 as well as some additional capping, some additional cover in areas of the site that are not capped at this point or where the covers are in disrepair. And, so, there was additional capping.

And the fourth alternative is all of the elements of Alternative 2 with the addition of a sitewide cap over Area 1, including over the areas where there is already engineered cap.

Just to take a look at some of the numbers...

We have the construction time for all of the alternatives. Of course, for no action, doesn't take any time at all; for Alternative 2, three months; Alternative 3, six months; Alternative 4, 12 months of construction time.

The construction time does not include negotiations with responsible parties for doing the work and doesn't include time to do the engineering design for the work and does not include time for procuring contracts and things like that. So, that's an actual construction time.

And the dollar amounts are there also, estimated present value costs. This is the cost including all the operation and maintenance and capital construction costs and normalized to today's dollars. So, even though some of those costs might be expended in monitoring 30 years from now, the calculation analysis is bringing it back to 2016 dollars for comparison.

So, $9.8 million, nominally, for Alternative 2; over $11 million for Alternative 3; and over $17 million for Alternative 4.

So, now I just want to move into the proposed plan. The proposed plan summarizes all the information I've

given already about the early investigations, the early response actions and cleanups, the remedial investigation, and the focused feasibility study.

And then as EPA's document, it goes one step further and identifies EPA's preferred alternative. It's based on those seven criteria that I mentioned before: The five balancing criteria, the two threshold criteria. It does not reflect state acceptance and community acceptance because that is still in progress.

We will complete the evaluation in the next step, which is a record of decision. That's a document that identifies the cleanup alternative. And there will be in that document a summary of the public comment received and EPA's responses to the public comment. So that section of the record of decision is called the responsiveness summary.

So, as mentioned, Alternative 3 is the one that EPA has proposed. It has

that additional cap and cover in targeted areas that need it. Those caps and covers would be tied into the existing caps and covers and engineered covers in that consolidation area, for example.

Continued passive recovery of the DNAPL in Area 1. That's what's collected over 6,000 gallons to date. It's been very successful.

Continued use of the barrier wall system that is in place to keep the contamination contained.

And then a new DNAPL recovery system in Area 2 that was not previously identified before.

Institutional controls in the form of the groundwater restrictions for the classification exception areas, well restriction areas, as well as deed notices on property to prevent exposure and to protect the remedy.

Building demolition of the five dilapidated Edison buildings.

And operation, maintenance, and

the five-year reviews.

So, again, that's a six-month construction time and $11,250,000.

So, this is just a drawing that shows some of the details that are in the focused feasibility study about the remediation plan. It's a little hard to see. The Edison buildings would be demolished, areas would have additional capping and/or caps would be replaced or repaired as necessary. This is sort of the engineering details there.

One of the things that EPA considered is future use of the Standard Chlorine site. So, EPA has a program called the Superfund Redevelopment Initiative. It's very much part of the Superfund process, and we work with communities to support the productive use of sites.

So, applying that to the Standard Chlorine site, we have been in contact with entities that are working towards redevelopment of the Standard Chlorine and Diamond Shamrock properties as well

as the Koppers Seaboard property. So, there are planning efforts that are underway for warehousing and distribution facilities where the Standard Chlorine site is located.

Alternative 3 is compatible with this redevelopment. And we do recognize that there may be some adjustments that are necessary to the location of existing components or the nature of the existing components. But these are pieces of the project that we would address during the remedial design.

So, when we're doing the engineering design for the cleanup, we would be able to take into account at that time if there are elements of the alternative that need to be adjusted due to the redevelopment plans. But any changes we make would need to maintain the level of environmental protectiveness that exists.

Alternative 3, just to wrap up the last couple of slides, it satisfies the two threshold criteria. So, it's

protective of human health and the environment and complies with the environmental applicable or relevant and appropriate requirements or in the case of the very stringent groundwater cleanup standards, we believe justifies a waiver based on technical impracticability. But for all the other ARARs, they would be met.

We find it has the best balance of tradeoffs among the balancing criteria. And we will, as I mentioned, address the two modifying criteria, state acceptance an community acceptance, at the close of the public comment period. And that will be contained within the record of decision, which is the EPA document that identifies the final cleanup decision.

So, just with respect to comments, to reiterate what David said, the public comment period is open until August 26. The comments come to me, and my e-mail address is there or, you know, U.S. Mail or snail mail. Any way that it comes.

And then at this meeting, we'll

take any oral and written comments that people would like to provide to us.

So, thank you.

(Applause.)

MR. KLUESNER: As you can tell, Alison is very thorough, a lot of time -- and I say that in the most -- you want somebody that is scientific and thorough and has a good grasp of what's going on with the site.

So, thanks, Alison, for really a very helpful presentation. It's a complex site, a lot of history and things to consider.

So, you can either supply comments on a card or e-mail or we'll open up the floor now. And let's get a show of hands for how many folks have a question or comment. Not holding you to it, just wanted to know how much time to allow for comments.

We'll start with you, then, sir. If you wouldn't mind stating your name.

MR. O'CONNOR: Can I do it from here?

MR. KLUESNER: You can do it from here as long as Linda can hear you.

MR. O'CONNOR: I'm Michael O'Connor, and I'm here representing the Hudson County Improvement Authority.

And before I say anything, I want to echo and expand on your comments regarding EPA's work through this process and particularly Alison Hess.

The Hudson County Improvement Authority, in the previous slides, owns the adjacent 135-acre parcel which is concluding the act of remediation of that 135 acres and transitioning to redevelopment. And we've been engaged particularly with Alison over the past three, maybe even four years, and she's been utterly professional and communicative.

And that goes for everyone on the EPA staff. We know how much hard work has gone into getting to this point and getting to a record of decision.

So, I'm here. I'll limit my comments beyond that. The HCIA has

provided written comments for the period, including a letter today, related to a specific issue we feel needs to be addressed before proceeding and included in a record of decision.

And for those in the audience, really, as much as for the record, the issue is a portion of the slurry wall that surrounds and contains the site that was placed on the 13-acre portion of the Koppers property approximately five years ago as an interim remedy.

The design of that wall is a cement and bentonite wall, which is -- while it serves its purpose to contain any issues with groundwater or movement of contaminants, it is not suitable for either completing the remediation that's ongoing with the Koppers site or, equally importantly, facilitating the redevelopment of the site.

Essentially, because of its nature and fragility, we cannot complete filling the property, the Koppers property. The Koppers property has been

raised outside the Sandy floodplain up in some spots as high as 14 feet with remediated dredge material from the harbor. That's all part of an approved remedial action work plan from the state Department of Environmental Protection. That work is almost complete.

However, there is probably 1,000 or so feet from the property line for the Standard Chlorine, there is what essentially is a valley now where the fill is on one side, the fill is on the other, and it tapers down; tapers down to the location of the cement bentonite slurry wall because that slurry wall was not designed to accommodate additional fill. That slurry wall in its present design, location, and condition will not accommodate development on the site.

The contract purchaser for the Koppers site, The Morris Company, has worked to design the site to try to avoid building on the slurry wall. Their current design only includes a small portion of a building on the

slurry wall; however, even in that condition, the slurry wall in its present condition and location is unsuitable for redevelopment.

So, we've asked in a number of letters and comments that EPA recognize at this point instead of waiting for the remedial design, which I know is reflected in the Powerpoint, and include our comments and our requests in the plan and, ultimately, in the record of decision.

We also have another issue that needs to be addressed, which is again in our letter, which is related to that Area 2 which has come up, I believe, late in the process. I think that was -- it's my understanding any way. The issue of that area is it is the, for all practical purposes, essentially the only location that a common access road can be created for this peninsula in order to get in and out and facilitate the development both of the Standard Chlorine and the Tierra piece, which is

all together approximately 50 acres, and the Town of Kearny has a plan for a 800,000-square foot warehouse on that site, and then the same access for vehicles and utilities to serve over 2 million square feet of warehouse distribution on the Koppers Seaboard site, as well as accommodating, which we anticipate on the site, a facility from New Jersey transit that is a regional -- a part of the regional microgrid post-Sandy project to provide electricity in the event of a system wide outage.

So, it's a critical point, the slurry wall. I think generally the other elements of this clearly lend themselves to the redevelopment of this entire peninsula. The peninsula was designated as redevelopment area with a plan adopted by the Meadowlands Commission, now Sports & Exposition Authority, consistent with everything that I've just described in the redevelopment plans that The Morris Company and the Town of Kearny have for

the entire site.

So, again we're asking the EPA just to acknowledge and recognize this in an appropriate way.

We've also engaged the participating parties group, the group of responsible parties. One of those parties is the responsible party for the Koppers Seaboard site, and they've been very cooperative throughout our process in terms of the Koppers Seaboard site. We're seeking that cooperation amongst the larger parties group to deal with this slurry wall.

The last thing I'll say about this is we're talking about the slurry wall basically bifurcating what would be the 30-acre development parcel on the Koppers site and rendering that potentially undevelopable or certainly much less developable. And that's jobs, both construction jobs and tax ratables and permanent jobs, for the town and for the region.

Thank you very much.

MR. KLUESNER: Thank you.

Back there?

Yes, sir.

MR. KENNEDY: Good evening. Excellent presentation.

Good evening. William Kennedy, President of the Essex County and Vicinity Building and Construction Trades Council. Thank you for that presentation.

A job like this comes around once in a lifetime for us guys that are in construction. We've driven by this site for years on our way to various jobs and see nothing happen. We see -- we're going back to 1981. We're very grateful to the Sports & Exposition Authority, Hudson County Improvement Authority, but were most grateful to Morris Company for having the vision for this site.

All we're asking for the craft is to just review the plan, please, with an open mind. Like I said, this is really critical to our survival. That's all we ask.

Thank you.

MR. KLUESNER: Thank you.

Next question? Comment?

MR. SHEEHY: Ron Sheehy.

What's the chemical that's most contaminated on the site, would you say?

MS. HESS: There are many, many different contaminants at the site.

MR. SHEEHY: The most with the parts per million.

MS. HESS: So, chlorinated benzene is a big one, naphthalene is a big one, and, you know, many volatile organic compounds. It's really quite a long list.

MR. SHEEHY: And you're shooting for Alternative 3 to clean up the site?

MS. HESS: Yes.

MR. SHEEHY: Are you familiar with the Linden Chlorine plant, one acre bigger, 26 acres?

That cost site cost $37 million to clean up and it took a couple years.

MS. YACOVONE: Are you referring to the LCP Chemical site in Linden, New

Jersey?

MR. SHEEHY: Yes.

MR. KLUESNER: Krista, if you could just introduce yourself.

MS. YACOVONE: Sorry. Krista Yacovone, site attorney with EPA.

That site has finished the RI/FS process and is now in the initial stages of the remedial design process, which would be the next step for Standard Chlorine after our ROD is issued. So, we're still in the cleanup process on the LCP site.

MR. SHEEHY: It's capped and covered and it's ready to be built on, LCP.

MS. YACOVONE: Similar to the Standard Chlorine site, there was an interim remedial measure as part of the RCRA, Research Conservation and Recovery Act, program. So, that was, like at the Standard Chlorine site, an interim measure.

So, LCP is not, you know, near the completion of the cleanup process yet.

MR. SHEEHY: All right. Well, I know that site costs $37 million plus.

MS. YACOVONE: There's an anticipated $37 million remedy. That was our remedy that was put forth in the ROD. But that remedy hasn't been implemented yet because we're still in the investigation and design phase.

MR. SHEEHY: Well, they had a warehouse hoping to be built there, I know that, ready to be started.

But if you do this for $11 million and that's final cost, I'm just confused how you got it cheaper.

MS. YACOVONE: The LCP site is a totally different site. There's different contamination at that property --

MR. SHEEHY: It was chlorine and it was capped.

MS. YACOVONE: There is still an extensive portion on the site that's not yet capped. So, there is a lot of elemental mercury on that site and there is a pilot study being tested to try to

reduce the level of contaminants before going forward with the capping remedy.

So, it's a little bit differently calibrated remedy because of the different nature of the contaminants and the different nature of the sites.

MR. SHEEHY: Okay. Thank you.

MS. YACOVONE: You're welcome.

MR. KLUESNER: Questions? Comments?

MS. COY: My name is Laura Tracey Coy. I was born and raised in Kearny, New Jersey. I presently live at 41 Washington Avenue in Elmwood Park, New Jersey.

I'm with the executive committee with the New Jersey Sierra Club. I have New Jersey Sierra Club's statement on this cleanup.

The cleanup plan for the Standard Chlorine Superfund site is really just a stabilization of one of the most toxic sites in New Jersey. We need the EPA to come up with a long-term plan to remove toxic chemicals from this site.

Far too long, Standard Chlorine Chemical has been leaking chemicals, like PCBs, benzene, dioxins, into the river. The cap they are proposing for the site is only temporary and will add more harm to the Hackensack River. To leave a toxic plume under a river is a disaster waiting to happen. A cap will further spread these contaminants into the groundwater and add insult to injury.

We are more concerned since the area is prone to flooding. When the cap fails, it will contaminate homes, basements, and all the area when it floods. Given climate change impact by sea level rise and increased storm surge, this cap could be a nightmare for years to come.

All sites that are capped at some point will fail, but in -- because institutional controls do not work. What the EPA must completely do is remove the contaminated sediment to protect the health of the public and the

environment.

The cleanup of this site has been a priority for The Sierra Club. We have been advocates for decades to fully clean it up. Standard Chlorine Chemical Company was originally nominated to the Superfund list in 2000 by Governor DiFrancesco. It was blocked from the list by 2002 by McGreevy Administration, who wanted to use the chlorine site for a rail yard and an industrial park.

The Sierra Club worked tirelessly to get this site relisted on the Superfund list. It made its documents public that showed the cover-up on this toxic site and released them to the press, blowing the whistle on this dirty deal in 2006.

The Sierra Club petitioned EPA director and the DEP to put Standard Chlorine back on the Superfund list, and then it was listed again in 2007. Lisa Jackson in the DEP reversed the previous administration's action, approving the site to go back on the list.

The Hackensack River and the Meadowlands are a beautiful place and environmentally important. We need to have this cleaned up and have this historic toxic legacy stopped. There are already fish advisories in place and we know the chemicals from this site are having a impact on wildlife, especially fish and birds.

The irony is the meadowlands becomes cleaner and attracts more species and the more toxic chemicals from this site ends up hurting those species that we are actually encouraging to come here. The toxic chemicals like PCBs, dioxins, are a real threat because they bioaccumulate in different species and affect the entire food chain.

This is one of the most complex sites because of the different types of pollutants and chemicals here. EPA must hold polluters accountable for a full cleanup. The Standard Chlorine Company is still around and the EPA must make them pay for a proper cleanup, not just

pave and wave. The EPA must put forward a cleanup plan, not a cap, that will not sell out people and the environment.

We also need a complete and thorough cleanup for the Hackensack River itself.

MR. KLUESNER: Thank you. Much.

MR. SCHWARTZ: Can everybody see that?

(A chorus of yeses.)

MR. SCHWARTZ: My voice, I have a little sore throat, but it gets better as I talk.

In any event, I'm glad everybody's here tonight. It's nice to see the folks from the unions concerned about this project.

I want to compliment Alison on her presentation. We're friends, we met before.

And my name is Theodore A. Schwartz. I'm with the law firm of Scarinci Hollenbeck, and I represent Morris Kearny Associates. My comments concern the EPA's proposed remediation plan for

the 13 acres located on the Koppers Coke site, which Alison referred to a number of times. That's the area where the bath tub is, but I'll show you all that.

Morris is the contract purchaser of the 175-acre Koppers Coke site from HCIA for redevelopment of the 175-acre site.

I want to make it clear upfront that Morris supports EPA's remediation objective, and our proposed modifications will not interfere with the protection of human health and the environment.

Mr. O'Connor spoke before, and I think he kind of laid out the issues, representing the HCIA. We have been working very closely with the HCIA in this development project, which I'll show you in a little while.

The redevelopment project consists of 2 million square feet of port-related warehouse distribution centers, comprising four buildings.

Now, this is an aerial view of the

Koppers site. The upper part up here is the Standard Chlorine site. I have no comments about the Standard Chlorine site. Whatever they have to do there, they have to do there.

But as you can see, the HCIA property ends right about here. You have these three retention basins. This is Route 7 --

Am I blocking your view?

This is Route 7 in the corner here. That's the Hackensack River. And that bridge over there, which is the biggest problem of Amtrak, is what they call the portals bridge. That breaks down a lot, gets stuck, so the trains can't go through to New York.

That bridge is going to be replaced and there's going to be two new tracks put in for Amtrak, so they have four tracks going to New York from Newark. Presently, there's only two.

So, in any event, on this Koppers site, there's a processing plant down here which takes in dredged material

from the New York Harbor deepening projects. They process the material and they make what they call a processed dredge material out of it, and that is the material that's been placed on the site, as Mr. O'Connor pointed out, to fill in in the area.

This entire site was underwater, most of it was, when Sandy came about. The elevation of the water on Sandy was about 13 feet on this site. So, the HCIA, through the fill material, has brought the site up to a grade that's protective of any flood condition.

And the area that Michael talked about where there's a valley up in here, where the slurry cutoff wall that Alison spoke about is located.

Now, Morris' plan is on here, and what it consists of is four big box warehouse buildings. This is the Hackensack River, if you remember from the other picture, comes around down here; this is the railroad, the old Erie Lackawanna Railroad; and then you have

the new portals bridge being built over the Hackensack River over here.

So, you have one, two, three buildings. This area is going to be purchased by New Jersey Transit for what Mr. O'Connor pointed out is this microgrid to help with the reserve power in case of storms. So, that's a pretty large project, and they got a grant for over five or six hundred million dollars for it.

Then we come to lowly building four, which is over here. And this is the area of the site that's impacted by the slurry cutoff wall.

Now, Morris will be investing substantial sums of money without any public funding subsidies to transform this property into a useful and productive area.

The New Jersey Sports & Exposition Authority has declared that this is a vital project for the region, and that's very significant. And it's part of the overall Koppers Coke peninsula

redevelopment plan.

Now, on this site, you'll not only have the four buildings, but all the parking and roads. On this site, we have to bring in -- Morris has to bring in many all of the infrastructure, all the water in, the sewer in, the electric in. And gas lines have to come in for the New Jersey transit project.

The redevelopment project, for Mr. Kennedy's benefit, will create about 1,500 to 1,800 permanent jobs and approximately 2,000 construction jobs. Morris has always been a union developer.

The project will generate approximately $1.2 billion in overall economic activity in the region, including substantial revenues to the Town of Kearny. The project is supported by federal, state, and county officeholders, along with the building trades of Hudson and Essex County and associated unions.

The issues of concern relate to

the focused feasibility study and remedy for the Standard Chlorine site; in particular, the 13-acre section that is located on the western portion of the Koppers site. The 13 acres consist of an interim underground slurry wall, which Alison went through, and associated monitoring pumping wells.

The focused feasibility study in the proposed EPA remediation plan seems to make the interim -- I call it interim -- slurry wall a permanent environmental control without consideration of matters of concern to HCIA, NJSEA, and Morris, all including development of the 13-acre area and, as Mr. O'Connor pointed out, the HCIA's obligation to meet the remedial action work plan requirements.

Now, the slurry wall in this picture, this chart -- this is a Tierra site, this is the Town of Kearny site, this is the property line of the Koppers Coke site, this is building four. As was shown on one of the pictures on the

TV screen, the slurry wall runs like this. It comes up here.

What does that impact? That impacts part of the building development because the slurry wall, as I'll get to later, is not designed to handle any of the fill material that has to go on it or even the parking lots or buildings. So, that slurry wall is our big issue.

As pointed out by Michael, it's made out of bentonite cement. If it was made of bentonite and soil, it would be a much better and stronger wall that could probably support some of the activities.

The HCIA has been filling the Koppers site to complete its final remedial action work plan remediation by elevating it out of the floodplain and enabling the final engineer control to be installed pursuant to the site redevelopment plan.

The slurry wall, due to its location, impacts the regulatory obligation of HCIA to complete

installation of the engineering controls required by DEP in the approved remedial action work plan for Koppers, placement of fill in the slurry wall area to enable final engineering controls and building foundations, parking, and other environmental controls.

See, all of these warehouses have a tremendous amount of truck parking on them, so most of the site is going to be paved, at least the Koppers Coke site, which is very good. That's the way you want to go. We don't have problems on the Koppers Coke site like they have on the Standard Chlorine site, but having the cap put on it, what they call an impervious cap, with buildings and parking lots, it's very important in maintaining the stability of a site.

The HCIA in its letter of July 8 outlined in detail the revisions necessary to the focused feasibility study. That letter was sent to EPA.

They also sent a recent letter, I think it was today, because I got a copy

of it, and we support that letter also.

As noted in those communications -- and this is important -- the interim slurry wall as it presently exists does not have the structural integrity to support the completion of the placement of the fill required by HCIA as called for in the remedial action work plan and, accordingly, prevents its implementation, the installation of engineering controls, the hard scape, the impervious cap, et cetera, that accompany development of this site.

This has been confirmed by an independent geotechnical study that was commissioned by the Hudson County Improvement Authority.

The slurry wall also materially affects building four, which is the building to the west, its foundation, parking, and installation of infrastructure needed for development of the peninsula, which is roads, water, sewer, gas, and stormwater.

I want to make particular mention of Area 2 that Alison spoke about, which has what they call DNAPL in it. That Area 2 is kind of up in here. And as you can see, that's where the main road is going to come in, that's where all the utilities come in for the site; electric, water, sewer, et cetera, comes in through that area. And with the contamination that exists in that section of the property, it will make it very difficult to install these features without some further environmental work being done.

And as Mr. O'Connor pointed out, presently there's a wide valley that exists between the slurry wall, which is located on the HCIA property. What's happened is the HCIA has filled kind of up to here and they have a big pile of fill material sitting on the site. But they can't put it on top of the slurry wall because the slurry wall will cave in. So, if you can't put the fill on top of the slurry wall, then the HCIA

can't complete their environmental remedy by capping the entire site. So, if they can't cap the entire site, hence, what happens is we can't build our buildings and parking lots on building four. That's a tremendous economic downside.

I'll try to cut this short because everybody wants to go home and watch the Olympics. We'll get there.

The remediation plan selected by EPA on the 13-acre area affected by the Superfund site is incompatible with the development of the Koppers site, as it interferes with the cleanup of HCIA and the redevelopment.

This is important. I understand from our environmental consultant and the LSRP, or the Licensed Site Remediation Professional, for HCIA that oversees the Koppers site remediation, that the interim slurry wall can be relocated and constructed of different materials without impact to the Standard Chlorine remediation. That's very

important. We feel it can be relocated to do the same job that it's doing now.

When the wall was originally designed and installed, it had to contend with this drainage basin which is up here. So, it went around the drainage basin. Well, now, with the site development plan, all of these drainage basins or retention basins, they are going to be eliminated.

So, there's no need for the wall to be where it is, it can easily be moved without impact to the environment, and that's basically what we're asking for.

There's also another approach where the EPA in their ROD can direct that the wall be moved or direct that the existing wall be rebuilt to a stronger consistency so that it could withstand the weight of the fill and the development.

MR. KLUESNER: If I could just ask, first of all, Linda, how are you doing?

THE COURT REPORTER: I'm okay, thank you.

MR. KLUESNER: You're fine.

I just want to make sure we have enough time to get to everybody's questions and comments.

MR. SCHWARTZ: I've handed in my whole speech, so I'm going to cut it back as much as I can. Lawyers get windy and wordy, you know how it is.

Some of the technical issues I'm not going to get into because they're very technical.

But in closing, what we'd like to do is continue to work with the EPA before the ROD is issued so that they can accommodate the concerns. And Alison is very well aware of what they are. I'm sure there's going to be a lot of correspondence in this regard.

So, we'd love to work with you. You've been great so far, and so has the young lady here, Krista.

So I think that's about it. There's not much more to say. I have

some handouts, if people want them, that explain everything that I've said.

I thank you for your patience. And I hope that this can be worked out so everybody can benefit and we get the project built, we get jobs, and so on, so forth. Thank you.

MR. KLUESNER: Thank you.

Other comments and questions? Comments or questions?

MS. McCURRIE: Susan McCurrie from Kearny. I know there will probably be written comments from the town representatives from Kearny for this.

Again, I'd like to echo Mike O'Connor's statements as far as EPA and Alison, everyone working there, David. It's a very complex and difficult thing to take a Superfund site and manage it the way you have looked at it and try to focus on what has been a great end goal, which is development.

And not only does it help everybody here, that development with the jobs, it helps the taxpayers in

Kearny, it helps everyone going along at the end of the game. We would support, and I know I support, any kind of development at Standard Chlorine, and we'll talk only about Standard Chlorine; that we support any kind of plan, any kind of remediation that supports the warehouse/industrial development that will bring jobs, bring construction jobs, bring jobs for those who will be in the warehousing business, and ratables. And maximize, maximize, the potential of that development on Standard Chlorine for as much as we can develop that property.

So, that's where we would be. Again, we appreciate the focus of this and the focus of this meeting, which is turning a Superfund site into a developable, usable property that brings ratables and jobs back to the Town of Kearny and Hudson County area.

Thank you.

(Applause.)

MR. KLUESNER: Questions?

Comments?

Can you identify yourself?

MS. LAMEGO: Debra Lamego. I'm a resident of Kearny, long-time resident. I just have some questions, concerns, about worker exposure to the VOCs, DNAPL, benzene.

Where will all the materials from the demolition go, and who owns the land that the Edison buildings are on?

MR. KLUESNER: Alison or Krista?

Between the two of you, you have the brain trust.

MS. HESS: The property that the Edison buildings are on is owned by the Town of Kearny.

The materials from that demolition would go offsite for disposal.

MS. LAMEGO: Where offsite?

MS. HESS: That location has not been selected yet. That would be part of the remedial design, engineering design, of the demolition component.

And the workers at the site for the remediation would have the standard

health and safety protocols and personal protective equipment that's necessary for their tasks. And training.

MS. YACOVONE: As part of the institutional controls that we would implement as part of the remedy for the site, there is a health and safety notice so that anyone who comes -- they have to be posted on the site. Anyone who comes on the site knows they have to follow certain protocols to be protected from potential exposure.

MR. KLUESNER: More questions? Comments?

Yes, sir?

MR. PARDAL: I'm Jorge Pardal, also a resident in Kearny.

My question is why can't that soil just be removed?

You're talking about 40 feet, 6 inches, 25 -- talking about 44 -- almost 70 cubic feet of soil.

Why can't that soil just be removed, cleaned off, filled; dredging and filling?

Why can't that soil just be taken out of here?

MS. HESS: It's theoretically possible to excavate and remove all the soil and take it somewhere else. It was determined in an early screening process in the focused feasibility study that that wasn't practicable, to take all of that material and move it somewhere else. That's similar to the approach with landfills that are also very extensive amount of material, and it's not practicable to take all of that somewhere else.

So, that technology, if you will, or that option was screened out early in the focused feasibility study.

MR. KLUESNER: Thank you.

Other questions or comments?

MR. ECKER: My name is Bill Ecker, I'm just a concerned citizen.

The woman from The Sierra Club spoke about this stuff getting into the Hackensack River.

Is there any evidence of that?

MS. HESS: Historically, there were releases from the Standard Chlorine and from other sites along the Hackensack River into the river.

But currently, because of all of the work that has been done to date, there's no longer any discharge from the site into the Hackensack River.

MR. ECKER: Thank you.

MR. KLUESNER: Additional questions? Comments?

You've been a very patient group. Again, thank you so much for coming out.

Again, the comment period goes through August 26. The comment cards are out on the table. How to contact Alison with your comments, that information is on the table and on the screen up there.

Thank you so much. I really appreciate it.

(Applause.)

(Time noted: 8:36 p.m.)

C E R T I F I C A T E

STATE OF NEW JERSEY)
) ss.
COUNTY OF HUDSON)

I, LINDA A. MARINO, a Registered Professional Reporter and Notary Public of the State of New Jersey, do hereby certify that the foregoing transcription of the meeting held at the time and place aforesaid is a true and correct transcription of said my shorthand notes.

I further certify that I am neither counsel for nor related to any party to said action, nor in any way interested in the result or outcome thereof.

IN WITNESS WHEREOF, I have hereunto set my hand this 21st day of August, 2016.

_____

LINDA A. MARINO, RPR, CCR

SCCC SITE

RECORD OF DECISION

APPENDIX 5-D WRITTEN COMMENTS

CASTANO QUIGLEY LLC
ATTORNEYS AT LAW

JAMES P. BRUNO
jbruno@cq-law.com

August 26, 2016

Via Electronic Mail

Alison Hess, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 19th Floor
New York, NY 10007

Re: *Standard Chlorine Proposed Plan*

Dear Alison:

Please accept this letter on behalf of the Town of Kearny with our comments on the remedial action alternative proposed by the USEPA.

At the outset, we want to commend you and the entire USEPA staff for working so diligently on a very difficult site. We look forward to continuing to work with the USEPA and all other public and private parties to complete the remediation and to promote the redevelopment of the site that will create jobs and produce tax ratables for the Town of Kearny.

We have only a few comments, which all relate to Kearny's proposed redevelopment of the Standard Chlorine Site, through its designated redeveloper, the Sitex Group.

At the August 16 public hearing the attorney for the Morris Companies ("Morris") presented a plan that showed access through the Standard Chlorine site. The Town is committed to work with the Hudson County Improvement Authority ("HCIA"), and Morris as its designated developer, to provide access through the Standard Chlorine site to the Belleville Turnpike. However, the access road shown on the plan presented by the attorney for Morris at the hearing encumbered a significant portion of the Standard Chlorine site. We intend to work with the HCIA/Morris to arrive at a location that works in conjunction with, and minimizes the impact on, the proposed redevelopment of the Standard Chlorine site.

We note also that, although the redevelopment agreement with Sitex is not finalized, that agreement will include provisions regarding the demolition of the remaining Standard Chlorine buildings by Sitex. Until redevelopment occurs, we must reiterate that Kearny has no liability, under federal or state law, for remediation because it acquired the property by tax foreclosure.

We thank you again for all of your efforts, and look forward to a continued cooperative effort with the USEPA and all parties to complete the remediation/redevelopment of the Standard Chlorine site and the adjacent properties on the Koppers Peninsula.

Very truly yours,

James P. Bruno
CASTANO QUIGLEY LLC

cc: Michael O'Connor, Esq. (HCIA)
Paul Conciatori, Esq. (Sitex)
Lori A. Mills, Esq. (Tierra)
Mayor Alberto Santos

PS&S

VIA OVERNIGHT MAIL

December 10, 2013
1407-0099

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

Education
Energy
Federal
Healthcare
Hospitality
Infrastructure
Real Estate
Science & Technology

RE: Former Koppers Seaboard Site
Kearny, New Jersey
Program Interest Number G000001985

Enclosed is a Remedial Action Work Plan for the Former Koppers Seaboard Site, Kearny, New Jersey. One hard copy and one electronic copy on CD are enclosed. An original signed copy of the NJDEP Remedial Action Work Plan Form is also enclosed.

If there are any questions regarding this matter, please call me at (732) 584-0286 or contact me by e-mail at jbolan@psands.com.

PAULUS, SOKOLOWSKI AND SARTOR, LLC

Very truly yours,

John T. Bolan

John T. Bolan, PE, LSRP
Senior Associate

Enclosures

cc: Patricia Carpenter, Municipal Clerk, Town of Kearny (w/enclosure)
John P. Sarnas, Kearny Health Department (w/enclosure)
Barbara Netchert, County Clerk, County of Hudson (w/enclosure)
Carol Ann Wilson, Director, Hudson County Department of Health & Human Services (w/enclosure)
Carrie Nawrocki, Executive Director, Hudson Regional Health Commission (w/enclosure)
Norman M. Guerra, Chief Executive Officer, Hudson County Improvement Authority (w/enclosure)
Michael Slenska, Senior Environmental Manager, Beazer East, Inc. (w/enclosure)

67B Mountain Blvd Ext
PO Box 4039
Warren, NJ 07059

t. 732.560.9700

www.psands.com

FINAL
REMEDIAL ACTION WORK PLAN ADDENDUM

FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

Prepared for:

Hudson County Improvement Authority

Prepared by:

Key Environmental, Inc.
200 Third Avenue
Carnegie, Pennsylvania 15106

NOVEMBER 2013

FORMER KOPPERS CO INC, SEABOARD SITE (PI NO:G000001985)CASE INVENTORY DOCUMENT

Area(s) of Concern, Receptor and Emergency Response Tracking	Impacted Media	Contaminants of Concern	Exposure Route	Receptors		
				Existing	Potential	
Unconsolidated Fill Zone (shallow) Groundwater	Groundwater	VOC's, SVOC's, Metals, Cyanide	Direct Contact, Groundwater	Hackensack River	Hackensack River	Phase I Investigation (ERT - August 1986) identified constituents (VOC's, SVOC's CN, metals) in surfical fill groundwater. Phase II RI (Keystone-June 1998). Plan for containment (slurry and steel sheetpile wall) and natural attenuation of dissolved phase contamination developed (KEY - RAWP May 1998) and implemented in 1999 by Safety Kleen (KEY - 2003 RARPR). Periodic groundwater monitoring/reporting conducted since 1999 (KEY Quarterly submissions). Modification of monitoring plan in 2007 (KEY-August 2007 RAWPA). Plan modifications performed in 2008. Addition of natural attenuation enhancement (Funnel and Gate and slurry wall extension) developed at NJDEP's request, (KEY-RAWPA August 2007) and implemented as documented in Remedial Action Progress Report (KEY - RAPR, August 2011). CEA issued by NJDEP (August 2011). A CEA Biennial certification was filed on August 12, 2013.
Former Production Wells	NA	NA	Groundwater			Workplan to locate former production wells (ITEX - May 1997) implemented. Two wells abandoned (PW01 and PW02). Following detailed investigations, two wells considered lost (PW03 and PW04) by NJDEP (NJDEP-12/1997). Deep bedrock well installed and sampled in PW area (June 1999) and no further action determined. Documentation provided (KEY-RARPR, October 2003)
Site wide surface soils	Soils	VOC's, SVOC's, Metals, Cyanide	Overland Flow, Direct contact, Groundwater, Surface Water	Hackensack River, Future On-Site Workers	Hackensack River, Future On-Site Workers	Phase I Investigation (ERT - August 1986) identified contamination (VOC's, SVOC's CN, metals) in surfical fill soils. Phase II Conducted (Keystone June 1988). Additional investigations in 1990 and 1997. Plan for installation of processed dredged material (PDM) surface cover (KEY - RAWP May 1998). Plan partially implemented (KEY- RARPR October 2003). Revisions to grading plans, permeability requirements and draft Deed Notice (KEY - RAWPA August 2008). Subgrade portion of surface cover plan implemented (KEY- RAPR August 2011).
Dense Non Aqueous Phase Liquids	Groundwater	VOC's, SVOC's	Groundwater, Direct Contact	Hackensack River	Hackensack River, Future On-Site Workers	Phase I Investigation (ERT August 1986) identified DNAPL in former coal tar plant area. Phase II RI conducted (Keystone - June 1988). Additional investigations and plans/permits (Keystone 1990 to 1991) for pilot interim remedial measures (IRM) system to remove DNAPL developed. Pilot IRM initiated in 1992. NJDEP issues NJPDES permit with monitoring and reporting requirements for IRM. IRM modifications for IRM approved by NJDEP and implemented by Beazer in 1994. NJPDES renewed by NJDEP in 1998. System has been upgraded and continues to operate on a continuous basis. 2007 NJDEP approved plan for expansion (KEY - RAWPA August 2007). System expansion completed and operational (KEY - RAPR August 2011). Periodic NJPDES reports issued.
Former -1 Million Gallon Above Ground Tank	Contents	Naphthalene, Coal Tar	Overland Flow			Phase I Investigation (ERT August 1986) identifies 1,000, 000 gallon former storage tank containing coal tar distillates. RAWP for Tank (KEY 1996) updated in 1998 (KEY- RAWP May 1998). Off-site disposal and demolition implemented in 1999 and documentation provided (KEY - RARPR October 2003).

FORMER KOPPERS CO INC, SEABOARD SITE (PI NO:G000001985)CASE INVENTORY DOCUMENT

Area(s) of Concern, Receptor and Emergency Response Tracking	Impacted Media	Contaminants of Concern	Exposure Route	Receptors		
				Existing	Potential	
Dike Materials	Fill/Debris	SVOC, Dioxins/furans, metals	Surface Water, direct contact	Hackensack River	Hackensack River and Future On-Site Workers.	Phase I Investigation (ERT-August 1986) identifies and characterizes structure. Phase II RI conducted (Keystone - June 1988). Additional characterization performed (Keystone - RASSP 1990). Plan to remediate dike (excavation and on site consolidation) included in 1998 RAWP and RAWPA August 2007. Additional characterization performed (KEY- June 2008). Remediation completed in 2009-2010 and documented in RAPR August 2011.
Sediments	Hackensack River Shoreline fill/sediments	SVOC, Dioxins/furans, metals	Surface Water	Hackensack River	Hackensack River, Future On-Site Workers	Investigation (Keystone - June 1988). Additional characterization performed in 1990 (Keystone - RASSP). Plan to remediate sediments (excavation and on site consolidation) included in 1998 RAWP and RAWPA August 2007. Additional characterization performed (KEY- June 2008). Remediation completed in 2009-2010 and documented in RAPR August 2011.
Western Area Waste Piles	Fill	SVOC's VOC's metals, Dioxins/Furans, metals	Overland Flow, Direct contact	Hackensack River	Future On-site workers	Phase I Investigation (ERT-August 1986) conducted. Phase II RI conducted (Keystone - June 1988). Additional characterization performed in 1990 (Keystone - RASSP). Plan to remediate waste piles (solidify and/or consolidation and surface cover) included in 1998 RAWP and RAWPA August 2007. Work performed in 2008/2009 and documented in RAPR August 2011.
Western Area Chromium Deposits	Fill	Chromium	Surface water, direct contact	Hackensack River	Future On-Site Workers	ERT - August 1986 identified chromium fill area in western area of Site. Additional delineation performed per 1998 RAWP. Per 1998 RAWP and 2007 RAWPA plan to consolidate/solidify areas. Additional characterization performed and amended remediation approach to capillary break installation (Western Area additional Chromium Delineation and RAWPA Supplement KEY- October 2008). Remediation performed (Capillary break) and documented (KEY - RAPR August 2011).
Eastern Area Chromium Deposits	Fill	Chromium	Surface water, direct contact	Hackensack River	Future On-Site Workers	Delineation performed per 1998 RAWP. Per 1998 RAWP and 2007 RAWPA included plan to consolidate/solidify areas. Additional characterization performed and amended remediation approach to capillary break installation (Eastern Area additional Chromium Delineation and RAWPA Supplement KEY- July 2008). Remediation performed (Capillary break) and documented (KEY - RAPR August 2011)
Central Area Waste Piles	Fill	CN, SVOC's, metals	face Water, direct cont	Hackensack River	Future On-Site Workers	ERT - August 1986 identified waste piles in central area of Site. Phase II RI conducted (June - 1988). Central area waste piles removed and disposed off-site and gravel surface cover installed. NJDEP accepts remediation as complete in 1990.
Glacial Till	NA	None	Groundwater			Phase I and Phase II RI conducted (ERT - 1986 and Keystone - June 1988). Per May 1997 letter work plan (ITEX) additional investigation of glacial till groundwater conducted. Glacial till groundwater monitoring plan included in 1998 RAWP and 2007 RAWPA. Monitoring and quarterly reporting ongoing.

New Jersey Department of Environmental Protection
Site Remediation Program

REMEDIAL ACTION WORKPLAN FORM

Date Stamp
(For Department use only)

SECTION A. SITE NAME AND LOCATION

Site Name: Former Koppers Seaboard Site

List all AKAs: Koppers Company Inc. Seaboard Plant; Beazer East, Inc. Seaboard Site; Beazer East, Inc.

Street Address: One Fish House Road

Municipality: Town of Kearny (Township, Borough or City)

County: Hudson Zip Code: 07032

Program Interest (PI) Number(s): G000001985 Case Tracking Number(s): NJD00244512

Date Remediation Initiated Pursuant to N.J.A.C. 7:26C-2: 03/01/1986

State Plane Coordinates for a central location at the site: Easting: 607049 Northing: 696938

Municipal Block(s) and Lot(s):

Block #	287	Lot #	32.01, 54, 55, 56, 60	Block #	287	Lot #	61.02, 61.03, 62,
Block #	287	Lot #	62.01, 63, 70, 70.1	Block #	287	Lot #	71, 71.01, 73 & 80
Block #		Lot #		Block #		Lot #	
Block #		Lot #		Block #		Lot #	

SECTION B. SUBMITTAL STATUS

1. Is this submittal a proposal to obtain NJDEP preapproval for using alternative fill in excess of the volume required for a remedial action? ☒ Yes ☐ No

   If "Yes," has notification been provided to:

   - ☒ Each owner of real property and the tenants of those properties, located within 200 feet of the site boundary;
   - ☒ The mayor of each municipality where the site located;
   - ☒ The county designated solid waste coordinator;
   - ☒ The municipal clerk of each municipality in which the site is located; and
   - ☒ The county health department and local health agency.

2. Indicate how the Electronic Data Deliverable (EDD) for this submittal is being provided to the NJDEP:

   - ☐ Via Email at srpedd@dep.state.nj.us (attach NJDEP confirmation email)
   - ☐ CD (attach to this submittal)

3. Is a Classification Exception Area (CEA) Proposal included with this submission? ☐ Yes ☒ No

4. Complete the following Submittal and Permit Status Table:

	Not Applicable	Included in This Submission	Previously Submitted	Date of Submission	Date of Revised Submission	Date of Document Withdrawal
Public Notification	☒	☐	☐			
Immediate Environmental Concern Report	☒	☐	☐			
IEC Engineered System Response Action Report	☒	☐	☐			
Vapor Concern Mitigation Report	☒	☐	☐			
LNAPL Interim Remedial Measure Report	☒	☐	☐			
Preliminary Assessment Report	☒	☐	☐			
Receptor Evaluation	☒	☐	☐			
Site Investigation Report	☒	☐	☐			
Remedial Investigation/Remedial Action Work Plan	☐	☒	☐	11/22/2013		

Remedial Action Report	☒	☐	☐			
Response Action Outcome	☒	☐	☐			
Alternative Soil Remediation Standard and/or Screening level Application Form	☒	☐	☐			
Case Inventory Document	☐	☒	☐	11/22/2013		
Technical Impracticability Determination	☒	☐	☐			
Permit Application – list:	☒	☐	☐			
	☐	☐	☐			
	☐	☐	☐			
	☐	☐	☐			
Radionuclide Remedial Investigation Workplan	☒	☐	☐			
Radionuclide Remedial Investigation Report	☒	☐	☐			
Radionuclide Remedial Action Workplan	☒	☐	☐			
Radionuclide Remedial Action Report	☒	☐	☐			

SECTION C. SITE USE

Current Site Use (check all that apply)

- ☒ Industrial
- ☐ Residential
- ☐ Commercial
- ☐ School or child care
- ☐ Agricultural
- ☐ Park or recreational use
- ☐ Vacant
- ☐ Government
- ☐ Other _____

Intended Future Site Use (check all that apply)

- ☒ Industrial
- ☐ Residential
- ☐ Commercial
- ☐ School or child care
- ☐ Park or recreational use
- ☐ Vacant
- ☐ Government
- ☐ Future site use unknown

SECTION D. CASE TYPE: (check all that apply)

- ☒ Administrative Consent Order (ACO)
- ☐ Brownfield Development Area (BDA)
- ☐ Child Care Facility
- ☐ Chrome Site (Chromate chemical production waste)
- ☐ Coal Gas
- ☐ Due Diligence with RAO
- ☐ Hazardous Discharge Remediation Fund (HDSRF) Grant/Loan
- ☐ ISRA
- ☐ Landfill (SRP subject only)
- ☐ Regulated Underground Storage Tank (UST)
- ☐ Remediation Agreement (RA)
- ☐ School Development Authority (SDA)
- ☐ School facility
- ☐ Spill Act Defense – Government Entity
- ☒ Spill Act Discharge
- ☐ UST Grant/Loan

Federal Case (check all that apply)

☐ **RCRA GPRA 2020** ☐ **CERCLA/NPL** ☐ **USDOD** ☐ **USDOE** ☐ TSCA

☐ Other (explain): _____

SECTION E. PUBLIC FUNDS

Did the remediation utilize public funds? ☐ Yes ☒ No

If "Yes," check applicable:

- ☐ UST Grant
- ☐ UST Loan
- ☐ Brownfield Reimbursement Program
- ☐ HDSRF Grant
- ☐ HDSRF Loan
- ☐ Landfill Reimbursement Program
- ☐ Spill Fund
- ☐ Schools Development Authority

SECTION F. SCOPE OF REMEDIAL ACTION WORKPLAN

1. Does the RAW address:
   - ☐ Area(s) of Concern (AOCs) Only
   - ☒ Entire Site (Based on a completed and submitted Preliminary Assessment/Site Investigation)
2. Total number of contaminated AOCs associated with the case: 8
3. Total number of contaminated AOCs addressed in this submittal: 8

SECTION G. GENERAL

1. Does the proposed remedial action require a permit that requires an approval from the NJDEP Site Remediation Program? ☐ Yes ☒ No

   If "Yes," list Permit Type(s) _____

   And if: ☐ Permit Application is attached to this submittal
   ☐ Permit Application submitted to SRP on this date: _____

2. Was a remediation initiated after May 6, 2010, for new construction or a change in the use of the site proposed for the purposes of residential use, use as a licensed child care center or use as a school? ☐ Yes ☒ No

   If "Yes," is an unrestricted use or a presumptive remedy being proposed? ☐ Yes ☐ No

3. Is the proposed remedial action an alternative remedy pursuant to N.J.A.C. 7:26E-5.3? ☐ Yes ☒ No

   If "Yes," specify the section/page(s) of the RAW where the alternative remedy is proposed:

   _____

4. Is any radiological contamination currently present at the AOC/Site? ☐ Yes ☒ No
5. Did any of the site contain Ordnance and Explosives/unexploded ordnance (OE/UXO)? ☐ Yes ☒ No
6. Does the proposed remedial action involve containment of free product? ☐ Yes ☒ No
7. At any time, have any of the following contaminants ever been detected in sediment above the ecological screening levels?

   ☐ Arsenic ☐ Dioxin ☐ Mercury ☐ PCBs ☐ Pesticides ☒ None

8. Have past deficiencies been addressed in this submittal? ☐ Yes ☐ No ☒ N/A
9. Will the proposed remedial action render the property unusable for future redevelopment or for recreational use (N.J.A.C. 7:26C-6.4(b))? ☐ Yes ☒ No
10. Are ground water contaminants from the site discharging to surface water? ☐ Yes ☒ No
11. Are ground water contaminants from the site discharging to an Environmentally Sensitive Natural Resource (ESNR)? ☐ Yes ☒ No
12. If you answered "Yes," to either question 10 or 11, identify the contaminant(s) and concentration(s) in the monitoring well(s) nearest to the surface water body or ESNR in the table below:

Well	Contaminant	Concentration	Well	Contaminant	Concentration

SECTION H. SITE CONDITIONS

1. Has dioxin been detected in any site media? ☐ Yes ☒ No
2. Check each media-type and highest concentration of contamination present above any applicable standards/criteria at the time of remedial investigation:

Soil in ppm	**GW = Ground Water in ppb**					**SW = Surface Water in ppb**					**Sed = Sediment in ppm**				
	Soil ppm	GW ppb	SW ppb	Sed ppm		Soil ppm	GW ppb	SW ppb	Sed ppm		Soil ppm	GW ppb	SW ppb	Sed ppm	
*VOCs	☐	☒	☐	☐	<100	☐	☐	☐	☐	100–1,000	☒	☐	☐	☐	>1,000
*SVOCs	☐	☒	☐	☐	<100	☐	☐	☐	☐	100–1,000	☒	☐	☐	☐	>1,000
*PAHs	☐	☐	☐	☐	<10	☐	☐	☐	☐	10–100	☐	☐	☐	☐	>100
*Metals	☐	☐	☐	☐	<100	☐	☐	☐	☐	100–1,000	☐	☒	☐	☐	>1,000
PCBs	☐	☐	☐	☐	<10	☐	☐	☐	☐	10–100	☐	☐	☐	☐	>100

*Pesticides	☐	☐	☐	☐	<1		☐	☐	☐	☐	1-10		☐	☐	☐	☐	>10
Chromium	☐	☐	☐	☐	<100		☐	☐	☐	☐	100–1,000		☐	☐	☐	☐	>1,000
Mercury	☐	☐	☐	☐	<100		☐	☐	☐	☐	100–1,000		☐	☐	☐	☐	>1,000
Arsenic	☐	☐	☐	☐	<10		☒	☐	☐	☐	10–100		☐	☐	☐	☐	>100
EPH	☐			☐	<1,700		☐			☐	1,700–5,100		☐			☐	>5,100

3. For any contaminant group (*) checked above, identify the contaminant with the highest concentration over its applicable remediation standard and/or screening level:
   Benzene | Benzo(a)Anthracene | Arsenic

4. Were the laboratory reporting minimum detection limits below applicable remediation standards/ screening levels criteria required for the site? ..... ☒ Yes ☐ No

5. Are any of the following conditions currently present (check all that apply):

Ground water:
- ☐ Contaminated ground water in the overburden aquifer
- ☐ Contaminated ground water in a confined aquifer
- ☐ Contaminated ground water in the bedrock aquifer
- ☒ Contaminated ground water in multiple aquifer units
- ☐ Multiple distinct ground water plumes
- ☐ Contaminated ground water migrating off-site
- ☐ Background ground water contamination
- ☐ Contaminated ground water discharging to surface water or ESNR
- ☐ Residual or free product
- ☐ Radionuclides

Soil:
- ☐ On-site discharge(s) impacting soil off-site
- ☐ Chromate Chemical Production Waste/COPR
- ☐ Munitions and explosives of concern
- ☒ Contaminated soil in the saturated zone
- ☐ Historic pesticide impacts to soil
- ☐ Residual or free product
- ☐ Radionuclides
- ☒ Historic Fill
- ☐ Soil contamination due to naturally occurring background conditions
- ☐ Soil contamination in an ESNR

6. Check each of the following that applies to the primary objective of the remedial action:

	Ground Water	Soil	Sediments	LNAPL	DNAPL	Soil Gas
☐ Treatment of:	☐	☐	☐	☐	☐	☐
☐ Removal of:	☐	☐	☐	☐	☐	☐
☒ Containment/Control of: ..	☐	☒	☐	☐	☐	☐

With migration pathway(s) to:
- ☐ Indoor Air
- ☐ Ground Water
- ☐ Surface Water
- ☐ Sediments or
- ☐ Other
- ☐ Other ESNRs

With exposure to:
- ☒ Human receptors
- ☐ Ecological receptor(s) / ESNR
- ☐ Offsite impacts

7. Is the remedial action an Interim Remedial Measure that was being implemented at the site? ..... ☐ Yes ☒ No

SECTION I. ALTERNATIVE STANDARD / VARIANCES

Alternative remediation standard

If proposing an alternative remediation standard pursuant to N.J.A.C. 7:26D-7.4, alternate vapor intrusion screening level, or ecological site specific goal check here ☐ and attach the Alternative Soil Remediation Standard and/or Screening Level Application Form as an addendum.

A site-specific screening level was developed for the evaluation of the VI pathway ..... ☐ Yes ☒ No

Variance from regulations

If the Licensed Site Remediation Professional has varied from the Technical Rules, provide the citation(s) from which the remediation varied and the page(s) in the attached document where the rationale for the variance is provided.

N.J.A.C. 7:26E- _____ Page _____

N.J.A.C. 7:26E- _____ Page _____

N.J.A.C. 7:26E- _____ Page _____

SECTION J. APPLICABLE REMEDIATION STANDARDS

1. Were Default Remediation Standards used for all contaminants? ☒ Yes ☐ No
   (If "Yes," check all that apply)
   - ☒ Direct Contact
   - ☐ Impact to Ground Water Soil Screening Levels
   - ☐ Ecological Screening Levels

2. Has compliance averaging been utilized to determine compliance with the Inhalation Pathway? ☐ Yes ☒ No
   If "Yes," check all that apply:

	Compliance Averaging Method Utilized			
Pathway	Arithmetic Mean	95 Percent UCL	Spatially Weighted Average	75 Percent/ 10X Procedure
☐ Ingestion-Dermal Pathway	☐	☐	☐	☐
☐ Inhalation Pathway	☐	☐	☐	☐
☐ Impact to Ground Water Pathway	☐	☐	☐	☐

3. Has a compliance option been utilized to determine compliance with the Impact to Ground Water Pathway? (If "Yes," check all that apply) ☐ Yes ☒ No
   - ☐ Immobile Compounds
   - ☐ Data evaluation for metals and semi-volatiles
   - ☐ Data evaluation for volatile organics derived from discharges of petroleum mixtures

4. Were Alternate Remediation Standards used for the Ingestion/Dermal Pathway? ☐ Yes ☒ No
5. Were Alternate Remediation Standards used for the Inhalation Pathway? ☐ Yes ☒ No
6. Were Site Specific Standards used for the Impact to Ground Water Pathway? ☐ Yes ☒ No
   (If "Yes," check all that apply)
   - ☐ Soil-Water Partitioning Equation ☐ SPLP ☐ Sesoil ☐ Sesoil/AT123D
   - ☐ DAF Modification ☐ Immobile Chemicals List
   - ☐ Soil and Ground Water Analytical Data Evaluation
7. Were Site Specific Ecological Remediation Goals used? ☐ Yes ☒ No
8. What is the ground water classification for this site as per N.J.A.C. 7:9C? (check all that apply)
   - ☐ Class I-A ☐ Class II-A
   - ☐ Class I-PL Pinelands Protection Area ☐ Class III-A
   - ☐ Class I-PL Pinelands Preservation Area ☒ Class III-B

SECTION K. ALTERNATIVE AND CLEAN FILL USE

1. Will alternative fill be used? ☒ Yes ☐ No
2. Will clean fill be used? ☐ Yes ☐ No
3. Will material be sent off-site for use as alternative and/or clean fill? ☐ Yes ☒ No
   If "Yes," specify the section/page in the RAW where it states the SRP site receiving this alternative and/or clean fill: _____
4. Will soil that has been blended due to historically applied pesticides for agricultural purposes be used for alternative and/or clean fill? ☐ Yes ☒ No
5. Specify the section/pages where the Fill Use Plan pursuant to N.J.A.C. 7:26E-5.2(g) can be found:
   1-3; 3-1 through 3-6 and Design Drawings

SECTION L. REMEDIAL ACTION WORKPLAN INFORMATION

General

1. Are NJDEP-approved permits, other than any permits needing SRP approval, required prior to the implementation of the remedial action? ☐ Yes ☒ No
   If "Yes," please list the type. _____

2. Are land use permits required prior to the implementation of the remedial action? ☒ Yes ☐ No

If "Yes," please list the type. NJMC Zoning Certificate

Soils

3. Check each type of remediation being proposed:
   - ☐ No remedial action required
   - ☐ Excavation
   - ☒ Capping/other Engineering Control
   - ☐ Bioremediation
   - ☐ Institutional Control
   - ☐ Soil Vapor Extraction
   - ☐ Chemical Oxidation
   - ☐ Chemical Reduction
   - ☐ Thermal desorption
   - ☐ Soil Washing
   - ☐ Other (specify):

4. Does the proposed remedial action address all saturated zone source material? ☐ Yes ☒ No ☐ N/A

5. If an engineering control is proposed, indicate the receptor(s) each engineering control is intended to protect (check all that apply):
   ☒ Human ☐ Ecological ☐ Offsite Impacts ☐ No Engineering Control

6. If a restricted use is being proposed, has consent from all involved property owners been obtained? ☒ Yes ☐ No

7. Is the proposed remedial action a presumptive remedy? ☐ Yes ☒ No

Ground Water

8. Check each type of remediation being proposed:
   - ☐ No remedial action required
   - ☐ Containment
   - ☐ Multiple Phase Extraction System
   - ☐ Hydraulic Control
   - ☐ SVE/Air Sparging
   - ☐ Monitored Natural Attenuation
   - ☐ Ozone Sparging
   - ☐ Chemical Oxidation
   - ☐ Pump & Treat
   - ☐ Other (specify):

Ecological

9. Check each type of remediation being proposed:
   - ☐ No remedial action required
   - ☐ Capping
   - ☐ Excavation/Dredging
   - ☐ Other (specify):

Indoor Air

10. Are soil gas concentrations currently >10x SGSLs? ☐ Yes ☐ No

11. Check each type of mitigation being proposed:
   - ☐ No remedial action required
   - ☐ Subsurface Depressurization System
   - ☐ HVAC Positive Pressure
   - ☐ Subsurface ventilation Systems
   - ☐ Soil Vapor Extraction System
   - ☐ Monitoring and Maintenance Schedule
   - ☐ Other (specify):

Natural Resource Restoration

12. Will any injured natural resources be restored concurrent with the remedial action? ☐ Yes ☒ No
    If "Yes," is the Office of Natural Resources Restoration involved? ☐ Yes ☐ No

SECTION M. PERSON RESPONSIBLE FOR CONDUCTING THE REMEDIATION INFORMATION AND CERTIFICATION

Full Legal Name of the Person Responsible for Conducting the Remediation: Hudson County Improvement Authority

Representative First Name: Norman Representative Last Name: Guerra

Title: Chief Executive Officer

Phone Number: (201) 324-6222 Ext: Fax:

Mailing Address: 830 Bergen Avenue, 9th Floor

City/Town: Jersey City State: NJ Zip Code: 07306

Email Address: norman@hcia.org

This certification shall be signed by the person responsible for conducting the remediation who is submitting this notification in accordance with Administrative Requirements for the Remediation of Contaminated Sites rule at N.J.A.C. 7:26C-1.5(a).

I certify under penalty of law that I have personally examined and am familiar with the information submitted herein, including all attached documents, and that based on my inquiry of those individuals immediately responsible for obtaining the information, to the best of my knowledge, I believe that the submitted information is true, accurate and complete. I am aware that there are significant civil penalties for knowingly submitting false, inaccurate or incomplete information and that I am committing a crime of the fourth degree if I make a written false statement which I do not believe to be true. I am also aware that if I knowingly direct or authorize the violation of any statute, I am personally liable for the penalties.

Signature: Norman M Guerra Date: 11/19/13

Name/Title: Norman M. Guerra, Chief Executive Officer

No changes to contact information since last submittal ☐

SECTION N. LICENSED SITE REMEDIATION PROFESSIONAL INFORMATION AND STATEMENT

LSRP ID Number: 577508

First Name: John Last Name: Bolan

Phone Number: (732) 584-0286 Ext: Fax: (732) 271-4890

Mailing Address: 67B Mountain Boulevrad Extension

City/Town: Township of Warren State: NJ Zip Code: 07059

Email Address: jbolan@psands.com

This statement shall be signed by the LSRP who is submitting this notification in accordance with SRRA Section 16 d. and Section 30 b.2.

I certify that I am a Licensed Site Remediation Professional authorized pursuant to N.J.S.A. 58:10C to conduct business in New Jersey. As the Licensed Site Remediation Professional of record for this remediation, I:

[SELECT ONE OR BOTH OF THE FOLLOWING AS APPLICABLE]:

☐ *directly oversaw and supervised all of the referenced remediation, and\or*

☒ *personally reviewed and accepted all of the referenced remediation presented herein.*

I believe that the information contained herein, and including all attached documents, is true, accurate and complete.

It is my independent professional judgment and opinion that the remediation conducted at this site, as reflected in this submission to the Department, conforms to, and is consistent with, the remediation requirements in N.J.S.A. 58:10C-14.

My conduct and decisions in this matter were made upon the exercise of reasonable care and diligence, and by applying the knowledge and skill ordinarily exercised by licensed site remediation professionals practicing in good standing, in accordance with N.J.S.A. 58:10C-16, in the State of New Jersey at the time I performed these professional services.

I am aware pursuant to N.J S.A. 58:10C-17 that for purposely, knowingly or recklessly submitting false statement, representation or certification in any document or information submitted to the board or Department, etc., that there are significant civil, administrative and criminal penalties, including license revocation or suspension, fines and being punished by imprisonment for conviction of a crime of the third degree.

LSRP Signature: John T Bolan Date: 12/10/2013

LSRP Name/Title: John T. Bolan, Senior Associate

Company Name: Paulus, Sokolowski and Sartor, LLC

No changes to contact information since last submittal ☐

Completed forms should be sent to:

Bureau of Case Assignment & Initial Notice
Site Remediation Program
NJ Department of Environmental Protection
401-05H
PO Box 420
Trenton, NJ 08625-0420

BEAZER EAST, INC.
c/o Three Rivers Management, Inc. (Agent for Beazer East, Inc.)
1910 Cochran Road, Manor Oak One, Suite 200, Pittsburgh, PA 15220-1273

December 3, 20013

Mr. John Bolan, P.E., LSRP
Paulus, Sokolowski & Sartor, LLC
67B Mountain Boulevard Extension
Warren, New Jersey 07059

RE: Remedial Action Workplan Addendum (RAWPA)
Former Koppers Seaboard Site
Kearny, Hudson County, New Jersey

Dear Mr. Bolan:

Please be advised that Beazer East, Inc. (Beazer) has reviewed the Remedial Action Work Plan Addendum - Former Koppers Seaboard Site, dated November 15, 2013, (2013 RAWPA) that was prepared by Key Environmental, Inc. for the Hudson County Improvement Authority (HCIA). Beazer has no objections to the content of the 2013 RAWPA and the approach described therein. Beazer also concurs with HCIA's submittal of this document to you and the New Jersey Department of Environmental Protection.

If you should have any questions, or require additional information, please contact me at 412-208-8867.

Sincerely,

Michael Slenska, P.E.
Senior Environmental Manager

cc: Chip McChesney
Norman Guerra, HCIA
Peter Sawchuck, KEY
Alan Briggs, KEY

RECEIVED
DEC 04 2013
Paulus Sokolowski & Sartor

Via Certified Mail, Return Receipt Requested

December 6, 2013

RE: Notification of Alternate Fill Use
Koppers Seaboard Site
NJDEP PI # G000001985
Town of Kearny, Hudson County
Block 287, Lots 32.01, 54, 55, 56, 60, 61.02, 61.03, 62, 62.01,63, 70, 70.1, 71, 71.01, 73 and 80

Education
Energy
Federal
Healthcare
Hospitality
Infrastructure
Real Estate
Science & Technology

To Whom It May Concern:

On behalf of the Hudson County Improvement Authority (HCIA), this letter serves as notice that a request is being submitted to the NJDEP in order to use Alternate Fill to raise the grades at the Koppers Seaboard Site (Site). A Remedial Action Work Plan Addendum (RAWPA) is being submitted to the NJDEP. The Alternate Fill will be processed dredge materials (PDM) created by an existing on-site PDM processing facility. This Notice is being provided in accordance with N.J.A.C.7:26C-1.7(k).

The Site is being remediated under NJDEP Case No. NJD002445112 and the remediation is overseen by a Licensed Site Remediation Professional (LSRP). PDM has been used to provide a surface cover and an engineering control at the Site in the accordance with previously approved Remedial Action Work Plan.

Subsequent to Super Storm Sandy and in consideration of the recent raising of the Advisory Base Flood Elevations by the Federal Emergency management Agency (FEMA), there is a desire to raise the final grades on the Site to provide for two feet of freeboard above the FEMA's Advisory Base Flood Elevations. The purpose of this filling is to minimize the potential for flooding damage to the remediation by the adjacent Hackensack River and to facilitate future Site development.

Attached hereto is a copy of the Site Location Map which identifies the area where Alternate Fill is intended to be placed. Please contact me with any questions.

Sincerely,

Paulus, Sokolowski and Sartor, LLC

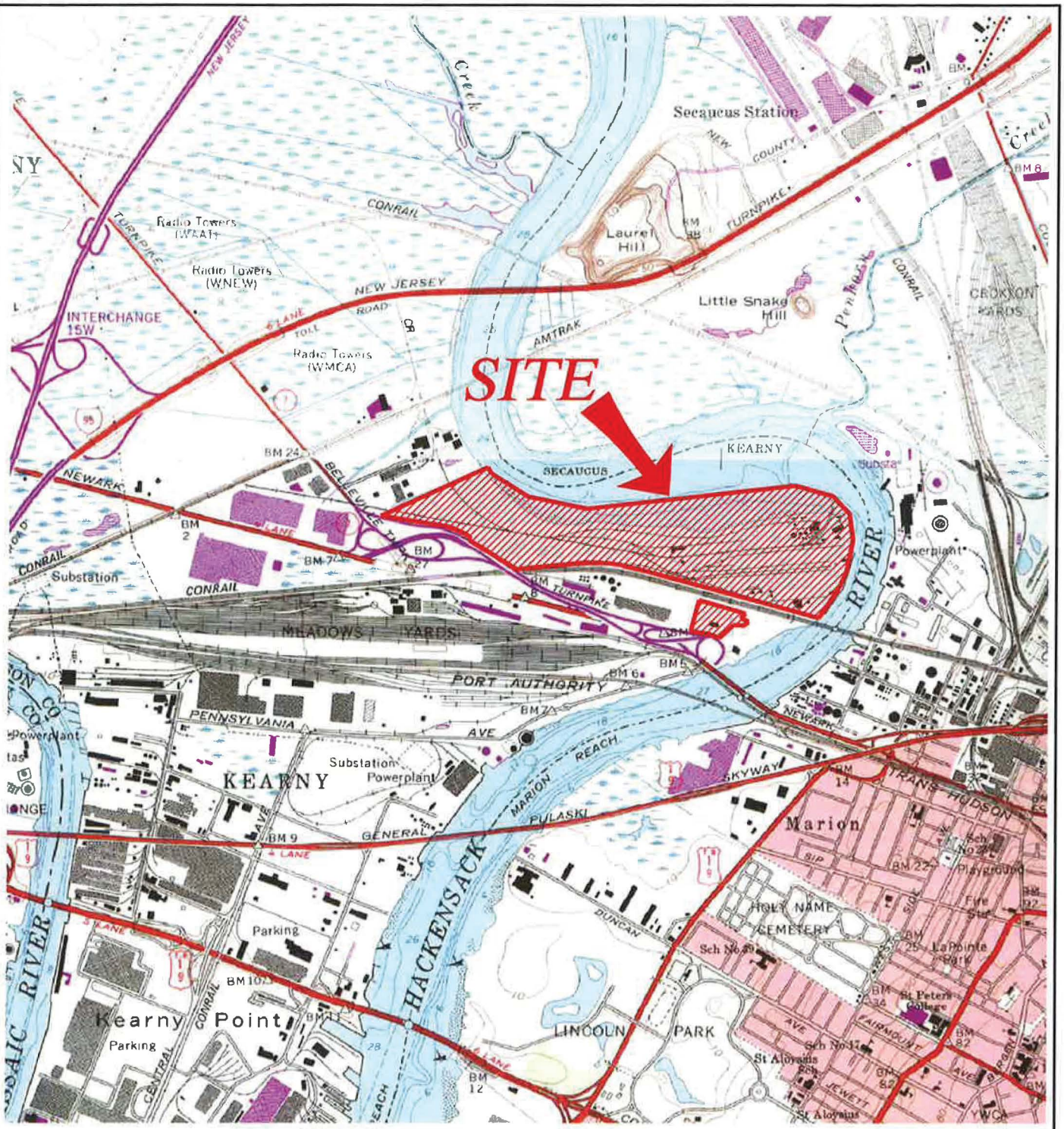
John T. Bolan, PE, LSRP
Senior Associate

Enclosure (1)

67B Mountain Blvd Ext
PO Box 4039
Warren, NJ 07059

t. 732.560.9700

www.psands.com



NEW JERSEY

N

QUADRANGLE LOCATION

0 2000 4000 FEET

REFERENCES: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES OF JERSEY CITY, AND WEEHAWKEN, NJ–NY.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

HUDSON COUNTY IMPROVEMENT AUTHORITY

DRWN: SCC	DATE: 07/24/13	KEY ENVIRONMENTAL INCORPORATED
CHKD: CAZ	DATE: 07/24/13	
APPD: AEB	DATE: 07/24/13	
SCALE: AS SHOWN		

REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

SITE LOCATION MAP

PROJECT NO: 13-677

FIGURE 1-1

x:\JOBS\pwh\seaboard\phase 4\acad plans ahead\use adjustment\production drawings\wap addendum\figure-1-1.dwg Last Saved By: Scomer 7/26/2013 6:37 AM Plotted By: Shelly Comer 7/26/2013 7:16 AM Scale: 1:1.0168

Entities Notified Pursuant to N.J.A.C.7:26C-1.7(k)

A copy of the site location map and a notification cover letter were sent via certified mail, with return receipt requested, to the following entities:

Department / Owner Name/Tenant	Attention	Address	Date Notified
Town of Kearny Mayor	Alberto Santos	410 Kearny Avenue, Kearny, NJ 07032	12/9/13
Town of Kearny Municipal Clerk	Patricia Carpenter	410 Kearny Avenue, Kearny, NJ 07032	12/9/13
Hudson County Clerk	Barbara Netchert	254 Cornelison Ave-4th floor, Jersey City, NJ 07302	12/9/13
Kearny Health Department	John P. Sarnas	645 Kearny Ave, Kearny, NJ 07032	12/9/13
Hudson County Dept. of Health & Human Services	Carol Ann Wilson	595 County Avenue, Secaucus, NJ 07094	12/9/13
Hudson Regional Health Commission	Carrie Nawrocki	595 County Avenue, Bldg. 1,Secaucus, NJ 07094	12/9/13
Hudson County Improvement Authority	Norman Guerra	830 Bergen Ave-9th floor, Jersey City, NJ 07306	12/9/13
Hudson County Solid Waste Coordinator	Norman Guerra	830 Bergen Ave-9th floor, Jersey City, NJ 07306	12/9/13
Great Lakes Dock & Dredge Company	Steven F. O'Hara	2122 York Road, Oak Brook, IL 60523	12/9/13
Owens Corning Roofing & Asphalt LLC		1249 Newark Turnpike, Kearny, NJ 07032	12/9/13
James M Salerno Enterprises, Inc.		979 Newark Avenue Jersey City, NJ 07306	12/9/13
CONRAIL Corp c/o Prop Tax Dept.		P.O. Box 8499, Philadelphia, PA 19101	12/9/13
New Jersey Department of Transportation		1035 Parkway Avenue, Trenton, NJ 08625	12/9/13

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Kearny, NJ 07032

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City, St Hudson Regional Health Commission
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Secaucus, NJ 07094

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Mr. Norman M. Guerra
Solid Waste Coordinator
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Hudson County Improvement Athy
City, State, ZIP+4
830 Bergen Ave, 9th Floor
Jersey City, NJ 07306

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Kearny Health Department
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645 Kearny Avenue
City, State, ZIP+4
Kearny, NJ 07032

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Hudson County Department of Health
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& Human Services
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Secaucus, NJ 07094

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Great Lakes Dock & Dredge Company
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City, State, ZIP+4
Oak Brook, IL 60523

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Mr. David A. Kenna, Site Leader
Owens Corning Roofing & Asphalt LLC
1249 Newark Turnpike
Kearny, NJ 07032

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James M. Salerno Enterprises, Inc.
979 Newark Avenue
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Hon. Alberto Santos, Mayor
Town of Kearny
402 Kearny Avenue
Kearny, NJ 07032

ruction

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2 - Air Monitoring Plan

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RAWPA TA-01 Title Sheet
RAWPA EA-01 Existing Conditions
RAWPA SCA-01 Phase II Subgrade Grading Plan
RAWPA SCA-02 Phase II Final Grading Plan
RAWPA SCA-03 Cross-Sections 1 of 2
RAWPA SCA-04 Cross-Sections 2 of 2
RAWPA SCA-05 Erosion and Sediment Control/Site Restoration Details and Notes
RAWPA SCA-06 Basin 1 - Plan and Details
RAWPA SCA-07 Basin 2 - Plan and Details
RAWPA SCA-08 Basin 3 - Plan and Details
RAWPA SCA-09 Basin 4 - Plan and Details
RAWPA SCA-10 General Details and Notes

APPENDICES

A - Slope Stability Calculations
B - Sediment/Stormwater Management Calculations
C - Consolidation Settlement Calculation

1.0 INTRODUCTION

This document entitled Remedial Action Work Plan Addendum, November 2013 (2013 RAWPA) and corresponding attachments and appendices were prepared on behalf of Hudson County Improvement Authority (HCIA) and provide a plan to complete the Surface Cover remediation component at the Former Koppers Seaboard Site (Site) in Kearny, Hudson County, New Jersey. The Surface Cover has not yet been completed relative to the September 2007 Remedial Action Work Plan Addendum[1] (2007 RAWPA). Additionally, this 2013 RAWPA was prepared in consideration of the Federal Emergency Management Agency's (FEMA) recent review of the Advisory Base Flood Elevation and will address HCIA's desire to raise the final grades on the Site (if sufficient fill material is available) to provide for a two- (2-) foot freeboard above the FEMA's Advisory Base Flood Elevations, to minimize the potential for flooding by the adjacent Hackensack River and to facilitate future Site development.

1.1 BACKGROUND

This 2013 RAWPA has been prepared in general accordance with the requirements of N.J.A.C. 7:26E (Technical Requirements for Site Remediation) and provides additional details regarding the proposed revisions to the 2007 RAWPA. For the purpose of this 2013 RAWPA several remedial action work plan requirements defined by the N.J.A.C. 7:26E have not been included herein because they were previously presented in the 2007 RAWPA. These requirements include a discussion of the findings and recommendations from the remedial investigation report, a description of previously implemented interim remedial measures, the identification of each area of concern, and a plan to evaluate the effectiveness of the remedial action. Supporting Design Drawings are included as Attachment 1, and pertinent support plans and calculations are provided as Attachment 2 and Appendices A through C.

The Seaboard Site occupies approximately 174 acres, with 131 acres located above the mean high water level. Its location is shown on Figure 1-1. The Site is bounded to the north and east by the Hackensack River, to the west by the Standard Chlorine Chemical Co., Inc. (SCCC) property and to the south by the New Jersey Transit (NJ Transit) rail line. A small portion of the Site (six [6] acres) lies south of the NJ Transit rail line and is bounded by Fish House Road, Owens Corning and Bellezza Construction Company. The Site, which is the location of a former integrated tar, coke, and coke by-products facility, is being addressed in accordance with a March 1987 Administrative Consent Order (ACO). The New Jersey Department of Environmental Protection (NJDEP) has designated the Site as Case No. NJD002445112. The Site is currently owned by the HCIA.

[1] Key Environmental, Inc., 2007, Remedial Action Work Plan Addendum, Former Koppers Seaboard Site, Kearny, New Jersey.

The April 1998 Remedial Action Work Plan[2] (1998 RAWP) specified the construction of a Surface Cover over the Site to prevent direct contact exposure to existing Site soils that exceed the non-residential direct contact soil cleanup criteria (SCC), to provide a reduction in the infiltration of precipitation and the associated recharge to shallow groundwater, and to raise the surface elevation of the Site to at least elevation +10 feet above mean sea level (msl), to minimize flooding by the adjacent Hackensack River as well as to augment stormwater drainage. The Surface Cover was to be comprised of a two- (2-) foot thick (minimum) layer of processed dredge material (PDM). Central to the 1998 RAWP was a Memorandum of Understanding (MOU)[3] among NJDEP, Beazer East, Inc. (Beazer), East Coast Development Corporation (ECDC) and HCIA that approved the use of PDM originating from the New York/New Jersey Harbor as structural fill and an engineering control to be placed over the entire Site. Therefore, during remedial activities, as documented in the October 2003 Remedial Action Report and Progress Report[4] (RARPR), PDM was placed over certain portions of the Site and otherwise stockpiled over large portions of the Site for future placement.

The 2007 RAWPA was prepared and approved by the NJDEP to specify all Site Remediation Activities that had not yet been completed. One of the objectives presented in the 2007 RAWPA was the completion of the Surface Cover. The Surface Cover surface grades were to be achieved through the movement, regrading, and recompaction of stockpiled PDM already on the Site, and through the placement of supplemental PDM to be provided by Great Lakes Dredge and Dock Company, LLC (GLDD).

In 2008, Sevenson Environmental Services (SES), Beazer's remediation general contractor, commenced field activities in accordance with the 2007 RAWPA, and remediation work was conducted from 2008 to 2010. During this period, previously stockpiled PDM was placed and compacted as Subgrade/Leveling Layer material to raise the surface elevation of the Site in order to augment stormwater drainage and to prepare the Site for placement of the Surface Cover. All of the 1.1 million cubic yards (CY) of PDM previously stockpiled on Site was placed to the grades as shown in the Remedial Action Progress Report[5] (RAPR), June 2012, which was prepared by KEY on behalf of Beazer. The RAR reported that although there was a slight deficit in the Subgrade/Leveling Layer materials needed to meet specified grades, on-Site NJDEP-approved stockpiles of PDM would be used to make up the majority of the subgrade deficit. As reported by the HCIA/GLDD, on-Site stockpiles have subsequently been placed as

[2] Key Environmental, April 1998, Remedial Action Work Plan, Former Koppers Seaboard Site, Kearny, New Jersey.
[3] Beazer, March 4, 1997, Memorandum of Understanding Koppers Seaboard Site, between NJDEP, Beazer, ECDC and HCIA.
[4] Key Environmental, October 2003, Remedial Action Report and Progress Report - Volume I, Former Koppers Seaboard Site, Kearny, New Jersey.
[5] Key Environmental, Inc., June 7, 2012, Remedial Action Progress Report, Former Koppers Seaboard Site, Kearny, New Jersey.

Subgrade/Leveling Layer material. Additionally, new sources of PDM have recently been designated to complete Subgrade/Leveling Layer placement to the 2007 RAWPA design grades.

HCIA reportedly has a contract with GLDD and their subcontractor, Clean Earth Dredging Technologies, Inc. (CEDTI), to operate a dredge processing plant on the eastern area of the Site. GLDD was to provide an additional 400,000 cubic yards (CY) of PDM in order to achieve the total volume necessary to construct the Surface Cover design grades. To date, the majority of the Surface Cover PDM has not yet been provided and placed. Finally, the two- (2-) foot thick low permeability portion of the Surface Cover would be covered with six (6) inches of topsoil and revegetated to control erosion.

1.2 OBJECTIVES

The primary objective of this document is to provide the remediation standards and details necessary for obtaining and placing additional PDM at the Site. This 2013 RAWPA was prepared in consideration of FEMA's recent review of the Advisory Base Flood Elevations and will address HCIA's desire to raise the final grades on the Site (if sufficient fill material is available) to provide for two (2) feet of freeboard above the FEMA's Advisory Base Flood Elevations, to minimize the potential for flooding by the adjacent Hackensack River, and to facilitate future Site development.

2.0 REMEDIATION STANDARDS AND REMEDIAL RESPONSES

In accordance with N.J.A.C. 7:26E-6.2(a) 4, this section identifies the applicable remedial standards for the Site established in the NJDEP-approved 1998 RAWP, and applicable updates, to reflect current requirements. Remediation standards and remedial responses as specifically related to soil and the Surface Cover are addressed herein. The remedial action standards and remedial responses are based on the current and reasonably expected future non-residential uses of the property, consistent with the current and reasonably anticipated future zoning of the property as heavy industrial.

Based on the planned future non-residential use for the Site, the remedial response for soils will be a combination of the following engineering and institutional controls:

- Placement of at least two (2) feet or more of low permeability [i.e., vertical permeability $\leq 1x10^{-5}$ centimeters per second (cm/s)] PDM meeting the NJDEP Non Residential Direct Contact Soil Cleanup Criteria (SCC), or alternate applicable remedial standard as described below, as an engineering control. The SCC are comprised of a suite chemical analytes consisting of Volatile Organic Contaminants, Semi Volatile Organic Contaminants, Metals, Pesticides, Herbicides and Cyanide; and,

- Establishment of a Deed Notice and associated institutional controls restricting future use of the Site to non-residential use, executed by the land owner, with the appropriate governing bodies.

In 2008 the NJDEP adopted new Remediation Standards (N.J.A.C 7:26D – June 2, 2008, amended October 3, 2010) that were provided to replace the SCC. For some analytes the Remediation Standards are more stringent than the original SCC. Because numerous remediation projects in New Jersey were already far along in the remediation process utilizing the SCC, such as the Seaboard Site, the NJDEP guidance allows that certain individual SCCs that were in effect prior to June 2, 2008 can be used in lieu of the new Remediation Standards (Phase In Period Guidance for Use of Remediation Standards – May 10, 2010). This option applies to projects where a RAWP was approved before December 2, 2008 but a No Further Action (NFA) determination has not been issued (i.e., the Seaboard Site). For these projects, NJDEP guidance (NJDEP's Order of Magnitude Guidance- August 10, 2009), requires a comparison of the Remediation Standards to the SCC, on an analyte-by-analyte basis, to determine the applicable criteria. More specifically, for any analyte with a respective new Remediation Standard that has decreased by an order of magnitude or more in comparison to the respective SCC, the owner must apply the new Remediation Standard for that analyte. In the case of the Seaboard project where a non-residential future use scenario was used to establish the original SCC, there are 13 contaminants where the new Remediation Standard has decreased by

an order of magnitude or more in comparison to the original SCC. Thus for the Seaboard Site the original SCC provide the applicable criteria for the Surface Cover except for the 13 analytes for which the new Remediation Standards have decreased by an order of magnitude or more. For these 13 contaminants, the new Remediation Standards supersede their respective SCC and therefore apply to the proposed Surface Cover for the Seaboard Site.

The 1998 RAWP permeability requirement applicable to the PDM component of the Surface Cover system was modified from $\leq 1 \times 10^{-6}$ cm/sec to $\leq 1 \times 10^{-5}$ cm/sec in the 2007 RAWPA. As a condition to the modification to the Surface Cover permeability requirement, the following additional remedial measures were implemented: 1) the DNAPL recovery Interim Remedial Measure (IRM) system was expanded; and, 2) a system was installed to enhance the natural attenuation of dissolved phase constituents in groundwater.

3.0 DESCRIPTION OF REMEDIAL ACTION ACTIVITIES

In accordance with 7:26E-6.2(a), a detailed description of the remedial action and the remedial technology to be conducted for the Surface Cover is to be provided in the Remedial Action Work Plan. This section of the 2013 RAWPA provides the details, supporting Design Drawings, and calculations required to address the remediation standards and remedial responses described in Section 2.0 and as necessary for the completion of Site remediation.

3.1 SURFACE COVER

Because of recent hurricane occurrences that have influenced flooding along the Hackensack River, it is desirable to raise the surface elevations of the Surface Cover, to aid in the future redevelopment of the Site. As such, the final grading configuration for the cover system has been revised to allow for additional fill placement that would provide a minimum of two (2) feet of freeboard above the FEMA Base Flood Elevation. The additional fill would be comprised of PDM meeting the same placement criteria that apply to the Surface Cover. The corresponding revised (maximum) design grades for the Subgrade/Leveling Layer are depicted on Drawing RAWPA-SCA-01.

In the event that insufficient PDM meeting the applicable criteria is available to achieve the depicted design grades for the Subgrade/Leveling Layer, lower final surface grades may be required. Nonetheless, any such grading plan revision will still meet/achieve the following:

- Final surface slopes will be a minimum of one-and-a-half (1.5) percent;
- Surface grades will be configured such that the contributory drainage area to each of the existing stormwater basins is unchanged; and,
- The uppermost two (2) feet (minimum) of compacted PDM will meet the criteria for Surface Cover, as defined in this 2013 RAWPA.

The primary remedial objectives that dictate placement of the Surface Cover at the Sites are as follows:

- Direct contact (i.e., incidental ingestion of soil or dermal exposure to soils) with constituents of interest (COIs) in excess of the SCC (or subsequently applicable remediation standards as described above) must be prevented; and,
- Infiltration of precipitation must be reduced to minimize migration of dissolved phase COIs and DNAPL and to support the natural attenuation component of the overall remedy.

3.2 REMEDIAL ACTION DESCRIPTION

Provided below is a description of the Surface Cover system components not yet constructed, and the approach to completing the Surface Cover. Drawing RAWPA SCA-02 presents a proposed detailed grading and stormwater management plan for the overall Site. As previously described, additional approved PDM will be transported to the Site and placed to provide a suitable Subgrade/Leveling Layer beneath the proposed Surface Cover and to achieve final grade. The maximum (i.e., highest) surface grades for the Subgrade/Leveling Layer are presented on Drawing RAWPA SCA-01. Approved imported PDM will be also used to construct the two- (2-) foot thick low permeability portion of the Surface Cover. PDM utilized for both Subgrade/Leveling Layer and Surface Cover will be placed in conformance with applicable permeability, unconfined compressive strength (UCS), SCC, and applicable remediation standards, with one exception: the permeability and UCS requirements will be waived for Subgrade/Leveling Layer material placed within the depression area located just north of the NJT Rail line, which was previously designated to remain unfilled for the purposes of a potential Public Service Electric and Gas Company (PSEG) utility easement. Finally, the two- (2-) foot thick low permeability portion of the Surface Cover will be covered with six (6) inches of topsoil and revegetated to control erosion. The maximum surface grades for the topsoil layer (i.e., final Site surface grades) are presented on Drawing RAWPA SCA-02. Drawings RAWPA SCA-03 and RAWPA SCA-04 present cross sections of the entire Site, depicting existing and proposed final conditions.

The final Site surface grades will be achieved through the placement of PDM from various dredging operations, all of which will meet the requirements established in the 2007 RAWPA and amended as summarized above in this document. In general, the maximum final grading configuration for the Surface Cover will provide a minimum of two (2) feet of freeboard above the FEMA Base Flood Elevation. In addition, the slope of the "plateau areas" will be increased to one-and-a-half (1.5) percent, to offset potential differential settlement and to ensure positive drainage. Finally, the previously proposed 50-foot PSEG easement along the property line on the south side of the Site will be filled with PDM because it is no longer required. A two- (2-) foot offset from the property line on the south side will be implemented prior to grading up to the "plateau area" at a 4H:1V sideslope. However, the existing drainage channel at the southeast corner of the Site (north of the railroad tracks and east of the tunnel) will be maintained to facilitate drainage of runoff from this portion of the Site, and to provide access to appurtenances serviced by others on the southeastern portion of the Site. With the exception of eliminating the 50-foot easement on the south side of the Site, all other offsets from the property line and steel sheet pile wall specified in the 2007 RAWPA were maintained in the revised grading configuration.

3.3 MATERIAL PLACEMENT SPECIFICATIONS

In summary, the components of fill placement that are required to ultimately construct the Surface Cover are as specified in the 2007 RAWPA and as listed below (in ascending order):

- Additional PDM Subgrade/Leveling Layer, as required (thickness varies);
- Two- (2-) foot thick low permeability PDM portion of the Surface Cover; and,
- Six- (6-) inch thick topsoil layer.

Details on Drawing RAWPA SCA-10 depict the new PDM Subgrade/Leveling Layer and Surface Cover placement under typical Site conditions. Along the southern boundary, where PDM material has not yet been placed (i.e., the previously delineated candidate PSEG utility easement), the existing subgrade will first be dewatered as necessary and then inspected, to identify any areas of soft soil conditions. Any excessively soft areas will require enhanced fill placement techniques that may include conditioning with additives (e.g., soil, rubble fill, cement, kiln dust, etc.) or placement of a PDM leveling layer, reinforcing grid, or geotextile fabric, as required to improve subgrade strength. This approach will ensure subgrade materials have sufficient strength to withstand increased stresses resulting from the placement of overlying materials, without failure or excessive displacement/settlement. This enhanced backfill placement technique will continue until the subgrade is sufficient to support compaction equipment without rutting. In all other areas of the Site (including above any enhanced backfill materials placed within the previously delineated candidate PSEG utility easement) the new Subgrade/Leveling Layer will be created by spreading and compacting the material in approximate 12-inch thick lifts to provide suitable subgrade support for placement and compaction of the overlying Surface Cover. Final surface grades of the Subgrade/Leveling Layer will not exceed, and may be less than, the design elevations indicated on Drawing RAWPA SCA-01. The Surface Cover will be placed over the final Subgrade/Leveling Layer surface.

The PDM component of the Surface Cover will be placed directly over the Subgrade/Leveling Layer and will be a minimum of two (2) feet thick. As explained previously, both Subgrade/Leveling Layer PDM and Surface Cover PDM will meet the following specifications, with the exception of the enhanced backfill materials placed within the previously delineated candidate PSEG utility easement:

- Permeability (k) $\leq$ 1x10-5 cm/s;
- UCS $\geq$ 3000 psf; and,
- Constituent Concentrations in Soil $\leq$ SCC (or subsequently applicable Remediation Standards as described above).

Permeability and UCS requirements will not apply to the enhanced backfill materials placed within the previously delineated candidate PSEG utility easement. However, the backfill material shall meet the requirements for alternative fill as defined by the New Jersey Department of Environmental Protection (NJDEP) Site Remediation Program (SRP) Fill Guidance at SRP Sites (August 11, 2011, version 1.0).

3.4 SITE COVERAGE

In general, the proposed Surface Cover will overlay the entire Site. However, due to certain physical Site constraints, the limits of the Surface Cover were offset from certain Site features. Specifically, in areas where there are perimeter drainage channels that are proximate to the property line, the limits of the Surface Cover were established at a two- (2-) foot distance from the top of the channel. In the southern area of the Site (i.e., south of the New Jersey Transit railroad embankment), a five- (5-) foot buffer distance was maintained from the wetlands along the southern property boundary. Similarly, a two- (2-) foot offset was provided from the property line, to minimize the likelihood of placing PDM beyond the property limits of the Site. These specific PDM placement limitations are depicted on the details on Drawings RAWPA SCA-09 and RAWPA SCA-10.

3.5 SLOPE STABILITY

Detailed slope stability analyses were performed in conjunction with preparation of the 1998 RAWP to establish an acceptable Surface Cover sideslope and also to determine the appropriate offset distances from the existing steel sheet pile wall, which parallels the Hackensack River. The proposed grading plan described herein utilizes the previously established fill placement offset distances. Nonetheless, an analysis of the stability of the revised maximum grading configuration was conducted. Based on the analysis, the determined factors of safety for the Surface Cover sideslope and the increase in surface elevation proposed herein meet or exceed the 1.3 design criteria safety factor previously established in the 1998 RAWP. The corresponding calculations are provided in Appendix A.

3.6 STORMWATER MANAGEMENT

The grading plan provides for stormwater runoff to be managed primarily by gently sloped one-and-a-half- (1.5-) percent overland flow from large plateau areas discharging into four (4) sediment/stormwater detention basins, prior to discharge into the receiving water body. The stormwater detention basins as designed in the RAWPA 2007 and presented in the RAR have been evaluated for adequacy utilizing the proposed revised Surface Cover configuration.

Using the final grading plan presented on Drawing RAWPA SCA-02, the hydrographs and basin routing calculations for a 25-year, 24-hour design storm event were computed for this RAWPA, using the new input parameters (e.g., one-and-a-half- [1.5-] percent surface grade instead of one [1] percent as used in the previous design). The analysis illustrates that the sediment/stormwater detention basins are sufficient to handle the anticipated runoff as well as to achieve the required sediment control and total suspended solids (TSS) removal rate, with at least one (1) foot of freeboard; the analysis also shows that the existing outlet structures are sufficiently sized to properly discharge the increased runoff that will be created by raising the grades to one-and-a-half (1.5) percent. Updated hydrographs and basin routing calculations are presented in Appendix B of this document. Basin plan and detail sheets are provided on Drawings RAWPA SCA-06 through RAWPA SCA-09.

Based upon retaining wall stability considerations identified during the design of the steel sheet pile (SSP) wall by others, as presented in the 1998 RAWP, a horizontal "offset" of between 50 and 140 feet was required between the SSP wall and the elevated plateau areas. After the Surface Cover has been placed in this relatively narrow offset area, the area will be revegetated and graded to drain directly to the Hackensack River, with a surface slope of one (1) percent. During construction of the Surface Cover, silt fences and/or straw bales will be maintained and augmented as needed to prevent offsite migration of solids associated with the Surface Cover materials. Upon completion of Surface Cover placement, runoff from this area will contact only "clean" topsoil surface cover material. The silt fences and/or straw bales will be maintained as necessary to control solids loading to the river until the vegetative buffer zone becomes established. As a result of the planned approach, no uncontrolled runoff from these areas that could affect the river will occur. A similar runoff management approach will be utilized along the eastern, western and southern perimeter sideslopes and minor offsets from the property lines as required (i.e., sheet flow towards the adjoining watercourse).

3.7 CONSOLIDATION AND DIFFERENTIAL SETTLEMENT ANALYSIS

Due to the additional PDM fill required to construct the raised final Site grades, consolidation settlement estimates were completed and an evaluation of the potential total/differential settlement effect on the integrity of the following existing remediation appurtenances was performed:

- Cement-bentonite (CB) and soil-bentonite (SB) slurry wall sections;
- Natural Attenuation Enhancement (NAE) System;
- IRM Expansion System; and,
- SCCC-related remedial appurtenances (i.e., slurry wall and recovery wells) on the western portion of the Site.

The effect of consolidation settlement on the integrity of the stormwater basin outlet systems was not deemed necessary as Surface Cover placed along the SSP wall will not exceed previous grades as presented in the design detailed in the 2007 RAWPA. The analyses indicate that the additional placement of PDM to the grades as presented on RAWPA SCA-02 may result in consolidation of soils surrounding the existing slurry walls, installed piping and conduits, monitoring wells, and piezometers, of up to one (1) foot or more. This magnitude of settlement is expected to have potentially significant deleterious impacts on the associated appurtenances. As such, and prior to placement of additional fill on the aforementioned appurtenances, HCIA proposes to perform a detailed analysis to determine the appropriate means of protection/augmentation. These means may include the following:

- Supplement the CB wing-wall of the NAE system with a redundant SSP wall, constructed with grout-sealed interlocks;
- Similarly supplement the CB wall of the SCCC barrier wall system with a redundant SSP wall, constructed with grout-sealed interlocks; and,
- Vertically extend, subsequently monitor for damage or distortion, and repair or replace as necessary, the various on-site vertical well casings and associated piping and conduits, including the following:
  - Groundwater monitoring wells and piezometers;
  - IRM recovery wells; and,
  - SCCC recovery wells (on the Seaboard Site).

PDM placement above the appurtenances will not occur without prior approval of the protection/augmentation methods by Beazer (and in the case of the SCCC-related appurtenances, not without prior approval by the Cooperating Parties Group [CPG]).

Because the northern wing-wall of the Seaboard Site slurry wall containment system was constructed of soil-bentonite it is anticipated that the material will have a plastic deformation response to the anticipated consolidation settlement, and therefore should not be significantly deleteriously impacted. Consolidation settlement estimates and total/differential settlement calculations are presented in Appendix C.

3.8 SOIL EROSION AND SEDIMENT CONTROL

Soil erosion and sediment control (E&SC) for the Site will be provided by the installation of Best Management Practices (BMPs) in conjunction with properly sequenced earthwork activities. Existing temporary E&SC control devices will be inspected and augmented where required. This includes silt fences and temporary diversions and other existing control devices. Details of the overall site E&SC program, including a description of the E&SC appurtenances and site revegetation specifications are provided on Drawing RAWPA SCA-05.

3.9 GEOTECHNICAL AND ANALYTICAL TESTING QUALITY ASSURANCE REQUIREMENTS

PDM placement CQA testing will be comprised of both pre-construction sampling/testing and in-place testing activities, as described below. PDM subject to testing will include imported materials to be used as Subgrade/Leveling Layer and materials to be used as the Surface Cover.

3.9.1 Pre-Construction Geotechnical Sampling/Testing

The objective of pre-construction sampling and testing for the PDM materials is to: 1) establish the general range of variability for PDM physical parameters; and, 2) develop a correlation between moisture/density and engineering parameters (i.e., UCS and permeability, as appropriate) for the relative extremes of physical parameters. Assuming that PDM may be placed under both "fresh" and "stockpiled" (i.e., partially cured) conditions, each of these conditions should be tested as well, resulting in a combination of four material property and placement condition extremes (i.e., a 2x2 matrix of physical parameters and placement conditions). The purpose of development of the correlation between physical and engineering parameters is to establish physical testing criteria (i.e., moisture content and maximum dry density) suitable for evaluation during actual PDM placement.

Twelve (12) representative PDM samples will be collected from the first 1,000 cubic yards of material proposed for placement from each source of PDM prior to being transported to the Site. Each sample will be tested to determine the relative extremes of material property variability. Tests will include the following for each representative sample:

- Moisture content (ASTM D 2216)
- Particle size (ASTM D 422)
- Unified Soil Classification System (ASTM D 2487)
- Compaction (ASTM D 1557)

Upon determination of the two relative extremes of material property variability, a larger series of compaction (density) and unconfined compression tests will be performed to establish a moisture-density "window" corresponding to acceptable UCS and permeability test results on the extremes of material property variability, and utilizing both fresh and stockpiled conditions, as explained above. Tests will include the following for each representative sample of the 2x2 matrix:

- Moisture content (ASTM D 2216)
- Particle size (ASTM D 422)
- Atterberg Limits (ASTM D 4318)

- Unified Soil Classification System (ASTM D 2487)
- Compaction (ASTM D 1557)
- Unconfined compression (ASTM D 2166) at varying densities and moisture contents
- Recompacted permeability (ASTM D 5084) at varying densities and moisture contents

The permeability and UCS tests will be performed at varying percentages of maximum dry density and moisture content, as required to establish well-defined limits of dry density and moisture content that corresponded to acceptable permeability and UCS test results. This testing program will generate a total of four (4) moisture-density windows.

Approximately one (1) week following initial import of PDM to the Site, an additional representative PDM sample will be collected and tested (again utilizing both fresh and stockpiled conditions), as follows, to establish two (2) additional acceptable moisture-density windows:

- Moisture content (ASTM D 2216)
- Particle size (ASTM D 422)
- Atterberg Limits (ASTM D 4318)
- Unified Soil Classification System (ASTM D 2487)
- Compaction (ASTM D 1557)
- Unconfined compression (ASTM D 2166) at varying densities and moisture contents
- Recompacted permeability (ASTM D 5084) at varying densities and moisture contents

3.9.2 In-Place Geotechnical Testing

In-place dry density for all placed PDM (i.e., Subgrade/Leveling Layer and Surface Cover) will be measured using either nuclear density testing (ASTM D 2922) or sand cone (ASTM D 1556-00) methods. As a result of the presence of cement within the treated PDM, nuclear density test devices will potentially produce erroneous measurements of soil moisture content; as such, a sample will be collected from each nuclear density test location, and tested separately to determine moisture content (ASTM D 2216).

Density and moisture tests will be performed at a minimum frequency of four (4) tests per lift per acre. These results will be compared to the corresponding moisture density window to verify the acceptability of the test results. If the test results are found to be outside the acceptable limits of the moisture density window, additional density and moisture testing will be performed to establish the limits of the non-conformance area, and the corresponding compacted PDM materials will be removed and reworked, or replaced as appropriate.

PDM samples will also be collected on a routine basis for the purposes of physical property testing, to verify selection of the appropriate moisture-density window for compaction test result assessment. Physical property tests will include the following for each representative sample:

- Particle size (ASTM D 422)
- Atterberg Limits (ASTM D 4318)
- Unified Soil Classification System (ASTM D 2487)

Samples will be collected at a minimum frequency of one (1) per 20,000 cubic yards of placed PDM.

If the acceptability windows developed as outlined above are determined to be too small or otherwise indefinable, the HCIA may elect to conduct plate load testing to alternatively and empirically determine UCS acceptability, thereby potentially expanding the moisture-density acceptability window based upon permeability criteria only. A higher range of acceptable moisture contents should be anticipated. If rework associated with meeting the acceptability criteria developed as outlined above remains untenable, the HCIA may consider relaxing the UCS criteria to a standard that will still provide adequate subgrade support as may be required for anticipated site end-uses, to establish attainable moisture-density acceptability and UCS criteria.

3.9.3 Analytical Sampling/Testing For Surface Cover

Analytical testing will be performed on sediment cores representative of the dredge areas that will be processed and placed on the Site. Following development of a sampling plan by the dredge contractor, the NJDEP Office of Dredge Sediment Technology (ODST) will confirm/specify the frequency of sediment cores to be taken, procedures for compositing the cores and frequency of analytical testing. These samples are considered "Raw" dredge samples. Bulk sediment chemistry, grain size, TOC and percent moisture will be performed on all samples. For each Raw Dredge sediment sample, a sample of the processed dredged material will be created that will replicate the additive and mixing time of the processing facility. The "Processed Dredge" samples will be tested for the same parameters as the Raw Dredge sediment samples. Bulk sediment chemistry includes the analytes included in the NJDEP's SCC and as per Appendix B Attachment 1 of the October 1997 NJDEP document entitled "The Management and Regulation of Dredging Activities and Dredged Materials in New Jersey's Tidal Waters" (Dredge Manual). Sediment sampling and analytical procedures will also conform to the Dredge Manual. The Processed Dredged samples will be compared to the NJDEP's SCC and 2008 remediation standards to determine compliance with remediation requirements.

In addition to the above, the NJDEP considers PDM as "alternative fill" when used in the remediation of contaminated sites. In August, 2011 the NJDEP published a guidance document entitled "Fill Guidance at SRP Sites." This guidance should be utilized in determining sampling frequencies for determining acceptability of PDM. For example, in accordance with the guidance "no new contaminants may be placed in an area of concern (AOC) other than those already determined to be present." Additionally, section 4.5.2, Table 1 of the guidance provides "default" sampling frequencies. However, a "reduced sampling frequency" can be utilized where there has been some prior assessment of the fill source. Thus due diligence on each source must be conducted and if sampling frequencies other than those stated in the guidance document are used, the rational for the decision must be appropriately supported and documented by the Licensed Site Remediation Professional (LSRP).

3.10 RESTORATION

Following the placement of Surface Cover PDM, six (6) inches of topsoil will be placed, and the surface will be seeded and mulched to establish a final vegetative cover. The topsoil must meet NJDEP's "clean fill" requirements or the analytical testing remediation requirements established for the Surface Cover as previously discussed.

3.11 SUPPORTING PLANS

To support the remediation activities and to address all applicable aspects of 7:26E-6.2 The Air Monitoring Plan (AMP) as presented in the 2007 RAWPA has been revised and is provided as Attachment 2. Other support plans and background information required to support remedial activities were included in Volume III of the 2007 RAWPA and do not require modification. These include the following:

- Field Sampling Plan;
- Quality Assurance Project Plan;
- Health and Safety Plan;
- Revised draft deed notice; and,
- 1998 RAWP Remedial Investigation.

4.0 PERMITS

Implementation of the remediation requires Federal, State and local agency authorizations, permits, and/or approvals. The specific type of Federal, State or local authorizations required and associated permit condition(s) will be dictated by the nature of the activity and its location.

The attached Table 4-1 provides a listing of permits previously obtained for the implementation of the 2007 RAWPA. The following provides a brief discussion of the permits or approvals anticipated to require amendment or renewal/reapplication for completion of the remaining remedial activities:

- NJDEP Division of Land Use Regulation (DLUR) – The current permits for Flood Hazard and Waterfront Development will require an amendment as the grades for construction of the Surface Cover will change.

- Acceptable Use Determination (AUD) – This permit is issued by the NJDEP LURP for processing and disposal or reuse of dredge sediments. This is necessary for importing\processing and placement of any new PDM, and it is assumed that GLDD has secured this permit;

- Hudson Essex Passaic Soil Conservation Permit (SCD Permit) - It is anticipated that the SCD Permit will require re-certification for the project.

- Zoning Certificate (NJMC) – Construction activities within the New Jersey Meadowlands Commission district require a local zoning and fill/stockpile authorization. Thus any additional import and placement of PDM over the currently approved 400,000CY will require re-authorization.

- Classification Exception Area/Well Restriction Area (CEA/WRA) CEA/WRA was issued by NJDEP in August 2011– Establishment of a CEA/WRA is required by NJDEP at the Site due to groundwater contamination that exceeds applicable groundwater quality standards. A CEA biennial certification report is due every two years from issuance of the CEA/WRA. On August 12, 2013, a CEA biennial certification was submitted to the NJDEP.

- Deed Restriction – Property use restrictions are required where an owner chooses to implement institutional and engineering controls for areas of a Site exceeding the NJDEP's unrestricted use soil cleanup standards. This institutional control document has been prepared in draft form and will be completed and filed after the Surface Cover is complete and a Remedial Action Report is submitted.

- Remedial Action Permits (Soil and Groundwater) – Following completion of the Remedial Action Report (RAR), both a Soil and Groundwater Permit will be necessary should the most restrictive standards be exceeded in either media.

5.0 SCHEDULE

In accordance with 7:26E-6.5, this section provides a schedule for the implementation of the remaining remediation components. Figure 5-1 provides a Gantt chart schedule for completing the remedial activities described in the 2013 RAWPA, and obtaining LSRP approval of the Final 2013 RAWPA, Per 7:26E–6.5(c), within 30 days of NJDEP approval of the 2013 RAWPA, the schedule will be revised to identify the projected month/year for each task.

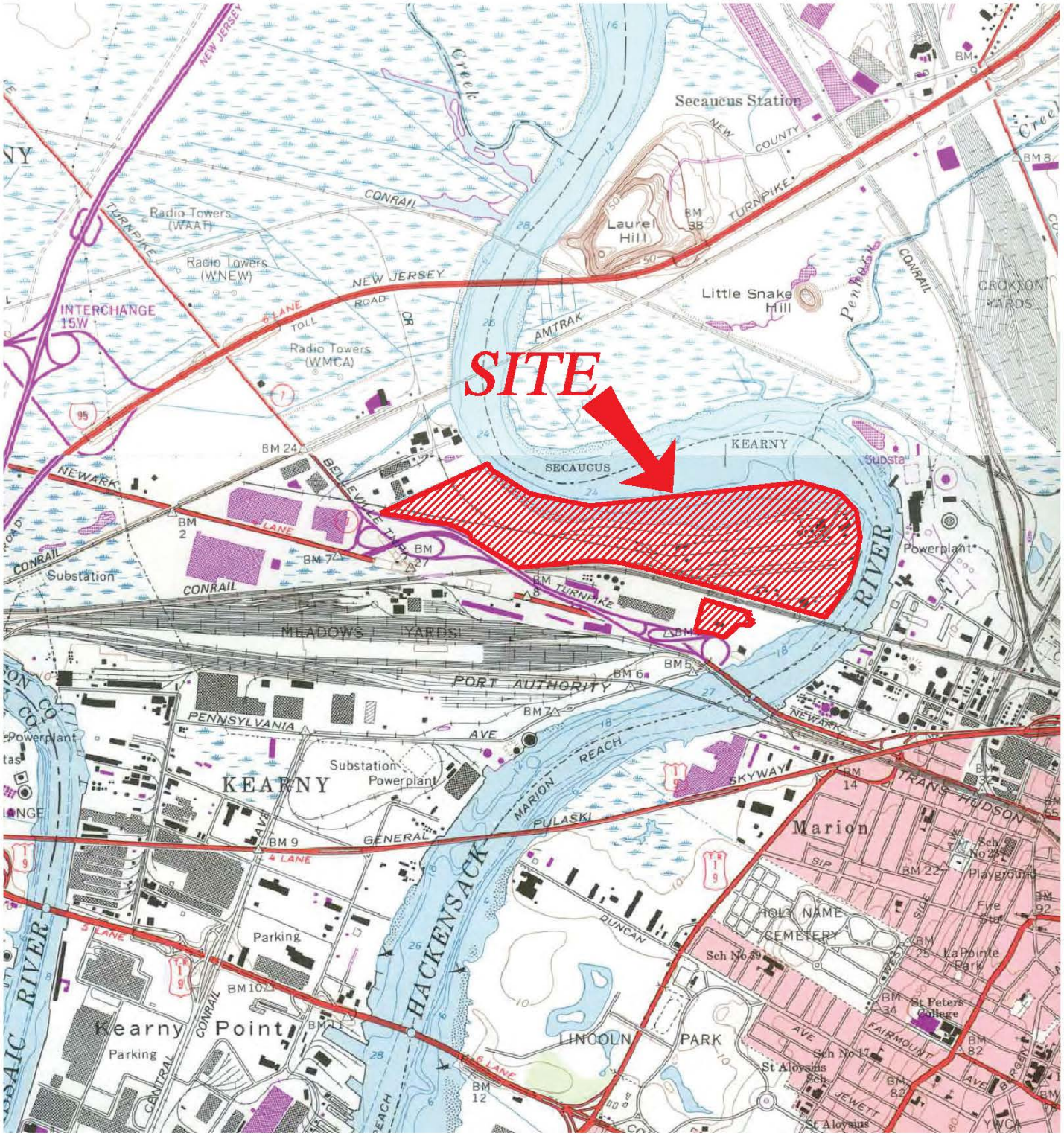
Should actual timeframes vary from those proposed, the LSRP will be notified and the schedule will be revised accordingly. In accordance with N.J.A.C. 7:26E-6.6, remedial action progress reports will be provided to the NJDEP on a quarterly basis.

TABLE

TABLE 4-1
LIST OF PRIOR PERMITS AND APPROVALS
REMEDIAL ACTION WORK PLAN ADDENDUM
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

Permit/Approval Type and Number	Regulated Activity/Number	Date of Issuance	Modification
Hudson Essex Passaic - Soil Conservation District	HEP #207-H-2480	12-11-07 to 06/11/2011	
		12/23/2009	Modification for Detention Basin No. 4
		3/19/2010	Modification for Basin No.3.
New Jersey Meadowlands Commission (NJMC) **NJMC** **NJMC**	File CZC 08-065 Site Remediation	5/01/2008	
		1/26/2009	Additional 400,000 cy of Imported PDM For Surface Cover (note:400,000 cy of PDM for final surface cover was not included in original May 1, 2009 NJMC approval)
		8/17/2010	Modification to Basin No. 4
NJDEP - New Jersey Pollutant Discharge Elimination System	NJPDES NJG0170411 Ponded Water and Sediment Conditioning Waters	04/09/2008	
	Treatment Works Authorization 08-0139 Ponded Water and Sediment Conditioning Treated Water	6/19/2008	
US ACOE	1998-02120-2	12/09/2008	Permit extension, modification of impacts to temporary wetlands to 0.64 acres
		06/12/2009	Wetland mitigation plan modification to establish 0.85 acres of tidal wetlands
NJDEP - Division of Land Use Regulation (DLUR)	0907-08-0001.1 Flood Hazard, Freshwater Wetlands, Waterfront Development and Water Quality Certificate	3/17/2008	
		6/24/09	Wetland mitigation plan modification
		9/01/10	Modification for Basins 3 and 4

FIGURES



NEW JERSEY

N

QUADRANGLE LOCATION

0 2000 4000 FEET

REFERENCES: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES OF JERSEY CITY, AND WEEHAWKEN, NJ–NY.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

HUDSON COUNTY IMPROVEMENT AUTHORITY

DRWN: SCC	DATE: 07/24/13	KEY ENVIRONMENTAL INCORPORATED
CHKD: CAZ	DATE: 07/24/13	
APPD: AEB	DATE: 07/24/13	
SCALE:	AS SHOWN	

REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

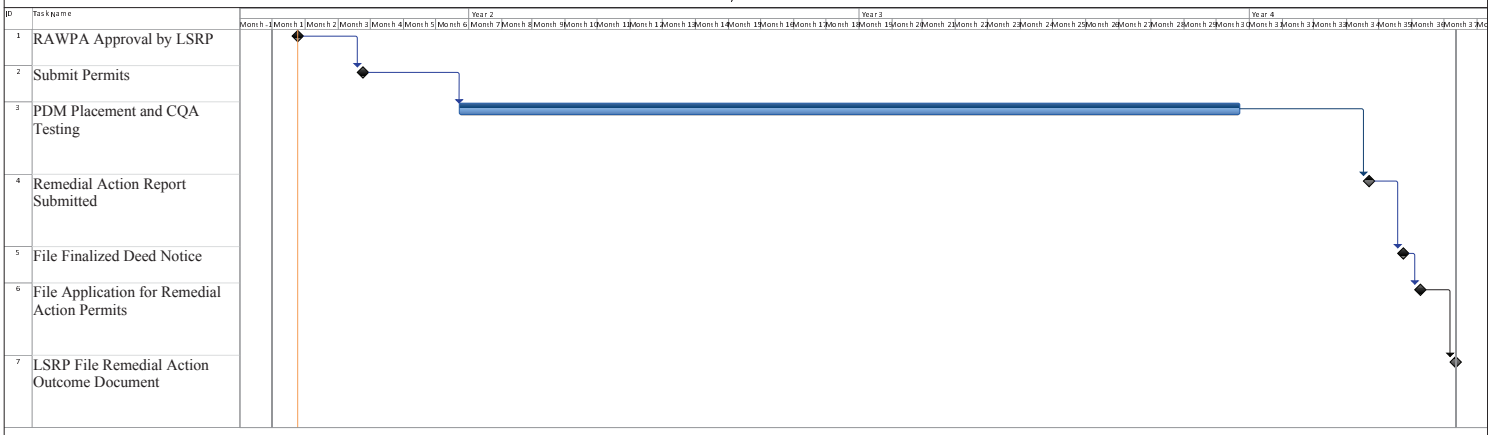
SITE LOCATION MAP

PROJECT NO: 13-677

FIGURE 1–1

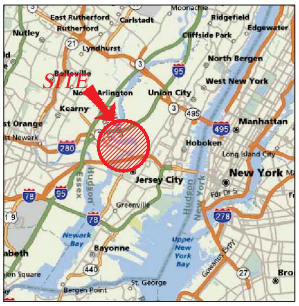
y:\00civil\seaboard\rawpa flood plain elevation adjustment\production drawings\rawp addendum\figure-1-1.dwg Last Saved By: Scamer 7/26/2013 6:37 AM Plotted By: Shelly Comer 7/26/2013 7:16 AM Scale: 1:1.0168

FIGURE 5-1
PRELIMINARY PROJECT SCHEDULE
REMEDIAL ACTION WORK PLAN ADDENDUM
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY



ATTACHMENT 1

DESIGN DRAWINGS

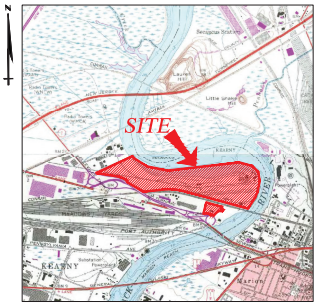


VICINITY MAP

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013) FORMER KOPPERS SEABOARD SITE KEARNY, NEW JERSEY

Prepared for:

HUDSON COUNTY IMPROVEMENT AUTHORITY



LOCATION MAP

DRAWING NO.	TITLE
TA-01	TITLE SHEET
EA-01	EXISTING CONDITIONS PLAN
SCA-01	SUBGRADE GRADING PLAN
SCA-02	FINAL GRADING PLAN
SCA-03	CROSS SECTIONS SHEET 1 OF 2
SCA-04	CROSS SECTIONS SHEET 2 OF 2
SCA-05	EROSION AND SEDIMENT CONTROL/SITE RESTORATION DETAILS AND NOTES
SCA-06	BASIN 1 - PLAN AND DETAILS
SCA-07	BASIN 2 - PLAN AND DETAILS
SCA-08	BASIN 3 - PLAN AND DETAILS
SCA-09	BASIN 4 - PLAN AND DETAILS
SCA-10	GENERAL DETAILS AND NOTES

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLES OF JERSEY CITY, AND WEEHAWKEN, NJ-NY.
AAA, NEW JERSEY AND PENNSYLVANIA ROAD MAP, 1997.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500

SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400

HUDSON COUNTY
IMPROVEMENT AUTHORITY

DRWN:	SCC	DATE: 11/14/13
CHKD:	CAZ	DATE: 11/14/13
APPD:	AEB	DATE: 11/14/13
SCALE:	AS SHOWN	

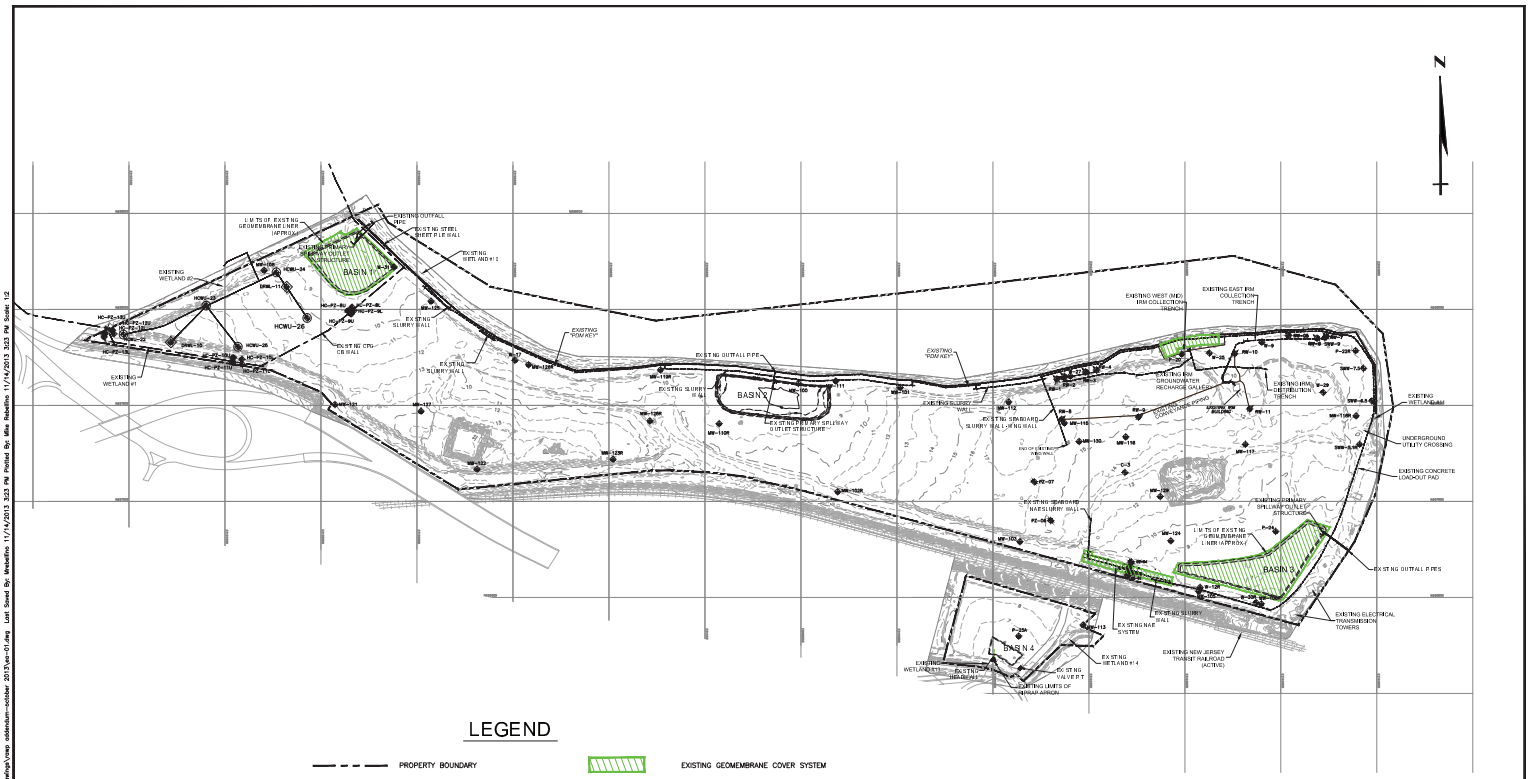
KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

TITLE SHEET

PROJECT NO: 13-677
TA-01

J:\JOBS\Seaboard\Design Base plan elevation adjustment\construction drawings\Final addendum - october 2013\ta-01.dwg Last Saved By: MikeHeller 11/14/2013 3:22 PM Plotted By: Mike Heller 11/14/2013 3:22 PM Scale: 1:2



LEGEND

- PROPERTY BOUNDARY
- EXISTING SEABOARD SLURRY WALL
- EXISTING CPG CB WALL
- EXISTING NEW JERSEY TRANSIT RAILROAD
- EXISTING GROUND SURFACE ELEVATION CONTOUR
- EXISTING CONVEYANCE PIPING
- EXISTING GROUNDWATER CONVEYANCE PIPING TRENCH ALIGNMENT
- EXISTING GEOMEMBRANE COVER SYSTEM
- EXISTING RECOVERY WELL LOCATION
- EXISTING GROUNDWATER EXTRACTION WELL LOCATION
- EXISTING MONITORING WELL LOCATION
- EXISTING PIEZOMETER LOCATION

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: FIGURE 2-1, AS-BUILT SURFACE CONTOURS, REMEDIAL ACTION REPORT, FORMER KOPPERS SEABOARD SITE, KEARNY, NEW JERSEY, APRIL 1, 2011.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500

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IMPROVEMENT AUTHORITY

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APPD:	AEB	DATE: 11/14/13
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KEY ENVIRONMENTAL INCORPORATED

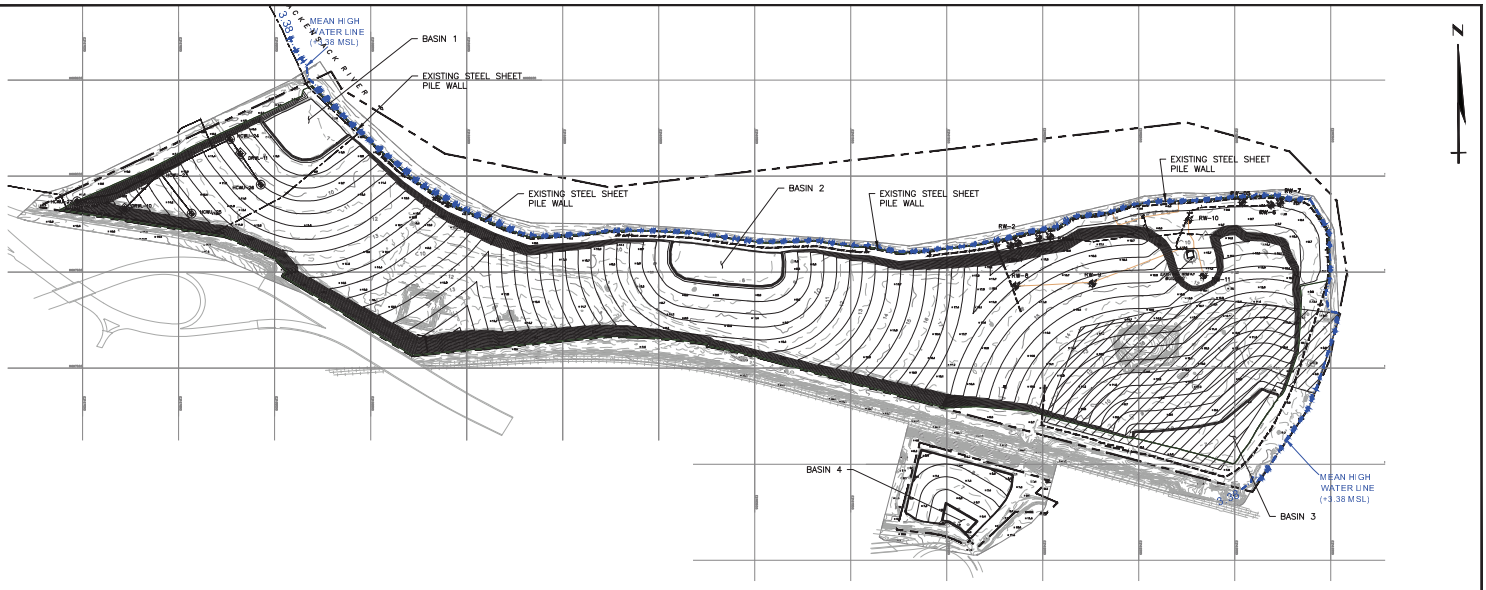
REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

EXISTING CONDITIONS PLAN

PROJECT NO: 13-677

EA-01

J:\JOBS\Hudson\Koppers Final plan elevation adjustment\production drawings\map addendum- october 2013\ea-01.dwg Last Saved By: kfedorko 11/14/2013 3:23 PM Plotted By: Mike Rebellino 11/14/2013 3:23 PM Scale: 1:2



LEGEND

- PROPERTY BOUNDARY
- EXISTING SEABOARD SLURRY WALL
- EXISTING SEABOARD STEEL SHEET PILE WALL
- EXISTING PRG CB WALL
- EXISTING "PDM KEY" LOCATION
- EXISTING NEW JERSEY TRANSIT RAILROAD *(ACTIVE)*
- 5 — EXISTING GROUND SURFACE ELEVATION CONTOUR
- x41 EXISTING GROUND SURFACE SPOT ELEVATION (FEET–MSL)
- 10 — PROPOSED MAXIMUM SUBGRADE CONTOUR (2 FT)
- RW–6 EXISTING IRM RECOVERY WELL LOCATION
- 3.38 MEAN HIGH WATER
- AREA OF PROPOSED INTERIM DREDGE PROCESSING OPERATIONS (SEE NOTE 3)
- EXISTING GROUNDWATER CONVEYANCE PIPING TRENCH ALIGNMENT
- EXISTING RECOVERY WELL LOCATION
- EXISTING GROUNDWATER EXTRACTION WELL LOCATION

NOTE:

1. THE PROPOSED MAXIMUM ELEVATION CONTOURS DEPICT THE TOP OF THE REGRADED SUBGRADE/LEVELING LAYER (EXISTING PROCESSED DREDGE MATERIAL). COMPLETED ELEVATIONS MAY BE LESS THAN MAXIMUMS PROVIDED THAT MINIMUM SLOPE IS MAINTAINED AND DRAINAGE AREAS ARE NOT ALTERED.
2. REFER TO DRAWINGS NOS. SCA–03 AND SCA–04 FOR CROSS SECTIONS.
3. GREAT LAKES DREDGE AND DOCK COMPANY, LLC (GLDD) WILL UTILIZE THE SOUTHEASTERN PORTION OF THE SITE AS A PDM PROCESSING AND STOCKPILE FACILITY. GLDD HAS DEVELOPED PLANS AND OBTAINED PERMITS FOR SITE OPERATIONS THAT WILL ENABLE GLDD TO CONDUCT THEIR PROCESSING AND STOCKPILING ACTIVITIES WHILE REMEDIATION OF THE SITE IS BEING COMPLETED. UPON COMPLETION OF THE GLDD OPERATIONS, THE CORRESPONDING FINAL SURFACE COVER SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH THE DESIGN PLANS CONTAINED HEREIN, TO COMPLETE CONSTRUCTION OF THE PRESCRIBED REMEDY.
4. TIDAL ELEVATION DATA CALCULATIONS WERE PROVIDED BY GEOD CORPORATION DERIVED BY UTILIZING INFORMATION FOR TIDAL STATIONS 853–0696 AND 853–0772 USING THE 1983–2001 TIDAL EPOCH AND ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 1929)
5. SIGNIFICANT PORTIONS OF THE SITE ARE LOCATED WITHIN THE 100–YEAR FLOOD PLAIN. THE FLOOD HAZARD ELEVATION NORTH OF THE NJT RAILLINE IS +10.1FT MSL AND SOUTH OF THE NJT RAILLINE IS +11.1 FT MSL. NEW JERSEY STATE PLANE COORDINATE SYSTEM (NAD 1927), VERTICAL REFERENCE NATIONAL GEODETIC VERTICAL DATUM (NGVD 1929).

0 250 500 FEET

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: DRAWING EA–01, REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013).

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500

SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400

HUDSON COUNTY
IMPROVEMENT AUTHORITY

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CHKD:	CAZ	DATE: 11/14/13
APPD:	AEB	DATE: 11/14/13
SCALE:	AS SHOWN	

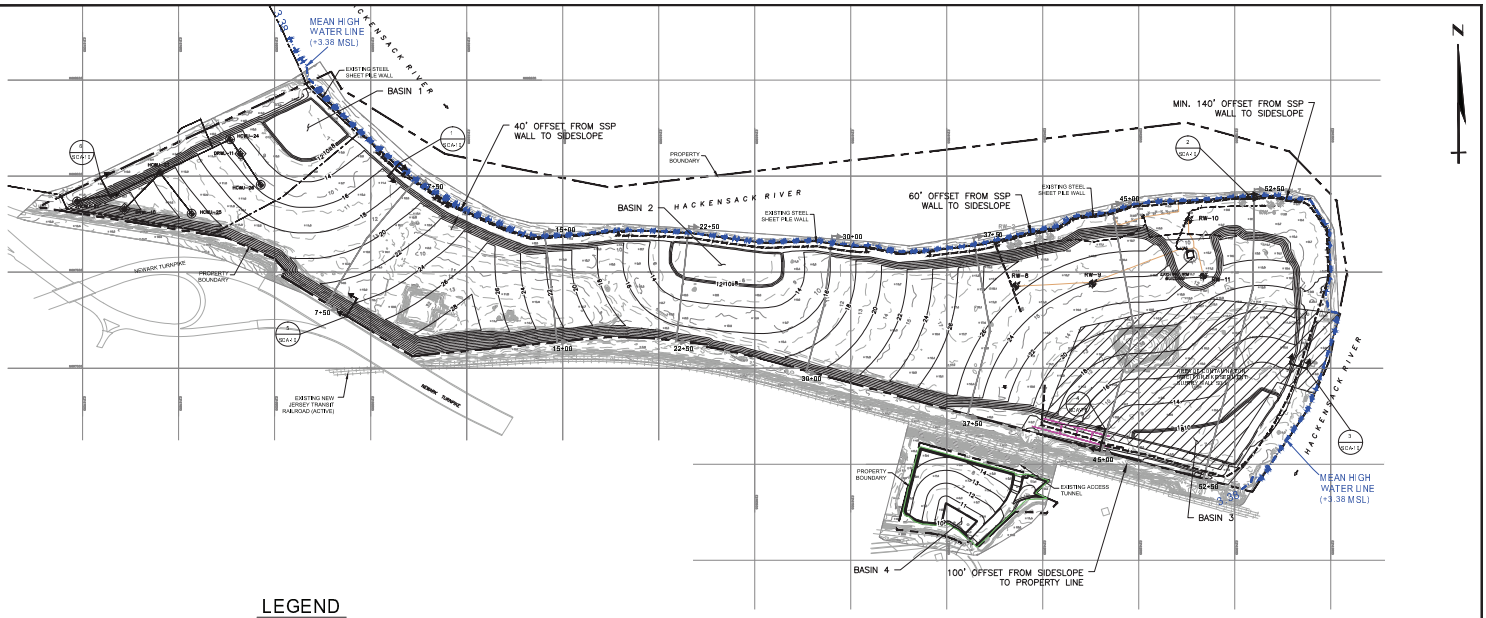
KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

SUBGRADE GRADING PLAN

PROJECT NO: 13–677
SCA–01

J:\JOBS\Seaboard\Design Base plan elevation adjustment\production drawings\new plotscript–october 2013\con–01.dwg Last Saved By: Webadmin 11/14/2013 3:23 PM Plotted By: Mike Rabellino 11/14/2013 3:24 PM Scale: 1:2



LEGEND

- PROPERTY BOUNDARY
- EXISTING SEABOARD SLURRY WALL
- EXISTING SEABOARD STEEL SHEET PILE WALL
- EXISTING PRG CB WALL
- EXISTING "PDM KEY" LOCATION
- EXISTING NEW JERSEY TRANSIT RAILROAD *(ACTIVE)*
- EXISTING GROUND SURFACE ELEVATION CONTOUR
- EXISTING GROUND SURFACE SPOT ELEVATION (FEET-MSL)
- PROPOSED MAXIMUM FINAL SURFACE ELEVATION CONTOUR
- EXISTING IRM RECOVERY WELL LOCATION
- MEAN HIGH WATER
- EXISTING AREA OF PROPOSED INTERIM DREDGE PROCESSING OPERATIONS (SEE NOTE 3)
- DETAIL NUMBER / DRAWING NUMBER
- EXISTING GROUNDWATER CONVEYANCE PIPING TRENCH ALIGNMENT
- EXISTING RECOVERY WELL LOCATION
- EXISTING GROUNDWATER EXTRACTION WELL LOCATION

NOTE:

1. THE PROPOSED MAXIMUM ELEVATION CONTOURS DEPICT THE TOP OF THE SIX INCH TOPSOIL LAYER. COMPLETED ELEVATIONS MAY BE LESS THAN MAXIMUMS PROVIDED THAT MINIMUM SLOPE IS MAINTAINED AND DRAINAGE AREAS ARE NOT ALTERED.
2. REFER TO DRAWINGS NOS. SCA-03 AND SCA-04 FOR CROSS SECTIONS.
3. REFER TO DRAWING NO. SCA-10 FOR TYPICAL PERIMETER DETAILS.
4. GREAT LAKES DREDGE AND DOCK COMPANY, LLC (GLDD) IS UTILIZING THE SOUTHEASTERN PORTION OF THE SITE AS A PDM PROCESSING AND STOCKPILE FACILITY. GLDD HAS DEVELOPED PLANS AND OBTAINED PERMITS FOR SITE OPERATIONS THAT WILL ENABLE GLDD TO CONDUCT THEIR PROCESSING AND STOCKPILING ACTIVITIES WHILE REMEDIATION OF THE SITE IS BEING COMPLETED. UPON COMPLETION OF THE GLDD OPERATIONS, THE CORRESPONDING FINAL SURFACE COVER SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH THE DESIGN PLANS CONTAINED HEREIN, TO COMPLETE CONSTRUCTION OF THE PRESCRIBED REMEDY.
5. ALL WELLS SHOWN ON EA-01 SHALL BE EXTENDED TO TOP OF SURFACE COVER AS REQUIRED FOR ACCESS.
6. TIDAL ELEVATION DATA CALCULATIONS WERE PROVIDED BY GEOD CORPORATION DERIVED BY UTILIZING INFORMATION FOR TIDAL STATIONS 853-0696 AND 853-0772 USING THE 1983-2001 TIDAL EPOCH AND ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 1929).

0 250 500 FEET

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: DRAWING EA-01, REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013)

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500

SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
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24GA27961400

HUDSON COUNTY
IMPROVEMENT AUTHORITY

DRWN:	SCC	DATE: 11/14/13
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APPD:	AEB	DATE: 11/14/13
SCALE:	AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

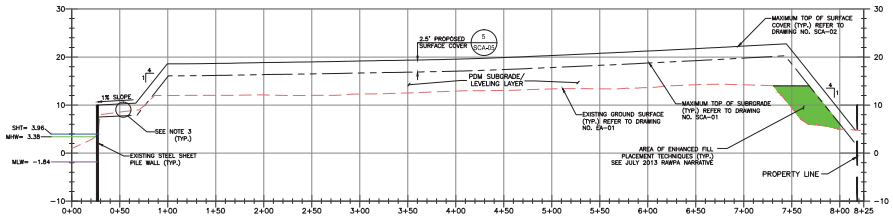
FINAL GRADING PLAN

PROJECT NO: 13-677
SCA-02

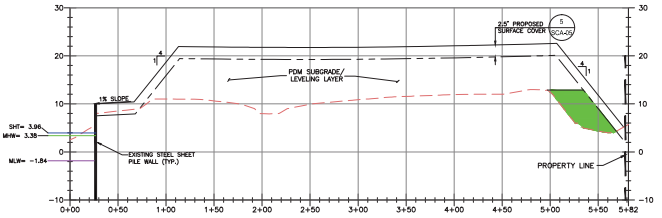
J:\Jobs\Seaboard\Design Base plan elevation adjustment\production drawings\new plotscript-october 2013\sca-02.dwg Last Saved By: Mebeattie 11/14/2013 3:24 PM Plotted By: Mike Beattie 11/14/2013 3:24 PM Scale: 1:2

LEGEND

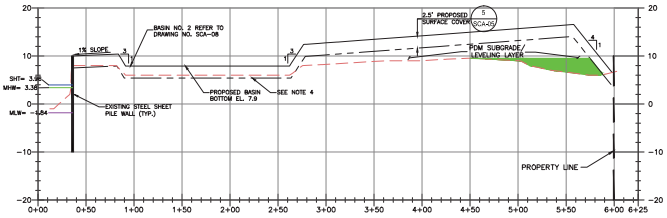
- PROPOSED MAXIMUM TOP OF SURFACE COVER
- PROPOSED MAXIMUM TOP OF SUBGRADE
- EXISTING GROUND SURFACE
- AREA OF ENHANCED FILL PLACEMENT TECHNIQUES (TYP.)
- EL.=3.96 SPRING HIGH TIDE
- EL.=3.38 MEAN HIGH WATER
- EL.=-1.84 MEAN LOW WATER



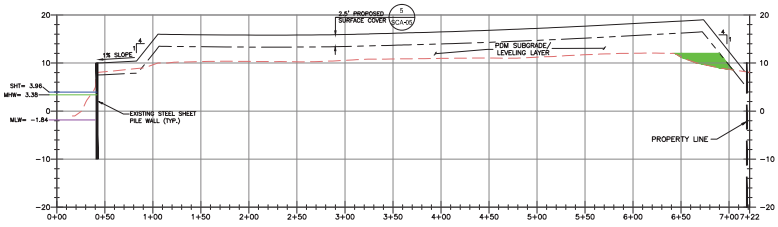
CROSS SECTION 7+50



CROSS SECTION 15+00



CROSS SECTION 22+50



CROSS SECTION 30+00

1. REFER TO DRAWING No. SCA-02 FOR CROSS SECTION LOCATIONS.
2. TIDAL ELEVATION DATA CALCULATIONS WERE PROVIDED BY GEOD CORPORATION DERIVED BY UTILIZING INFORMATION FOR TIDAL STATIONS 853-0696 AND 853-0772 USING THE 1983-2001 TIDAL EPOCH AND ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 1929).
3. IN LOCATIONS WHERE EXISTING GRADES ARE SLIGHTLY HIGHER THAN PROPOSED GRADES (I.E., LESS THAN 1.0 FOOT) MODEST ADJUSTMENTS OF THE FINAL GRADES MAY BE MADE TO MINIMIZE EXCAVATION BUT TO MAINTAIN PROPOSED SURFACE SLOPES AND FINAL COVER THICKNESS.
4. IN BASIN 2 LOCATIONS WHERE EXISTING GRADES ARE SLIGHTLY HIGHER THAN PROPOSED SUBGRADE THE EXISTING GRADE SHALL BE CUT TO THE PROPOSED SUBGRADE ELEVATION.
5. COMPLETED ELEVATIONS MAY BE LESS THAN MAXIMUMS PROVIDED THAT MINIMUM SLOPE IS MAINTAINED AND DRAINAGE AREAS ARE NOT ALTERED.

V: 0 10 20 FEET

H: 0 50 100 FEET

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: DRAWING EA-01, REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013).

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARED BY:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500

SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400

HUDSON COUNTY
IMPROVEMENT AUTHORITY

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SCALE:	AS SHOWN	

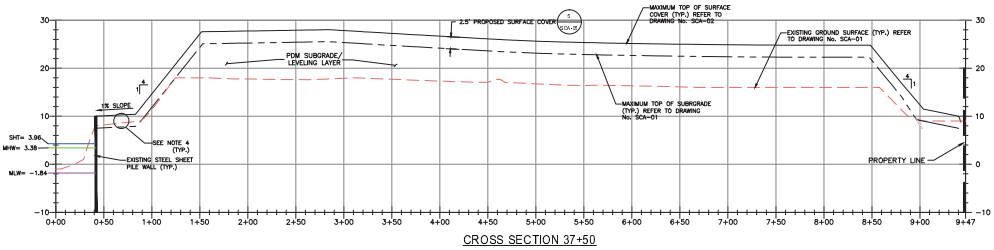
KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

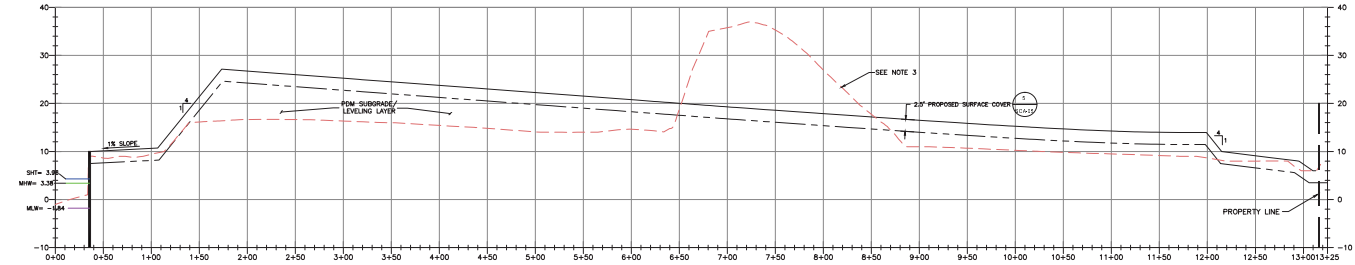
CROSS SECTIONS SHEET 1 OF 2

PROJECT NO: 13-677
SCA-03

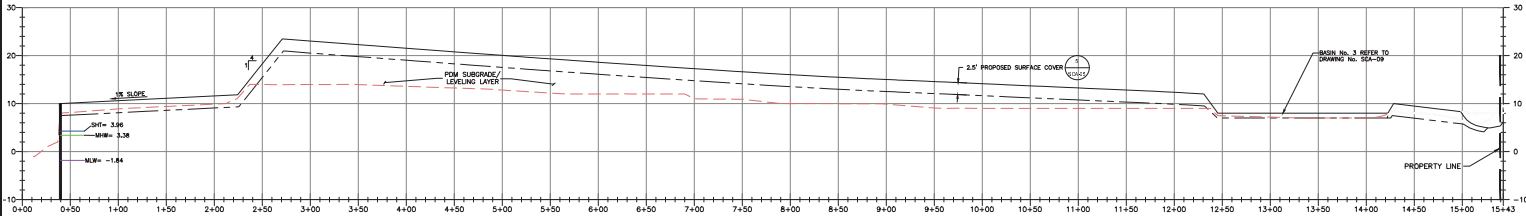
J:\JOBS\Seaboard\Design Base plan elevation adjustment\construction drawings\cross sidebottom october 2013\scn-03.dwg Last Saved By: Wakefins 11/14/2013 3:25 PM Plotted By: Wes Wakefins 11/14/2013 3:25 PM Scale: 1:2



CROSS SECTION 37+50



CROSS SECTION 45+00



CROSS SECTION 52+50

LEGEND

- EXISTING GROUND SURFACE
- PROPOSED MAXIMUM TOP OF SURFACE COVER
- PROPOSED MAXIMUM TOP OF SUBGRADE
- EL=3.96 SPRING HIGH TIDE
- EL=3.38 MEAN HIGH WATER
- EL=-1.84 MEAN LOW WATER

NOTES:

1. REFER TO DRAWING No. SCA-02 FOR CROSS SECTION LOCATIONS.
2. TIDAL ELEVATION DATA CALCULATIONS WERE PROVIDED BY GEOD CORPORATION DERIVED BY UTILIZING INFORMATION FOR TIDAL STATIONS 853-0696 AND 853-0772 USING THE 1983-2001 TIDAL EPOCH AND ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 1929).
3. AFTER THE AERIAL SURVEY WAS CONDUCTED BY AEROMETRIC, APRIL 2011, THE EXISTING GRADE GLDD PDM STOCKPILE SHOWN WAS REMOVED AND SPREAD OVER THE SITE SURFACE.
4. IN LOCATIONS WHERE EXISTING GRADES ARE SLIGHTLY HIGHER THAN PROPOSED GRADES (I.E., LESS THAN 1.0 FOOT) MODEST ADJUSTMENTS OF THE FINAL GRADES MAY BE MADE TO MINIMIZE EXCAVATION BUT TO MAINTAIN COVER THICKNESS.
5. COMPLETED ELEVATIONS MAY BE LESS THAN THE MAXIMUMS PROVIDED THAT THE MINIMUM SLOPE IS MAINTAINED AND DRAINAGE AREAS ARE NOT ALTERED.

V: 0 10 20 FEET

H: 0 50 100 FEET

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: DRAWING EA-01, REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013)

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500

SIGNATURE DATE

STATE OF NEW JERSEY
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24GA27961400

HUDSON COUNTY
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APPD:	AEB	DATE:	11/14/13
SCALE:	AS SHOWN		

KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

CROSS SECTIONS SHEET 2 OF 2

PROJECT NO: 13-677

SCA-04

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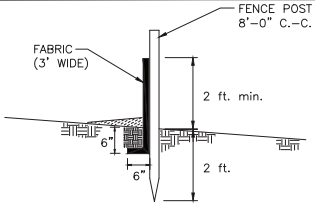
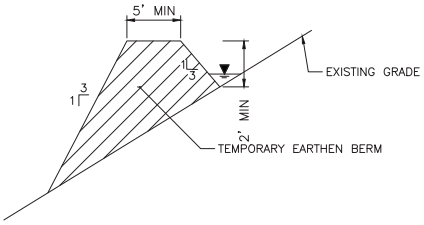
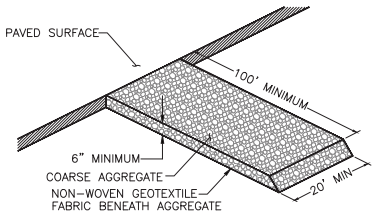


NOTE:
BOTTOM 1 FT. OF FABRIC EMBEDDED IN 6" TRENCH TAMPED IN PLACE.

1 SCA-05 **SILT FENCE DETAIL**
N.T.S.

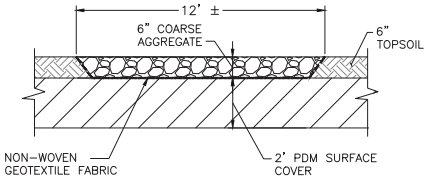


3 SCA-05 **TEMPORARY DIVERSION DETAIL**
N.T.S.



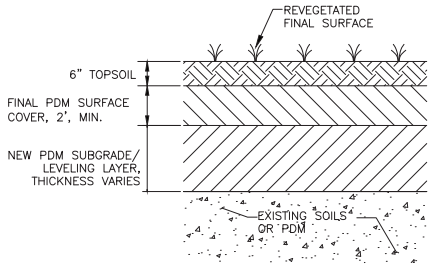
2 SCA-05 **GRAVEL CONSTRUCTION ENTRANCE DETAIL**
N.T.S.

NOTE:
COARSE AGGREGATE – USE ASTM C-33 SIZE No.2 OR No.3 STONE.

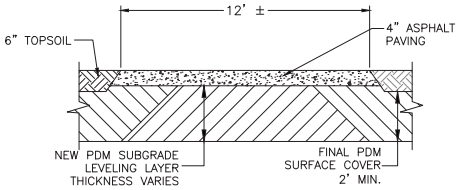


4 SCA-05 **ACCESS ROAD DETAIL**
N.T.S.

NOTE:
MAINTAIN ACCESS ROAD BETWEEN EXISTING TUNNEL AND IRM SYSTEM, ALONG EASTERN BOUNDARY OF PROPERTY. OFFSET FROM EXISTING SLURRY WALL AT LEAST 50 FEET.



5 SCA-05 **SURFACE COVER CONSTRUCTION DETAIL**
N.T.S.



6 SCA-05 **SOUTHERN AREA ACCESS ROAD DETAIL**
N.T.S.

SOIL EROSION AND SEDIMENT CONTROL NOTES

1. ALL SOIL EROSION AND SEDIMENT CONTROL PRACTICES ON THIS PLAN WILL BE CONSTRUCTED IN ACCORDANCE WITH THE "**NEW JERSEY STANDARDS FOR SOIL EROSION AND SEDIMENT CONTROL**" **LAST REVISED JULY 1999** (STANDARDS). THESE MEASURES WILL BE INSTALLED PRIOR TO ANY MAJOR SITE DISTURBANCE OR IN THEIR PROPER SEQUENCE AND MAINTAINED UNTIL PERMANENT PROTECTION IS ESTABLISHED.
2. UPON ACHIEVING THE SUBGRADE ELEVATIONS AS INDICATED ON SCA-01, IF THE REGRADED PDM SURFACE IS EXPOSED FOR A PERIOD OF GREATER THAN 60 DAYS (I.E., IF THE FINAL SURFACE COVER CONSTRUCTION IS DELAYED FOR GREATER THAN 60 DAYS), TEMPORARY STABILIZATION OF THE REGRADED PDM WILL BE ACHIEVED WITH THE USE OF MULCH WITH A BINDER ADDITIVE IN ACCORDANCE WITH THE STANDARDS. THIS TEMPORARY COVER SHALL BE MAINTAINED UNTIL SUCH TIME WHEREBY THE FINAL SURFACE COVER CONSTRUCTION IS COMPLETE AND PERMANENT SEEDING CAN BE PERFORMED.
3. SEEDING DATES: BASED UPON THE SEED MIXTURES SPECIFIED BELOW, THE FOLLOWING SEEDING DATES ARE ACCEPTABLE TO ESTABLISH PERMANENT VEGETATIVE COVER: MARCH 1 TO OCTOBER 1. AS IDENTIFIED IN THE STANDARDS, SEED MIXTURE NUMBER 14 SHALL BE UTILIZED FOR THE ESTABLISHMENT OF VEGETATION OF THE FILTER STRIPS AND DETENTION BASIN BOTTOMS. ALL OTHER AREAS SHALL BE SEEDED WITH SEED MIXTURE NUMBER 17, INCLUDING PLATEAU AREAS, SIDE SLOPE AREAS AND BASIN BERMS AND SIDESLOPES. ALTERNATE SEED MIXTURES ARE SUBJECT TO THE APPROVAL OF THE ENGINEER.
4. SILT FENCE SHALL BE INSTALLED AROUND THE PERIMETER OF THE SITE PRIOR TO ANY INTRUSIVE ACTIVITIES. ALL SILT FENCE IS TO BE PROPERLY TRENCHED AND MAINTAIN UNTIL PERMANENT VEGETATIVE COVER IS ESTABLISHED. SEDIMENT RETAINED BY SILT FENCE AT THE TIME OF REMOVAL SHALL BE SPREAD ON-SITE AT A LOCATION DIRECTED BY THE ENGINEER AND RESEEDED.
5. STORM DRAINAGE OUTLET POINTS SHALL BE PROTECTED AS REQUIRED BEFORE THEY BECOME FUNCTIONAL.
6. FOR ESTABLISHMENT OF A PERMANENT VEGETATIVE COVER, MULCH MATERIALS SHALL BE UN-ROTTED SALT HAY OR SMALL GRAIN STRAW APPLIED AT THE RATE OF 70-90 POUNDS PER 1000 SQUARE FEET (1.5-2.0 TONS/ACRE). ADDITIONAL REQUIRED MULCH PRACTICES ARE PRESCRIBED IN THE STANDARDS. OTHER PERMANENT REVEGETATION MEASURES, WHICH INCLUDE SITE PREPARATION, SEEDBED PREPARATION AND PERMANENT SEEDING, SHALL BE CONDUCTED IN ACCORDANCE WITH THE STANDARDS. PRIOR TO PERMANENT SEEDING, SCARIFICATION OF TOPSOIL SHALL BE LIMITED TO A MAXIMUM DEPTH OF THREE (3) INCHES TO PREVENT DISTURBANCE OF THE UNDERLYING PDM SURFACE.
7. ALL EROSION CONTROL DEVICES SHALL BE INSPECTED WEEKLY OR FOLLOWING EVERY SIGNIFICANT RAINFALL EVENT, MAINTAINED AND CORRECTED BY THE CONTRACTOR AS NECESSARY. ANY DAMAGE INCURRED BY EROSION SHALL BE RECTIFIED IMMEDIATELY.
8. THE HUDSON-ESSEX-PASSAIC SOIL CONSERVATION DISTRICT WILL BE NOTIFIED IN WRITING AT LEAST 72 HOURS PRIOR TO ANY SOIL DISTURBING ACTIVITIES. FAX - (973) 364-0784 EMAIL - INFORMATION@HEPSCD.ORG
9. **THE APPLICANT MUST OBTAIN A DISTRICT ISSUED REPORT-OF-COMPLIANCE PRIOR TO APPLYING FOR THE CERTIFICATE OF OCCUPANCY OR TEMPORARY CERTIFICATE OF OCCUPANCY FROM THE RESPECTIVE MUNICIPALITY, NJ - DCA OR ANY OTHER CONTROLLING AGENCY.** CONTACT THE DISTRICT AND GIVE ADVANCED NOTICE UPON COMPLETION OF THE RESTABILIZATION MEASURES. A PERFORMANCE DEPOSIT MAY BE POSTED WITH THE DISTRICT WHEN WINTER WEATHER OR SNOW COVER PROHIBITS THE PROPER APPLICATION OF SEED, MULCH, FERTILIZER OR HYDRO-SEED.
10. PAVED ROADWAYS MUST BE KEPT CLEAN AT ALL TIMES. SOIL OR MUD THAT IS SPILLED, DROPPED, WASHED OR TRUCKED ONTO PUBLIC ROAD SHALL BE REMOVED IMMEDIATELY AND PLACED ON SITE AT A LOCATION DIRECTED BY THE ENGINEER.
11. ALL SURFACES, EXCEPT THOSE INDICATED, ARE TO BE PROVIDED WITH 6 INCHES OF TOPSOIL PRIOR TO PERMANENT RE-SEEDING.
12. ALL PLAN REVISIONS MUST BE SUBMITTED TO THE DISTRICT FOR PROPER REVIEW AND APPROVAL.
13. A CRUSHED STONE WHEEL CLEANING TRACKING-PAD IS TO BE INSTALLED AT ALL SITE ENTRANCES/EXITS USING COARSE AGGREGATE TO A MINIMUM LENGTH OF 100 FEET. THE PAD SHALL BE MAINTAINED THROUGHOUT THE PROJECT. ADDITIONAL STONE SHALL BE APPLIED AS CONDITIONS DEMAND.
14. MAXIMUM SOIL SLOPES SHALL NOT EXCEED 2:1 UNLESS ADDITIONAL MEASURES ARE TAKEN AND APPROVED BY THE SOIL CONSERVATION DISTRICT. THESE "SPECIAL" MEASURES SHALL BE DESIGNED BY THE APPLICANT'S ENGINEER.
15. **THE HUDSON-ESSEX-PASSAIC SOIL CONSERVATION DISTRICT SHALL BE NOTIFIED, IN WRITING, FOR THE SALE OF ANY PORTION OF THE PROJECT OR FOR THE SALE OF INDIVIDUAL LOTS. NEW OWNERS' INFORMATION SHALL BE PROVIDED. ADDITIONAL MEASURES DEEMED NECESSARY BY DISTRICT OFFICIALS SHALL BE IMPLEMENTED AS CONDITIONS WARRANT.**
16. TEMPORARY DIVERSIONS, AS SHOWN ON THIS DRAWING, SHALL BE USED AS REQUIRED THROUGHOUT CONSTRUCTION TO PREVENT DIRECT DISCHARGE OF CONCENTRATED STORMWATER FLOW FROM THE SITE.
17. DUST CONTROL MEASURES SHALL BE PERFORMED IN ACCORDANCE WITH THE STANDARDS.

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES:

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500

SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400

HUDSON COUNTY
IMPROVEMENT AUTHORITY

DRWN:	SCC	DATE: 11/14/13
CHKD:	CAZ	DATE: 11/14/13
APPD:	AEB	DATE: 11/14/13
SCALE:	AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

EROSION AND SEDIMENT CONTROL/SITE RESTORATION DETAILS AND NOTES

PROJECT NO: 13-677

SCA-05

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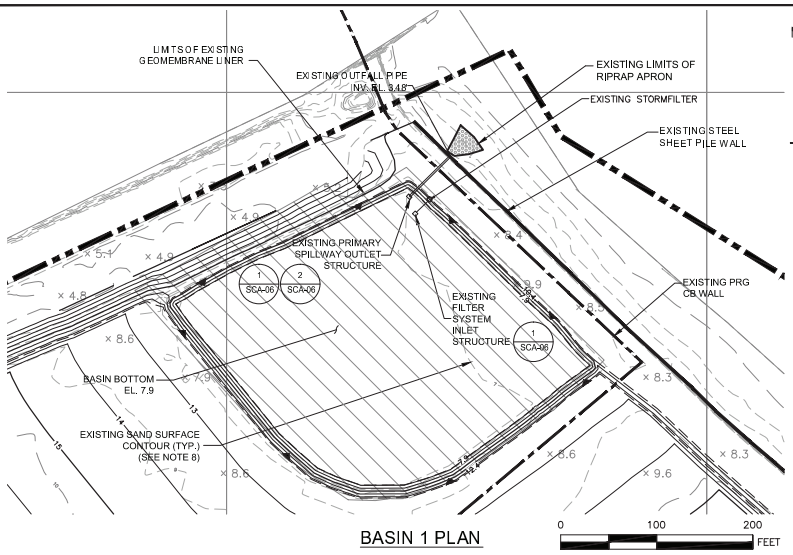


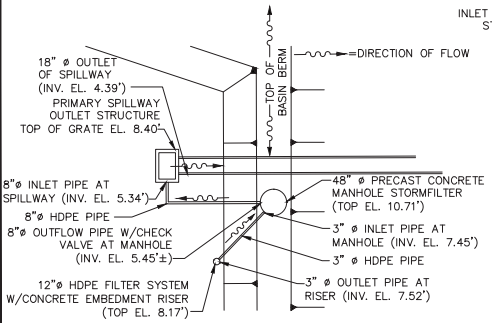
BASIN 1 PLAN

LEGEND

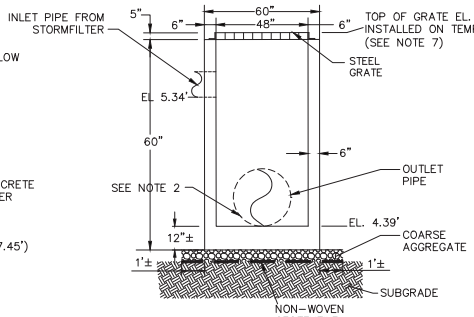
- PROPERTY BOUNDARY
- EXISTING STEEL SHEET PILE WALL
- EXISTING PRG CB WALL
- TOP OF SLOPE
- BOTTOM OF SLOPE
- 8.0 — PROPOSED MAXIMUM FINAL SURFACE ELEVATION CONTOUR
- 7 — EXISTING GROUND SURFACE
- × 14.3 — EXISTING SPOT ELEVATION (TYP.)
- EXISTING 40 MIL GEOMEMBRANE LINER

NOTES:

1. SPILLWAY BARREL IS ADS N-12 CORRUGATED PLASTIC PIPE WITH SMOOTH INTERIOR WALL.
2. BARREL INLET AND STORMFILTER OUTLET CONNECTIONS AT OUTLET ARE EQUIPPED WITH ADAPTER FITTINGS TO CREATE WATER TIGHT CONNECTIONS.
3. A CONCRETE PLUG AND CAULKING SEAL WAS PROVIDED AT BARREL PENETRATION THROUGH STEEL SHEET PILE WALL. THE DIAMETER OF THE CONCRETE PLUG IS APPROXIMATELY FIVE (5) FEET.
4. A TRASH RACK WAS PROVIDED ON THE PRIMARY SPILLWAY OUTLET STRUCTURE.
5. CONCRETE ANCHOR USED TO ATTACH GEOMEMBRANE LINER TO CONCRETE OUTLET STRUCTURES.
6. STANDARD PIPE BOOT SKIRT USED AT PIPE PENETRATIONS THROUGH GEOMEMBRANE LINER.
7. A 9 INCH COLLAR WAS CUT FROM THE PRIMARY SPILLWAY OUTLET STRUCTURE TO ACCOMMODATE EXISTING SUBSURFACE ELEVATIONS. STORM GRATE WAS INSTALLED ON THE TEMPORARY SURFACE. COLLAR TO BE REINSTALLED FOLLOWING FINAL COVER PLACEMENT.
8. ADDITIONAL SAND SHALL BE PLACED AS REQUIRED TO ADJUST EXISTING BASIN GRADES TO MATCH FINAL DESIGN GRADE.



1 SCA-06 BASIN OUTLET STRUCTURE/STORMFILTER DETAIL (TYP.)
N.T.S.



2 SCA-06 OUTLET STRUCTURE - BASIN 1 DETAIL
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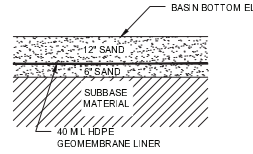

3 SCA-06 BASIN 1 LINER DETAIL (TYP.)
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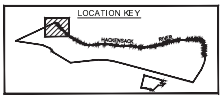

HUDSON COUNTY IMPROVEMENT AUTHORITY

DRWN:	SCC	DATE:	11/14/13
CHKD:	CAZ	DATE:	11/14/13
APPD:	AEB	DATE:	11/14/13
SCALE:	AS SHOWN		

KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

BASIN 1 – PLAN AND DETAILS

PROJECT NO: 13-677

SCA-06

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: DRAWING EA-01, REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013).

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500

SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400

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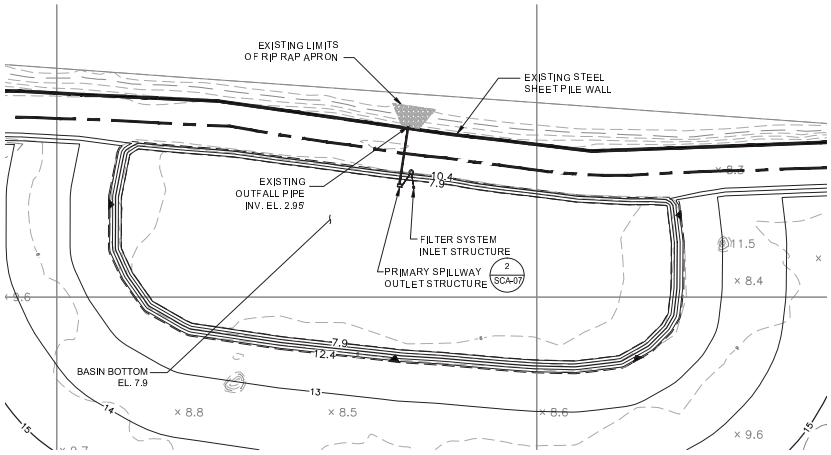


BASIN 2 PLAN

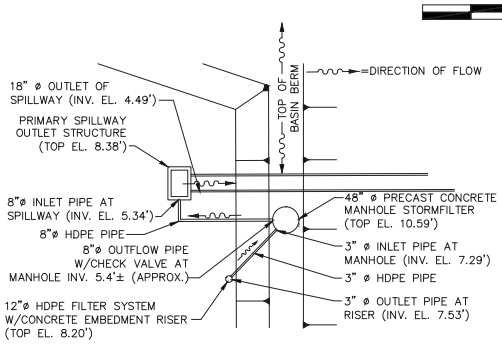
0 100 200 FEET

LEGEND

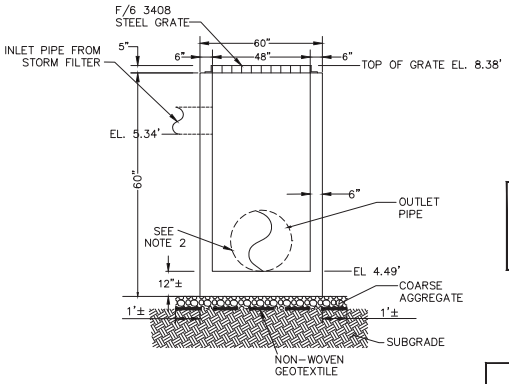
- EXISTING STEEL SHEET PILE WALL
- EXISITING SEABOARD CB WALL
- TOP OF SLOPE
- BOTTOM OF SLOPE
- 8.0 PROPOSED MAXIMUM FINAL SURFACE ELEVATION CONTOUR
- EXISTING CONTOUR
- × 14.3 EXISTING SPOT ELEVATION (TYP.)

NOTES:

1. SPILLWAY BARREL IS ADS N-12 CORRUGATED PLASTIC PIPE WITH SMOOTH INTERIOR WALL.
2. BARREL INLET AND STORMFILTER OUTLET CONNECTIONS AT OUTLET ARE EQUIPPED WITH ADAPTER FITTINGS TO CREATE WATER TIGHT CONNECTIONS.
3. A CONCRETE PLUG AND CAULKING SEAL WAS PROVIDED AT BARREL PENETRATION THROUGH STEEL SHEET PILE WALL. THE DIAMETER OF THE CONCRETE PLUG IS APPROXIMATELY FIVE (5) FEET.
4. A TRASH RACK WAS PROVIDED ON PRIMARY SPILLWAY OUTLET STRUCTURE.

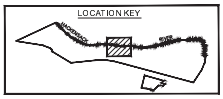


1 SCA-07 BASIN OUTLET STRUCTURE/STORMFILTER DETAIL (TYP.)
N.T.S.



2 SCA-07 OUTLET STRUCTURE - BASIN 2 DETAIL
N.T.S.

LOCATION KEY



PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500
SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400

HUDSON COUNTY
IMPROVEMENT AUTHORITY

DRWN:	SCC	DATE: 11/14/13
CHKD:	CAZ	DATE: 11/14/13
APPD:	AEB	DATE: 11/14/13
SCALE:	AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

BASIN 2 PLAN AND DETAILS

PROJECT NO: 13-677
SCA-07

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: DRAWING EA-01, REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013)

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

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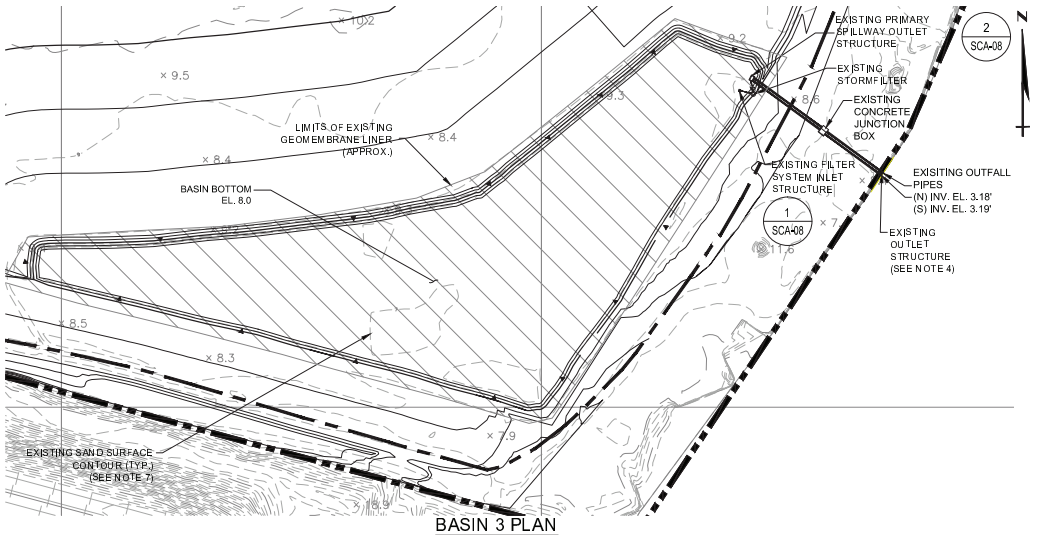


BASIN 3 PLAN

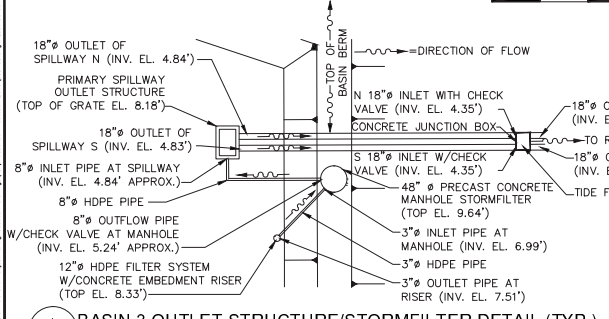
0 100 200 FEET

LEGEND

- PROPERTY BOUNDARY
- EXISTING SLURRY WALL
- TOP OF SLOPE
- BOTTOM OF SLOPE
- 40 MIL GEOMEMBRANE LINER
- EXISTING STRUCTURES
- 8.0 — PROPOSED MAXIMUM FINAL SURFACE ELEVATION CONTOUR
- EXISTING GROUND SURFACE
- × 14.3 EXISTING SPOT ELEVATION (TYP.)

NOTES:

1. BARREL IS ADS N-12 CORRUGATED PIPE WITH SMOOTH INTERIOR WALL.
2. BARREL INLET AND STORMFILTER OUTLET CONNECTIONS AT OUTLET STRUCTURE ARE EQUIPPED WITH ADAPTER FITTINGS TO CREATE WATER TIGHT CONNECTIONS.
3. A TRASH RACK INSTALLED ON OUTLET STRUCTURE.
4. PIPE OUTFALL INSTALLED THROUGH EXISTING CONCRETE BULKHEAD (DEMARLL).
5. CONCRETE ANCHOR USED TO ATTACH GEOMEMBRANE LINER TO CONCRETE OUTLET STRUCTURES.
6. STANDARD PIPE BOOT SKIRT USED AT PIPE LINE PENETRATORS THROUGH GEOMEMBRANE LINER.
7. ADDITIONAL SAND/GRAVEL SHALL BE PLACED AS REQUIRED TO ADJUST EXISTING BASIN GRADES TO MATCH FINAL DESIGN GRADE.



1 SCA-08 BASIN 3 OUTLET STRUCTURE/STORMFILTER DETAIL (TYP.)

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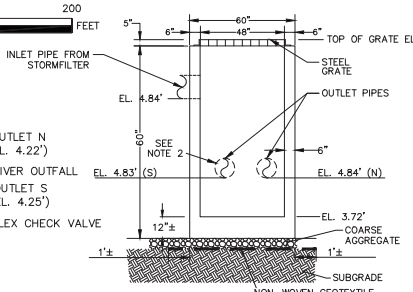
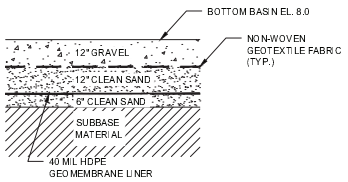


2 SCA-08 OUTLET STRUCTURE - BASIN 3 DETAIL

N.T.S.



3 SCA-08 BASIN 3 LINER DETAIL (TYP.)

N.T.S.

LOCATION KEY

HUDSON COUNTY IMPROVEMENT AUTHORITY

DRWN:	SCC	DATE: 11/14/13
CHKD:	CAZ	DATE: 11/14/13
APPD:	AEB	DATE: 11/14/13
SCALE:	AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

BASIN 3 – PLAN AND DETAILS

PROJECT NO: 13-677

SCA-08

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: DRAWING EA-01, REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013)

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500

SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400

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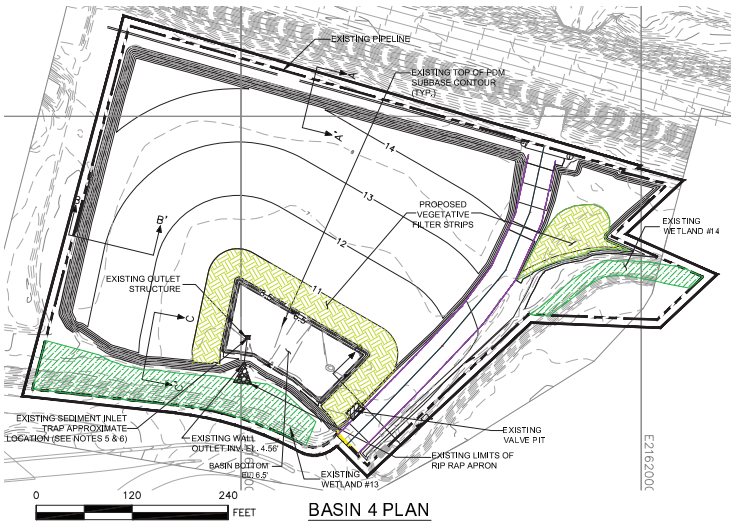
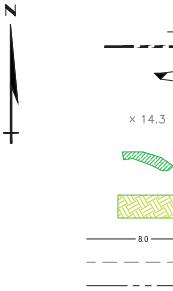
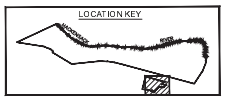


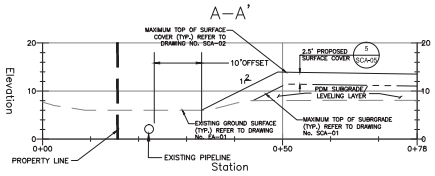
BASIN 4 PLAN

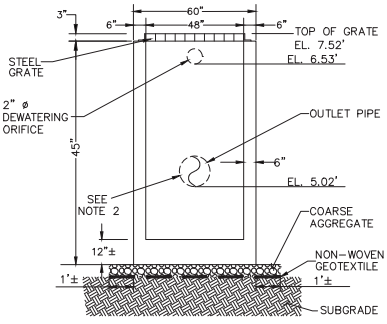




NOTES:

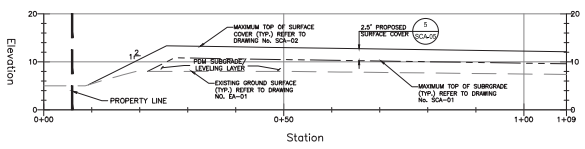
1. SPILLWAY BARREL IS ADS N-12 CORRUGATED PIPE WITH SMOOTH INTERIOR.
2. BARREL INLET CONNECTION EQUIPPED WITH AN ADAPTER FITTING TO CREATE WATERTIGHT CONNECTION.
3. A TRASH RACK WAS INSTALLED ON OUTLET STRUCTURE.
4. OUTLET PROTECTION CONSTRUCTED USING STANDARD RIP RAP WITH A MINIMUM D50 = 11".
5. OUTLET BARREL WAS TEMPORARILY NOT INSTALLED IN OUTLET STRUCTURE UNTIL FINAL PDM SURFACE COVER IS PLACED.
6. TEMPORARY SEDIMENT INLET TRAP CONSTRUCTED OF NJDOT NO.2 COARSE AGGREGATE PLACED ON NON-WOVEN GEOTEXTILE SURROUNDING INLET OF 12"ø OUTLET BARREL.

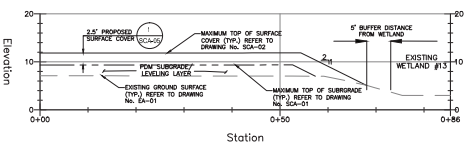


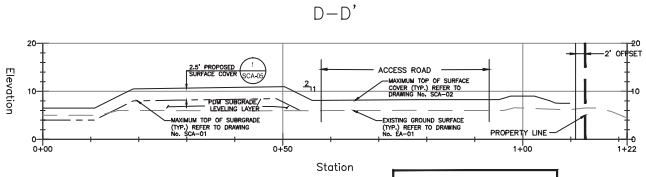


1 SCA-05 OUTLET STRUCTURE DETAIL - BASIN 4

N.T.S.







HUDSON COUNTY
IMPROVEMENT AUTHORITY

DRWN:	SCC	DATE: 11/14/13
CHKD:	CAZ	DATE: 11/14/13
APPD:	AEB	DATE: 11/14/13
SCALE:	AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

BASIN 4 PLAN AND DETAILS

PROJECT NO: 13-677

SCA-09

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: DRAWING EA-01, REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013)

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500

SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400

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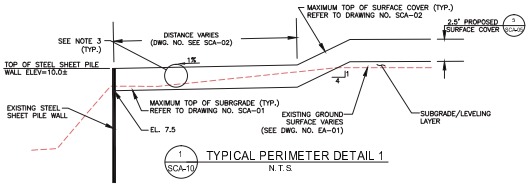

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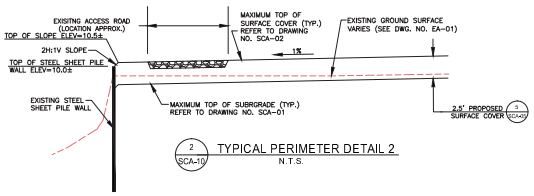

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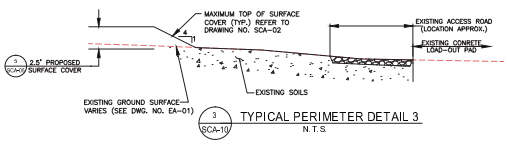

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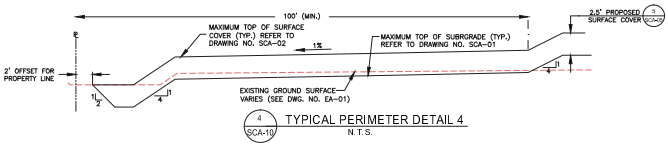

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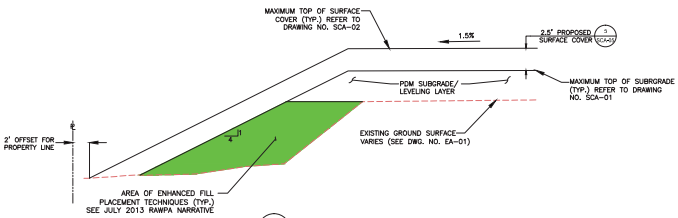

5 SCA-10 TYPICAL PERIMETER DETAIL 5
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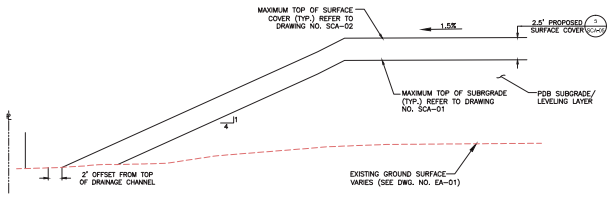

8 SCA-10 TYPICAL PERIMETER DETAIL 6
N.T.S.

GENERAL NOTES:

1. "SURFACE COVER" IS COMPRISED OF 2' OF PDM OVERLAIN BY 6" OF TOPSOIL.
2. SEE DRAWING NO. SCA-02 FOR LOCATION OF DETAILS 1 THROUGH 6.
3. IN LOCATIONS WHERE EXISTING GRADES ARE SLIGHTLY HIGHER THAN PROPOSED GRADES (I.E., LESS THAN 1.0 FOOT) MODEST ADJUSTMENTS OF THE FINAL GRADES MAY BE MADE TO MINIMIZE EXCAVATION BUT TO MAINTAIN COVER THICKNESS.
4. COMPLETED ELEVATIONS MAY BE LESS THAN MAXIMUMS PROVIDED THAT MINIMUM SLOPE IS MAINTAINED AND DRAINAGE AREAS ARE NOT ALTERED.

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: DRAWING EA-01, REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013).

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500
SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400

HUDSON COUNTY
IMPROVEMENT AUTHORITY

DRWN:	SCC	DATE: 11/14/13
CHKD:	CAZ	DATE: 11/14/13
APPD:	AEB	DATE: 11/14/13
SCALE:	AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (NOVEMBER 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

GENERAL DETAILS AND NOTES

PROJECT NO: 13-677
SCA-10

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ATTACHMENT 2

AIR MONITORING PLAN

(Provided under separate cover)

REMEDIAL ACTION WORK PLAN ADDENDUM

REVISED AIR MONITORING PLAN

FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

Prepared for:

Hudson County Improvement Authority

Prepared by:

Key Environmental, Inc.
200 Third Avenue
Carnegie, Pennsylvania 15106

June 2, 2008
Revised July 25, 2013

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C – SPECIFICATIONS FOR THE ppbRAE
D – SPECIFICATIONS FOR THE SOLARRAE

1.0 INTRODUCTION

On behalf of Hudson County Improvement Authority (HCIA), Key Environmental, Inc. (KEY) has prepared this revised Air Monitoring Plan (AMP) to supplement the 2013 Remedial Action Work Plan Addendum (RAWPA 2013) for the Former Koppers Seaboard Site (Site) located in Kearny, New Jersey. An AMP was provided in the Final Remedial Action Work Plan Addendum[1], approved by NJDEP in 2007 (RAWPA 2007). Subsequently, on March 5, 2008 the NJDEP provided new requirements for inclusion into the AMP. The March 5, 2008 document[2] entitled "Requirements for Revision of the Air Monitoring Plan" provided guidance pertaining to development of action levels and perimeter monitoring requirements to ensure that emission are controlled to levels that are protective of potential off-site receptors during active remediation. The March 5, 2008 NJDEP document was based on draft guidance developed by the NJDEP Division of Remediation Management and Response and the Division of Air Quality. This revised AMP incorporates the NJDEP requirements for monitoring activities associated with 2013 RAWPA remedial actions.

The 2013 RAWPA identifies the Site remedies that will be implemented by HCIA which consist of construction of a Surface Cover, including spreading of the large existing processed dredged material (PDM) stockpile on site.

In addition, Great Lakes Dredge and Dock Company, LLC (GLDD) leased from the HCIA a 20-acre portion of the Site for unloading, processing and shipment of dredge material. GLDD has obtained an Acceptable Use Determination (AUD) from the NJDEP's Land Use Regulatory Program, Office of Dredge Sediment Technology (LURP ODST) for their Site activities. In accordance with an agreement between the HCIA and GLDD an additional 400,000 cubic yards of PDM supplied by GLDD will be used on Site as a portion of the surface cover system. The additional PDM provided by GLDD will meet Site remediation requirements. Accordingly, the

[1] September 2007, KEY Environmental, Inc., Remedial Action Work Plan Addendum, Koppers Seaboard Site, Kearny, NJ.
[2] March 2007, NJDEP, Requirements for Revision of the Air Monitoring Plan, RAWPA

GLDD operational plans have been integrated into the remediation activities and thus have been included in the Final RAWPA.

In accordance with NJDEP requirements, perimeter monitoring is only required during active remediation when there is potential for emission from contaminated material. For the purposes of this AMP it is assumed that the PDM material (either the existing stockpile or the GLDD material) is not considered contaminated material as the PDM has/will meet acceptable NJDEP exposure criteria prior to importation to the Site and the PDM is regulated by the NJDEP Department of Land Use Regulation. Air monitoring will be required during the periods that any remedial activities are being performed that require excavation into existing subsurface potentially contaminated soils.

The remainder of this AMP outlines the establishment of Contaminant Action Levels (CALs) and Daily Action Levels (DALs) for fugitive dust and volatile organic contaminants (VOCs), procedures for air monitoring procedures, and corrective action procedures. Note that the establishment of CALs is risk based and more conservative than the Occupational Safety and Health Administration (OSHA) Permissible Exposure Limit (PEL) for Particulates Otherwise Regulated (PNOR) and the Threshold Limit Value (TLV) for total particulates specified by the American Conference of Governmental Industrial Hygienists (ACGIH).

The objectives of the air monitoring program are outlined in the following section.

1.1 OBJECTIVES

As stated in the introduction, this AMP the objectives of the air monitoring program are to ensure that emissions are controlled to levels that are protective of off-site receptors during active remediation. Accordingly the AMP will:

- Provide real-time data to verify/ensure that dust and vapor controls are adequate to protect potential off-site receptors; and,

- Provide the information necessary for documentation of fugitive emissions for the project records and for future use, if necessary

In addition to outlining the procedures to be used for air monitoring, this AMP establishes a bright line ambient air concentration for fugitive dust and VOCs that will be used to initiate stop work conditions and corrective action to mitigate further emissions.

2.0 DUST ACTION LEVEL

Dust action levels have been established for the Site perimeter. Perimeter action levels have been established such that 1) offsite downwind receptors are protected from potential chemical risks, and 2) such that the contributions to particulate concentrations at the perimeter resulting from remediation activities do not exceed the National Ambient Air Quality Standard for particulate matter 10 microns in diameter or less (PM_{10}) adjusted to account for annual particulate background in the State of New Jersey.

2.1 PERIMETER DUST ACTION LEVEL

Perimeter air monitoring will also be conducted to ensure that downwind receptors are protected and to ensure that the relevant ambient air criteria for respirable particulates attributable to Site remediation related emissions are not exceeded at the perimeter. Detailed calculations were completed to derive particulate Contaminant Action Levels (CALs) in accordance with procedures currently under development by the NJDEP as set forth in the March 5, 2007 "Requirements for Revision of the Air Monitoring Plan". These CALs were developed based on appropriate exposure assumptions, Site-specific Upper 95% Confidence Limits on the mean, Reference Concentrations, and/or Unit Risk Factors.

The CALs were derived for historic contaminant concentrations for upland soils and for near-shore Hackensack River sediments. Only those constituents detected in these media at concentrations in excess of Residential Direct Contact Soil Cleanup Criteria (RDCSCC) were considered to be of concern and included in the CAL calculations. Note that a RDCSCC has not been developed by NJDEP for dioxins and furans. Therefore, an EPA value of 1 ug/kg was used as an appropriate residential benchmark for dioxin and furan expressed as toxicity equivalents (all toxicity equivalent concentrations were determined to be below 1 ug/Kg for sediment and soil).

Identification of the constituents of interest (i.e., screening versus the RDCSCC or the EPA dioxin/furan benchmark) and development of the particulate Contaminant Action Levels is documented in Attachment A. In all cases, the contaminant-based particulate action levels at the property line were found to be in excess of the National Ambient Air Quality Standard adjusted for New Jersey background (NJAAQS). Therefore, in accordance with the March 5, 2007 "Requirements for Revision of the Air Monitoring Plan" the lowest of the relevant values will be applied for perimeter monitoring.

In conclusion, the action level for ambient air dust monitoring at the perimeter will be equivalent to the adjusted National Ambient Air Quality Standard (i.e. the NJAAQS). The perimeter dust action level associated with remedial activities at the Former Koppers Seaboard Site remedial CAL is therefore 338 ug/m^3.

Daily Action levels - Dust

Daily action levels (DALs) for use in evaluating the data from perimeter air monitors will be determined by adding the upwind background concentration of the PM_{10} to the applicable CAL. Upwind background concentrations will be established before Site disturbance activities begin for each day of monitoring (at least one hour) with the upwind background concentrations measured continuously during the workday.

The upper ceiling of the DAL is 338 ug/m^3 based on an adjusted National Ambient Air Quality Standard for an 8-hour period corrected for a New Jersey measured annual ambient background level (NJDEP AMP guidance). This value will be used as the maximum DAL for PM_{10}.

Instrumentation - Dust

Real-time monitoring for particulates (PM_{10}) will be performed using an instrument capable of measuring PM_{10} in real-time such as a DustTrak aerosol monitor or MIE DataRam. The equipment will have a detection limit below the CAL and will be suitable for and set up for outdoor use. Each dust monitor will be equipped with an omnidirectional inlet to ensure representative accurate monitoring.

3.0 VOC ACTION LEVEL

Volatile Organic Chemical (VOC) action levels have been established for the Site perimeter. Perimeter action levels have been established such that offsite downwind receptors are protected from potential chemical risks. The perimeter action level will be a function of a calculated CAL and daily background levels. Note that in accordance with the NJDEP requirements, the CAL will conservatively be applied at the property boundary and does not take into account any dispersion factors.

3.1 PERIMETER VOC ACTION LEVEL

Perimeter air monitoring will also be conducted to ensure that downwind receptors are protected from potential exposure to VOCs. Detailed calculations were completed to derive the VOC, CALs in accordance with procedures currently under development by the NJDEP as set forth in the March 5, 2007 "Requirements for Revision of the Air Monitoring Plan". These CALs were developed based on appropriate exposure assumptions, Reference Concentrations, and/or Unit Risk Factors (Attachment A).

Only those constituents detected in site media at concentrations in excess of Residential Direct Contact Soil Cleanup Criteria (RDCSCC) were considered to be of concern, as previously discussed. Volatile organics were not detected in any of the near-shore Hackensack sediments at concentrations in excess of the RDCSCC. Historically, benzene, toluene, and xylenes were detected in upland soils at concentrations in excess of the direct contact standards. The Contaminant Action Levels for these three constituents were determined to be as follows:

- Benzene CAL = 219 ug/m^3
- Toluene CAL = 2190 ug/m^3
- Xylene CAL = 730 ug/m^3

Daily Action levels - VOCs

In accordance with NJDEP developmental guidance, the Daily Action Level (DAL) will be set as the lowest of the CALs plus the daily background concentrations. Upwind background concentrations will be established before Site disturbance activities begin for each day of monitoring (at least one hour) with the upwind background concentrations measured continuously during the workday.

Total VOC instrumentation reports results on a volume/volume basis. Therefore the preceding CALs have been converted to volume/volume based units using their respective molecular weights and the ideal gas law. A summary of the CALs in mass/volume, and volume/volume units, as well as the final Daily Action Levels for the three volatile constituents of interest is as follows:

VOC	MW (g/mol)	CAL (ug/m^3)	CAL (ppb_v)	DAL (ppb_v)
Benzene	78.1	219	69	69 + BG
Toluene	92.1	2190	581	581 + BG
Xylenes	106.2	730	168	168 + BG

CALs converted to ppb_v using: CAL (ppb_v) = CAL (ug/m^3) x 24.45/MW.

As shown the lowest of the DALs is that for benzene. The DAL for VOCs will be set at this level although chemical-specific monitoring may also may also be used to determine compliance with the specific DALs.

In conclusion, the DAL for VOCs at the site perimeter are, as follows:

- **Total VOCs: 69 ppb_v + Background**
- **Benzene: 69 ppb_v + Background**
- **Toluene: 581 ppb_v + Background**
- **Xylenes: 168 ppb_v + Background**

Instrumentation - VOCs

Real-time monitoring for total VOCs will be performed using an photoionization detector (PID) instrument capable of measuring total VOCs in real-time such as a RAE Systems ppbRAE. The

equipment will have a detection limit below the CAL and will be suitable for and set up for outdoor use. Note that the conservative risked based CAL are low (part per billion range) and may be difficult to reliably measure using commercially available air monitoring equipment. If the reliability of the equipment to measure at the low levels is verified by erratic or unsupported filed readings, Beazer reserves the right to propose modifications to the AMP.

4.0 AIR MONITORING

This section discusses the air monitoring program including an overview (Section 4.1), data evaluation (Section 4.2), corrective actions (Section 4.3), best management practices (Section 4.4), and air monitoring instrumentation Section 4.5).

4.1 OVERVIEW

As discussed in Section 1.0, Introduction, real-time air perimeter monitoring of dust and VOCs is only required during active remediation when there is potential for emission from contaminated material. Disturbance activities includes driving vehicles over exposed contaminated material, excavation of contaminated materials, and regrading activities until the material has been capped with clean material or will no longer be disturbed by Site activities during the remedial action.

Because the potentially contaminated materials have been capped there is no need to perform continuous VOC monitoring at this time. Activities that require disturbance of larger areas (i.e., exclusive of test pits and borings) of contaminated material from previous existing grade materials (i.e., pre-PDM placement grades) for more than 30 calendar days will require VOC monitoring per this AMP. For disturbance of such larger areas up to 30 calendar days, work zone VOC monitoring will be conducted.[3] Continuous work zone VOC monitoring will use a handheld PID as detailed in the Health and Safety Plan 2007 RAWPA Volume III-C.

In an electronic email communication NJDEP stipulated that dust monitoring is required at the Site throughout all remediation activities until placement of the final 2 foot Surface Cover was completed.[4] Therefore dust monitoring is required during placement, spreading and compaction of PDM at the Site.

[3] Key Environmental, Inc., October 5, 2009, Air Monitoring Plan, Request to Terminate VOC Monitoring, Former Koppers Seaboard Site, Kearny, New Jersey.
[4] NJDEP, January 7, 2009, Electronic Mail, RE: Koppers: Deed Notice and Air Monitoring re PDM

Dust emissions will be monitored using a DustTrak or similar aerosol monitor. VOC emissions will be monitored using a RAE Systems ppbRAE, or similar photoionization detector (PID). Continuous monitoring will be performed using one each of a dust and a VOC monitor positioned at the following locations during active remediation when there is potential for emission from contaminated material. Similar stations will be used for dust monitoring during placement, spreading and compaction of PDM before the final Surface Cover is in place.

# of Stations	Approx Site Locations	Objectives	Station Type
1	Western Site Boundary	Upwind or Downwind depending on Site wind direction	Fixed
1	Eastern Area	Upwind or Downwind depending on Site wind direction	Fixed
1	Southern Boundary	Downwind of NAE system, upwind of Fish House Rd Office Bldg	Fixed
1	Various Remediation Areas	Downwind of Remediation Work Area	Non- Fixed
1	Southern Boundary	Specific Potential Receptors (GLDD, Owens Corning or Fish House Rd Office Bldg)	Non-Fixed

In general, a combination of two fixed stations one located near the eastern Site boundary and one located along the western Site boundary will be used to monitor perimeter upwind or downwind conditions. These locations were selected based upon the prevailing wind direction (generally west to east.) The western Site boundary air monitoring station will be located at the road crossing the ditch between the Seaboard Site and the Standard Chlorine Site. The function of each station will be determined on a day to day basis pending anticipated wind direction for that day. An additional fixed air monitoring station will be situated along the southern Site boundary by the NAE system due to the proximity of the Fish House Road office building. If factors such as wind direction or the location of Site activities dictate a modification in the location of the fixed stations, the rationale dictating the location modification will be documented. Figure AMP-01 shows the anticipated locations for the fixed monitoring stations and the locations where the remedial actions will take place. These locations are approximate and may change depending on wind direction and Site activities.

One non-fixed station will be situated as a perimeter monitor along the southern boundary of the Site adjacent to the New Jersey Transit (NJT) embankment to monitor the potential off-site receptors, Owens Corning Asphalt facility and the office building located near the entrance of the Site on Fish House Road. One non-fixed monitoring station will be used to monitor downwind of the active remediation areas. Note that monitoring from locations north or east of the site in the Hackensack River will not be performed. In addition to the five monitoring stations described above, one dust monitor may be deployed between the active contaminated work area and the Processed Dredge Material (PDM) work area in order to factor out dust potentially generated from the PDM placement activities or the GLDD dredge processing, stockpiling and trucking activities.

In addition to dust and VOC monitoring, a meteorological station that records wind speed and direction will be operated during the construction activities to provide information to identify appropriate sampling locations.

It will be the responsibility of the Field Operations Leader and Site Air Monitoring Technician to identify appropriate locations for the monitoring instruments on a daily basis and determine which stations are upwind and downwind. The instruments will be placed to accommodate the spatial orientations specified in the preceding paragraph to the extent possible. As remediation continues and contaminated areas are covered the locations of some monitoring stations may change.

Perimeter monitors will be set to alarm when the DAL is exceeded for a 15-minute time weighted average. Perimeter monitors will be set to send an alarm condition to the base station computer so the Air Monitoring Technician can notify the work area supervisor to stop or modify operations to eliminate the release of dust and/or VOCs. Because of the size of the Site and the difficulty of seeing and hearing perimeter station alarms, it is planned to use an e-mail to cell phone/pager notification system to notify the Air Monitoring Technician and the work supervisor of alarm conditions. Any alarm condition from a monitor will be relayed to the base station then automatically alert the designated personnel of the alarm condition.

Before the start of work in contaminated areas, baseline air monitoring conditions will be established by conducting a short-term air monitoring program for at least three days to troubleshoot the system and help determine variability of background ambient conditions. This pre-work monitoring will be conducted in the same manner as described in this air monitoring plan. Note that given the urban/industrial setting of the Site, there are numerous potential background sources (GLDD activities, nearby PSEG power generating facilities, the adjacent Owens Corning asphalt plant, commercial ship emissions, solid waste incinerators, etc) of emissions that could contribute to background.

Real-time perimeter monitoring also will be conducted 24 hours per day for the first three days of active remediation in contaminated areas. After this period an evaluation will be made to determine if real-time monitoring is required only during work hours or whether monitoring must continue for 24 hours per day. It is expected that the use of best management practices will control dust and vapors during non-work hours and that 24-hour monitoring will not be required.

Worker monitoring for VOCs and dust also will be performed continuously using a PID and a dust monitor as presented in the Health and Safety Plan, RAWPA 2007, Volume III-C).

4.2 DATA EVALUATION – INTERPRETATION OF EXCEEDANCES

The following are steps to take when evaluating alarm conditions that warn of exceedances of the DALs:

- For the initial exceedance of a DAL, or visible dust, determine the cause of the exceedance and take appropriate corrective action.
- For the next exceedance of a DAL, determine the cause(s), reassess the corrective actions, and maximize the corrective actions.
- If exceedances of the DALs continue to occur, stop all Site disturbance activities that may generate vapors and dust, rethink the operations and establish a plan to prevent future exceedances.

- Investigation of the cause(s) of exceedances and implementation of corrective actions must take place within the shortest amount of time possible; no more than 30 minutes.

4.3 CORRECTIVE ACTIONS

Short-term exceedances may occasionally occur that are caused by non-Site disturbance activities. If these exceedances occur they will be documented, the monitoring station reset as needed and activities will then proceed. Appropriate action will be taken to eliminate the activity causing the exceedance. Reasons for anomalous exceedances may include vehicles and/or equipment idling near monitors, off-site background sources of contaminants, and equipment malfunction. Corrective actions may include moving the vehicle or equipment, resetting the monitors, moving the location of the monitors, and adjusting work practices.

The anomalous exceedances will be recorded as well as their corrective actions. Corrective actions will be implemented as soon as possible.

4.4 BEST MANAGEMENT PRACTICES

Real time dust and VOC data will be available from monitoring of the work area as presented in Section 4.1. A combination of the monitoring data and observations as to the conditions (i.e., wet or dry) will be made at the end of each day to determine if additional BMP needs to be employed during non working hours. As necessary, the material will be treated with water to before and during Site disturbance activities. Based on the daily observations noted above, stockpiles or material from regrading or Site disturbance activities will be treated with water to control dust and vapors during non-work hours and over weekends. Tarps or dust/odor suppressant foam may be used if water treatment is not effective.

Interior, unpaved roads will be treated as necessary to prevent the generation of visible dust and exceedances of DALs.

4.5 AIR MONITORING INSTRUMENTATION

A weather station equipped with data logger will be used on-site to document weather conditions during Site disturbance activities. Wind direction measurements will be used to help situate the air monitors. Wind speed and direction will be noted on a site map (prevailing direction, date and time) prior to the start of monitoring each day and a wind rose will be generated for each monitoring day.

A real-time, datalogging aerosol monitor will be used to obtain continuous real-time measurements of dust concentrations upwind, downwind, and at other strategic Site locations. The instruments will be positioned on tripods or affixed to stakes or existing site physical objects (e.g., telephone poles, fence posts, etc.) at a height of approximately 5 feet above ground surface.

A DustTrak (Attachment B) is proposed for dust monitoring. This device has a measurement range from 0.001 to 100 milligrams per cubic meter (mg/m^3) with a resolution of 0.001 mg/m^3. This measurement range is suitable for the action level of 338 ug/m^3 (0.338 mg/m^3).

Dust measurements will be made following the manufacturer's instructions on instrument operation and maintenance. The complete manufacturer's operations manual will be on-site at all times.

A photoionization detector equipped with a datalogger will be used to obtain continuous real-time measurements of total VOC concentrations at the same locations as the dust monitors. A ppbRAE (Attachment C) with a 10.6 electron Volt (eV) lamp is proposed for VOC monitoring. This device has a measurement range from 0 to 10,000 ppm with a resolution of 1 ppb and response time of less than 3 seconds. This measurement range is suitable based on the VOC action level of 69 ppb.

VOC measurements will be made following the manufacturer's instructions on instrument operation and maintenance. The complete manufacturer's operations manual will be on-site at all times.

In addition to manufacturer's instrument and equipment manuals, standard operating procedures (SOPs) will be established for operation of the dust monitors and PIDs as well as for operation of the entire air monitoring system setup.

The data from the dust monitors and VOC monitors will be sent wirelessly to a host controller and central computer that will display the data in real-time. If necessary, a signal repeater will be used to ensure that data is transmitted over the Site distances to the computer.

Each air monitoring station will consist of a SolarRAE (Attachment D) that will provide power for a dust monitor and PID as well as providing an environmental enclosure for the instruments. Separate omnidirectional inlets will be provided for the dust monitor and PID; an inlet water vapor trap on dust monitors and water/humidity filter on PIDs will be provided to help alleviate the potential effects of humidity on readings. Each monitoring instrument will also be equipped with a wireless modem to allow real-time transmission of data to the base station (host controller and computer.) The modems can transmit data up to two miles to the base station, however, if Site terrain obstructs the transmission path a wireless transmission repeater will be used to relay the signals to the base station. The base station software is capable of monitoring the input of up to 32 remotely located monitors.

If an exceedance of the DAL or other alarm condition occurs the base station will alert the Air Monitoring Technician via e-mail to a cell phone or pager. The Air Monitoring Technician immediately will verify the alarm condition by checking the real-time data on the computer and/or checking the affected monitor(s). Once an exceedance of the DAL is confirmed the Air Monitoring Technician will notify the Field Operations Leader who will initiate dust and vapor suppression activities as appropriate.

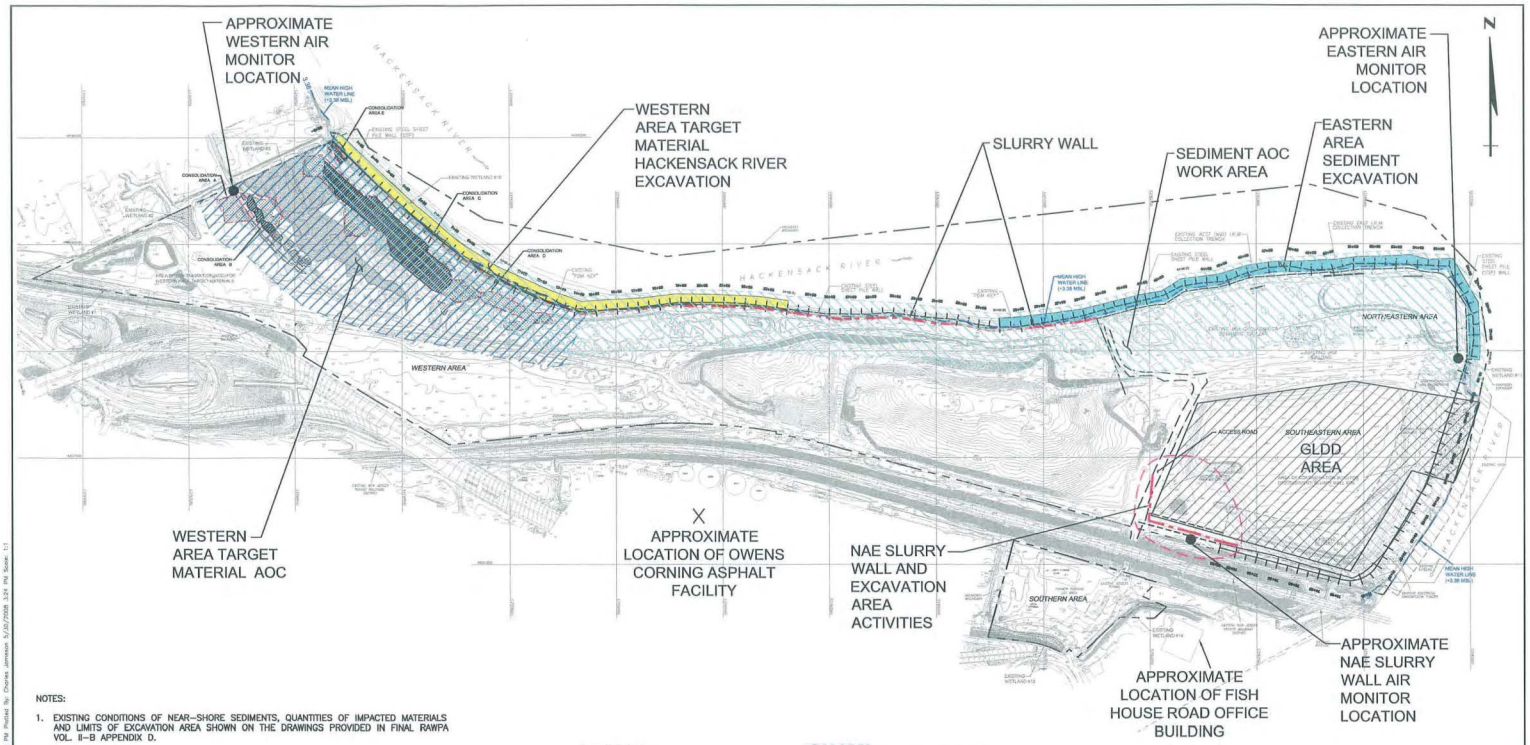
5.0 RECORD KEEPING AND REPORTING

Records of all monitoring activities will be maintained in hard copy and/or electronic form. Records to be maintained in the project file will consist of the following:

- Air monitoring field log book with the notes of daily activities, exceedances, corrective actions and other pertinent information;
- Electronic and hardcopy printout of the data logger results for the weather station, dust monitors and PIDs;
- Site maps with daily wind speed and direction and dust/VOC monitoring locations;
- Site operational data related to the construction activities;
- All exceedances of the DAL with an explanation for each exceedance and corrective actions;
- Daily wind roses; and,
- Charts or tables of the daily monitoring results will be generated and maintained. These charts or tables will show the DALs and clearly note any exceedances. Notations will be added that identify the causes of exceedances and the corrective actions taken.

The daily records of exceedances, explanations and corrective actions will be included in an appendix in the remedial action report (RAR) with a summary in the main text of the RAR. If any air samples are collected then the results of the sampling will be included in the RAR along with data deliverables for laboratory and analytical data. Datalogger output from the meteorological station and perimeter monitors will be included in an appendix of the RAR, most likely as a CD because the data will be voluminous.

FIGURE



NOTES:

1. EXISTING CONDITIONS OF NEAR-SHORE SEDIMENTS, QUANTITIES OF IMPACTED MATERIALS AND LIMITS OF EXCAVATION AREA SHOWN ON THE DRAWINGS PROVIDED IN FINAL RAWPA VOL. II-B APPENDIX D.

LEGEND

- PROPERTY BOUNDARY
- EXISTING ACCESS ROAD
- EXISTING NEW JERSEY TRANSIT RAILROAD
- EXISTING FENCE
- EXISTING STRUCTURES
- EXISTING UTILITY POLES
- EXISTING LIGHT STANDARD
- EXISTING CONCRETE PAD
- EXISTING GROUND SURFACE ELEVATION CONTOURS
- EXISTING VEGETATION
- EXISTING STREAM, POND AND RIVER BANK
- EXISTING GROUND SURFACE ELEVATION (FEET-MSL)
- EXISTING WETLAND
- EXISTING SLURRY WALL
- EXISTING STEEL SHEET PILE WALL
- EXISTING PIPELINE
- EXISTING "PDM KEY" LOCATION
- EXISTING ELECTRIC DISTRIBUTION LINE
- IN-SITU SOLDIFICATION AREA
- 3.38 — MEAN HIGH WATER
- AOC FOR DIKE/SEDIMENT/ SLURRY WALL SOIL
- AOC FOR WESTERN AREA TARGET MATERIALS
- TARGET MATERIALS
- APPROXIMATE LIMIT OF SEDIMENT REMOVAL
- MAXIMUM LIMIT OF DIKE MATERIAL REMOVAL
- APPROXIMATE FIXED MONITOR LOCATIONS

0 450 900 FEET

REV #	DATE	DESCRIPTION	APPD
△			
△			
△			

REFERENCES:
1. EXISTING GROUND SURFACE ELEVATION CONTOURS PER AIR SURVEY, DULLES, VIRGINIA, APRIL 14, 2007. HORIZONTAL DATUM: NEW JERSEY STATE PLANE COORDINATES (NAD 1983). VERTICAL REFERENCE: NATIONAL GEODETIC VERTICAL DATUM (NGVD 1929).
2. EXISTING WETLANDS PER WETLAND DELINEATION BY PAULUS, SOKOLOWSKI AND SARTOR CONSULTING ENGINEERS, FOR HUDSON COUNTY IMPROVEMENT AUTHORITY AND ARE SUBJECT TO FINAL APPROVAL BY APPROPRIATE REGULATORY AGENCIES. WETLAND #16 APPEARS TO EXTEND UPLAND OF THE STEEL SHEET PILE WALL WHICH MAY BE IN ERROR.
3. PROPERTY BOUNDARY PER PAULUS, SOKOLOWSKI, SARTOR, CONSULTING ENGINEERS, AUGUST 1995.
4. EXISTING SLURRY WALL LOCATION AND STEEL SHEET PILE WALL LOCATION PER SLURRY WALL AND SHEET PILE WALL LOCATION MAP BY DAVEY & LEVIN, INC. DATED 10/1/1996, LAST REVISED 11/5/2001 PLUS ADDITIONAL LOCATIONS PER MONITORING WELL LOCATION SKETCH BY BOSS CORPORATION DATED 4/17/2002.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

BEAZER EAST, INC.
PITTSBURGH, PENNSYLVANIA

DRWN:	CRJ	DATE:	4/3/08
CHKD:	AEB	DATE:	4/3/08
APPD:	PWS	DATE:	4/3/08
SCALE:	AS SHOWN		

KEY ENVIRONMENTAL INCORPORATED

AIR MONITORING PLAN
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY
BLOCK 287 – LOTS 54, 55, 56, 60, 61B, 61C, 62, 62R, 63, 70, 70R, 71, 71R, 73 AND 80

PLAN VIEW – AIR MONITORING LOCATIONS

PROJECT NO: 07-487
AMP-01

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ATTACHMENT A

DAILY ACTION LEVEL CALCULATIONS

Calculation of Numerical Action Levels for Air Monitoring
Former Koppers Seaboard Site - Kearny, New Jersey

Identification of Indicator Constituents

Indicator constituents were selected based on potential toxicity. Chemicals that are potentially toxic and/or were detected at relatively high concentrations in the site media of interest (i.e., soil and sediment) were selected as indicator constituents for the purposes of air monitoring. Comparison of concentrations to Residential Direct Contact Soil Cleanup Criteria was used to select the chemicals of interest with one exception. Dioxin/Furan congeners were converted to Toxicity Equivalent Concentrations (TECs). These TECs were then compared to an EPA benchmark of 1 ug/kg. TECs did not exceed this benchmark. The following constituents were detected at average concentrations in excess of the Residential Cirect Contact Soil Cleanup Criteria (See Tables 1 through 3 for screening results):

Benzo(a)anthracene	Benzo(k)fluoranthene	Indeno(1,2,3-cd)pyrene
Benzo(a)pyrene	Chrysene	Naphthalene
Benzo(b)fluoranthene	Dibenz(a,h)anthracene	Arsenic

Although historical sampling of the site focused on semi-volatile organics and metals for the most part, various volatile organics were also detected in some samples. Two samples of chromium processing-related material were also obtained. The following additional constituents have been identified as being of potential interest based on review of these additional data:

Benzene	Ethylbenzene	Hexavalent Chromium
Toluene	Xylenes	

Determination of Representative Concentrations

Representative concentrations (RC) in soil and sediment were determined for the nonvolatle constituents. Either maximum observed values or the Upper 95% Confidence Limit (UCL) on the mean were identified as the RC. The following representative concentrations were determined based on existing analytical data.

Chemical	Media	RC (mg/Kg)	Type[1]
Benzo(a)anthracene	Soil	926.4	UCL
	Sediment	410.5	UCL
Benzo(a)pyrene	Soil	771	UCL
	Sediment	362.8	UCL
Benzo(b)fluoranthene	Soil	781.6	UCL
	Sediment	435.4	UCL
Benzo(k)fluoranthene	Soil	516.8	UCL
	Sediment	164.8	UCL
Chrysene	Soil	1112	UCL
	Sediment	379.5	UCL
Dibenz(a,h)anthracene	Soil	604.4	UCL
	Sediment	62.04	UCL
Indeno(1,2,3-cd)pyrene	Soil	452.6	UCL
	Sediment	224	UCL
Naphthalene	Soil	6394	UCL
	Sediment	145.9	UCL
Arsenic	Soil	13.13	UCL
	Sediment	25.55	UCL
Chromium (VI)	Soil	1590	Max
	Sediment	--[2]	--

1. UCL calculations were completed using software developed for USEPA (ProUCL Version 4.0). Output from ProUCL is attached. The representative soil concentration is not applicable for volatile organic constiutents as per draft NJDEP guidance.
2. Chromium (VI) was not detected in any of the sediment samples.

Calculation of Numerical Action Levels for Air Monitoring
Former Koppers Seaboard Site - Kearny, New Jersey

Numeric Contaminant Action Level (CAL) Calculation

Per NJDEP guidance as provided in comments on the September 2007 Remedial Action Workplan Addendum Air Monitoring Plan (RAWPA AMP), the following equations are applicable for determining CALs[1].

1) $$CAL\ (ug/m3) = \frac{RfC \times AT_{nc}}{C_{soil} \times CF \times ET \times EF \times ED}$$

2) $$CAL\ (ug/m3) = \frac{TR \times AT_{c}}{C_{soil} \times CF \times URF \times ET \times EF \times ED}$$

1. Equation 1 is used if an RfC is available. If an RfC is not available, Equation 2 is used.

Where:

RfC is the Reference Concentration (ug/m^3)	CS[1]
URF is the Unit Risk Factor in $(ug/m^3)^{-1}$	CS
C_{soil} is the representative concentration (mg/Kg)	CS
AT_{nc} is the averaging time for noncarcinogenic effects (years)	1
AT_c is the averaging time for noncarcinogenic effects (years)	70
CF is a conversion factor (kg/mg)	1.00E-06
ET is the exposure time (hours/24 hours)	10
EF is the exposure frequency (days/365 days)	120
ED is the exposure duration (years)	1
TR is the Target Risk	1.00E-06

1. CS - Chemical-Specific.

Identify Relevant Dose-Response Parameters

The following Reference Concentrations or Unit Risk Factors were determined for the indicator constituents:

Chemical	RfC (ug/m^3)	URF $(ug/m^3)^{-1}$	Source
Benzo(a)anthracene	--	1.1E-04	A
Benzo(a)pyrene	--	1.1E-03	A
Benzo(b)fluoranthene	--	1.1E-04	A
Benzo(k)fluoranthene	--	1.1E-04	A
Chrysene	--	1.1E-05	A
Dibenz(a,h)anthracene	--	1.2E-03	A
Indeno(1,2,3-cd)pyrene	--	1.1E-04	A
Naphthalene	3	--	B
Arsenic	--	4.3E-03	A
Chromium (VI)	0.1	--	B
Benzene	30	--	B
Toluene	300	--	B
Ethylbenzene	--	--	A,B
Xylenes	100	--	B

A. www.nj.gov/dep/aqpp/downloads/risk/URFs2007.pdf

B. www.nj.gov/dep/aqpp/downloads/risk/RfCs2007.pdf

Calculation of Numerical Action Levels for Air Monitoring
Former Koppers Seaboard Site - Kearny, New Jersey

Calculate Numerical Contaminant Action Levels

Constant for RfC Equation (Eqn 1A):

$$\frac{AT_{nc}}{CF \times ET \times EF \times ED} = 7300000 \text{ mg/Kg}$$

Constant for RfC Equation (Eqn 1B) for volatiles:

$$\frac{AT_{nc}}{ET \times EF \times ED} = 7.3 \text{ no units}$$

Constant for URF Equation (Eqn 2A):

$$\frac{TR \times AT_{c}}{CF \times ET \times EF \times ED} = 511 \text{ mg/Kg}$$

Constant for URF Equation (Eqn 2B) for volatiles:

$$\frac{TR \times AT_{c}}{ET \times EF \times ED} = 5.11E\text{-}04 \text{ no units}$$

Calculation of Contaminant Action Levels for Air Monitoring
Former Koppers Seaboard Site - Kearny, New Jersey

Chemical	Media	RC (mg/Kg)	Relevant Equation	Relevant Constant	RfC	URF	CAL (ug/m^3)
Benzo(a)anthracene	Soil	926.4	2A	511	--	1.1E-04	5.0E+03
	Sediment	410.5	2A	511	--	1.1E-04	1.1E+04
Benzo(a)pyrene	Soil	771	2A	511	--	1.1E-03	6.0E+02
	Sediment	362.8	2A	511	--	1.1E-03	1.3E+03
Benzo(b)fluoranthene	Soil	781.6	2A	511	--	1.1E-04	5.9E+03
	Sediment	435.4	2A	511	--	1.1E-04	1.1E+04
Benzo(k)fluoranthene	Soil	516.8	2A	511	--	1.1E-04	9.0E+03
	Sediment	164.8	2A	511	--	1.1E-04	2.8E+04
Chrysene	Soil	1112	2A	511	--	1.1E-05	4.2E+04
	Sediment	379.5	2A	511	--	1.1E-05	1.2E+05
Dibenz(a,h)anthracene	Soil	604.4	2A	511	--	1.2E-03	7.0E+02
	Sediment	62.04	2A	511	--	1.2E-03	6.9E+03
Indeno(1,2,3-cd)pyrene	Soil	452.6	2A	511	--	1.1E-04	1.0E+04
	Sediment	224	2A	511	--	1.1E-04	2.1E+04
Naphthalene	Soil	6394	1A	7300000	3.0E+00	--	3.4E+03
	Sediment	145.9	1A	7300000	3.0E+00	--	1.5E+05
Arsenic	Soil	13.13	2A	511	--	4.3E-03	9.1E+03
	Sediment	25.55	2A	511	--	4.3E-03	4.7E+03
Chromium (VI)	Soil	1590	1A	7300000	1.0E-01	--	4.6E+02
Benzene	Soil	NA	1B	7.3	3.0E+01	--	2.2E+02
Toluene	Soil	NA	1B	7.3	3.0E+02	--	2.2E+03
Xylenes	Soil	NA	1B	7.3	1.0E+02	--	7.3E+02

Calculation of Numerical Action Levels for Air Monitoring
Former Koppers Seaboard Site - Kearny, New Jersey

Other Relevant Criteria

The upper ceiling for particulate matter (PM10) is the National Ambient Air Quality Standard adjusted to account for New Jersey ambient levels is 338 ug/m^3 as specified in the NJDEP comments on the RAWPA AMP.

Therefore, the particulate ceiling will be set as 338 ug/m^3 unless a constituent-specific UCL-based Numerical Action Level results in a lower number.
Levels.

Daily Actions Levels (DALs)

Daily Action Levels (DALs) will be set based on background values (BG), the Contaminant Action Levels derived previously, and the adjusted National Ambient Air Quality Standard corrected for annual background in the state of New Jersey (NJAAQS). The final Daily Action Levels for the Former Koppers Seaboard Site are as follows:

Chemical	Matrix	CAL (ug/m^3)	DAL (ug/m^3)	NJAAQS (ug/m^3)	Final DAL (ug/m^3)
Particulate Based					
Benzo(a)pyrene	Soil	5015	CAL+BG	338	338
	Sediment	11317	CAL+BG	338	338
Benzo(a)pyrene	Soil	603	CAL+BG	338	338
	Sediment	1280	CAL+BG	338	338
Benzo(b)fluoranthene	Soil	5944	CAL+BG	338	338
	Sediment	10669	CAL+BG	338	338
Benzo(k)fluoranthene	Soil	8989	CAL+BG	338	338
	Sediment	28188	CAL+BG	338	338
Chrysene	Soil	41776	CAL+BG	338	338
	Sediment	122410	CAL+BG	338	338
Dibenz(a,h)anthracene	Soil	705	CAL+BG	338	338
	Sediment	6864	CAL+BG	338	338
Indeno(1,2,3-cd)pyrene	Soil	10264	CAL+BG	338	338
	Sediment	20739	CAL+BG	338	338
Naphthalene	Soil	3425	CAL+BG	338	338
	Sediment	150103	CAL+BG	338	338
Arsenic	Soil	9051	CAL+BG	338	338
	Sediment	4651	CAL+BG	338	338
Chromium (VI)	Soil	459	CAL+BG	338	338
Volatile Based					
Benzene	Soil	219	CAL+BG	NA	TBD
		(68 ppb)			
Toluene	Soil	2190	CAL+BG	NA	TBD
		(581 ppb)			
Xylenes	Soil	730	CAL+BG	NA	TBD
		(168 ppb)			

Notes:

Final Daily Action Levels for volatile organics will be determied as the CALs plus daily background and will be determined in the field.
The DAL for particulates cannot exceed 338 ug/m^3.

ATTACHMENT B

SPECIFICATIONS FOR THE DUSTTRAK

DUSTTRAK™ Aerosol Monitor

The DUSTTRAK™ Aerosol Monitor measures aerosols in a wide variety of environments, from offices and industrial workplaces to outdoor environmental and construction sites. TSI's DUSTTRAK provides reliable exposure assessment by measuring particle concentrations corresponding to PM10, PM2.5, PM1.0 or respirable size fractions.

The DUSTTRAK is a portable, battery-operated laser photometer which gives you a real-time digital readout with the added benefits of a built-in data logger. Suitable for clean office settings as well as harsh industrial workplaces and outdoor applications, the DUSTTRAK detects potential problems with airborne contaminants such as dust, smokes, fumes and mists.

The DUSTTRAK is easy to use, too. You can perform quick spot checks or you can program the advanced logging modes for long-term sampling. You can program the start/stop times, recording intervals and other parameters. You can even set up the instrument for continuous unattended operation.

The DUSTTRAK's new continuous analog output and adjustable alarm output allow remote access to real-time particle concentration data. Applications include site perimeter monitoring, ambient monitoring, process area monitoring and other remote uses. The alarm output with user-defined setpoint alerts you when upset or changing conditions occur. This feature allows you to program a switch closure at a concentration value of your choosing.

The DUSTTRAK provides a real-time measurement based on 90° light scattering. A pump draws the sample aerosol through an optics chamber where it is measured. A sheath air system isolates the aerosol in the chamber to keep the optics clean for improved reliability and low maintenance.

TSI®

Specifications

Model 8520 DustTrak Aerosol Monitor

Sensor Type	90° light scattering
Range	0.001 to 100 mg/m³ (Calibrated to ISO 12103-1, A1 test dust)
Resolution	±0.1% of reading or ±0.001 mg/m³, whichever is greater
Zero Stability	±0.001 mg/m³ over 24 hours using 10-second time-constant
Particle Size Range	0.1 to approximately 10 micrometers
Flow Rate	Adjustable 1.4 to 2.4 l/min (1.7 nominally)
Temperature Coefficient	+0.001 mg/m³ per °C (for variations from temperature at which the DustTrak was zeroed)
Operating Temperature	32° F to 120° F (0°C to 50°C)
Storage Temperature	-4° F to 140° F (-20°C to 60°C)
Operating Humidity	0 to 95% rh (non-condensing)
Time Constant	Adjustable from 1 to 60 seconds
Data Logging	31,000 data points (21 days of logging once/minute)
Logging Interval	Adjustable from 1 second to 1 hour
Physical	
External Dimensions	8.7 in. × 5.9 in. × 3.4 in. (221 mm × 150 mm × 87 mm)
Instrument Weight	3.3 pounds with batteries (1.5 kg)
Serial Interface	RS-232 1200 baud
Power	
AC	AC adapter (included)
Battery	Four C-size alkaline batteries (included)
Battery Run-time	Alkaline 16 hours
Analog Output Specifications	
Analog Output Voltage	0 to 5 VDC
Analog Output Scaling[1]	0 to 100 mg/m³ 0 to 10.0 mg/m³ 0 to 1.00 mg/m³ 0 to 0.100 mg/m³
Output Impedance	0.01 ohm
Maximum Output Current	15 mA

The DustTrak comes complete with TSI's TrakPro™ Data Analysis Software to allow you to perform a more comprehensive analysis of your measurement results. This exclusive Windows®-based program helps you generate the detailed graphs and reports needed to effectively communicate your findings.

Specifications are subject to change without notice.
Windows is a registered trademark of the Microsoft Corporation.

Alarm Output Specifications

Type	Non-latching, MOSFET solid state (polarized)[2] analog switch
Setpoint Range[1]	0.010 to 100 mg/m³
Maximum Voltage	15 VDC
Maximum Current	1 Amp
Deadband	-5% of alarm setpoint
Connector	4-Pin, Mini-DIN connector

1 User selectable through TrakPro™ Data Analysis Software.
2 See TSI Application Note ITI - 074 for important wiring information.

Ordering Information

Model	Description
8520	The DustTrak Aerosol Monitor and accessories includes: Auxiliary Analog and Alarm Outputs, Carrying Case, Alkaline Batteries, TrakPro™ Data Analysis Software, Filter, Computer Cable, 25-pin to 9-pin Adapter, Operation Service Manual, Calibration Certificate, 10 mm Nylon Dorr-Oliver Cyclone, Inlet Conditioning Kit 1.0 and 2.5 µm, Sampling Extension Tube, Miscellaneous Service Tools and Two-Year Warranty.

Optional Accessories

Model	Description
8520-1	Environmental Enclosure

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CERTIFIED ISO 9001

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HEALTH AND SAFETY

Exposure Monitoring

DustTrak™ II Aerosol Monitor

Models 8530 and 8532

Desktop or Handheld Units for Any Environment, Any Application

The new DustTrak II Aerosol Monitors are battery-operated, data-logging, light-scattering laser photometers that give you real-time aerosol mass readings. They use a sheath air system that isolates the aerosol in the optics chamber to keep the optics clean for improved reliability and low maintenance. Suitable for clean office settings as well as harsh industrial workplaces, construction and environmental sites and other outdoor applications. DustTrak II monitors measure aerosol contaminants such as dust, smoke, fumes and mists.

Features and Benefits

- **The DustTrak II Model 8530 has been upgraded to measure mass in high concentrations up to 400 mg/m^3**
- Easy to program, easy to operate
- New graphical user interface with color touch-screen
- Perform in-line gravimetric analysis for custom reference calibrations
- Automatic zeroing (with optional zero module) minimizes the effect of zero drift
- Measure aerosol concentrations corresponding to PM_1, $PM_{2.5}$, PM_{10}, or Respirable size fractions

Applications

- Industrial/occupational hygiene surveys
- Indoor air quality investigations
- Outdoor environmental monitoring
- Baseline trending and screening
- Point source monitoring
- Engineering control evaluations
- Engineering studies
- Remote monitoring
- Process monitoring
- Epidemiology studies
- Aerosol research studies

Easy to Program and Operate

The new graphical user interface with color touch-screen puts everything at your fingertips. The easy-to-read display shows real-time mass concentration and graphical data as well as other statistical information along with instrument pump, laser and flow status, and much more. Perform quick walk-through surveys or program the instrument's advanced logging modes for long-term sampling investigations. Program start times, total sampling times, logging intervals, alarm setpoints and many other parameters. You can even set up the instrument for continuous unattended operation.

Desktop Models: Ideal for Long-Term Surveys and Remote Monitoring Applications

New product enhancement for 2011, the DustTrak II Model 8530 has high-concentration range from 0.001 to 400 mg/m^3. Manual and programmable data logging functions also make DustTrak II desktop monitors ideal for unattended applications. They come with USB (device and host), Ethernet, and analog and alarm outputs allowing remote access to data. User adjustable alarm setpoints for instantaneous or 15-minute short-term excursion limit (STEL) are available on desktop models. The alarm output with user-defined setpoint alerts you when upset or changing conditions occur.

All DustTrak II desktop monitors have four unique features:

- **The DustTrak II Model 8530 has been upgraded to measure mass in high concentrations up to 400 mg/m^3.**
- Gravimetric sampling capability using a 37-mm filter cassette which can be inserted in-line with the aerosol stream allowing you to perform an integral gravimetric analysis for custom reference calibrations.
- They can be zeroed automatically using the external zeroing module. This optional accessory is used when sampling over extended periods of time. By zeroing the monitor during sampling, the effect of zero drift is minimized.
- STEL alarm feature for tracking 15-minute average mass concentrations when alarm setpoint has been reached for applications like monitoring fugitive emissions at hazardous waste sites.

Handheld Models: Perfect for Walk-Through Surveys and Single-Point Data Collection Applications

DustTrak II handheld models are lightweight and portable. They're perfect for industrial hygiene surveys, point source location monitoring, indoor air quality investigations, engineering control evaluations/validation, and for baseline trending and screening. Like desktop models, they have manual and programmable data logging functions. In addition, they have single-point data logging capability. Single-point data collection is used for walk-through industrial hygiene surveys and indoor air quality investigations.

New Software Makes Monitoring Easier than Ever

TrakPro™ Data Analysis Software allows you to set up and program directly from a PC. A new feature is the ability for remote programming and data acquisition from your PC via wireless (922 MHz or 2.4 GHz) communications or over an Ethernet network. As always, you can print graphs, raw data tables, and statistical and comprehensive reports for recordkeeping purposes.

Specifications

Models 8530 and 8532
DustTrak™ II Aerosol Monitor

Sensor Type
90° light scattering

Particle Size Range
0.1 to 10 µm

Aerosol Concentration Range

8530 Desktop	0.001 to 400 mg/m³
8532 Handheld	0.001 to 150 mg/m³

Resolution
±0.1% of reading or 0.001 mg/m³, whichever is greater

Zero Stability
±0.002 mg/m³ per 24 hours at 10 sec time constant

Flow Rate
3.0 L/min set at factory, 1.40 to 3.0 L/min, user adjustable

Flow Accuracy
±5% of factory set point, internal flow controlled

Temperature Coefficient
+0.001 mg/m³ per °C

Operational Temp
32 to 120°F (0 to 50°C)

Storage Temp
-4 to 140°F (-20 to 60°C)

Operational Humidity
0 to 95% RH, non-condensing

Time Constant
User adjustable, 1 to 60 seconds

Data Logging
5 MB of on-board memory (>60,000 data points)
45 days at 1 minute logging interval

Log Interval
User adjustable, 1 second to 1 hour

Physical Size (HWD)

Handheld	4.9 x 4.8 x 12.5 in. (12.5 x 12.1 x 31.6 cm)
Desktop	5.3 x 8.5 x 8.8 in. (13.5 x 21.6 x 22.4 cm)

Weight

Handheld	2.9 lb (1.3 kg), 3.3 lb (1.5 kg) with battery
Desktop	3.5 lb (1.6 kg), 4.5 lb (2.0 kg)–1 battery, 5.5 lb (2.5 kg)–2 batteries

Communications

8530	USB (host and device) and Ethernet. Stored data accessible using flash memory drive
8532	USB (Hose and device). Stored data accessible using flash memory drive

Power–AC
Switching AC power adapter with universal line cord included, 115–240 VAC

Analog Out

8530	User selectable output, 0 to 5 V or 4 to 20 mA User selectable scaling range

Alarm Out

8530	Relay or audible buzzer Relay Non-latching MOSFET switch User selectable set point –5% deadband Connector 4-pin, Mini-DIN connectors
8532	Audible buzzer

Screen

8530	5.7 in. VGA color touchscreen
8532	3.5 in. VGA color touchscreen

Gravimetric Sampling

8530	Removable 37 mm cartridge (user supplied)

CE Rating

Immunity	EN61236-1:2006
Emissions	EN61236-1:2006

Specifications are subject to change without notice. TSI, the TSI logo, DustTrak, and TrakPro are trademarks of TSI Incorporated. Microsoft and Windows are trademarks of Microsoft Corporation.

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Contact your local TSI Distributor or visit our website **www.tsi.com** for more detailed specifications.

P/N 6001986 Rev E
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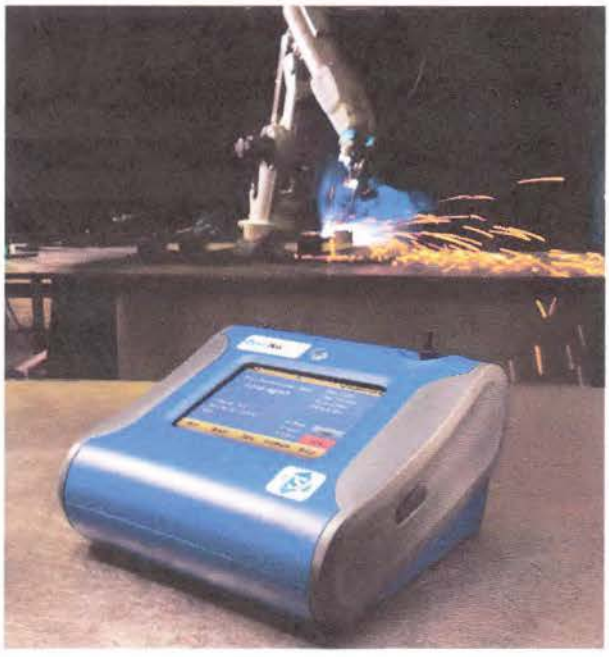
DustTrak II Aerosol Monitor Features

All Models

- Li-Ion rechargeable batteries
- Internal and external battery charging capabilities
- Outlet port for isokinetic sampling applications
- User serviceable sheath flow and pump filters
- Logged test pause and restart feature
- Logged test programming
  - Color touch screen—either manual mode or program mode
  - TrakPro™ Data Analysis Software via a PC
- User adjustable custom calibration settings
- Instantaneous alarm settings with visual and audible warnings
- Real-time graph display
- View statistical information during and after sampling
- On-screen instrument status indicators: FLOW, LASER and FILTER
- Filter service indicator for user preventative maintenance

All Desktop Models

- Hot swappable batteries
- Gravimetric reference sample capability
- Long life internal pump
- TrakPro Data Analysis Software
- Auto zeroing module (optional accessory)
- STEL alarm setpoint



All Handheld Models

- Long life internal pump
- Single-point data collection for walk through surveys
- TrakPro Data Analysis Software

Battery Performance

Models 8530 (typical) 6600 mAH Li-Ion Battery Pack (P/N 801680)	1 Battery	2 Batteries
Battery Runtime (hours)	up to 6	up to 12
Charge Time * (hours) in DustTrak	4	8
Charge Time* (hours) in external battery charger (P/N 801685)	4	8

Model 8532 (typical) 3600 mAH Li-Ion Battery Pack (P/N 801681)	Battery
Battery Runtime (hours)	up to 6
Charge Time * (hours) in DustTrak	4
Charge Time* (hours) in external battery charger (P/N 801686)	4

*of a fully depleted battery

ATTACHMENT C

SPECIFICATIONS FOR THE ppbRAE

ppbRAE 3000

Portable Handheld VOC Monitor

The ppbRAE 3000 is the most advanced handheld volatile organic compound (VOC) monitor on the market. Its photoionization detector's (PID) extended range of 1 ppb to 10,000 ppm makes it an ideal instrument for applications from HazMat/Homeland Security and industrial hygiene to Indoor Air Quality and military applications.

The **RF modem allows real-time data communication** with a base controller located up to 500 feet away from the ppbRAE 3000 detector (or two miles with optional RAELink3 portable modem). A personal computer can be used as the base station for a ppbRAE 3000 system. The standard ProRAE Remote software is capable of monitoring the input of up to 64 remotely located monitors, including ppbRAE 3000, AreaRAE, etc.

Wireless

AutoRAE Compatible

Key Features

- **Proven PID technology.** The patented sensor provides the following unique features:
  - 3-second response time
  - Extended range from 1 ppb to 10,000 ppm with improved linearity
  - Humidity compensation with integral humidity and temperature sensors
- **Real-time wireless** data transmission with built-in RF modem or Bluetooth
- **Designed for simple service** Easy access to lamp and sensor in seconds without tools
- **Big graphic display** for easy overview of gas type, Correction Factor and concentration
- **Field-interchangeable battery pack** replaced in seconds without tools
- **Integrated flashlight** for better view in dark conditions
- **User-friendly screens including dataplot chart view**
- **Integrated RAE Systems Correction Factors list for more than 200 compounds** to measure more chemicals than any other PID
- **Multi-language support** with 12 languages encoded
- **Rugged housing** withstands use in harsh environments
  - IP67 waterproof design for easy cleaning and decontamination in water
  - Strong, protective removable rubber boot

Additional Advantages

- View real-time sensor data and alarm status at headquarters or command center
- Automatic lamp type recognition
- Duty-cycling™ lamp and sensor auto-cleaning technology
- Tough, flexible inlet Flexi-Probe™
- 3 Large keys operable with 3 layers of gloves
- Strong, built-in sample pump draws up to 100 feet (30m) horizontally or vertically
- Loud 95 dB audible alarm
- Bright red flashing visual alarm
- Interchangeable drop-in Lithium-Ion and alkaline battery packs
- Charging cradle doubles as an external battery charger
- Compatible with AutoRAE™ calibration station
- ProRAE Remote software simultaneously controls and displays readings for up to 64 remote detectors
- License free, ISM band RF transmission with communication range up to 500 feet (2 miles with optional RAELink3 modem)
- Optional RAELink3 modem provides GPS capability to track and display readings from remote detectors and provides up to 2 miles long distance transmission
- Data logging with up to 6 months of data at one-minute intervals
- 3-year 10.6eV lamp Warranty

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ppbRAE 3000

Specifications*

Detector Specifications

Size	10" L x 3.0" W x 2.5" H (25.5 cm x 7.6 cm x 6.4 cm)
Weight	26 oz (738 g)
Sensors	Photoionization sensor with standard 10.6 eV or optional 9.8 eV or 11.7 eV lamps
Battery	• Rechargeable, external field-replaceable Lithium-Ion battery pack • Alkaline battery adapter
Operating Hours	16 hours of operation (12 hours with alkaline battery)
Display Graphic	4 lines, 28 x 43 mm, with LED backlight for enhanced display readability
Keypad	1 operation and 2 programming keys, 1 flashlight on/off
Direct Readout	Instantaneous reading • VOCs as ppm by volume • High values • STEL and TWA • Battery and shutdown voltage • Date, time, temperature
Alarms	95 dB (at 30 cm) buzzer and flashing red LED to indicate exceeded preset limits • High: 3 beeps and flashes per second • Low: 2 beeps and flashes per second • STEL and TWA: 1 beep and flash per second • Alarms latching with manual override or automatic reset • Additional diagnostic alarm and display message for low battery and pump stall
EMI/RFI	Highly resistant to EMI/RFI Compliant with EMC Directive 89/336/EEC
IP Rating	• IP67 unit off and without flexible probe • IP65 unit running
Datalogging	Standard 6 months at one-minute intervals
Calibration	Two-point or three-point calibration for zero and span. Calibration memory for 8 calibration gases, alarm limits, span values and calibration dates
Sampling Pump	• Internal, integrated flow rate at 500 cc/mn • Sample from 100' (30m) horizontally and vertically
Low Flow Alarm	• Auto pump shutoff at low-flow condition
Communication	• Download data and upload instrument set-up from PC through charging cradle or optional Bluetooth™ • Wireless data transmission through built-in RF modem
Frequency	902 to 928 MHz (license-free), 2.400 to 2.4835 GHz (license-free), 433 MHz, 869 MHz
RF Range	Up to 500' (900 MHz, 433 Mhz, 869 Mhz), extendable with RAELink3 Repeater to 2 miles
Hazard Area Approval	• **US and Canada:** UL, cUL, Classified as Intrinsically Safe for use in Class I, Division I Groups A, B, C, D • **Europe:** ATEX II 1G EEx ia IIC T4 (pending) • **IECEx:** II 1G EEx ia IIC T4 (pending)
Temperature	-4° to 113° F (-20° to 50° C)
Humidity	0% to 95% relative humidity (non-condensing)
Attachments	Durable black rubber boot
Warranty	Lifetime on non-consumable components (per RAE Systems Standard Warranty), 3-year warranty for 10.6 eV lamp, 1 year for pump and battery

*Specifications are subject to change

Sensor Specifications

Gas Monitor	Range	Resolution	Response Time T90
VOCs	0 to 9999 ppb 10 to 99 ppm 100 to 999.9 ppm 1000 to 9999 ppm	1 ppb 0.01 ppm 0.1 ppm 1 ppm	< 3 s < 3 s < 3 s < 3 s

Monitor only includes:

- ppbRAE 3000 Monitor, Model PGM-7340
- Wireless communication module built in, as specified
- Datalogging with ProRAE Studio Package for Windows™ 98, 2000, NT, ME & XP
- Charging/download adapter
- RAE UV lamp, as specified
- VOC Zeroing Tubes (1 box)
- Tube adapter
- Tedlar® bag for calibration
- Flex-I-Probe™
- External filter
- Rubber boot with straps
- Alkaline battery adapter
- Lamp-cleaning kit
- Tool Kit
- Operation CD-ROM
- Operation & Maintenance manual
- Soft leather case

Monitor with accessories kit adds:

- Hard transport case with pre-cut foam padding
- Charging/download cradle
- 5 Porous metal filters and O-rings
- Organic vapor zeroing kit
- Gas outlet port adapter and tubing

Optional calibration kit adds:

- 10 ppm isobutylene calibration gas, 34L
- Calibration regulator and flow controller

Optional Guaranteed Cost of Ownership Program:

- 4-year repair and replacement guarantee
- Annual maintenance service

DISTRIBUTED BY:

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ATTACHMENT D

SPECIFICATIONS FOR THE SOLARRAE

SolarRAE™

Remote Alternative Power Source

The RAE Solar Enclosure provides safe and reliable power generation without the expense of installing utility power. The solar system is designed to be used with AreaRAE wireless detectors or any RAE Systems wireless product including the MiniRAE, ppbRAE, MultiRAE, and ChemRAE.

SolarRAE provides remote power for RAE Systems monitors. Each system has an externally mounted 30-watt solar panel that provides power to a 55 Amp/hr sealed gel battery specically designed for solar systems. In addition, each solar enclosure is equipped with a powerful fan that automatically circulates cool air inside the enclosure when a specific temperature threshold is reached. Fully charged, a solar enclosure can provide up to 2 weeks of continuous usage with no additional solar input.

Key Features

- Ruggedized steel enclosure to withstand harsh environments
- Viewing window allows for local readings and alarm notification
- Powerful ventilation fan enables use in hot environments
- Large 55 Amp/hr gel battery specifically designed for solar applications
- Fully adjustable (tilt and rotate) 30W solar panel to maximize power output
- Fully adjustable external antenna to maximize radio transmission distances
- Lightning arrestor to prevent damage to internal components

SolarRAE is compatible with:

- AreaRAE series
- SentryRAE
- ChemRAE
- MultiRAE
- MiniRAE 2000
- pppRAE Plus
- MiniRAE 3000
- ppbRAE 3000

Additional Features

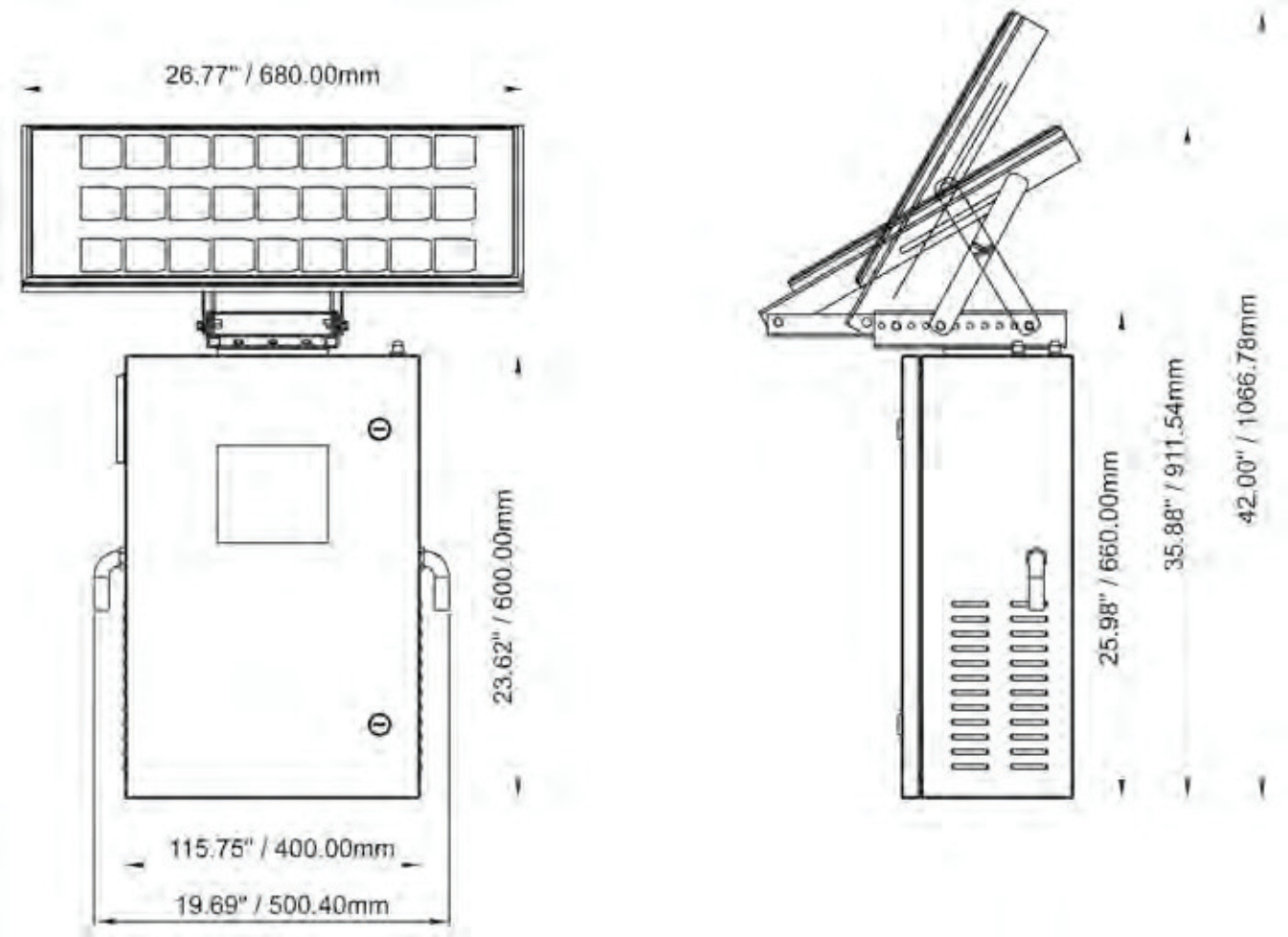
- Up to 2 weeks of continuous power with no sunlight
- Ruggedized steel enclosure
- Local viewing window
- 30W solar panel
- Fan to regulate internal temperature
- External fiberglass antenna

SolarRAE™

Specifications*

Size	20" W x 10" Dx 42" H (50cm W x 25cm D x 1065cm H) *see diagram below
Weight	70.5 lbs (32 kg) *not including battery weight
Material	Painted steel enclosure with and stainless steel components
Solar Panel	30 W peak output
Battery	55 Amp-hr sealed gel
Charging Controller	97% efficiency with included overcharge protection
Cooling Fan	Maximum airflow of 84 CFM (2.4 m^3/min)
Operating Temperature	-4° to 122° F (-20° to 50° C)
Pole Mount	2" to 3.5" diameter (5cm to 8.9cm)
Certifications	None

*Specifications are subject to change



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www.raesystems.com

APPENDIX A

SLOPE STABILITY CALCULATIONS

(Provided under separate cover)

1/82

MJR 7/25/13
PAS 7/25/13

Slope Stability Analysis
Former Koppers Seaboard Site, Kearny, New Jersey

Objective:

Slope stability analyses were carried out for various locations along the northern border of the Former Koppers Seaboard Site (Site), located in Kearny, New Jersey. Locations selected are situated behind the in-place steel sheet pile wall, and encompass the western, central, and eastern areas of the Site.

References:

1. Stability Analysis – Final Fill, Seaboard Site, Kearny, NJ, Mueser Rutledge Consulting Engineers, April 1998.

2. Remedial Action Report (RAR), Former Koppers Seaboard Site, Kearny, New Jersey, KEY Environmental, Inc., August 2011.

3. Phase I Geotechnical Boring Investigation Laboratory Data, Remedial Action Work Plan (RAWP), Mueser Rutledge Consulting Engineers, 1997

Assumptions:

1. Slope geometries and top of fill elevations are based on most recent Final Cover Grading Plan design.
2. The slopes of interest will be locations A, C, E, and D from Reference 1 and an additional location at the corner of the river bend in the northeast area of the Site where slope stability is expected to be critical (see Figure 1).
3. The slope will be divided into inboard and outboard sections, depending on whether the soil resides landward or seaward, respectively, of the steel sheet pile (SSP) wall.
4. Outboard geometries will be based on soil depths provided in Reference 2; initial surface elevations provided in the tables in Reference 2 (attached) will be considered existing conditions in order to take into account the anticipated settlement of the backfill.
5. Because the elevations given in Reference 2 only continue to a distance of 50 ft. outboard from the SSP wall, the profile will be extended as a straight line for another 50 ft. to ensure that the computation is not artificially truncated.
6. The backfill layer will be included in the geometry, and will assume the soil properties specified in Reference 2. That is, sand placed as backfill will assume the same soil properties as buried sand from bore logs; backfill gravel is assumed to have moist and saturated unit weight of 125 lb/ft^3 with friction angle of 38°; and rip-rap will have moist and saturated unit weight of 100 lb/ft^3 with friction angle of 40°.
7. Beneath the backfill layer the soil profile will be based on the data provided in Reference 3 (attached).
8. SSP wall elevation is held constant over all profiles as +10 ft. mean sea level (msl) NGVD 1929.

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PAS 7/25/13

9. Inboard of the SSP wall, the given design offsets from the top of the wall to the toe of the fill slope will be taken as per Reference 1, page 5. This offset will include a 1% grade between the offset and toe of slope.
10. The slope from the toe of slope to the Final Cover Grading Plan "plateau area" is 4H:1V, and the top elevation of the "plateau area" varies depending on location (see Table 1).
11. The "plateau area" is graded at a uniform 1.5% grade, which is implemented until the end of the profile.
12. Soil profiles for the inboard portion of the Site will be taken per Reference 3 (attached), which covers the extent from fill material to glacial till. Any fill above the beginning of the bore record will be assumed to be processed dredged material (PDM) which will be placed on the Site.
13. When elevations for the beginning of certain soil layers do not match between bore logs used for one location, assume that the tops and bottoms of the layers are connected linearly by a profile with constant slope.
14. Soil properties are taken from the Reference 1, page 4, Table of Soil Parameters used in Stability Analysis. Where the organic or varved clay layers vary over depth, the average of the maximum and minimum cohesion values observed in that layer is applied over the entire depth. For the northeast corner location, where this clay layer is thicker than in other locations, the layer has been divided into three layers before the averaging process was done in order to more accurately depict the soil characteristics. The results of the calculation of cohesion values are provided as Attachment B.
15. Groundwater elevation is assumed to be +2.5 msl (NGVD 1929) outboard, as per the reference tide elevation indicated in Reference 3, and +4 msl (NGVD 1929) inboard as assumed in other geotechnical calculations in this package.
16. SSP wall will be idealized as a soil with maximum unit weight, cohesion, and friction angle, and will have dimensions of 2.5 ft. in width and typically 26 ft. in depth as per SSP wall design calculations performed by Mueser Rutledge Consulting Engineers.

Design Criteria:

1. A factor of safety of at least 1.3 is sufficient for the present analysis, as per Reference 1.

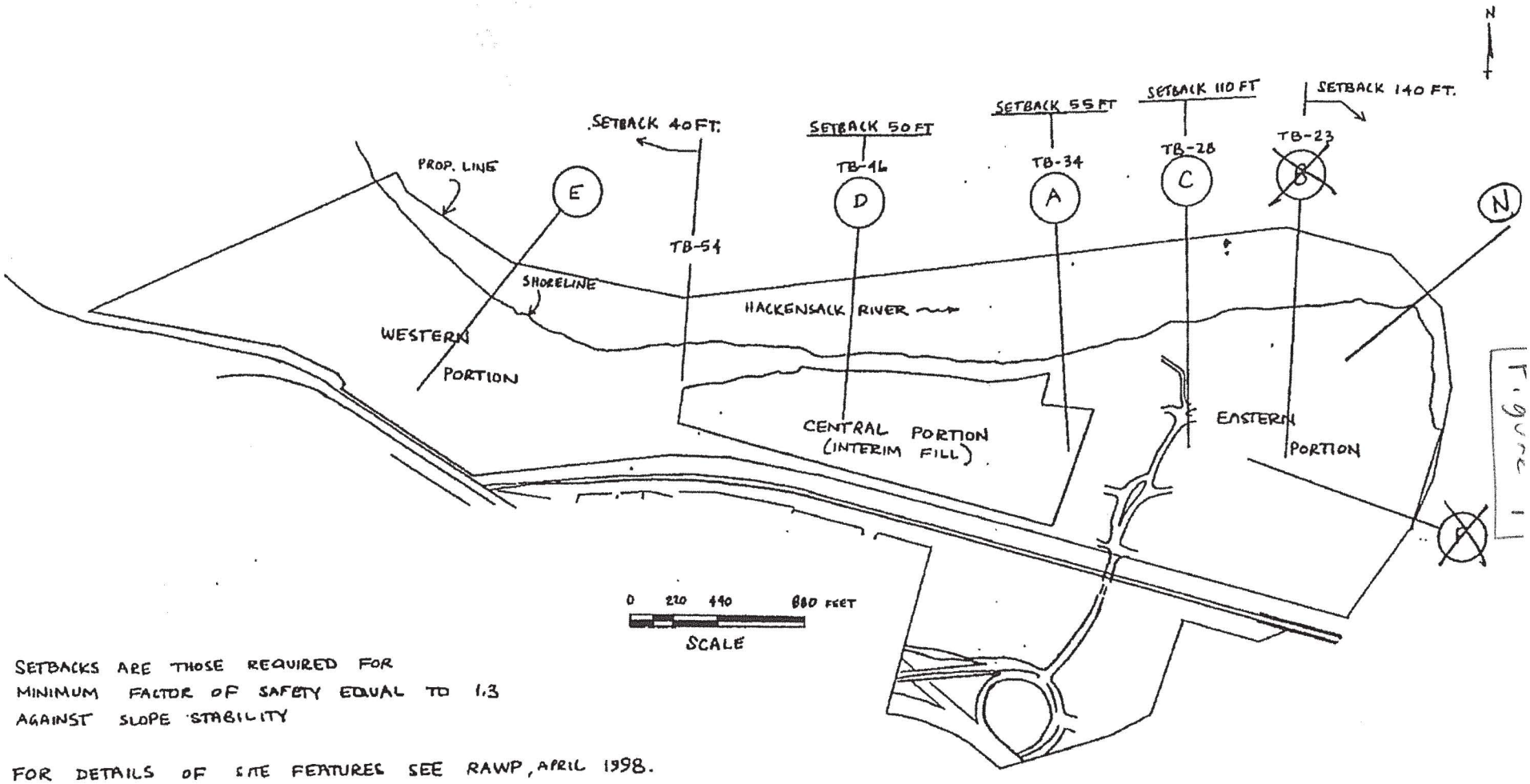
Development:

Five slopes were generated using STEDwin, according to the above assumptions and the boring logs which correspond to the locations under consideration. The particular design parameters used in each scenario are provided in Table 1. All input data for soil, slope geometry, groundwater table, and program search criteria are included in Attachment A. Using the Modified Bishop Method of slope stability analysis, the search criteria in STEDwin were first set very broadly to identify the location of the most critical slip planes, and was then refined to specify the actual lowest factor of safety. The factors of safety results are included in Table 1. All five slopes investigated satisfied the design criteria of a factor of safety of greater than or equal to 1.3. The corresponding slope failure planes are provided as Figures 2 – 6.

MSR 7/25/13
PAS 7/25/13

Table 1 – Design Parameters and Results

Location	Setback (ft.)	PDM Fill Depth (ft.)	Boring Logs Used	Backfill Material	Factor of Safety	Notes
A	55	28	220, 219, 10	Gravel	1.71	Failure within varved clay layer
C	110	27	224, 108	Sand	1.88	Failure within varved clay layer
D	55	13	215, 216, 105	Sand	2.31	Failure within varved clay layer
E	40	18	206 (incomplete, refer to Ref. 1), 102	Gravel	2.16	Failure within varved clay layer
N	140	22	228UB, 110	Rip-rap	1.54	Failure beneath SSP wall in middle depths organic clay



SETBACKS ARE THOSE REQUIRED FOR MINIMUM FACTOR OF SAFETY EQUAL TO 1.3 AGAINST SLOPE STABILITY

FOR DETAILS OF SITE FEATURES SEE RAWP, APRIL 1998.

SEABOARD SITE

KEARNY NJ

ECDC

PORT NEWARK NJ

MUESER RUTLEDGE CONSULTING ENGINEERS

708 THIRD AVENUE, NEW YORK, N.Y. 10017

AS SHOWN | DRAWN BY JLV | DATE 4/15/98 | JOB NO.

SLOPE STABILITY PLAN PROFILES A-F | FIG-SS-

Figure 1

Generated by CamScanner from intsig.com

Location A

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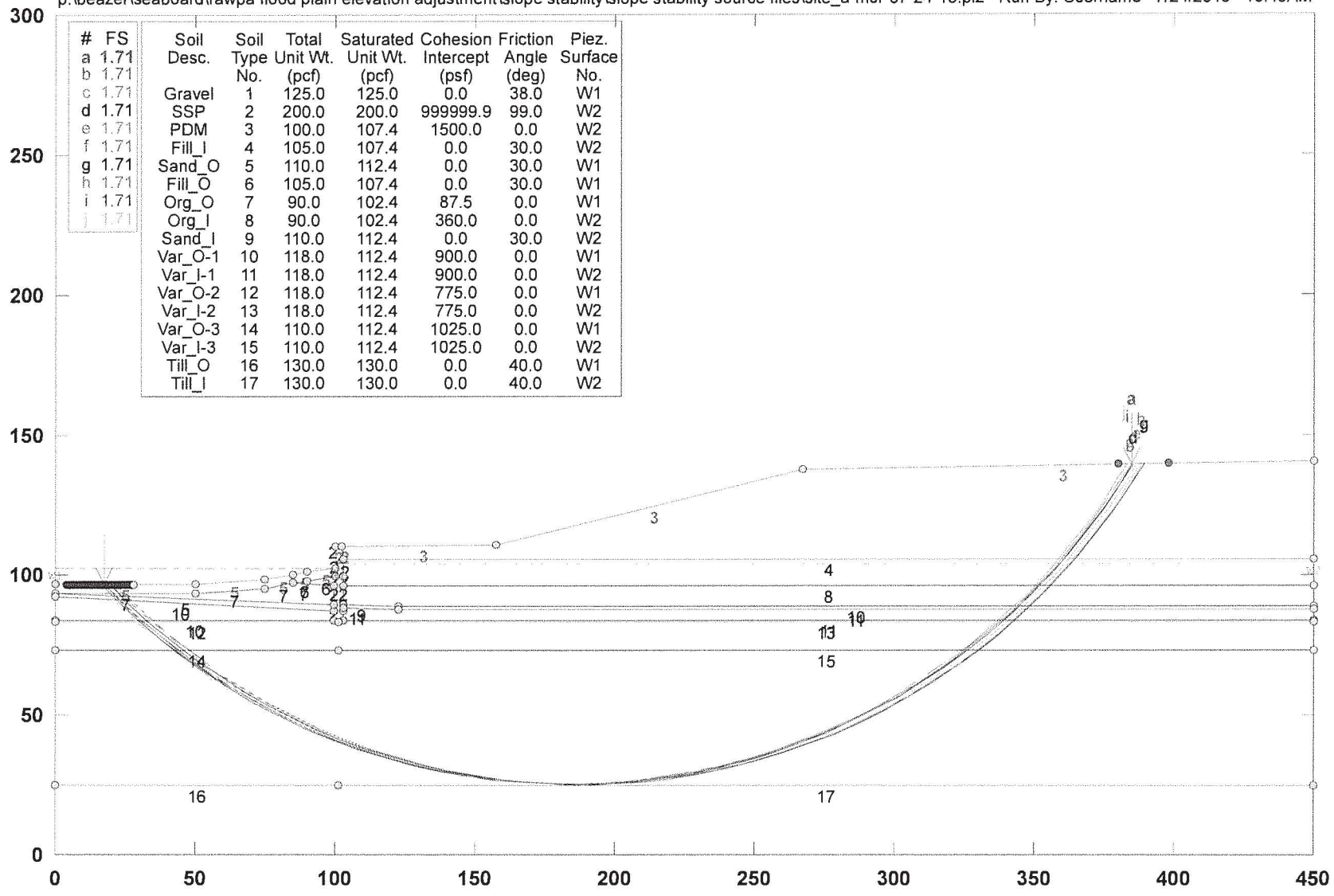
b	1.71
c	1.71
d	1.71
e	1.71
f	1.71
g	1.71
h	1.71
i	1.71
j	1.71

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Gravel	1	125.0	125.0	0.0	38.0	W1
SSP	2	200.0	200.0	999999.9	99.0	W2
PDM	3	100.0	107.4	1500.0	0.0	W2
Fill_I	4	105.0	107.4	0.0	30.0	W2
Sand_O	5	110.0	112.4	0.0	30.0	W1
Fill_O	6	105.0	107.4	0.0	30.0	W1
Org_O	7	90.0	102.4	87.5	0.0	W1
Org_I	8	90.0	102.4	360.0	0.0	W2
Sand_I	9	110.0	112.4	0.0	30.0	W2
Var_O-1	10	118.0	112.4	900.0	0.0	W1
Var_I-1	11	118.0	112.4	900.0	0.0	W2
Var_O-2	12	118.0	112.4	775.0	0.0	W1
Var_I-2	13	118.0	112.4	775.0	0.0	W2
Var_O-3	14	110.0	112.4	1025.0	0.0	W1
Var_I-3	15	110.0	112.4	1025.0	0.0	W2
Till_O	16	130.0	130.0	0.0	40.0	W1
Till_I	17	130.0	130.0	0.0	40.0	W2



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Safety Factors Are Calculated By The Modified Bishop Method

STED

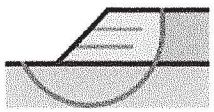

Figure 2

MSR 7/25/13
PAS 7/25/13

Location C

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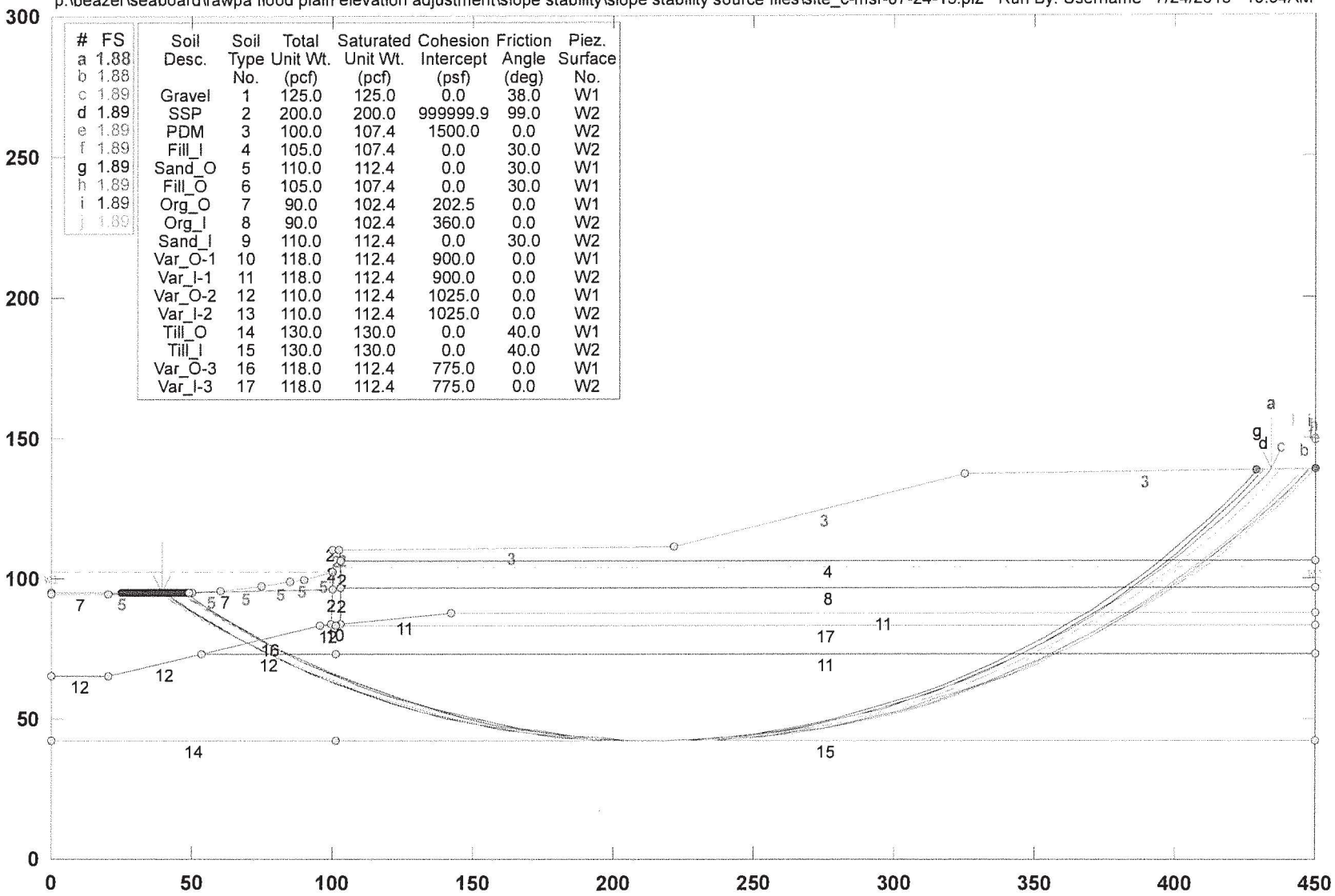
c	1.89
d	1.89
e	1.89
f	1.89
g	1.89
h	1.89
i	1.89
j	1.89

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Gravel	1	125.0	125.0	0.0	38.0	W1
SSP	2	200.0	200.0	999999.9	99.0	W2
PDM	3	100.0	107.4	1500.0	0.0	W2
Fill_I	4	105.0	107.4	0.0	30.0	W2
Sand_O	5	110.0	112.4	0.0	30.0	W1
Fill_O	6	105.0	107.4	0.0	30.0	W1
Org_O	7	90.0	102.4	202.5	0.0	W1
Org_I	8	90.0	102.4	360.0	0.0	W2
Sand_I	9	110.0	112.4	0.0	30.0	W2
Var_O-1	10	118.0	112.4	900.0	0.0	W1
Var_I-1	11	118.0	112.4	900.0	0.0	W2
Var_O-2	12	110.0	112.4	1025.0	0.0	W1
Var_I-2	13	110.0	112.4	1025.0	0.0	W2
Till_O	14	130.0	130.0	0.0	40.0	W1
Till_I	15	130.0	130.0	0.0	40.0	W2
Var_O-3	16	118.0	112.4	775.0	0.0	W1
Var_I-3	17	118.0	112.4	775.0	0.0	W2



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Safety Factors Are Calculated By The Modified Bishop Method

STED

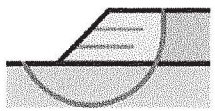

Figure 3

MSR 7/25/13
PAS 7/25/13

Location D

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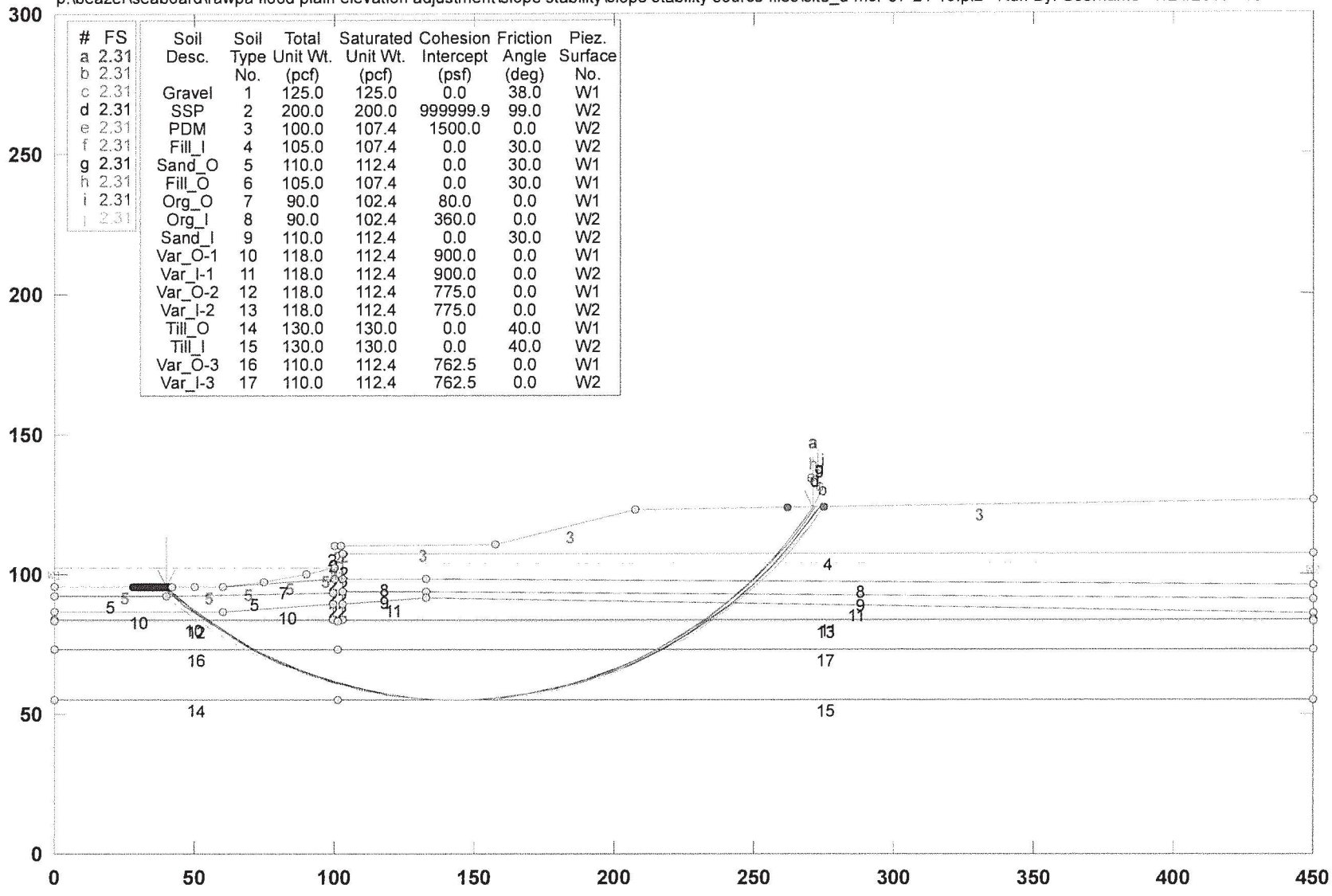
c	2.31
d	2.31
e	2.31
f	2.31
g	2.31
h	2.31
i	2.31
j	2.31

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Gravel	1	125.0	125.0	0.0	38.0	W1
SSP	2	200.0	200.0	999999.9	99.0	W2
PDM	3	100.0	107.4	1500.0	0.0	W2
Fill_I	4	105.0	107.4	0.0	30.0	W2
Sand_O	5	110.0	112.4	0.0	30.0	W1
Fill_O	6	105.0	107.4	0.0	30.0	W1
Org_O	7	90.0	102.4	80.0	0.0	W1
Org_I	8	90.0	102.4	360.0	0.0	W2
Sand_I	9	110.0	112.4	0.0	30.0	W2
Var_O-1	10	118.0	112.4	900.0	0.0	W1
Var_I-1	11	118.0	112.4	900.0	0.0	W2
Var_O-2	12	118.0	112.4	775.0	0.0	W1
Var_I-2	13	118.0	112.4	775.0	0.0	W2
Till_O	14	130.0	130.0	0.0	40.0	W1
Till_I	15	130.0	130.0	0.0	40.0	W2
Var_O-3	16	110.0	112.4	762.5	0.0	W1
Var_I-3	17	110.0	112.4	762.5	0.0	W2



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Safety Factors Are Calculated By The Modified Bishop Method

STED

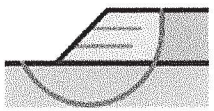


Figure 4

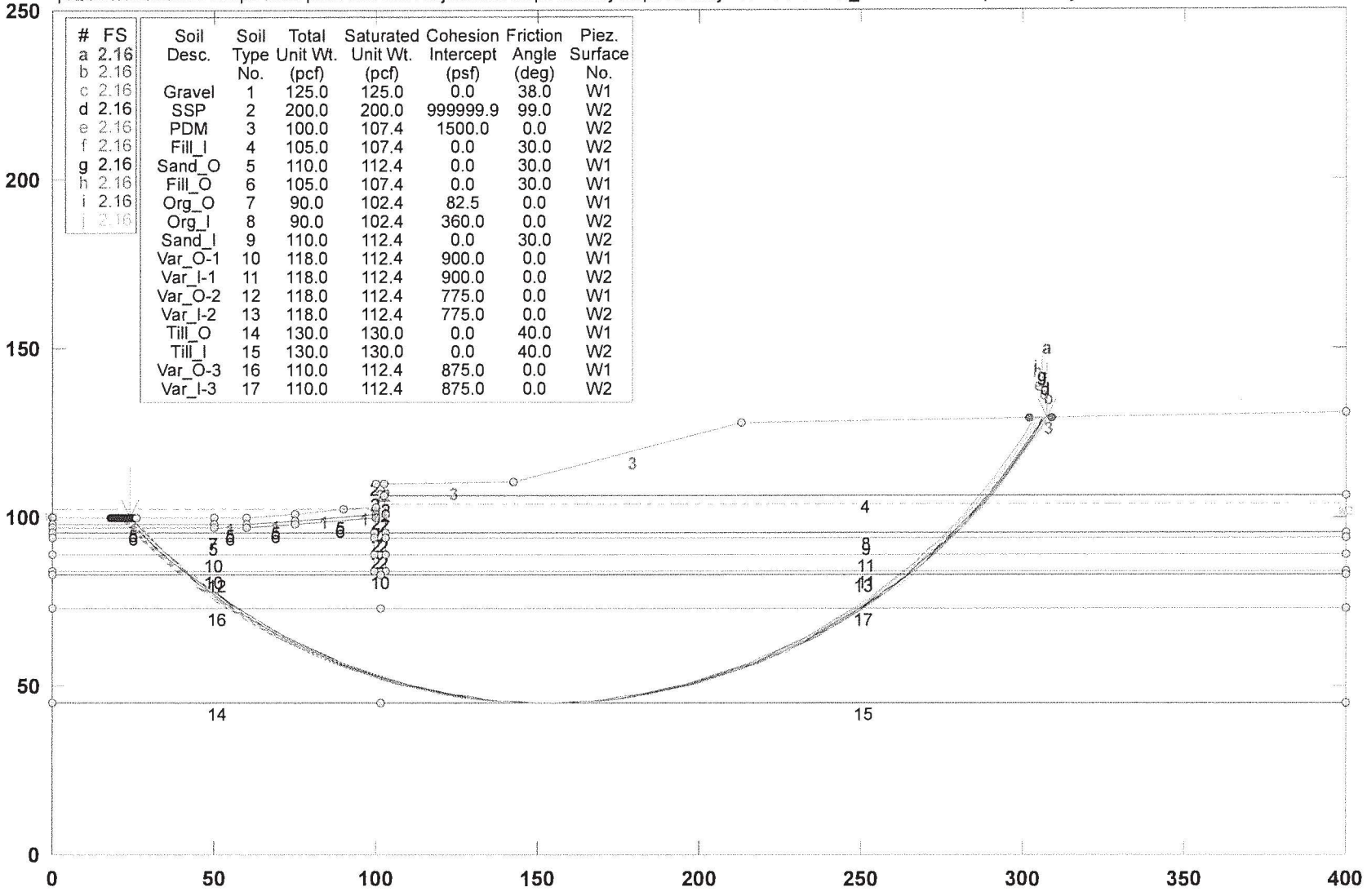
MSRE #1275111
PAS 7/25/13

Location E

p:\beazer\seaboard\rawpa flood plain elevation adjustment\slope stability\slope stability source files\site_e-msr-07-24-13.pl2 Run By: Username 7/24/2013 11:01AM

#	FS
a	2.16
b	2.16
c	2.16
d	2.16
e	2.16
f	2.16
g	2.16
h	2.16
i	2.16
j	2.16

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Gravel	1	125.0	125.0	0.0	38.0	W1
SSP	2	200.0	200.0	999999.9	99.0	W2
PDM	3	100.0	107.4	1500.0	0.0	W2
Fill_I	4	105.0	107.4	0.0	30.0	W2
Sand_O	5	110.0	112.4	0.0	30.0	W1
Fill_O	6	105.0	107.4	0.0	30.0	W1
Org_O	7	90.0	102.4	82.5	0.0	W1
Org_I	8	90.0	102.4	360.0	0.0	W2
Sand_I	9	110.0	112.4	0.0	30.0	W2
Var_O-1	10	118.0	112.4	900.0	0.0	W1
Var_I-1	11	118.0	112.4	900.0	0.0	W2
Var_O-2	12	118.0	112.4	775.0	0.0	W1
Var_I-2	13	118.0	112.4	775.0	0.0	W2
Till_O	14	130.0	130.0	0.0	40.0	W1
Till_I	15	130.0	130.0	0.0	40.0	W2
Var_O-3	16	110.0	112.4	875.0	0.0	W1
Var_I-3	17	110.0	112.4	875.0	0.0	W2



PCSTABL5M/si FSmin=2.16
Safety Factors Are Calculated By The Modified Bishop Method

STED

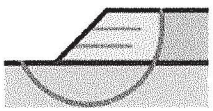


Figure 5

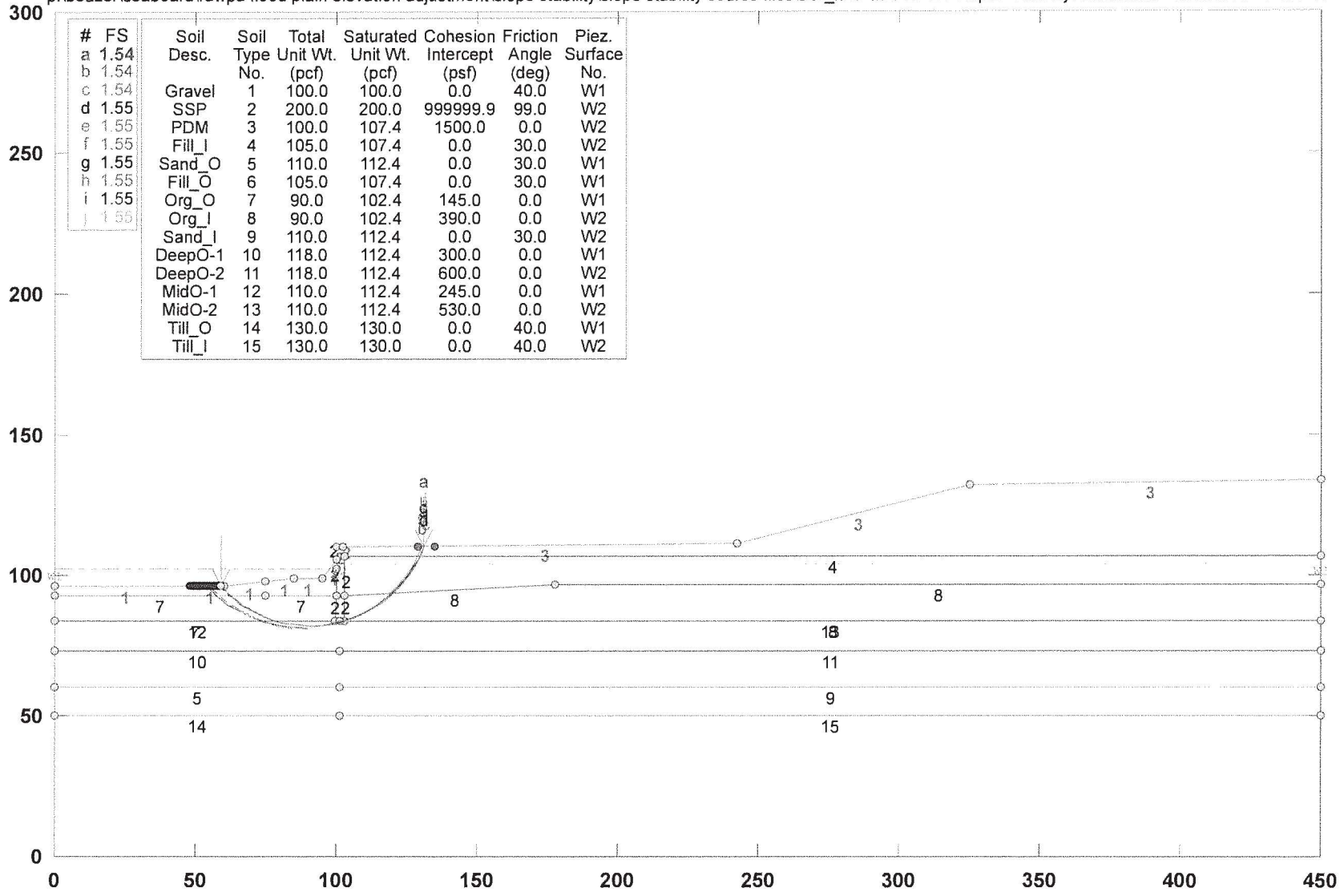
MSR 4/25/13
PAS 7/25/13

Location N

p:\beazer\seaboard\rawpa flood plain elevation adjustment\slope stability\slope stability source files\site_new-msr-07-24-13.pl2 Run By: Username 7/24/2013 11:08AM

#	FS
a	1.54
b	1.54
c	1.54
d	1.55
e	1.55
f	1.55
g	1.55
h	1.55
i	1.55
j	1.55

Soil Desc.	Soil Type No.	Total Unit Wt. (pcf)	Saturated Unit Wt. (pcf)	Cohesion Intercept (psf)	Friction Angle (deg)	Piez. Surface No.
Gravel	1	100.0	100.0	0.0	40.0	W1
SSP	2	200.0	200.0	999999.9	99.0	W2
PDM	3	100.0	107.4	1500.0	0.0	W2
Fill_I	4	105.0	107.4	0.0	30.0	W2
Sand_O	5	110.0	112.4	0.0	30.0	W1
Fill_O	6	105.0	107.4	0.0	30.0	W1
Org_O	7	90.0	102.4	145.0	0.0	W1
Org_I	8	90.0	102.4	390.0	0.0	W2
Sand_I	9	110.0	112.4	0.0	30.0	W2
DeepO-1	10	118.0	112.4	300.0	0.0	W1
DeepO-2	11	118.0	112.4	600.0	0.0	W2
MidO-1	12	110.0	112.4	245.0	0.0	W1
MidO-2	13	110.0	112.4	530.0	0.0	W2
Till_O	14	130.0	130.0	0.0	40.0	W1
Till_I	15	130.0	130.0	0.0	40.0	W2



PCSTABL5M/si FSmin=1.54
Safety Factors Are Calculated By The Modified Bishop Method

STED

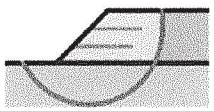


Figure 6

MSE 7/25/13
PAL 7/25/13

Attachment A

MSR 7/25/13
PAS 7/25/13

Location A Input (stedwin)

```
PROFIL  P:\Beazer\SEABOARD\RAWPA Flood Plain Elevation Adjustment\Slope Stability\Slope Stability So

42 10
0. 96.5 50. 96.5 5
50. 96.5 75. 98.3 5
75. 98.3 85. 100.1 5
85. 100.1 90. 101.1 5
90. 101.1 100. 102.5 5
100. 102.5 100.1 110. 2
100.1 110. 102.6 110. 2
102.6 110. 157.6 110.55 3
157.6 110.55 267.4 138. 3
267.4 138. 450. 140.7 3
102.6 110. 102.7 106. 2
102.7 106. 450. 106. 4
0. 93.5 50. 93.5 7
50. 93.5 75. 95.3 7
75. 95.3 85. 97.1 7
85. 97.1 90. 98.1 6
90. 98.1 99.9 99.5 6
99.9 99.5 100. 102.5 2
102.7 106. 102.8 99.5 2
85. 97.1 99.8 96. 7
99.8 96. 99.9 99.5 2
102.8 99.5 102.9 96. 2
102.9 96. 450. 96. 8
0. 93.5 99.7 89.55 5
99.7 89.55 99.8 96. 2
102.9 96. 103. 89.55 2
103. 89.55 122.5 89. 9
122.5 89. 450. 89. 10
0. 92. 99.6 87.05 10
99.6 88.05 99.7 89.55 2
103. 89.55 103.1 87.05 2
103.1 88.05 122.5 87.5 11
122.5 87.5 450. 87.5 11
0. 84. 99.5 84. 10
103.1 88.05 103.2 84. 2
103.2 84. 450. 84. 11
0. 83. 101.25 83. 12
101.25 83. 450. 83. 13
0. 73. 101.25 73. 14
101.25 73. 450. 73. 15
0. 25. 101.25 25. 16
101.25 25. 450. 25. 17
SOIL  Gravel  SSP     PDM     Fill_I  Sand_O  Fill_O  Org_O   Org_I   Sand_I  Var_O-1 Var_I-1 Var_O-
17
125. 125. 0. 38. 0. 0. 1
200. 200. 999999.9 99. 0. 0. 2
100. 107.4 1500. 0. 0. 0. 2
105. 107.4 0. 30. 0. 0. 2
110. 112.4 0. 30. 0. 0. 1
105. 107.4 0. 30. 0. 0. 1
90. 102.4 87.5 0. 0. 0. 1
90. 102.4 360. 0. 0. 0. 2
110. 112.4 0. 30. 0. 0. 2
118. 112.4 900. 0. 0. 0. 1
118. 112.4 900. 0. 0. 0. 2
118. 112.4 775. 0. 0. 0. 1
118. 112.4 775. 0. 0. 0. 2
110. 112.4 1025. 0. 0. 0. 1
110. 112.4 1025. 0. 0. 0. 2
130. 130. 0. 40. 0. 0. 1
130. 130. 0. 40. 0. 0. 2
WATER
2 62.4
2
0. 102.5
101.25 102.5
2   W2
101.25 104.
450. 104.
```

11/8 -

MJR 7/25/13
PAS 7/25/13

```
CIRCL2
100 100
4. 28. 380. 398.
0. 10. 0. 0.
```

12|84

MJR 7/25/13
PAS 7/25/13

Location C

Input

(Stedwin)

PROFIL P:\Beazer\SEABOARD\RAWPA Flood Plain Elevation Adjustment\Slope Stability\Slope Stability So

```
32 11
0. 95. 50. 95. 5
50. 95. 60. 95.6 5
60. 95.6 75. 97.3 5
75. 97.3 85. 99.1 5
85. 99.1 90. 99.7 5
90. 99.7 100. 102.5 5
100. 102.5 100.1 110. 2
100.1 110. 102.6 110. 2
102.6 110. 221.6 111.1 3
221.6 111.1 325.2 137. 3
325.2 137. 450. 138.9 3
102.6 110. 102.7 106.4 2
102.7 106.4 450. 106.4 4
0. 94.5 20. 94.5 7
20. 94.5 99.9 96. 7
99.9 96. 100. 102.5 2
102.7 106.4 102.8 96.9 2
102.8 96.9 450. 96.9 8
99.8 84. 99.9 96. 2
102.8 96.9 102.9 84. 2
102.9 84. 142.5 88. 11
142.5 88. 450. 88. 11
```

3/8+

MSA 7/25/13
PA 3 7/25/13

```
0. 65. 20. 65. 12
20. 65. 53.25 73. 12
53.25 73. 95.6 83. 16
95.6 83. 99.8 84. 10
95.6 83. 101.25 83. 12
101.25 83. 450. 83. 17
53.25 73. 101.25 73. 12
101.25 73. 450. 73. 11
0. 42. 101.25 42. 14
101.25 42. 450. 42. 15
SOIL  Gravel  SSP     PDM     Fill_I  Sand_O  Fill_O  Org_O   Org_I   Sand_I  Var_O-1 Var_I-1 Var_O-
17
125. 125. 0. 38. 0. 0. 1
200. 200. 999999.9 99. 0. 0. 2
100. 107.4 1500. 0. 0. 0. 2
105. 107.4 0. 30. 0. 0. 2
110. 112.4 0. 30. 0. 0. 1
105. 107.4 0. 30. 0. 0. 1
90. 102.4 202.5 0. 0. 0. 1
90. 102.4 360. 0. 0. 0. 2
110. 112.4 0. 30. 0. 0. 2
118. 112.4 900. 0. 0. 0. 1
118. 112.4 900. 0. 0. 0. 2
110. 112.4 1025. 0. 0. 0. 1
110. 112.4 1025. 0. 0. 0. 2
130. 130. 0. 40. 0. 0. 1
130. 130. 0. 40. 0. 0. 2
118. 112.4 775. 0. 0. 0. 1
118. 112.4 775. 0. 0. 0. 2
WATER
2 62.4
2
0. 102.5
101.25 102.5
2   W2
101.25 104.
450. 104.
CIRCL2
100 100
25. 49. 429. 450.
0. 10. 0. 0.
```

1/82

Location D

Input

(stedwin)

PAS 7/25/13

```
PROFIL  P:\Beazer\SEABOARD\RAWPA Flood Plain Elevation Adjustment\Slope Stability\Slope Stability So

39 10
0. 95.5 50. 95.5 5
50. 95.5 60. 95.9 5
60. 95.9 75. 97.3 5
75. 97.3 90. 100.2 5
90. 100.2 100. 102.5 5
100. 102.5 100.1 110. 2
100.1 110. 102.6 110. 2
102.6 110. 157.6 110.55 3
157.6 110.55 207.4 123. 3
207.4 123. 450. 126.6 3
102.6 110. 102.7 107.7 2
102.7 107.7 450. 107.7 4
102.7 107.7 102.8 98.3 2
60. 95.5 99.9 98.2 7
99.9 98.2 100. 102.5 2
102.8 98.3 132.5 98.7 8
132.5 98.7 450. 96. 8
0. 92.5 40. 92.5 5
40. 92.5 99.8 93.6 5
99.8 93.6 99.9 98.2 2
102.8 98.3 102.9 93.66 2
102.9 93.66 132.5 94.2 9
132.5 94.2 450. 91. 9
0. 86.6 60. 86.6 10
60. 86.6 99.7 89.4 10
99.7 89.4 99.8 93.6 2
102.9 93.66 103. 89.6 2
103. 89.6 132.5 91.7 11
132.5 91.7 450. 86. 11
0. 84. 99.6 84. 10
99.6 84. 99.7 89.4 2
103. 89.6 103.1 84. 2
103.1 84. 450. 84. 11
0. 83. 101.25 83. 12
101.25 83. 450. 83. 13
0. 73. 101.25 73. 16
101.25 73. 450. 73. 17
0. 55. 101.25 55. 14
101.25 55. 450. 55. 15
SOIL  Gravel  SSP     PDM     Fill_I  Sand_O  Fill_O  Org_O   Org_I   Sand_I  Var_O-1 Var_I-1 Var_O-
17
125. 125. 0. 38. 0. 0. 1
200. 200. 999999.9 99. 0. 0. 2
100. 107.4 1500. 0. 0. 0. 2
105. 107.4 0. 30. 0. 0. 2
110. 112.4 0. 30. 0. 0. 1
105. 107.4 0. 30. 0. 0. 1
90. 102.4 80. 0. 0. 0. 1
90. 102.4 360. 0. 0. 0. 2
110. 112.4 0. 30. 0. 0. 2
118. 112.4 900. 0. 0. 0. 1
118. 112.4 900. 0. 0. 0. 2
118. 112.4 775. 0. 0. 0. 1
118. 112.4 775. 0. 0. 0. 2
130. 130. 0. 40. 0. 0. 1
130. 130. 0. 40. 0. 0. 2
110. 112.4 762.5 0. 0. 0. 1
110. 112.4 762.5 0. 0. 0. 2
WATER
2 62.4
2
0. 102.5
101.25 102.5
2   W2
```

5182

MSR 7/25/13
PA3 7/25/13

```
101.25 104.
450. 104.
CIRCL2
100 100
28. 42. 262. 275.
0. 10. 0. 0.
```

6/82

Location E

Input

(stedwin)

MSK 7/25/13

PAS 7/25/13

PROFIL P:\Beazer\SEABOARD\RAWPA Flood Plain Elevation Adjustment\Slope Stability\Slope Stability So

```
46 10
0. 99.9 50. 99.9 1
50. 99.9 60. 100.1 1
60. 100.1 75. 100.8 1
75. 100.8 90. 102.5 1
90. 102.5 100. 103.2 1
100. 103.2 100.1 110. 2
100.1 110. 102.6 110. 2
102.6 110. 142.6 110.4 3
142.6 110.4 213. 128. 3
213. 128. 400. 130.8 3
102.6 110. 102.7 106.5 2
102.7 106.5 400. 106.5 4
0. 97.9 50. 97.9 5
50. 97.9 60. 98.1 5
60. 98.1 75. 98.8 5
75. 98.8 99.9 101.2 5
99.9 101.2 100. 103.2 2
102.7 106.5 102.8 101.2 2
0. 96.9 50. 96.9 6
50. 96.9 60. 97.1 6
60. 97.1 75. 97.8 6
75. 97.8 99.8 100.2 6
```

.418-

MSR 7/25/13
PA's 7/25/13

```
99.8 100.2 99.9 101.2 2
0. 95.5 99.7 95.5 7
99.7 95.5 99.8 100.2 2
102.8 101.2 102.9 95.5 2
102.9 95.5 400. 95.5 8
0. 94. 99.6 94. 5
99.6 94. 99.7 95.5 2
102.9 95.5 103. 94. 2
103. 94. 400. 94. 9
0. 88.8 99.5 88.8 10
99.5 88.8 99.6 94. 2
103. 94. 103.1 88.8 2
103.1 88.8 400. 88.8 11
0. 84. 99.4 84. 10
99.4 84. 99.5 88.8 2
103.1 88.8 103.2 84. 2
103.2 84. 400. 84. 11
99.4 84. 103.2 84. 10
0. 83. 101.25 83. 12
101.25 83. 400. 83. 13
0. 73. 101.25 73. 16
101.25 73. 400. 73. 17
0. 45. 101.25 45. 14
101.25 45. 400. 45. 15
SOIL  Gravel  SSP     PDM     Fill_I  Sand_O  Fill_O  Org_O   Org_I   Sand_I  Var_O-1 Var_I-1 Var_O-
17
125. 125. 0. 38. 0. 0. 1
200. 200. 999999.9 99. 0. 0. 2
100. 107.4 1500. 0. 0. 0. 2
105. 107.4 0. 30. 0. 0. 2
110. 112.4 0. 30. 0. 0. 1
105. 107.4 0. 30. 0. 0. 1
90. 102.4 82.5 0. 0. 0. 1
90. 102.4 360. 0. 0. 0. 2
110. 112.4 0. 30. 0. 0. 2
118. 112.4 900. 0. 0. 0. 1
118. 112.4 900. 0. 0. 0. 2
118. 112.4 775. 0. 0. 0. 1
118. 112.4 775. 0. 0. 0. 2
130. 130. 0. 40. 0. 0. 1
130. 130. 0. 40. 0. 0. 2
110. 112.4 875. 0. 0. 0. 1
110. 112.4 875. 0. 0. 0. 2
WATER
2 62.4
2
0. 102.5
101.25 102.5
2   W2
101.25 104.
400. 104.
CIRCL2
100 100
18. 26. 302. 309.
0. 5. 0. 0.
```

MSR 7/25/13
PMJ 7/25/13

Location N
Input
(Stedwin)

PROFIL P:\Beazer\SEABOARD\RAWPA Flood Plain Elevation Adjustment\Slope Stability\Slope Stability So

```
31 11
0. 96.3 50. 96.3 1
50. 96.3 60. 96.3 1
60. 96.3 75. 97.9 1
75. 97.9 85. 98.8 1
85. 98.8 95. 99.2 1
95. 99.2 100. 106. 1
100. 106. 100.1 110. 2
100.1 110. 102.6 110. 2
102.6 110. 242.6 111.4 3
242.6 111.4 325. 132. 3
325. 132. 450. 133.9 3
102.6 110. 102.7 106.7 2
102.7 106.7 450. 106.7 4
0. 93. 75. 93. 7
75. 93. 99.9 93. 7
99.9 93. 100. 102.5 2
102.7 106.7 102.8 93. 2
102.8 93. 177.8 96.7 8
177.8 96.7 450. 96.7 8
0. 84. 99.8 84. 7
99.8 84. 99.9 93. 2
102.8 93. 102.9 84. 2
102.9 84. 450. 84. 8
```

MSR 7/25/13
PAS 7/25/13

```
0. 83.9 101.25 83.9 12
101.25 83.9 450. 83.9 13
0. 73. 101.25 73. 10
101.25 73. 450. 73. 11
0. 60. 101.25 60. 5
101.25 60. 450. 60. 9
0. 50. 101.25 50. 14
101.25 50. 450. 50. 15
SOIL  Gravel  SSP     PDM     Fill_I  Sand_O  Fill_O  Org_O   Org_I   Sand_I  DeepO-1 DeepO-2 MidO-1
15
100. 100. 0. 40. 0. 0. 1
200. 200. 999999.9 99. 0. 0. 2
100. 107.4 1500. 0. 0. 0. 2
105. 107.4 0. 30. 0. 0. 2
110. 112.4 0. 30. 0. 0. 1
105. 107.4 0. 30. 0. 0. 1
90. 102.4 145. 0. 0. 0. 1
90. 102.4 390. 0. 0. 0. 2
110. 112.4 0. 30. 0. 0. 2
118. 112.4 300. 0. 0. 0. 1
118. 112.4 600. 0. 0. 0. 2
110. 112.4 245. 0. 0. 0. 1
110. 112.4 530. 0. 0. 0. 2
130. 130. 0. 40. 0. 0. 1
130. 130. 0. 40. 0. 0. 2
WATER
2 62.4
2
0. 102.5
101.25 102.5
2   W2
101.25 104.
450. 104.
CIRCL2
50 50
48. 59. 129. 135.
0. 5. 0. 0.
```

Attachment B - see end of attachment for Notes pertaining to data presented below for Locations A, C, D, E and N.

PAS 7/25/13

LOCATION A

Outboard Organic Layer	Refer to Plate 1, Ref. 1, Outboard Organic Profile (without overlying fill)		
Top of Layer Elev:	-3	c =	50
Bottom of Layer Elev:	-10.5	c =	125
		c =	**87.5**
Inboard Organic Layer	As per Ref. 1, Table of Soil Parameters, Organic Clay (west and central areas)		
		c =	**360**
Outboard Varved Clay Layer 1	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-8	c =	900
Bottom of Layer Elev:	-17	c =	900
		c =	**900**
Inboard Varved Clay Layer 1	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-13	c =	900
Bottom of Layer Elev:	-17	c =	900
		c =	**900**
Outboard Varved Clay Layer 2	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-17	c =	900
Bottom of Layer Elev:	-27	c =	650
		c =	**775**
Inboard Varved Clay Layer 2	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-17	c =	900
Bottom of Layer Elev:	-27	c =	650
		c =	**775**
Outboard Varved Clay Layer 3	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-27	c =	650
Bottom of Layer Elev:	-75	c =	1400
		c =	**1025**
Inboard Varved Clay Layer 3	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-27	c =	650
Bottom of Layer Elev:	-75	c =	1400
		c =	**1025**

MSR 7/25/13
PMS 7/25/13

LOCATION C

Outboard Organic Layer Refer to Plate 1, Ref. 1, Outboard Organic Profile (without overlying fill)

Top of Layer Elev:	-5	c =	75
Bottom of Layer Elev:	-35	c =	330
		c =	**202.5**

Inboard Organic Layer As per Ref. 1, Table of Soil Parameters, Organic Clay (west and central areas)

		c =	**360**

Outboard Varved Clay Layer 1 N/A - this layer not present in Location C

Inboard Varved Clay Layer 1 Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction

Top of Layer Elev:	-12	c =	900
Bottom of Layer Elev:	-18	c =	900
		c =	**900**

Outboard Varved Clay Layer 2 Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction

Top of Layer Elev:	-17	c =	900
Bottom of Layer Elev:	-27	c =	650
		c =	**775**

Inboard Varved Clay Layer 2 Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction

Top of Layer Elev:	-17	c =	900
Bottom of Layer Elev:	-27	c =	650
		c =	**775**

Outboard Varved Clay Layer 3 Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction

Top of Layer Elev:	-27	c =	650
Bottom of Layer Elev:	-75	c =	1400
		c =	**1025**

Inboard Varved Clay Layer 3 Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction

Top of Layer Elev:	-27	c =	650
Bottom of Layer Elev:	-75	c =	1400
		c =	**1025**

MJK 7/2011
PAS 7/25/13

LOCATION D

Outboard Organic Layer Refer to Plate 1, Ref. 1, Outboard Organic Profile (without overlying fill)

Top of Layer Elev:	-1	c =	50
Bottom of Layer Elev:	-8	c =	110
		c =	**80**

Inboard Organic Layer As per Ref. 1, Table of Soil Parameters, Organic Clay (west and central areas)

		c =	**360**

Outboard Varved Clay Layer 1 Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction

Top of Layer Elev:	-11	c =	900
Bottom of Layer Elev:	-17	c =	900
		c =	**900**

Inboard Varved Clay Layer 1 Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction

Top of Layer Elev:	-9	c =	900
Bottom of Layer Elev:	-17	c =	900
		c =	**900**

Outboard Varved Clay Layer 2 Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction

Top of Layer Elev:	-17	c =	900
Bottom of Layer Elev:	-27	c =	650
		c =	**775**

Inboard Varved Clay Layer 2 Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction

Top of Layer Elev:	-17	c =	900
Bottom of Layer Elev:	-27	c =	650
		c =	**775**

Outboard Varved Clay Layer 3 Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction

Top of Layer Elev:	-27	c =	650
Bottom of Layer Elev:	-45	c =	875
		c =	**762.5**

Inboard Varved Clay Layer 3 Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction

Top of Layer Elev:	-27	c =	650
Bottom of Layer Elev:	-45	c =	875
		c =	**762.5**

MSR 7/25/13
PAS 7/25/13

LOCATION E

Outboard Organic Layer	Refer to Plate 1, Ref. 1, Outboard Organic Profile (without overlying fill)		
Top of Layer Elev:	-5	c =	75
Bottom of Layer Elev:	-6.5	c =	90
		c =	**82.5**

Inboard Organic Layer	As per Ref. 1, Table of Soil Parameters, Organic Clay (west and central areas)		
		c =	**360**

Outboard Varved Clay Layer 1	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-11	c =	900
Bottom of Layer Elev:	-17	c =	900
		c =	**900**

Inboard Varved Clay Layer 1	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-9	c =	900
Bottom of Layer Elev:	-17	c =	900
		c =	**900**

Outboard Varved Clay Layer 2	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-17	c =	900
Bottom of Layer Elev:	-27	c =	650
		c =	**775**

Inboard Varved Clay Layer 2	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-17	c =	900
Bottom of Layer Elev:	-27	c =	650
		c =	**775**

Outboard Varved Clay Layer 3	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-27	c =	650
Bottom of Layer Elev:	-55	c =	1100
		c =	**875**

Inboard Varved Clay Layer 3	Refer to Plate 2, Ref. 1, Design Strength profile for varved deposits with strain compaction reduction		
Top of Layer Elev:	-27	c =	650
Bottom of Layer Elev:	-55	c =	1100
		c =	**875**

MSR 7/25/13
PRS 7/25/13

LOCATION N

Outboard Organic Layer 1	Refer to Plate 1, Ref. 1, Outboard Organic Profile (without overlying fill)		
Top of Layer Elev:	-7	c =	100
Bottom of Layer Elev:	-16	c =	190
		c =	**145**

Inboard Organic Layer 1	Refer to Plate 1, Ref. 1, Design Strength Profile for Organic Deposits (Eastern Area)		
Top of Layer Elev:	-4	c =	320
Bottom of Layer Elev:	-16	c =	460
		c =	**390**

Outboard Organic Layer 2	Refer to Plate 1, Ref. 1, Outboard Organic Profile (without overlying fill)		
Top of Layer Elev:	-16	c =	190
Bottom of Layer Elev:	-27	c =	300
		c =	**245**

Inboard Organic Layer 2	Refer to Plate 1, Ref. 1, Design Strength Profile for Organic Deposits (Eastern Area)		
Top of Layer Elev:	-16	c =	460
Bottom of Layer Elev:	-27	c =	600
		c =	**530**

Outboard Organic Layer 3	Refer to Plate 1, Ref. 1, Outboard Organic Profile (without overlying fill)		
Top of Layer Elev:	-27	c =	300
Bottom of Layer Elev:	-40	c =	300
		c =	**300**

Inboard Organic Layer 3	Refer to Plate 1, Ref. 1, Design Strength Profile for Organic Deposits (Eastern Area)		
Top of Layer Elev:	-27	c =	600
Bottom of Layer Elev:	-40	c =	600
		c =	**600**

2510

MGR 7/25/13
PAS 7/25/13

Attachment B Notes:

1.) Elevations shown are relative to NGVD 1929.

2.) 'c' = undrained shear strength;

3.) 'c' is given in kips/ft^2 in Ref. 1, Plates 1 and 2; values of 'c' provided for each location in Attachment B have been converted to lbs/ft^2, which is how they were input into STEDwin; and,

4.) Values of 'c' shown in bold text and highlighted are averages of the preceding values shown for 'c' found in Ref. 1, Plates 1 and 2.

26/82

MSR 7/25/13
PIA's 7/25/13

Reference 1

MUESER RUTLEDGE CONSULTING ENGINEERS
STABILITY ANALYSIS
FINAL FILL
SEABOARD SITE
KEARNY, NJ

Tony Fennimore
N.J. P.E. No. 37007
4/16/98

MSR 7/25/13
PMS 7/25/13

Geotechnical Analysis of the Global Stability of the Site Upon Completion of Filling

Introduction

MRCE performed analyses to determine required setbacks of the Final Fill Processed Dredged Material (PDM) from the steel sheet pile wall. Six design profiles were selected for analyses. These sections shown in plan on Figure SS-1, cover the variation in subsurface conditions observed in the borings.

The westerly portion of the site consists of fill, a relatively thin organic deposit, a thin sand layer, and a varved layer of silt, clay, and fine sand, to a depth of approximately 70 feet below existing grade. The central area of the site comprises a profile of fill, a thin organic layer, a sand layer, and varved materials to a depth of about 90 feet below grade. This central portion of the site is currently being utilized as an Interim Fill Storage area and began receiving PDM in December 1997. The northeast corner profile consists of fill over a deep layer of organic deposits where the varved deposits have been eroded away by the meandering of the Hackensack River. From west to east around the corner of the site, the river bottom drops from about Elev. -5 to Elev. -28.

Soil strengths for analyses were selected based on results of the Phase I laboratory testing program with consideration for anistropic effects, strain compatibility, and strength gain due to consolidation during PDM placement. Original design strength profiles were as shown on the attached Soil Properties Profiles. Subsequent to the 35% design slope stability studies submitted in the October 1997 RAWP, and the April 1998 RAWP, several changes have been made to the soil strengths. Anistropic strengths of the varved material and strain compatibility between the PDM and underlying soils suggested the need to lower the soil strengths used in the analyses. A staged analysis has been performed to evaluate strength gain due to consolidation of compressible soils under the applied load during PDM placement and in the long term, final condition.

Stability Studies

Analyses were performed to evaluate the effects of PDM placement to a maximum at Elev. +10 for the setback area between the sheet pile wall and the toe of slope. Final filling is designed as a 2:1 slope (horizontal to vertical) to a shoulder at Elev. +37, continuing on a 2% slope for drainage to a crest at Elev. of +45, where space permits. A minimum setback of 40 feet was originally selected to minimize loading on the steel sheet pile wall.

Stability analyses were performed using the program SLOPE/W, Version 3.05, with the Bishop method of analysis and circular failure surfaces. MRCE also considered wedge type failure surfaces and concluded that the Bishop method with circular failure surfaces permits consideration of a wider range of potential failure surfaces without effecting the minimum factor of safety.

An anistropic reduction in strength is accounted for in the analyses by applying a multiplicative

factor to the input strength profile. This factor is identified on the stability printouts as "Ch/Cv = 0.6" which sets the horizontal cohesion equal to 60% of the vertical cohesion. A vector component of this reduction is applied to the bottom of each slice in the Bishop analysis.

A reduction in strength was also applied to portions of the varved clay to account for strain compatibility with the PDM. Unconfined compressive strength tests on PDM indicate that failure typically occurs at strains between 1% and 3%. Tests on the varved clay indicate failures typically occured at strains between 2% and 6%. However, many tests in the upper dessicated varved layer failed at higher strains. Accordingly, a reduction in strength of the dessicated varved layer was applied by using observed strengths at 2% strain. This resulted in a strength reduction of approximately 50% in the upper dessicated varved stratum.

Staged analyses were performed in which strength gain due to consolidation of the organic and varved deposits was evaluated. Generally, three conditions were evaluated.

Case 1 — PDM placed to a shoulder at Elev. +23 over existing materials using existing strengths.

Case 2 — Final fill profiles with the shoulder at Elev. at +37 were evaluated with strength gain of the underlying soils from the PDM placed in Case 1. No gain in strength was accounted for PDM placed above Elev. +23. Time-rate of consolidation theory was utilized to estimate the strength gain during construction. This resulted in a gain of strength of 162 pcf for the normally consolidated portion of the varved clay layer and organic soils. Construction to a shoulder at Elev. +37 is assumed to take approximately 6 to 9 months. Note that consolidation under the Interim Fill stockpile began in December 1997.

Case 3 — Final Fill profiles with full strength gain due to primary consolidation of organic and varved deposits due to placement of PDM.

The attached tables identify the soil properties used in the analyses and the computed Factors of Safety for the six different profiles analyzed. Figure No. SS-1 identifies the locations of the profiles. Phase I borings were utilized to form the profiles and are identified on the individual printouts where applicable.

After evaluating the three cases it became apparent that Case 2 was the most critical condition. This represents a relatively short term condition (less than a year) during which pore pressures will dissipate with time and computed Factors of Safety will increase. For the short term condition, setbacks were increased until a Factor of Safety of 1.3 was obtained. A minimum Factor of Safety of 1.5 was sought for the long term condition in Case 3. Case 2 governed in each case.

29182

MSA 7/25/13
PAS 7/25/13

Set backs from the steel sheet pile wall range from 40 feet to a maximum of 140 feet in the northeast corner. Setbacks are referenced herein to the April 1998 sheet pile wall alignment. The required setback gradually decreases from 140 feet at the dock and around the northeast corner, to 40 feet at the west end.

MSR 7/25/13
PAS 7/25/13

Table of Soil Parameters used in Stability Analysis

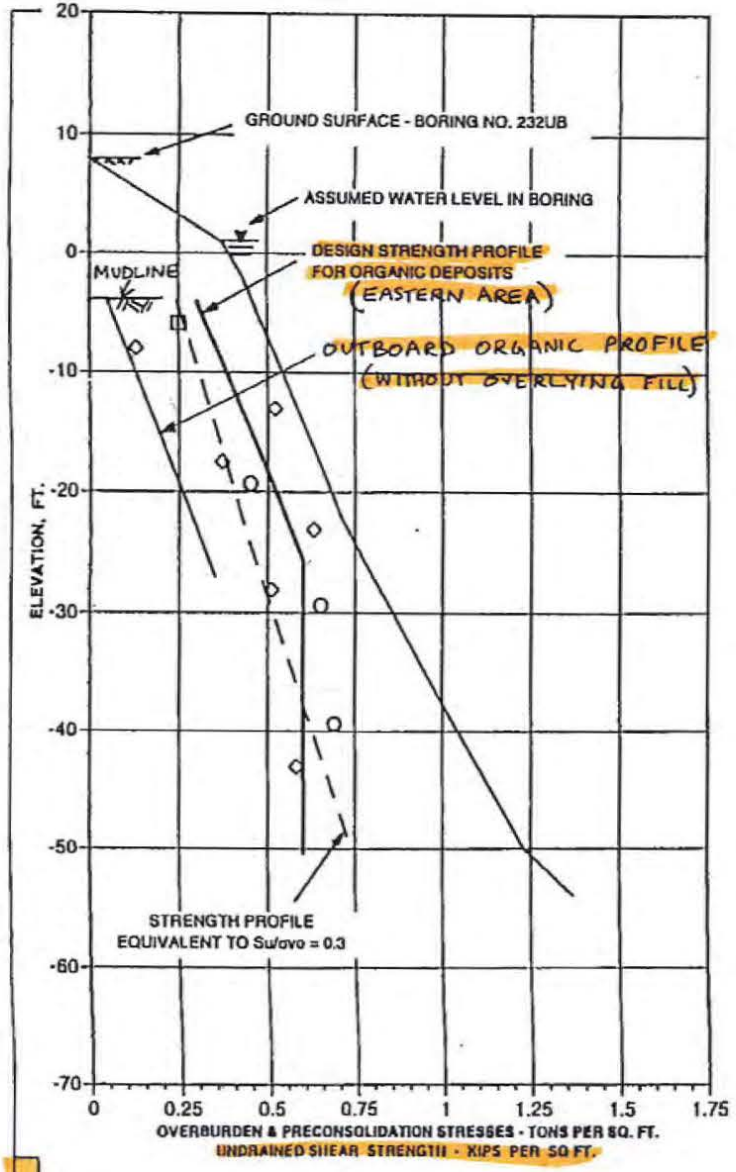
Strata	Unit Weight (pcf)	Friction Angle (degrees)	Cohesion (psf)
PDM	100	0	1500
Existing Site Fill	105	30	0
Organic Clay (west and central)	90	0	360
Organic Clay (eastern area)	90	0	see soil properties profile
Outboard Organic Clay (without overlying fill)	90	0	see soil properties profile
Sand	110	30	0
Dessicated Varved Clay (above El. -20)	118	0	see soil properties profile
Varved Clay (-20 > El. > -27)	118	0	see soil properties profile
Varved Clay (below El. -27)	110	0	see soil properties profile
Till	130	40	0

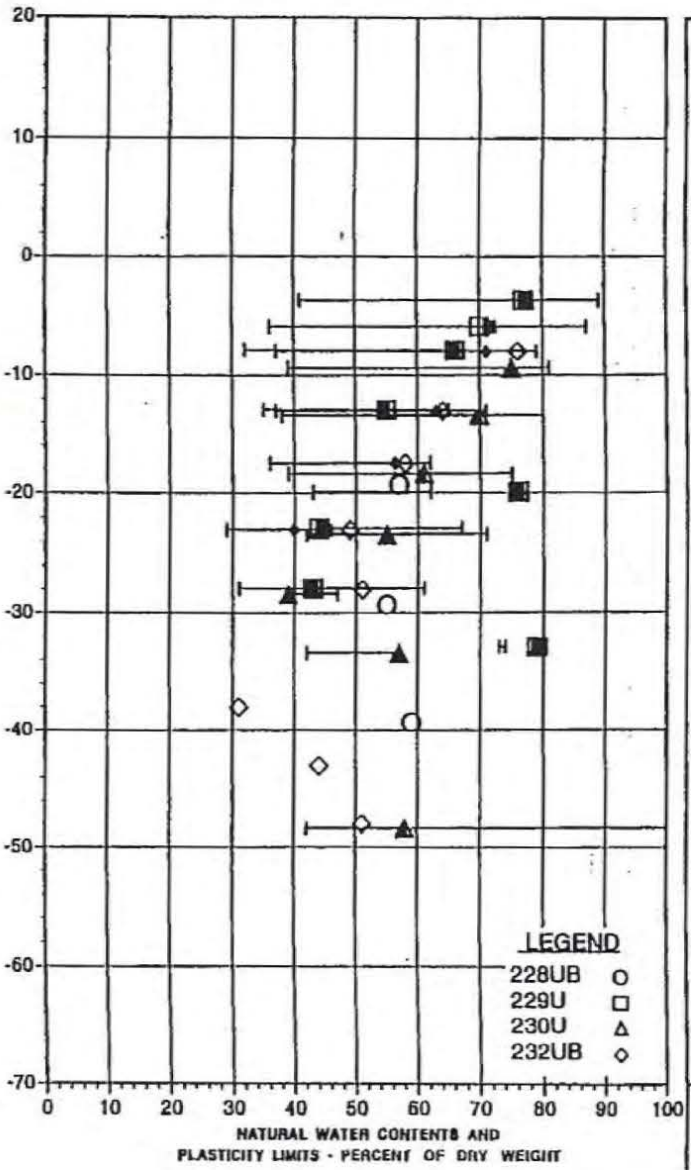
Summary of Mass Stability Analyses Factors of Safety

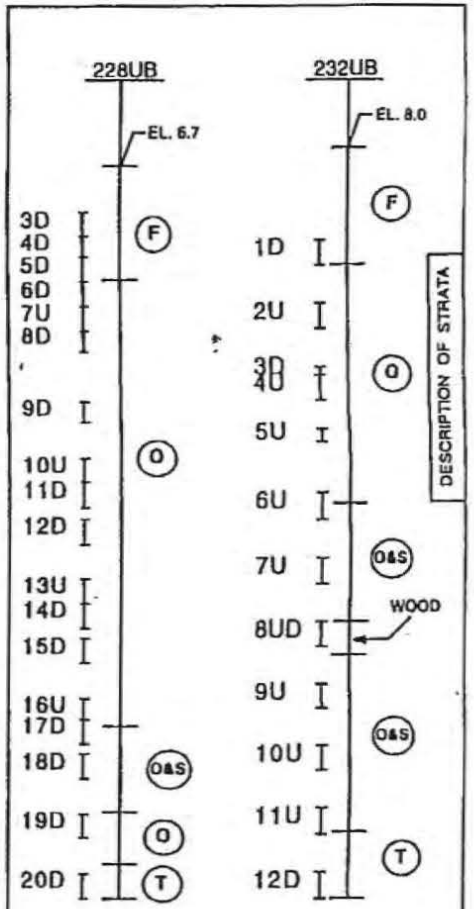
Profile	Factor of Safety	Setback (ft)	Conditions	File Name
A	1.7	55	Case 1, no strength gain under 13 ft of PDM	AHALF
	1.3	55	Case 2, partial strength gain under Final Fill	AFIN50
	1.8	55	Case 3, Long term condition	AEND
B	1.3	140	Case 2, partial strength gain under Final Fill	BFINAL
C	1.3	110	Case 2, partial strength gain under Final Fill	CFINAL
D	1.3	55	Case 2, partial strength gain under Final Fill	DFIN55
E	1.3	40	Case 2, partial strength gain under Final Fill	EFINAL
F	1.3	140	no strength gain under full height of PDM	sdk_wdg

Factors of Safety were computed by Bishop's Method through use of the computer program Slope/W, version 3.05, by Geo-Slope.

"Setback" is the distance from toe of PDM slope to the steel sheet pile wall or dock face where there is no sheet pile wall. Case 2 generally governed the required setback. For that reason, Case 1 and 3 are only shown for comparison purposes for Profile A.



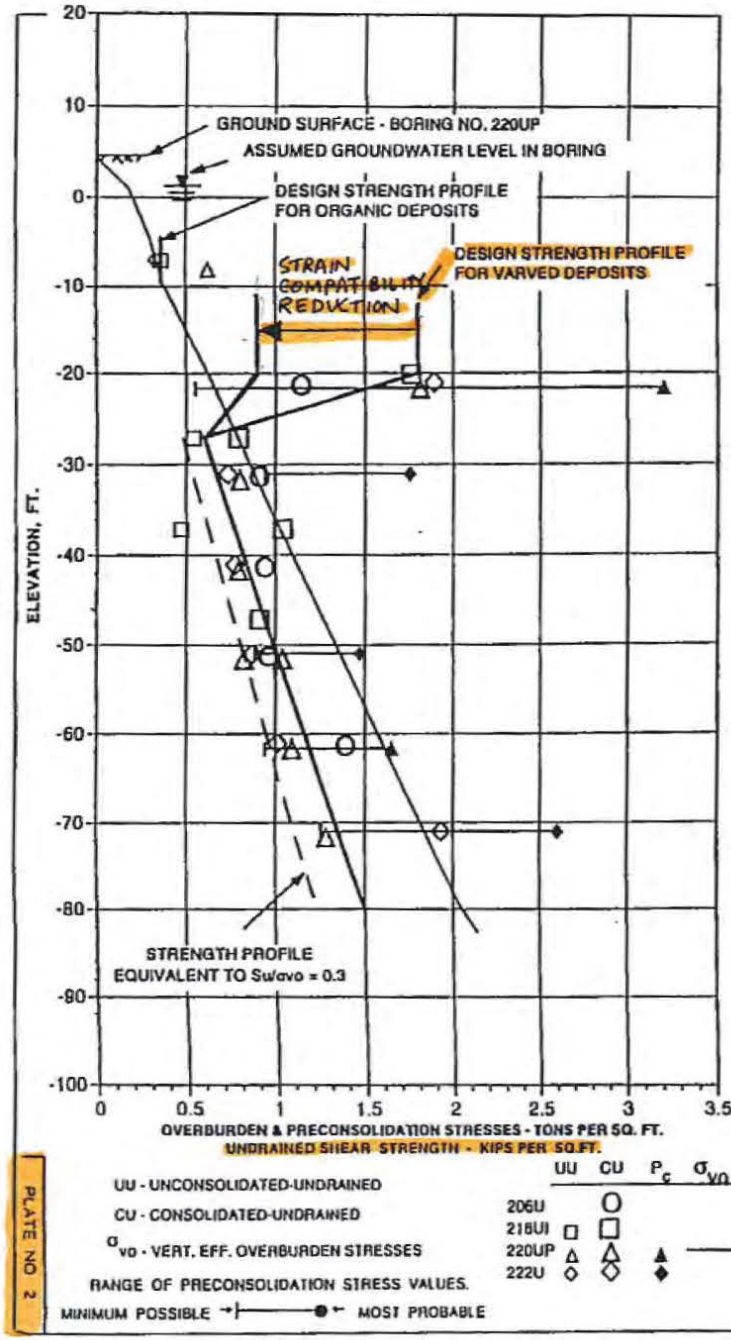


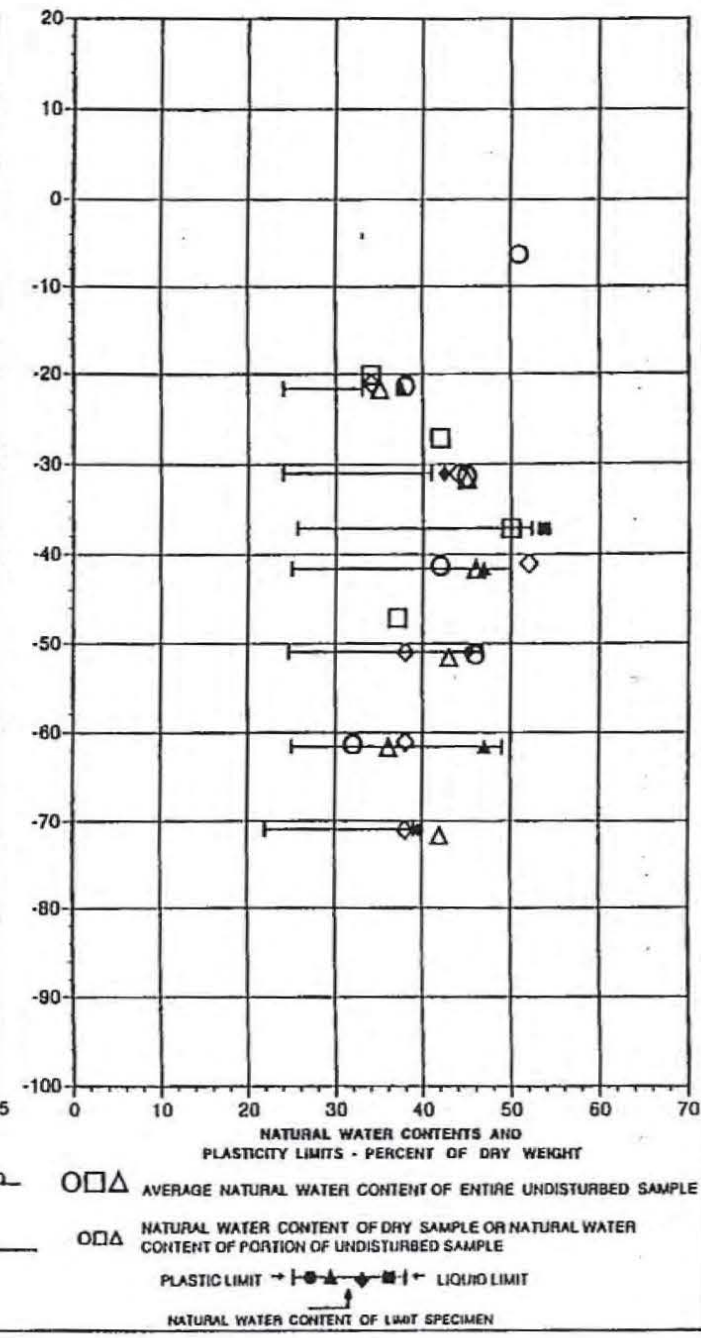


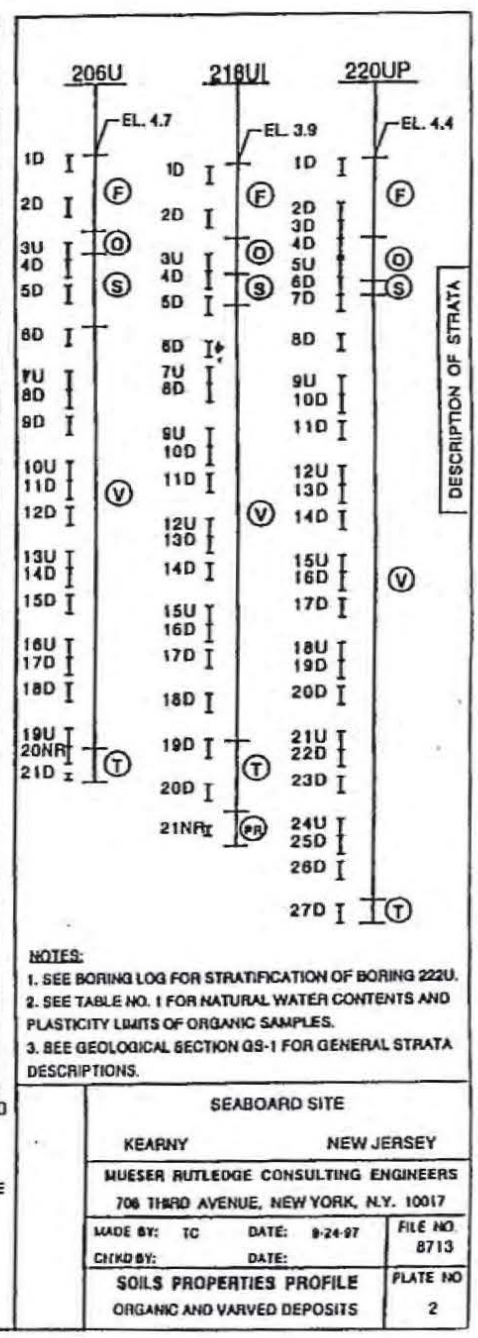
NOTES:
1. SEE BORING LOGS FOR STRATIFICATIONS OF BORINGS 229U AND 230U.
2. SEE GEOLOGIC SECTION GS-1 FOR GENERAL STRATA DESCRIPTIONS.

SEABOARD SITE
KEARNY NEW JERSEY
MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y. 10017
MADE BY: TC DATE: 8/25/97 FILE NO. 8713
CHKD BY: DATE:
SOILS PROPERTIES PROFILE ORGANIC DEPOSITS PLATE NO. 1

PLATE NO. 1







NOTES:
1. SEE BORING LOG FOR STRATIFICATION OF BORING 222U.
2. SEE TABLE NO. 1 FOR NATURAL WATER CONTENTS AND PLASTICITY LIMITS OF ORGANIC SAMPLES.
3. SEE GEOLOGICAL SECTION GS-1 FOR GENERAL STRATA DESCRIPTIONS.

SEABOARD SITE

KEARNY NEW JERSEY

MUESER RUTLEDGE CONSULTING ENGINEERS
706 THIRD AVENUE, NEW YORK, N.Y. 10017

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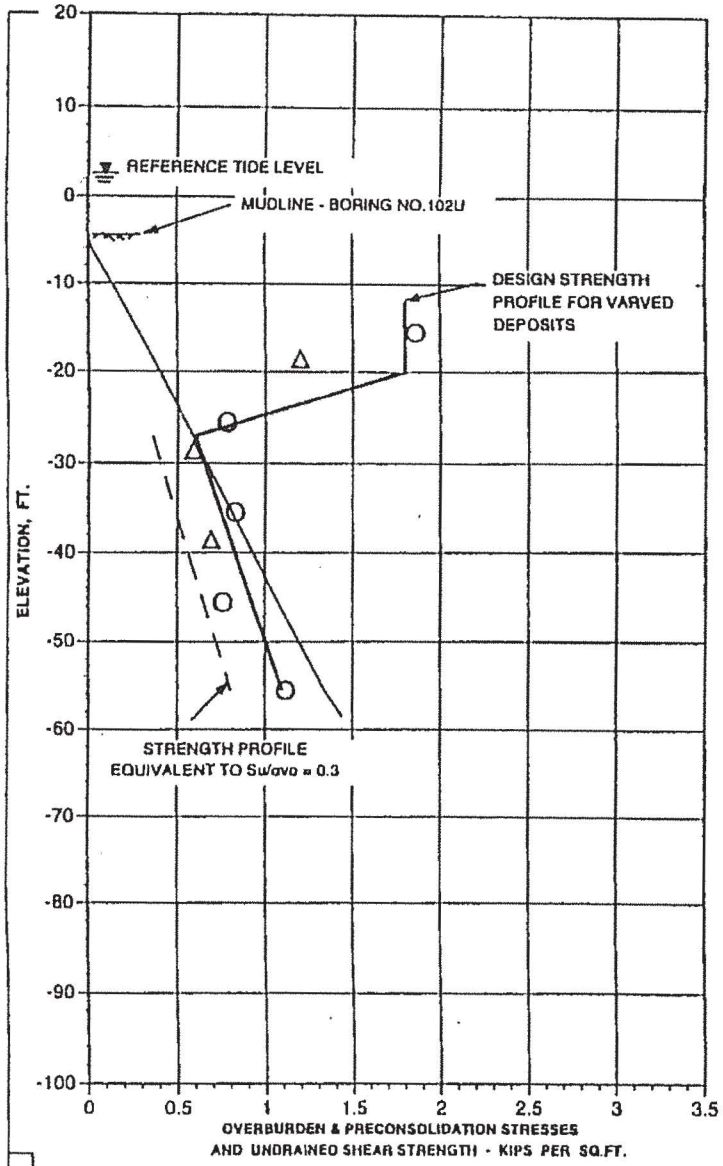
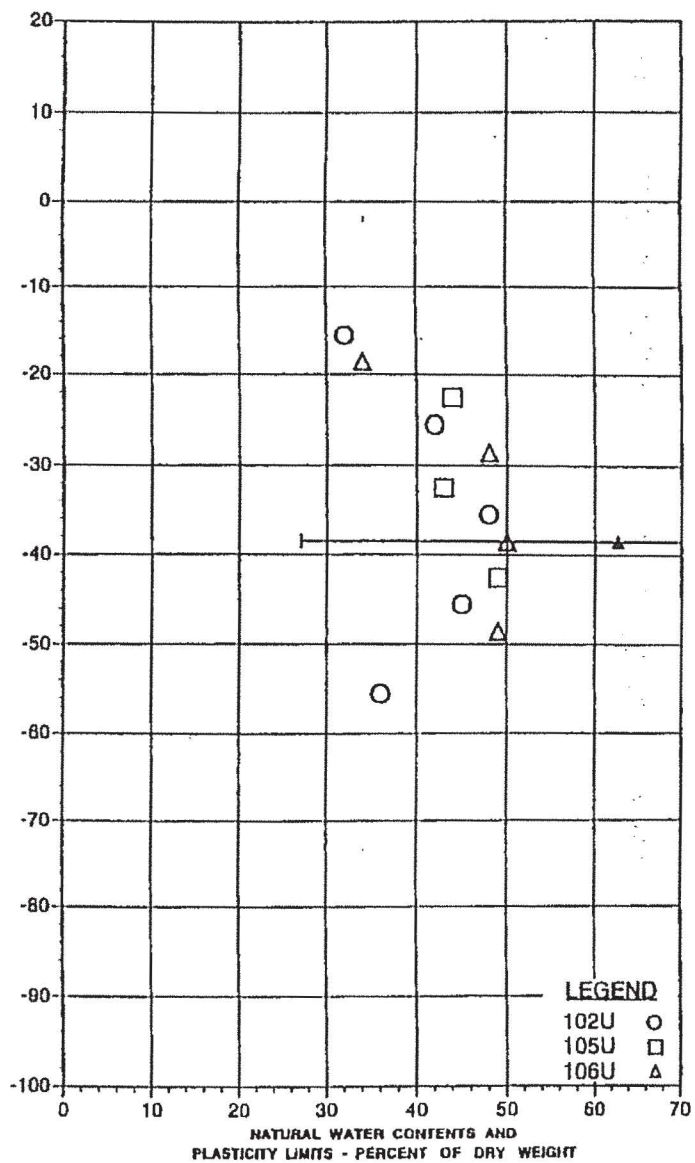
CHKD BY:	DATE:	

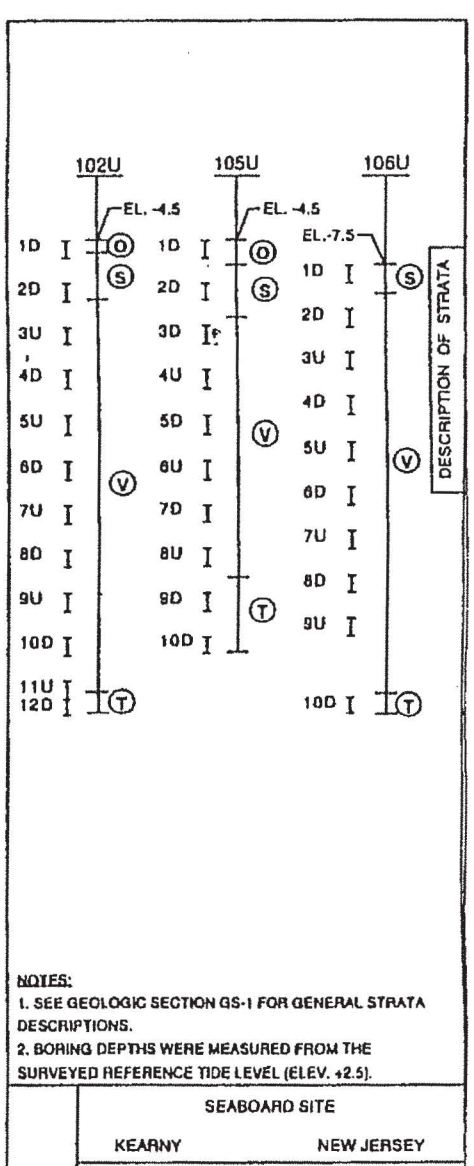
SOILS PROPERTIES PROFILE
ORGANIC AND VARVED DEPOSITS

PLATE NO 2

PLATE NO. 2







CU - CONSOLIDATED-UNDRAINED

σ_{vo} - VERT. EFF. OVERBURDEN STRESSES

	CU	σ_{vo}
102U	O	——
106U	△	— · —

O□△ AVERAGE NATURAL WATER CONTENT OF ENTIRE UNDISTURBED SAMPLE

O□△ NATURAL WATER CONTENT OF DRY SAMPLE OR NATURAL WATER CONTENT OF PORTION OF UNDISTURBED SAMPLE

PLASTIC LIMIT ← |—▲—●—■—| → LIQUID LIMIT

NATURAL WATER CONTENT OF LIMIT SPECIMEN

NOTES:
1. SEE GEOLOGIC SECTION GS-1 FOR GENERAL STRATA DESCRIPTIONS.
2. BORING DEPTHS WERE MEASURED FROM THE SURVEYED REFERENCE TIDE LEVEL (ELEV. +2.5).

SEABOARD SITE

KEARNY NEW JERSEY

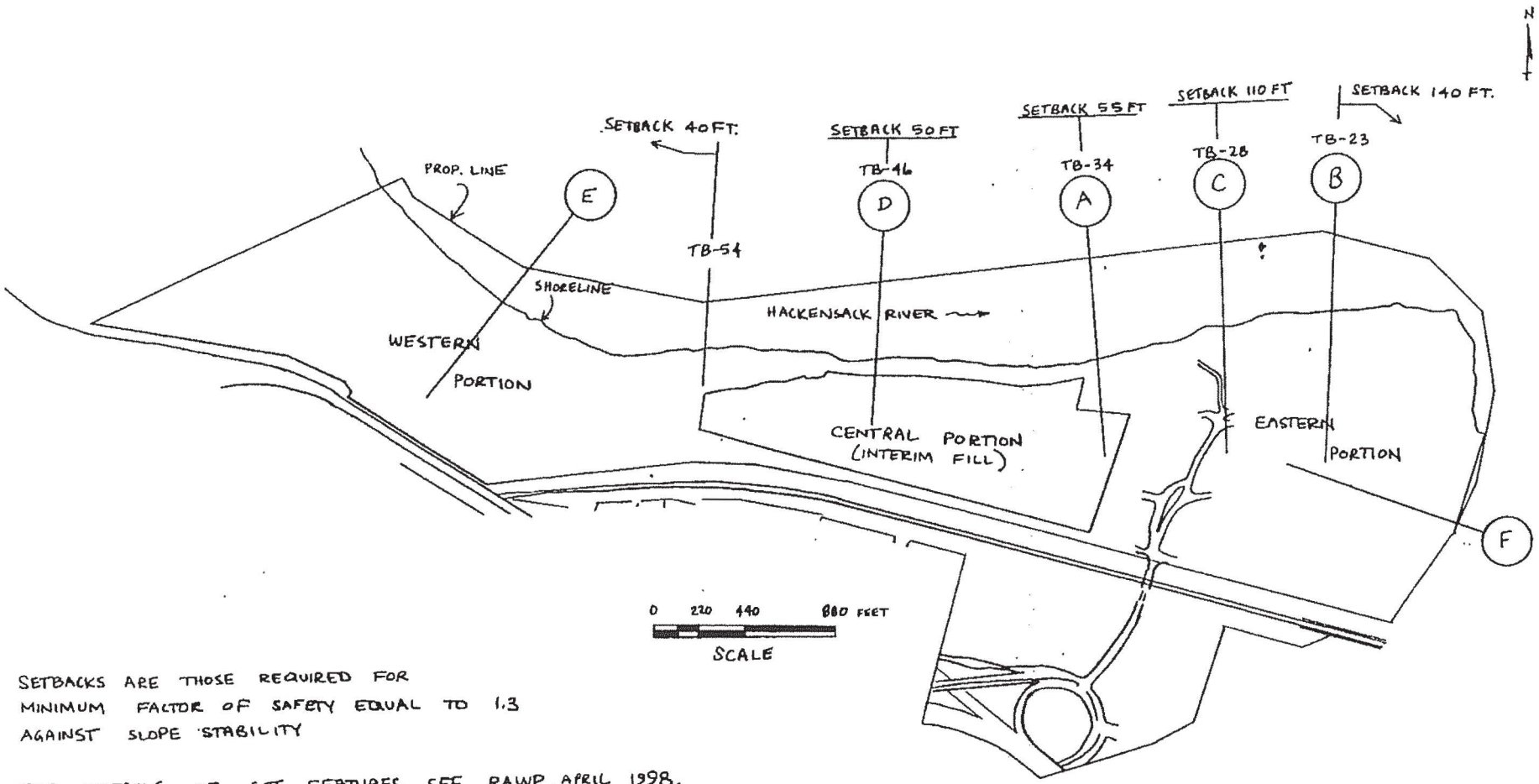
MUESER RUTLEDGE CONSULTING ENGINEERS
708 THIRD AVENUE, NEW YORK, N.Y. 10017

MADE BY: TC	DATE: 9-27-87	FILE NO. 8713
CHKD BY:	DATE:	

SOILS PROPERTIES PROFILE
VARVED DEPOSITS:
WATER BORINGS

PLATE NO. 3

PLATE NO. 1



SETBACKS ARE THOSE REQUIRED FOR MINIMUM FACTOR OF SAFETY EQUAL TO 1.3 AGAINST SLOPE STABILITY

FOR DETAILS OF SITE FEATURES SEE RAWP, APRIL 1998.

SEABOARD SITE

KEARNY NJ

ECDC

PORT NEWARK NJ

MUESER RUTLEDGE CONSULTING ENGINEERS

708 THIRD AVENUE, NEW YORK, N.Y. 10017

SCALE: AS SHOWN | DRAWN BY: JLV | DATE: 4/14/98 | CHKD BY: | DATE: | TASK NO.

SLOPE STABILITY PLAN
PROFILES A - F

DRAWING NO. Fig-SS-

PAS 7/25/13

MUE 7/25/13

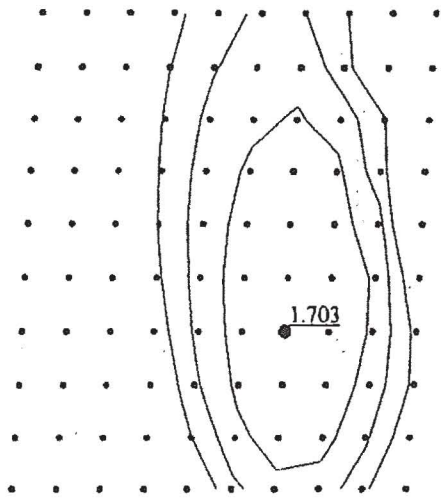
SEABOARD SITE
FILENAME: AHALF

FINAL FILL SECTION AT BORINGS 220UP, 219, & 107

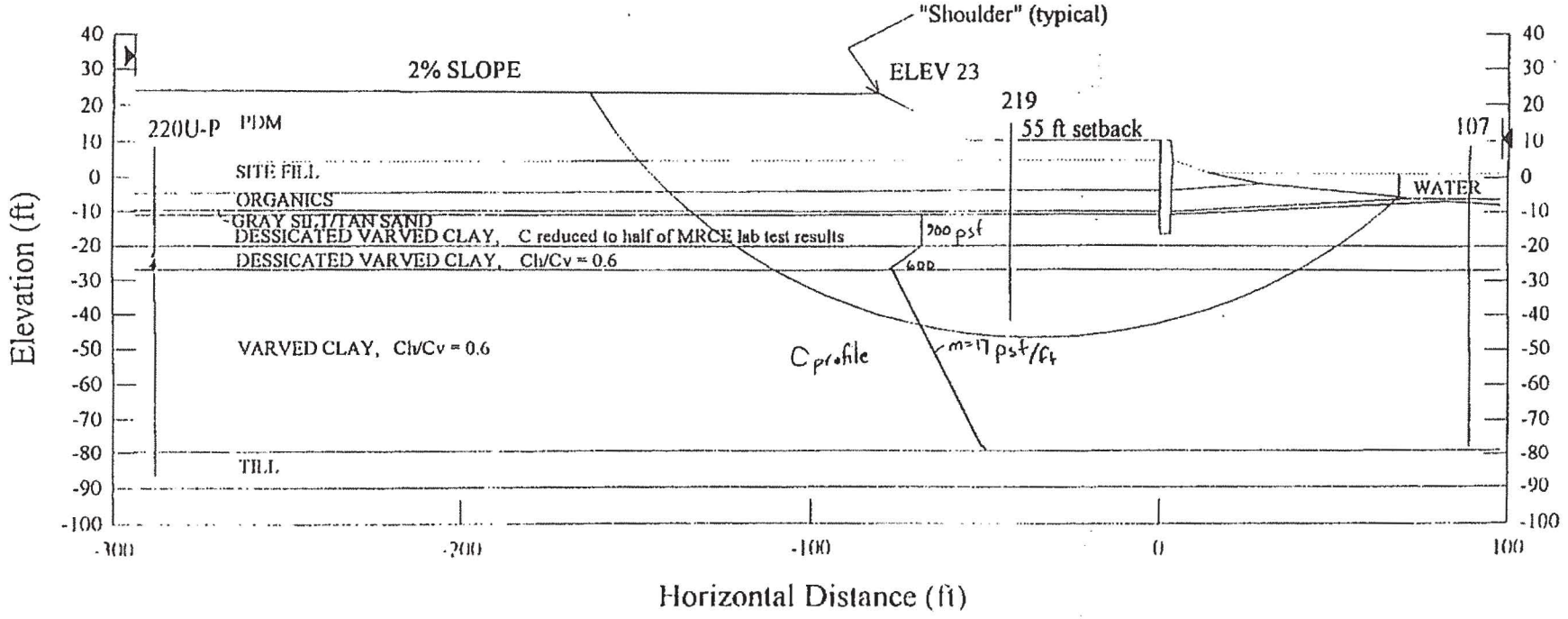
MRCE Lab strengths used for Organic, Dessicated and Varved Clay deposits
Subsurface profile from MRCE Soil Borings

PDM: C = 1,500 psf, Unit weight = 100 pcf

Made by: JLV
Date: 4/15/98
Checked by:



PDM Final Fill in mid-construction, no strength gain due to consolidation



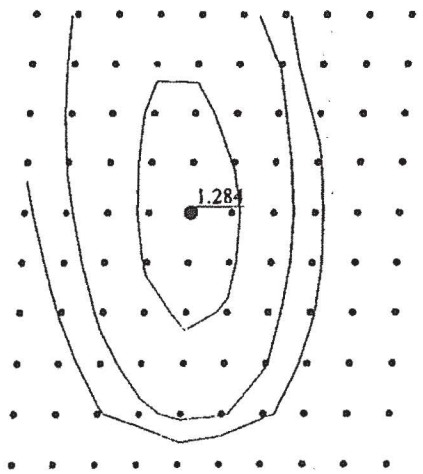
FINAL FILL SECTION AT BORINGS 220UP, 219, & 107

SEABOARD SITE
FILENAME: AFIN50

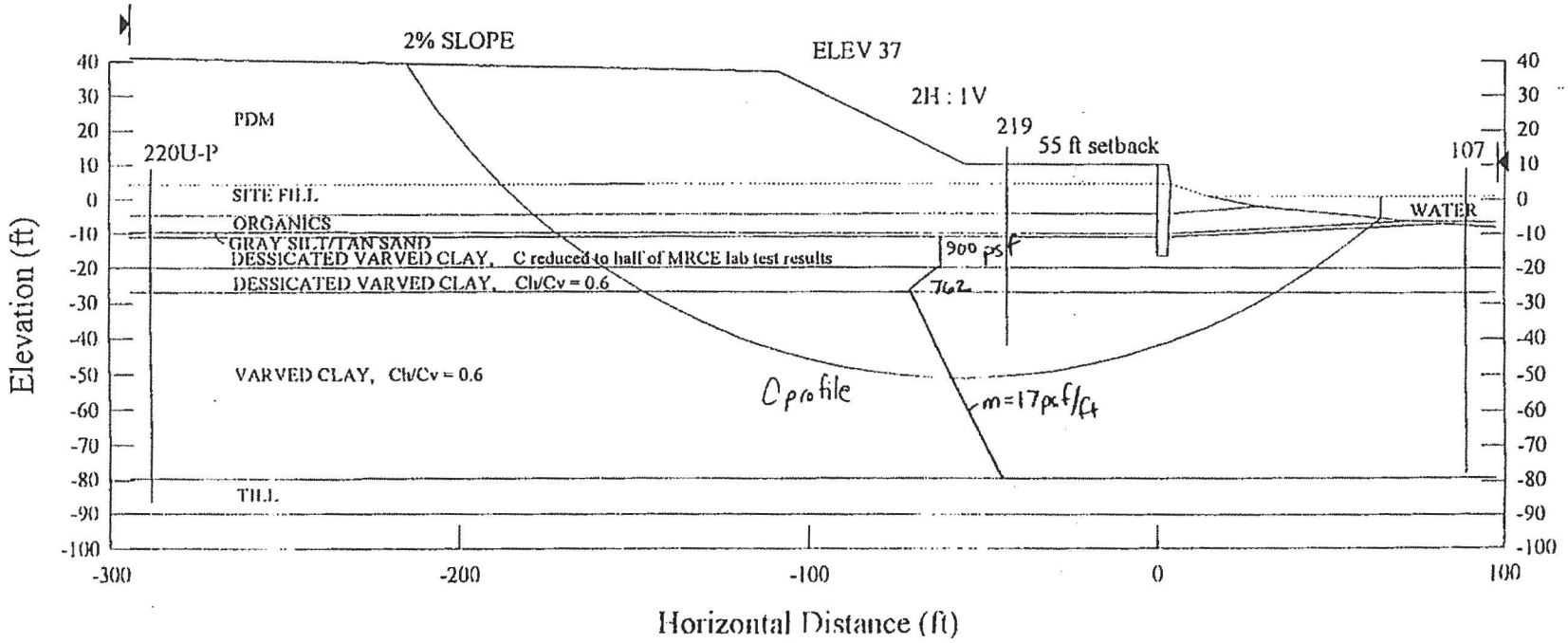
MRCE Lab strengths used for Organic, Dessicated and Varved Clay deposits
Subsurface profile from MRCE Soil Borings

PDM: C = 1,500 psf, unit weight 100 pcf

Made by: JLV
Date: 3/30/98
Checked by:



PDM Final Fill, with strength gain due to consolidation under 13 feet of PDM



MSB 7/25/13
PAJ 7/25/13

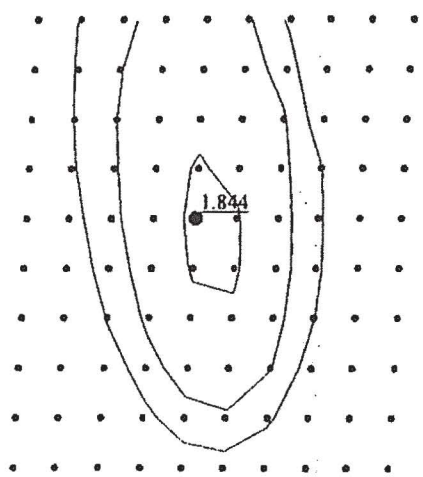
FINAL FILL SECTION AT BORINGS 220UP, 219, & 107

SEABOARD SITE
FILENAME: AEND

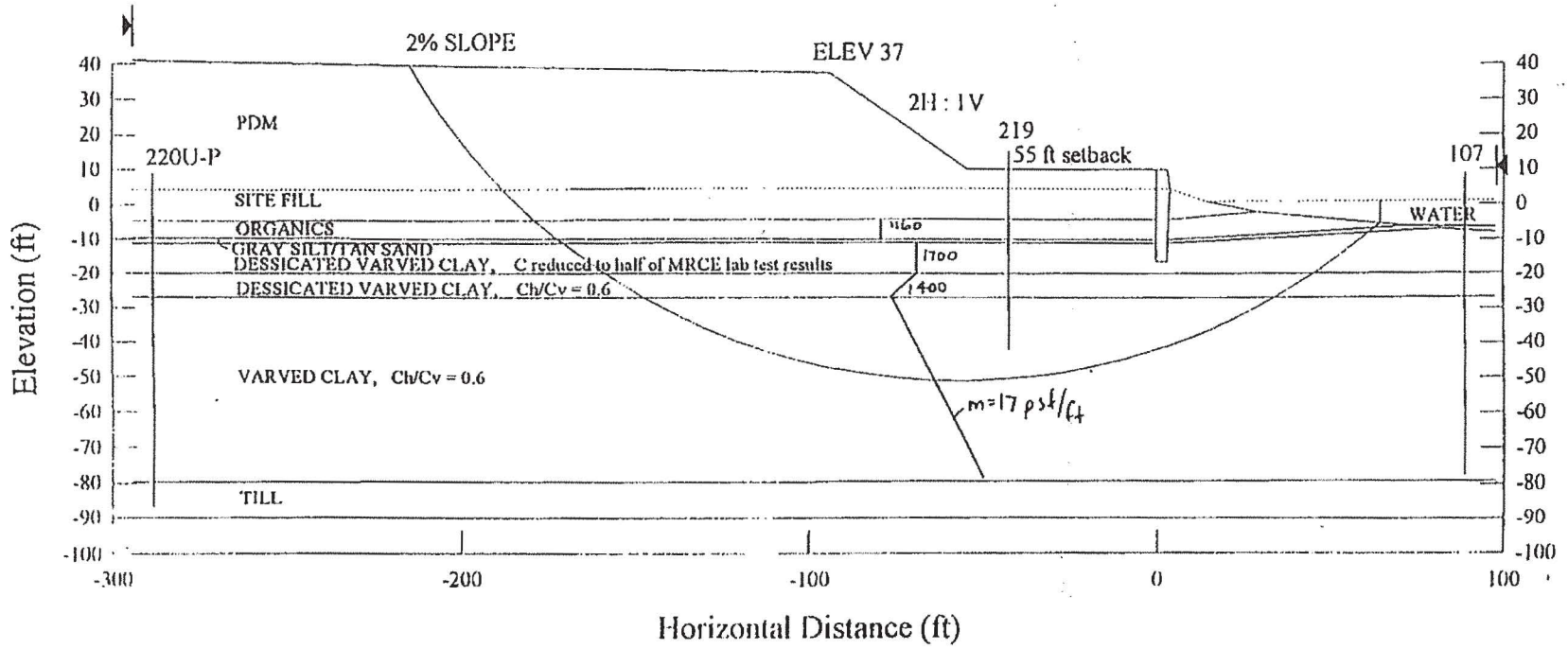
MRCE Lab strengths used for Organic, Dessicated and Varved Clay deposits
Subsurface profile from MRCE Soil Borings

PDM: C = 1,500 psf, Unit weight = 100 pcf

Made by: JLV.
Date: 4/15/98
Checked by:



PDM Final Fill, with complete strength gain at end of primary consolidation



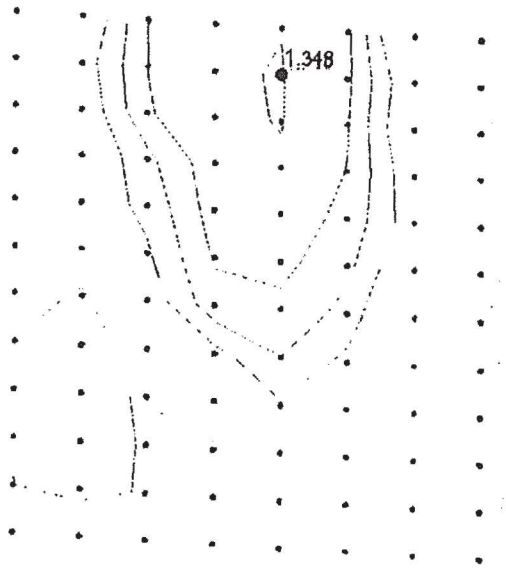
SEABOARD SITE
FILENAME: B.SLP

MRCE Lab strengths used for Organic, Dessicated Crust, and Varved Clay Deposits
Subsurface profile from MRCE Soil Borings

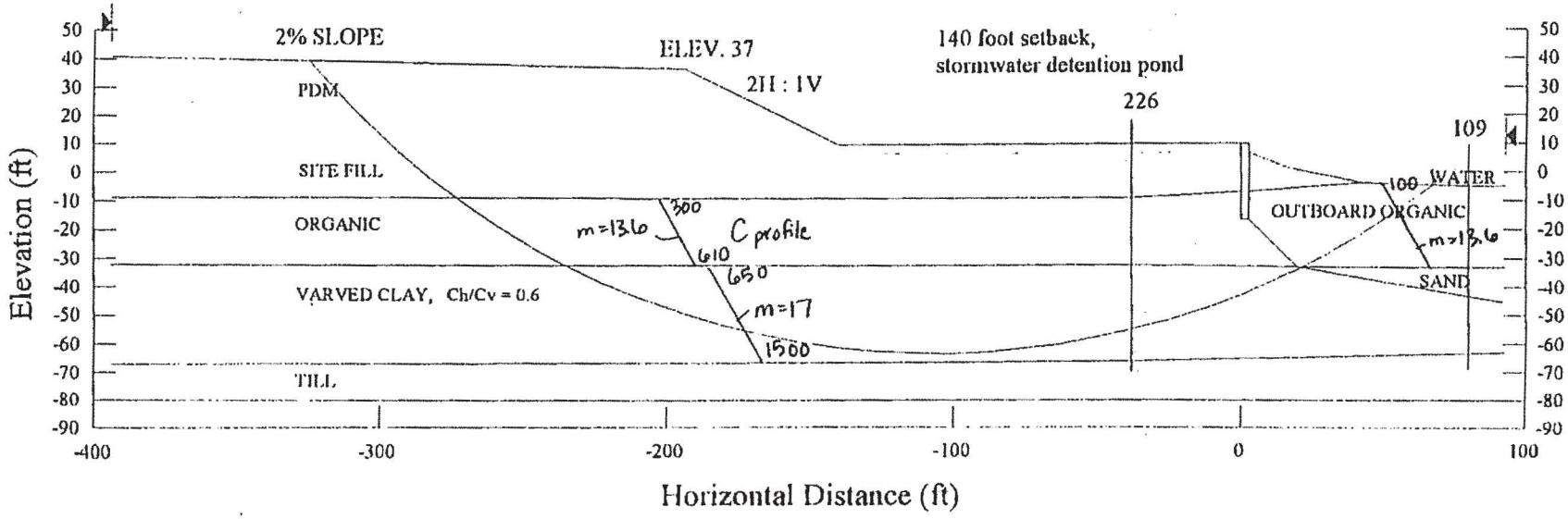
PDM: C = 1,500 psf, Unit weight = 100 pcf

Made By: JLV
Date: 4/7/98
Chk'd By:
Date:

Section along western edge of stormwater detention pond in northeast corner at Boring 226 and 109



PDM Final Fill, no strength gain due to consolidation



SEABOARD SITE
FILENAME: CFINAL.SLP

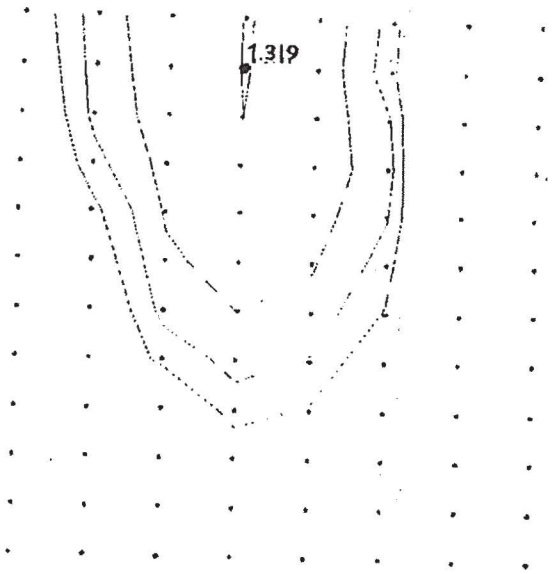
MRCE Lab strengths used for Organic, Dessicated Crust, Varved Clay Deposits
Subsurface profile from MRCE Soil Borings

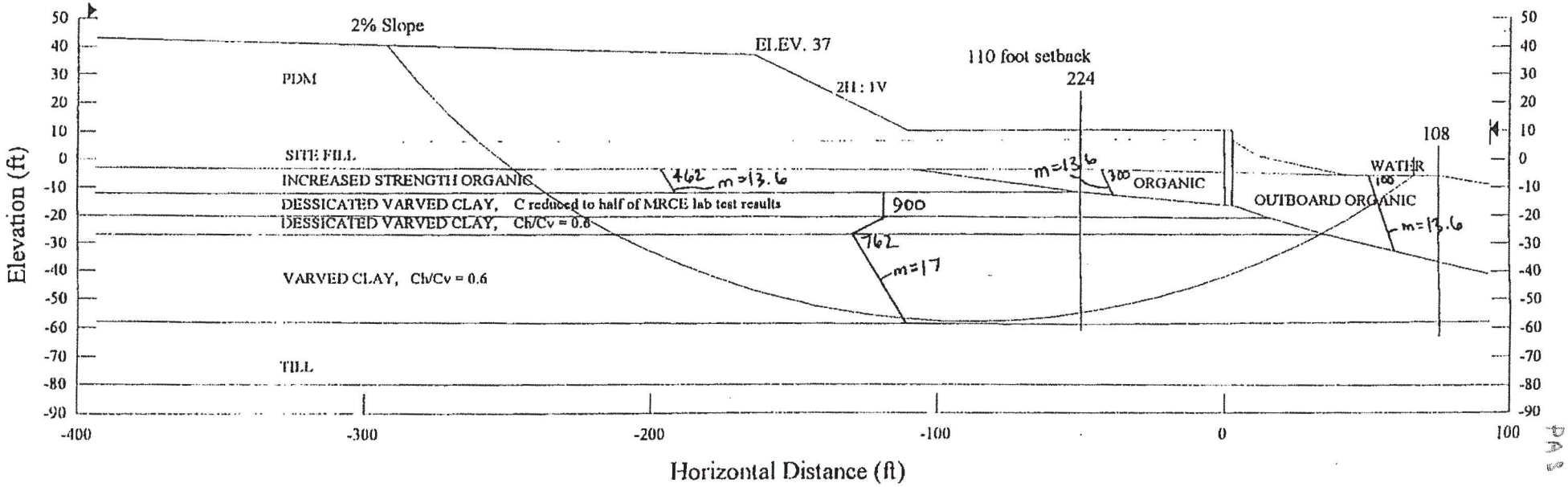
PDM: C = 1,500 psf, Unit weight = 100 pcf

Made By: JLV
Date: 4/7/98
Chk'd By:

PDM Final Fill, with strength gain due to consolidation under 13 feet of PDM

Section at Boring 224 and 108, west of northeastern stormwater detention basin





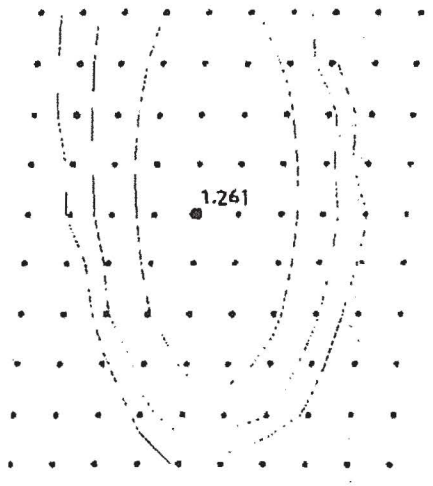
FINAL FILL SECTION AT BORINGS 215P, 216-I, and 105U

SEABOARD SITE
FILENAME: DFIN55

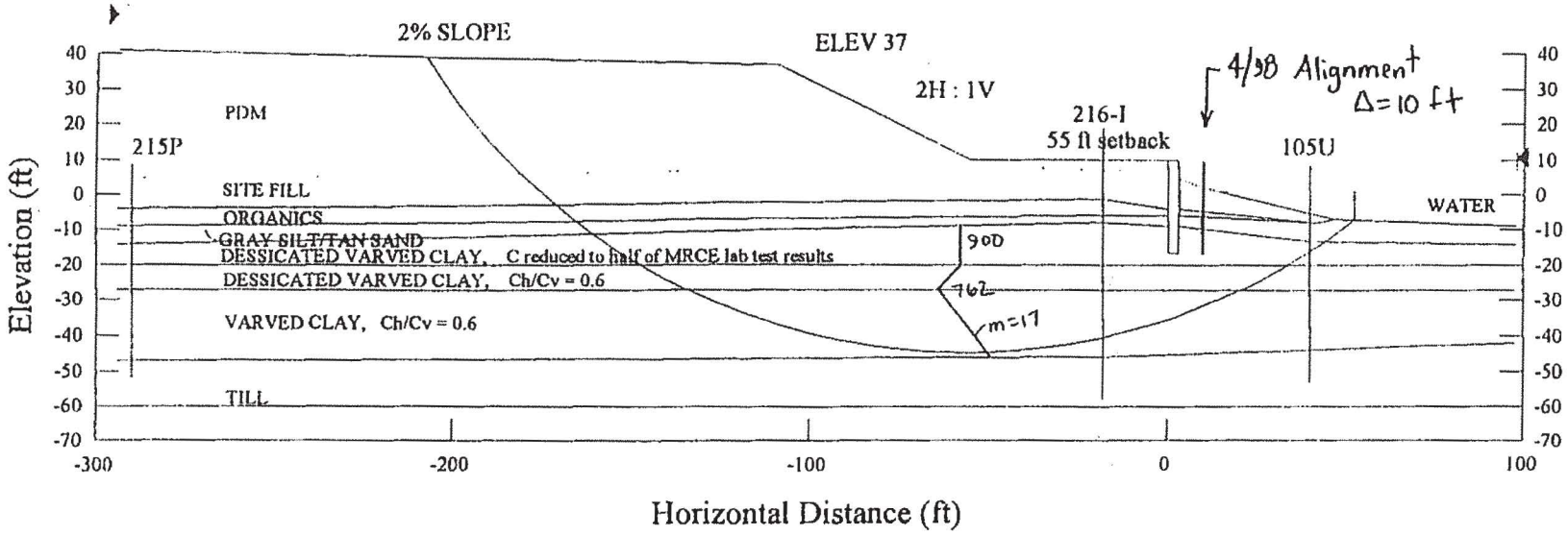
MRCE Lab strengths used for Organic, Dessicated and Varved Clay deposits
Subsurface profile from MRCE Soil Borings

PDM: C = 1,500 psf, Unit weight = 100 pcf

Made by: JLV
Date: 3/31/98
Checked by:



PDM Final Fill, with strength gain due to consolidation of 13 feet of PDM



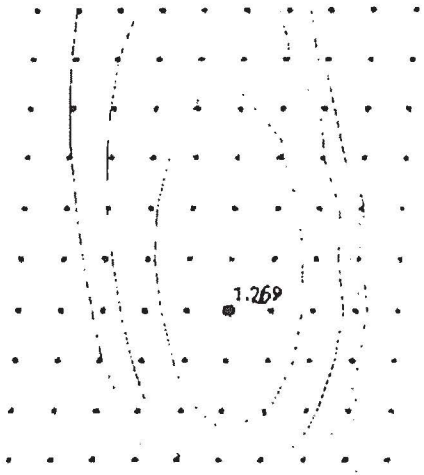
FINAL FILL SECTION AT BORINGS 206U and 102U

SEABOARD SITE
FILENAME: EFINAL

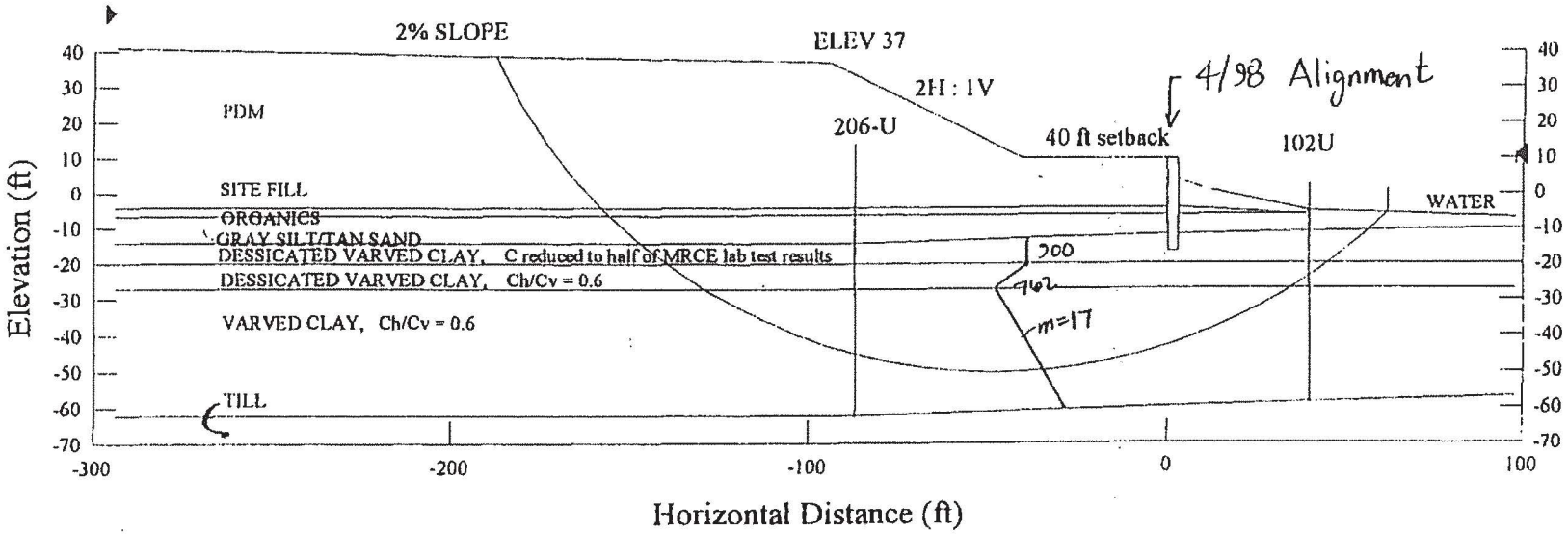
MRCE Lab strengths used for Organic, Dessicated and Varved Clay deposits
Subsurface profile from MRCE Soil Borings

Structural Fill Strength: 1,500 psf, unit weight 100 pcf

Made by: JLV
Date: 4/1/98
Checked by:



PDM Final Fill, with strength gain due to consolidation under 13 feet of PDM

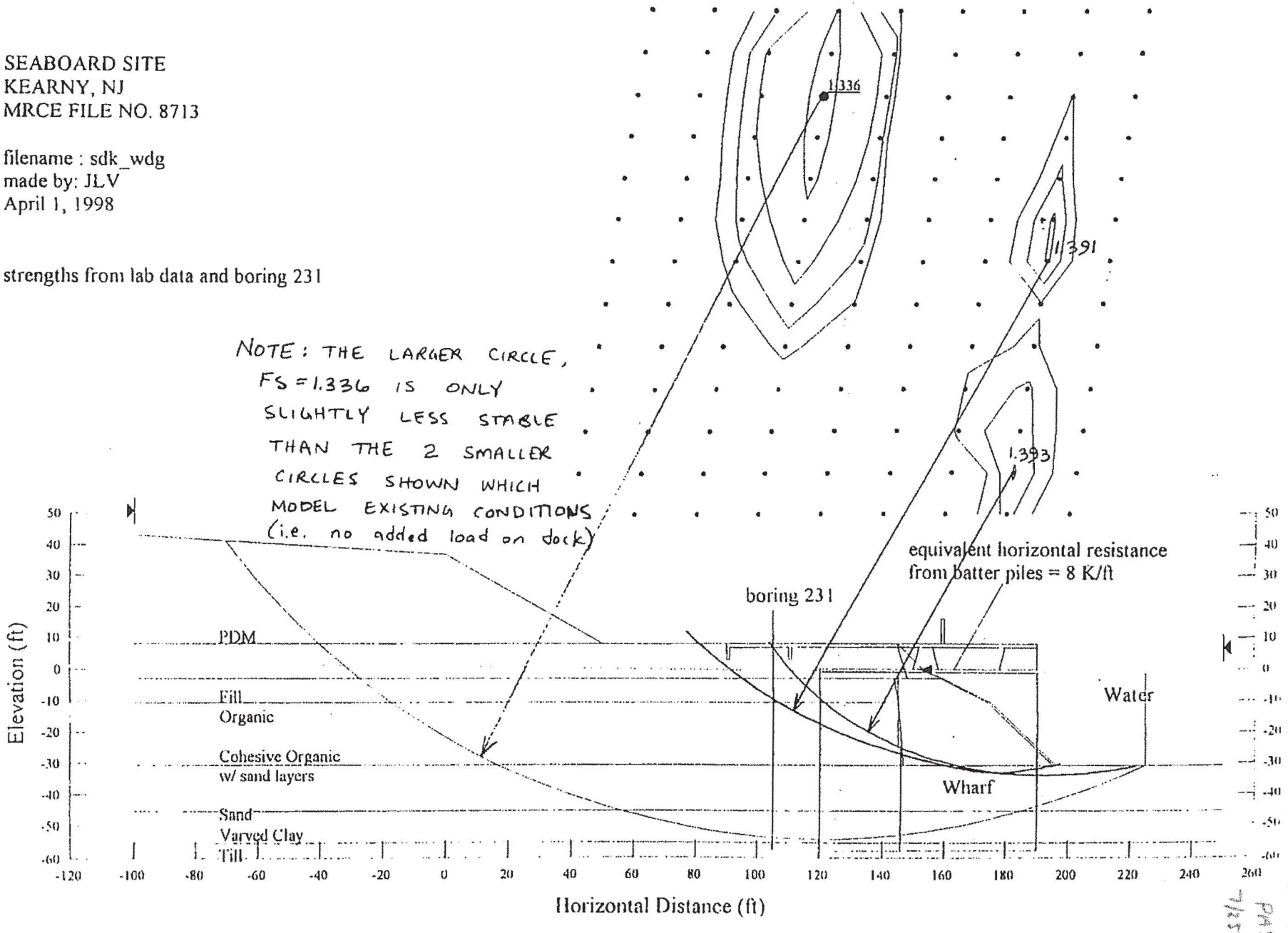


SEABOARD SITE
KEARNY, NJ
MRCE FILE NO. 8713

filename : sdk_wdg
made by: JLV
April 1, 1998

strengths from lab data and boring 231

NOTE: THE LARGER CIRCLE, FS = 1.336 IS ONLY SLIGHTLY LESS STABLE THAN THE 2 SMALLER CIRCLES SHOWN WHICH MODEL EXISTING CONDITIONS (i.e. no added load on dock)



MSR 7/25/13
PAS 7/25/13

Reference 2

SSP Wall Station 07+75 (SITE E)					
	Distance from SSP Wall	Feet below laser (@ elev. 9.2')	Elevation	Avg. Amount of Material Removed (ft)	Confining Layer
Surface	0.0	6.0	3.20		
Excavation		**9.0**	0.20	**3.0**	**N/A**
Backfill		5.65	3.55		
Surface	10.0	6.7	2.50		
Excavation		**9.7**	-0.50	**3.0**	**N/A**
Backfill		6.35	2.85		
Surface	24.0	8.2	**1.00**		
Excavation		**11.2**			
Backfill		8.2			
Surface	25.0	8.4	0.80		
Excavation		**11.4**	-2.20	**3.0**	**Wood / MM**
Backfill		8.4	0.80		
Surface	40.0	9.1	0.10		
Excavation		**12.6**	-3.40	**3.5**	**Wood / MM**
Backfill		9.1	0.10		
Surface	50.0	9.3	-0.10		
Excavation		**12.3**	-3.10	**3.0**	**N/A**
Backfill		9.3	-0.10		

SSP Wall Station 24+25 (SITE D)				
Distance from SSP Wall	Feet below laser (@ elev. 9.2')	Elevation	Avg. Amount of Material Removed (ft)	Confining Layer
0.0	6.7	2.50		
	10.7	-1.50	**4.0**	**MM**
	6.20	3.00		
10.0	9.0	0.20		
	13.5	-4.30	**4.5**	**MM**
	8.50	0.70		
25.0	11.9	-2.70		
	15.9	-6.70	**4.0**	**MM**
	11.9	-2.70		
40.0	13.3	-4.10		
	17.3	-8.10	**4.0**	**MM**
	12.9	-3.70		
50.0	13.7	-4.50		
	17.7	-8.50	**4.0**	**MM**
	13.7	-4.50		

45/8+

MSR 7/25/13
PAS 7/25/13

SSP Wall Station 38+10 (SITE A)						
	Distance from SSP Wall	Feet below laser	Feet below top of SSP Wall (grade + 3.5)	Elevation	Avg. Amount of Material Removed (ft)	Confining Layer
Surface	0	3.7	7.2	2.5		
Excavation		7.0	10.5	-1.0	**3.5**	MM
Limit		7.0	-	-	-	
Backfill		3.3	6.9	2.2		
Surface	10	4.9	8.4	1.1		
Excavation		8.9	12.4	-2.9	**4.0**	OH / MM
Limit		8.9	12.4	-2.9	-	
Backfill		4.5	8.0	1.5		
Surface	15	5.9	9.4	0.1		
Excavation		9.9	13.4	-3.9	**4.0**	N/A / OH
Limit		9.9	13.4	-3.9	-	
Backfill		5.5	9.0	0.5		
Surface	25	7.7	11.2	-1.7		
Excavation		11.7	15.2	-5.7	**4.0**	N/A / OH
Limit		11.7	15.2	-5.7	-	
Backfill		7.3	10.8	-1.3		
Surface	50	9.5	13	-3.5		
Excavation		10.5	14	-4.5	**1.0**	MM
Limit		16.5	20	-10.5	-	
Backfill		9.1	12.6	-3.1		

SSP Wall Station 44+00 (SITE A)						
	Distance from SSP Wall	Feet below laser	Feet below top of SSP Wall (grade + 3.5)	Elevation	Avg. Amount of Material Removed (ft)	Confining Layer
Surface	10	6.3	9.8	-0.3		
Excavation		10.0	13.5	-4.0	**3.7**	N/A / OH
Backfill		6.0	9.5	0.0		
Surface	15	6.9	10.4	-0.9		
Excavation		9.9	13.4	-3.9	**3.0**	N/A / OH
Backfill		6.6	10.1	-0.6		
Surface	25	8.7	12.2	-2.7		
Excavation		12.5	16.0	-6.5	**3.8**	N/A / OH
Backfill		8.4	11.9	-2.4		
Surface	40	10.4	13.9	-4.4		
Excavation		13.4	16.9	-7.4	**3.0**	OH
Backfill		10.1	13.6	-4.1		
Surface	50	11.0	14.5	-5.0		
Excavation		14.0	17.5	-8.0	**3.0**	OH
Backfill		10.7	14.2	-4.7		

MSA 7/25/13
PAS 7/25/13

SSP Wall Station 50+50 (SITE C)					
Distance from SSP Wall	Feet below laser	Feet below top of SSP Wall (grade + 3.5)	Elevation	Avg. Amount of Material Removed (ft)	Confining Layer
10	5.4	5.4	4.1		
	8.2	**8.4**	**1.1**	**3.0**	N/A / OH
	5.1	5.1	4.4		
15	6.2	6.2	3.3		
	8.9	**9.3**	**0.2**	**3.1**	N/A
	5.9	5.9	3.6		
25	7.6	7.6	1.9		
	11.4	**10.8**	**-1.3**	**3.2**	N/A / OH
	7.3	7.3	2.2		
40	8.8	8.8	0.7		
	13.0	**11.9**	**-2.4**	**3.1**	OH
	8.5	8.5	1.0		
50	9.2	9.2	0.3		
	12.2	**12.2**	**-2.7**	**3.0**	OH / MM
	8.9	8.9	0.6		

SSP Wall Station 56+50 (SITE N)					
Distance from SSP Wall	Feet below laser	Feet below top of SSP Wall (grade + 3.5)	Elevation	Avg. Amount of Material Removed (ft)	Confining Layer
S	6.8	10.3	-0.8		
	9.8	13.3	-3.8	**3.0**	NA
		3.5	6.0		
15	7.2	10.7	-1.2		
	10.2	13.7	-4.2	**3.0**	OH
	7.2	10.7	-1.2		
25	8.1	11.6	-2.1		
	11.5	15.0	-5.5	**3.4**	OH
	8.1	11.6	-2.1		
40	9.7	13.2	-3.7		
	12.7	16.2	-6.7	**3.0**	OH
	9.7	13.2	-3.7		
50	9.7	13.2	-3.7		
	12.7	16.2	-6.7	**3.0**	NA
	9.7	13.2	-3.7		

1710-

Reference 3

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. 102U
SHEET 1 OF 3
FILE NO. 8713
SURFACE ELEV. 2.5
RES. ENGR. O. CARPIO

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:30				Sample depths on this log have been			PUSHED	
07-25-97				adjusted. Jars and soils samples were				
Friday				referenced to the drilling platform, Elev.				
Partly				9.5.				
Sunny						5		
80°F								
						7		Mudline at 7'.
	1D	7.0	WR/24"	Top: Soft dark gray organic silty clay (OH)	O			1D Top: WC=137
		9.0		Bot 6": Gray fine sand, some silt, trace		8.5		
				clay, clay layers (SM)		10		
					S			
	2D	12.0	15-13	Top: Brown silty fine sand, trace clay layers				
		14.0	15-15	(SM)		13.7		
				Bot 4': Brown silt, some fine sand varved		15		
				with trace clayey silt (ML)				
	3U	17.0	PUSH=24"	Stiff brown silt varved with clay, trace fine				WC=32
		19.0	REC=22"	sand seams (ML)&(CL)				
						20		
	4D	22.0	2-2	Medium gray brown silty clay varved with				WC=37
		24.0	2-2	clayey silt, trace clay & silt seams				
				(CL)&(ML)		25		
	5U	27.0	PUSH=24"	Do 4D (CL)	V			WC=42
		29.0	REC=23"				▽	
						30		
	6D	32.0	1-1	Soft brown silty clay varved with clay, trace				WC=41
		34.0	2-3	fine sand seams (CL)&(CH)				
						35		
	7U	37.0	PUSH=24"	Do 6D (CL)				WC=48
		39.0	REC=23"					
						40		
	8D	42.0	WH/24"	Soft brown silty clay varved with clay, trace				WC=41
		44.0		silt seams (CL&CH)				
						45		
	9U	47.0	PUSH=24"	Do 8D (CL)				WC=45
		49.0	REC=21"					
						50		

48/8-

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. 102U
SHEET 2 OF 3
FILE NO. 8713
SURFACE ELEV. 2.5
RES. ENGR. O. CARPIO

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
07-25-97								
Friday	10D	52.0	1-1	Soft red brown silty clay varved with clay,				WC=44
Partly		54.0	1-1	trace fine sand seams (CL)&(CH)	V			
Sunny						55		
80°F								
	11U	57.0	PUSH=24"	Top: Do 10D (CL)		58		WC=36
		59.0	REC=24"	Bot: Red brown c-f sand, some silt (SM)	- - - - -			
	12D	59.0	7-7	Hard coarse to fine sandy clay, trace gravel	T	60		WC=16
14:30		61.0	9-38	(CL)		61		End of Boring at 61'.
								WC=Water Content
						65		in percent of dry
								weight.
						70		
						75		
						80		
						85		
						90		
						95		
						100		

49/82

MJR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 102U
SHEET 3 **OF** 3
FILE NO. 8713
SURFACE ELEV. 2.5
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK		MECHANICAL		DIA., IN 4	DEPTH, FT. FROM 0	TO 29	
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM	TO	
BARGE	MOBIL B-51	OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER 3" FIXED PISTON
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE, BORING GROUTED IMMEDIATELY
					UPON COMPLETION.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT. 54	NO. OF 2" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	5
CORE DRILLING IN ROCK	LIN. FT.	OTHER: CASING THROUGH OPEN	7 LIN. FT.
		OTHER: SPACE/WATER	

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER MIKE MCCARTHY HELPERS CEMMIE HARTLEY
REMARKS WATER BORING.
RESIDENT ENGINEER O. CARPIO DATE 7-25-97

BORING NO. 102U

50182

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. 105U
SHEET 1 OF 3
FILE NO. 8713
SURFACE ELEV. 2.5
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
14:00							LOWERED	
07-22-97								
Tuesday								
Sunny					WATER			
						5		
						7		Mudline at 7'.
							▽	
					O		PUSHED	
	1D	9.0	4-5	Top: Gray organic fine sandy silt, grass,		10		WC=51
		11.0	15-13	roots, wood (OL)				
				Bot: Gray silty fine sand, trace clay layers				
				(SM)	S1			
	2D	14.0	10-10	Top: Gray brown fine to medium sand, trace		15		
		16.0	8-13	silt, gravel, wood (SP-SM)		15.9		
				Bot: Brown red clay varved with silty clay &				
				silt (CH&CL&ML)				
	3D	19.0	2-3	Medium brown red silty clay varved with		20		WC=33
14:30		21.0	2-4	clayey silt & clay, trace fine sand seams				
08:30				(CL&ML&CH)				
07-23-97								
Vednesday								
Mostly	4U	24.0	PUSH=24"	Soft brown to brown red silty clay varved		25		
Cloudy		26.0	REC=24"	with gray brown clay (CL&CH)				WC=44
70°F							▽	
	5D	29.0	WR/24"	Soft brown red clay varved with clayey silt	V	30		WC=52
		31.0		(CH&MH)				6" Recovery.
	6U	34.0	PUSH=24"	Soft red brown silty clay, trace shell (CL)		35		Shell on top.
		36.0	REC=24"					6U: WC=43
	7D	39.0	WR/24"	Soft brown red clay varved with trace silt		40		WC=45
		41.0		(CH)				
	8U	44.0	PUSH=24"	Top: Soft red brown clay (CH)		45		8U Top: WC=49
		46.0	REC=23"	Bot: Red brown silty clay, trace coarse to				8U Bot: WC=16
				fine sand (CL)				
					TILL			
	9D	49.0	57-16	Red brown clayey fine to coarse sand, some		50		
		51.0	8-10	gravel (SC)				

51/82

ASK 7/25/11
PRS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. 105U
SHEET 2 OF 3
FILE NO. 8713
SURFACE ELEV. 2.5
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd								
07-23-97								
Wednesday					T			
Mostly								
Cloudy	10D	54.0	11-17	Red coarse to fine sand, some gravel, silt		55		
70°F		55.8	47-80/3"	(SM)		55.8		End of Boring at 55.8'.
						60		WC=Water Content in percent of dry weight.
						65		
						70		
						75		
						80		
						85		
						90		
						95		
						100		

BORING NO. 105U

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 105U
SHEET 3 **OF** 3
FILE NO. 8713
SURFACE ELEV. 2.5
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK		MECHANICAL		DIA., IN 4	DEPTH, FT. FROM -7	TO 28	
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM	TO	
BARGE	MOBIL B-51	OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER 3" FIXED PISTON
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE, BOREHOLE GROUTED IMMEDIATELY
					UPON COMPLETION.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT. 48.8	NO. OF 2" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER: CASING THROUGH OPEN	14 LIN. FT.
		OTHER: SPACE/WATER	

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER MIKE MCCARTHY HELPERS CEMMIE HARTLEY
REMARKS WATER BORING.
RESIDENT ENGINEER P. PIZZIMENTI DATE 7-22, 7-23-97

BORING NO. 105U

7718

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. 107
SHEET 1 OF 3
FILE NO. 8713
SURFACE ELEV. 2.5
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
10:45							LOWERED	
07-28-97								
Monday								
Hazy,								
Hot,					WATER	5		
Humid								
90°F								
								Casing to barge deck at 7' above MTL.
						9	▽	
	1D	9.0	10-5	Top: Gray fine to medium sand, some silt, trace clay pockets (SM)	S	10	PUSH	Mudline at 9'.
		11.0	7-7			10.5		
				Bot 6": Soft gray brn clayey silt varved with si clay, tr f sand partings (ML&CL)				1D Bot: WC=24
	2D	14.0	8-10	Top 6": Soft brown yellow silty clay varved		15		
		16.0	10-7	with clayey silt, f-m sand sms (CL&ML)				
				Bot: Soft red brn clayey silt varved with silt, trace clay layers (ML)				2D Bot: WC=29
	3D	19.0	3-3	Soft gray brn silty clay varved with some		20	▽	WC=34
		21.0	4-3	clay, trace fine sand partings (CL&CH)				
	4D	24.0	WR-1	Soft red brown clay varved with silty clay		25		WC=36
		26.0	WH-1	(CH&CL)				
					V			
	5D	29.0	WR	Do 4D, trace silt seams (CH&CL)		30		WC=46
		31.0	WH/18"					
	6D	34.0	WR/12"	Do 4D (CH&CL)		35		WC=48
		36.0	WH/12"					
	7D	39.0	WH/24"	Do 4D, trace silt seams (CH&CL)		40		WC=46
		41.0						
	8D	44.0	WR/12"	Do 4D, trace silt layers (CH&CL)		45		WC=35
		46.0	WH/12"					
	9D	49.0	WR-1	Do 4D (CH&CL)		50		WC=40
		51.0	1-1					

5 7/8 2

MSR 7/25/13
PMS 7/25/13

MOESER HUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. 107
SHEET 2 OF 3
FILE NO. 8713
SURFACE ELEV. 2.5
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd 07-28-97 Monday Hazy, Hot, Humid 90°F	10D	54.0	WR/24"	Soft red clay varved with some silty clay (CH&CL)		55		WC=52.2
		56.0						
	11D	59.0	WR/24"	Do 10D (CH&CL)		60		WC=32
		61.0						
					V			
	12D	64.0	2-2	Do 10D, trace silt seams (CH&CL)		65		WC=47
		66.0	4-5					
	13D	69.0	3-5	Do 10D, trace silt layers (CH&CL)		70		WC=33
		71.0	4-3					
	14D	74.0	4-5	Do 10D, trace silt layers, fine sand layers (CH&CL)		75		WC=48
13:45		76.0	4-4					
08:10 07-29-97 Tuesday Sunny 80°F, 8:40	15D	79.0	WR-3	Top 12": Do 10D, trace silt layers (CH&CL)		80		15D Top: WC=39
		81.0	16-11	Bot 12": Red brown clayey fine to coarse sand, trace gravel (SC)	TILL	81		End of Boring at 81'.
						85		WC=Water Content in percent of dry weight.
						90		
						95		
						100		

BORING NO. 107

55/82

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 107
SHEET 3 **OF** 3
FILE NO. 8713
SURFACE ELEV. 2.5
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK		MECHANICAL		DIA., IN 4	DEPTH, FT. FROM -7	TO	20
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM	TO	
BARGE	MOBIL B-51	OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE, BOREHOLE GROUTED IMMEDIATELY
					UPON COMPLETION.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT. 72	NO. OF 2" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER: CASING THROUGH OPEN	16 LIN. FT.
		OTHER: SPACE/WATER	

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER MIKE MCCARTHY HELPERS CEMMIE HARTLEY
REMARKS WATER BORING.
RESIDENT ENGINEER P. PIZZIMENTI DATE 7-28-97

BORING NO. 107

56/82

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. 108
SHEET 1 OF 3
FILE NO. 8713
SURFACE ELEV. 2.5
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
							LOWERED	
07-29-97 Tuesday					WATER			
						5		
								Mudline at 8'.
						8	▽	
	1D	8.0	WR/24"	Soft gray organic silty clay, some decomposed vegetation (OH)			PUSH	
		10.0				10		1D:pp=0.1, WC=116 Visible oil, strong petroleum odor.
	2D	13.0	WH/24"	Soft gray organic silty clay, trace fine sand (OH)				pp=0.1, WC=84
		15.0				15		
							▽	
	3D	18.0	WH/24"	Gray organic clayey silt, trace fine sand (OH)				WC=81
		20.0				20		
					O			
	4D	23.0	WH/24"	Do 3D, trace decomposed vegetation (OH)				WC=68
		25.0				25		
	5D	28.0	WH/12"	Do 3D, trace fine sand pockets (OH)				WC=72
		30.0	1-1			30		
	6D	33.0	WR/24"	Do 3D (OH)				WC=63
		35.0				35		
						37		
	7D	38.0	WR/24"	Soft red brown silty clay varved with some clay, trace silt seams (CL&CH)				WC=50
		40.0				40		
	8D	43.0	WR/24"	Soft brown red silty clay varved with some clay, trace silt seams (CL&CH)	V			WC=47
		45.0				45		
	9D	48.0	5-2	Soft brown red clay varved with silty clay, trace silt seams (CH&CL)				WC=52
		50.0	1-1			50		

57/82

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. 108
SHEET 2 OF 3
FILE NO. 8713
SURFACE ELEV. 2.5
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
07-29-97 Tuesday	10D	53.0	WR/18"	Do 9D (CH&CL)				WC=46
		55.0	WH		V	55		
	11D	59.0	3-2	Top: Soft red brown silty clay varved with		60		11D Top: WC=29
		61.0	39-16	silt, trace fine sand seam, clay layer (CL&ML)				
				Bot 4": Gray red fine to coarse sand, some gravel, silt, trace clay pockets (SM)	T			
	12D	64.0	30-22	Red gravelly coarse to fine sand, some silt,		65		
12:00		66.0	12-22	trace clay (SM)		66		End of Boring at 66'.
						70		
						75		pp=Pocket Penetrometer reading in tsf.
						80		WC=Water Content in percent of dry weight.
						85		
						90		
						95		
						100		

BORING NO. 108

58/82

MJK 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 108
SHEET 3 **OF** 3
FILE NO. 8713
SURFACE ELEV. 2.5
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO			
TRUCK		MECHANICAL		DIA., IN	4	DEPTH, FT. FROM	-7	TO 18
SKID		HYDRAULIC	X	DIA., IN.		DEPTH, FT. FROM		TO
BARGE	MOBIL B-51	OTHER		DIA., IN.		DEPTH, FT. FROM		TO
OTHER								

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE, BOREHOLE GROUTED IMMEDIATELY
					UPON COMPLETION.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT. 58	NO. OF 2" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER: CASING THROUGH OPEN	15 LIN. FT.
		OTHER: SPACE/WATER	

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER MIKE MCCARTHY HELPERS CEMMIE HARTLEY
REMARKS WATER BORING.
RESIDENT ENGINEER P. PIZZIMENTI DATE 7-29-97

BORING NO. 108

59/82

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. 110U
SHEET 1 OF 3
FILE NO. 8713
SURFACE ELEV. 2.5
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
11:00							LOWERED	
07-30-97								
Wednesday								
Sunny								
80°F						5		
					WATER			
						10		
						13	▽	Mudline at 13'.
	1D	13.0	WR/24"	Top 18": Soft black organic silty clay, trace vegetation, fine sand (OH)			PUSH	1D Top: pp=0.03
		15.0				15		1D Bot: pp=0.05
				Bot 6": Soft black organic clayey silt, some meadow mat (OL)	O			Oily sheen & odor.
								1D Top: WC=134
						18		1D Bot: WC=305
						20		
					S1			
	2U	21.0	PUSH=24"	Black fine to medium sand, some organic				Sample 2U forward-
		23.0	REC=24"	silt (SM)		23		ed to Key Environ-
								mental for testing as
						25		requested.
					O			
	3D	26.0	WR-WH/12"	Soft gray organic silty clay, trace				pp=0.1, WC=79
		28.0	2	vegetation, fine sand, fine sand seams (OH)				
						29		
						30		
	4U	31.0	PUSH=24"	Gray silty fine to medium sand, some				WC=43
		33.0	REC=24"	organic silty clay layers (SM&OH)			▽	
						35		
					S1			
	5D	36.0	2-2	Gray organic silty fine to medium sand,				
		38.0	3-5	trace clay, decomposed vegetation, shells				
				(SM)				
						40		
	6D	41.0	2-3	Do 5D, trace decomposed vegetation				
		43.0	5-8	seams (SM)				Hole beginning to
						44		collapse.
						45		
	7D	46.0	2-2	Gray organic clayey silt, some fine sand,				pp=0.5, WC=50
		48.0	3-3	trace fine sand seams (OL)	O			
						50		
	NR	51.0	PUSH=3"	No recovery		51		
		51.3	REC=0"		T			

60/82

MSR 7/25/13
PAS 7/25/13

MOESER HUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. 110U
SHEET 2 OF 3
FILE NO. 8713
SURFACE ELEV. 2.5
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd, 7-30	8D	51.0	23-6	Red gravel, some coarse to fine sand, clay (GC)				2" Recovery.
Wed.,Sun		53.0	7-14		T			
80°F, 14:00						53		End of Boring at 53'.
						55		
						60		pp=Pocket Penetrometer reading in tsf.
						65		WC=Water Content in percent of dry weight.
						70		
						75		
						80		
						85		
						90		
						95		
						100		

BORING NO. 110U

61/82

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 110U
SHEET 3 **OF** 3
FILE NO. 8713
SURFACE ELEV. 2.5
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK		MECHANICAL		DIA., IN 4	DEPTH, FT. FROM -7	TO	33
SKID		HYDRAULIC	X	DIA., IN.	DEPTH, FT. FROM	TO	
BARGE	MOBIL B-51	OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER 3" FIXED PISTON
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD REVERT

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE, BOREHOLE GROUTED IMMEDIATELY
					UPON COMPLETION.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT. 40	NO. OF 2" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER: CASING THROUGH OPEN	20 LIN. FT.
		OTHER: SPACE/WATER	

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER MIKE MCCARTHY HELPERS CEMMIE HARTLEY
REMARKS WATER BORING.
RESIDENT ENGINEER P. PIZZIMENTI DATE 7-30-97

BORING NO. 110U

62/82

MSR 7/25/13
PAS 7/25/13

BORING LOG

BORING NO. 206U
SHEET 2 OF 3
FILE NO. 8713
SURFACE ELEV. 4.7
RES. ENGR. O. CARPIO

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd							USED	
08-08-97							REVERT	
Friday								
Partly								
Sunny						55		
80°F	16U	55.0	PUSH=24"	Top: Red brown fine sand, some silt (SM)				
		57.0	REC=23"	Bot: Med red brn clay vvd w silt (CH&ML)				16U Bot: WC=46
	17D	57.0	3-6	Medium brown silty clay, varved with silt,				WC=35
		59.0	6-11	some red brown fine sand layers (CL&ML)	V			
						60		
	18D	60.0	WH/12"	Soft brown silty clay varved with clayey silt,				WC=51
		62.0	6-7	trace fine sand layers (CL&ML)				
15:00						65		
07:30	19U	65.0	PUSH=24"	Medium red brown silt vvd with silty clay, tr				WC=32
08-11-97		67.0	REC=24"	fine sand seams, gravel (ML&CL)		67		
Monday	20NR	67.0	30-10	No recovery				
Sunny		69.0	17-17		T			
85°F						70	▽	
09:00	21D	70.0	20-100/4"	Red brown fine to coarse sand, some silt,		70.8		End of Boring at
		70.8		gravel, trace clay (SM)				70.8'.
						75		WC=Water Content
								in percent of dry
								weight.
						80		
						85		
						90		
						95		
						100		

63/82

MSR 7/25/13
PAJ 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 206U
SHEET 3 **OF** 3
FILE NO. 8713
SURFACE ELEV. 4.7
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK		MECHANICAL		DIA., IN 4	DEPTH, FT. FROM 0	TO 9	
SKID		HYDRAULIC		DIA., IN.	DEPTH, FT. FROM	TO	
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER	TRACK:NODWELL						

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER 3" FIXED PISTON
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD REVERT

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
8-11-97	7:30	65	9	3.5	OVER WEEKEND READING - REVERT MUD LEVEL.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.		NO. OF 2" SHELBY TUBE SAMPLES		
3.5" DIA. U-SAMPLE BORING	LIN. FT.	70.8	NO. OF 3" UNDISTURBED SAMPLES		6
CORE DRILLING IN ROCK	LIN. FT.		OTHER:		

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER MIKE MCCARTHY HELPERS CEMMIE HARTLEY
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER O. CARPIO DATE 8-11-97

BORING NO. 206U

64/82

MSL 7/25/13
PAS 7/25/13

BORING LOG

BORING NO. 215P
SHEET 1 OF 4
FILE NO. 8713
SURFACE ELEV. + 4.5
RES. ENGR. O. CARPIO

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
13:00	1D	0.0	7-12	Gray fine to coarse sandy gravel, some silt,			DRILLED	
07-21-97		2.0	13-15	trace cinders, brick, wood (GM)			AHEAD	
Monday								
Cloudy					F			
80°F						5		
	2D	5.0	10-5	Dark gray fine to coarse sandy gravel, some				
		7.0	5-5	silt, trace cinders (GM)				
						8.5		
						10		
	3D	10.0	1-1	Soft brown organic silty clay, some peat	O			WC=315
		12.0	1-2	(OH&Pt)				
						13.5		
						15		
	4D	15.0	4-9	Gray fine to medium sand, some organic silt	S			
		17.0	20-25	(SM)				
						18.5	▽	
						20	USED	Casing to 19'.
	5D	20.0	4-7	Medium gray brown clayey silt varved with			REVERT	WC=29
		22.0	13-13	silty clay, trace fine sand seams (ML&CL)				
						25		
	6D	25.0	2-2	Soft gray brown silty clay varved with				WC=34
		27.0	3-2	clayey silt, trace fine sand seams (CL&ML)				
						30		
	7D	30.0	WH/24"	Soft brown silty clay varved with clay, trace				WC=40
		32.0		silt seasms (CL&CH)	V			
						35		
	8D	35.0	WH/12"	Do 7D (CL&CH)				WC=50
15:30		37.0	1-1					
11:30								Hole caved in at
07-28-97								20'.
Monday						40		
Suny	9D	40.0	WH/12"	Do 7D (CL&CH)				WC=42
90°F		42.0	6-4					
						45		
	10D	45.0	1-2	Soft brown clay varved with clayey silt, silt				WC=29
		47.0	1-1	layers, trace fine sand layers (CH&ML)				
						50		
	11D	50.0	WH/18"	Top:Med brn silty clay varved w/si(CL&ML)				11D Top: 36
		52.0	4	Bot 6": Red brn f-c sandy gravel, sm cl (GC)			▽	

65|82

MSR 7/25/13
PA3 7/25/13

BORING LOG

BORING NO. 215P
SHEET 2 OF 4
FILE NO. 8713
SURFACE ELEV. + 4.5
RES. ENGR. O. CARPIO

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
					V		USED	
07-28-97						51.5	REVERT	
Monday					T			
Suny							▽	Hard drilling at
90°F	12D	54.5	48-59	Red brown silty fine to coarse sand, some		55		54'.
15:00		56.5	68-79	gravel (SM)				End of Boring at
						56.5		56.5'.
						60		
						65		WC=Water Content in percent of dry weight.
						70		
						75		
						80		
						85		
						90		
						95		
						100		

66/82

MSR 7/25/13
PAS 7/25/13

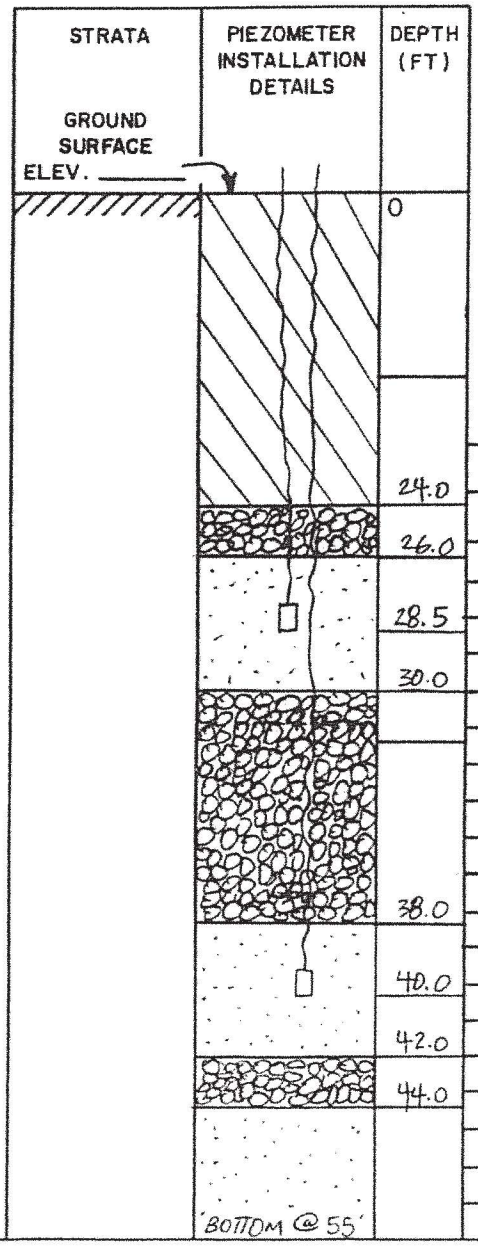
FILE NO. 87/3
SUBCODE _____

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT Seaboard Site — PIEZOMETER NO. 215P
LOCATION Kearny, NJ
PIEZOMETER LOCATION In borehole 215P — DATE OF INSTALLATION 7-28-97
☐ SEE SKETCH ON BACK — RES. ENG. Oscar Carpio

PIEZOMETER TYPE Pneumatic



INTAKE POINT

depth to bottom, ft = _____
depth to top, ft = _____
length, ft = _____ = L
diameter, in = _____, ft = _____ = 2R

STANDPIPE/RISER

elevation of rim, ft = _____
diameter, in = _____, ft = _____ = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			

Sand Bentonite
Gravel Grout

GROUND SURFACE ELEV. +4.5

PIEZOMETER NO. 215P

67/82

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 215P
SHEET 4 **OF** 4
FILE NO. 8713
SURFACE ELEV. +4.5
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK		MECHANICAL		DIA., IN 4	DEPTH, FT. FROM 0	TO 19	
SKID		HYDRAULIC		DIA., IN.	DEPTH, FT. FROM	TO	
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER	ATV						

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD REVERT

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON SHEET 3

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	56.5	NO. OF 2" SHELBY TUBE SAMPLES		
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES		
CORE DRILLING IN ROCK	LIN. FT.		OTHER: PNEUMATIC PIEZOMETERS		2

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER JOE KURZYNOWSKI/GUS SURI HELPERS DONALD CUTHBERT
REMARKS PNEUMATIC PIEZOMETERS INSTALLED IN BOREHOLE.
RESIDENT ENGINEER O. CARPIO DATE 7-28-97

BORING NO. 215P

MSR 7/25/13
PAS 7/25/13

BORING LOG

BORING NO. 216-I
SHEET 1 OF 3
FILE NO. 8713
SURFACE ELEV. + 7.7
RES. ENGR. O. CARPIO

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
08:00	1D	0.0	5-5	Dark gray fine to coarse sandy gravel, some			DRILLED	Gravel surface.
07-18-97		2.0	4-5	silt, trace cinders, vegetation (Fill) (GM)			AHEAD	
Friday								
Sunny								
95°F					F	5		
	2D	7.0	5-15	Dark gray coarse to fine sand, some gravel				
		9.0	34-1	sized cinders, trace silt (Cinder Fill) (SP-SM)		9	▽	Casing to 9'.
						10	USED	
	3D	10.0	1-1	Soft brown peat & organic clayey silt, &			REVERT	Sand material
		12.0	WH-1	dark gray coarse to fine sand, some silt,	O			possible washed.
				trace gravel, cinders (Pt&OH&SM)				3D: WC=79 (For
						13.5		organic material).
					S	15		
	4D	15.0	10-9	Top: Brown fine to medium sand, some silt,		16		
		17.0	6-5	fine sandy silt layers (SM&ML)				
				Bot: Medium brown clayey silt, some fine				4D Bot: WC=24
				sand seams (ML)				
						20		
	5D	20.0	2-2	Medium brown clayey silt varved with silt,				WC=33
		22.0	3-3	trace fine sandy silt seams (ML)				
						25		
	6D	25.0	WR/24"	Soft brown clayey silt varved with clay &				WC=41
		27.0		silt (ML&CH)				
					V	30		
	7D	30.0	WH/24"	Do 6D (ML&CH)				WC=42
		32.0						
						35		
	8D	35.0	WH/24"	Soft brown clay varved with clayey silt				WC=47
		37.0		(CH&ML)				
						40		
	9D	40.0	WH/12"	Top: Do 8D (CH&ML)				9D Top: WC=45,
		42.0	2-1	Bot: Soft red brown silty clay varved with				9D Bot: WC=32
				silty fine sand, some silt seams (CL&SM)				
						45		
	10D	45.0	2-1	Soft brown clay varved with clayey silt				WC=44
		47.0	1-1	(CH&ML)				
						50		
	11D	50.0	WR/12"	Top: Soft red brn cl silt vvd w/cl(ML&CH)				11D Top: WC=36
		52.0	7-3	Bot: Red brn c-f sa silt, sm cl, tr gvl (ML)			▽	11D Bot: WC=15

69/82

MSR 7/25/13
PAJ 7/25/13

BORING LOG

BORING NO. 216-I
SHEET 2 OF 3
FILE NO. 8713
SURFACE ELEV. + 7.7
RES. ENGR. O. CARPIO

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
Cont'd							USED	
07-18-97					V		REVERT	
Friday								
Sunny						53.5		
95°F						55		
	12D	55.0	35-100/3"	Red brown clayey coarse to fine sand & gravel, trace silt pockets (SC&GC)				Hard drilling from 55' to 65.1'.
		55.8			T			12D: WC=11
14:00						60		
07:00	13D	60.0	65-75	Red brown coarse to fine sandy gravel,				
07-21-97		61.5	100/6"	some clay, silt (GM-GC)		62		Possible rock noted by driller at 62'.
Monday								
Sunny					PR			
80°F						65		
09:30	14NR	65.0	100/1"	No recovery		65.1		End of Boring at 65.1'.
		65.1						
								WC=Water Content in percent of dry weight.
						70		
						75		
						80		
						85		
						90		
						95		
						100		

70/82

MSR 7/25/13
PA3 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 216-I
SHEET 3 **OF** 3
FILE NO. 8713
SURFACE ELEV. +7.7
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO			
TRUCK		MECHANICAL		DIA., IN	5	DEPTH, FT. FROM	0	TO 9
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO
OTHER	ATV							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 4-7/8
TYPE OF DRILLING MUD REVERT

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. _____ AVERAGE FALL, IN. _____
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON SHEET 3

STANDPIPE:	TYPE		ID, IN.		LENGTH, FT.	TOP ELEV.	
INTAKE ELEMENT:	TYPE		OD, IN.		LENGTH, FT.	TIP ELEV.	
FILTER:	MATERIAL		OD, IN.		LENGTH, FT.	BOT. ELEV.	

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT. 65.1	NO. OF 2" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER JOE KURZYNOWSKI HELPERS DONALD CUTHBERT
REMARKS INCLINOMETER CASING INSTALLED IN BOREHOLE UPON COMPLETION.
RESIDENT ENGINEER O. CARPIO DATE 7-21-97

BORING NO. 216-I

71/82

MGR 2/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. 219
SHEET 1 OF 2
FILE NO. 8713
SURFACE ELEV. + 4.5
RES. ENGR. O. CARPIO

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:30	1D	0.0	4-4	Dark gray fine to coarse sand, some gravel			DRILLED	Gravel surface.
07-17-97		2.0	3-4	sized cinders, trace silt (Cinder Fill) (SP-SM)			AHEAD	
Thursday								
Sunny					F			
90°F						5		
	2D	5.0	4-1	Black coarse to fine sand, some gravel,				Washed sample.
		7.0	1-1	wood, organic silt (SM)				
						8.5		
						10	▽	
	3D	10.0	1/12"	Soft gray organic silty clay & peat pockets,			PUSHED	WC=130
		12.0	1/12"	trace fine to medium sand layers (OH&Pt)	O			
							▽	Casing to 14'.
						15	USED	
	4D	15.0	5-4	Top: Soft gray clayey silt, trace			REVERT	4D Top: WC=28
		17.0	3-2	decomposed vegetation, fine sand, mica				4D Bot: WC=24
				(MH)				
				Bot: Med blue gray silty clay varved w / fine				
				sandy silt, sm fine sand lyrs (CL&ML)		20		
	5D	20.0	3-3	Medium brown silty clay varved with clayey				WC=32
		22.0	3-4	silt (CL&ML)				
						25		
	6D	25.0	3-2	Medium gray brown clayey silt varved with				WC=35
		27.0	3-3	silty clay, trace fine sand seams (ML&CL)	V			
						30		
	7D	30.0	WH/18"	Soft gray brown clayey silt varved with clay				WC=42
		32.0	2	(ML&CH)				
						35		
	8D	35.0	WR/24"	Top: Soft gray brown clayey silt varved				8D Top: WC=41
		37.0		with silty clay, trace lignite (ML&CL)				8D Bot: WC=45
				Bot: Soft brown clay varved with clayey silt				
				(CH&ML)				
						40		
	9D	40.0	WR/12"	Do 8D, Bot (CH&ML)				WC=47
		42.0	1-2					
						45	▽	
	10D	45.0	WR/24"	Soft red brown clay varved with clayey silt				WC=51
14:30		47.0		(CH&ML)		47		End of Boring at 47'.
								WC=Water Content
						50		in percent of dry weight.

BORING NO. 219

72/82

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 219
SHEET 2 **OF** 2
FILE NO. 8713
SURFACE ELEV. + 4.5
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	MOBIL B-61	MECHANICAL		DIA., IN 4	DEPTH, FT. FROM 0	TO 14	
SKID		HYDRAULIC		DIA., IN.	DEPTH, FT. FROM	TO	
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [X] YES [ ] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD REVERT

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT. 47	NO. OF 2" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER REYNOLDS BRIDGPAL HELPERS RANDY PERRY
REMARKS BOREHOLE WAS GROUTED UPON COMPLETION.
RESIDENT ENGINEER O. CARPIO DATE 7-17-97

BORING NO. 219

73/82

MSR 7/25/13
PAS 7/25/13

MOESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. 220UP
SHEET 1 OF 4
FILE NO. 8713
SURFACE ELEV. + 4.4
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
08:00	1D	0.0	7-10	Gray fine to coarse sandy gravel, some silt,			DRILLED	Gravel surface.
08-01-97		2.0	10-24	trace roots (GM)			AHEAD	1D: Bottom of
Friday								spoon wet.
Sunny								
90°F					F	5		
	2D	5.0	3-4	Red brown silty fine to medium sand, trace				
		7.0	5-6	gravel, silt pockets (SM)				
	3D	7.0	10-7	Do 2D, trace coarse sand (SM)				Little recovery.
		9.0	9-6			9	▽	Casing to 9'.
	4D	9.0	WR-1	Top: Med brn meadow mat (Pt)		10	USED	4D Top: WC=395
		11.0	1-1	Bot: Soft gray org silty clay, tr peat (OH)			WATER	4D Bot: WC=94
	5U	11.5	PUSH=24"	Medium brown peat (Pt)	O			WC=400
		13.5	REC=24"					
	6D	13.5	1-2	Top: Med gry org si clay, sm peat (OH&Pt)		14		6D Top: WC=168
		15.5	9-11	Bot:Gry f sand, sm silt, tr clay layers(SM)	S	15		
	7D	15.5	8-16	Gray silt, some fine sand, trace clay varved		15.5		WC=17
		17.5	12-13	with trace clayey silt, trace fine to medium				
				sand layers (ML)				
						20		
	8D	20.0	12-12	Brown silt varved with trace clayey silt (ML)				WC=29
		22.0	14-11					
						25		
	9U	25.0	PUSH=24"	Medium brown clayey silt varved with trace				WC=35
		27.0	REC=19"	clay, trace fine sand seams, silt seams (ML)				
	10D	27.0	4-6	Top: Intld brn m-f sand, sm silt & soft brn				Top 6" of tube was
		29.0	6-5	clayey silt (SM&ML)				cut-off to remove
				Bot6":Soft brn cl silt vvd w/tr cl & si(ML)		30		it from piston head.
	11D	30.0	WH-1/12"	Soft brown gray clayey silt varved with	V			10D Bot: WC=34
		32.0	1	clay, trace fine sand seams (ML&CH)				11D: WC=35
						35		
	12U	35.0	PUSH=24"	Soft brown silty clay varved with clayey silt,				WC=45
		37.0	REC=18"	trace silt seams (CL&ML)				
	13D	37.0	WR-1	Soft brown clay varved with clayey silt,				WC=44
		39.0	2-2	trace silt seams (CH&ML)				
						40		
	14D	40.0	WH/18"	Do 13D (CH&ML)				WC=45
		42.0	1					
						45		
	15U	45.0	PUSH=24"	Soft red brn clay varved with silty clay &				WC=46
		47.0	REC=22"	clayey silt, trace silt seams (CH&CL&ML)				
	16D	47.0	1-1	Do 15U (CH&CL&ML)				WC=48
		49.0	1-1					
						50		
	17D	50.0	WH-1	Soft red brown clay varved with clayey silt,				WC=44
		52.0	1-1	trace silt layers (CH&ML)			▽	

MSR 7/25/13
PAS 7/25/13

BORING LOG

BORING NO. 220UP
SHEET 2 OF 4
FILE NO. 8713
SURFACE ELEV. + 4.4
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
							USED	
14:30							WATER	
07:30								
08-04-97								
Monday						55		
Sunny	18U	55.0	PUSH=24"	Soft red brn silty clay & clay vvd w / cl silt,				WC=43
80°F		57.0	REC=24"	tr silt seams, f sand sms(CL&CH&ML)				
	19D	57.0	5-5	Soft red brown clay varved with silty clay,				WC=37
		59.0	3-3	trace fine sand layers, silt layers (CH&CL)				
						60		
	20D	60.0	WR/18"	Soft brown clay varved with silty clay, trace				WC=41
		62.0	2	silt seams (CH&CL)				
						65		
	21U	65.0	PUSH=24"	Soft red brown clay varved with silty clay,	V			WC=36
		67.0	REC=22"	some fine sand seams (CH&CL)				
	22D	67.0	WR-3	Do 21U, trace fine sand seams, silt seams				WC=43
		69.0	3-3	(CH&CL)				
						70		
	23D	70.0	WH/24"	Soft red brown clay varved with clayey silt,				WC=36
		72.0		trace silt layers (CH&ML)				
						75		
	24U	75.0	PUSH=24"	Soft red brown clay varved with clayey silt,				WC=42
		77.0	REC=24"	tr silt layers, f sand seams (CH&ML)				
	25D	77.0	6-2	Soft red brown clay varved with clayey silt,				WC=39
		79.0	2-2	trace silt layers (CH&ML)				
						80		
	26D	80.0	WR/12"	Medium red brown silty clay varved with				WC=34
		82.0	7-4	silt, trace clay layers (CL&ML)				
						84		Rods chattering at
						85	▽	84'.
	27D	85.0	17-16	Red brown silty fine to coarse sand, some	T			
13:00		87.0	19-18	gravel & fine sandy clay pockets (SM&CL)		87		End of Boring at 87'.
						90		WC=Water Content in percent of dry weight.
						95		
						100		

BORING NO. 220UP

75/82

MSR 7/25/13
DAS 7/25/13

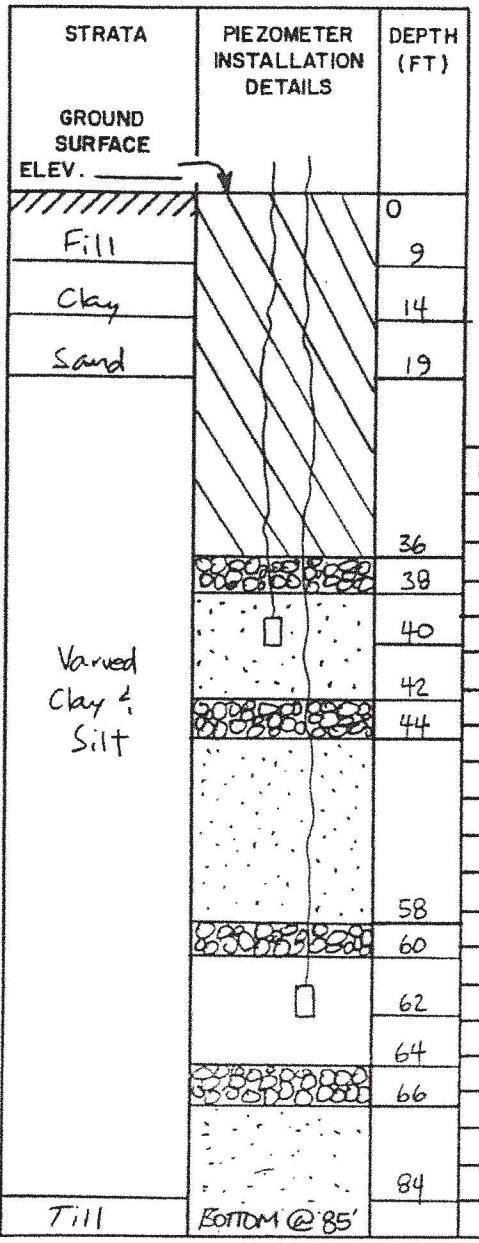
FILE NO. 8713
SUBCODE

MUESER RUTLEDGE CONSULTING ENGINEERS

PIEZOMETER RECORD

PROJECT Seaboard Site — PIEZOMETER NO. 220UP
LOCATION Kearny, NJ
PIEZOMETER LOCATION In borehole 220UP — DATE OF INSTALLATION
☐ SEE SKETCH ON BACK — RES. ENG. O Carpio

PIEZOMETER TYPE Pneumatic



INTAKE POINT

depth to bottom, ft = _____
depth to top, ft = _____
length, ft = _____ = L
diameter, in = _____, ft = _____ = 2R

STANDPIPE/RISER

elevation of rim, ft = _____
diameter, in = _____, ft = _____ = 2r

READING TIME		DEPTH – RIM TO WATER	ELEVATION OF WATER	REMARKS
DATE	CLOCK			

Sand ▨ Bentonite
Gravel ▨ Grout

GROUND SURFACE ELEV. +4.4

PIEZOMETER NO. 220UP

74/82

MSR 7/25/13
PRS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 220UP
SHEET 4 **OF** 4
FILE NO. 8713
SURFACE ELEV. +4.4
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO		
TRUCK	MOBIL B-61	MECHANICAL		DIA., IN 4	DEPTH, FT. FROM 0	TO 9	
SKID		HYDRAULIC		DIA., IN	DEPTH, FT. FROM	TO	
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM	TO	
OTHER							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER 3" FIXED PISTON HEAD
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. 300 AVERAGE FALL, IN. 24
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
8-4-97	13:00	85	9	4	UPON COMPLETION.

PIEZOMETER INSTALLED [X] YES [ ] NO SKETCH SHOWN ON SEE PAGE 3

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	NO. OF 2" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT. 87	NO. OF 3" UNDISTURBED SAMPLES	7
CORE DRILLING IN ROCK	LIN. FT.	OTHER:	

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER REYNOLDS BRIDGPAL HELPERS RANDY PERRY
REMARKS TWO PNEUMATIC PIEZOMETERS INSTALLED IN BOREHOLE.
RESIDENT ENGINEER O. CARPIO DATE 8-4-97

BORING NO. 220UP

77/82

MSR 7/25/13
PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS
BORING LOG

BORING NO. 224
SHEET 1 OF 3
FILE NO. 8713
SURFACE ELEV. + 6.4
RES. ENGR. O. CARPIO

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00	1D	0.0	8-8	Dark gray coarse to fine sand, some			DRILLED	Petroleum odor.
07-28-97		2.0	10-11	cinders, coal, gravel, silt (Fill) (SM)			AHEAD	
Monday	2D	2.0	11-27	Do 1D (SM)				Petroleum odor.
Sunny		4.0	30-12					
90°F	3D	4.0	7-8	Do 1D (SM)	F	5		Petroleum odor.
		6.0	11-12					
	4D	6.0	8-8	Do 1D (SM)				Petroleum odor.
		8.0	5-5					
	5D	8.0	4-5	Top: Do 1D (SM)				Petroleum odor.
10:00		10.0	5-6	Bot 6": Soft brown organic silty clay & peat		9.5		5D Bot: WC=296
07:30				(OH&Pt)			▽	Bottom of 4" casing
07-31-97							USED	grouted in-place
Thursday							WATER	at 11'.
Sunny					O			
85°F						15		
	6D	15.0	1-1	Soft gray organic silty clay, trace				WC=55
		17.0	1-1	vegetation (OH)				
						18.5		
						20		
	7D	20.0	15-13	Stiff brown clayey silt varved with clay,				WC=30
		22.0	15-18	trace fine sand layers (ML&CH)				
						25		
	8D	25.0	6-6	Do 7D (ML&CH)				WC=35
		27.0	8-8					
						30		
	9D	30.0	2-2	Soft gray brown clay varved with clayey				WC=40
		32.0	1-1	silt, trace silty fine sand seams (CH&ML)				
					V			
						35		
	10D	35.0	2-1	Do 9D (CH&ML)				WC=38
		37.0	1-1					
						40		
	11D	40.0	WH/24"	Soft brown clay varved with clayey silt				WC=45
		42.0		(CH&MH)				
						45		
	12D	45.0	WH/24"	Do 11D (CH&MH)				WC=45
		47.0						
						50		
	13D	50.0	2-2	Soft brown clayey silt varved with clay				WC=40
		52.0	2-3	(ML&CH)			▽	

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PAS 7/25/13

MUELLER HUTELDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. 224
SHEET 2 OF 3
FILE NO. 8713
SURFACE ELEV. + 6.4
RES. ENGR. O. CARPIO

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS USED WATER	REMARKS
Cont'd							USED	
07-31-97							WATER	
Thursday								
Sunny								
85°F						55		
	14D	55.0	WH/18"	Do 11D (ML&CH)				WC=40
		57.0	1					
					V			
						60		
	15D	60.0	WR-3	Top: Medium red brown clay varved with				WC=43
		62.0	10-12	clayey silt, trace fine sand seams (CH&ML)				
				Bot 6": Red brown fine sand, some silt,				
				clay, clay pockets (SM-SC)				
						65	∇	
	16D	65.0	7-12	Red brown silty fine to coarse sand, some	T			
14:00		67.0	23-34	gravel, trace clay (SM)		67		End of Boring at 67'.
						70		
								WC=Water Content in percent of dry weight.
						75		
						80		
						85		
						90		
						95		
						100		

BORING NO. 224

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PAS 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 224
SHEET 3 **OF** 3
FILE NO. 8713
SURFACE ELEV. + 6.4
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[X] YES [ ] NO			
TRUCK		MECHANICAL		DIA., IN	4	DEPTH, FT. FROM	0	TO 11
SKID		HYDRAULIC		DIA., IN.		DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.		DEPTH, FT. FROM		TO
OTHER	ATV							

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.	67	NO. OF 2" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.		NO. OF 3" UNDISTURBED SAMPLES	
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER GUS SURI HELPERS DONALD CUTHBERT
REMARKS BOREHOLE GROUTED UPON COMPLETION.
RESIDENT ENGINEER O. CARPIO DATE 7-31-97

BORING NO. 224

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MSR 7/25/13
PA's 7/25/13

MUESER RUTLEDGE CONSULTING ENGINEERS

BORING NO. 228UB
SHEET 3 **OF** 3
FILE NO. 8713
SURFACE ELEV. + 6.7
DATUM NGVD

PROJECT SEABOARD SITE
LOCATION KEARNY, NEW JERSEY
BORING LOCATION SEE BORING LOCATION PLAN

BORING EQUIPMENT AND METHODS OF STABILIZING BOREHOLE

TYPE OF BORING RIG		TYPE OF FEED DURING CORING		CASING USED	[ ] YES [X] NO		
TRUCK		MECHANICAL		DIA., IN.	DEPTH, FT. FROM		TO
SKID		HYDRAULIC		DIA., IN.	DEPTH, FT. FROM		TO
BARGE		OTHER		DIA., IN.	DEPTH, FT. FROM		TO
OTHER	ATV						

TYPE AND SIZE OF:
D-SAMPLER 2" O.D. SPLIT SPOON
U-SAMPLER
S-SAMPLER
CORE BARREL
CORE BIT
DRILL RODS N

DRILLING MUD USED [ ] YES [X] NO
DIAMETER OF ROTARY BIT, IN. 3-7/8
TYPE OF DRILLING MUD REVERT

AUGER USED [ ] YES [X] NO
TYPE AND DIAMETER, IN.

CASING HAMMER, LBS. AVERAGE FALL, IN.
SAMPLER HAMMER, LBS. 140 AVERAGE FALL, IN. 30

WATER LEVEL OBSERVATIONS IN BOREHOLE

DATE	TIME	DEPTH OF HOLE (FEET)	DEPTH OF CASING (FEET)	DEPTH TO WATER (FEET)	CONDITIONS OF OBSERVATION
					NONE MADE.

PIEZOMETER INSTALLED [ ] YES [X] NO SKETCH SHOWN ON

STANDPIPE: TYPE ID, IN. LENGTH, FT. TOP ELEV.
INTAKE ELEMENT: TYPE OD, IN. LENGTH, FT. TIP ELEV.
FILTER: MATERIAL OD, IN. LENGTH, FT. BOT. ELEV.

PAY QUANTITIES

3.5" DIA. DRY SAMPLE BORING	LIN. FT.		NO. OF 2" SHELBY TUBE SAMPLES	
3.5" DIA. U-SAMPLE BORING	LIN. FT.	57.3	NO. OF 3" UNDISTURBED SAMPLES	4(One w/Key Environ. Co.)
CORE DRILLING IN ROCK	LIN. FT.		OTHER:	

BORING CONTRACTOR WARREN GEORGE, INC.
DRILLER JOE KURZYNOWSKI HELPERS DONALD CUTHBERT
REMARKS
RESIDENT ENGINEER O. CARPIO DATE

BORING NO. 228UB

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MSR 7/25/13
PAS 7/25/13

MOESER HUTLEDGE CONSULTING ENGINEERS

BORING LOG

BORING NO. 228UB
SHEET 1 OF 3
FILE NO. 8713
SURFACE ELEV. + 6.7
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS	REMARKS
09:00				For soil description between 0' & 4', see			PUSH	
07-25-97				Boring Log 228				
Friday								
Cloudy								
60°F	3D	4.0	3-3	Black f-c sand, sm silt, gravel sized cinders,	F	5		Petroleum odor.
		6.0	3-1	tr veg fibers (Cinder Fill) (SM)				
	4D	6.0	3-3	Black fine to medium sand, some silt, trace				Petroleum odor.
		8.0	7-9	gravel, cinders, coal (Cinder Fill) (SM)				
	5D	8.0	4-3	Black fine to coarse sand, trace gravel, silt,				Petroleum odor.
		10.0	1-3	cinders (Cinder Fill) (SP-SM)		10	▽	
	6D	10.0	WH/12"	Soft gray organic silty clay, some meadow			USED	WC=118
		12.0	1-1	mat (OH&Pt)			WATER	
	7U	12.0	PUSH=24"	Do 6D (OH&Pt)				Tube 7U sent to
		14.0	REC=24"					Key Environmental.
	8D	14.0	WH/12"	Soft gray organic silty clay, trace roots		15		
		16.0	1-1	(OH)				WC=79
						20		
	9D	20.0	WH/12"	Soft gray organic silty clay, trace fine sand,				WC=50
		22.0	2-1	decomposed vegetation, organic silt				
				pockets (OH)				
						25		
	10U	25.0	PUSH=24"	Do 9D (OH)				WC=57
		27.0	REC=24"					
	11D	27.0	WH/24"	Soft gray organic silty clay, trace fine sand,	O			WC=62
		29.0		fine sand seams (OH)				
						30		
	12D	30.0	WH/24"	Soft gray organic silty clay, trace fine sand,				WC=69
		32.0		decomposed vegetation (OH)				
						35		
	13U	35.0	PUSH=24"	Soft gray organic silty clay, trace fine sand				WC=55
		37.0	REC=24"	(OH)				
	14D	37.0	WH/18"	Soft gray organic silty clay, trace fine sand,				WC=57
		39.0	WH-1	fine sand pockets (OH)				
						40		
	15D	40.0	WH/12"	Soft gray organic silty clay, some fine sand,				WC=53
		42.0	1-1	trace fine sand seams, decomposed				
				vegetation (OH)				
						45		
	16U	45.0	PUSH=24"	Do 15D, trace gravel (OH)				WC=59
		47.0	REC=24"					
	17D	47.0	1-4	Interlayered gray organic silty fine sand &		47.5		WC=100
		49.0	6-12	decomposed vegetation, tr organic clayey				
				silt seams, dec wood seams (SM&Pt)	O&S	50		
	18D	50.0	WH-1	Interlayered gray org fine sandy silt, dec				WC=98
		52.0	5-6	veg & org silty fine sand (OL&Pt&SM)			▽	

MJR 7/25/13
PAS 7/25/13

BORING LOG

BORING NO. 228UB
SHEET 2 OF 3
FILE NO. 8713
SURFACE ELEV. + 6.7
RES. ENGR. P. PIZZIMENTI

PROJECT: SEABOARD SITE
LOCATION : KEARNY, NEW JERSEY

DAILY PROGRESS	SAMPLE NO.	SAMPLE DEPTH	SAMPLE BLOWS/6"	SAMPLE DESCRIPTION	STRATA	DEPTH	CASING BLOWS (USED / WATER)	REMARKS
Cont'd 07-25-97 Friday Cloudy 60°F					O&S	55		
	19D	55.0	3-4	Soft gray organic silty clay, some decomposed vegetation layers, trace fine sand, fine sand seams, decomposed wood seams (OH&Pt)	O			WC=156
		57.0	4-5			60	▽	
	20D	60.0	23-27	Red brown silty fine to coarse sand, some gravel, trace clay (SP)	T			
14:00		62.0	28-22			62		End of Boring at 62'.
						65		Note: Undisturbed soil Sample No. 7U is in possesion of Key Environmental Company. Soil sample description of Sample No. 7U is based on field identification.
						70		
						75		WC=Water Content in percent of dry weight.
						80		
						85		
						90		
						95		
						100		

APPENDIX B

SEDIMENT/STORMWATER MANAGEMENT CALCULATIONS

(Provided under separate cover)

APPENDIX B

SEDIMENT/STORMWATER MANAGEMENT CALCULATIONS

(Provided under separate cover)

1 | 7

MJR 7/23/13
PAS 7/25/13

Stormwater Hydrograph Analyses
Former Koppers Seaboard Site, Kearny, New Jersey

Objective:

The following calculations were used to determine the peak discharge for the 2-hour NJDEP design storm and the 25-year 24-hour Type III design storm for four (4) drainage areas at the Former Koppers Seaboard Site (Site), located in Kearny, New Jersey.

References:

1) Drainage Report, Appendix A, Remedial Action Work Plan Addendum, KEY Environmental, Inc., March 2008.

2) Urban Hydrology for Small Watersheds, U.S. Department of Agriculture, Soil Conservation Service, Engineering Division, Technical Release 55, June 1986.

3) New Jersey Stormwater Best Management Practices Manual, New Jersey Department of Environmental Protection, April 2004 (revised September 2009).

4) NJMC Regulations Code Book, New Jersey Meadowlands Commission, March 2006.

5) HydroCAD Software Solutions, LLC, HydroCAD Stormwater Modeling System, Version 10, Chocorua, NH, 2011.

6) Autodesk, Inc., AutoCAD Civil 3D 2013, San Rafael, CA, 2013.

7) Remedial Action Work Plan, KEY Environmental, Inc., April 1998.

8) Precipitation-Frequency Atlas of the United States, National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, Version 3 – Extracted Thursday, March 13, 2008.

9) N.J.A.C. 19:4-8.6 Drainage – subparagraph (b)3iii.

Assumptions:

The following assumptions were made in developing the hydrographs:

1) For the purpose of computing flows and hydrographs using the SCS Unit Hydrograph Method, a type III, 24-hour rainfall distribution was assumed according to Reference 3 (p. 5-10);

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2) The stormwater quality storm is a 1.25-inch/2-hour storm event per Reference 3 (p. 5-5); a type III rainfall distribution was assumed;

3) The 25-year 24-hour rainfall event for Kearny, New Jersey is 6.1 inches per Reference 8;

4) The SCS-TR55 method was used for time of concentration (Tc) calculations, with a maximum sheet flow length of 100-feet per Reference 9 (p. 3-3);

5) For the sheet flow portion of the Tc calculations, a dense grass surface was used, corresponding to a Manning's coefficient of 0.24 (Reference 4);

6) For the shallow concentrated flow portion of the Tc calculations, a velocity factor of 7-feet/second was used, corresponding to a short grass pasture surface (Reference 4);

7) Based upon the Remedial Action Work Plan (Reference 7), specifications for the post-construction soil cover, a hydrologic soil group 'D' was assumed; and,

8) For post-construction conditions a runoff curve number (CN) of 80 was chosen for the drainage areas, corresponding to an open space with >75% grass cover per Reference 2 (Table 2-2a).

Development:

For the purposes of this design, drainage areas were assigned numbers according to their respective receiving bodies (i.e., Basin 1 through Basin 4). Drainage area boundaries were plotted on the project base-map and AutoCAD Civil 3D Software (Reference 6) was used to determine the size of each drainage area. Flow segments (sheet and shallow concentrated) were then assigned to each drainage area according to Site conditions and preceding assumptions. HydroCAD software (Reference 5) was then used to model each drainage area, providing time of concentration and peak runoff calculations for each area (HydroCAD results are provided at the end of this calculation). The following summarizes the hydrologic characteristics for each drainage area:

Computation of Hydrographs for Drainage Area 1:

The area for Drainage Area 1 was determined to be 24.6 acres. The drainage flow path (see Figure 1) contains segments of both sheet and shallow concentrated flow. The following information summarizes the various flow segments:

<u>Sheet Flow Segment:</u>
Hydraulic Length: 100 ft
Slope: 0.015 ft/ft

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PM 7/25/11

Shallow Concentrated Flow Segment:
Hydraulic Length: 1,053 ft
Slope: 0.015 ft/ft

Using the above information, HydroCAD was used to calculate the peak discharges resulting from the design storms with the SCS Unit Hydrograph Method. The computation results indicate the following:

Time of Concentration (Tc): 36.3 min
2-hour Peak Runoff: 5.01 cfs
25-year Peak Runoff: 57.32 cfs

Computation of Hydrographs for Drainage Area 2:

The area for Drainage Area 2 was determined to be 29.7 acres. The drainage flow path (see Figure 1) contains segments of both sheet and shallow concentrated flow. The following information summarizes the various flow segments:

Sheet Flow Segment:
Hydraulic Length: 100 ft
Slope: 0.015 ft/ft

Shallow Concentrated Flow Segment:
Hydraulic Length: 1,057 ft
Slope: 0.015 ft/ft

Using the above information, HydroCAD was used to calculate the peak discharges resulting from the design storms with the SCS Unit Hydrograph Method. The computation results indicate the following:

Time of Concentration (Tc): 36.3 min
2-hour Peak Runoff: 6.04 cfs
25-year Peak Runoff: 69.21 cfs

Computation of Hydrographs for Drainage Area 3:

The area for Drainage Area 3 was determined to be 34.9 acres. The drainage flow path (see Figure 1) contains segments of both sheet and shallow concentrated flow. The following information summarizes the various flow segments:

Sheet Flow Segment:
Hydraulic Length: 100 ft
Slope: 0.015 ft/ft

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Shallow Concentrated Flow Segment:
Hydraulic Length: 1,031 ft
Slope: 0.015 ft/ft

Using the above information, HydroCAD was used to calculate the peak discharges resulting from the design storms with the SCS Unit Hydrograph Method. The computation results indicate the following:

Time of Concentration (Tc): 35.8 min
2-hour Peak Runoff: 7.10 cfs
25-year Peak Runoff: 81.84 cfs

Computation of Hydrographs for Drainage Area 4:

The area for Drainage Area 4 was determined to be 3.64 acres. The drainage flow path (see Figure 1) contains segments of both sheet and shallow concentrated flow. The following information summarizes the various flow segments:

Sheet Flow Segment:
Hydraulic Length: 100 ft
Slope: 0.015 ft/ft

Shallow Concentrated Flow Segment:
Hydraulic Length: 197 ft
Slope: 0.015 ft/ft

Using the above information, HydroCAD was used to calculate the peak discharges resulting from the design storms with the SCS Unit Hydrograph Method. The computation results indicate the following:

Time of Concentration (Tc): 19.6 min
2-hour Peak Runoff: 1.06 cfs
25-year Peak Runoff: 10.98 cfs

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PAS 7/25/18

Drainage Areas

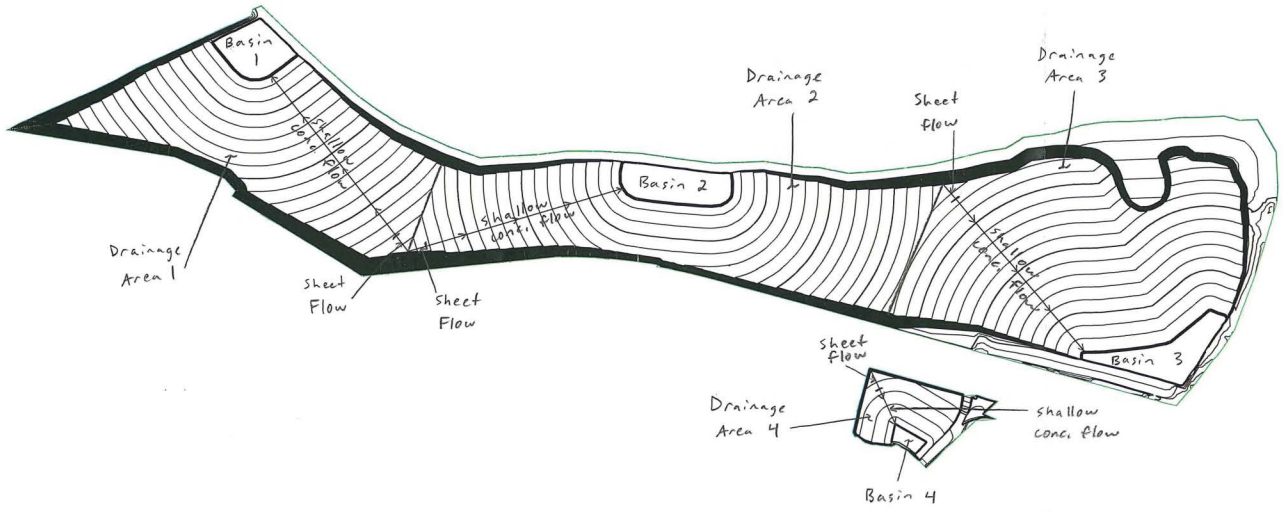
1 - 24.6 acres

2 - 29.7 acres

3 - 34.9 acres

4 - 3.64 acres

Figure 1



Legend

Drainage Area Boundary

Flow Direction

0 500 1000 FEET

p:\02bolt\passport\engineering\base data\elevation adjustment\source drawings\curvbase\de_final curve grading plan.dwg Last Saved By: kmeadow 7/23/2013 8:51 AM Plotted By: ellie thibadeau 7/23/2013 8:02 AM Scale: 1:1

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MSR 7/23/13
PM3 7/25/13

HydroCAD Results

T/T

MJR 7/23/
PAS 7/25/13

Summary for Subcatchment 1S: Drainage Area 1

Runoff = 5.01 cfs @ 1.60 hrs, Volume= 0.355 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type III 24-hr 2.00 hrs Rainfall=1.25"

Area (ac)	CN	Description
24.600	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0150	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
20.5	1,053	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
36.3	1,153	Total			

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Summary for Subcatchment 1S: Drainage Area 1

Runoff = 57.32 cfs @ 12.50 hrs, Volume= 7.937 af, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-Year Rainfall=6.10"

Area (ac)	CN	Description
24.600	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0150	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
20.5	1,053	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
36.3	1,153	Total			

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PAS 7/25/13

Summary for Subcatchment 2S: Drainage Area 2

Runoff = 6.04 cfs @ 1.60 hrs, Volume= 0.428 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type III 24-hr 2.00 hrs Rainfall=1.25"

Area (ac)	CN	Description
29.700	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0150	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
20.5	1,057	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
36.3	1,157	Total			

MSR 7/23/13
PAS 7/25/13

Summary for Subcatchment 2S: Drainage Area 2

Runoff = 69.21 cfs @ 12.50 hrs, Volume= 9.582 af, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-Year Rainfall=6.10"

Area (ac)	CN	Description
29.700	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0150	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
20.5	1,057	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
36.3	1,157	Total			

11/17

MSR 7/23/13
PM 3 7/25/1:

Summary for Subcatchment 3S: Drainage Area 3

Runoff = 7.10 cfs @ 1.59 hrs, Volume= 0.503 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type III 24-hr 2.00 hrs Rainfall=1.25"

Area (ac)	CN	Description
34.900	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0150	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
20.0	1,031	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
35.8	1,131	Total			

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MSR 7/23/13
PAS 7/25/13

Summary for Subcatchment 3S: Drainage Area 3

Runoff = 81.84 cfs @ 12.49 hrs, Volume= 11.260 af, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-Year Rainfall=6.10"

Area (ac)	CN	Description
34.900	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0150	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
20.0	1,031	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
35.8	1,131	Total			

MSR 7/23/13
PAS 7/25/13

Summary for Subcatchment 4S: Drainage Area 4

Runoff = 1.06 cfs @ 1.34 hrs, Volume= 0.053 af, Depth= 0.17"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type III 24-hr 2.00 hrs Rainfall=1.25"

Area (ac)	CN	Description
3.640	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0150	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
3.8	197	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
19.6	297	Total			

MSR 7/23/13
PA's 7/25/13

Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Subcatchment 4S: Drainage Area 4

Runoff = 10.98 cfs @ 12.28 hrs, Volume= 1.174 af, Depth= 3.87"

Runoff by SCS TR-20 method, UH=SCS, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Type III 24-hr 25-Year Rainfall=6.10"

Area (ac)	CN	Description
3.640	80	>75% Grass cover, Good, HSG D

Tc (min)	Length (feet)	Slope (ft/ft)	Velocity (ft/sec)	Capacity (cfs)	Description
15.8	100	0.0150	0.11		**Sheet Flow,** Grass: Dense n= 0.240 P2= 3.30"
3.8	197	0.0150	0.86		**Shallow Concentrated Flow,** Short Grass Pasture Kv= 7.0 fps
19.6	297	Total			

25-year 24-hour Type III storm

MSK 6/19/13 PAS 9/25/13

Precipitation Frequency Data Server

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

New Jersey 40.732 N 74.053 W 88 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted: Thu Mar 13 2008

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | Docs | U.S. Map

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.33	0.53	0.66	0.90	1.11	1.38	1.53	1.98	2.41	2.72	3.16	3.52	4.11	4.65	6.26	7.84	9.98	11.96
2	0.40	0.63	0.79	1.08	1.35	1.67	1.86	2.39	2.92	3.29	3.82	4.25	4.94	5.56	7.44	9.26	11.74	14.02
5	0.47	0.75	0.95	1.33	1.70	2.11	2.35	3.00	3.69	4.20	4.87	5.40	6.17	6.84	8.90	10.87	13.59	16.05
10	0.53	0.84	1.05	1.51	1.96	2.45	2.73	3.50	4.32	4.96	5.76	6.36	7.19	7.90	10.05	12.10	14.99	17.56
25	0.60	0.95	1.19	1.75	2.31	2.93	3.27	4.20	5.23	6.10	7.06	7.76	8.66	9.41	11.61	13.71	16.81	19.47
50	0.65	1.02	1.29	1.92	2.58	3.31	3.71	4.78	6.00	7.08	8.18	8.95	9.89	10.67	12.84	14.93	18.17	20.87
100	0.70	1.10	1.38	2.09	2.86	3.71	4.16	5.38	6.82	8.14	9.41	10.23	11.21	12.00	14.07	16.13	19.48	22.19
200	0.75	1.17	1.47	2.25	3.13	4.12	4.64	6.02	7.71	9.33	10.75	11.64	12.63	13.41	15.32	17.30	20.74	23.42
500	0.81	1.26	1.58	2.47	3.51	4.70	5.31	6.92	8.99	11.09	12.74	13.70	14.67	15.43	17.00	18.82	22.35	24.95
1000	0.86	1.32	1.66	2.63	3.80	5.15	5.84	7.66	10.06	12.59	14.43	15.42	16.36	17.08	18.35	19.95	23.52	26.03

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

*** Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)**

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.37	0.58	0.72	0.98	1.22	1.52	1.69	2.17	2.65	2.96	3.46	3.81	4.43	4.99	6.66	8.30	10.52	12.58
2	0.44	0.69	0.87	1.19	1.49	1.85	2.05	2.63	3.21	3.59	4.19	4.61	5.33	5.97	7.91	9.80	12.37	14.75
5	0.52	0.83	1.04	1.46	1.86	2.33	2.59	3.30	4.05	4.57	5.33	5.85	6.65	7.34	9.46	11.50	14.32	16.89
10	0.58	0.92	1.16	1.66	2.15	2.71	3.02	3.83	4.73	5.39	6.28	6.88	7.74	8.46	10.68	12.80	15.80	18.48
25	0.66	1.04	1.31	1.92	2.54	3.23	3.61	4.60	5.71	6.61	7.70	8.39	9.31	10.08	12.33	14.51	17.72	20.49
50	0.71	1.12	1.42	2.10	2.83	3.66	4.09	5.23	6.55	7.66	8.92	9.68	10.64	11.43	13.64	15.81	19.16	21.97
100	0.77	1.21	1.52	2.29	3.14	4.10	4.59	5.89	7.45	8.81	10.28	11.09	12.08	12.87	14.96	17.10	20.56	23.38
200	0.83	1.29	1.62	2.48	3.45	4.57	5.13	6.62	8.44	10.11	11.78	12.64	13.63	14.43	16.33	18.37	21.93	24.71
500	0.90	1.40	1.75	2.74	3.90	5.22	5.88	7.64	9.87	12.04	14.02	14.95	15.95	16.69	18.19	20.07	23.70	26.39
1000	0.95	1.47	1.84	2.93	4.24	5.75	6.50	8.49	11.07	13.71	15.94	16.90	17.84	18.54	19.73	21.35	25.02	27.60

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

*** Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)**

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.31	0.49	0.60	0.82	1.02	1.25	1.40	1.81	2.21	2.51	2.90	3.25	3.82	4.35	5.89	7.41	9.46	11.36
2	0.36	0.58	0.72	0.99	1.24	1.52	1.70	2.19	2.67	3.04	3.52	3.94	4.60	5.20	7.00	8.75	11.12	13.31
5	0.43	0.69	0.86	1.22	1.55	1.92	2.14	2.74	3.37	3.87	4.47	4.99	5.73	6.39	8.37	10.26	12.87	15.23
10	0.48	0.77	0.96	1.38	1.78	2.23	2.48	3.18	3.93	4.56	5.26	5.86	6.66	7.36	9.43	11.41	14.19	16.65
25	0.54	0.86	1.08	1.58	2.09	2.64	2.95	3.79	4.72	5.57	6.41	7.10	7.97	8.73	10.85	12.89	15.88	18.44
50	0.59	0.92	1.16	1.73	2.33	2.97	3.33	4.28	5.37	6.41	7.38	8.13	9.06	9.83	11.95	14.01	17.12	19.73
100	0.63	0.98	1.24	1.87	2.56	3.30	3.70	4.78	6.04	7.32	8.41	9.23	10.19	10.98	13.04	15.08	18.30	20.93
200	0.67	1.04	1.31	2.00	2.79	3.63	4.09	5.30	6.74	8.30	9.52	10.41	11.37	12.16	14.12	16.11	19.43	22.04

Reference 8

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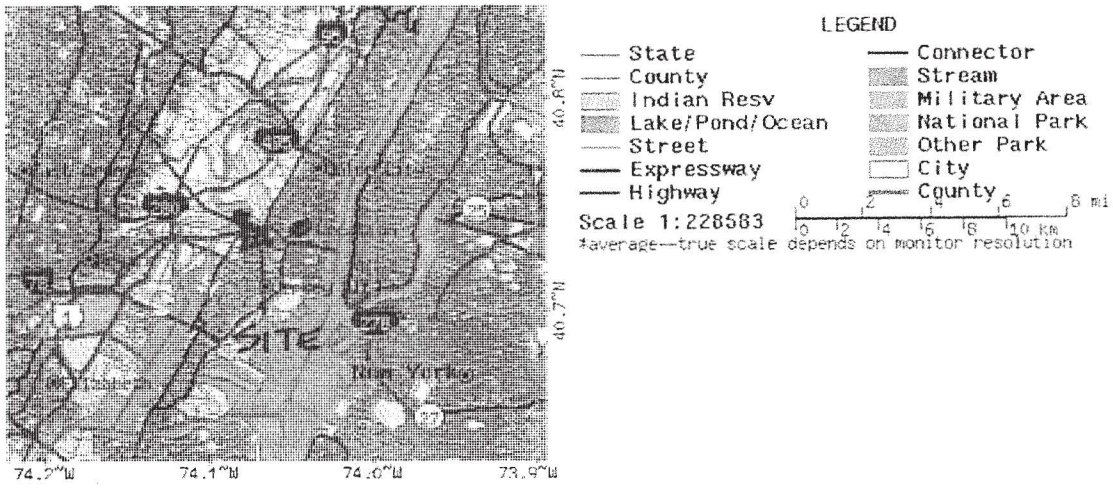

Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; **USGS Aerial Photograph** may also be available from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study, please refer to our documentation.

Using the National Climatic Data Center's (NCDC) station search engine, locate other climate stations within:

+/-30 minutes ...OR... +/-1 degree of this location (40.732/-74.053). Digital ASCII data can be obtained directly from NCDC.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910

(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

Disclaimer

17/17

2-hour / 1.25 inch stormwater Quality storm

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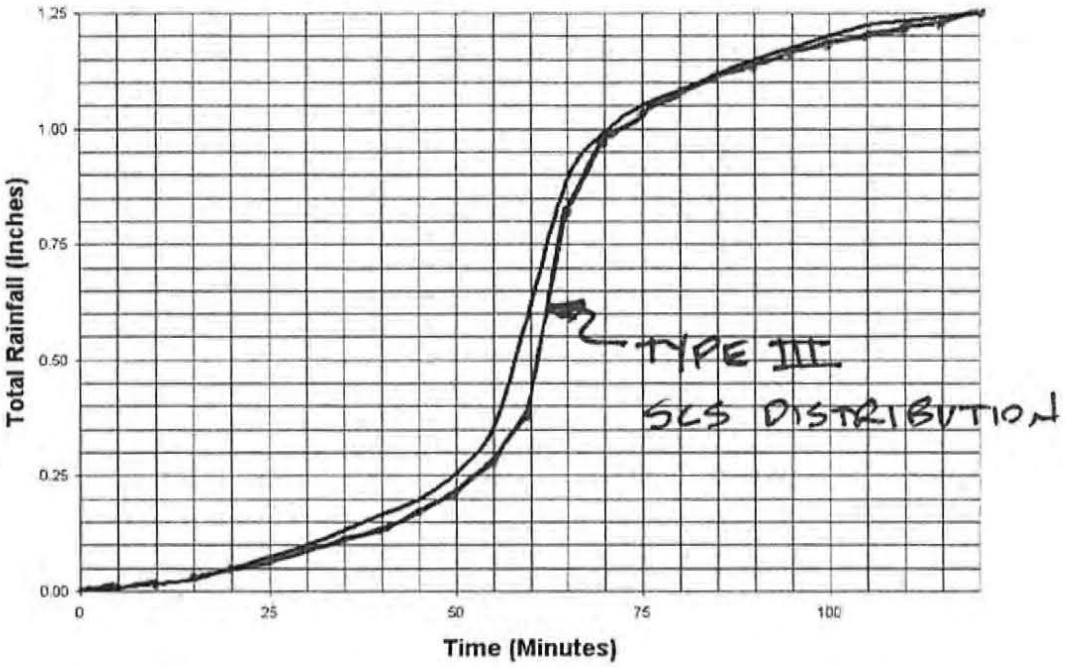
Figure 5-2: NJDEP 1.25-Inch/2-Hour Stormwater Quality Design Storm



The NJDEP stormwater quality design storm can be used to analyze and design stormwater quality BMPs based on the Rational, Modified Rational, or NRCS methods. Selection of the appropriate method will depend on the type of BMP selected and its required design data. BMPs that essentially store, treat, and slowly release the stormwater quality design storm runoff (such as extended detention basins, wet ponds, constructed stormwater wetlands, and sand filters) generally require a runoff volume at the very least and, ideally, an entire runoff hydrograph. This mandates the use of either the NRCS methodology or Modified Rational Method. However, BMPs that treat the stormwater quality design storm runoff as it is conveyed through them (such a filter strip, buffer or manufactured treatment device) generally require only a peak runoff rate. This can be computed using either the NRCS or Rational Methods. Further information on the use of these methods is presented below. When using either the Rational or Modified Rational Methods, it is important to remember their 20-acre drainage area limitations.

Table 5-1 was prepared for those using the NRCS methodology to compute stormwater quality design storm runoff peaks or hydrographs. It contains cumulative and incremental rainfall values for the stormwater quality design storm in five minute increments. These values can be used in computer programs such as TR-20, HEC-1, HEC-HMS, and other programs that both contain the NRCS methodology and allow user-specified rainfalls.

Reference 3

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Design of Extended Detention Basins
Former Koppers Seaboard Site, Kearny, New Jersey

Objective:

The following calculations were performed to determine the dimensions for construction of four (4) extended detention basins (Basin 1 through Basin 4) at the Former Koppers Seaboard Site (Site), located in Kearny, New Jersey. Detention Basins 1, 2, and 3 will provide sediment control for runoff from Drainage Areas 1, 2, and 3, respectively, prior to direct discharge to the Hackensack River. Detention Basin 4 will provide sediment control for runoff from Drainage Area 4 prior to direct discharge to the Beleeza ditch system. See Attachment 3 for location of basins and drainage areas.

References:

1) Basin 4 Calculation Complete Package, KEY Environmental, Inc., May 2009.

2) Drainage Report, Appendix A, Remedial Action Work Plan Addendum (RAWPA), KEY Environmental, Inc., March 2008.

3) Urban Hydrology for Small Watersheds, U.S. Department of Agriculture, Soil Conservation Service, Engineering Division, Technical Release 55, June 1986.

4) New Jersey Stormwater Best Management Practices Manual, New Jersey Department of Environmental Protection, April 2004 (revised September 2009).

5) NJMC Regulations Code Book, New Jersey Meadowlands Commission, March 2006.

6) Standards for Soil Erosion and Sediment Control in New Jersey, New Jersey State Soil Conservation Committee, July 1999 (revised May 2012).

7) HydroCAD Software Solutions, LLC, HydroCAD Stormwater Modeling System, Version 10, Chocorua, NH, 2011.

8) Remedial Action Work Plan (RAWP), KEY Environmental, Inc., April 1998.

9) Precipitation-Frequency Atlas of the United States, National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, Version 3 – Extracted Thursday, March 13, 2008.

MSR 7/25/
PAS 7/25/15

Assumptions:

1) For the purpose of computing flows and hydrographs using the SCS Unit Hydrograph method, a type III, 24-hour rainfall distribution was assumed per Reference 4 (p. 5-10);

2) The stormwater quality storm is a 1.25-inch/2-hour storm event per Reference 4 (p. 5-5); a type III rainfall distribution was assumed;

3) The 25-year 24-hour rainfall event for Kearny, New Jersey is 6.1 inches per Reference 9 (see Attachment 1);

4) Groundwater recharge standards are not applicable due to RAWP (Reference 8) specifications regarding reduced Site infiltration;

5) An analysis of stormwater quantity impact is not required due to proximity to tidal zone;

6) The mean high water elevation for the Hackensack River near the Site is 3.38 feet above mean sea level (ft-msl);

7) The design of Basins 1, 2, and 3 considers conditions in which the tailwater elevation is set to the mean high water elevation;

8) The design of Basin 4 considers conditions in which the tailwater elevation equals the water elevation of the Belezza ditch system (5 feet), which is approximated by the invert of the channel plus the peak water depth (Reference 2);

9) In order to maximize the degree of sedimentation, basins will be designed to be shallow and have large bottom surface areas per Reference 6 (p. 37-4);

10) Based upon RAWP (Reference 8) specifications for post-construction soil cover, a hydrologic soil group 'D' was assumed; and,

11) For post-construction conditions a runoff curve number (CN) of 80 was chosen for the drainage areas, corresponding to an open space with >75% grass cover per Reference 3 (Table 2-2a).

Design Criteria:

1) The spillway conveys a 25-year 24-hour (minimum) design storm per Reference 6 (Table A10-5);

2) Outlet device orifices must have a 3-inch (minimum) diameter per Reference 6 (p. 37-3);

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3) No more than 90% of the peak storage volume collected during the 1.25-inch/2-hour rainfall event is discharged prior to 36 hours per Reference 5 (p. 80); and,

4) To achieve a 60% TSS removal rate, no more than 90% of the peak storage volume collected during the 1.25-inch/2-hour rainfall event is discharged prior to 24 hours per Reference 4 (p. 9.4-3).

Development:

The detention basins were designed to meet all applicable regulations and were modeled using HydroCAD Software (Reference 7). HydroCAD results and pertinent design calculations are provided at the end of this calculation. Basin locations are depicted on the Site Plan View provided as Attachment 3. The following data summarizes the basins:

	Elevations (ft-msl)				
	Bottom of Basin	**Top of Berm**	**Emergency Spillway**	**Barrel Inlet**	**Barrel Outlet**
Basin 1	7.9	10.4	8.4	4.39	3.48
Basin 2	7.9	10.4	8.4	4.49	2.95
Basin 3	8.0	10.0	8.18	4.84	3.19
Basin 4	6.5	8.5	7.52	5.02	4.56

The following tables show how the design criteria were achieved for each detention pond:

Criteria #	**Requirement**	**Pond 1**		**Notes**
		Design Value	**Proof**	
1	Spillway conveys 25-year storm	Spillway conveys 25-year storm	Figure 1	
2	3-inch orifice (min.)	3-inch orifice (min.)	Figure 1	3-inch orifice will be on Stormfilter® unit
3	10% detention after 36-hours (min.)	63%	Figure 2	
4	10% detentions after 24-hours	73%	Figure 2	60% TSS removal is achieved

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Criteria #	Requirement	Pond 2		Notes
		Design Value	Proof	
1	Spillway conveys 25-year storm	Spillway conveys 25-year storm	Figure 3	
2	3-inch orifice (min.)	3-inch orifice (min.)	Figure 3	3-inch orifice will be on Stormfilter® unit
3	10% detention after 36-hours (min.)	69%	Figure 4	
4	10% detentions after 24-hours	78%	Figure 4	60% TSS removal is achieved

Criteria #	Requirement	Pond 3		Notes
		Design Value	Proof	
1	Spillway conveys 25-year storm	Spillway conveys 25-year storm	Figure 5	
2	3-inch orifice (min.)	3-inch orifice (min.)	Figure 5	3-inch orifice will be on Stormfilter® unit
3	10% detention after 36-hours (min.)	64%	Figure 6	
4	10% detentions after 24-hours	72%	Figure 6	60% TSS removal is achieved

Criteria #	Requirement	Pond 4		Notes
		Design Value	Proof	
1	Spillway conveys 25-year storm	Spillway conveys 25-year storm	Figure 7	
2	3-inch orifice (min.)	3-inch orifice (min.)	Figure 7	3-inch orifice
3	10% detention after 36-hours (min.)	33%	Figure 8	
4	10% detentions after 24-hours	40%	Figure 8	60% TSS removal is achieved

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HydroCAD Results and Pertinent Design Calculations

Figures 1 – 8

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Figure 1

MSP 7/23/13
PAS 7/25/13

Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 1P: Basin 1

Inflow Area = 24.600 ac, Inflow Depth > 3.85" for 25-Year event
Inflow = 57.32 cfs @ 12.50 hrs, Volume= 7.886 af
Outflow = 18.19 cfs @ 13.22 hrs, Volume= 6.823 af, Atten= 68%, Lag= 42.8 min
Primary = 18.19 cfs @ 13.22 hrs, Volume= 6.823 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 9.71' @ 13.22 hrs Surf.Area= 1.901 ac Storage= 3.315 af

Plug-Flow detention time= 137.8 min calculated for 6.823 af (87% of inflow)
Center-of-Mass det. time= 80.5 min (918.1 - 837.5)

Volume	Invert	Avail.Storage	Storage Description
#1	7.90'	4.647 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
7.90	1.764	0.000	0.000
9.00	1.847	1.986	1.986
10.00	1.923	1.885	3.871
10.40	1.955	0.776	4.647

Device	Routing	Invert	Outlet Devices
#1	Primary	4.39'	**18.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.39' / 3.48' S= 0.0152 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	7.90'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	8.40'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=18.19 cfs @ 13.22 hrs HW=9.71' TW=3.38' (Fixed TW Elev= 3.38')
↑—**1=Culvert** (Inlet Controls 18.19 cfs @ 10.29 fps)
↑—**2=Orifice/Grate** (Passes < 0.31 cfs potential flow)
—**3=Orifice/Grate** (Passes < 55.08 cfs potential flow)

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Figure 2

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Original Design Elevations
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Type III 24-hr 2.00 hrs Rainfall=1.25"
Printed 7/23/2013

Hydrograph for Pond 1P: Basin 1

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	7.90	0.00
1.00	**0.00**	0.000	7.90	0.00
2.00	**3.01**	0.250	8.04	0.04
3.00	0.13	**0.347**	**8.10**	**0.06**
4.00	0.00	**0.344**	**8.09**	**0.06**
5.00	0.00	0.339	8.09	0.06
6.00	0.00	0.334	8.09	0.06
7.00	0.00	0.330	8.09	0.06
8.00	0.00	0.325	8.08	0.06
9.00	0.00	0.320	8.08	0.06
10.00	0.00	0.316	8.08	0.05
11.00	0.00	0.311	8.08	0.05
12.00	0.00	0.307	8.07	0.05
13.00	0.00	0.303	8.07	0.05
14.00	0.00	0.299	8.07	0.05
15.00	0.00	0.295	8.07	0.05
16.00	0.00	0.291	8.06	0.05
17.00	0.00	0.287	8.06	0.05
18.00	0.00	0.283	8.06	0.05
19.00	0.00	0.279	8.06	0.04
20.00	0.00	0.276	8.06	0.04
21.00	0.00	0.272	8.05	0.04
22.00	0.00	0.269	8.05	0.04
23.00	0.00	0.265	8.05	0.04
24.00	0.00	0.262	8.05	0.04
25.00	0.00	0.259	8.05	0.04
26.00	0.00	0.256	8.04	0.04
27.00	0.00	0.253	8.04	0.04
28.00	0.00	0.249	8.04	0.04
29.00	0.00	0.246	8.04	0.04
30.00	0.00	0.244	8.04	0.04
31.00	0.00	0.241	8.04	0.03
32.00	0.00	0.238	8.03	0.03
33.00	0.00	0.235	8.03	0.03
34.00	0.00	0.232	8.03	0.03
35.00	0.00	0.230	8.03	0.03
36.00	0.00	0.227	8.03	0.03
37.00	0.00	0.225	8.03	0.03
38.00	0.00	0.222	8.03	0.03
39.00	0.00	0.220	8.02	0.03
40.00	0.00	0.217	8.02	0.03
41.00	0.00	0.215	8.02	0.03
42.00	0.00	0.213	8.02	0.03
43.00	0.00	0.210	8.02	0.03
44.00	0.00	0.208	8.02	0.03
45.00	0.00	0.206	8.02	0.03
46.00	0.00	0.204	8.02	0.03
47.00	0.00	0.202	8.01	0.03
48.00	0.00	0.200	8.01	0.02
49.00	0.00	0.198	8.01	0.02
50.00	0.00	0.196	8.01	0.02

→ peak volume

Detention after 24 hours:

$\left(\frac{0.253}{0.347}\right) = 73\% < 90\%$

Detention after 36 hours:

$\left(\frac{0.220}{0.347}\right) = 63\% < 90\%$

Figure 3

MSR 7/23/13
PMS 7/25/13

Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 2P: Basin 2

Inflow Area = 29.700 ac, Inflow Depth > 3.85" for 25-Year event
Inflow = 69.21 cfs @ 12.50 hrs, Volume= 9.520 af
Outflow = 18.16 cfs @ 13.34 hrs, Volume= 8.161 af, Atten= 74%, Lag= 50.2 min
Primary = 18.16 cfs @ 13.34 hrs, Volume= 8.161 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 9.79' @ 13.34 hrs Surf.Area= 2.382 ac Storage= 4.333 af

Plug-Flow detention time= 157.7 min calculated for 8.127 af (85% of inflow)
Center-of-Mass det. time= 99.3 min (936.8 - 837.5)

Volume	Invert	Avail.Storage	Storage Description
#1	7.90'	5.798 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
7.90	2.197	0.000	0.000
9.00	2.304	2.476	2.476
10.00	2.403	2.353	4.829
10.40	2.443	0.969	5.798

Device	Routing	Invert	Outlet Devices
#1	Primary	4.49'	**18.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.49' / 2.95' S= 0.0257 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	7.90'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	8.40'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=18.15 cfs @ 13.34 hrs HW=9.79' TW=3.38' (Fixed TW Elev= 3.38')
↑—**1=Culvert** (Inlet Controls 18.15 cfs @ 10.27 fps)
↑—**2=Orifice/Grate** (Passes < 0.31 cfs potential flow)
—**3=Orifice/Grate** (Passes < 56.80 cfs potential flow)

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Figure 4

MSR 7/23/18
PAS 7/25/18

Original Design Elevations
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Type III 24-hr 2.00 hrs Rainfall=1.25"
Printed 7/23/2013

Hydrograph for Pond 2P: Basin 2

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	7.90	0.00
1.00	**0.00**	0.000	7.90	0.00
2.00	**3.63**	0.302	8.04	0.03
3.00	0.16	**0.420**	**8.09**	**0.06**
4.00	0.00	**0.418**	**8.09**	**0.06**
5.00	0.00	0.413	8.09	0.06
6.00	0.00	0.409	8.09	0.06
7.00	0.00	0.404	8.08	0.06
8.00	0.00	0.399	8.08	0.06
9.00	0.00	0.395	8.08	0.05
10.00	0.00	0.390	8.08	0.05
11.00	0.00	0.386	8.08	0.05
12.00	0.00	0.382	8.07	0.05
13.00	0.00	0.378	8.07	0.05
14.00	0.00	0.373	8.07	0.05
15.00	0.00	0.369	8.07	0.05
16.00	0.00	0.365	8.07	0.05
17.00	0.00	0.361	8.06	0.05
18.00	0.00	0.358	8.06	0.05
19.00	0.00	0.354	8.06	0.05
20.00	0.00	0.350	8.06	0.04
21.00	0.00	0.346	8.06	0.04
22.00	0.00	0.343	8.06	0.04
23.00	0.00	0.339	8.05	0.04
24.00	0.00	0.336	8.05	0.04
25.00	0.00	0.332	8.05	0.04
26.00	0.00	0.329	8.05	0.04
27.00	0.00	0.326	8.05	0.04
28.00	0.00	0.323	8.05	0.04
29.00	0.00	0.319	8.04	0.04
30.00	0.00	0.316	8.04	0.04
31.00	0.00	0.313	8.04	0.04
32.00	0.00	0.310	8.04	0.04
33.00	0.00	0.307	8.04	0.04
34.00	0.00	0.304	8.04	0.04
35.00	0.00	0.301	8.04	0.03
36.00	0.00	0.298	8.04	0.03
37.00	0.00	0.296	8.03	0.03
38.00	0.00	0.293	8.03	0.03
39.00	0.00	0.290	8.03	0.03
40.00	0.00	0.287	8.03	0.03
41.00	0.00	0.285	8.03	0.03
42.00	0.00	0.282	8.03	0.03
43.00	0.00	0.280	8.03	0.03
44.00	0.00	0.277	8.03	0.03
45.00	0.00	0.275	8.02	0.03
46.00	0.00	0.272	8.02	0.03
47.00	0.00	0.270	8.02	0.03
48.00	0.00	0.268	8.02	0.03
49.00	0.00	0.265	8.02	0.03
50.00	0.00	0.263	8.02	0.03

→ peak volume

Detention after 24 hours:

$\left(\frac{0.326}{0.420}\right) = 78\% < 90\%$

Detention after 36 hours:

$\left(\frac{0.290}{0.420}\right) = 69\% < 90\%$

Figure 5

MSR 7/23/13
PAS 7/25/13

Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
Prepared by Microsoft Printed 7/23/2013
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Summary for Pond 3P: Basin 3

Inflow Area = 34.900 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 81.84 cfs @ 12.49 hrs, Volume= 11.260 af
Outflow = 33.67 cfs @ 13.06 hrs, Volume= 10.914 af, Atten= 59%, Lag= 33.7 min
Primary = 33.67 cfs @ 13.06 hrs, Volume= 10.914 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 9.50' @ 13.06 hrs Surf.Area= 2.493 ac Storage= 3.608 af

Plug-Flow detention time= 91.4 min calculated for 10.892 af (97% of inflow)
Center-of-Mass det. time= 76.4 min (917.5 - 841.1)

Volume	Invert	Avail.Storage	Storage Description
#1	8.00'	4.861 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
8.00	2.306	0.000	0.000
9.00	2.430	2.368	2.368
10.00	2.556	2.493	4.861

Device	Routing	Invert	Outlet Devices
#1	Primary	4.84'	**18.0" Round Culvert X 2.00** L= 165.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.84' / 3.19' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	8.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	8.18'	**72.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=33.66 cfs @ 13.06 hrs HW=9.50' TW=3.38' (Fixed TW Elev= 3.38')
↑—**1=Culvert** (Inlet Controls 33.66 cfs @ 9.52 fps)
↑—**2=Orifice/Grate** (Passes < 0.28 cfs potential flow)
—**3=Orifice/Grate** (Passes < 99.32 cfs potential flow)

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Figure 6

MSR 7/23/13
PAS 7/25/13

Original Design Elevations
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Type III 24-hr 2.00 hrs Rainfall=1.25"
Printed 7/23/2013

Hydrograph for Pond 3P: Basin 3

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	8.00	0.00
1.00	**0.00**	0.000	8.00	0.00
2.00	**4.21**	**0.358**	**8.15**	**0.04**
3.00	0.18	**0.479**	**8.21**	**0.36**
4.00	0.00	0.458	8.20	0.23
5.00	0.00	0.443	8.19	0.16
6.00	0.00	0.431	8.19	0.11
7.00	0.00	0.423	8.18	0.08
8.00	0.00	0.418	8.18	0.06
9.00	0.00	0.413	8.18	0.05
10.00	0.00	0.409	8.18	0.05
11.00	0.00	0.404	8.17	0.05
12.00	0.00	0.400	8.17	0.05
13.00	0.00	0.396	8.17	0.05
14.00	0.00	0.392	8.17	0.05
15.00	0.00	0.388	8.17	0.05
16.00	0.00	0.384	8.17	0.05
17.00	0.00	0.380	8.16	0.05
18.00	0.00	0.376	8.16	0.05
19.00	0.00	0.372	8.16	0.05
20.00	0.00	0.368	8.16	0.04
21.00	0.00	0.365	8.16	0.04
22.00	0.00	0.361	8.16	0.04
23.00	0.00	0.358	8.15	0.04
24.00	0.00	0.354	8.15	0.04
25.00	0.00	0.351	8.15	0.04
26.00	0.00	0.347	8.15	0.04
27.00	0.00	0.344	8.15	0.04
28.00	0.00	0.341	8.15	0.04
29.00	0.00	0.337	8.15	0.04
30.00	0.00	0.334	8.14	0.04
31.00	0.00	0.331	8.14	0.04
32.00	0.00	0.328	8.14	0.04
33.00	0.00	0.325	8.14	0.04
34.00	0.00	0.322	8.14	0.04
35.00	0.00	0.319	8.14	0.04
36.00	0.00	0.316	8.14	0.03
37.00	0.00	0.314	8.14	0.03
38.00	0.00	0.311	8.13	0.03
39.00	0.00	0.308	8.13	0.03
40.00	0.00	0.305	8.13	0.03
41.00	0.00	0.303	8.13	0.03
42.00	0.00	0.300	8.13	0.03
43.00	0.00	0.297	8.13	0.03
44.00	0.00	0.295	8.13	0.03
45.00	0.00	0.292	8.13	0.03
46.00	0.00	0.290	8.13	0.03
47.00	0.00	0.287	8.12	0.03
48.00	0.00	0.285	8.12	0.03
49.00	0.00	0.283	8.12	0.03
50.00	0.00	0.280	8.12	0.03

→ peak volume

Detention after 24 hours:

$\left(\frac{0.344}{0.479}\right) = 72\% < 90\%$

Detention after 36 hours:

$\left(\frac{0.308}{0.479}\right) = 64\% < 90\%$

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Figure 7

MSR 7/23/13
PAS 7/25/13

Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 4P: Basin 4

Inflow Area = 3.640 ac, Inflow Depth > 3.86" for 25-Year event
Inflow = 10.98 cfs @ 12.28 hrs, Volume= 1.171 af
Outflow = 5.98 cfs @ 12.58 hrs, Volume= 0.902 af, Atten= 46%, Lag= 18.4 min
Primary = 5.98 cfs @ 12.58 hrs, Volume= 0.902 af

Routing by Stor-Ind method, Time Span= 0.00-24.00 hrs, dt= 0.10 hrs
Peak Elev= 8.02' @ 12.58 hrs Surf.Area= 0.289 ac Storage= 0.413 af

Plug-Flow detention time= 137.9 min calculated for 0.902 af (77% of inflow)
Center-of-Mass det. time= 56.9 min (881.0 - 824.1)

Volume	Invert	Avail.Storage	Storage Description
#1	6.50'	0.555 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
6.50	0.255	0.000	0.000
7.00	0.266	0.130	0.130
8.00	0.289	0.277	0.408
8.50	0.301	0.148	0.555

Device	Routing	Invert	Outlet Devices
#1	Primary	5.02'	**12.0" Round Culvert** L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.02' / 4.56' S= 0.0131 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	6.53'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	7.52'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.97 cfs @ 12.58 hrs HW=8.01' TW=5.00' (Fixed TW Elev= 5.00')
↑—**1=Culvert** (Inlet Controls 5.97 cfs @ 7.60 fps)
↑—**2=Orifice/Grate** (Passes < 0.28 cfs potential flow)
—**3=Orifice/Grate** (Passes < 14.78 cfs potential flow)

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Figure 8

MSR 7/23/13
PAS 7/25/13

Original Design Elevations
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Type III 24-hr 2.00 hrs Rainfall=1.25"
Printed 7/23/2013

Hydrograph for Pond 4P: Basin 4

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	6.50	0.00
1.00	**0.00**	0.000	6.50	0.00
2.00	**0.29**	**0.045**	**6.68**	**0.04**
3.00	0.00	**0.048**	**6.69**	**0.04**
4.00	0.00	0.044	6.67	0.04
5.00	0.00	0.041	6.66	0.03
6.00	0.00	0.039	6.65	0.03
7.00	0.00	0.037	6.64	0.02
8.00	0.00	0.035	6.64	0.02
9.00	0.00	0.033	6.63	0.02
10.00	0.00	0.032	6.62	0.02
11.00	0.00	0.030	6.62	0.02
12.00	0.00	0.029	6.61	0.01
13.00	0.00	0.028	6.61	0.01
14.00	0.00	0.027	6.60	0.01
15.00	0.00	0.026	6.60	0.01
16.00	0.00	0.025	6.60	0.01
17.00	0.00	0.024	6.60	0.01
18.00	0.00	0.024	6.59	0.01
19.00	0.00	0.023	6.59	0.01
20.00	0.00	0.022	6.59	0.01
21.00	0.00	0.022	6.59	0.01
22.00	0.00	0.021	6.58	0.01
23.00	0.00	0.021	6.58	0.01
24.00	0.00	0.020	6.58	0.01
25.00	0.00	0.020	6.58	0.00
26.00	0.00	0.020	6.58	0.00
27.00	0.00	0.019	6.57	0.00
28.00	0.00	0.019	6.57	0.00
29.00	0.00	0.018	6.57	0.00
30.00	0.00	0.018	6.57	0.00
31.00	0.00	0.018	6.57	0.00
32.00	0.00	0.018	6.57	0.00
33.00	0.00	0.017	6.57	0.00
34.00	0.00	0.017	6.57	0.00
35.00	0.00	0.017	6.57	0.00
36.00	0.00	0.017	6.56	0.00
37.00	0.00	0.016	6.56	0.00
38.00	0.00	0.016	6.56	0.00
39.00	0.00	0.016	6.56	0.00
40.00	0.00	0.016	6.56	0.00
41.00	0.00	0.016	6.56	0.00
42.00	0.00	0.015	6.56	0.00
43.00	0.00	0.015	6.56	0.00
44.00	0.00	0.015	6.56	0.00
45.00	0.00	0.015	6.56	0.00
46.00	0.00	0.015	6.56	0.00
47.00	0.00	0.015	6.56	0.00
48.00	0.00	0.014	6.56	0.00
49.00	0.00	0.014	6.56	0.00
50.00	0.00	0.014	6.56	0.00

→ peak volume

Detention after 24 hours:

$\left(\frac{0.019}{0.048}\right) = 40\% < 90\%$

Detention after 36 hours:

$\left(\frac{0.016}{0.048}\right) = 33\% < 90\%$

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25 year 24 hour
Type III storm

MSR 6/19/13
PAS 7/25/13

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

New Jersey 40.732 N 74.053 W 88 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted: Tue Mar 11 2008

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.33	0.53	0.66	0.90	1.11	1.38	1.53	1.98	2.41	2.72	3.16	3.52	4.11	4.65	6.26	7.84	9.98	11.96
2	0.40	0.63	0.79	1.08	1.35	1.67	1.86	2.39	2.92	3.29	3.82	4.25	4.94	5.56	7.44	9.26	11.74	14.02
5	0.47	0.75	0.95	1.33	1.70	2.11	2.35	3.00	3.69	4.20	4.87	5.40	6.17	6.84	8.90	10.87	13.59	16.05
10	0.53	0.84	1.05	1.51	1.96	2.45	2.73	3.50	4.32	4.96	5.76	6.36	7.19	7.90	10.05	12.10	14.99	17.56
25	0.60	0.95	1.19	1.75	2.31	2.93	3.27	4.20	5.23	6.10	7.06	7.76	8.66	9.41	11.61	13.71	16.81	19.47
50	0.65	1.02	1.29	1.92	2.58	3.31	3.71	4.78	6.00	7.08	8.18	8.95	9.89	10.67	12.84	14.93	18.17	20.87
100	0.70	1.10	1.38	2.09	2.86	3.71	4.16	5.38	6.82	8.14	9.41	10.23	11.21	12.00	14.07	16.13	19.48	22.19
200	0.75	1.17	1.47	2.25	3.13	4.12	4.64	6.02	7.71	9.33	10.75	11.64	12.63	13.41	15.32	17.30	20.74	23.42
500	0.81	1.26	1.58	2.47	3.51	4.70	5.31	6.92	8.99	11.09	12.74	13.70	14.67	15.43	17.00	18.82	22.35	24.95
1000	0.86	1.32	1.66	2.63	3.80	5.15	5.84	7.66	10.06	12.59	14.43	15.42	16.36	17.08	18.35	19.95	23.52	26.03

Text version of table

*These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

* Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.37	0.58	0.72	0.98	1.22	1.52	1.69	2.17	2.65	2.96	3.46	3.81	4.43	4.99	6.66	8.30	10.52	12.58
2	0.44	0.69	0.87	1.19	1.49	1.85	2.05	2.63	3.21	3.59	4.19	4.61	5.33	5.97	7.91	9.80	12.37	14.75
5	0.52	0.83	1.04	1.46	1.86	2.33	2.59	3.30	4.05	4.57	5.33	5.85	6.65	7.34	9.46	11.50	14.32	16.89
10	0.58	0.92	1.16	1.66	2.15	2.71	3.02	3.83	4.73	5.39	6.28	6.88	7.74	8.46	10.68	12.80	15.80	18.48
25	0.66	1.04	1.31	1.92	2.54	3.23	3.61	4.60	5.71	6.61	7.70	8.39	9.31	10.08	12.33	14.51	17.72	20.49
50	0.71	1.12	1.42	2.10	2.83	3.66	4.09	5.23	6.55	7.66	8.92	9.68	10.64	11.43	13.64	15.81	19.16	21.97
100	0.77	1.21	1.52	2.29	3.14	4.10	4.59	5.89	7.45	8.81	10.28	11.09	12.08	12.87	14.96	17.10	20.56	23.38
200	0.83	1.29	1.62	2.48	3.45	4.57	5.13	6.62	8.44	10.11	11.78	12.64	13.63	14.43	16.33	18.37	21.93	24.71
500	0.90	1.40	1.75	2.74	3.90	5.22	5.88	7.64	9.87	12.04	14.02	14.95	15.95	16.69	18.19	20.07	23.70	26.39
1000	0.95	1.47	1.84	2.93	4.24	5.75	6.50	8.49	11.07	13.71	15.94	16.90	17.84	18.54	19.73	21.35	25.02	27.60

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

* Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.31	0.49	0.60	0.82	1.02	1.25	1.40	1.81	2.21	2.51	2.90	3.25	3.82	4.35	5.89	7.41	9.46	11.36
2	0.36	0.58	0.72	0.99	1.24	1.52	1.70	2.19	2.67	3.04	3.52	3.94	4.60	5.20	7.00	8.75	11.12	13.31
5	0.43	0.69	0.86	1.22	1.55	1.92	2.14	2.74	3.37	3.87	4.47	4.99	5.73	6.39	8.37	10.26	12.87	15.23
10	0.48	0.77	0.96	1.38	1.78	2.23	2.48	3.18	3.93	4.56	5.26	5.86	6.66	7.36	9.43	11.41	14.19	16.65
25	0.54	0.86	1.08	1.58	2.09	2.64	2.95	3.79	4.72	5.57	6.41	7.10	7.97	8.73	10.85	12.89	15.88	18.44
50	0.59	0.92	1.16	1.73	2.33	2.97	3.33	4.28	5.37	6.41	7.38	8.13	9.06	9.83	11.95	14.01	17.12	19.73
100	0.63	0.98	1.24	1.87	2.56	3.30	3.70	4.78	6.04	7.32	8.41	9.23	10.19	10.98	13.04	15.08	18.30	20.95
200	0.67	1.04	1.31	2.00	2.79	3.63	4.09	5.30	6.74	8.30	9.52	10.41	11.37	12.16	14.12	16.11	19.43	22.04

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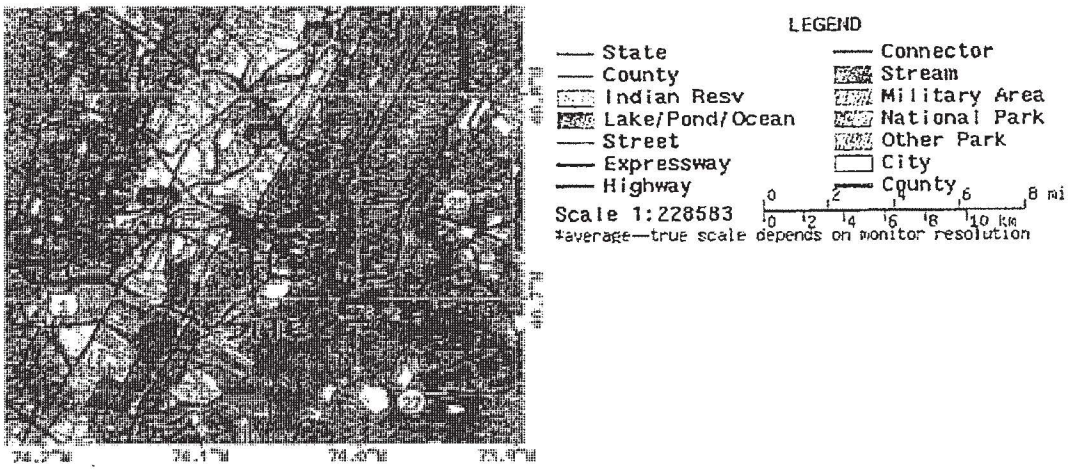

Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; **USGS Aerial Photograph** may also be available from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study, please refer to our documentation.

Using the National Climatic Data Center's (NCDC) station search engine, locate other climate stations within:

+/-30 minutes ...OR... +/-1 degree of this location (40.732/-74.053). Digital ASCII data can be obtained directly from NCDC.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910
(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

Disclaimer

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2-hour / 1.25 inch Stormwater Quality storm

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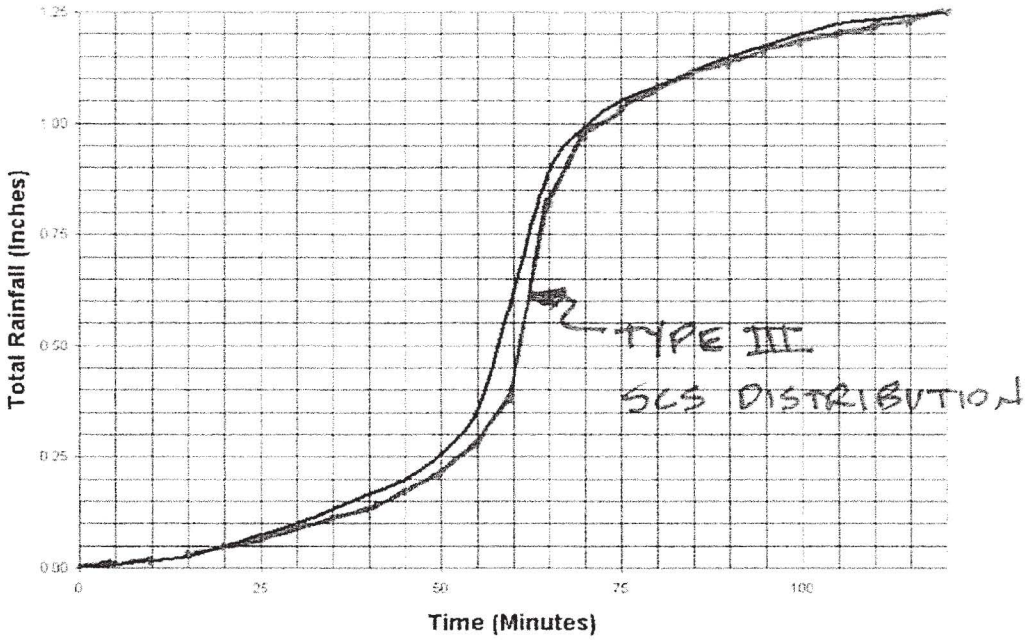
Figure 5-2: NJDEP 1.25-Inch/2-Hour Stormwater Quality Design Storm



The NJDEP stormwater quality design storm can be used to analyze and design stormwater quality BMPs based on the Rational, Modified Rational, or NRCS methods. Selection of the appropriate method will depend on the type of BMP selected and its required design data. BMPs that essentially store, treat, and slowly release the stormwater quality design storm runoff (such as extended detention basins, wet ponds, constructed stormwater wetlands, and sand filters) generally require a runoff volume at the very least and, ideally, an entire runoff hydrograph. This mandates the use of either the NRCS methodology or Modified Rational Method. However, BMPs that treat the stormwater quality design storm runoff as it is conveyed through them (such a filter strip, buffer or manufactured treatment device) generally require only a peak runoff rate. This can be computed using either the NRCS or Rational Methods. Further information on the use of these methods is presented below. When using either the Rational or Modified Rational Methods, it is important to remember their 20-acre drainage area limitations.

Table 5-1 was prepared for those using the NRCS methodology to compute stormwater quality design storm runoff peaks or hydrographs. It contains cumulative and incremental rainfall values for the stormwater quality design storm in five minute increments. These values can be used in computer programs such as TR-20, HEC-1, HEC-HMS, and other programs that both contain the NRCS methodology and allow user-specified rainfalls.

Reference 4

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TSS Removal Rate
Former Koppers Seaboard Site, Kearny, New Jersey

Objective:

The following calculations were used to determine the Total Suspended Solids (TSS) removal rate for the Southern Area at the Former Koppers Seaboard Site, located in Kearny, New Jersey. A Site average TSS removal rate was then calculated to demonstrate that adequate sediment controls are installed across the entire Site.

References:

1) Basin 4 Calculation Complete Package, KEY Environmental, Inc., May 2009.

2) Drainage Report, Appendix A, Remedial Action Work Plan Addendum (RAWPA), KEY Environmental, Inc., March 2008.

3) Design of Extended Detention Basins, RAWPA, KEY Environmental, Inc., July 2013.

4) New Jersey Stormwater Best Management Practices Manual, New Jersey Department of Environmental Protection, April 2004 (revised September 2009).

5) Final RAWPA, Volume II-A – Surface Cover Remedial Action Plan, Former Koppers Seaboard Site, Kearny, New Jersey.

6) Standards for Soil Erosion and Sediment Control in New Jersey, New Jersey State Soil Conservation Committee, July 1999 (revised May 2012).

7) Extension Approval to Conditional Interim Certification for the Stormwater Management Stormfilter Letter, New Jersey Department of Environmental Protection, December 22, 2004.

8) Addendum to the Stormfilter Conditional Interim Certification, New Jersey Department of Environmental Protection, January 17, 2007.

9) Autodesk, Inc., AutoCAD Civil 3D 2013, San Rafael, CA, 2013.

Assumptions:

The following assumptions were made in calculating the TSS removal rate for the Southern Area:

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1) Equation 4-1 of Reference 4 (p. 4-3) is applicable for calculating the TSS removal rate for Best Management Practices (BMPs) in series;

2) The disturbed perimeter areas that do not drain into sediment Basin 4 will be adequately seeded as specified in Reference 5;

3) Natural drainage features located on the perimeter of Drainage Area 4 will be preserved;

4) The average annual TSS load from a 1.25-inch/2-hour variable rainfall event design storm was evaluated; and,

5) All disturbed areas will be planted with vegetative cover.

The following assumptions were made in calculating the Site average TSS removal rate:

1) Equation 4-1 of Reference 4 (p. 4-3) is applicable for calculating the TSS removal rate for BMPs in series;

2) Per References 7 and 8, the TSS removal rate of the StormFilter® products used for Basins 1, 2, and 3 is 80%.

3) The narrow perimeter areas that do not drain to a sediment basin will be adequately seeded and maintained to qualify as vegetative filter strips with 60% TSS removal; and,

4) A Site-wide average TSS removal rate of 80% or greater will account for less significant removal rates along the narrow perimeter areas that do not drain to a sediment basin.

Design Criteria for TSS Removal in Southern Area:

Soil Erosion and Sedimentation Control for the Southern Area will be provided by installing BMPs as described in Reference 4. Non-structural BMPs were incorporated to the maximum extent practicable. Non-structural Low Impact Development (LID) BMPs included minimizing site disturbance, preserving important features, flattening slopes, utilizing native vegetation and maintaining natural drainage features and characteristics. The Stormwater Management Rules require an 80% TSS reduction in the post-construction runoff from a land development site.

Drainage Area and Runoff Characteristics in Southern Area:

The Southern Area is divided into two sections, A2 and A5, as shown on Figure 1.

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Area A2

Post-construction area A2 will be a total of 7.34 acres. All runoff from section A2 flows to Wetland No. 13 (see Figure 1). Following additional PDM placement in the Southern Area, only 3.64 acres of section A2 (labeled S1 on Figure 1) will drain to extended detention Basin 4, which then discharges directly to Wetland No. 13. The natural drainage swales and existing watercourses located outside of S1 convey runoff from the remaining 3.70 acres of section A2 and will be preserved.

To remove TSS from area S1, a vegetated filter strip and an extended detention basin (i.e., Basin 4) will be utilized. Following additional PDM placement in the Southern Area, the overland slope within area S1 to drainage Basin 4 will be a well-graded uniform slope of 1.5% as depicted on Figure 1. It is assumed that the Hydrologic Soil Group for the Southern Area is 'D.' From Reference 4 (Table 9.10-2) the maximum filter strip slope is 8%; thus the slope within area S1 of 1.5% is less than the maximum allowable slope for a vegetated filter strip. The vegetative filter will be planted with native grass (meadow type) vegetative cover to satisfy the requirement defined in Reference 4 (Table 9.10-1). The drainage area was configured so runoff to Basin 4 will remain as sheet flow to the maximum extent possible.

The vegetated filter strip in area S1 ranges in length from 43 feet to 53 feet along the western and northern sides of Basin 4, satisfying the minimal filter strip length requirement of 43 feet per Reference 4 (Figure 9.10-6). The vegetative filter strip will be constructed adjacent to Basin 4 as illustrated on Figure 1, and will be planted with native grasses with dense growth patterns, limed, fertilized, and mulched. The length requirement of 43 feet is not met in the vegetative filter strip along the eastern and southern sides of Basin 4 because the strip is merely an added precaution in these areas and is not necessary to achieve the required TSS removal rate. An aggressive maintenance plan will be performed on the vegetative filter strip to expedite native grass growth. The maintenance plan will include irrigation as required to initiate plant growth during summer months, or a nurse crop will be planted with the native grass if required to provide runoff protection during the winter months.

Total TSS removal rate for two BMPs in series can be determined from the following:

$$R = A + B - [(A \times B) / 100]$$ (Equation 4-1, Reference 4)

Where: R = Total TSS removal rate
A = TSS removal rate of the first or upstream BMP
= 70% for native grass vegetated filter strip (Table 9.10-1, Reference 4)
B = TSS removal rate of the second or downstream BMP
= 60% for extended detention Basin 4 as designed in Reference 3

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Area S1:

$$R = 70 + 60 - [(70 \times 60) / 100]$$
$$= 88\% \text{ TSS removal rate}$$

Area A5

Post construction area A5 will be 1.14 acres. The naturally occurring steep slopes in the area that lead to a drainage swale which drains to Wetland No. 14 (see Figure 1) will be preserved. Non-structural LID BMPs will be incorporated to the extent practicable during the proposed remediation work. All disturbed areas within area A5 will be planted with vegetative cover comprised of native grasses that meet the requirement of a vegetated filter strip cover as defined in Reference 4 (Table 9.10-1).

Only 0.576 acres of area A5 will be disturbed during the proposed remediation work. The northern area of A5 that will be disturbed (A5N, see Figure 1) is 0.22 acres. The drainage area will be a well-graded uniform slope of 1%. A vegetative filter strip, consisting of 50 feet of a well-graded uniform 1% slope then transitioning to 12.5 feet of a well graded uniform 8% slope, will be constructed. These slopes are less than the maximum allowable slope for a vegetated filter strip as specified in Reference 4 (Table 9.10-2). The average slope over the length of the vegetative filter will be 2%; based on this average slope and Figure 9.10-6 of Reference 4, the minimum vegetated filter strip length for native grasses is 48 feet. The vegetated filter strip length as shown on Figure 1 is 62.5 feet. The TSS removal rate for an appropriately sized and constructed vegetated filter strip comprised of native grasses is 70%, as mentioned previously.

The remaining 0.356 acres of area A5 that will be disturbed during the proposed remediation work is located east of the access road (A5E, see Figure 1). The length of runoff flow to the existing drainage swale varies in this region between 20 feet and 50 feet. This area will be uniformly graded to disperse runoff. In addition, adequate vegetation will be planted to fulfill the requirements of a natural grass vegetative filter. Mulch will also be utilized as needed to reduce erosion as specified in Reference 4. However, because of the naturally occurring steep slopes in this area, it was conservatively estimated that no TSS removal will be achieved in this area.

Evaluation of TSS removal for the Southern Area:

The TSS removal rate for runoff from areas S1, A5N, and A5E in the Southern Area was calculated through a weighted average:

S1: R = 88%, area = 3.64 acres
A5N: R = 70%, area = 0.22 acres
A5E: R = 0, area = 0.356 acres

$$R_{Total} \text{ (weighted average)} = [(88 \times 3.64) + (70 \times 0.22) + (0 \times 0.356)] / 4.22$$
$$= 80\% \text{ TSS removal rate}$$

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Evaluation of Site-wide TSS Removal Rate:

Equation 4-1 from Reference 4 can be used to determine the TSS removal rate (R) for BMPs in series:

$$R = A + B - [(A \times B) / 100]$$

Basins 1, 2, and 3

For Basins 1, 2, and 3, the TSS removal rate of the first or upstream BMP (A) is 60% for the extended detention basins as designed in Reference 3. The TSS removal rate of the second or downstream BMP (B) is 80% for the StormFilter® units per Reference 7. Thus:

$$R = 60 + 80 - [(60 \times 80) / 100]$$
$$= 92\% \text{ TSS removal rate for Basins 1, 2, and 3}$$

Drainage areas for each basin are as follows: Basin 1 drainage area is 24.6 acres, Basin 2 drainage area is 29.7 acres, and Basin 3 drainage area is 34.9 acres.

Perimeter Area

Per Assumption 3 under assumptions that were made in calculating the Site average TSS removal rate, the narrow perimeter areas that do not drain to a sediment basin will be adequately seeded and maintained to qualify as vegetative filter strips with 60% TSS removal. The perimeter area is 35.7 acres.

Southern Area

The TSS removal rate for the Southern Area is 80%, as calculated above. This rate was calculated for runoff from the areas that will be disturbed within the Southern Area (i.e., areas S1, A5N). These disturbed portions of the Southern Area have a collective area of 4.22 acres.

Average TSS Removal Rate

Based on the above information, the weighted average TSS removal rate for the Site is calculated as follows:

$$R = [(24.6 \times 92) + (29.7 \times 92) + (34.9 \times 92) + (35.7 \times 60) + (4.22 \times 80)] / 129.12$$
$$= 82.8\% \text{ TSS removal rate for the Site.}$$

Thus, the minimum TSS removal rate of 80% is met across the entire Site.

Figure 1

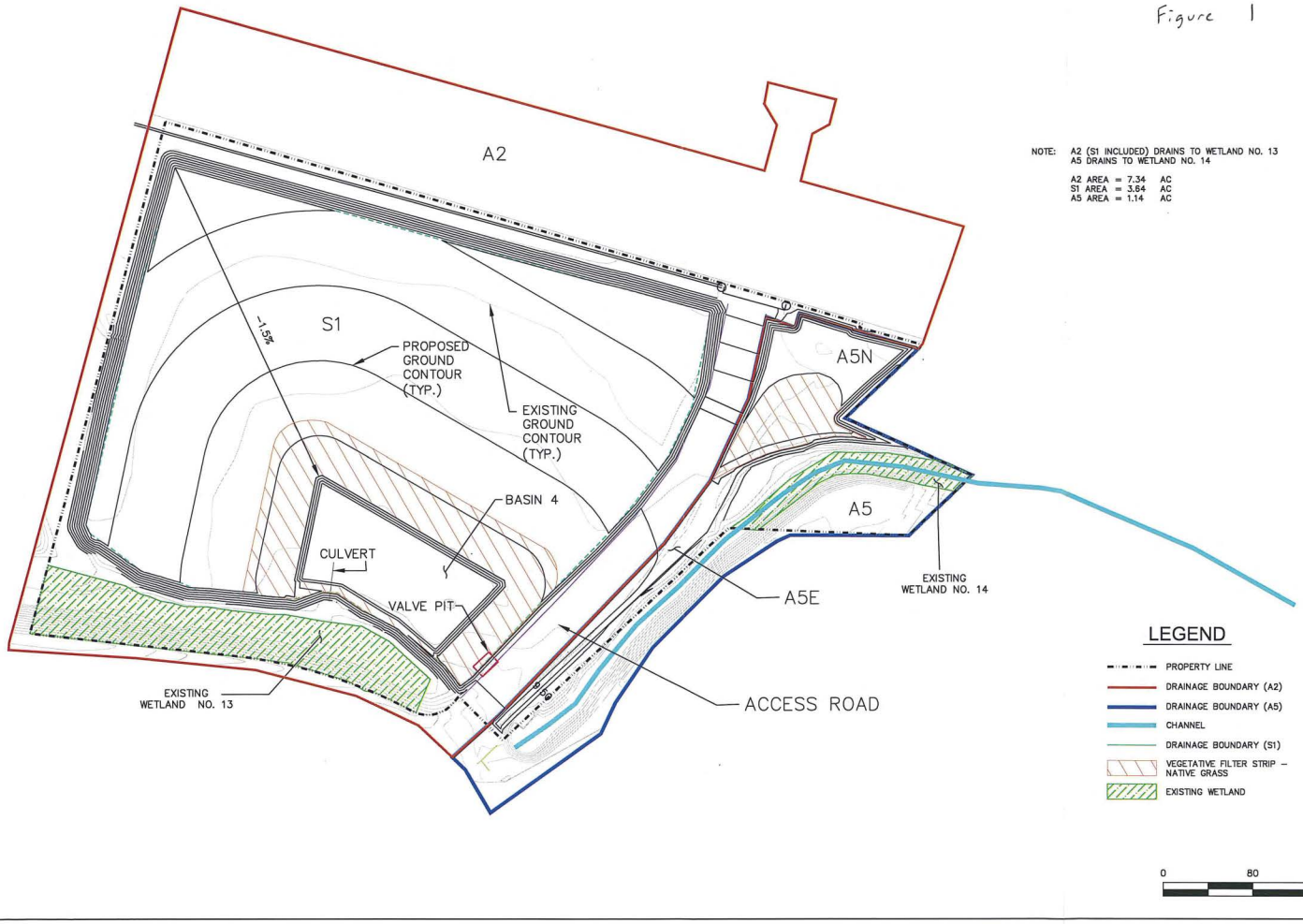
A2
S1
A5N
A5
A5E
-1.5%
PROPOSED GROUND CONTOUR (TYP.)
EXISTING GROUND CONTOUR (TYP.)
BASIN 4
CULVERT
VALVE PIT
EXISTING WETLAND NO. 13
EXISTING WETLAND NO. 14
ACCESS ROAD
NOTE: A2 (S1 INCLUDED) DRAINS TO WETLAND NO. 13
A5 DRAINS TO WETLAND NO. 14
A2 AREA = 7.34 AC
S1 AREA = 3.64 AC
A5 AREA = 1.14 AC
LEGEND
PROPERTY LINE
DRAINAGE BOUNDARY (A2)
DRAINAGE BOUNDARY (A5)
CHANNEL
DRAINAGE BOUNDARY (S1)
VEGETATIVE FILTER STRIP – NATIVE GRASS
EXISTING WETLAND
0
80
160
FEET

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Table 9.10-2: Maximum Filter Strip Slope

Filter Strip Soil Type	Hydrologic Soil Group	Maximum Filter Strip Slope (Percent)	
		Turf Grass, Native Grasses, and Meadows	Planted and Indigenous Woods
Sand	A	7	5
Sandy Loam	B	8	7
Loam, Silt Loam	B	8	8
Sandy Clay Loam	C	8	8
Clay Loam, Silty Clay, Clay	D	8	8

E. Required Filter Strip Length

To achieve the adopted TSS removal rates shown above in Table 9.10-1, the required filter strip length can be determined from Figures 9.10-2 to 6 below based upon the filter strip's slope, vegetated cover, and the soil within its drainage area. As shown in the figures, the minimum length for all vegetated filter strips is 25 feet.

Reference 4

New Jersey Stormwater Best Management Practices Manual, Chapter 9.10: Standard for Vegetative Filters, February 2004.

The total suspended solid (TSS) removal rate for vegetative filters will depend upon the vegetated cover in the filter strip. Table 9.10-1 below presents the adopted TSS removal rates for various vegetated covers.

Table 9.10-1: Adopted TSS Removal Rates for Vegetated Filter Strips

Vegetated Cover	Adopted TSS Removal Rate
Turf grass	60 %
Native Grasses, Meadow, and Planted Woods	70 %
Indigenous woods	80 %

New Jersey Stormwater Best Management Practices Manual, Chapter 9.10: Standard for Vegetative Filters, February 2004.

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Figure 9.10-5: Vegetated Filter Strip Length
Drainage Area Soil: Sandy Clay Loam HSG: C

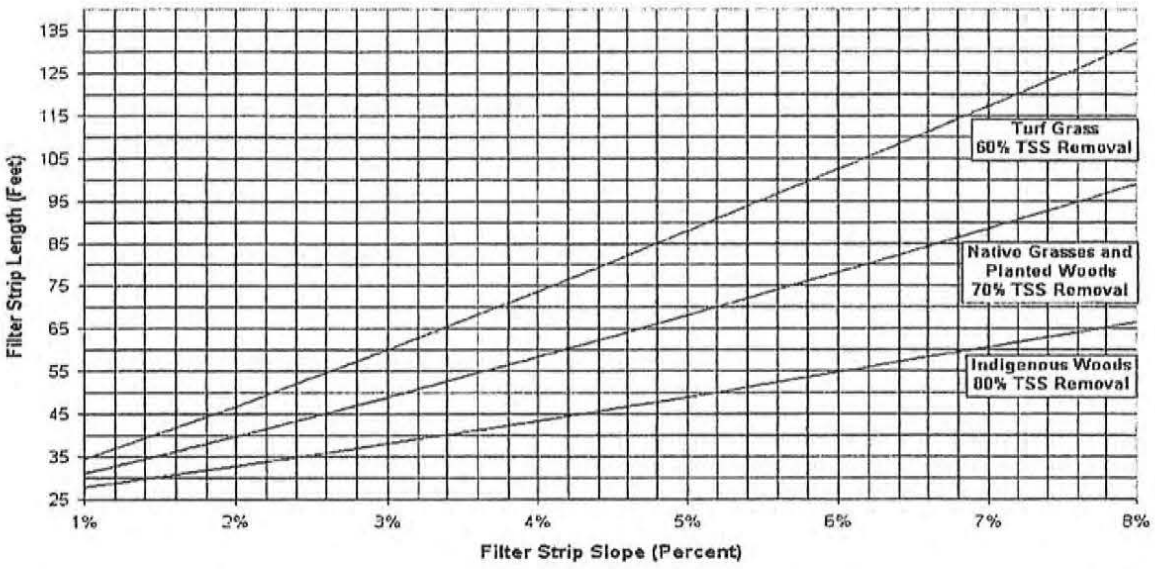
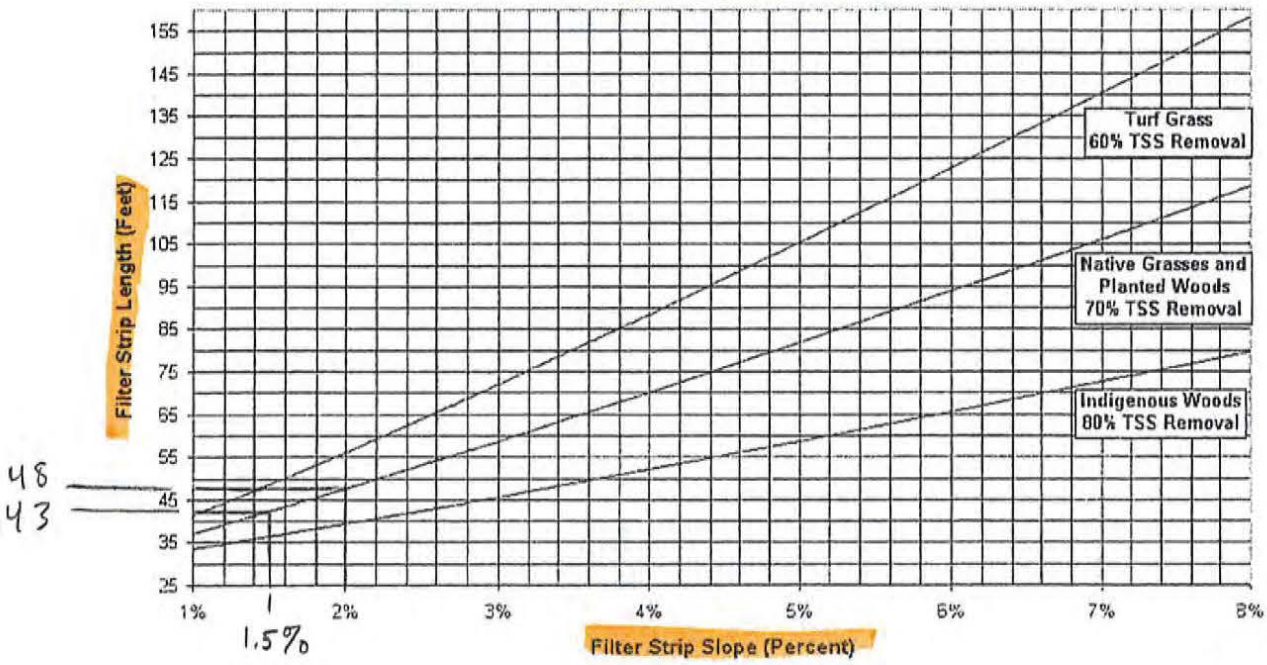


Figure 9.10-6: Vegetated Filter Strip Length
Drainage Area Soil: Clay Loam, Silty Clay, Clay HSG: D

MINIMAL LENGTH



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Reference 7

MSR 7/23/1
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State of New Jersey

Richard J. Codey
Acting Governor

Department of Environmental Protection
Division of Science, Research and Technology
Bureau of Sustainable Communities and Innovative Technologies
PO Box 409
Trenton, NJ 08625-0409
Tel: 609-292-9692
FAX: 609-292-7340

Bradley M. Campbell
Commissioner

December 22, 2004

James H. Lenhart, P.E.
Senior Vice President
Stormwater Management, Inc. (SMI)
12021-B NE Airport Way
Portland, OR 97220

Re: Extension Approval to Conditional Interim Certification for the Stormwater Management StormFilter®.

Dear Mr. Lenhart:

The New Jersey Department of Environmental Protection (NJDEP) received your correspondence requesting an extension to the conditional interim certification of the Stormwater Management StormFilter® (StormFilter). The expiration date for the current interim certification is December 31, 2004. This interim conditional certification was given in accordance with the Energy and Environmental Technology Verification (EETV) Act at N.J.S.A. 13:1D-134 et seq. After careful consideration, the NJDEP approves the request to extend the conditional interim certification, which will now expire on December 30, 2006.

The conditional interim approval was based on the New Jersey Corporation for Advanced Technology (NJCAT) verification report. According to the report, the StormFilter System, with influent concentrations of 300 mg/l or less and where Total Suspended Solids (TSS) particle sizes are expected to be similar to those tested, should be able to meet the basic treatment goal of 80% removal of TSS. Based on the NJCAT verification report and the recent information submitted by Stormwater Management regarding the analyses from the treatment of four storm events at Greenville Yards, the NJDEP has decided on the following:

1) The StormFilter can be used as a stand alone unit for the period of time that the interim certification remains in effect.
2) This conditional interim certification is for the current design of the StormFilter, and any modification will require a new review before use.

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3) All maintenance requirements must be implemented, and any training must be provided for personnel assigned to perform the maintenance, to ensure that the technology functions in accordance with the conditions of this conditional interim certification.
4) The StormFilter shall be designed in accordance with New Jersey's water quality standards and SMI's *Product Design Manual Version 3.0 (April 2002)*, or current edition, unless otherwise specified. The design, pretreatment, land use application, and maintenance criteria in SMI's Design Manual must be closely followed.

As part of the interim conditional approval, the StormFilter is currently being field tested, and the results will be analyzed and submitted for consideration in order to receive a final certification from the NJDEP. This phase of testing must satisfy the requirements of the Technology Acceptance and Reciprocity Partnership (TARP) Stormwater Best Management Practice Demonstration Tier II Protocol. For any questions regarding this correspondence, please contact Ravi Patraju of my staff at (609) 292-0125.

Marty Rosen,

Chief, Bureau of Sustainable Communities
and Innovative Technologies

Enclosure

c: Ernest Hahn, Assistant Commissioner, Land Use Management
Sam Wolfe, Assistant Commissioner, Environmental Regulation
Jeanne Herb, Director, Policy, Planning, and Science
Larry Baier, Director, Watershed Management Program
Narinder Ahuja, Director, Division of Water Quality
Mark Mauriello, Director, Land Use Regulations
Eileen Murphy, Director, Division of Science, Research, and Technology
Rhea Brekke, Executive Director, New Jersey Corporation for Advanced Technology

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Reference 8

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January 17, 2007

Addendum to the Stormfilter® Conditional Interim Certification

The New Jersey Department of Environmental Protection (NJDEP) is in receipt of, and presently reviewing, the Stormfilter® manufactured treatment device's Final Verification Report dated December 2006 from New Jersey Corporation for Advanced Technology (NJCAT). The review and evaluation of this verification report serves as a basis for the NJDEP final certification for this device. Therefore, the deadline for the current Stormfilter® Conditional Interim Certification has been extended until the NJDEP review of the Final Verification Report has been completed and a Final Certification is issued. Any inquiries regarding the review process can be made through the contact information given in the Conditional Interim Certification letter.

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Stormwater Outlet Pipe Discharge Velocity Evaluation
Former Koppers Seaboard Site, Kearny, New Jersey

Objective:

To verify that the requirements of NJMC 19:4-8.6 Drainage are met for the 25-year 24-hour Type III storm event.

References:

1) NJMC 19:4 iii, which states:
"Design velocities in pipes shall be a minimum of two feet per second, or as otherwise approved on a case-by-case basis by the NJMC, to allow for self-cleaning and a maximum of 15 feet per second to prevent scouring of pipes, manholes, and inlets and erosion at points of discharge."

2) HydroCAD Software Solutions, LLC, HydroCAD Stormwater Modeling System, Version 10, Chocorua, NH, 2011.

3) Drainage Report, Appendix A, Remedial Action Work Plan Addendum (RAWPA), KEY Environmental, Inc., March 2008.

4) Basin 4 Calculation Complete Package, KEY Environmental, Inc., May 2009.

5) Precipitation-Frequency Atlas of the United States, National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, Version 3 – Extracted Thursday, March 13, 2008.

Evaluation:

Basin 1:

Peak Outflow = 18.19 cfs

Culvert Diameter = 1.5 ft

$V = Q/A = (18.19 \text{ cfs}) / \{\pi \times [(1.5 \text{ ft}) / 2]^2\} = 10.3 \text{ fps}$

Check: $2 \text{ fps} \leq 10.3 \text{ fps} \leq 15 \text{ fps}$; Basin 1 stormwater outlet pipe discharge velocity is satisfactory.

Basin 2:

Peak Outflow = 18.15 cfs

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Culvert Diameter = 1.5 ft

$V = Q/A = (18.15 \text{ cfs}) / \{\pi \times [(1.5 \text{ ft}) / 2]^2\} = 10.3 \text{ fps}$

Check: 2 fps $\leq$ 10.3 fps $\leq$ 15 fps; Basin 2 stormwater outlet pipe discharge velocity is satisfactory.

Basin 3:

Peak Outflow = 33.66 cfs

Culvert Diameter = 1.5 ft (*Note: Basin 3 has two [2] culverts*)

$V = Q/A = [(33.66 \text{ cfs}) / 2] / \{\pi \times [(1.5 \text{ ft}) / 2]^2\} = 9.5 \text{ fps}$

Check: 2 fps $\leq$ 9.5 fps $\leq$ 15 fps; Basin 3 stormwater outlet pipe discharge velocity is satisfactory.

Basin 4:

Peak Outflow = 5.97 cfs

Culvert Diameter = 1.0 ft

$V = Q/A = (5.97 \text{ cfs}) / \{\pi \times [(1.0 \text{ ft}) / 2]^2\} = 7.6 \text{ fps}$

Check: 2 fps $\leq$ 7.6 fps $\leq$ 15 fps; Basin 4 stormwater outlet pipe discharge velocity is satisfactory.

Conclusion:

All stormwater outlet pipe discharge velocities (i.e., at Basins 1 through 4) meet the requirements set forth in NJMC 19:4 iii.

Note: Refer to References 3 and 4 for additional calculations to ensure that the requirements of NJMC 19:4-8.6 are met.

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PAS 7/25/15

HydroCAD Results

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RAS 7/25/13

Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 1P: Basin 1

Inflow Area = 24.600 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 57.32 cfs @ 12.50 hrs, Volume= 7.937 af
Outflow = 18.19 cfs @ 13.22 hrs, Volume= 7.271 af, Atten= 68%, Lag= 42.8 min
Primary = 18.19 cfs @ 13.22 hrs, Volume= 7.271 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 9.71' @ 13.22 hrs Surf.Area= 1.901 ac Storage= 3.315 af

Plug-Flow detention time= 182.5 min calculated for 7.271 af (92% of inflow)
Center-of-Mass det. time= 140.2 min (981.7 - 841.6)

Volume	Invert	Avail.Storage	Storage Description
#1	7.90'	4.647 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
7.90	1.764	0.000	0.000
9.00	1.847	1.986	1.986
10.00	1.923	1.885	3.871
10.40	1.955	0.776	4.647

Device	Routing	Invert	Outlet Devices
#1	Primary	4.39'	**18.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.39' / 3.48' S= 0.0152 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	7.90'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	8.40'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=18.19 cfs @ 13.22 hrs HW=9.71' TW=3.38' (Fixed TW Elev= 3.38')
↑—**1=Culvert** (Inlet Controls 18.19 cfs @ 10.29 fps)
↑—**2=Orifice/Grate** (Passes < 0.31 cfs potential flow)
—**3=Orifice/Grate** (Passes < 55.08 cfs potential flow)

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PM 2 7/25/13

Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 2P: Basin 2

Inflow Area = 29.700 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 69.21 cfs @ 12.50 hrs, Volume= 9.582 af
Outflow = 18.16 cfs @ 13.34 hrs, Volume= 8.687 af, Atten= 74%, Lag= 50.2 min
Primary = 18.16 cfs @ 13.34 hrs, Volume= 8.687 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 9.79' @ 13.34 hrs Surf.Area= 2.382 ac Storage= 4.333 af

Plug-Flow detention time= 200.0 min calculated for 8.687 af (91% of inflow)
Center-of-Mass det. time= 154.0 min (995.5 - 841.6)

Volume	Invert	Avail.Storage	Storage Description
#1	7.90'	5.798 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
7.90	2.197	0.000	0.000
9.00	2.304	2.476	2.476
10.00	2.403	2.353	4.829
10.40	2.443	0.969	5.798

Device	Routing	Invert	Outlet Devices
#1	Primary	4.49'	**18.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.49' / 2.95' S= 0.0257 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	7.90'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	8.40'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=18.15 cfs @ 13.34 hrs HW=9.79' TW=3.38' (Fixed TW Elev= 3.38')
- **1=Culvert** (Inlet Controls 18.15 cfs @ 10.27 fps)
  - **2=Orifice/Grate** (Passes < 0.31 cfs potential flow)
  - **3=Orifice/Grate** (Passes < 56.80 cfs potential flow)

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Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 3P: Basin 3

Inflow Area = 34.900 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 81.84 cfs @ 12.49 hrs, Volume= 11.260 af
Outflow = 33.67 cfs @ 13.06 hrs, Volume= 10.914 af, Atten= 59%, Lag= 33.7 min
Primary = 33.67 cfs @ 13.06 hrs, Volume= 10.914 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 9.50' @ 13.06 hrs Surf.Area= 2.493 ac Storage= 3.608 af

Plug-Flow detention time= 91.4 min calculated for 10.892 af (97% of inflow)
Center-of-Mass det. time= 76.4 min (917.5 - 841.1)

Volume	Invert	Avail.Storage	Storage Description
#1	8.00'	4.861 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
8.00	2.306	0.000	0.000
9.00	2.430	2.368	2.368
10.00	2.556	2.493	4.861

Device	Routing	Invert	Outlet Devices
#1	Primary	4.84'	**18.0" Round Culvert X 2.00** L= 165.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.84' / 3.19' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	8.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	8.18'	**72.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=33.66 cfs @ 13.06 hrs HW=9.50' TW=3.38' (Fixed TW Elev= 3.38')
↑—**1=Culvert** (Inlet Controls 33.66 cfs @ 9.52 fps)
↑—**2=Orifice/Grate** (Passes < 0.28 cfs potential flow)
—**3=Orifice/Grate** (Passes < 99.32 cfs potential flow)

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Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 4P: Basin 4

Inflow Area = 3.640 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 10.98 cfs @ 12.28 hrs, Volume= 1.174 af
Outflow = 5.98 cfs @ 12.58 hrs, Volume= 1.140 af, Atten= 46%, Lag= 18.4 min
Primary = 5.98 cfs @ 12.58 hrs, Volume= 1.140 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 8.02' @ 12.58 hrs Surf.Area= 0.289 ac Storage= 0.413 af

Plug-Flow detention time= 297.3 min calculated for 1.138 af (97% of inflow)
Center-of-Mass det. time= 283.1 min (1,109.1 - 826.1)

Volume	Invert	Avail.Storage	Storage Description
#1	6.50'	0.555 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
6.50	0.255	0.000	0.000
7.00	0.266	0.130	0.130
8.00	0.289	0.277	0.408
8.50	0.301	0.148	0.555

Device	Routing	Invert	Outlet Devices
#1	Primary	5.02'	**12.0" Round Culvert** L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.02' / 4.56' S= 0.0131 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	6.53'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	7.52'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.97 cfs @ 12.58 hrs HW=8.01' TW=5.00' (Fixed TW Elev= 5.00')
↑—**1=Culvert** (Inlet Controls 5.97 cfs @ 7.60 fps)
↑—**2=Orifice/Grate** (Passes < 0.28 cfs potential flow)
—**3=Orifice/Grate** (Passes < 14.78 cfs potential flow)

25 year 24 hour
Type III storm

MSR 6/19/13
PAL 7/25/13

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

New Jersey 40.732 N 74.053 W 88 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted: Thu Mar 13 2008

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.33	0.53	0.66	0.90	1.11	1.38	1.53	1.98	2.41	2.72	3.16	3.52	4.11	4.65	6.26	7.84	9.98	11.96
2	0.40	0.63	0.79	1.08	1.35	1.67	1.86	2.39	2.92	3.29	3.82	4.25	4.94	5.56	7.44	9.26	11.74	14.02
5	0.47	0.75	0.95	1.33	1.70	2.11	2.35	3.00	3.69	4.20	4.87	5.40	6.17	6.84	8.90	10.87	13.59	16.05
10	0.53	0.84	1.05	1.51	1.96	2.45	2.73	3.50	4.32	4.96	5.76	6.36	7.19	7.90	10.05	12.10	14.99	17.56
25	0.60	0.95	1.19	1.75	2.31	2.93	3.27	4.20	5.23	6.10	7.06	7.76	8.66	9.41	11.61	13.71	16.81	19.47
50	0.65	1.02	1.29	1.92	2.58	3.31	3.71	4.78	6.00	7.08	8.18	8.95	9.89	10.67	12.84	14.93	18.17	20.87
100	0.70	1.10	1.38	2.09	2.86	3.71	4.16	5.38	6.82	8.14	9.41	10.23	11.21	12.00	14.07	16.13	19.48	22.19
200	0.75	1.17	1.47	2.25	3.13	4.12	4.64	6.02	7.71	9.33	10.75	11.64	12.63	13.41	15.32	17.30	20.74	23.42
500	0.81	1.26	1.58	2.47	3.51	4.70	5.31	6.92	8.99	11.09	12.74	13.70	14.67	15.43	17.00	18.82	22.35	24.95
1000	0.86	1.32	1.66	2.63	3.80	5.15	5.84	7.66	10.06	12.59	14.43	15.42	16.36	17.08	18.35	19.95	23.52	26.03

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

* Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.37	0.58	0.72	0.98	1.22	1.52	1.69	2.17	2.65	2.96	3.46	3.81	4.43	4.99	6.66	8.30	10.52	12.58
2	0.44	0.69	0.87	1.19	1.49	1.85	2.05	2.63	3.21	3.59	4.19	4.61	5.33	5.97	7.91	9.80	12.37	14.75
5	0.52	0.83	1.04	1.46	1.86	2.33	2.59	3.30	4.05	4.57	5.33	5.85	6.65	7.34	9.46	11.50	14.32	16.89
10	0.58	0.92	1.16	1.66	2.15	2.71	3.02	3.83	4.73	5.39	6.28	6.88	7.74	8.46	10.68	12.80	15.80	18.48
25	0.66	1.04	1.31	1.92	2.54	3.23	3.61	4.60	5.71	6.61	7.70	8.39	9.31	10.08	12.33	14.51	17.72	20.49
50	0.71	1.12	1.42	2.10	2.83	3.66	4.09	5.23	6.55	7.66	8.92	9.68	10.64	11.43	13.64	15.81	19.16	21.97
100	0.77	1.21	1.52	2.29	3.14	4.10	4.59	5.89	7.45	8.81	10.28	11.09	12.08	12.87	14.96	17.10	20.56	23.38
200	0.83	1.29	1.62	2.48	3.45	4.57	5.13	6.62	8.44	10.11	11.78	12.64	13.63	14.43	16.33	18.37	21.93	24.71
500	0.90	1.40	1.75	2.74	3.90	5.22	5.88	7.64	9.87	12.04	14.02	14.95	15.95	16.69	18.19	20.07	23.70	26.39
1000	0.95	1.47	1.84	2.93	4.24	5.75	6.50	8.49	11.07	13.71	15.94	16.90	17.84	18.54	19.73	21.35	25.02	27.60

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

* Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.31	0.49	0.60	0.82	1.02	1.25	1.40	1.81	2.21	2.51	2.90	3.25	3.82	4.35	5.89	7.41	9.46	11.36
2	0.36	0.58	0.72	0.99	1.24	1.52	1.70	2.19	2.67	3.04	3.52	3.94	4.60	5.20	7.00	8.75	11.12	13.31
5	0.43	0.69	0.86	1.22	1.55	1.92	2.14	2.74	3.37	3.87	4.47	4.99	5.73	6.39	8.37	10.26	12.87	15.23
10	0.48	0.77	0.96	1.38	1.78	2.23	2.48	3.18	3.93	4.56	5.26	5.86	6.66	7.36	9.43	11.41	14.19	16.65
25	0.54	0.86	1.08	1.58	2.09	2.64	2.95	3.79	4.72	5.57	6.41	7.10	7.97	8.73	10.85	12.89	15.88	18.44
50	0.59	0.92	1.16	1.73	2.33	2.97	3.33	4.28	5.37	6.41	7.38	8.13	9.06	9.83	11.95	14.01	17.12	19.75
100	0.63	0.98	1.24	1.87	2.56	3.30	3.70	4.78	6.04	7.32	8.41	9.23	10.19	10.98	13.04	15.08	18.30	20.93
200	0.67	1.04	1.31	2.00	2.79	3.63	4.09	5.30	6.74	8.30	9.52	10.41	11.37	12.16	14.12	16.11	19.43	22.04

Reference 5

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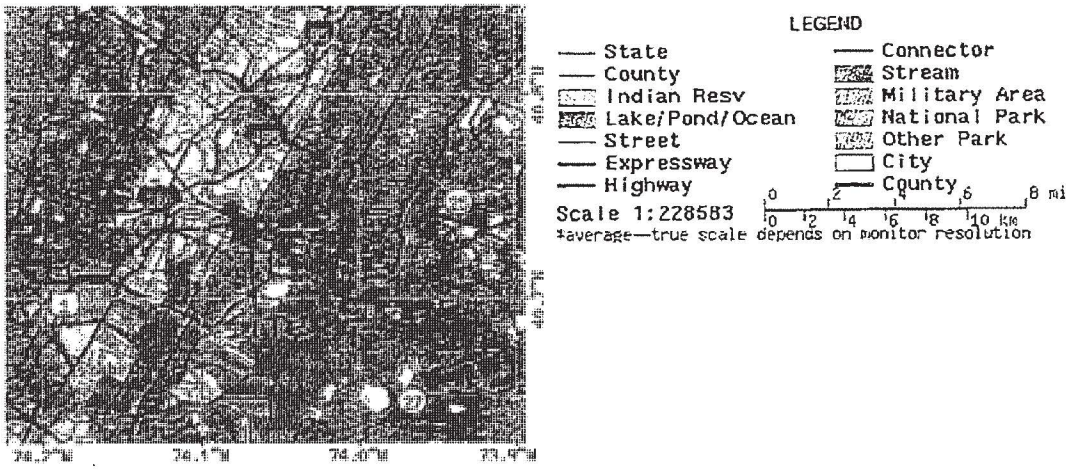

Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; USGS Aerial Photograph may also be available from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study, please refer to our documentation.

Using the National Climatic Data Center's (NCDC) station search engine, locate other climate stations within:

+/-30 minutes ...OR... +/-1 degree of this location (40.732/-74.053). Digital ASCII data can be obtained directly from NCDC.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910
(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

Disclaimer

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Outlet Protection Design for Basins 1, 2, and 4
Former Koppers Seaboard Site, Kearny, New Jersey

Objective:

The following calculations were used to determine the dimensions for construction of outlet control features from three (3) extended detention basins (Basins 1, 2, and 4) at the Former Koppers Seaboard Site, located in Kearny, New Jersey.

References:

1) HydroCAD Software Solutions, LLC, HydroCAD Stormwater Modeling System, Version 10, Chocorua, NH, 2011.

2) New Jersey Stormwater Best Management Practices Manual, New Jersey Department of Environmental Protection, April 2004 (revised September 2009).

3) Standards for Soil Erosion and Sediment Control in New Jersey, Standard for Conduit Outlet Protection, July 1999 (revised May 2012).

4) Stormwater Outlet Pipe Discharge Velocity Evaluation, Key Environmental, July 2013.

5) Precipitation-Frequency Atlas of the United States, National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, Version 3 – Extracted Thursday, March 13, 2008.

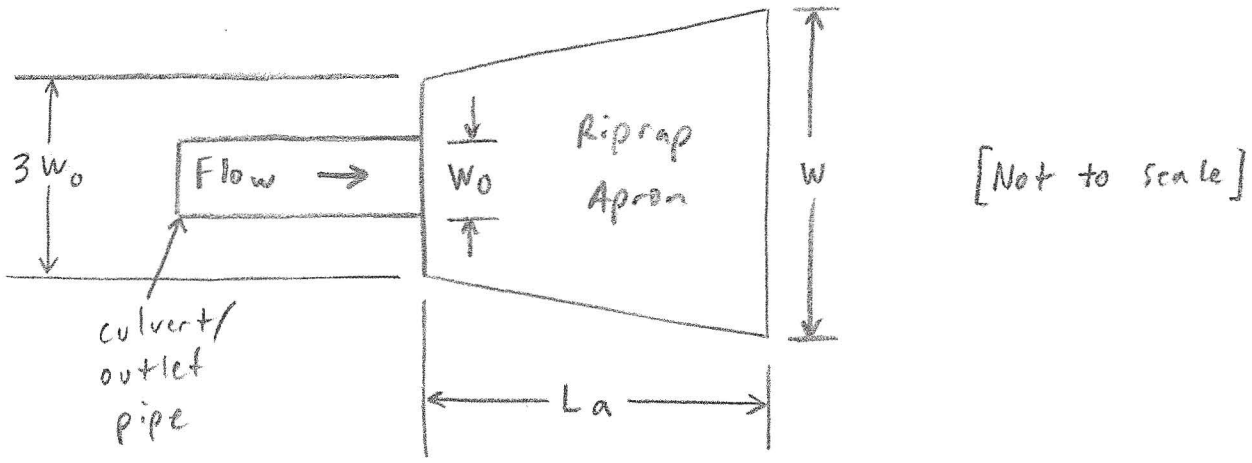
Assumptions:

1) The 25-year 24-hour Type III storm peak flow rate was used.

2) Tailwater (Tw) is < $1/2D_0$.

3) Riprap apron will be underlain with non-woven geotextile.

Design Information:



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The length of the apron, L_a, shall be determined from the following:

$$L_a = 1.8 \times [q / (D_0^{1/2})] + 7 \times D_0$$

The width of the apron, W, shall be determined from the following:

$$W = 3 \times W_0 + L_a$$

The width at the outlet shall be determined from the following:

$$\text{Width at outlet} = 3 \times W_0$$

Riprap size shall be determined from the following:

$$D_{50} = (0.016 / Tw) \times q^{1.33}$$

Where:

$$Tw = 0.2 \times D_0$$

Where:

L_a = length of apron (ft)
W = width of apron (ft)
q = unit discharge (cfs/ft) = Q / W_0
Q = 25-year 24-hour Type III storm discharge (cfs)
$W_0 = D_0$ = culvert width/height (ft)

Development:

Basin	Q (cfs)	$W_0 = D_0$ (ft)	q
1	18.19	1.5	12.1
2	18.15	1.5	12.1
4	5.97	1.0	6.0

Calculations:

Basins 1 and 2:

$L_a = 1.8 \times [12.1 / (1.5 \text{ ft})^{1/2}] + 7 \times (1.5 \text{ ft}) = 28.3$ ft; use $L_a = 29$ ft

$W = 3 \times (1.5 \text{ ft}) + (29.0 \text{ ft}) = 33.5$ ft; use W = 34.0 ft

Width at outlet = $3 \times (1.5 \text{ ft}) = 4.5$ ft

$Tw = 0.2 \times (1.5 \text{ ft}) = 0.3$ ft

$D_{50} = [0.016 / (0.3 \text{ ft})] \times 12.1^{1.33} = 1.5$ ft; use $D_{50} = 18$ inch

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Basin 4:

$L_a = 1.8 \times [6.0 / (1.0 \text{ ft})^{1/2}] + 7 \times (1.0 \text{ ft}) = 17.8 \text{ ft}$; use $L_a = 18.0$ ft

$W = 3 \times (1.0 \text{ ft}) + (18.0 \text{ ft}) = 21.0$ ft

Width at outlet $= 3 \times (1.0 \text{ ft}) = 3.0$ ft

$Tw = 0.2 \times (1.0 \text{ ft}) = 0.2$ ft

$D_{50} = [0.016 / (0.2 \text{ ft})] \times 6.0^{1.33} = 0.9$ ft; use $D_{50} = 12$ inch

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PRS 7/25/13

HydroCAD Results

MSR 7/25/13
PAL 7/25/13

Original Design Elevations
Prepared by Microsoft
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Type III 24-hr 25-Year Rainfall=6.10"
Printed 7/25/2013

Summary for Pond 1P: Basin 1

Inflow Area = 24.600 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 57.32 cfs @ 12.50 hrs, Volume= 7.937 af
Outflow = 18.19 cfs @ 13.22 hrs, Volume= 7.271 af, Atten= 68%, Lag= 42.8 min
Primary = 18.19 cfs @ 13.22 hrs, Volume= 7.271 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 9.71' @ 13.22 hrs Surf.Area= 1.901 ac Storage= 3.315 af

Plug-Flow detention time= 182.5 min calculated for 7.271 af (92% of inflow)
Center-of-Mass det. time= 140.2 min (981.7 - 841.6)

Volume	Invert	Avail.Storage	Storage Description
#1	7.90'	4.647 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
7.90	1.764	0.000	0.000
9.00	1.847	1.986	1.986
10.00	1.923	1.885	3.871
10.40	1.955	0.776	4.647

Device	Routing	Invert	Outlet Devices
#1	Primary	4.39'	**18.0" Round Culvert**
			L= 60.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 4.39' / 3.48' S= 0.0152 '/' Cc= 0.900
			n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	7.90'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	8.40'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Primary OutFlow Max=18.19 cfs @ 13.22 hrs HW=9.71' TW=3.38' (Fixed TW Elev= 3.38')
↑—**1=Culvert** (Inlet Controls 18.19 cfs @ 10.29 fps)
↑—**2=Orifice/Grate** (Passes < 0.31 cfs potential flow)
—**3=Orifice/Grate** (Passes < 55.08 cfs potential flow)

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Type III 24-hr 25-Year Rainfall=6.10"
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Summary for Pond 2P: Basin 2

Inflow Area = 29.700 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 69.21 cfs @ 12.50 hrs, Volume= 9.582 af
Outflow = 18.16 cfs @ 13.34 hrs, Volume= 8.687 af, Atten= 74%, Lag= 50.2 min
Primary = 18.16 cfs @ 13.34 hrs, Volume= 8.687 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 9.79' @ 13.34 hrs Surf.Area= 2.382 ac Storage= 4.333 af

Plug-Flow detention time= 200.0 min calculated for 8.687 af (91% of inflow)
Center-of-Mass det. time= 154.0 min (995.5 - 841.6)

Volume	Invert	Avail.Storage	Storage Description
#1	7.90'	5.798 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
7.90	2.197	0.000	0.000
9.00	2.304	2.476	2.476
10.00	2.403	2.353	4.829
10.40	2.443	0.969	5.798

Device	Routing	Invert	Outlet Devices
#1	Primary	4.49'	**18.0" Round Culvert**
			L= 60.0' CPP, square edge headwall, Ke= 0.500
			Inlet / Outlet Invert= 4.49' / 2.95' S= 0.0257 '/' Cc= 0.900
			n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	7.90'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	8.40'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600
			Limited to weir flow at low heads

Primary OutFlow Max=18.15 cfs @ 13.34 hrs HW=9.79' TW=3.38' (Fixed TW Elev= 3.38')
↑—**1=Culvert** (Inlet Controls 18.15 cfs @ 10.27 fps)
↑—**2=Orifice/Grate** (Passes < 0.31 cfs potential flow)
—**3=Orifice/Grate** (Passes < 56.80 cfs potential flow)

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Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 4P: Basin 4

Inflow Area = 3.640 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 10.98 cfs @ 12.28 hrs, Volume= 1.174 af
Outflow = 5.98 cfs @ 12.58 hrs, Volume= 1.140 af, Atten= 46%, Lag= 18.4 min
Primary = 5.98 cfs @ 12.58 hrs, Volume= 1.140 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 8.02' @ 12.58 hrs Surf.Area= 0.289 ac Storage= 0.413 af

Plug-Flow detention time= 297.3 min calculated for 1.138 af (97% of inflow)
Center-of-Mass det. time= 283.1 min (1,109.1 - 826.1)

Volume	Invert	Avail.Storage	Storage Description
#1	6.50'	0.555 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
6.50	0.255	0.000	0.000
7.00	0.266	0.130	0.130
8.00	0.289	0.277	0.408
8.50	0.301	0.148	0.555

Device	Routing	Invert	Outlet Devices
#1	Primary	5.02'	**12.0" Round Culvert** L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.02' / 4.56' S= 0.0131 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	6.53'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	7.52'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.97 cfs @ 12.58 hrs HW=8.01' TW=5.00' (Fixed TW Elev= 5.00')
↑—**1=Culvert** (Inlet Controls 5.97 cfs @ 7.60 fps)
↑—**2=Orifice/Grate** (Passes < 0.28 cfs potential flow)
—**3=Orifice/Grate** (Passes < 14.78 cfs potential flow)

25 year 24 hour
Type III storm

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POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

New Jersey 40.732 N 74.053 W 88 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted: Thu Mar 13 2008

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.33	0.53	0.66	0.90	1.11	1.38	1.53	1.98	2.41	2.72	3.16	3.52	4.11	4.65	6.26	7.84	9.98	11.96
2	0.40	0.63	0.79	1.08	1.35	1.67	1.86	2.39	2.92	3.29	3.82	4.25	4.94	5.56	7.44	9.26	11.74	14.02
5	0.47	0.75	0.95	1.33	1.70	2.11	2.35	3.00	3.69	4.20	4.87	5.40	6.17	6.84	8.90	10.87	13.59	16.05
10	0.53	0.84	1.05	1.51	1.96	2.45	2.73	3.50	4.32	4.96	5.76	6.36	7.19	7.90	10.05	12.10	14.99	17.56
25	0.60	0.95	1.19	1.75	2.31	2.93	3.27	4.20	5.23	6.10	7.06	7.76	8.66	9.41	11.61	13.71	16.81	19.47
50	0.65	1.02	1.29	1.92	2.58	3.31	3.71	4.78	6.00	7.08	8.18	8.95	9.89	10.67	12.84	14.93	18.17	20.87
100	0.70	1.10	1.38	2.09	2.86	3.71	4.16	5.38	6.82	8.14	9.41	10.23	11.21	12.00	14.07	16.13	19.48	22.19
200	0.75	1.17	1.47	2.25	3.13	4.12	4.64	6.02	7.71	9.33	10.75	11.64	12.63	13.41	15.32	17.30	20.74	23.42
500	0.81	1.26	1.58	2.47	3.51	4.70	5.31	6.92	8.99	11.09	12.74	13.70	14.67	15.43	17.00	18.82	22.35	24.95
1000	0.86	1.32	1.66	2.63	3.80	5.15	5.84	7.66	10.06	12.59	14.43	15.42	16.36	17.08	18.35	19.95	23.52	26.03

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

* Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.37	0.58	0.72	0.98	1.22	1.52	1.69	2.17	2.65	2.96	3.46	3.81	4.43	4.99	6.66	8.30	10.52	12.58
2	0.44	0.69	0.87	1.19	1.49	1.85	2.05	2.63	3.21	3.59	4.19	4.61	5.33	5.97	7.91	9.80	12.37	14.75
5	0.52	0.83	1.04	1.46	1.86	2.33	2.59	3.30	4.05	4.57	5.33	5.85	6.65	7.34	9.46	11.50	14.32	16.89
10	0.58	0.92	1.16	1.66	2.15	2.71	3.02	3.83	4.73	5.39	6.28	6.88	7.74	8.46	10.68	12.80	15.80	18.48
25	0.66	1.04	1.31	1.92	2.54	3.23	3.61	4.60	5.71	6.61	7.70	8.39	9.31	10.08	12.33	14.51	17.72	20.49
50	0.71	1.12	1.42	2.10	2.83	3.66	4.09	5.23	6.55	7.66	8.92	9.68	10.64	11.43	13.64	15.81	19.16	21.97
100	0.77	1.21	1.52	2.29	3.14	4.10	4.59	5.89	7.45	8.81	10.28	11.09	12.08	12.87	14.96	17.10	20.56	23.38
200	0.83	1.29	1.62	2.48	3.45	4.57	5.13	6.62	8.44	10.11	11.78	12.64	13.63	14.43	16.33	18.37	21.93	24.71
500	0.90	1.40	1.75	2.74	3.90	5.22	5.88	7.64	9.87	12.04	14.02	14.95	15.95	16.69	18.19	20.07	23.70	26.39
1000	0.95	1.47	1.84	2.93	4.24	5.75	6.50	8.49	11.07	13.71	15.94	16.90	17.84	18.54	19.73	21.35	25.02	27.60

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

* Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.31	0.49	0.60	0.82	1.02	1.25	1.40	1.81	2.21	2.51	2.90	3.25	3.82	4.35	5.89	7.41	9.46	11.36
2	0.36	0.58	0.72	0.99	1.24	1.52	1.70	2.19	2.67	3.04	3.52	3.94	4.60	5.20	7.00	8.75	11.12	13.31
5	0.43	0.69	0.86	1.22	1.55	1.92	2.14	2.74	3.37	3.87	4.47	4.99	5.73	6.39	8.37	10.26	12.87	15.23
10	0.48	0.77	0.96	1.38	1.78	2.23	2.48	3.18	3.93	4.56	5.26	5.86	6.66	7.36	9.43	11.41	14.19	16.65
25	0.54	0.86	1.08	1.58	2.09	2.64	2.95	3.79	4.72	5.57	6.41	7.10	7.97	8.73	10.85	12.89	15.88	18.44
50	0.59	0.92	1.16	1.73	2.33	2.97	3.33	4.28	5.37	6.41	7.38	8.13	9.06	9.83	11.95	14.01	17.12	19.73
100	0.63	0.98	1.24	1.87	2.56	3.30	3.70	4.78	6.04	7.32	8.41	9.23	10.19	10.98	13.04	15.08	18.30	20.93
200	0.67	1.04	1.31	2.00	2.79	3.63	4.09	5.30	6.74	8.30	9.52	10.41	11.37	12.16	14.12	16.11	19.43	22.04

reference 5

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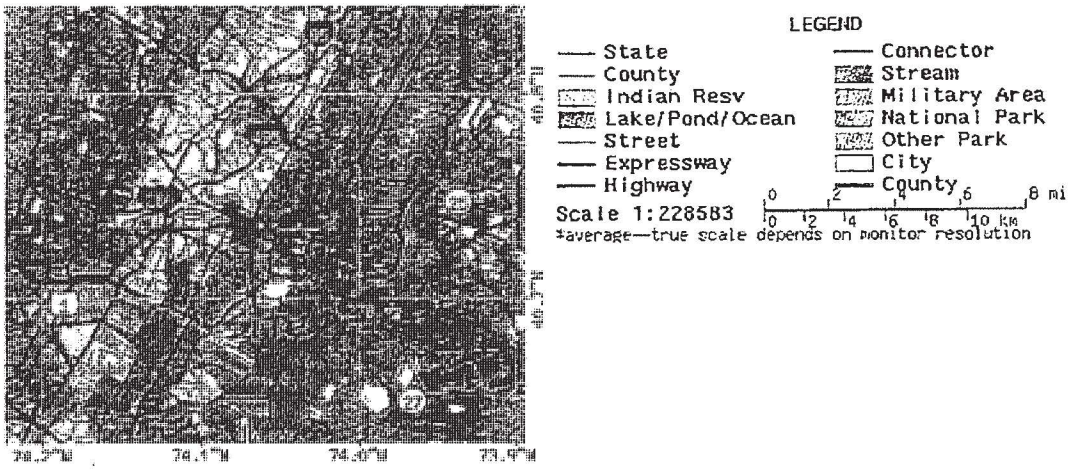

Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; USGS Aerial Photograph may also be available from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study, please refer to our documentation.

Using the National Climatic Data Center's (NCDC) station search engine, locate other climate stations within:

+/-30 minutes ...OR... +/-1 degree of this location (40.732/-74.053). Digital ASCII data can be obtained directly from NCDC.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910

(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

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Stormwater Outlet Structure Discharge Velocity Determination
Former Koppers Seaboard Site, Kearny, New Jersey

Objective:

Per NJAC 7:8 – 6.2(a) 3, determine the average flow velocity through the trash racks for Basins 1 through 4 under the full range of stage and discharge. The velocity is to be computed on the basis of the net area of opening through the trash rack.

References:

1) NJAC – Chapter 8, Stormwater Management.

2) Shop Drawing, MFG. Literature, Plastic Solutions, LLC.

3) Design of Extended Detention Basins, Key Environmental, Inc., 2013.

4) HydroCAD Software Solutions, LLC, HydroCAD Stormwater Modeling System, Version 10, Chocorua, NH, 2011.

5) Precipitation-Frequency Atlas of the United States, National Oceanic and Atmospheric Administration (NOAA) Atlas 14, Volume 2, Version 3 – Extracted Thursday, March 13, 2008.

Development:

Based on the peak stage in each basin resulting from the 25-year 24-hour Type III storm event, the discharge velocity will be calculated using the net effective area of the opening of the trash rack.

Calculations:

Determine the depth of flow over the principal spillway during the 25-year 24-hour storm event:

Basin	Top of Riser (Elevation, ft-msl)	Peak Flow (Elevation, ft-msl)	Depth of Flow (ft)
1	8.40	9.67	1.27
2	8.40	9.78	1.38
3	8.18	9.50	1.32
4	7.52	8.00	0.48

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Based on the depth of flow presented above, determine the net effective open area in each trash rack:

Per MFG. Literature (Reference 2), the trash rack openings are 4.75" x 4.75"; the width of the bars in the rack is 5/8" (0.625").

Therefore, the net effective area of flow is:

Area of opening: 4.75" x 4.75" = 22.56 in^2

Area of opening plus bar: 4.75" + 0.625" = 5.375" x 5.375" = 28.89 in^2

(22.56 in^2) / (28.89 in^2) = 78% of flow area

Based on the peak discharge in each basin and the net area of flow, determine the discharge velocity in each basin:

Basin	Peak Discharge (cfs)	Perimeter of Outlet (ft)
1	18.19	13
2	18.16	13
3	33.67	20
4	5.98	13

Basin	New Flow Area (sf)	Velocity through Trash Rack (fps)
1	13' x 1.27' x 0.78 = 12.88	(18.19 cfs) / (12.88 sf) = 1.41
2	13' x 1.38' x 0.78 = 13.99	(18.16 cfs) / (13.99 sf) = 1.30
3	20' x 1.32' x 0.78 = 20.59	(33.67 cfs) / (20.59 sf) = 1.64
4	13' x 0.48' x 0.78 = 4.87	(5.98 cfs) / (4.87 sf) = 1.23

Conclusions and Comments:

This calculation determined the discharge velocity through the proposed trash rack for each basin (i.e., Basins 1 through 4) at the Former Koppers Seaboard Site resulting from the 25-year 24-hour Type III storm event, which is judged to be the worst case scenario.

This calculation did not account for any decrease in net effective area that may result from the sloped portion of the trash rack, which is judged to be minimal.

This analysis completed for each basin indicates that the maximum velocity through a clean trash rack is less than 2.5 feet per second pursuant to the cited regulation (NJAC 7:8 – 6.2(a) 3).

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HydroCAD Results

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Type III 24-hr 25-Year Rainfall=6.10"
Printed 7/23/2013

Hydrograph for Pond 1P: Basin 1

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	7.90	0.00
0.50	0.00	0.000	7.90	0.00
1.00	0.00	0.000	7.90	0.00
1.50	0.00	0.000	7.90	0.00
2.00	0.00	0.000	7.90	0.00
2.50	0.00	0.000	7.90	0.00
3.00	0.00	0.000	7.90	0.00
3.50	0.00	0.000	7.90	0.00
4.00	0.00	0.000	7.90	0.00
4.50	0.00	0.000	7.90	0.00
5.00	0.00	0.000	7.90	0.00
5.50	0.00	0.000	7.90	0.00
6.00	0.00	0.000	7.90	0.00
6.50	0.00	0.000	7.90	0.00
7.00	0.01	0.000	7.90	0.00
7.50	0.12	0.002	7.90	0.00
8.00	0.30	0.011	7.91	0.00
8.50	0.54	0.028	7.92	0.00
9.00	0.89	0.057	7.93	0.00
9.50	1.38	0.103	7.96	0.01
10.00	1.97	0.172	8.00	0.02
10.50	2.73	0.267	8.05	0.04
11.00	3.88	0.399	8.13	0.08
11.50	5.72	0.589	8.23	0.11
12.00	15.36	0.947	8.43	0.39
12.50	**57.32**	2.184	9.11	16.95
13.00	26.70	**3.247**	**9.67**	**18.12**
13.50	12.21	**3.235**	**9.67**	**18.10**
14.00	8.44	2.907	9.49	17.75
14.50	6.76	2.494	9.27	17.30
15.00	5.84	2.048	9.03	16.79
15.50	5.08	1.652	8.82	11.71
16.00	4.33	1.458	8.71	7.63
16.50	3.64	1.352	8.65	5.64
17.00	3.21	1.285	8.62	4.50
17.50	2.87	1.241	8.59	3.79
18.00	2.54	1.207	8.57	3.27
18.50	2.24	1.178	8.56	2.87
19.00	2.08	1.156	8.55	2.55
19.50	1.98	1.139	8.54	2.33
20.00	1.88	1.126	8.53	2.16
20.50	1.78	1.115	8.52	2.02
21.00	1.70	1.106	8.52	1.91
21.50	1.63	1.098	8.51	1.81
22.00	1.55	1.090	8.51	1.73
22.50	1.48	1.083	8.51	1.64
23.00	1.40	1.077	8.50	1.56
23.50	1.32	1.070	8.50	1.49
24.00	1.25	1.063	8.50	1.41

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Hydrograph for Pond 2P: Basin 2

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	7.90	0.00
0.50	0.00	0.000	7.90	0.00
1.00	0.00	0.000	7.90	0.00
1.50	0.00	0.000	7.90	0.00
2.00	0.00	0.000	7.90	0.00
2.50	0.00	0.000	7.90	0.00
3.00	0.00	0.000	7.90	0.00
3.50	0.00	0.000	7.90	0.00
4.00	0.00	0.000	7.90	0.00
4.50	0.00	0.000	7.90	0.00
5.00	0.00	0.000	7.90	0.00
5.50	0.00	0.000	7.90	0.00
6.00	0.00	0.000	7.90	0.00
6.50	0.00	0.000	7.90	0.00
7.00	0.01	0.000	7.90	0.00
7.50	0.14	0.003	7.90	0.00
8.00	0.36	0.013	7.91	0.00
8.50	0.65	0.034	7.92	0.00
9.00	1.08	0.069	7.93	0.00
9.50	1.66	0.125	7.96	0.01
10.00	2.38	0.207	7.99	0.02
10.50	3.29	0.322	8.05	0.04
11.00	4.68	0.483	8.12	0.07
11.50	6.90	0.713	8.22	0.10
12.00	18.54	1.147	8.42	0.26
12.50	**69.21**	2.724	9.11	16.73
13.00	32.23	**4.165**	**9.72**	**18.01**
13.50	14.74	**4.308**	**9.78**	**18.13**
14.00	10.19	4.062	9.68	17.93
14.50	8.17	3.702	9.53	17.62
15.00	7.06	3.295	9.35	17.26
15.50	6.14	2.862	9.17	16.86
16.00	5.23	2.409	8.97	16.44
16.50	4.39	2.024	8.80	11.09
17.00	3.88	1.816	8.71	7.60
17.50	3.47	1.694	8.66	5.78
18.00	3.06	1.615	8.62	4.67
18.50	2.70	1.557	8.60	3.92
19.00	2.52	1.514	8.58	3.39
19.50	2.39	1.483	8.57	3.03
20.00	2.27	1.459	8.55	2.76
20.50	2.15	1.441	8.55	2.56
21.00	2.06	1.425	8.54	2.40
21.50	1.96	1.412	8.53	2.26
22.00	1.87	1.401	8.53	2.14
22.50	1.78	1.390	8.52	2.03
23.00	1.69	1.380	8.52	1.93
23.50	1.60	1.370	8.52	1.84
24.00	1.51	1.361	8.51	1.74

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MSR 7/23/13
PAS 7/25/13

Original Design Elevations
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Type III 24-hr 25-Year Rainfall=6.10"
Printed 7/23/2013

Hydrograph for Pond 3P: Basin 3

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	8.00	0.00
0.50	0.00	0.000	8.00	0.00
1.00	0.00	0.000	8.00	0.00
1.50	0.00	0.000	8.00	0.00
2.00	0.00	0.000	8.00	0.00
2.50	0.00	0.000	8.00	0.00
3.00	0.00	0.000	8.00	0.00
3.50	0.00	0.000	8.00	0.00
4.00	0.00	0.000	8.00	0.00
4.50	0.00	0.000	8.00	0.00
5.00	0.00	0.000	8.00	0.00
5.50	0.00	0.000	8.00	0.00
6.00	0.00	0.000	8.00	0.00
6.50	0.00	0.000	8.00	0.00
7.00	0.02	0.000	8.00	0.00
7.50	0.17	0.004	8.00	0.00
8.00	0.43	0.016	8.01	0.00
8.50	0.77	0.040	8.02	0.00
9.00	1.28	0.082	8.04	0.00
9.50	1.96	0.148	8.06	0.01
10.00	2.81	0.245	8.11	0.02
10.50	3.89	0.381	8.16	0.05
11.00	5.53	0.558	8.24	1.05
11.50	8.16	0.742	8.32	3.50
12.00	22.16	1.033	8.44	8.94
12.50	**81.82**	2.433	9.03	31.55
13.00	37.26	**3.600**	**9.50**	**33.65**
13.50	17.10	**3.250**	**9.36**	**33.04**
14.00	11.90	2.493	9.05	31.66
14.50	9.57	1.677	8.71	25.66
15.00	8.27	1.262	8.54	14.26
15.50	7.20	1.089	8.47	10.15
16.00	6.13	0.991	8.42	8.06
16.50	5.15	0.921	8.40	6.65
17.00	4.55	0.867	8.37	5.64
17.50	4.06	0.828	8.36	4.93
18.00	3.59	0.794	8.34	4.35
18.50	3.17	0.764	8.33	3.86
19.00	2.95	0.740	8.32	3.46
19.50	2.81	0.722	8.31	3.18
20.00	2.66	0.707	8.30	2.97
20.50	2.53	0.696	8.30	2.79
21.00	2.41	0.685	8.29	2.65
21.50	2.31	0.676	8.29	2.52
22.00	2.20	0.668	8.29	2.40
22.50	2.09	0.659	8.28	2.29
23.00	1.99	0.652	8.28	2.18
23.50	1.88	0.644	8.28	2.07
24.00	1.77	0.635	8.27	1.97

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MSR 7/23/13
PAL 7/25/13

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Type III 24-hr 25-Year Rainfall=6.10"
Printed 7/23/2013

Hydrograph for Pond 4P: Basin 4

Time (hours)	Inflow (cfs)	Storage (acre-feet)	Elevation (feet)	Primary (cfs)
0.00	0.00	0.000	6.50	0.00
0.50	0.00	0.000	6.50	0.00
1.00	0.00	0.000	6.50	0.00
1.50	0.00	0.000	6.50	0.00
2.00	0.00	0.000	6.50	0.00
2.50	0.00	0.000	6.50	0.00
3.00	0.00	0.000	6.50	0.00
3.50	0.00	0.000	6.50	0.00
4.00	0.00	0.000	6.50	0.00
4.50	0.00	0.000	6.50	0.00
5.00	0.00	0.000	6.50	0.00
5.50	0.00	0.000	6.50	0.00
6.00	0.00	0.000	6.50	0.00
6.50	0.00	0.000	6.50	0.00
7.00	0.01	0.000	6.50	0.00
7.50	0.03	0.001	6.50	0.00
8.00	0.06	0.003	6.51	0.00
8.50	0.10	0.006	6.52	0.00
9.00	0.17	0.011	6.54	0.00
9.50	0.25	0.020	6.58	0.00
10.00	0.34	0.031	6.62	0.02
10.50	0.48	0.047	6.68	0.04
11.00	0.68	0.068	6.76	0.08
11.50	1.09	0.099	6.88	0.11
12.00	**4.46**	0.182	7.19	0.17
12.50	**7.37**	**0.408**	**8.00**	**5.96**
13.00	2.11	**0.336**	**7.75**	**4.88**
13.50	1.33	0.299	7.62	1.55
14.00	1.09	0.294	7.60	1.18
14.50	0.92	0.290	7.59	0.98
15.00	0.81	0.288	7.58	0.85
15.50	0.70	0.286	7.57	0.75
16.00	0.58	0.284	7.56	0.64
16.50	0.50	0.282	7.56	0.54
17.00	0.45	0.281	7.55	0.48
17.50	0.40	0.279	7.55	0.43
18.00	0.35	0.278	7.54	0.38
18.50	0.32	0.277	7.54	0.34
19.00	0.30	0.276	7.54	0.32
19.50	0.29	0.275	7.53	0.30
20.00	0.27	0.275	7.53	0.29
20.50	0.26	0.274	7.53	0.27
21.00	0.25	0.273	7.53	0.26
21.50	0.23	0.273	7.52	0.25
22.00	0.22	0.272	7.52	0.24
22.50	0.21	0.272	7.52	0.22
23.00	0.20	0.271	7.52	0.22
23.50	0.19	0.270	7.52	0.22
24.00	0.18	0.269	7.51	0.22

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MSR 7/23/13
PAJ 7/25/13

Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 1P: Basin 1

Inflow Area = 24.600 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 57.32 cfs @ 12.50 hrs, Volume= 7.937 af
Outflow = 18.19 cfs @ 13.22 hrs, Volume= 7.271 af, Atten= 68%, Lag= 42.8 min
Primary = 18.19 cfs @ 13.22 hrs, Volume= 7.271 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 9.71' @ 13.22 hrs Surf.Area= 1.901 ac Storage= 3.315 af

Plug-Flow detention time= 182.5 min calculated for 7.271 af (92% of inflow)
Center-of-Mass det. time= 140.2 min (981.7 - 841.6)

Volume	Invert	Avail.Storage	Storage Description
#1	7.90'	4.647 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
7.90	1.764	0.000	0.000
9.00	1.847	1.986	1.986
10.00	1.923	1.885	3.871
10.40	1.955	0.776	4.647

Device	Routing	Invert	Outlet Devices
#1	Primary	4.39'	**18.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.39' / 3.48' S= 0.0152 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	7.90'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	8.40'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=18.19 cfs @ 13.22 hrs HW=9.71' TW=3.38' (Fixed TW Elev= 3.38')
↑—**1=Culvert** (Inlet Controls 18.19 cfs @ 10.29 fps)
↑—**2=Orifice/Grate** (Passes < 0.31 cfs potential flow)
—**3=Orifice/Grate** (Passes < 55.08 cfs potential flow)

Perimeter of Outlet $= 2\left(\frac{48"}{12}\right) + 2\left(\frac{30"}{12}\right)$

$= 13'$

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MSR 7/23/13
PAS 7/25/13

Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 2P: Basin 2

Inflow Area = 29.700 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 69.21 cfs @ 12.50 hrs, Volume= 9.582 af
Outflow = 18.16 cfs @ 13.34 hrs, Volume= 8.687 af, Atten= 74%, Lag= 50.2 min
Primary = 18.16 cfs @ 13.34 hrs, Volume= 8.687 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 9.79' @ 13.34 hrs Surf.Area= 2.382 ac Storage= 4.333 af

Plug-Flow detention time= 200.0 min calculated for 8.687 af (91% of inflow)
Center-of-Mass det. time= 154.0 min (995.5 - 841.6)

Volume	Invert	Avail.Storage	Storage Description
#1	7.90'	5.798 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
7.90	2.197	0.000	0.000
9.00	2.304	2.476	2.476
10.00	2.403	2.353	4.829
10.40	2.443	0.969	5.798

Device	Routing	Invert	Outlet Devices
#1	Primary	4.49'	**18.0" Round Culvert** L= 60.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.49' / 2.95' S= 0.0257 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	7.90'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	8.40'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=18.15 cfs @ 13.34 hrs HW=9.79' TW=3.38' (Fixed TW Elev= 3.38')
↑ **1=Culvert** (Inlet Controls 18.15 cfs @ 10.27 fps)
↑ **2=Orifice/Grate** (Passes < 0.31 cfs potential flow)
3=Orifice/Grate (Passes < 56.80 cfs potential flow)

Perimeter of Outlet = $2\left(\frac{48''}{12}\right) + 2\left(\frac{30''}{12}\right)$

$= 13'$

0/13

MSR 7/23/13
PAS 7/23/13

Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 3P: Basin 3

Inflow Area = 34.900 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 81.84 cfs @ 12.49 hrs, Volume= 11.260 af
Outflow = 33.67 cfs @ 13.06 hrs, Volume= 10.914 af, Atten= 59%, Lag= 33.7 min
Primary = 33.67 cfs @ 13.06 hrs, Volume= 10.914 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 9.50' @ 13.06 hrs Surf.Area= 2.493 ac Storage= 3.608 af

Plug-Flow detention time= 91.4 min calculated for 10.892 af (97% of inflow)
Center-of-Mass det. time= 76.4 min (917.5 - 841.1)

Volume	Invert	Avail.Storage	Storage Description
#1	8.00'	4.861 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
8.00	2.306	0.000	0.000
9.00	2.430	2.368	2.368
10.00	2.556	2.493	4.861

Device	Routing	Invert	Outlet Devices
#1	Primary	4.84'	**18.0" Round Culvert X 2.00** L= 165.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 4.84' / 3.19' S= 0.0100 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 1.77 sf
#2	Device 1	8.00'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	8.18'	**72.0" x 48.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=33.66 cfs @ 13.06 hrs HW=9.50' TW=3.38' (Fixed TW Elev= 3.38')
↑—**1=Culvert** (Inlet Controls 33.66 cfs @ 9.52 fps)
↑—**2=Orifice/Grate** (Passes < 0.28 cfs potential flow)
—**3=Orifice/Grate** (Passes < 99.32 cfs potential flow)

Perimeter of Outlet $= 2\left(\frac{72''}{12}\right) + 2\left(\frac{48''}{12}\right)$

$= 20'$

11/13

MSR 7/23/13
PAL 7/25/13

Original Design Elevations *Type III 24-hr 25-Year Rainfall=6.10"*
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Summary for Pond 4P: Basin 4

Inflow Area = 3.640 ac, Inflow Depth = 3.87" for 25-Year event
Inflow = 10.98 cfs @ 12.28 hrs, Volume= 1.174 af
Outflow = 5.98 cfs @ 12.58 hrs, Volume= 1.140 af, Atten= 46%, Lag= 18.4 min
Primary = 5.98 cfs @ 12.58 hrs, Volume= 1.140 af

Routing by Stor-Ind method, Time Span= 0.00-50.00 hrs, dt= 0.10 hrs
Peak Elev= 8.02' @ 12.58 hrs Surf.Area= 0.289 ac Storage= 0.413 af

Plug-Flow detention time= 297.3 min calculated for 1.138 af (97% of inflow)
Center-of-Mass det. time= 283.1 min (1,109.1 - 826.1)

Volume	Invert	Avail.Storage	Storage Description
#1	6.50'	0.555 af	**Custom Stage Data (Prismatic)** Listed below (Recalc)

Elevation (feet)	Surf.Area (acres)	Inc.Store (acre-feet)	Cum.Store (acre-feet)
6.50	0.255	0.000	0.000
7.00	0.266	0.130	0.130
8.00	0.289	0.277	0.408
8.50	0.301	0.148	0.555

Device	Routing	Invert	Outlet Devices
#1	Primary	5.02'	**12.0" Round Culvert** L= 35.0' CPP, square edge headwall, Ke= 0.500 Inlet / Outlet Invert= 5.02' / 4.56' S= 0.0131 '/' Cc= 0.900 n= 0.010 PVC, smooth interior, Flow Area= 0.79 sf
#2	Device 1	6.53'	**3.0" Vert. Orifice/Grate** C= 0.600
#3	Device 1	7.52'	**48.0" x 30.0" Horiz. Orifice/Grate** C= 0.600 Limited to weir flow at low heads

Primary OutFlow Max=5.97 cfs @ 12.58 hrs HW=8.01' TW=5.00' (Fixed TW Elev= 5.00')
↑ **1=Culvert** (Inlet Controls 5.97 cfs @ 7.60 fps)
↑ **2=Orifice/Grate** (Passes < 0.28 cfs potential flow)
↑ **3=Orifice/Grate** (Passes < 14.78 cfs potential flow)

Perimeter of outlet = $2\left(\frac{48"}{12}\right) + 2\left(\frac{30"}{12}\right)$

$= 13'$

12/13

25 year 24 hour
Type III storm

MSR 6/19/13
PAV 7/25/13

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

New Jersey 40.732 N 74.053 W 88 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 2, Version 3
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M. Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2004

Extracted: Thu Mar 13 2008

Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.33	0.53	0.66	0.90	1.11	1.38	1.53	1.98	2.41	2.72	3.16	3.52	4.11	4.65	6.26	7.84	9.98	11.96
2	0.40	0.63	0.79	1.08	1.35	1.67	1.86	2.39	2.92	3.29	3.82	4.25	4.94	5.56	7.44	9.26	11.74	14.02
5	0.47	0.75	0.95	1.33	1.70	2.11	2.35	3.00	3.69	4.20	4.87	5.40	6.17	6.84	8.90	10.87	13.59	16.05
10	0.53	0.84	1.05	1.51	1.96	2.45	2.73	3.50	4.32	4.96	5.76	6.36	7.19	7.90	10.05	12.10	14.99	17.56
25	0.60	0.95	1.19	1.75	2.31	2.93	3.27	4.20	5.23	6.10	7.06	7.76	8.66	9.41	11.61	13.71	16.81	19.47
50	0.65	1.02	1.29	1.92	2.58	3.31	3.71	4.78	6.00	7.08	8.18	8.95	9.89	10.67	12.84	14.93	18.17	20.87
100	0.70	1.10	1.38	2.09	2.86	3.71	4.16	5.38	6.82	8.14	9.41	10.23	11.21	12.00	14.07	16.13	19.48	22.19
200	0.75	1.17	1.47	2.25	3.13	4.12	4.64	6.02	7.71	9.33	10.75	11.64	12.63	13.41	15.32	17.30	20.74	23.42
500	0.81	1.26	1.58	2.47	3.51	4.70	5.31	6.92	8.99	11.09	12.74	13.70	14.67	15.43	17.00	18.82	22.35	24.95
1000	0.86	1.32	1.66	2.63	3.80	5.15	5.84	7.66	10.06	12.59	14.43	15.42	16.36	17.08	18.35	19.95	23.52	26.03

Text version of table

* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

* Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.37	0.58	0.72	0.98	1.22	1.52	1.69	2.17	2.65	2.96	3.46	3.81	4.43	4.99	6.66	8.30	10.52	12.58
2	0.44	0.69	0.87	1.19	1.49	1.85	2.05	2.63	3.21	3.59	4.19	4.61	5.33	5.97	7.91	9.80	12.37	14.75
5	0.52	0.83	1.04	1.46	1.86	2.33	2.59	3.30	4.05	4.57	5.33	5.85	6.65	7.34	9.46	11.50	14.32	16.89
10	0.58	0.92	1.16	1.66	2.15	2.71	3.02	3.83	4.73	5.39	6.28	6.88	7.74	8.46	10.68	12.80	15.80	18.48
25	0.66	1.04	1.31	1.92	2.54	3.23	3.61	4.60	5.71	6.61	7.70	8.39	9.31	10.08	12.33	14.51	17.72	20.49
50	0.71	1.12	1.42	2.10	2.83	3.66	4.09	5.23	6.55	7.66	8.92	9.68	10.64	11.43	13.64	15.81	19.16	21.97
100	0.77	1.21	1.52	2.29	3.14	4.10	4.59	5.89	7.45	8.81	10.28	11.09	12.08	12.87	14.96	17.10	20.56	23.38
200	0.83	1.29	1.62	2.48	3.45	4.57	5.13	6.62	8.44	10.11	11.78	12.64	13.63	14.43	16.33	18.37	21.93	24.71
500	0.90	1.40	1.75	2.74	3.90	5.22	5.88	7.64	9.87	12.04	14.02	14.95	15.95	16.69	18.19	20.07	23.70	26.39
1000	0.95	1.47	1.84	2.93	4.24	5.75	6.50	8.49	11.07	13.71	15.94	16.90	17.84	18.54	19.73	21.35	25.02	27.60

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

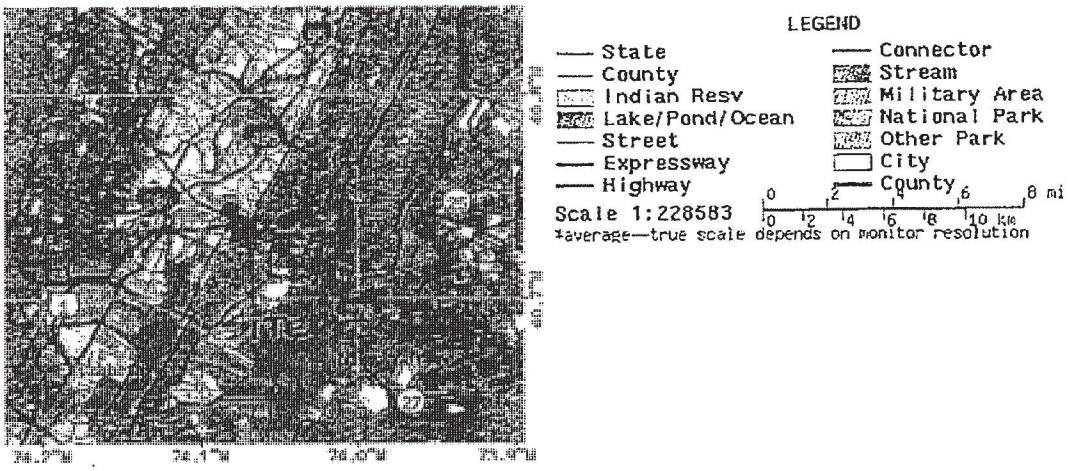
* Lower bound of the 90% confidence interval Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.31	0.49	0.60	0.82	1.02	1.25	1.40	1.81	2.21	2.51	2.90	3.25	3.82	4.35	5.89	7.41	9.46	11.36
2	0.36	0.58	0.72	0.99	1.24	1.52	1.70	2.19	2.67	3.04	3.52	3.94	4.60	5.20	7.00	8.75	11.12	13.31
5	0.43	0.69	0.86	1.22	1.55	1.92	2.14	2.74	3.37	3.87	4.47	4.99	5.73	6.39	8.37	10.26	12.87	15.23
10	0.48	0.77	0.96	1.38	1.78	2.23	2.48	3.18	3.93	4.56	5.26	5.86	6.66	7.36	9.43	11.41	14.19	16.65
25	0.54	0.86	1.08	1.58	2.09	2.64	2.95	3.79	4.72	5.57	6.41	7.10	7.97	8.73	10.85	12.89	15.88	18.44
50	0.59	0.92	1.16	1.73	2.33	2.97	3.33	4.28	5.37	6.41	7.38	8.13	9.06	9.83	11.95	14.01	17.12	19.73
100	0.63	0.98	1.24	1.87	2.56	3.30	3.70	4.78	6.04	7.52	8.41	9.23	10.19	10.98	13.04	15.08	18.30	20.93
200	0.67	1.04	1.31	2.00	2.79	3.63	4.09	5.30	6.74	8.30	9.52	10.41	11.37	12.16	14.12	16.11	19.43	22.04

Reference 5

13/13

MSR 6/19/13
PAS. 7/25/13



Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; USGS Aerial Photograph may also be available from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study, please refer to our documentation.

Using the National Climatic Data Center's (NCDC) station search engine, locate other climate stations within:

+/-30 minutes ...OR... +/-1 degree of this location (40.732/-74.053). Digital ASCII data can be obtained directly from NCDC.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910
(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

Disclaimer

APPENDIX C

CONSOLIDATION SETTLEMENT CALCULATION

(Provided under separate cover)

APPENDIX C

CONSOLIDATION SETTLEMENT CALCULATION

(Provided under separate cover)

CaJ 7/29/13
MSR 7/29/13
Page 1 of 55

Engineering Analysis
Consolidation Settlement at the Cement Bentonite Slurry Walls
Former Koppers Seaboard Site
Kearny, New Jersey

OBJECTIVE

An analysis was completed to evaluate the immediate settlement and long-term consolidation settlement expected from the meadow mat and the varved clay layers underlying the Former Koppers Seaboard Site (Site) and the effects of settlement on the existing slurry walls. The analysis consisted of estimating the magnitude of consolidation settlement and the time rate of consolidation settlement of the soils surrounding the slurry walls and to evaluate the stress applied to the slurry walls from the placement of processed dredge materials (PDM) above the wall.

REFERENCES

1. ARC Kearny Yard Test Embankment Report, Koppers Seaboard Site, Kearny NJ, letter dated September 20, 2010 to Mr. Kanakis, NJDEP, from Nicholas Caiazza, THE Tunnel Project.
2. Contract 22 Final Engineering Geotechnical Design Considerations Report, Rev. 3.1, December 9, 2009, THE Partnership.
3. Drawing CB-03, Slurry Wall Profile 2 of 2, Interim Remedial Action Report, SCCC and Diamond Sites, Kearny, New Jersey, prepared by Key Environmental, Inc., December 2011.
4. Drawings RA-D12 and RA-D13, Barrier Wall Profiles (1 of 2 and 2 of 2, respectively), Final Design Remedial Action Work Plan, Former Koppers Seaboard Site, Kearny, New Jersey, prepared by Key Environmental, Inc., April 6, 1998.
5. Drawing E-01, Construction Drawings, Former Koppers Seaboard Site, prepared by Key Environmental, Inc., October 2007.
6. Final Engineering Geotechnical Design Considerations Report, Kearny Yard Embankment Design Analysis of Proposed Fill for Kearny Yard, Calculation Notebook, THE Partnership, October 2007.
7. Final Design Remedial Action Work Plan, Former Koppers Seaboard Site, Kearny, New Jersey, prepared by Key Environmental, Inc., April 6, 1998.
8. Time Rate Consolidation Perloff and Baron Table 7.7, Pg. 331, from double drained, decreasing pressure.

PROCEDURE

There are three existing slurry walls installed on the Site: the Seaboard Barrier wall located parallel to the existing steel sheet pile wall, the Seaboard Natural Attenuation Enhancement (NAE) cement bentonite wall (CB wall) and the CB wall installed by the Peninsula Restoration Group (PRG) during an Interim Remedial Response Action from 2010 to 2011 at the neighboring SCCC and Diamond Sites, Kearny, New Jersey. Figure 1 shows the location of each slurry wall. The PRG CB wall has a design minimum UCS of 25 psi while the Seaboard Barrier wall and the NAE CB wall have a design minimum UCS of 12.5 psi. The Seaboard Barrier wall was constructed during Remedial Action Work Plan (RAWP) Activities conducted in 1998 and is a soil bentonite slurry wall. When evaluating the potential stress applied to the slurry walls, the magnitude of settlement and settlement rate were evaluated at the location where the maximum thickness and minimum thickness of PDM will be placed based on the

proposed final grade presented in the 2013 RAWPA Drawing SCA-02. Drawing SCA-02 is included in Attachment A. Based on the maximum and minimum fill thickness placements, the primary consolidation settlement was calculated, the time rate of settlement consolidation was evaluated, the anticipated secondary compression of the subsurface soil layers was calculated and the vertical strain on each subsurface soil layer was evaluated.

Soil Profiles for the three slurry walls at both the maximum and minimum anticipated consolidation locations were prepared using Reference 3 and Reference 4 and are included in Attachment A as Drawing CBS-03 and RA-D12. In addition, slurry wall profiles utilizing the 2013 RAWPA proposed final grade and the existing grade are included in Attachment A as Profile 1 and Profile 2, and were used to determine the anticipated thickness of PDM to be placed over the slurry walls. Existing grade elevations were interpolated from Figure 1.

Existing subsurface soil profile data previously presented in Reference 3 and Reference 4 was used for this analysis. In addition extensive soil borings have been collected at the Site and geotechnical testing has been conducted and presented in References 1, 2, 6 and 7. A general description of the subsurface layers of the central portion of the Site in descending order includes the following: 4 to 12 feet of fill; 4 to 5 feet of meadow mat; 2 to 10 feet of sand; 20 to 72 feet of varved clay; 5 to 40 feet of glacial till; and bedrock. Because a subsurface soil profile is not available for the NAE CB wall location, and the subsurface soil profile is fairly uniform over the majority of the Site, it was estimated that the thicknesses of the subsurface stratums in the vicinity of the NAE CB wall are similar to the thicknesses of the subsurface stratums in the vicinity of the Seaboard Barrier wall.

From the primary consolidation settlement evaluation, the compression of the meadow mat and varved clay from the placement of PDM during the Remedial Action (RA) Activities (2008 to 2010) were calculated. Next the time rate of settlement and the secondary consolidation settlement for the PDM placed during the RA activities were calculated. In some cases, PDM was not placed at the areas of interest during RA activities so settlement due to initial PDM placement was not calculated. Next the consolidation settlement, time rate of settlement and secondary consolidation settlement were determined for the placement of the proposed PDM as shown on the Final Grading Plan, Drawing SC-02 presented in Attachment A.

RESULTS

Results of the consolidation settlement analyses and the time rate of consolidation settlement are presented in Attachment B and a summary of the results is presented in Table 2, Summary of Results. Table 3 presents the estimated vertical strain for each stratum following settlement. When PDM was placed during the previous RA activities (PDM was placed to existing grades), the consolidation of the meadow mat occurred very shortly after the PDM fill was placed. From the time rate of settlement calculation it is estimated that the primary consolidation of the varved clay layers should be complete as well. Therefore, the following discussion of the analysis results will be in regard to the anticipated

primary consolidation that is anticipated to occur when PDM is placed to the proposed final grades as depicted in the RAWPA 2013.

PRG CB Wall

The maximum primary consolidation settlement along the PRG CB wall is anticipated to take place along the southern property line, just north of the New Jersey Transit rail line. The estimated settlement was determined to be 1.72 feet of which 0.87 feet occur in the meadow mat layer. This large estimated settlement is due to placement of approximately 12 feet of PDM in this area that did not receive PDM during RA activities and therefore the meadow mat and varved clay was not consolidated during the initial PDM placement. The meadow mat layer is estimated to be 4 feet thick and therefore a 22 percent vertical strain is expected. The varved clay layer combined thickness is estimated to be 44 feet. Primary consolidation in the combined varved clay layer was calculated to be 0.86 feet, which equates to a 2 percent vertical strain.

Along the portion of the PRG CB wall that cuts across the Seaboard Site (station 45+00 to 36+00) PDM had previously been placed during RA activities between 2008 and 2010 (PDM was placed to existing grades) and the time rate of consolidation calculation indicates that the compression of the meadow mat and the varved clay has taken place. Additional consolidation will occur when additional PDM is placed to the proposed final grade. As summarized in Table 2, the primary consolidation due to the placement of PDM to proposed final grade is anticipated to vary from 0.87 feet (at Station 45+00, the location where the largest quantity of PDM will be placed {approximately 7 feet}) to 0.38 feet (at Station 36+00, the location along the steel sheet pile wall where the and minimum quantity of PDM will be placed {approximately 3.5 feet}). At station 45+00 the vertical strain in the meadow mat layer following PDM placement to the proposed final grades was determined to be 12 percent (0.39 feet compression over a 3.2 feet thick layer of meadow mat) and the vertical strain in the combined varved clay layer was determined to be 1.8 percent (0.49 feet compression over 43.28 feet thick layer). At station 36+00 the vertical strain in the meadow mat layer following placement of PDM to the proposed final grade was determined to be 5.4 percent and the vertical strain in the combined varved clay layer was estimated to be 1.1 percent. Table 3 summarizes the percent vertical strain due to PDM placement to final grade for all three slurry walls.

Seaboard Barrier Slurry Wall

Along the wing wall of the Seaboard Barrier wall, that cuts into the Seaboard Site, (station 38+50 to 39+55) PDM had previously been placed during RA activities between 2008 and 2010 (PDM was placed to existing grades) and the time rate of consolidation calculation indicates that the compression of the meadow mat and the varved clay has taken place. Additional consolidation will occur when additional PDM is placed to the proposed final grade. As summarized in Table 2, the primary consolidation due to the placement of PDM to proposed final grade is anticipated to vary from 0.70 feet (at Station 38+50,

the location where the minimum quantity of PDM will be placed {approximately 3.5 feet}) to 1.45 feet (at Station 39+55, the location where the largest quantity of PDM will be placed {approximately 10.5 feet}). At station 38+50 the vertical strain in the meadow mat layer following PDM placement to the proposed final grades was determined to be 8 percent (0.42 feet compression over 5.3 feet thick layer of meadow mat) and the vertical strain in the combined varved clay layer was found to be 1.1 percent (0.27 feet compression over 43.69 feet thick layer of varved clay). At station 39+55 the vertical strain in the meadow mat layer following PDM placement to the proposed final grades was estimated to be 11.9 percent and the vertical strain in the combined varved clay layer following placement of PDM to proposed final grade was determined to be 2.8 percent (total for both varved clay layers combined). Table 3 summarizes the percent vertical strain due to PDM placement to final grade for all three slurry walls.

Seaboard NAE Slurry Wall

The maximum primary consolidation settlement along the Seaboard NAE CB wall is anticipated to take place along the wing wall that cuts into the Seaboard Site (station 83+15). Where PDM had previously been placed during RA activities between 2008 and 2010 (PDM was placed to existing grades), the time rate of consolidation calculation indicates that the compression of the meadow mat and the varved clay has taken place. Additional consolidation will occur when PDM is placed to the proposed final grade. As summarized in Table 2, the settlement due to the placement of PDM to proposed final grade is anticipated to vary from 1.06 feet (at Station 83+15, the location where the maximum quantity of PDM will be placed {approximately 10 feet}) to 0.19 feet (at Station 82+30, the location where the least quantity of PDM will be placed {approximately 1 foot}). At station 83+15 the vertical strain in the meadow mat layer following PDM placement to the proposed final grades was determined to be 11.2 percent (0.48 feet compression over 4.3 feet thick layer of meadow mat) and vertical strain in the combined varved clay layer was determined to be 2.2 percent (0.58 feet compression over 42.95 feet thick layer). At station 82+30 the vertical strain in the meadow mat layer following PDM placement to the proposed final grades was estimated to be 2.7 percent and the vertical strain in the varved clay layer following placement of PDM to proposed final grade was determined to be 0.3 percent (total for both varved clay layers combined). Table 3 summarizes the percent vertical strain due to PDM placement to final grade for all three slurry walls.

CONCLUSIONS

When PDM was placed during the RA activities to existing grade conditions, based on the calculated time rate of settlement consolidation evaluation the consolidation of the meadow mat occurred very shortly after the PDM fill was placed. From the time rate of settlement consolidation calculations it is estimated that the consolidation of the varved clay layers should be complete as well.

Based on a review of the vertical strain due to PDM placement above the existing slurry walls to the proposed final grade, it is anticipated that the PRG CB wall and the NAE CB slurry wall may be subject to significant deformation as the meadow mat and varved clay compress. Because the Seaboard Barrier

wall is constructed of soil/bentonite, which is more plastic than a CB wall, it is anticipated that placement of PDM material to the proposed final grade along the wing wall of the Seaboard Barrier wall will not compromise the wall's performance. It is recommended that additional evaluation of the PRG and the NAE CB walls be conducted to determine if the additional strain induced on the walls would compromise their performance.

CALCULATION SHEET

Computed: CA3 Date: 7/29/13 Checked: MSR Date: 7/29/13	KEY ENVIRONMENTAL INCORPORATED	Client: Project No.: Task:	Page 6 of 55

Subject:

SLURRY WALL PROFILES

MAX FILL - NO PREVIOUS CONSOLIDATION

PRG CB WALL

STATION 45+40

EL'

20' ____ FINAL GRADE (2013)

PDM

8' ____ EXISTING GRADE / INITIAL GRADE

FILL

-3' ____

MEADOW MAT

7' ____

SAND

13' ____

VARVED CLAY

UPPER STRATUM = 15'

LOWER STRATUM = 29'

(REF. 5)

MINIMUM FILL

STATION 36+00

EL'

10' ____ FINAL GRADE 2013

EXISTING GRADE

8' PDM ____ INITIAL GRADE (2007 E-01)

FILL

-2' ____

MEADOW MAT

-6' ____

SAND

-13' ____

VARVED CLAY

UPPER STRATUM = 15'

LOWER STRATUM = 29'

(REF. 5)

MAX FILL WITH PREVIOUS CONSOLIDATION

PRG CB WALL

STATION 45+00

19' ____ FINAL GRADE (2013)

PDM ↕ 7

12 ____ EXISTING GRADE

PDM ↕ 8

4' ____ INITIAG GRADE (2007 E-01)

FILL

-2.5' ____

MEADOW MAT

-7' ____

SAND

-12.5' ____

VARVED CLAY

UPPER STRATUM = 15'

LOWER STRATUM = 29'

(REF 5.)

* WATER TABLE IS LOCATED AT 4'.

EXISTING GRADE IS GRADE AFTER REMEDIAL ACTION ACTIVITIES - 2011

INITIAL GRADE IS GRADE PRIOR TO REMEDIAL ACTION ACTIVITIES 2008

CALCULATION SHEET

Computed: GJ Date: 7/29/13 Checked: MSR Date: 7/29/13	KEY ENVIRONMENTAL INCORPORATED	Client: _____ Project No.: _____ Task: _____ Page 7 of 55
Subject:		

SEABOARD BARRIER WALL - CB WALL PROFILES

STATION 38+50
SLURRY WALL AT 8'
WATER TABLE AT 4'

EL'
12.5' ____ FINAL GRADE
9.0' PDM ____ EXISTING GRADE
5.5 PDM ____ INITIAL GRADE (1998)
FILL
-3 ____
MEADOW MAT
-9 ____
SAND
-14 ____

VARVED CLAY
UPPER STRATUM = 15 FT
LOWER STRATUM - 29 FT
(REF. 5)

STATION 39+55
SLURRY WALL AT 8'

EL
28.5' ____ FINAL GRADE (2013)
18 PDM ____ EXISTING GRADE
5.5 PDM ____ INITIAL GRADE 1998
FILL
-2 ____
MEADOW MAT
-9 ____
SAND
-11 ____

CALCULATION SHEET

Computed: QJ3 Date: 7/29/13 Checked: MSR Date: 7/29/13	KEY ENVIRONMENTAL INCORPORATED	Client: _____ Project No.: _____ Task: _____ Page 8 of 55
Subject:		

SEABOARD NAE SLURRY WALL - SLURRY WALL AT EL 8'
WATER TABLE AT EL 4'

STATION 82+30 (DRAWING 1)

EL'		
9.0'	———	FINAL GRADE.
	PDM	
8'	———	EXISTING GRADE /
	FILL	INITIAL GRADE
-3	———	
	MEADOW MAT	
-7	———	
	SAND	
-13	———	
	VARVED CLAY	
	UPPER STRATUM = 15'	
	LOWER STRATUM = 29'	
	(REF 5)	

STATION 83+15 (DRAWING 1)
WING WALL

EL.		
19'	———	FINAL GRADE
	PDM	
11'	———	EXISTING GRADE
8'	PDM	INITIAL GRADE
	FILL	
-3	———	
	MEADOW MAT	
-7	———	
	SAND	
-13	———	
	VARVED CLAY	
	UPPER STRATUM = 15'	
	LOWER STRATUM = 29	

SETTLEMENT ANALYSIS -

THE SETTLEMENT ANALYSIS AND THE TIME RATE CONSOLIDATION ANALYSIS WHERE CONDUCTED USING AN EXCELL SPREAD SHEET. A PRINT OUT OF THE ANALYSIS IS PROVIDED IN ATTACHMENT B

DATA USED IN THE ANALYSIS IS PROVIDEON TABLE 1 AND WAS OBTAINED FROM REFERENCE 1 AND REFERENCE 2

BELOW ARE THE CALCULATION EQUATIONS USED.

PRIMARY CONSOLIDATION - ONE DIMENSIONAL

SETTLEMENT $S = \sum \frac{C_c H}{1+e_o} \log\left(\frac{P_o + \Delta P}{P_o}\right)$

and $CR = \frac{C_c}{1+e_o}$ COMPRESSION RATIO

$\therefore \quad S = \sum CR \cdot H \log\left(\frac{P_o + \Delta P}{P_o}\right)$

ΔP = STRESS INCREASE FROM LOAD; where H = HEIGHT OF PDM

$\Delta P = \gamma H$

P_o = EFFECTIVE STRESS IN LAYER

ASSUME GROUNDWATER ELEV. = 4.0 FT

ASSUME $\gamma_{FILL\ ABOVE\ G.W.EL} = \gamma_{FILL\ SAT} = 120$ pcf

TIME RATE OF CONSOLIDATION SETTLEMENT
ASSUME STRATUM IS DOUBLE DRAINED, UNIFORM LOAD

TIME FACTOR $T = \frac{C_v t}{H_2}$

Where H = THICKNESS OF A SINGLE DRAINED STRATUM AND ½ THE THICKNESS OF A DOUBLE DRAINED STRATUM

$$t = \frac{H^2}{C_v} T$$

SETTLEMENT $U\% = \frac{\text{SETTLEMENT}(t)}{\text{SETTLEMENT (MAX)}}$

SECONDARY COMPRESSION, compression index

$$S_s = \frac{H_o}{1+e_o} C_\alpha \log \frac{t}{t_{90}}$$

$$C_\alpha = \frac{\alpha}{1+e_o} \quad \text{were} \quad \alpha = \frac{\log(t_2) - \log(t_1)}{e_2 - e_1}$$

$$S_s = C_\alpha H \log \frac{t_2}{t_1}$$ (Ref 3)

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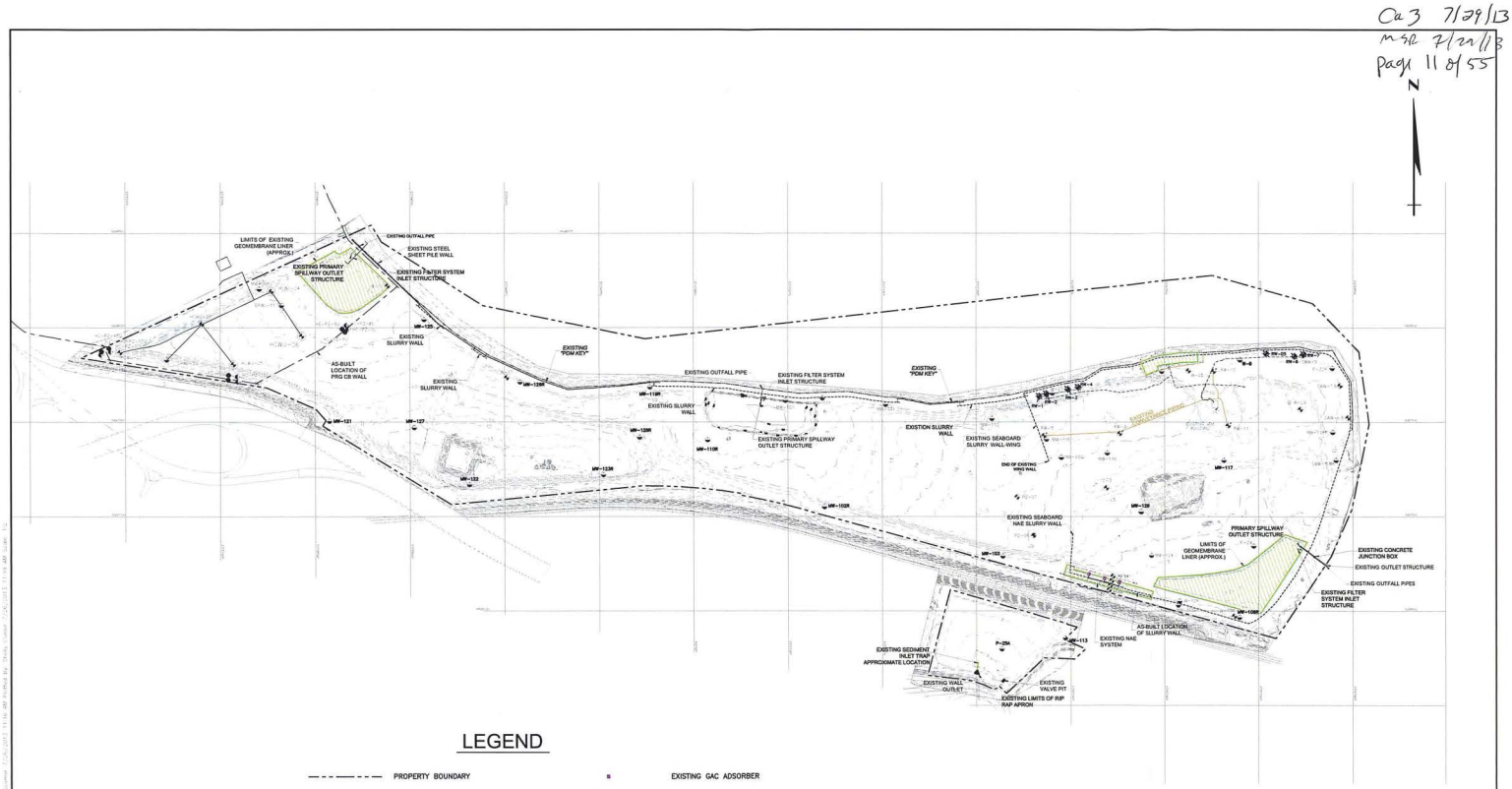

LEGEND

- PROPERTY BOUNDARY
- EXISTING SEABOARD SLURRY WALL
- EXISTING PRG SLURRY WALL
- EXISTING SURFACE CONTOURS
- EXISTING CONVEYANCE PIPING
- EXISTING GROUNDWATER CONVEYANCE PIPING TRENCH ALIGNMENT
- EXISTING GAC ADSORBER
- EXISTING GEOMEMBRANE COVER SYSTEM
- EXISTING RECOVERY WELL LOCATION
- EXISTING GROUNDWATER EXTRACTION WELL LOCATION
- EXISTING MONITORING WELL LOCATION
- EXISTING PIEZOMETER LOCATION

0 500 1000 FEET

REV #	DATE	DESCRIPTION	APPD

REFERENCES:
1. APRIL 25, 2011 AS-BUILT SURVEY PROVIDED BY BORBAS SURVEYING & MAPPING LLC, BOONTON, NEW JERSEY 07005, DATED APRIL 29, 2011.
2. PROPERTY BOUNDARY PER PAULUS, SOKOLOWSKI, SARTOR, CONSULTING ENGINEERS, AUGUST 1995.
3. EXISTING STEEL SHEET PILE WALL LOCATION PER SLURRY WALL AND SHEET PILE WALL LOCATION MAP BY CASEY & KELLER INC., DATED 12/12/95, LAST REVISED 1/5/2000 PLUS ADDITIONAL LOCATIONS PER MONITORING WELL LOCATION SKETCH BY GEDO CORPORATION DATED 4/11/2002.
4. CURRENT GROUND SURFACE ELEVATION CONTOURS PER AIR SURVEY BY AEROMETRIC INC., DULLES, VIRGINIA, MARCH 27, 2011. HORIZONTAL REFERENCE NJ STATE PLANE COORDINATES (NAD 1927). VERTICAL REFERENCE NATIONAL GEODETIC VERTICAL DATUM (NGVD 1929).

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03678500
SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400

HUDSON COUNTY
IMPROVEMENT AUTHORITY

DRWN:	SCC	DATE:	07/15/13
CHKD:	CAZ	DATE:	07/15/13
APPD:	AEB	DATE:	07/15/13
SCALE:	AS SHOWN		

KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

CONSOLIDATION AND SETTLEMENT EVALUATION

PROJECT NO: 13-677

FIGURE 1

Table 1 - Design Soil Parameters
As Presented by THE Partnership in the Final Engineering Geotechnical Design Consideration Report (Reference 2)
and revised in the ARC Kearny Yard Test Embankment Report (Reference 1)

Soil Parameter	PDM (Note 1)	Existing Fill	Meadow Mat	Varved Clay		Glacial Till
				Upper Stratum	Lower Stratum	
Total Unit Weight -γ (pcf)	100	120	80	120	115	130
Over Consolidation Ratio - OCR	1		1	5	1	
Compression Ratio -CR	0.15		0.6	0.1	0.18	
Recompression Ratio - RR	0.01		0.06	0.03	0.04	
Coefficient of Consolidation in Vertical Direction - Cv (ft2/day)	0.4		0.1	0.4	0.25	
Coefficient of Consolidation in Horizontal Direction - Ch (ft2/day)	0.8		0.05	0.8	0.8	
Coefficient of Secondary Compression - Cα	0.01		0.02	0.006	0.01	
Drained Angle of Internal Friction - φ (deg.)	28	30		30	26	36
Undrained Shear Strength - Su (psf)	900		400	1800	600	
Dry Unit Weight - γdry (pcf)	40					

Note
PDM Data obtained from Final Engineering Geotechnical Design Considerations Report, Kearny Yard Embankment Design Analysis of Proposed fill for Kearny Yard, Calculation Notebook, THE Partnership, October 2007.

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Table 2
Summary of Results
Consolidation Settlement at the Slurry Walls
Former Koppers Seaboard Site

Location Along Slurry Wall	Primary Consolidation (feet)	Time Rate of Settlement Consolidation (days)	Secondary Compression in 10 Year (feet)	Primary Consolidation (feet)	Time Rate of Settlement Consolidation (days)	Secondary Compression in 10 Year (feet)
	PDM Placed to Existing Grade			PDM Placed to Proposed Final Grade		
PRG CB Wall						
Station 45+40 - Former Easement, no PDM previously placed, no consolidation has occurred						
Meadow Mat				0.87	40.0	0.08
Varved Clay Upper				0.08	140.6	0.09
Varved Clay Lower				0.77	841	0.29
Total				**1.72**		**0.46**
Station 45+00						
Meadow Mat	1.26	50.6	0.17	0.39	26.2	0.12
Varved Clay Upper	0.08	140.6	0.13	0.04	139.2	0.13
Varved Clay Lower	0.64	841	0.21	0.44	804.3	0.20
Total	**1.98**		**0.51**	**0.87**		**0.46**
Station 36+00						
Meadow Mat				0.22	40	0.16
Varved Clay Upper				0.01	140.6	0.13
Varved Clay Lower				0.15	841	0.21
Total				**0.38**		**0.50**
Seaboard Barrier Slurry Wall						
Station 38+50						
Meadow Mat	0.69	90	0.20	0.42	70.6	0.18
Varved Clay Upper	0.03	140.6	0.13	0.02	140.1	0.13
Varved Clay Lower	0.28	841	0.21	0.25	824.8	0.20
Total	**1.00**		**0.54**	**0.70**		**0.52**
Station 39+55						
Meadow Mat	2.08	123	0.22	0.58	61	0.15
Varved Clay Upper	0.13	160	0.14	0.06	157	0.14
Varved Clay Lower	1.04	1156	0.19	0.80	1086	0.19
Total	**3.25**		**0.55**	**1.45**		**0.48**
Seaboard NAE CB Wall						
Station 82+30						
Meadow Mat				0.11	40	0.16
Varved Clay Upper				0.01	140.6	0.13
Varved Clay Lower				0.07	841	0.21
Total				**0.19**		**0.50**
Station 83+15 Wing Wall						
Meadow Mat	1.70	90	0.20	0.48	46	0.14
Varved Clay Upper	0.12	141	0.13	0.05	138	0.13
Varved Clay Lower	0.93	841	0.21	0.53	788	0.20
Total	**2.75**		**0.54**	**1.06**		**0.48**

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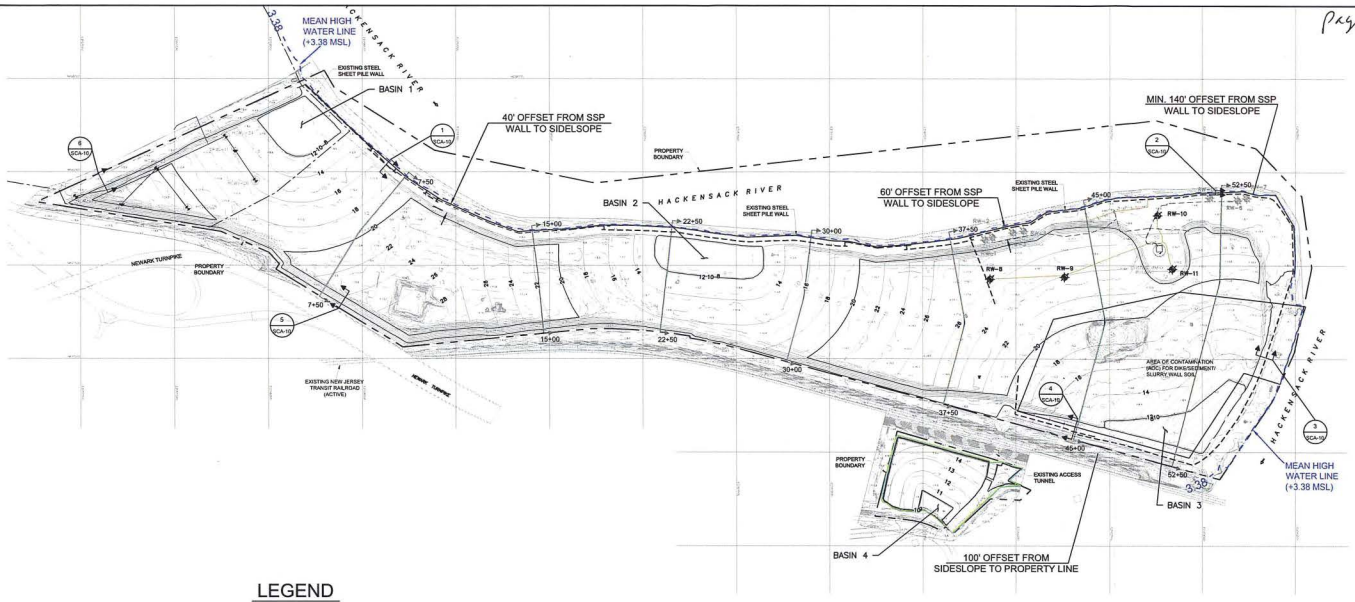
Table 3
Pecent Vertical Strain due to
PDM Placement to Proposed Final Grade
Former Koppers Seaboard Site

Location	Stratum Thickness (feet)	Calculated Compression	Vertical Strain (percent)
PRG Slurry Wall			
Station 45+40 - Former Easement, no PDM previously placed,			
Meadow Mat	4.00	0.87	21.8
Varved Clay Upper	15.00	0.08	0.5
Varved Clay Lower	29.00	0.77	2.6
Station 45+00			
Meadow Mat	3.24	0.39	12.0
Varved Clay Upper	14.92	0.04	0.3
Varved Clay Lower	28.36	0.44	1.5
Station 36+00			
Meadow Mat	4.00	0.22	5.4
Varved Clay Upper	15.00	0.01	0.1
Varved Clay Lower	29.00	0.15	0.5
Seaboard Barrier Wall			
Station 38+50			
Meadow Mat	5.31	0.42	8.0
Varved Clay Upper	14.97	0.02	0.2
Varved Clay Lower	28.72	0.25	0.9
Station 39+55			
Meadow Mat	4.92	0.58	11.9
Varved Clay Upper	15.87	0.06	0.4
Varved Clay Lower	32.96	0.80	2.4
Seaboard NAE Slurry Wall			
Station 82+30			
Meadow Mat	4.00	0.11	2.7
Varved Clay Upper	15.00	0.01	0.0
Varved Clay Lower	29.00	0.07	0.3
Station 83+15			
Meadow Mat	4.30	0.48	11.2
Varved Clay Upper	14.88	0.05	0.3
Varved Clay Lower	28.07	0.53	1.9

Ca 3 7/29/13
MJR 7/29/13
page 15 of 55

ATTACHMENT A



LEGEND

- PROPERTY BOUNDARY
- EXISTING SEABOARD SLURRY WALL
- EXISTING SEABOARD STEEL SHEET PILE WALL
- EXISTING PRG CB WALL
- EXISTING "PDM KEY" LOCATION
- EXISTING NEW JERSEY TRANSIT RAILROAD *(ACTIVE)*
- EXISTING GROUND SURFACE ELEVATION CONTOUR
- EXISTING GROUND SURFACE SPOT ELEVATION (FEET–MSL)
- 10 — PROPOSED FINAL SURFACE ELEVATION CONTOUR
- RW-6 — EXISTING IRM RECOVERY WELL LOCATION
- 3.38 — MEAN HIGH WATER
- EXISTING AREA OF PROPOSED INTERIM DREDGE PROCESSING OPERATIONS (SEE NOTE 3)
- 1 / SCA-03 — DETAIL NUMBER / DRAWING NUMBER
- EXISTING GROUNDWATER CONVEYANCE PIPING TRENCH ALIGNMENT
- EXISTING RECOVERY WELL LOCATION
- EXISTING GROUNDWATER EXTRACTION WELL LOCATION

NOTE:

1. THE PROPOSED ELEVATION CONTOURS DEPICT THE TOP OF THE SIX INCH TOPSOIL LAYER.
2. REFER TO DRAWINGS NOS. SCA–03 AND SCA–04 FOR CROSS SECTIONS.
3. REFER TO DRAWING NO. SCA–10 FOR TYPICAL PERIMETER DETAILS.
4. GREAT LAKES DREDGE AND DOCK COMPANY, LLC (GLDD) IS UTILIZING THE SOUTHEASTERN PORTION OF THE SITE AS A PDM PROCESSING AND STOCKPILE FACILITY. GLDD HAS DEVELOPED PLANS AND OBTAINED PERMITS FOR SITE OPERATIONS THAT WILL ENABLE GLDD TO CONDUCT THEIR PROCESSING AND STOCKPILING ACTIVITIES WHILE REMEDIATION OF THE SITE IS BEING COMPLETED. UPON COMPLETION OF THE GLDD OPERATIONS, THE CORRESPONDING FINAL SURFACE COVER SYSTEM WILL BE INSTALLED IN ACCORDANCE WITH THE DESIGN PLANS CONTAINED HEREIN, TO COMPLETE CONSTRUCTION OF THE PRESCRIBED REMEDY.
5. ALL WELLS SHOWN ON EA–01 SHALL BE EXTENDED TO TOP OF SURFACE COVER AS REQUIRED FOR ACCESS.
6. TIDAL ELEVATION DATA CALCULATIONS WERE PROVIDED BY GEOD CORPORATION DERIVED BY UTILIZING INFORMATION FOR TIDAL STATIONS 853–0696 AND 853–0772 USING THE 1983–2001 TIDAL EPOCH AND ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 1929).

0 250 500 FEET

HUDSON COUNTY IMPROVEMENT AUTHORITY

DRWN:	SCC	DATE:	07/26/13
CHKD:	GAZ	DATE:	07/26/13
APPD:	AEB	DATE:	07/26/13
SCALE:	AS SHOWN		

KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

FINAL GRADING PLAN

PROJECT NO: 13–667
SCA–02

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: DRAWING EA–01, REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013)

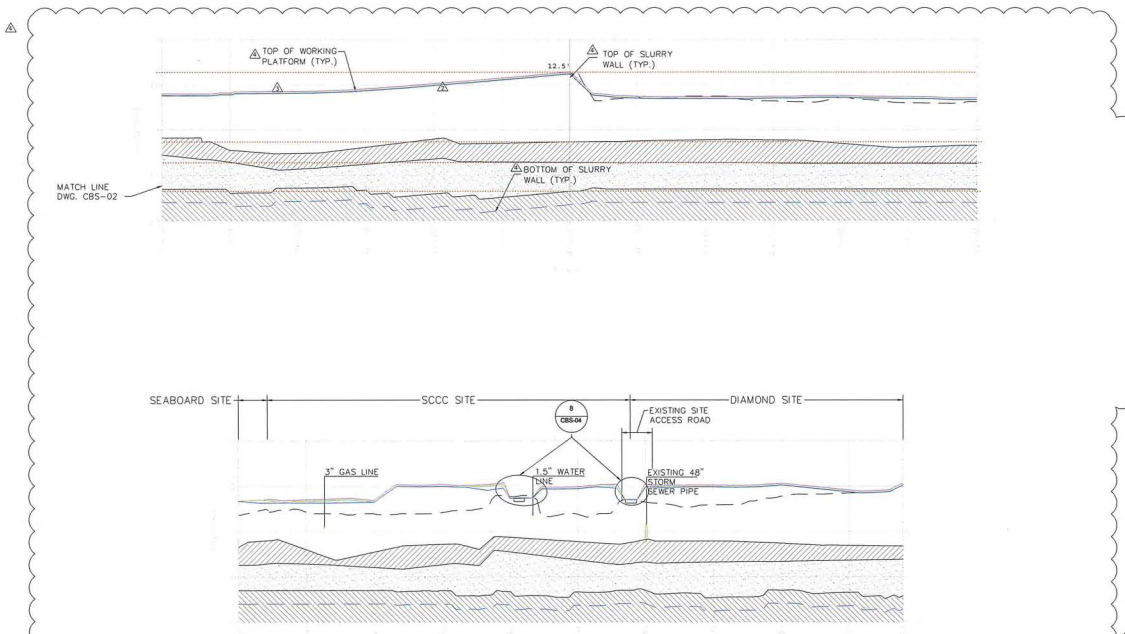
ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03678500

SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400



LEGEND

- FILL
- MEADOWMAT
- SAND
- VARVED CLAY
- EXISTING GROUND SURFACE
- TOP OF WORKING PLATFORM
- TOP OF SLURRY WALL
- BOTTOM OF SLURRY WALL
- TOPSOIL
- ACCESS ROAD SLURRY WALL CROSSING

PRG Cement Bentonite Slurry Wall As-Built Profile

V: 0 10 20 FEET

H: 0 100 200 FEET

NOTES:
1. BOTTOM OF SLURRY WALL WAS EXTENDED A MIN OF 3' INTO THE VARVED CLAY LAYER.
2. AS-BUILT DRAWING WAS PREPARED BASED ON THE CORRESPONDING INTERIM RESPONSE ACTION CIVIL ENGINEERING DESIGN DRAWING. THIS AS-BUILT DRAWING DEPICTS MAJOR CHANGES TO OR DEVIATIONS FROM THE DESIGN DRAWING, AS DOCUMENTED BY FIELD INSPECTION BY KEY'S COA PERSONNEL. AS-BUILT DIMENSIONS OR MEASUREMENTS MAY VARY SLIGHTLY FROM THOSE DEPICTED ON THIS AS-BUILT DRAWING
3. WORKING PLATFORM AND SLURRY WALL REMOVED POST SLURRY WALL INSTALLATION TO PROVIDE SITE ACCESS.

REV #	DATE	DESCRIPTION	APPD
4	12/28/11	AS-BUILT	AEB
3	11/10/10	MODIFIED ELEVATIONS OF SLURRY WALL AND WORKING PLATFORM	AEB
2	06/22/10	MODIFIED SEABOARD SLURRY WALL ALIGNMENT	AEB
1	01/28/10	REVISED DIAMETER OF EXISTING WATER LINE.	AEB
0	12/22/09	ISSUED FOR BID	AEB

REFERENCE:

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03378500

SIGNATURE DATE

CERTIFICATE OF AUTHORIZATION TO OFFER ENGINEERING SERVICES
24GA27961400

PENINSULA RESTORATION GROUP

DRWN: ALP	DATE: 12/22/09	KEY ENVIRONMENTAL INCORPORATED
CHKD: CAZ	DATE: 12/22/09	
APPD: AEB	DATE: 12/22/09	
SCALE: AS SHOWN		

INTERIM RESPONSE ACTION DESIGN
SCCC AND DIAMOND SITES
KEARNY, NEW JERSEY

SLURRY WALL PROFILE 2 OF 2

PROJECT NO. 09-803/804

CBS-03

Ca 3 11/27/13
mg 12 7/22/13

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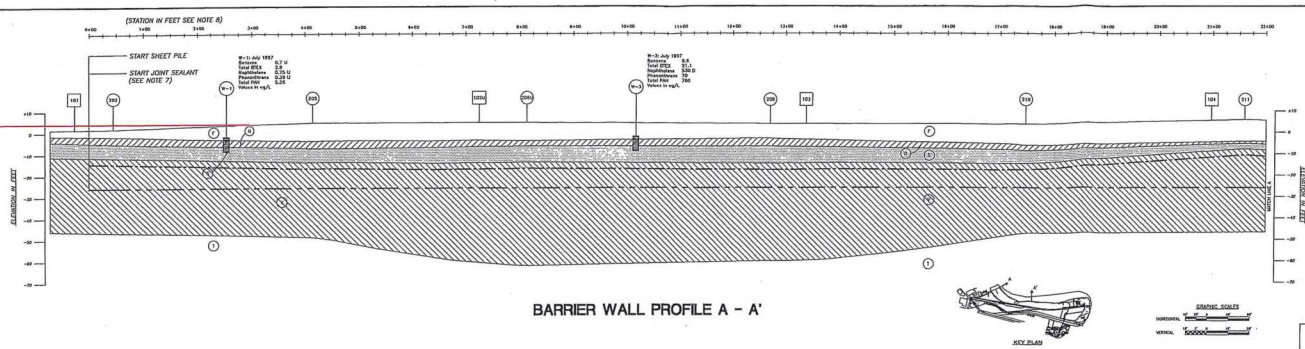
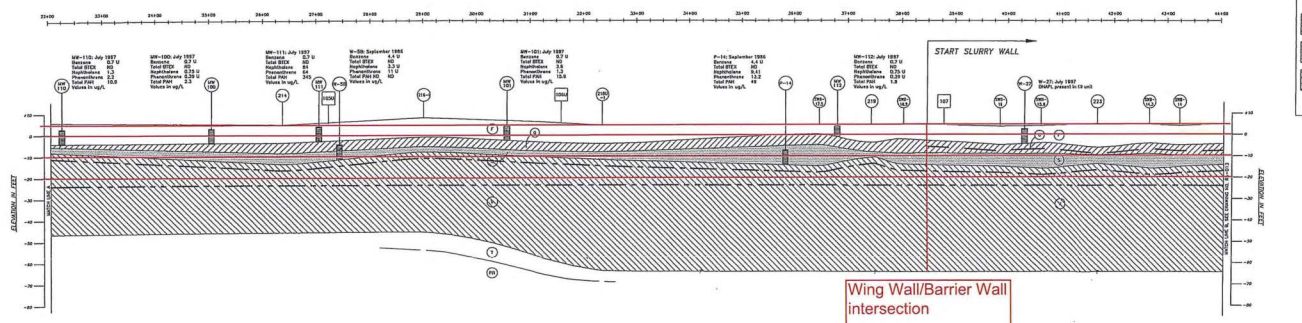


BARRIER WALL PROFILE A - A'

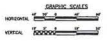
LEGEND:

- WELL LOCATION
- ORGANIC SILTY CLAY/ ORGANIC SILTY CLAY AND SAND
- SAND
- VARVED SILT AND CLAY



Wing Wall/Barrier Wall intersection

BARRIER WALL PROFILE B - B'



Seaboard Barrier Wall - Soil Bentonite Slurry Wall Profile

GENERAL STRATA DESCRIPTIONS

(F) FILL – LOOSE TO VERY COMPACT DARK GRAY CINDER FILL AND FINE TO COARSE SAND GRAVEL TO FINE TO COARSE SAND, TRACE TO SOME GRAVEL, SILT, WOOD, BRICK, TRACE VEGETATION, ROOTS, COAL, WITH POSSIBLE OBSTRUCTIONS.

(O) ORGANIC SILTY CLAY – SOFT TO MEDIUM DARK GRAY TO BROWN ORGANIC SILTY CLAY TO CLAYEY SILT, TRACE TO SOME PEAT, DECOMPOSED VEGETATION, DECOMPOSED WOOD, FINE SAND, TRACE MEADOW MAT, SHELLS, FINE SAND SEAMS WITH OCCASIONAL PEAT DEPOSITS.

(OAS) ORGANIC SILTY CLAY AND SAND – INTERLAYERED GRAY MEDIUM ORGANIC SILTY CLAY AND FINE SAND, TRACE TO SOME SHELLS, ORGANIC SILTY FINE SAND TO FINE SAND, TRACE TO SOME ORGANIC SILT, DECOMPOSED VEGETATION AND DECOMPOSED WOOD LAYERS AND SEAMS, TRACE SHELLS.

(S) SAND – LOOSE TO COMPACT GRAY TO GRAY GREEN SILTY FINE SAND TO FINE TO MEDIUM SAND, TRACE TO SOME SILT (SILT OCCASIONALLY ORGANIC) TRACE CLAY POCKETS AND LAYERS, GRAVEL, DECOMPOSED VEGETATION, OCCASIONAL SANDY SILT AND CLAYEY FINE SAND LAYERS.

(V) VARVED SILT AND CLAY – SOFT TO STIFF GRAY BROWN TO RED BROWN CLAYEY SILT VARVED WITH CLAY AND SILTY CLAY, TRACE TO SOME FINE SAND AND SILT SEAMS AND LAYERS.

(T) TILL – MEDIUM COMPACT TO VERY COMPACT RED BROWN SILTY TO CLAYEY FINE TO COARSE SAND, SOME GRAVEL, TO FINE TO COARSE SAND, SOME SILT, GRAVEL, COBBLES AND BOULDERS, OCCASIONAL CLAY AND SILT WITH OCCASIONAL SILTY CLAY AND FINE TO COARSE SANDY CLAY POCKETS.

(PR) POSSIBLE ROCK – POSSIBLE ROCK NOTED BY DRILLER BY OBSERVING TRC WASH AND SHARP DRILLING. NO SAMPLE OF ROCK WAS OBTAINED.

GENERAL NOTES

1. FOR LOCATIONS OF BORINGS, SEE MRCE DRAWING NO. B-2 (VOLUME II-C, ATTACHMENT 1).
2. STRATIFICATIONS SHOWN ARE BY MRCE AND REPRESENT NECESSARY INTERPOLATIONS BETWEEN BORINGS WHICH MAY NOT REPRESENT ACTUAL SUBSURFACE CONDITIONS.
3. SOIL CLASSIFICATIONS IN 1997 BORINGS ARE BY MRCE. FOR COMPLETE SAMPLE DESCRIPTIONS, SEE INDIVIDUAL BORING LOGS.
4. FOR BORING LEGEND AND SOIL CLASSIFICATION SYSTEM, SEE MRCE DRAWING NO. CS-8 (VOLUME II-C, ATTACHMENT 1).
5. ELEVATIONS OF 1997 BORINGS WERE DETERMINED BY CASEY & KELLER.
6. ELEVATIONS ARE REFERRED TO NGVD IN WHICH ELEV. 0.0 EQUALS MEAN SEA LEVEL AT SANDY HOOK, N.J. 1929.
7. REFER TO DETAIL #1, DRAWING RA-D11 FOR JOINT SEALANT SYSTEM OPTIONS.
8. THE HORIZONTAL STATIONING REPRESENTS THE GEOLOGICAL BASELINE SHOWN ON THE KEY PLAN. REFER TO RA-D10 FOR THE PERIMETER BASELINE.

PROPOSED BOTTOM OF SLURRY WALL

PROPOSED BOTTOM (TIP) OF SHEET PILE WALL

PROPOSED BOTTOM OF JOINT SEALANT

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

PREPARED FOR:
ECDC
149 HARSH STREET
PORT NEWARK
NEW JERSEY, 07114

ISSUE DATE:
04/06/98

ROSSLYN FARMS INDUSTRIAL PARK
1200 ARCH ST., SUITE 200
CARNEGIE, PA 15106

ECDC

DRW: MEL DSB	DATE: 04/06/98	KEY ENVIRONMENTAL INCORPORATED
CHKD: MRL	DATE: 04/06/98	
APPD: PWS	DATE: 04/06/98	
SCALE: AS SHOWN		

FINAL DESIGN REMEDIAL ACTION WORK PLAN
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY
BLOCK 287 LOTS 54, 55, 56, 60, 61B, 61C, 62, 62R, 63, 70, 70R, 71, 71R, 80

BARRIER WALL PROFILES (1 OF 2)

DRAWING NUMBER
97305
RA-D12

DESIGNED BY: | DRAWN: MDH | CHKD: EIF | VERSION: AUG 13 | FILE: ECADD\DRAWINGS\FINAL\RA-D12.DWG

Ca 3 7/29/13
M,R 7/29/13

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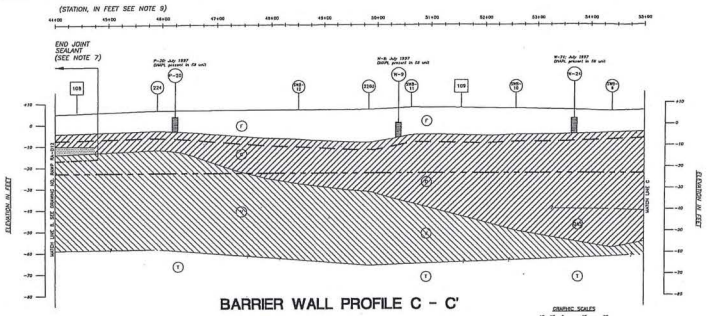
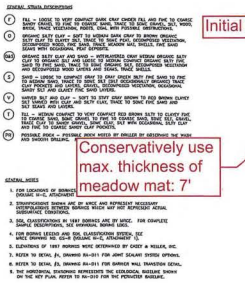
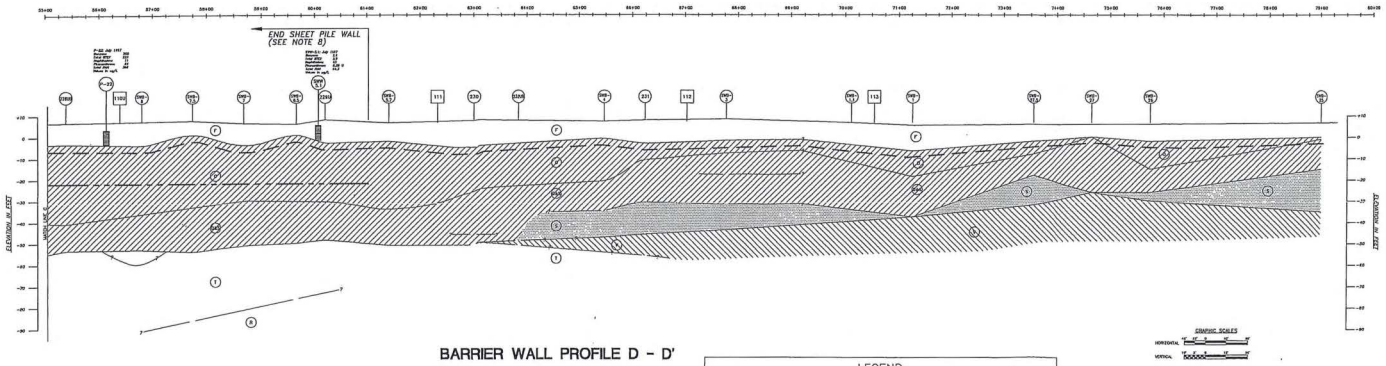


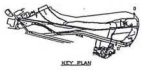
BARRIER WALL PROFILE C - C'



BARRIER WALL PROFILE E - E'



BARRIER WALL PROFILE D - D'



PROPOSED BOTTOM OF SLURRY WALL
PROPOSED BOTTOM OF SHEET PILE WALL
PROPOSED BOTTOM OF JOINT SEALANT

LEGEND:
WELL LOCATION
SAND
ORGANIC SILTY CLAY/ ORGANIC SILTY CLAY AND SAND
VARVED SILT AND CLAY

Seaboard Barrier Wall Soil Bentonite Slurry Wall Profile

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

PREPARED FOR:
ECDC
140 HARSH STREET
PORT NEWARK
NEW JERSEY, 07114

ISSUE DATE:
04/06/98

ROSSLYN FARMS INDUSTRIAL PARK
1200 ARCH ST., SUITE 200
CARNEGIE, PA 15106

ECDC

DRW: DSB MEL	DATE: 04/06/98	KEY ENVIRONMENTAL INCORPORATED
CHKD: MRL	DATE: 04/06/98	
APPD: PMS	DATE: 04/06/98	
SCALE: AS SHOWN		

FINAL DESIGN REMEDIAL ACTION WORK PLAN
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY
BLOCK 287 LOTS 54, 55, 56, 60, 61B, 61C, 62, 62R, 63, 70, 70R, 71, 71R, 80

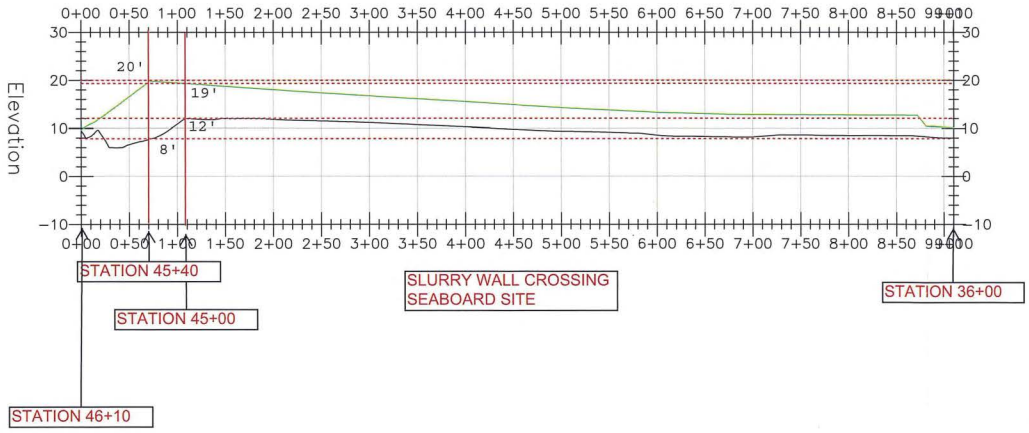
BARRIER WALL PROFILES (2 OF 2)

DRAWING NUMBER
87305
RA-D13

DATE | HORIZ. SCALE 1:3 | VERT. SCALE 1:3 | FILE: S:\GRAPHICS\PWG\RA-D13.DWG

Ca3 7/29/13
MSR 7/24/13
Page 20 of 55

PRG CEMENT BENTONITE SLURRY WALL PROFILE



LEGEND
RAWPA 2013 FINAL GRADE-GREEN
EXISTING GRADE-BLACK

NOTES: THE LABELED STATIONS CORRESPOND TO THE SLURRY WALL AS-BUILT STATIONS (SEE CB-03)

0 500 1000 FEET

SEABOARD CONSOLIDATION
SETTLEMENT ANALYSIS

DRWN: XXX	DATE: XX/XX/XX	KEY ENVIRONMENTAL INCORPORATED	
CHKD: XXX	DATE: XX/XX/XX		
APPD: XXX	DATE: XX/XX/XX		
SCALE: AS SHOWN			

PRG CB SLURRY WALL
PROFILE

RAWPA 2013

PROJECT NO: XX-XXX
PROFILE 1

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCE:

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

Ca3 7/29/13
MSR 7/29/13
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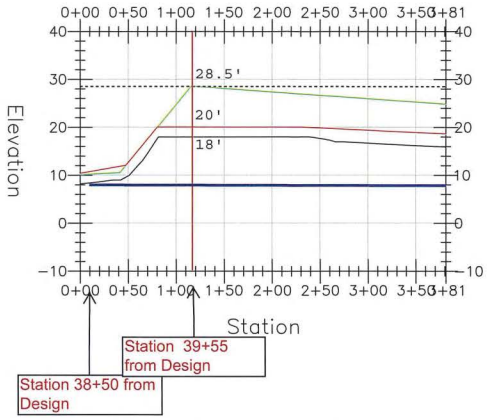
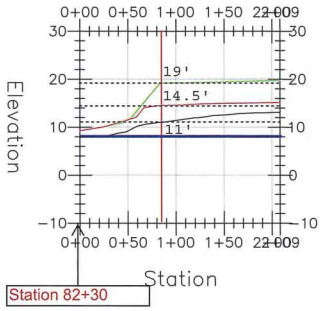
SEABOARD BARRIER WALL - WING WALL PROFILE



NOTES FOR SEABOARD BARRIER WALL-WING WALL:
1. SEABOARD STEEL SHEET PILE WALL IS LOCATED PERPENDICULAR TO THE WING WALL AT STATION 0+00 AS SHOWN ON PROFILE.
2. SEABOARD BARRIER WALL IS LOCATED PARALLEL TO SSP WALL AT STATION 10+00 (APPROX.) AS SHOWN ON PROFILE.

LEGEND
RAWPA 2013 FINAL DESIGN GRADE - GREEN
RAWPA 2007 FINAL DESIGN GRADE- RED
EXISTING GRADE - BLACK
TOP OF SLURRY WALL - BLUE

SEABOARD NAE SLURRY WALL - WING WALL PROFILE



NOTE FOR NAE SLURRY WALL- WING WALL:
NAE SLURRY WALL IS ORIENTED PERPENDICULAR TO THE WING WALL AT STATION 0+00 AS SHOWN ON PROFILE.

0 200 400 FEET

SEABOARD CB WALL CONSOLIDATION SETTLEMENT ANALYSIS

DRWN: XXX	DATE: XX/XX/XX	KEY ENVIRONMENTAL INCORPORATED
CHKD: XXX	DATE: XX/XX/XX	
APPD: XXX	DATE: XX/XX/XX	
SCALE: AS SHOWN		

SEABOARD BARRIER WALL & NAE SLURRY WALL PROFILES

RAWPA 2013 | PROJECT NO: XX-XXX Profile 2

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCE:

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

ATTACHMENT B

CA3 7/29/13
MSA 7/24/13
Page 2304 55

PRG Slurry Wall - Station 45+40
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	4	480	0	480	480
Fill, saturated	120	7	840	436.8	403.2	883.2
Meadow Mat	80	2	160	124.8	35.2	918.4
Meadow Mat	80	2	160	124.8	35.2	953.6
Sand	130	6	780	374.4	405.6	1359.2
Varved Clay	120	7.5	900	468	432	1791.2
Varved Clay	120	7.5	900	468	432	2223.2
Varved Clay	115	14.5	1667.5	904.8	762.7	2985.9
Varved Clay	115	14.5	1667.5	904.8	762.7	3748.6

Organic Peat Layer - Meadow Mat

Layer Thickness	4.00	ft
Initial Midpoint Effective Stress	918.40	psf
PDM Thickness	12.00	ft
Stress Increase from Loading	1200.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.87	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	918.40	psf
Estimated Consolidation	**0.87**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1791.20	psf
PDM Thickness	12.00	ft
Stress Increase from Loading	1200.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.33	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	8956.00	psf
Estimated Consolidation	**0.08**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2985.90	psf
PDM Thickness	12.00	ft
Stress Increase from Loading	1200.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.77	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2985.90	psf
Estimated Consolidation	**0.77**	**ft**

Total Estimated Consolidation **1.72 Feet**

Ca3 7/29/13
MSR 7/29/13
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PRG Slurry Wall - Station 45+40
TIME RATE OF CONSOLIDATION SETTLEMENT
PDM Placed to Final Grade

Meadow Mat			
Layer Thickness		4.00	ft
Drainage Length		2	ft
Coef. Consolidation Cv		0.1	ft2/day
Time to Consolidate		40.00	day
Consolidation		0.87	ft
U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.00
5	0.002	0	0.04
10	0.0078	0	0.09
15	0.0177	1	0.13
20	0.0314	1	0.17
25	0.0491	2	0.22
30	0.0707	3	0.26
35	0.0962	4	0.30
40	0.126	5	0.35
45	0.159	6	0.39
50	0.197	8	0.44
55	0.239	10	0.48
60	0.286	11	0.52
65	0.342	14	0.57
70	0.403	16	0.61
75	0.477	19	0.65
80	0.567	23	0.70
85	0.684	27	0.74
90	0.848	34	0.78
95	1.129	45	0.83

Varved Clay Upper Stratum			
Layer Thickness		15.00	ft
Drainage Length		7.5	ft
Coef. Consolidation Cv		0.4	ft2/day
Time to Consolidate		140.625	day
Consolidation		0.08	ft
U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	0	0.004
10	0.0078	1	0.008
15	0.0177	2	0.012
20	0.0314	4	0.016
25	0.0491	7	0.020
30	0.0707	10	0.025
35	0.0962	14	0.029
40	0.126	18	0.033
45	0.159	22	0.037
50	0.197	28	0.041
55	0.239	34	0.045
60	0.286	40	0.049
65	0.342	48	0.053
70	0.403	57	0.057
75	0.477	67	0.061
80	0.567	80	0.066
85	0.684	96	0.070
90	0.848	119	0.074
95	1.129	159	0.078

Varved Clay Lower Stratum			
Layer Thickness		29.00	ft
Drainage Length		14.5	ft
Coef. Consolidation Cv		0.25	ft2/day
Time to Consolidate		841	day
Consolidation		0.766	ft
U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	2	0.038
10	0.0078	7	0.077
15	0.0177	15	0.115
20	0.0314	26	0.153
25	0.0491	41	0.191
30	0.0707	59	0.230
35	0.0962	81	0.268
40	0.126	106	0.306
45	0.159	134	0.345
50	0.197	166	0.383
55	0.239	201	0.421
60	0.286	241	0.460
65	0.342	288	0.498
70	0.403	339	0.536
75	0.477	401	0.574
80	0.567	477	0.613
85	0.684	575	0.651
90	0.848	713	0.689
95	1.129	949	0.728

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PRG Slurry Wall - Station 45+40

SECONDARY COMPRESSION SETTLEMENT CALCULATION

PDM Placed to Final Grade

Organic Peat Layer - Meadow Mat

Layer Thickness	4.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.02	
Estimated Secondary Compression	**0.16**	**ft**

Varved Clay Upper Stratum

Layer Thickness	15.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.006	
Estimated Secondary Compression	**0.13**	**ft**

Varved Clay Lower Stratum

Layer Thickness	29.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.01	
Estimated Secondary Compression	**0.21**	**ft**

PRG Slurry Wall - Station 45+00
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)
PDM Placed to Existing Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	0	0	0	0	0
Fill, saturated	120	6.5	780	405.6	374.4	374.4
Meadow Mat	80	2.25	180	140.4	39.6	414
Meadow Mat	80	2.25	180	140.4	39.6	453.6
Sand	130	5.5	715	343.2	371.8	825.4
Varved Clay	120	7.5	900	468	432	1257.4
Varved Clay	120	7.5	900	468	432	1689.4
Varved Clay	115	14.5	1667.5	904.8	762.7	2452.1
Varved Clay	115	14.5	1667.5	904.8	762.7	3214.8

Organic Peat Layer - Meadow Mat

Layer Thickness	4.50	ft
Initial Midpoint Effective Stress	414.00	psf
PDM Thickness	8.00	ft
Stress Increase from Loading	800.00	psf
Compression Ratio	0.6	
Normal Consolidation	1.26	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	414.00	psf
Estimated Consolidation	**1.26**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1257.40	psf
PDM Thickness	8.00	ft
Stress Increase from Loading	800.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.32	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	6287.00	psf
Estimated Consolidation	**0.08**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2452.10	psf
PDM Thickness	8.00	ft
Stress Increase from Loading	800.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.64	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2452.10	psf
Estimated Consolidation	**0.64**	**ft**

Total Estimated Consolidation **1.98 Feet**

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PRG Slurry Wall - Station 45+00
TIME RATE OF CONSOLIDATION SETTLEMENT
PDM Placed to Existing Grade

Meadow Mat		
Layer Thickness	4.50	ft
Drainage Length	2.25	ft
Coef. Consolidation Cv	0.1	ft2/day
Time to Consolidate	50.63	day
Consolidation	1.26	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.00
5	0.002	0	0.06
10	0.0078	0	0.13
15	0.0177	1	0.19
20	0.0314	2	0.25
25	0.0491	2	0.32
30	0.0707	4	0.38
35	0.0962	5	0.44
40	0.126	6	0.50
45	0.159	8	0.57
50	0.197	10	0.63
55	0.239	12	0.69
60	0.286	14	0.76
65	0.342	17	0.82
70	0.403	20	0.88
75	0.477	24	0.95
80	0.567	29	1.01
85	0.684	35	1.07
90	0.848	43	1.14
95	1.129	57	1.20

Varved Clay Upper Stratum		
Layer Thickness	15.00	ft
Drainage Length	7.5	ft
Coef. Consolidation Cv	0.4	ft2/day
Time to Consolidate	140.625	day
Consolidation	0.08	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	0	0.004
10	0.0078	1	0.008
15	0.0177	2	0.012
20	0.0314	4	0.016
25	0.0491	7	0.020
30	0.0707	10	0.023
35	0.0962	14	0.027
40	0.126	18	0.031
45	0.159	22	0.035
50	0.197	28	0.039
55	0.239	34	0.043
60	0.286	40	0.047
65	0.342	48	0.051
70	0.403	57	0.055
75	0.477	67	0.059
80	0.567	80	0.062
85	0.684	96	0.066
90	0.848	119	0.070
95	1.129	159	0.074

Varved Clay Lower Stratum		
Layer Thickness	29.00	ft
Drainage Length	14.5	ft
Coef. Consolidation Cv	0.25	ft2/day
Time to Consolidate	841	day
Consolidation	0.640	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	2	0.032
10	0.0078	7	0.064
15	0.0177	15	0.096
20	0.0314	26	0.128
25	0.0491	41	0.160
30	0.0707	59	0.192
35	0.0962	81	0.224
40	0.126	106	0.256
45	0.159	134	0.288
50	0.197	166	0.320
55	0.239	201	0.352
60	0.286	241	0.384
65	0.342	288	0.416
70	0.403	339	0.448
75	0.477	401	0.480
80	0.567	477	0.512
85	0.684	575	0.544
90	0.848	713	0.576
95	1.129	949	0.608

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PRG Slurry Wall - Station 45+00

SECONDARY COMPRESSION SETTLEMENT CALCULATION

PDM Placed to Existing Grade

Organic Peat Layer - Meadow Mat

Layer Thickness	4.50	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Consolidation	0.02	
Estimated Secondary Compression	**0.17**	**ft**

Varved Clay Upper Stratum

Layer Thickness	15.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.006	
Estimated Secondary Compression	**0.13**	**ft**

Varved Clay Lower Stratum

Layer Thickness	29.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.01	
Estimated Secondary Compression	**0.21**	**ft**

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PRG Slurry Wall - Station 45+00
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	8.00	800	0	800	800
Fill, moist	120	0	0	0	0	800
Fill, saturated	120	6.5	780.0	405.6	374.4	1174.4
Meadow Mat	80	1.6	129.5	101.0	28.5	1202.9
Meadow Mat	80	1.6	129.5	101.0	28.5	1231.4
Sand	130	5.5	715.0	343.2	371.8	1603.2
Varved Clay	120	7.5	895.3	465.6	429.8	2033.0
Varved Clay	120	7.5	895.3	465.6	429.8	2462.7
Varved Clay	115	14.2	1630.7	884.8	745.9	3208.6
Varved Clay	115	14.2	1630.7	884.8	745.9	3954.4

Organic Peat Layer - Meadow Mat

Layer Thickness	3.24	ft
Initial Midpoint Effective Stress	1202.90	psf
PDM Thickness	7.00	ft
Stress Increase from Loading	700.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.39	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	1202.90	psf
Estimated Consolidation	**0.39**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	14.92	ft
Initial Midpoint Effective Stress	2032.95	psf
PDM Thickness	7.00	ft
Stress Increase from Loading	700.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.19	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	10164.75	psf
Estimated Consolidation	**0.04**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	28.36	ft
Initial Midpoint Effective Stress	3208.57	psf
PDM Thickness	7.00	ft
Stress Increase from Loading	700.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.44	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	3208.57	psf
Estimated Consolidation	**0.44**	**ft**

Total Estimated Consolidation **0.87** **Feet**

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PRG Slurry Wall - Station 4S+00
TIME RATE OF CONSOLIDATION SETTLEMENT
PDM Placed to Final Grade

Meadow Mat		
Layer Thickness	3.24	ft
Drainage Length	1.619255	ft
Coef. Consolidation Cv	0.1	ft2/day
Time to Consolidate	26.22	day
Consolidation	0.39	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.00
5	0.002	0	0.02
10	0.0078	0	0.04
15	0.0177	1	0.06
20	0.0314	2	0.08
25	0.0491	2	0.10
30	0.0707	4	0.12
35	0.0962	5	0.14
40	0.126	6	0.15
45	0.159	8	0.17
50	0.197	10	0.19
55	0.239	12	0.21
60	0.286	14	0.23
65	0.342	17	0.25
70	0.403	20	0.27
75	0.477	24	0.29
80	0.567	29	0.31
85	0.684	35	0.33
90	0.848	43	0.35
95	1.129	57	0.37

Varved Clay Upper Stratum		
Layer Thickness	14.92	ft
Drainage Length	7.460986	ft
Coef. Consolidation Cv	0.4	ft2/day
Time to Consolidate	139.1658	day
Consolidation	0.04	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	0	0.002
10	0.0078	1	0.004
15	0.0177	2	0.006
20	0.0314	4	0.009
25	0.0491	7	0.011
30	0.0707	10	0.013
35	0.0962	14	0.015
40	0.126	18	0.017
45	0.159	22	0.019
50	0.197	28	0.022
55	0.239	34	0.024
60	0.286	40	0.026
65	0.342	48	0.028
70	0.403	57	0.030
75	0.477	67	0.032
80	0.567	80	0.035
85	0.684	96	0.037
90	0.848	119	0.039
95	1.129	159	0.041

Varved Clay Lower Stratum		
Layer Thickness	28.36	ft
Drainage Length	14.18	ft
Coef. Consolidation Cv	0.25	ft2/day
Time to Consolidate	804.28	day
Consolidation	0.44	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	2	0.022
10	0.0078	7	0.044
15	0.0177	15	0.066
20	0.0314	26	0.088
25	0.0491	41	0.109
30	0.0707	59	0.131
35	0.0962	81	0.153
40	0.126	106	0.175
45	0.159	134	0.197
50	0.197	166	0.219
55	0.239	201	0.241
60	0.286	241	0.263
65	0.342	288	0.284
70	0.403	339	0.306
75	0.477	401	0.328
80	0.567	477	0.350
85	0.684	575	0.372
90	0.848	713	0.394
95	1.129	949	0.416

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PRG Slurry Wall - Station 45+00
SECONDARY COMPRESSION SETTLEMENT CALCULATION
PDM Placed to Final Grade

Organic Peat Layer - Meadow Mat

Layer Thickness	3.24	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.02	
Estimated Secondary Compression	**0.12**	**ft**

Varved Clay Upper Stratum

Layer Thickness	14.92	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.006	
Estimated Secondary Compression	**0.13**	**ft**

Varved Clay Lower Stratum

Layer Thickness	28.36	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.01	
Estimated Secondary Compression	**0.20**	**ft**

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PRG Slurry Wall - Station 36+00
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	4	480	0	480	480
Fill, saturated	120	6	720	374.4	345.6	825.6
Meadow Mat	80	2	160	124.8	35.2	860.8
Meadow Mat	80	2	160	124.8	35.2	896
Sand	130	7	910	436.8	473.2	1369.2
Varved Clay	120	7.5	900	468	432	1801.2
Varved Clay	120	7.5	900	468	432	2233.2
Varved Clay	115	14.5	1667.5	904.8	762.7	2995.9
Varved Clay	115	14.5	1667.5	904.8	762.7	3758.6

Organic Peat Layer - Meadow Mat

Layer Thickness	4.00	ft
Initial Midpoint Effective Stress	860.80	psf
PDM Thickness	2.00	ft
Stress Increase from Loading	200.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.22	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	860.80	psf
Estimated Consolidation	**0.22**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1801.20	psf
PDM Thickness	2.00	ft
Stress Increase from Loading	200.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.07	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	9006.00	psf
Estimated Consolidation	**0.01**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2995.90	psf
PDM Thickness	2.00	ft
Stress Increase from Loading	200.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.15	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2995.90	psf
Estimated Consolidation	**0.15**	**ft**

Total Estimated Consolidation **0.38 Feet**

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PRG Slurry Wall - Station 36+00
TIME RATE OF CONSOLIDATION SETTLEMENT
PDM Placed to Final Grade

Meadow Mat		
Layer Thickness	4	ft
Drainage Length	2	ft
Coef. Consolidation Cv	0.1	ft2/day
Time to Consolidate	40	day
Consolidation	0.22	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.00
5	0.002	0	0.01
10	0.0078	0	0.02
15	0.0177	1	0.03
20	0.0314	1	0.04
25	0.0491	2	0.05
30	0.0707	3	0.07
35	0.0962	4	0.08
40	0.126	5	0.09
45	0.159	6	0.10
50	0.197	8	0.11
55	0.239	10	0.12
60	0.286	11	0.13
65	0.342	14	0.14
70	0.403	16	0.15
75	0.477	19	0.16
80	0.567	23	0.17
85	0.684	27	0.19
90	0.848	34	0.20
95	1.129	45	0.21

Varved Clay Upper Stratum		
Layer Thickness	15.00	ft
Drainage Length	7.5	ft
Coef. Consolidation Cv	0.4	ft2/day
Time to Consolidate	140.625	day
Consolidation	0.01	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	0	0.001
10	0.0078	1	0.001
15	0.0177	2	0.002
20	0.0314	4	0.003
25	0.0491	7	0.004
30	0.0707	10	0.004
35	0.0962	14	0.005
40	0.126	18	0.006
45	0.159	22	0.006
50	0.197	28	0.007
55	0.239	34	0.008
60	0.286	40	0.009
65	0.342	48	0.009
70	0.403	57	0.010
75	0.477	67	0.011
80	0.567	80	0.011
85	0.684	96	0.012
90	0.848	119	0.013
95	1.129	159	0.014

Varved Clay Lower Stratum		
Layer Thickness	29.00	ft
Drainage Length	14.5	ft
Coef. Consolidation Cv	0.25	ft2/day
Time to Consolidate	841	day
Consolidation	0.147	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	2	0.007
10	0.0078	7	0.015
15	0.0177	15	0.022
20	0.0314	26	0.029
25	0.0491	41	0.037
30	0.0707	59	0.044
35	0.0962	81	0.051
40	0.126	106	0.059
45	0.159	134	0.066
50	0.197	166	0.073
55	0.239	201	0.081
60	0.286	241	0.088
65	0.342	288	0.095
70	0.403	339	0.103
75	0.477	401	0.110
80	0.567	477	0.117
85	0.684	575	0.125
90	0.848	713	0.132
95	1.129	949	0.139

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PRG Slurry Wall - Station 36+00
SECONDARY COMPRESSION SETTLEMENT CALCULATION
PDM Placed to Final Grade

Organic Peat Layer - Meadow Mat

Layer Thickness	4.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.02	
Estimated Secondary Compression	**0.16**	**ft**

Varved Clay Upper Stratum

Layer Thickness	15.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.006	
Estimated Secondary Compression	**0.13**	**ft**

Varved Clay Lower Stratum

Layer Thickness	29.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.01	
Estimated Secondary Compression	**0.21**	**ft**

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Seaboard CB Wall - Wing Wall - Station 38+50
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RA PDM Placement)
PDM Placed to Existing Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	1.5	180	0	180	180
Fill, saturated	120	7	840	436.8	403.2	583.2
Meadow Mat	80	3	240	187.2	52.8	636
Meadow Mat	80	3	240	187.2	52.8	688.8
Sand	130	5	650	312	338	1026.8
Varved Clay	120	7.5	900	468	432	1458.8
Varved Clay	120	7.5	900	468	432	1890.8
Varved Clay	115	14.5	1667.5	904.8	762.7	2653.5
Varved Clay	115	14.5	1667.5	904.8	762.7	3416.2

Organic Peat Layer - Meadow Mat

Layer Thickness	6.00	ft
Initial Midpoint Effective Stress	636.00	psf
PDM Thickness	3.50	ft
Stress Increase from Loading	350.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.69	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	636.00	psf
Estimated Consolidation	**0.69**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1458.80	psf
PDM Thickness	3.50	ft
Stress Increase from Loading	350.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.14	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	7294.00	psf
Estimated Consolidation	**0.03**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2653.50	psf
PDM Thickness	3.50	ft
Stress Increase from Loading	350.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.28	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2653.50	psf
Estimated Consolidation	**0.28**	**ft**

Total Estimated Consolidation **1.00 Feet**

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Seaboard CB Wall - Wing Wall - Station 38+50
TIME RATE OF CONSOLIDATION SETTLEMENT
PDM Placed to Existing Grade

Meadow Mat		
Layer Thickness	6	ft
Drainage Length	3	ft
Coef. Consolidation Cv	0.1	ft2/day
Time to Consolidate	90	day
Consolidation	0.69	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.00
5	0.002	0	0.03
10	0.0078	1	0.07
15	0.0177	2	0.10
20	0.0314	3	0.14
25	0.0491	4	0.17
30	0.0707	6	0.21
35	0.0962	9	0.24
40	0.126	11	0.27
45	0.159	14	0.31
50	0.197	18	0.34
55	0.239	22	0.38
60	0.286	26	0.41
65	0.342	31	0.45
70	0.403	36	0.48
75	0.477	43	0.51
80	0.567	51	0.55
85	0.684	62	0.58
90	0.848	76	0.62
95	1.129	102	0.65

Varved Clay Upper Stratum		
Layer Thickness	15.00	ft
Drainage Length	7.5	ft
Coef. Consolidation Cv	0.4	ft2/day
Time to Consolidate	140.625	day
Consolidation	0.03	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	0	0.002
10	0.0078	1	0.003
15	0.0177	2	0.005
20	0.0314	4	0.006
25	0.0491	7	0.008
30	0.0707	10	0.009
35	0.0962	14	0.011
40	0.126	18	0.012
45	0.159	22	0.014
50	0.197	28	0.015
55	0.239	34	0.017
60	0.286	40	0.018
65	0.342	48	0.020
70	0.403	57	0.021
75	0.477	67	0.023
80	0.567	80	0.024
85	0.684	96	0.026
90	0.848	119	0.027
95	1.129	159	0.029

Varved Clay Lower Stratum		
Layer Thickness	29.00	ft
Drainage Length	14.5	ft
Coef. Consolidation Cv	0.25	ft2/day
Time to Consolidate	841	day
Consolidation	0.281	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	2	0.014
10	0.0078	7	0.028
15	0.0177	15	0.042
20	0.0314	26	0.056
25	0.0491	41	0.070
30	0.0707	59	0.084
35	0.0962	81	0.098
40	0.126	106	0.112
45	0.159	134	0.126
50	0.197	166	0.140
55	0.239	201	0.154
60	0.286	241	0.169
65	0.342	288	0.183
70	0.403	339	0.197
75	0.477	401	0.211
80	0.567	477	0.225
85	0.684	575	0.239
90	0.848	713	0.253
95	1.129	949	0.267

Seaboard CB Wall - Wing Wall - Station 38+50
SECONDARY COMPRESSION SETTLEMENT CALCULATION
PDM Placed to Existing Grade

Organic Peat Layer - Meadow Mat

Layer Thickness	6.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.02	
Estimated Secondary Compression	**0.20**	**ft**

Varved Clay Upper Stratum

Layer Thickness	15.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.006	
Estimated Secondary Compression	**0.13**	**ft**

Varved Clay Lower Stratum

Layer Thickness	29.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.01	
Estimated Secondary Compression	**0.21**	**ft**

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Seaboard CB Wall - Wing Wall - Station 38+50
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	3.50	350	0	350	350
Fill, moist	120	1.5	180	0	180	530
Fill, saturated	120	7.0	840.0	436.8	403.2	933.2
Meadow Mat	80	2.7	212.6	165.8	46.8	980.0
Meadow Mat	80	2.7	212.6	165.8	46.8	1026.7
Sand	130	5.0	650.0	312.0	338.0	1364.7
Varved Clay	120	7.5	898.2	467.0	431.1	1795.9
Varved Clay	120	7.5	898.2	467.0	431.1	2227.0
Varved Clay	115	14.4	1651.3	896.0	755.3	2982.3
Varved Clay	115	14.4	1651.3	896.0	755.3	3737.6

Organic Peat Layer - Meadow Mat

Layer Thickness	5.31	ft
Initial Midpoint Effective Stress	979.97	psf
PDM Thickness	3.50	ft
Stress Increase from Loading	350.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.42	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	979.97	psf
Estimated Consolidation	**0.42**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	14.97	ft
Initial Midpoint Effective Stress	1795.86	psf
PDM Thickness	3.50	ft
Stress Increase from Loading	350.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.12	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	8979.28	psf
Estimated Consolidation	**0.02**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	28.72	ft
Initial Midpoint Effective Stress	2982.29	psf
PDM Thickness	3.50	ft
Stress Increase from Loading	350.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.25	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2982.29	psf
Estimated Consolidation	**0.25**	**ft**

Total Estimated Consolidation **0.70 Feet**

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Seaboard CB Wall - Wing Wall - Station 38+50
TIME RATE OF CONSOLIDATION SETTLEMENT
PDM Placed to Final Grade

Meadow Mat		
Layer Thickness	5.31	ft
Drainage Length	2.66	ft
Coef. Consolidation Cv	0.10	ft2/day
Time to Consolidate	70.61	day
Consolidation	0.42	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.00
5	0.002	0	0.02
10	0.0078	1	0.04
15	0.0177	2	0.06
20	0.0314	3	0.08
25	0.0491	4	0.11
30	0.0707	6	0.13
35	0.0962	9	0.15
40	0.126	11	0.17
45	0.159	14	0.19
50	0.197	18	0.21
55	0.239	22	0.23
60	0.286	26	0.25
65	0.342	31	0.27
70	0.403	36	0.30
75	0.477	43	0.32
80	0.567	51	0.34
85	0.684	62	0.36
90	0.848	76	0.38
95	1.129	102	0.40

Varved Clay Upper Stratum		
Layer Thickness	14.97	ft
Drainage Length	7.48	ft
Coef. Consolidation Cv	0.40	ft2/day
Time to Consolidate	140.05	day
Consolidation	0.02	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	0	0.001
10	0.0078	1	0.002
15	0.0177	2	0.004
20	0.0314	4	0.005
25	0.0491	7	0.006
30	0.0707	10	0.007
35	0.0962	14	0.009
40	0.126	18	0.010
45	0.159	22	0.011
50	0.197	28	0.012
55	0.239	34	0.014
60	0.286	40	0.015
65	0.342	48	0.016
70	0.403	57	0.017
75	0.477	67	0.019
80	0.567	80	0.020
85	0.684	96	0.021
90	0.848	119	0.022
95	1.129	159	0.024

Varved Clay Lower Stratum		
Layer Thickness	28.72	ft
Drainage Length	14.36	ft
Coef. Consolidation Cv	0.25	ft2/day
Time to Consolidate	824.79	day
Consolidation	0.25	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	2	0.012
10	0.0078	7	0.025
15	0.0177	15	0.037
20	0.0314	26	0.050
25	0.0491	41	0.062
30	0.0707	59	0.075
35	0.0962	81	0.087
40	0.126	106	0.100
45	0.159	134	0.112
50	0.197	166	0.125
55	0.239	201	0.137
60	0.286	241	0.149
65	0.342	288	0.162
70	0.403	339	0.174
75	0.477	401	0.187
80	0.567	477	0.199
85	0.684	575	0.212
90	0.848	713	0.224
95	1.129	949	0.237

Seaboard CB Wall - Wing Wall - Station 38+50
SECONDARY COMPRESSION SETTLEMENT CALCULATION
PDM Placed to Final Grade

Organic Peat Layer - Meadow Mat

Layer Thickness	5.31	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.02	
Estimated Secondary Compression	**0.18**	**ft**

Varved Clay Upper Stratum

Layer Thickness	14.97	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.006	
Estimated Secondary Compression	**0.13**	**ft**

Varved Clay Lower Stratum

Layer Thickness	28.72	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.01	
Estimated Secondary Compression	**0.20**	**ft**

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Seaboard CB Wall Station 39+55

PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)

PDM Placed to Existing Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	1.5	180	0	180	180
Fill, saturated	120	6	720	374.4	345.6	525.6
Meadow Mat	80	3.5	280	218.4	61.6	587.2
Meadow Mat	80	3.5	280	218.4	61.6	648.8
Sand	130	2	260	124.8	135.2	784
Varved Clay	120	8	960	499.2	460.8	1244.8
Varved Clay	120	8	960	499.2	460.8	1705.6
Varved Clay	115	17	1955	1060.8	894.2	2599.8
Varved Clay	115	17	1955	1060.8	894.2	3494

Organic Peat Layer - Meadow Mat

Layer Thickness	7.00	ft
Initial Midpoint Effective Stress	587.20	psf
PDM Thickness	12.50	ft
Stress Increase from Loading	1250.00	psf
Compression Ratio	0.6	
Normal Consolidation	2.08	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	587.20	psf
Estimated Consolidation	**2.08**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	16.00	ft
Initial Midpoint Effective Stress	1244.80	psf
PDM Thickness	12.50	ft
Stress Increase from Loading	1250.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.48	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	6224.00	psf
Estimated Consolidation	**0.13**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	34.00	ft
Initial Midpoint Effective Stress	2599.80	psf
PDM Thickness	12.50	ft
Stress Increase from Loading	1250.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	1.04	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2599.80	psf
Estimated Consolidation	**1.04**	**ft**

Total Estimated Consolidation **3.25 Feet**

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Seaboard CB Wall Station 39+55
TIME RATE OF CONSOLIDATION SETTLEMENT
PDM Placed to Existing Grade

Meadow Mat			
Layer Thickness		7	ft
Drainage Length		3.5	ft
Coef. Consolidation Cv		0.1	ft2/day
Time to Consolidate		122.5	day
Consolidation		2.08	ft
U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.00
5	0.002	0	0.10
10	0.0078	1	0.21
15	0.0177	2	0.31
20	0.0314	4	0.42
25	0.0491	6	0.52
30	0.0707	9	0.62
35	0.0962	12	0.73
40	0.126	15	0.83
45	0.159	19	0.94
50	0.197	24	1.04
55	0.239	29	1.14
60	0.286	35	1.25
65	0.342	42	1.35
70	0.403	49	1.46
75	0.477	58	1.56
80	0.567	69	1.66
85	0.684	84	1.77
90	0.848	104	1.87
95	1.129	138	1.98

Varved Clay Upper Stratum			
Layer Thickness		16	ft
Drainage Length		8	ft
Coef. Consolidation Cv		0.4	ft2/day
Time to Consolidate		160	day
Consolidation		0.13	ft
U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	0	0.006
10	0.0078	1	0.013
15	0.0177	3	0.019
20	0.0314	5	0.025
25	0.0491	8	0.032
30	0.0707	11	0.038
35	0.0962	15	0.045
40	0.126	20	0.051
45	0.159	25	0.057
50	0.197	32	0.064
55	0.239	38	0.070
60	0.286	46	0.076
65	0.342	55	0.083
70	0.403	64	0.089
75	0.477	76	0.095
80	0.567	91	0.102
85	0.684	109	0.108
90	0.848	136	0.114
95	1.129	181	0.121

Varved Clay Lower Stratum			
Layer Thickness		34.00	ft
Drainage Length		17	ft
Coef. Consolidation Cv		0.25	ft2/day
Time to Consolidate		1156	day
Consolidation		1.043	ft
U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	2	0.052
10	0.0078	9	0.104
15	0.0177	20	0.157
20	0.0314	36	0.209
25	0.0491	57	0.261
30	0.0707	82	0.313
35	0.0962	111	0.365
40	0.126	146	0.417
45	0.159	184	0.470
50	0.197	228	0.522
55	0.239	276	0.574
60	0.286	331	0.626
65	0.342	395	0.678
70	0.403	466	0.730
75	0.477	551	0.783
80	0.567	655	0.835
85	0.684	791	0.887
90	0.848	980	0.939
95	1.129	1305	0.991

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Seaboard CB Wall Station 39+55
SECONDARY COMPRESSION SETTLEMENT CALCULATION
PDM Placed to Existing Grade

Organic Peat Layer - Meadow Mat

Layer Thickness	7.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.02	
Estimated Secondary Compression	**0.22**	**ft**

Varved Clay Upper Stratum

Layer Thickness	16.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.006	
Estimated Secondary Compression	**0.14**	**ft**

Varved Clay Lower Stratum

Layer Thickness	34.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.01	
Estimated Secondary Compression	**0.19**	**ft**

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Seaboard CB Wall Station 39+55
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	12.5	1250	0	1250	1250
Fill, moist	120	1.5	180	0	180	1430
Fill, saturated	120	6	720	374.4	345.6	1775.6
Meadow Mat	80	2.5	196.8	153.5	43.3	1818.9
Meadow Mat	80	2.5	196.8	153.5	43.3	1862.2
Sand	130	2	260	124.8	135.2	1997.4
Varved Clay	120	7.9	952.4	495.2	457.1	2454.5
Varved Clay	120	7.9	952.4	495.2	457.1	2911.7
Varved Clay	115	16.5	1895.0	1028.2	866.8	2864.1
Varved Clay	115	16.5	1895.0	1028.2	866.8	3321.3

Organic Peat Layer - Meadow Mat

Layer Thickness	4.92	ft
Initial Midpoint Effective Stress	1818.89	psf
PDM Thickness	10.50	ft
Stress Increase from Loading	1050.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.58	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	1818.89	psf
Estimated Consolidation	**0.58**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.87	ft
Initial Midpoint Effective Stress	2454.52	psf
PDM Thickness	10.50	ft
Stress Increase from Loading	1050.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.25	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	12272.60	psf
Estimated Consolidation	**0.06**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	32.96	ft
Initial Midpoint Effective Stress	2864.14	psf
PDM Thickness	10.50	ft
Stress Increase from Loading	1050.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.80	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2864.14	psf
Estimated Consolidation	**0.80**	**ft**

Total Estimated Consolidation **1.45 Feet**

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Seaboard CB Wall Station 39+55
TIME RATE OF CONSOLIDATION SETTLEMENT
PDM Placed to Final Grade

Meadow Mat		
Layer Thickness	4.92	ft
Drainage Length	2.46	ft
Coef. Consolidation Cv	0.10	ft2/day
Time to Consolidate	60.50	day
Consolidation	0.58	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.00
5	0.002	0	0.03
10	0.0078	1	0.06
15	0.0177	2	0.09
20	0.0314	4	0.12
25	0.0491	6	0.15
30	0.0707	9	0.18
35	0.0962	12	0.20
40	0.126	15	0.23
45	0.159	19	0.26
50	0.197	24	0.29
55	0.239	29	0.32
60	0.286	35	0.35
65	0.342	42	0.38
70	0.403	49	0.41
75	0.477	58	0.44
80	0.567	69	0.47
85	0.684	84	0.50
90	0.848	104	0.53
95	1.129	138	0.55

Varved Clay Upper Stratum		
Layer Thickness	15.87	ft
Drainage Length	7.94	ft
Coef. Consolidation Cv	0.40	ft2/day
Time to Consolidate	157.47	day
Consolidation	0.06	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	0	0.003
10	0.0078	1	0.006
15	0.0177	3	0.008
20	0.0314	5	0.011
25	0.0491	8	0.014
30	0.0707	11	0.017
35	0.0962	15	0.020
40	0.126	20	0.023
45	0.159	25	0.025
50	0.197	32	0.028
55	0.239	38	0.031
60	0.286	46	0.034
65	0.342	55	0.037
70	0.403	64	0.040
75	0.477	76	0.042
80	0.567	91	0.045
85	0.684	109	0.048
90	0.848	136	0.051
95	1.129	181	0.054

Varved Clay Lower Stratum		
Layer Thickness	32.96	ft
Drainage Length	16.48	ft
Coef. Consolidation Cv	0.25	ft2/day
Time to Consolidate	1086.13	day
Consolidation	0.80	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	2	0.040
10	0.0078	9	0.080
15	0.0177	20	0.121
20	0.0314	36	0.161
25	0.0491	57	0.201
30	0.0707	82	0.241
35	0.0962	111	0.282
40	0.126	146	0.322
45	0.159	184	0.362
50	0.197	228	0.402
55	0.239	276	0.443
60	0.286	331	0.483
65	0.342	395	0.523
70	0.403	466	0.563
75	0.477	551	0.603
80	0.567	655	0.644
85	0.684	791	0.684
90	0.848	980	0.724
95	1.129	1305	0.764

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Seaboard CB Wall Station 39+55
SECONDARY COMPRESSION SETTLEMENT CALCULATION
PDM Placed to Final Grade

Organic Peat Layer - Meadow Mat

Layer Thickness	4.92	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.02	
Estimated Secondary Compression	**0.15**	**ft**

Varved Clay Upper Stratum

Layer Thickness	15.87	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.006	
Estimated Secondary Compression	**0.14**	**ft**

Varved Clay Lower Stratum

Layer Thickness	32.96	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.01	
Estimated Secondary Compression	**0.19**	**ft**

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Seaboard NAE CB Wall - 82+30

PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RA PDM Placement)

PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	4	480	0	480	480
Fill, saturated	120	7	840	436.8	403.2	883.2
Meadow Mat	80	2	160	124.8	35.2	918.4
Meadow Mat	80	2	160	124.8	35.2	953.6
Sand	130	6	780	374.4	405.6	1359.2
Varved Clay	120	7.5	900	468	432	1791.2
Varved Clay	120	7.5	900	468	432	2223.2
Varved Clay	115	14.5	1667.5	904.8	762.7	2985.9
Varved Clay	115	14.5	1667.5	904.8	762.7	3748.6

Organic Peat Layer - Meadow Mat

Layer Thickness	4.00	ft
Initial Midpoint Effective Stress	918.40	psf
PDM Thickness	1.00	ft
Stress Increase from Loading	100.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.11	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	918.40	psf
Estimated Consolidation	**0.11**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1791.20	psf
PDM Thickness	1.00	ft
Stress Increase from Loading	100.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.04	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	8956.00	psf
Estimated Consolidation	**0.01**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2985.90	psf
PDM Thickness	1.00	ft
Stress Increase from Loading	100.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.07	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2985.90	psf
Estimated Consolidation	**0.07**	**ft**

Total Estimated Consolidation **0.19 Feet**

Seaboard NAE CB Wall - 82+30
TIME RATE OF CONSOLIDATION SETTLEMENT
PDM Placed to Final Grade

Meadow Mat		
Layer Thickness	4	ft
Drainage Length	2	ft
Coef. Consolidation Cv	0.1	ft2/day
Time to Consolidate	40	day
Consolidation	0.11	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.00
5	0.002	0	0.01
10	0.0078	0	0.01
15	0.0177	1	0.02
20	0.0314	1	0.02
25	0.0491	2	0.03
30	0.0707	3	0.03
35	0.0962	4	0.04
40	0.126	5	0.04
45	0.159	6	0.05
50	0.197	8	0.05
55	0.239	10	0.06
60	0.286	11	0.06
65	0.342	14	0.07
70	0.403	16	0.08
75	0.477	19	0.08
80	0.567	23	0.09
85	0.684	27	0.09
90	0.848	34	0.10
95	1.129	45	0.10

Varved Clay Upper Stratum		
Layer Thickness	15.00	ft
Drainage Length	7.5	ft
Coef. Consolidation Cv	0.4	ft2/day
Time to Consolidate	140.625	day
Consolidation	0.01	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	0	0.000
10	0.0078	1	0.001
15	0.0177	2	0.001
20	0.0314	4	0.001
25	0.0491	7	0.002
30	0.0707	10	0.002
35	0.0962	14	0.003
40	0.126	18	0.003
45	0.159	22	0.003
50	0.197	28	0.004
55	0.239	34	0.004
60	0.286	40	0.004
65	0.342	48	0.005
70	0.403	57	0.005
75	0.477	67	0.005
80	0.567	80	0.006
85	0.684	96	0.006
90	0.848	119	0.007
95	1.129	159	0.007

Varved Clay Lower Stratum		
Layer Thickness	29.00	ft
Drainage Length	14.5	ft
Coef. Consolidation Cv	0.25	ft2/day
Time to Consolidate	841	day
Consolidation	0.075	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	2	0.004
10	0.0078	7	0.007
15	0.0177	15	0.011
20	0.0314	26	0.015
25	0.0491	41	0.019
30	0.0707	59	0.022
35	0.0962	81	0.026
40	0.126	106	0.030
45	0.159	134	0.034
50	0.197	166	0.037
55	0.239	201	0.041
60	0.286	241	0.045
65	0.342	288	0.049
70	0.403	339	0.052
75	0.477	401	0.056
80	0.567	477	0.060
85	0.684	575	0.063
90	0.848	713	0.067
95	1.129	949	0.071

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Seaboard NAE CB Wall - 82+30
SECONDARY COMPRESSION SETTLEMENT CALCULATION
PDM Placed to Final Grade

Organic Peat Layer - Meadow Mat

Layer Thickness	4.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.02	
Estimated Secondary Compression	**0.16**	**ft**

Varved Clay Upper Stratum

Layer Thickness	15.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.006	
Estimated Secondary Compression	**0.13**	**ft**

Varved Clay Lower Stratum

Layer Thickness	29.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.01	
Estimated Secondary Compression	**0.21**	**ft**

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Seaboard NAE CB Wall - Wing Wall

PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RA PDM Placement)

PDM Placed to Existing Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	1.5	180	0	180	180
Fill, saturated	120	7	840	436.8	403.2	583.2
Meadow Mat	80	3	240	187.2	52.8	636
Meadow Mat	80	3	240	187.2	52.8	688.8
Sand	130	2	260	124.8	135.2	824
Varved Clay	120	7.5	900	468	432	1256
Varved Clay	120	7.5	900	468	432	1688
Varved Clay	115	14.5	1667.5	904.8	762.7	2450.7
Varved Clay	115	14.5	1667.5	904.8	762.7	3213.4

Organic Peat Layer - Meadow Mat

Layer Thickness	6.00	ft
Initial Midpoint Effective Stress	636.00	psf
PDM Thickness	12.50	ft
Stress Increase from Loading	1250.00	psf
Compression Ratio	0.6	
Normal Consolidation	1.70	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	636.00	psf
Estimated Consolidation	**1.70**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1256.00	psf
PDM Thickness	12.50	ft
Stress Increase from Loading	1250.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.45	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	6280.00	psf
Estimated Consolidation	**0.12**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2450.70	psf
PDM Thickness	12.50	ft
Stress Increase from Loading	1250.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.93	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2450.70	psf
Estimated Consolidation	**0.93**	**ft**

Total Estimated Consolidation **2.75 Feet**

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Seaboard NAE CB Wall - Wing Wall
TIME RATE OF CONSOLIDATION SETTLEMENT
PDM Placed to Existing Grade

Meadow Mat		
Layer Thickness	6	ft
Drainage Length	3	ft
Coef. Consolidation Cv	0.1	ft2/day
Time to Consolidate	90	day
Consolidation	1.70	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.00
5	0.002	0	0.08
10	0.0078	1	0.17
15	0.0177	2	0.25
20	0.0314	3	0.34
25	0.0491	4	0.42
30	0.0707	6	0.51
35	0.0962	9	0.59
40	0.126	11	0.68
45	0.159	14	0.76
50	0.197	18	0.85
55	0.239	22	0.93
60	0.286	26	1.02
65	0.342	31	1.10
70	0.403	36	1.19
75	0.477	43	1.27
80	0.567	51	1.36
85	0.684	62	1.44
90	0.848	76	1.53
95	1.129	102	1.61

Varved Clay Upper Stratum		
Layer Thickness	15.00	ft
Drainage Length	7.5	ft
Coef. Consolidation Cv	0.4	ft2/day
Time to Consolidate	140.625	day
Consolidation	0.12	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	0	0.006
10	0.0078	1	0.012
15	0.0177	2	0.018
20	0.0314	4	0.024
25	0.0491	7	0.030
30	0.0707	10	0.035
35	0.0962	14	0.041
40	0.126	18	0.047
45	0.159	22	0.053
50	0.197	28	0.059
55	0.239	34	0.065
60	0.286	40	0.071
65	0.342	48	0.077
70	0.403	57	0.083
75	0.477	67	0.089
80	0.567	80	0.095
85	0.684	96	0.101
90	0.848	119	0.106
95	1.129	159	0.112

Varved Clay Lower Stratum		
Layer Thickness	29.00	ft
Drainage Length	14.5	ft
Coef. Consolidation Cv	0.25	ft2/day
Time to Consolidate	841	day
Consolidation	0.934	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	2	0.047
10	0.0078	7	0.093
15	0.0177	15	0.140
20	0.0314	26	0.187
25	0.0491	41	0.234
30	0.0707	59	0.280
35	0.0962	81	0.327
40	0.126	106	0.374
45	0.159	134	0.420
50	0.197	166	0.467
55	0.239	201	0.514
60	0.286	241	0.561
65	0.342	288	0.607
70	0.403	339	0.654
75	0.477	401	0.701
80	0.567	477	0.747
85	0.684	575	0.794
90	0.848	713	0.841
95	1.129	949	0.888

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MSR 7/24/13

Seaboard NAE CB Wall - Wing Wall
SECONDARY COMPRESSION SETTLEMENT CALCULATION
PDM Placed to Existing Grade

Organic Peat Layer - Meadow Mat

Layer Thickness	6.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.02	
Estimated Secondary Compression	**0.20**	**ft**

Varved Clay Upper Stratum

Layer Thickness	15.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.006	
Estimated Secondary Compression	**0.13**	**ft**

Varved Clay Lower Stratum

Layer Thickness	29.00	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.01	
Estimated Secondary Compression	**0.21**	**ft**

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Seaboard NAE CB Wall - Wing Wall
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	12.50	1250	0	1250	1250
Fill, moist	120	1.5	180	0	180	1430
Fill, saturated	120	7.0	840.0	436.8	403.2	1833.2
Meadow Mat	80	2.2	172.0	134.2	37.8	1871.0
Meadow Mat	80	2.2	172.0	134.2	37.8	1908.9
Sand	130	2.0	260.0	124.8	135.2	2044.1
Varved Clay	120	7.4	892.9	464.3	428.6	2472.7
Varved Clay	120	7.4	892.9	464.3	428.6	2901.3
Varved Clay	115	14.0	1613.8	875.6	738.1	3639.4
Varved Clay	115	14.0	1613.8	875.6	738.1	4377.5

Organic Peat Layer - Meadow Mat

Layer Thickness	4.30	ft
Initial Midpoint Effective Stress	1871.04	psf
PDM Thickness	10.00	ft
Stress Increase from Loading	1000.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.48	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	1871.04	psf
Estimated Consolidation	**0.48**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	14.88	ft
Initial Midpoint Effective Stress	2472.68	psf
PDM Thickness	10.00	ft
Stress Increase from Loading	1000.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.22	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	12363.42	psf
Estimated Consolidation	**0.05**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	28.07	ft
Initial Midpoint Effective Stress	3639.40	psf
PDM Thickness	10.00	ft
Stress Increase from Loading	1000.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.53	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	3639.40	psf
Estimated Consolidation	**0.53**	**ft**

Total Estimated Consolidation **1.06 Feet**

Seaboard NAE CB Wall - Wing Wall
TIME RATE OF CONSOLIDATION SETTLEMENT
PDM Placed to Final Grade

Meadow Mat		
Layer Thickness	4.30	ft
Drainage Length	2.15	ft
Coef. Consolidation Cv	0.10	ft2/day
Time to Consolidate	46.24	day
Consolidation	0.48	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.00
5	0.002	0	0.02
10	0.0078	1	0.05
15	0.0177	2	0.07
20	0.0314	3	0.10
25	0.0491	4	0.12
30	0.0707	6	0.14
35	0.0962	9	0.17
40	0.126	11	0.19
45	0.159	14	0.22
50	0.197	18	0.24
55	0.239	22	0.26
60	0.286	26	0.29
65	0.342	31	0.31
70	0.403	36	0.34
75	0.477	43	0.36
80	0.567	51	0.38
85	0.684	62	0.41
90	0.848	76	0.43
95	1.129	102	0.46

Varved Clay Upper Stratum		
Layer Thickness	14.88	ft
Drainage Length	7.44	ft
Coef. Consolidation Cv	0.40	ft2/day
Time to Consolidate	138.42	day
Consolidation	0.05	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	0	0.003
10	0.0078	1	0.005
15	0.0177	2	0.008
20	0.0314	4	0.010
25	0.0491	7	0.013
30	0.0707	10	0.015
35	0.0962	14	0.018
40	0.126	18	0.020
45	0.159	22	0.023
50	0.197	28	0.025
55	0.239	34	0.028
60	0.286	40	0.030
65	0.342	48	0.033
70	0.403	57	0.035
75	0.477	67	0.038
80	0.567	80	0.040
85	0.684	96	0.043
90	0.848	119	0.045
95	1.129	159	0.048

Varved Clay Lower Stratum		
Layer Thickness	28.07	ft
Drainage Length	14.03	ft
Coef. Consolidation Cv	0.25	ft2/day
Time to Consolidate	787.68	day
Consolidation	0.53	ft

U (%)	Time Factor (T)	t (day)	Settlement (ft)
0	0	0	0.000
5	0.002	2	0.027
10	0.0078	7	0.053
15	0.0177	15	0.080
20	0.0314	26	0.107
25	0.0491	41	0.133
30	0.0707	59	0.160
35	0.0962	81	0.186
40	0.126	106	0.213
45	0.159	134	0.240
50	0.197	166	0.266
55	0.239	201	0.293
60	0.286	241	0.320
65	0.342	288	0.346
70	0.403	339	0.373
75	0.477	401	0.399
80	0.567	477	0.426
85	0.684	575	0.453
90	0.848	713	0.479
95	1.129	949	0.506

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Seaboard NAE CB Wall - Wing Wall
SECONDARY COMPRESSION SETTLEMENT CALCULATION
PDM Placed to Final Grade

Organic Peat Layer - Meadow Mat

Layer Thickness	4.30	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.02	
Estimated Secondary Compression	**0.14**	**ft**

Varved Clay Upper Stratum

Layer Thickness	14.88	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.006	
Estimated Secondary Compression	**0.13**	**ft**

Varved Clay Lower Stratum

Layer Thickness	28.07	ft
Time of Consolidation	10.00	years
Coef. Of Secondary Compression	0.01	
Estimated Secondary Compression	**0.20**	**ft**

CALCULATION SHEET

Computed: CB3 Date: 8/4/13	8/26/13 KEY ENVIRONMENTAL INCORPORATED	Client:
Checked: MSR Date: 8/20/13		Project No.:
		Task: Page 1 of 34

Subject:

EVALUATE THE EFFECTS ON HDPE GROUNDWATER AND DNAPL CONVEYANCE PIPING WHEN ADDITIONAL PDM MATERIALL IS PLACED ON THE SEABOARD STE.

ASSUME - UNDER LYING MEADOW MAT AND VARVED CLAY WILL CONSOLIDATE WHEN PDM LOAD IS APPLIED. CALCULATE THE CONSOLIDATION SETTLEMENT AMOINT. ASSUME THE PIPE WILL SETTLE THE SAME AMOUNT. CALCULATE THE STAIN ON THE PIPE (DUE TO ELONGATION) FROM SETTLEMENT.

ASSUME ONE PRIMARY CONSOLIDATION SETTLEMENT OCCURS

PIPE - HDPE DR11 PIPE MANUFACTURED BY ISCO (SEE ATTACHED SPECIFICATION SHEET - ATTACHMENT A)

FLEXURAL MODULUS = 110,000 to 140,000 psi = STRESS / STRAIN
TENSILE STRENGTH = 3,200 psi
MODULUS OF ELASTICITY = 130,000 psi
ELONGATION = 8% (min) [ELONGATION AT BREAK = 750%]

REFERENCES

1) PLASTIC PIPE ORANIZATION, SECOND EDITION HANDBOOK OF PE PIPE. (www.Plasticpipe.org)

2) PERFORMANCE PIPE FIELD HAND BOOK, CHEVRON PHILLIPS CHEMICAL COMPANY, LP. AUGUST 2007.

3) HDPE PIPE SPECIFICATIONS, ISCO INDUSTRIES, INC., 2009. (PROVIDED IN ATTACHMENT A)

PIPE LINE SHOWN ON ATTACHED DRAWING E4-01, REMEDIAL ACTION WORK PLAN ADDENDUM, JULY 2013, KEY ENVIRONMENTAL

FIGURE 1 AND 2 PROVIDE PIPE LENGTHS AND ELEVATION DATA FOR PIPING EVALUATED

ASSUME ALL PIPE HDPE DR11, INSTALLED 3 FEET BGS.

Subject:

DEFLECTION OF PIPE DUE TO CONSOLIDATION SETTLEMENT OF MEADOW MAT AND VARVED CLAY SUBSURFACE SOIL

ASSUME THAT PIPE DEFLECTION OCCURS DUE TO CONSOLIDATION ONLY. AND THAT PIPE WILL ELONGATE AS CONSOLIDATION OCCURS

ASSUME ALL HDPE PIPE IS ISCO HDPE PE 3408 /3608 DR11. REFERENCE 3. SEE ATTACHED TYPICAL PHSICAL PROPERTIES FOR PIPE

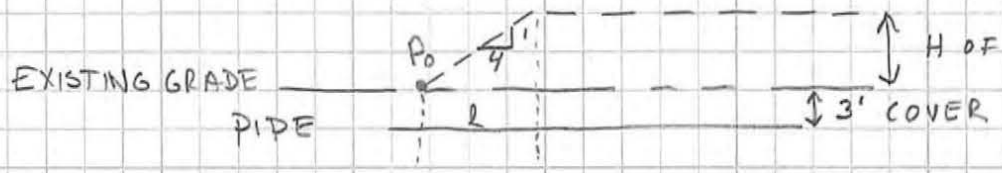
ELONGATION @ YIELD = 8%
FLEXURAL MODULUS = 110000 to 140000 psi
MODULUS OF ELASTICITY = 130,000 psi

WHERE MOD. OF ELASTICITY = $\frac{\text{STRESS}}{\text{STRAIN}}$

STRESS APPLIED TO PIPE = EFFECTIVE STRESS DUE TO PDM LOAD APPLIED

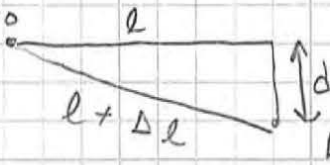
STRAIN = CHANGE IN LENGTH DIVIDED BY TOTAL LENGTH
= $\frac{\Delta l}{l}$

CONSOLIDATION CALCULATIONS ARE PROVIDED IN ATTACHMENT B.



ASSUME ELONGATION WILL BEGIN AT THE LOCATION WHERE THE LOAD IS APPLIED P_o

ASSUME SETTLEMENT IS UNIFORM UNDER THE APPLIED LOAD



Δl = elongation
l = initial length of pipe
= H of PDM x SIDESLOPE
= H x 4

EXAMPLE

RW-9

SETTLEMENT = 2.00 FEET + 1.37 FEET = 3.37 FT (ATTACH. B)
HEIGHT OF PDM = 7.83FT + 8.09 FT = 15.94FT
FROM FIGURE 2
SIDE SLOPE OF PDM LOAD = 1:4
LENGTH OF PIPE (INITIAL) = 15.94FT x 4 = 63.7FEET

$$\text{ELONGATION} = \sqrt{\ell^2 + d^2} - \ell$$

$$\Delta\ell = \sqrt{63.7^2 + 3.37^2} - 63.7$$

$$\Delta\ell = 0.089 \text{ FEET}$$

$$\text{STRAIN ON PIPE} = \frac{.089 \text{ FT}}{63.7 \text{ FT}} = 0.0014$$

$$= 0.14\% \text{ ELONGATION}$$

EQUIVALENT FORCE APPLIED

$$\text{ELONGATION} = \frac{P \times L}{A \times E} \quad \text{OR} \quad P = \frac{\Delta\ell \times A \times E}{L}$$

WHERE L = LENGTH = 63.7
A = CROSS SECTIONAL AREA OF PIPE
E = 130000 PSI
P = LOAD APPLIED

$A = \pi\left(\frac{D}{2}\right)^2$ ID = 1.062" FROM PIPE PROPERTIES IN ATTACHMENT A
$\pm$ = 0.12"
D = 1.062 + 2(.12)
= 1.086 INCHES

$A = \pi\left(\frac{1.086}{2}\right)^2$ = 0.93 IN^2

$$P = \frac{0.089 \text{FT} \times 0.93 \text{IN}^2 \times 130000 \text{lb/in}^2}{63.7 \text{ FT}}$$

= 168.9 lbs

CALCULATION SHEET

Computed: CAZ Checked: MSH	Date: 8/4/13 Date: 8/26/13	KEY ENVIRONMENTAL INCORPORATED	Client: Project No.: Task: Page 4 of 34

Subject:

FROM ISCO TYPICAL PHYSICAL PROPERTIES

TENSILE STRENGTH AT YIELD = 3200 psi

STRESS = STRAIN x MOD OF E

$$= \frac{0.089\ FT}{63.68\ FT} \times 130{,}000\ psi$$

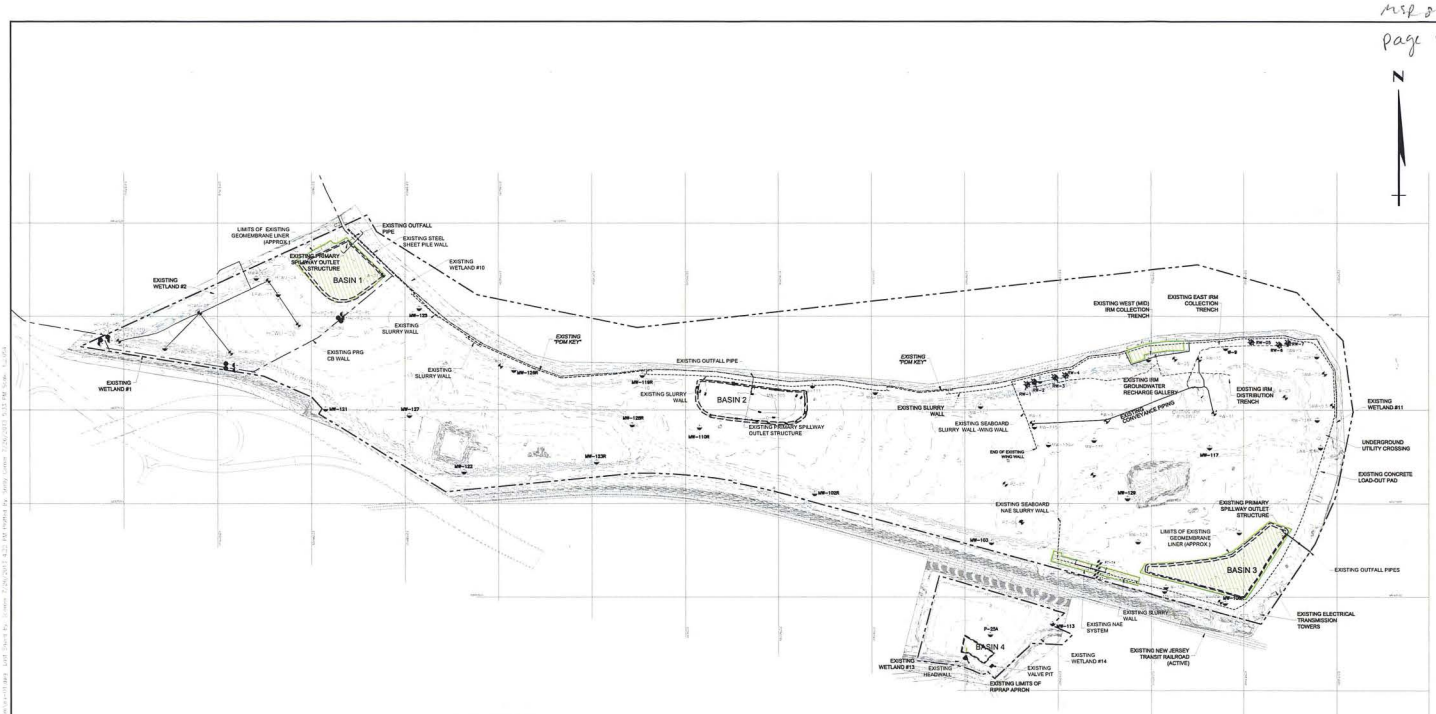
$$= 181.7\ psi$$

APPLIED STRESS < TENSILE STRENGTH

TABLE 1 PROVIDES A SUMMARY OF PIPE DEFLECTION AND CALCULATED APPLIED STRESS FOR THE BELOW SURFACE PIPES

Table 1
Deflection of Pipe Due to Settlement
RAWPA, 2013
Former Koppers Seaboard Site

Well Id	Estimated Deflection Initial PDM (feet)	Estimated Deflection Final PDM (feet)	Total Estimated Deflection (feet)	Length of Pipe (feet)	Change of Pipe Length (feet)	Longitudinal Strain on Pipe (ft/ft)	Elongation (<8%) (percent)	Applied Stress on Pipe (lb/in2)
RW-8	2.41	1.42	3.83	78.32	0.094	1.20E-03	1.20E-01	155.65
RW-9	2.00	1.37	3.37	63.68	0.089	1.40E-03	1.40E-01	182.13
HCWU-22	0.13	0.09	0.21	4.28	0.0053	1.24E-03	1.24E-01	161.50
HCWU-23	1.33	0.47	1.80	50.44	0.032	6.36E-04	6.36E-02	82.74
HCWU-24	1.69	0.81	2.50	48.84	0.064	1.31E-03	1.31E-01	170.78
HCWU-25	1.38	0.88	2.26	68.32	0.037	5.45E-04	5.45E-02	70.81
HCWU-26	1.68	0.74	2.42	46.28	0.063	1.37E-03	1.37E-01	178.15
DRWL-10	0.41	2.01	2.42	68.0	0.043	6.31E-04	6.31E-02	82.05
DRWL-11	1.58	0.79	2.36	44.68	0.063	1.40E-03	1.40E-01	181.98



LEGEND

- PROPERTY BOUNDARY
- EXISTING SEABOARD SLURRY WALL
- EXISTING PRB CB WALL
- EXISTING NEW JERSEY TRANSIT RAILROAD
- EXISTING GROUND SURFACE ELEVATION CONTOUR
- EXISTING CONVEYANCE PIPING
- EXISTING GROUNDWATER CONVEYANCE PIPING TRENCH ALIGNMENT
- EXISTING GEOMEMBRANE COVER SYSTEM
- EXISTING RECOVERY WELL LOCATION
- EXISTING GROUNDWATER EXTRACTION WELL LOCATION
- EXISTING MONITORING WELL LOCATION
- EXISTING PIEZOMETER LOCATION

0 500 1000 FEET

REV #	DATE	DESCRIPTION	APPD
1			
2			
3			

REFERENCES: FIGURE 2-1, AS-BUILT SURFACE CONTOURS, REMEDIAL ACTION REPORT, FORMER KOPPERS SEABOARD SITE, KEARNY, NEW JERSEY, APRIL 1, 2011.

ISSUE DATE:

KEY ENVIRONMENTAL, INC.
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878500
SIGNATURE DATE

STATE OF NEW JERSEY
CERTIFICATE OF AUTHORIZATION
TO OFFER ENGINEERING SERVICES
24GA27961400

HUDSON COUNTY
IMPROVEMENT AUTHORITY

DRWN:	SCC	DATE: 07/26/13
CHKD:	CAZ	DATE: 07/26/13
APPD:	AEB	DATE: 07/26/13
SCALE:	AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

REMEDIAL ACTION WORK PLAN ADDENDUM (JULY 2013)
FORMER KOPPERS SEABOARD SITE
KEARNY, NEW JERSEY

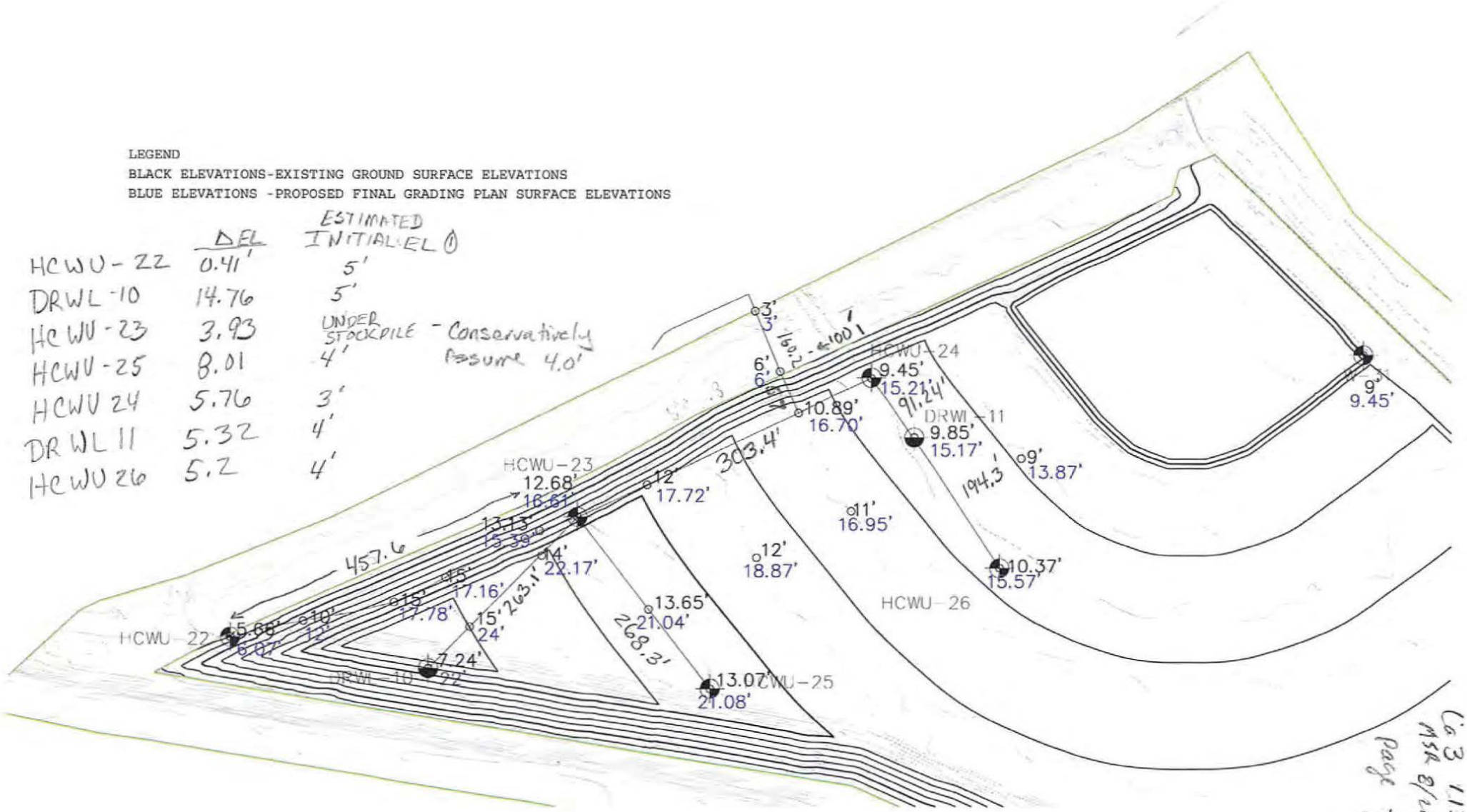
EXISTING CONDITIONS PLAN

PROJECT NO: 13-677
EA-01

FIGURE 1
PRG HCTS CONVEYANCE PIPING AND WELLS.

LEGEND
BLACK ELEVATIONS-EXISTING GROUND SURFACE ELEVATIONS
BLUE ELEVATIONS -PROPOSED FINAL GRADING PLAN SURFACE ELEVATIONS

	ΔEL	ESTIMATED INITIAL EL ①
HCWU-22	0.41'	5'
DRWL-10	14.76	5'
HCWU-23	3.93	UNDER STOCKPILE - Conservatively Assume 4.0'
HCWU-25	8.01	4'
HCWU 24	5.76	3'
DRWL 11	5.32	4'
HCWU 26	5.2	4'



PIPE 1" FORCE MAIN HDPE DR 11

① ELEVATIONS ESTIMATED FROM DRAWING EA-01, RAWPA, 2013

251.6
206.

Co 3 11 Wells
MSR 8/20/13 Blank
Page 7 of 34

FIGURE 2
SEABOARD IRM CONVEYANCE PIPING AND WELLS.

RW-8 ELEVATION PRIOR TO PDM PLACEMENT = 7'
INITIAL PDM = 17' - 7' = 10'

PDM TO BE PLACED AT RW-8 = 9.58 FT

RW-9 ELEVATION PRIOR TO PDM PLACEMENT = 8'
INITIAL PDM = 15.83' - 8' = 7.83'

PDM TO BE PLACED AT RW-9 = 8.09 FT

LEGEND
BLACK ELEVATIONS-EXISTING GROUND SURFACE ELEVATIONS
BLUE ELEVATIONS -PROPOSED FINAL GRADING PLAN SURFACE ELEVATIONS

PIPE - 2" HDPE

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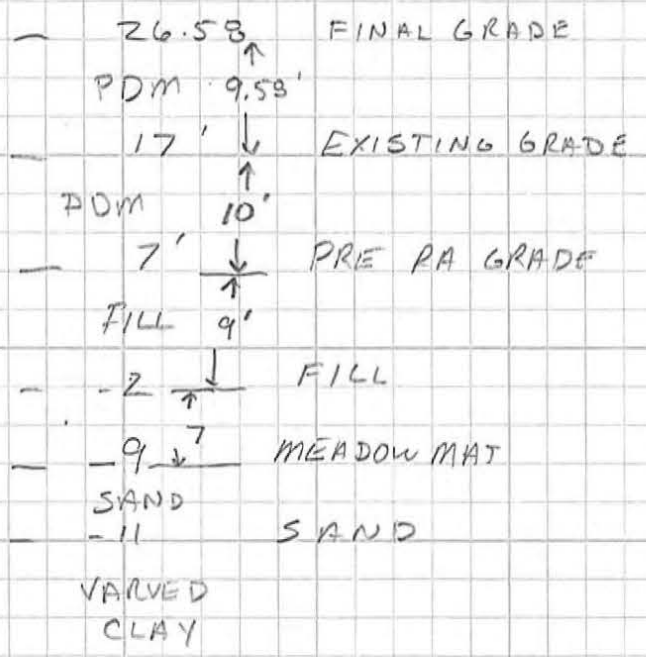
CALCULATION SHEET

Computed: CAZ Date: 7/31/13	8/26/13 KEY ENVIRONMENTAL INCORPORATED	Client:	
Checked: MSR Date: 8/26/13		Project No.:	
		Task:	Page 9 of 34

Subject:

SOIL PROFILE EXAMPLE USED TO CALCULATE CONSOLIDATION SETTLEMENT
RW-8 / RW-1



CALCULATION SHEET

Computed: CaB Date: 7/31/13	8/26/13 KEY ENVIRONMENTAL INCORPORATED	Client:	
Checked: MSR Date: 8/26/13		Project No.:	
		Task:	Page 10 of 34

Subject:

ATTACHMENT A

Ca 3 1131113
MSR 5/20/13
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ISCO INDUSTRIES
800-345-ISCO
www.isco-pipe.com

HIGH DENSITY POLYETHYLENE PIPE
Typical Physical Properties***

	Property	Specification	Unit	Nominal Value
	Material Designation	PPI / ASTM		PE 3408
	Material Classification	ASTM D-1248		III C 5 P34
	Cell Classification	**ASTM D3350-99**		**345464C**
	-Density (3)	ASTM D-1505	gm/cm3	0.955
	-Melt Index (4)	ASTM D-1238 (216 kg/190¡C)	gm/10 min.	0.11*
→	-Flex Modulus (5)	ASTM D-790	psi	135,000
	-Tensile Strength (4)	ASTM D-638	psi	3,200
	PENT (6)	ASTM F-1473	Hours	>100
	-HDB @73¡ F (4)	ASTM D-2837	psi	1,600
	-HDB @ 140 Deg F	ASTM D-2837	psi	800
	-U-V Stabilizer (C)	ASTM D-1603	% C	2.5
	Hardness	ASTM D-2240	Shore "D"	65
→	Compressive Strength (yield)	ASTM D-695	psi	1,600
→	Tensile Strength @ Yield (Type IV Spec.)	ASTM D-638 (2"/min.)	psi	3,200
→	Elongation @ Yield	ASTM D-638	%, minimum	8
	Tensile Strength @ Break (Type IV Spec.)	ASTM D-638	psi	5,000
	Elongation @ Break	ASTM D-638	%, minimum	750
→	Modulus of Elasticity	ASTM D-638	psi	130,000
	PENT (6)	ASTM F-1473	Hours	>100
	(Cond. A, B, C: Mold. Slab)	ASTM D-1693	Fo, Hours	>5,000
	(Compressed Ring - pipe)	ASTM F-1248	Fo, Hours	>3,500
	Slow Crack Growth	Battelle Method	Days to Failure	>64
	Impact Strength (IZOD) (.125Ó Thick)	ASTM D-256 (Method A)	In-lb / in notch	42
	Linear Thermal Expansion Coef.	ASTM D-696	in / in/¡F	1.2x10-4
	Thermal Conductivity	ASTM D-177	BTU-in/ft2/ hrs/ degreesF	2.7
	Brittleness Temp.	ASTM D-746	degrees F	< -180
	Vicat Soft. Temp.	ASTM D-1525	degrees F	257
	Heat Fusion Cond.	ASTM D-1525	@ psi degrees F	75 @ 400

*** This list of typical physical properties is intended for basic characterization of the material and does not represent specific determinations of specifications. The physical properties values reported herein were determined on compression molded specimens prepared in accordance with Procedure C of ASTM D 1928 and may differ from specimens taken from pipe.
** Tests were discontinued because no failures and no indication of stress crackinitiation.
* Average Melt Index value with a standard deviation of 0.01

This document reports accurate and reliable information to the best of our knowledge but our suggestions and recommendations cannot be guaranteed because the conditions of the use are beyond our control. The user of such information assumes all risk connected with the use thereof. Chevron Phillips Chemical Co. and its subsidiaries assume no responsibility for the use of information presented herein and hereby expressly disclaims all liability in regards to such use.

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MR 8/24/13
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KEY ENVIRONMENTAL INCORPORATED

200 Third Avenue• Carnegie, PA 15106
(412) 279-3363 • Fax: (412) 279-4332

TO: *Todd King*
Senior Program Manager
WRScompass
2305 West Park Place Blvd, Suite L
Stone Mountain GA 30087

DATE: November 18, 2010

SUBJECT: Peninsula Restoration Group
Interim Response Action WorkPlan
Implementation - Submittals
Kearny, New Jersey

PROJECT NO: 201010

The Following Items Are:

☒ Enclosed ☐ Requested ☐ Sent Separately Via

NO. OF COPIES	DESCRIPTION
1	Submittal No. 52.1 – HDPE SDR 11 HCTS Influent and Effluent Pipe and Fittings

Remarks:

The submittals described above are transmitted as checked below:

☐ As Requested ☒ Approved ☐ Disapproved ☐ No Action

☐ For Your Use ☐ Approved as Noted ☐ Rejected ☐ Resubmit

Comments:

cc: File (201010.001)

By:
Christine Zubrow, P.E.
Staff Engineer

CA3 7/19/11 9/20/13
MSR 9/26/13
Pag 13 of 34

GROUND/WATER TREATMENT & TECHNOLOGY, INC.

P.O. BOX 1174 DENVILLE, NEW JERSEY 07834
Phone (973)-983-0901 • Fax (973) 983-0903

SUBMITTAL COVER SHEET FROM CONTRACTOR

DATE: July 22, 2010

TO: WRS Compass
92 North Main Street, Unit 20B
Windsor, NJ 08561
Attn: Todd King

RE: Hydraulic Control Treatment System
Standard Chlorine Chemical Company Site and Diamond Site
Submittal No. 442319-3 Influent and Effluent HDPE lines

Please find enclosed for your review an electronic copy of the following item:

Specification No.	Prepared by:	Tag ID	Description
44 23 19 (Drawing IEF-01)	AJP		Influent lines, 1-in DR11 HDPE pipe Effluent line, 4-in and 6-in DR11 HDPE pipe and fittings; Fernco Coupling, 3-in to 6-in

Remarks:
These are transmitted as checked below:

__X__ For approval	_____ Resubmit	_____ Approved as noted
_____ For your use	_____ Submit	_____ Approved as submitted
_____ As requested	_____ Return	_____ Returned for corrections
__X__ For review	_____ Returned for corrections	

Sincerely,
Ground/Water Treatment & Technology, Inc.

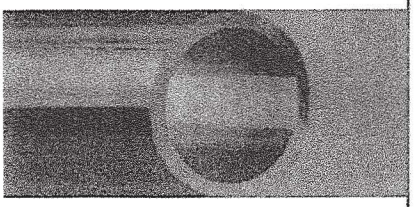
Patrick T. Hunnewell

☒ APPROVED ☐ APPROVED AS NOTED
☐ NO ACTION ☐ DISAPPROVED
☐ REJECTED ☐ RESUBMIT

Submittal Review is only for general conformance with the design concept of the project and general compliance with the information given in the Contract Documents. Any action shown is subject to the requirements of the Drawings and Technical Specifications. Contractor is responsible for: dimensions which shall be confirmed and correlated at the job site, fabrication processes and techniques of construction, coordination of his Work with that of all other trades and the satisfactory performance of his Work.

KEY ENVIRONMENTAL, INC

Date: 11/18/10 By: caz



HDPE Pipe

Specifications for HDPE Pipe

The physical properties of high-density polyethylene pipe are described using ASTM D 3350-05, "Standard Specification for Polyethylene Plastic Pipe and Fittings Materials". Recently this standard was changed. The two key areas changed are, density and slow crack growth. In the 05 version, the cell classifications for density were increased from four cells to seven cells defining the density ranges for various resins.

New high performance bimodal resins, PE 4710 resins, have higher PENT test values. Slow crack grow properties can now be defined using eight cells.

As of December 2006, most HDPE pipe is made from resin with a cell classification of PE 345464C. The pipe is labeled as PE3408/3608. The physical properties for PE 345464C are:

PROPERTY VALUE		SPECIFICATION	UNIT	NOMINAL VALUE
Material Designation		PPI / ASTM		PE 3408/3608
Cell Classification		ASTM D 3350		345464C
Density	(3)	ASTM D 1505	g/cm3	0.941-943
Melt Index	(4)	ASTM D 1238	gm/ 10 min	0.05 -.11
Flexural Modulus	(5)	ASTM D 790	psi	110,000 to 140,000
Tensile Strength	(4)	ASTM D 638	psi	3,200
Slow Crack Growth				
ESCR		ASTM D 1693	hours in 100% igepal	>5,000
PENT	(6)	ASTM F 1473	hours	>100
HDB @ 73 deg F	(4)	ASTM D 2837	psi	1,600
UV Stabilizer	(C)	ASTM D 1603	%C	2 to 2.5%

The density provided is without carbon black. Typical HDPE pipe has a density of .955 to .957 with carbon black.

Types of Polyethylene Pipe

All polyethylene (PE) is not the same. In ASTM D 3350-05, low density PE is defined as having a density range of 0.919 to 0.925 g/cc; medium density has a range of 0.926 to 0.940 g/cc and high density is defined with a range from 0.941 to 0.955. All densities are without carbon black.

Density influences key properties in polyethylene materials. As the density increases, the tensile strength increases; also chemical resistance increases.

Medium density PE resins have been used for gas distribution. This original selection was made based on superior slow crack growth properties of medium density resins. Medium density pipe is designated as PE 2406 and PE 2708.

Today new bimodal resins are being used in gas distribution because of higher pressure ratings plus superior slow crack growth. These resins are designated PE 3408, PE 3608, PE 3708, PE 3710 and PE 4710.

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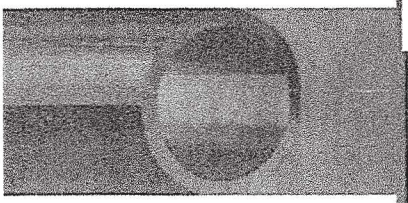

HDPE Pipe

- Items highlighted in Blue indicates standard stocking items that are more readily available.
- Pressures are based on using water at 23°C (73°F).
- Average inside diameter calculated using nominal OD and minimum wall plus 6% for use in estimating fluid flows. Actual ID will vary.
- Other piping sizes or DR's may be available upon request.
- Standard Lengths: 40' for 2"-24" 50' for 26" and larger Coils available for 3/4"-6"(8" by special order)

PE 3608/3408 IPS HDPE Pipe Sizes

Pressure Rating	Nominal Size	3/4"	1"	1 1/4"	1 1/2"	2"	3"	4"	5"	5"	6"	7"	8"	10"	12"	14"	16"
	Actual O.D.	1.05"	1.315"	1.66"	1.90"	2.375"	3.50"	4.50"	5.375"	5.563"	6.625"	7.125"	8.625"	10.75"	12.75"	14.00"	16.00"
DR 7 (267psi)	Min. wall	0.150"	0.188"	0.237"	0.271"	0.339"	0.500"	0.643"	0.768"	0.795"	0.946"	1.018"	1.232"	1.536"	1.821"	2.000"	2.286"
	Average I.D.	0.732"	0.917"	1.157"	1.325"	1.656"	2.440"	3.137"	3.747"	3.878"	4.619"	4.967"	6.013"	7.494"	8.889"	9.760"	11.42"
	Weight lb/ft	0.190	0.290	0.460	0.603	0.950	2.060	3.400	4.850	5.200	7.360	8.490	12.480	19.400	27.280	32.900	42.970
DR 7.3 (254psi)	Min. wall	0.144"	0.180"	0.227"	0.260"	0.325"	0.479"	0.616"	0.736"	0.762"	0.908"	0.976"	1.182"	1.473"	1.747"	1.918"	2.192"
	Average I.D.	0.745"	0.933"	1.178"	1.348"	1.685"	2.484"	3.193"	3.814"	3.947"	4.701"	5.056"	6.120"	7.626"	9.047"	9.934"	11.353"
	Weight lb/ft	0.180	0.280	0.445	0.583	0.911	1.980	3.280	4.680	5.020	7.120	8.230	12.060	18.740	26.360	31.780	41.510
DR 9 (200psi)	Min. wall	0.117"	0.146"	0.184"	0.211"	0.264"	0.389"	0.500"	0.597"	0.618"	0.736"	0.792"	0.958"	1.194"	1.417"	1.556"	1.778"
	Average I.D.	0.803"	1.005"	1.269"	1.452"	1.816"	2.676"	3.440"	4.109"	4.253"	5.064"	5.447"	6.593"	8.218"	9.747"	10.702"	12.231"
	Weight lb/ft	0.150	0.234	0.372	0.490	0.770	1.660	2.750	3.920	4.200	5.932	6.850	10.054	15.680	22.070	26.610	34.750
DR 11 (160psi)	Min. wall	0.095"	0.120"	0.151"	0.173"	0.215"	0.318"	0.409"	0.489"	0.506"	0.602"	0.648"	0.784"	0.977"	1.159"	1.273"	1.455"
	Average I.D.	0.848"	1.062"	1.340"	1.534"	1.917"	2.825"	3.633"	4.339"	4.491"	5.348"	5.752"	6.963"	8.678"	10.293"	11.302"	12.916"
	Weight lb/ft	0.130	0.200	0.312	0.410	0.640	1.367	2.300	3.290	3.520	4.990	5.780	8.400	13.140	18.490	22.360	29.120
DR 13.5 (128psi)	Min. wall	---	---	---	---	0.176"	0.259"	0.333"	0.398"	0.412"	0.491"	0.528"	0.639"	0.796"	0.944"	1.037"	1.185"
	Average I.D.	---	---	---	---	2.002"	2.950"	3.793"	4.531"	4.689"	5.585"	6.006"	7.271"	9.062"	10.748"	11.801"	13.487"
	Weight lb/ft	---	---	---	---	0.531	1.160	1.910	2.730	2.920	4.150	4.800	7.030	10.920	15.360	18.520	24.190
DR 15.5 (110psi)	Min. wall	---	---	---	---	0.153"	0.226"	0.290"	0.347"	0.359"	0.427"	0.460"	0.556"	0.694"	0.823"	0.903"	1.032"
	Average I.D.	---	---	---	---	2.059"	3.021"	3.885"	4.640"	4.802"	5.719"	6.150"	7.445"	9.280"	11.006"	12.085"	13.812"
	Weight lb/ft	---	---	---	---	0.470	1.020	1.680	2.400	2.570	3.637	4.210	6.164	9.580	13.480	16.242	21.214
DR 17 (100psi)	Min. wall	---	---	---	---	0.140"	0.206"	0.265"	0.316"	0.327"	0.390"	0.419"	0.507"	0.632"	0.750"	0.824"	0.941"
	Average I.D.	---	---	---	---	2.079"	3.064"	3.939"	4.705"	4.869"	5.799"	6.236"	7.549"	9.409"	11.160"	12.254"	14.005"
	Weight lb/ft	---	---	---	---	0.430	0.932	1.540	2.200	2.353	3.340	3.860	5.660	8.880	12.362	14.910	19.470
DR 19 (89psi)	Min. wall	---	---	---	---	---	---	0.237"	0.283"	0.293"	0.349"	0.375"	0.454"	0.566"	0.671"	0.737"	0.842"
	Average I.D.	---	---	---	---	---	---	3.998"	4.775"	4.942"	5.886"	6.330"	7.663"	9.551"	11.327"	12.438"	14.215"
	Weight lb/ft	---	---	---	---	---	---	1.390	1.980	2.120	3.010	3.480	5.100	7.920	11.140	13.430	17.540
DR 21 (80psi)	Min. wall	---	---	---	---	---	---	0.214"	0.256"	0.265"	0.315"	0.339"	0.411"	0.512"	0.607"	0.667"	0.762"
	Average I.D.	---	---	---	---	---	---	4.046"	4.832"	5.001"	5.956"	6.406"	7.754"	9.665"	11.463"	12.587"	14.385"
	Weight lb/ft	---	---	---	---	---	---	1.262	1.801	1.930	2.740	3.170	4.640	7..21	10.134	12.220	15.960
DR 26 (64 psi)	Min. wall	---	---	---	---	---	---	0.173"	0.207"	0.214"	0.255"	0.274"	0.332"	0.413"	0.490"	0.538"	0.615"
	Average I.D.	---	---	---	---	---	---	4.133"	4.937"	5.109"	6.085"	6.544"	7.922"	9.873"	11.710"	12.856"	14.695"
	Weight lb/ft	---	---	---	---	---	---	1.030	1.470	1.574	2.233	2.582	3.790	5.860	8.270	9.970	13.022
DR 32.5 (51 psi)	Min. wall	---	---	---	---	---	---	0.138"	0.165"	0.171"	0.204"	0.219"	0.265"	0.331"	0.392"	0.431"	0.492"
	Average I.D.	---	---	---	---	---	---	4.206"	5.024"	5.200"	6.193"	6.660"	8.062"	10.049"	11.916"	13.087"	14.956"
	Weight lb/ft	---	---	---	---	---	---	0.831	1.190	1.270	1.801	2.083	3.053	4.750	6.671	8.050	10.510

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CALCULATION SHEET

Computed: CAB Date: 8/26/13 Checked: MJP Date: 8/26/13	KEY ENVIRONMENTAL INCORPORATED	Client: _____ Project No.: _____ Task: _____ Page 16 of 34

Subject: _____

ATTACHMENT B

CC3 7/31/13 8/26/13
MSR 8/26/13

PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)

Seaboard IRM Conveyance Piping RW-8

PDM Placed to Existing Grade

Soil Profile Obtained from Slurry Wall Settlement Evaluation for Seaboard Barrier Wall Station 39+55

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	3	360	0	360	360
Fill, saturated	120	6	720	374.4	345.6	705.6
Meadow Mat	80	3.5	280	218.4	61.6	767.2
Meadow Mat	80	3.5	280	218.4	61.6	828.8
Sand	130	2	260	124.8	135.2	964
Varved Clay	120	7.9	948	492.96	455.04	1419.04
Varved Clay	120	7.9	948	492.96	455.04	1874.08
Varved Clay	115	16.5	1897.5	1029.6	867.9	2741.98
Varved Clay	115	16.5	1897.5	1029.6	867.9	3609.88

Settlement at RW-8

Organic Peat Layer - Meadow Mat

Layer Thickness	7.00	ft
Initial Midpoint Effective Stress	767.20	psf
PDM Thickness	10.00	ft
Stress Increase from Loading	1000.00	psf
Compression Ratio	0.6	
Normal Consolidation	1.52	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	767.20	psf
Estimated Consolidation	**1.52**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.80	ft
Initial Midpoint Effective Stress	1419.04	psf
PDM Thickness	10.00	ft
Stress Increase from Loading	1000.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.37	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	7095.20	psf
Estimated Consolidation	**0.09**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	33.00	ft
Initial Midpoint Effective Stress	2741.98	psf
PDM Thickness	10.00	ft
Stress Increase from Loading	1000.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.80	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2741.98	psf
Estimated Consolidation	**0.80**	**ft**

Total Estimated Consolidation **2.41 Feet**

Ca 3 7/31 | 13 8/24
MSK 8/24/13

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PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
Seaboard IRM Conveyance Piping RW-8
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	10.0	1000	0	1000	1000
Fill, moist	120	3	360	0	360	1360
Fill, saturated	120	6	720	374.4	345.6	1705.6
Meadow Mat	80	2.7	219.1	170.9	48.2	1753.8
Meadow Mat	80	2.7	219.1	170.9	48.2	1802.0
Sand	130	2	260	124.8	135.2	1937.2
Varved Clay	120	7.9	942.6	490.1	452.4	2389.6
Varved Clay	120	7.9	942.6	490.1	452.4	2842.1
Varved Clay	115	16.1	1851.4	1004.6	846.8	2784.0
Varved Clay	115	16.1	1851.4	1004.6	846.8	3236.5

Organic Peat Layer - Meadow Mat

Layer Thickness	5.48	ft
Initial Midpoint Effective Stress	1753.81	psf
PDM Thickness	9.58	ft
Stress Increase from Loading	958.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.62	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	1753.81	psf
Estimated Consolidation	**0.62**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.71	ft
Initial Midpoint Effective Stress	2389.65	psf
PDM Thickness	9.58	ft
Stress Increase from Loading	958.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.23	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	11948.24	psf
Estimated Consolidation	**0.05**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	32.20	ft
Initial Midpoint Effective Stress	2784.02	psf
PDM Thickness	9.58	ft
Stress Increase from Loading	958.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.74	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2784.02	psf
Estimated Consolidation	**0.74**	**ft**

Total Estimated Consolidation **1.42 Feet**

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PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)

Seaboard IRM Conveyance Piping RW-9

PDM Placed to Existing Grade

Soil Profile Obtained from Slurry Wall Settlement Evaluation for Seaboard Barrier Wall Station 39+55

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	3	360	0	360	360
Fill, saturated	120	6	720	374.4	345.6	705.6
Meadow Mat	80	3.5	280	218.4	61.6	767.2
Meadow Mat	80	3.5	280	218.4	61.6	828.8
Sand	130	2	260	124.8	135.2	964
Varved Clay	120	7.9	948	492.96	455.04	1419.04
Varved Clay	120	7.9	948	492.96	455.04	1874.08
Varved Clay	115	16.5	1897.5	1029.6	867.9	2741.98
Varved Clay	115	16.5	1897.5	1029.6	867.9	3609.88

Organic Peat Layer - Meadow Mat

Layer Thickness	7.00	ft
Initial Midpoint Effective Stress	767.20	psf
PDM Thickness	7.83	ft
Stress Increase from Loading	783.00	psf
Compression Ratio	0.6	
Normal Consolidation	1.28	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	767.20	psf
Estimated Consolidation	**1.28**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.80	ft
Initial Midpoint Effective Stress	1419.04	psf
PDM Thickness	7.83	ft
Stress Increase from Loading	783.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.30	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	7095.20	psf
Estimated Consolidation	**0.07**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	33.00	ft
Initial Midpoint Effective Stress	2741.98	psf
PDM Thickness	7.83	ft
Stress Increase from Loading	783.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.65	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2741.98	psf
Estimated Consolidation	**0.65**	**ft**

Total Estimated Consolidation **2.00 Feet**

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PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
Seaboard IRM Conveyance Piping RW-9
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	7.8	783	0	783	783
Fill, moist	120	3	360	0	360	1143
Fill, saturated	120	6	720	374.4	345.6	1488.6
Meadow Mat	80	2.9	228.7	178.4	50.3	1538.9
Meadow Mat	80	2.9	228.7	178.4	50.3	1589.2
Sand	130	2	260	124.8	135.2	1724.4
Varved Clay	120	7.9	943.7	490.7	453.0	2177.4
Varved Clay	120	7.9	943.7	490.7	453.0	2630.4
Varved Clay	115	16.2	1860.2	1009.4	850.9	2575.3
Varved Clay	115	16.2	1860.2	1009.4	850.9	3028.2

Organic Peat Layer - Meadow Mat

Layer Thickness	5.72	ft
Initial Midpoint Effective Stress	1538.91	psf
PDM Thickness	8.09	ft
Stress Increase from Loading	809.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.63	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	1538.91	psf
Estimated Consolidation	**0.63**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.73	ft
Initial Midpoint Effective Stress	2177.39	psf
PDM Thickness	8.09	ft
Stress Increase from Loading	809.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.22	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	10886.95	psf
Estimated Consolidation	**0.05**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	32.35	ft
Initial Midpoint Effective Stress	2575.28	psf
PDM Thickness	8.09	ft
Stress Increase from Loading	809.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.69	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2575.28	psf
Estimated Consolidation	**0.69**	**ft**

Total Estimated Consolidation **1.37 Feet**

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PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)

Seaboard Conveyance Piping HCWU-22

PDM Placed to Existing Grade

Soil Profile Obtained from Slurry Wall Settlement Evaluation for Seaboard Barrier Wall Station 45+40

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	4	480	0	480	480
Fill, saturated	120	7	840	436.8	403.2	883.2
Meadow Mat	80	2	160	124.8	35.2	918.4
Meadow Mat	80	2	160	124.8	35.2	953.6
Sand	130	6	780	374.4	405.6	1359.2
Varved Clay	120	7.5	900	468	432	1791.2
Varved Clay	120	7.5	900	468	432	2223.2
Varved Clay	115	14.5	1667.5	904.8	762.7	2985.9
Varved Clay	115	14.5	1667.5	904.8	762.7	3748.6

Organic Peat Layer - Meadow Mat

Layer Thickness	4.00	ft
Initial Midpoint Effective Stress	918.40	psf
PDM Thickness	0.66	ft
Stress Increase from Loading	66.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.07	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	918.40	psf
Estimated Consolidation	**0.07**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1791.20	psf
PDM Thickness	0.66	ft
Stress Increase from Loading	66.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.02	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	8956.00	psf
Estimated Consolidation	**0.00**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2985.90	psf
PDM Thickness	0.66	ft
Stress Increase from Loading	66.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.05	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2985.90	psf
Estimated Consolidation	**0.05**	**ft**

Total Estimated Consolidation **0.13 Feet**

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PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
Seaboard Conveyance Piping HCWU-22
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	0.7	66	0	66	66
Fill, moist	120	4	480	0	480	546
Fill, saturated	120	7	840	436.8	403.2	949.2
Meadow Mat	80	2.0	157.1	122.5	34.6	983.8
Meadow Mat	80	2.0	157.1	122.5	34.6	1018.3
Sand	130	6	780	374.4	405.6	1423.9
Varved Clay	120	7.5	899.7	467.9	431.9	1855.8
Varved Clay	120	7.5	899.7	467.9	431.9	2287.7
Varved Clay	115	14.5	1664.7	903.3	761.4	2185.3
Varved Clay	115	14.5	1664.7	903.3	761.4	2617.2

Organic Peat Layer - Meadow Mat

Layer Thickness	3.93	ft
Initial Midpoint Effective Stress	983.76	psf
PDM Thickness	0.41	ft
Stress Increase from Loading	41.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.04	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	983.76	psf
Estimated Consolidation	**0.04**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1855.79	psf
PDM Thickness	0.41	ft
Stress Increase from Loading	41.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.01	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	9278.95	psf
Estimated Consolidation	**0.00**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	28.95	ft
Initial Midpoint Effective Stress	2185.32	psf
PDM Thickness	0.41	ft
Stress Increase from Loading	41.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.04	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2185.32	psf
Estimated Consolidation	**0.04**	**ft**

Total Estimated Consolidation **0.09 Feet**

PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)

Seaboard Conveyance Piping HCWU-23

PDM Placed to Existing Grade

Soil Profile Obtained from Slurry Wall Settlement Evaluation for Seaboard Barrier Wall Station 45+40

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	4	480	0	480	480
Fill, saturated	120	7	840	436.8	403.2	883.2
Meadow Mat	80	2	160	124.8	35.2	918.4
Meadow Mat	80	2	160	124.8	35.2	953.6
Sand	130	6	780	374.4	405.6	1359.2
Varved Clay	120	7.5	900	468	432	1791.2
Varved Clay	120	7.5	900	468	432	2223.2
Varved Clay	115	14.5	1667.5	904.8	762.7	2985.9
Varved Clay	115	14.5	1667.5	904.8	762.7	3748.6

Organic Peat Layer - Meadow Mat

Layer Thickness	4.00	ft
Initial Midpoint Effective Stress	918.40	psf
PDM Thickness	8.68	ft
Stress Increase from Loading	868.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.69	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	918.40	psf
Estimated Consolidation	**0.69**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1791.20	psf
PDM Thickness	8.68	ft
Stress Increase from Loading	868.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.26	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	8956.00	psf
Estimated Consolidation	**0.06**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2985.90	psf
PDM Thickness	8.68	ft
Stress Increase from Loading	868.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.58	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2985.90	psf
Estimated Consolidation	**0.58**	**ft**

Total Estimated Consolidation **1.33 Feet**

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PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
Seaboard Conveyance Piping HCWU-23
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	8.7	868	0	868	868
Fill, moist	120	4	480	0	480	1348
Fill, saturated	120	7	840	436.8	403.2	1751.2
Meadow Mat	80	1.7	132.3	103.2	29.1	1780.3
Meadow Mat	80	1.7	132.3	103.2	29.1	1809.4
Sand	130	6	780	374.4	405.6	2215.0
Varved Clay	120	7.5	896.4	466.1	430.3	2645.3
Varved Clay	120	7.5	896.4	466.1	430.3	3075.5
Varved Clay	115	14.2	1634.2	886.8	747.5	2962.5
Varved Clay	115	14.2	1634.2	886.8	747.5	3392.7

Organic Peat Layer - Meadow Mat

Layer Thickness	3.31	ft
Initial Midpoint Effective Stress	1780.30	psf
PDM Thickness	3.93	ft
Stress Increase from Loading	393.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.17	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	1780.30	psf
Estimated Consolidation	**0.17**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	14.94	ft
Initial Midpoint Effective Stress	2645.26	psf
PDM Thickness	3.93	ft
Stress Increase from Loading	393.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.09	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	13226.30	psf
Estimated Consolidation	**0.02**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	28.42	ft
Initial Midpoint Effective Stress	2962.48	psf
PDM Thickness	3.93	ft
Stress Increase from Loading	393.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.28	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2962.48	psf
Estimated Consolidation	**0.28**	**ft**

Total Estimated Consolidation **0.47 Feet**

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Seaboard Conveyance Piping HCWU-24
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)
PDM Placed to Existing Grade
Soil Profile Obtained from Slurry Wall Settlement Evaluation for Seaboard Barrier Wall Station 45+00

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	0	0	0	0	0
Fill, saturated	120	6.5	780	405.6	374.4	374.4
Meadow Mat	80	2.25	180	140.4	39.6	414
Meadow Mat	80	2.25	180	140.4	39.6	453.6
Sand	130	5.5	715	343.2	371.8	825.4
Varved Clay	120	7.5	900	468	432	1257.4
Varved Clay	120	7.5	900	468	432	1689.4
Varved Clay	115	14.5	1667.5	904.8	762.7	2452.1
Varved Clay	115	14.5	1667.5	904.8	762.7	3214.8

Organic Peat Layer - Meadow Mat

Layer Thickness	4.50	ft
Initial Midpoint Effective Stress	414.00	psf
PDM Thickness	6.45	ft
Stress Increase from Loading	645.00	psf
Compression Ratio	0.6	
Normal Consolidation	1.10	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	414.00	psf
Estimated Consolidation	**1.10**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1257.40	psf
PDM Thickness	6.45	ft
Stress Increase from Loading	645.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.27	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	6287.00	psf
Estimated Consolidation	**0.06**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2452.10	psf
PDM Thickness	6.45	ft
Stress Increase from Loading	645.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.53	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2452.10	psf
Estimated Consolidation	**0.53**	**ft**

Total Estimated Consolidation **1.69 Feet**

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Seaboard Conveyance Piping HCWU-24
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	6.45	645	0	645	645
Fill, moist	120	0	0	0	0	645
Fill, saturated	120	6.5	780.0	405.6	374.4	1019.4
Meadow Mat	80	1.7	135.9	106.0	29.9	1049.3
Meadow Mat	80	1.7	135.9	106.0	29.9	1079.2
Sand	130	5.5	715.0	343.2	371.8	1451.0
Varved Clay	120	7.5	896.2	466.0	430.2	1881.2
Varved Clay	120	7.5	896.2	466.0	430.2	2311.4
Varved Clay	115	14.2	1637.1	888.3	748.8	3060.1
Varved Clay	115	14.2	1637.1	888.3	748.8	3808.9

Organic Peat Layer - Meadow Mat

Layer Thickness	3.40	ft
Initial Midpoint Effective Stress	1049.31	psf
PDM Thickness	5.76	ft
Stress Increase from Loading	576.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.39	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	1049.31	psf
Estimated Consolidation	**0.39**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	14.94	ft
Initial Midpoint Effective Stress	1881.18	psf
PDM Thickness	5.76	ft
Stress Increase from Loading	576.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.17	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	9405.92	psf
Estimated Consolidation	**0.04**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	28.47	ft
Initial Midpoint Effective Stress	3060.13	psf
PDM Thickness	5.76	ft
Stress Increase from Loading	576.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.38	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	3060.13	psf
Estimated Consolidation	**0.38**	**ft**

Total Estimated Consolidation **0.81 Feet**

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PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)

Seaboard Conveyance Piping HCWU-25

PDM Placed to Existing Grade

Soil Profile Obtained from Slurry Wall Settlement Evaluation for Seaboard Barrier Wall Station 45+40

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	4	480	0	480	480
Fill, saturated	120	7	840	436.8	403.2	883.2
Meadow Mat	80	2	160	124.8	35.2	918.4
Meadow Mat	80	2	160	124.8	35.2	953.6
Sand	130	6	780	374.4	405.6	1359.2
Varved Clay	120	7.5	900	468	432	1791.2
Varved Clay	120	7.5	900	468	432	2223.2
Varved Clay	115	14.5	1667.5	904.8	762.7	2985.9
Varved Clay	115	14.5	1667.5	904.8	762.7	3748.6

Organic Peat Layer - Meadow Mat

Layer Thickness	4.00	ft
Initial Midpoint Effective Stress	918.40	psf
PDM Thickness	9.07	ft
Stress Increase from Loading	907.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.72	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	918.40	psf
Estimated Consolidation	**0.72**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1791.20	psf
PDM Thickness	9.07	ft
Stress Increase from Loading	907.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.27	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	8956.00	psf
Estimated Consolidation	**0.06**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2985.90	psf
PDM Thickness	9.07	ft
Stress Increase from Loading	907.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.60	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2985.90	psf
Estimated Consolidation	**0.60**	**ft**

Total Estimated Consolidation **1.38 Feet**

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PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
Seaboard Conveyance Piping HCWU-25
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	9.1	907	0	907	907
Fill, moist	120	4	480	0	480	1387
Fill, saturated	120	7	840	436.8	403.2	1790.2
Meadow Mat	80	1.6	131.4	102.5	28.9	1819.1
Meadow Mat	80	1.6	131.4	102.5	28.9	1848.0
Sand	130	6	780	374.4	405.6	2253.6
Varved Clay	120	7.5	896.2	466.0	430.2	2683.8
Varved Clay	120	7.5	896.2	466.0	430.2	3114.0
Varved Clay	115	14.2	1632.9	886.0	746.9	3000.5
Varved Clay	115	14.2	1632.9	886.0	746.9	3430.7

Organic Peat Layer - Meadow Mat

Layer Thickness	3.28	ft
Initial Midpoint Effective Stress	1819.10	psf
PDM Thickness	8.01	ft
Stress Increase from Loading	801.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.31	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	1819.10	psf
Estimated Consolidation	**0.31**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	14.94	ft
Initial Midpoint Effective Stress	2683.79	psf
PDM Thickness	8.01	ft
Stress Increase from Loading	801.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.17	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	13418.94	psf
Estimated Consolidation	**0.04**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	28.40	ft
Initial Midpoint Effective Stress	3000.48	psf
PDM Thickness	8.01	ft
Stress Increase from Loading	801.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.53	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	3000.48	psf
Estimated Consolidation	**0.53**	**ft**

Total Estimated Consolidation **0.88 Feet**

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Seaboard Conveyance Piping HCWU-26
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)
PDM Placed to Existing Grade
Soil Profile Obtained from Slurry Wall Settlement Evaluation for Seaboard Barrier Wall Station 45+00

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	0	0	0	0	0
Fill, saturated	120	6.5	780	405.6	374.4	374.4
Meadow Mat	80	2.25	180	140.4	39.6	414
Meadow Mat	80	2.25	180	140.4	39.6	453.6
Sand	130	5.5	715	343.2	371.8	825.4
Varved Clay	120	7.5	900	468	432	1257.4
Varved Clay	120	7.5	900	468	432	1689.4
Varved Clay	115	14.5	1667.5	904.8	762.7	2452.1
Varved Clay	115	14.5	1667.5	904.8	762.7	3214.8

Organic Peat Layer - Meadow Mat

Layer Thickness	4.50	ft
Initial Midpoint Effective Stress	414.00	psf
PDM Thickness	6.37	ft
Stress Increase from Loading	637.00	psf
Compression Ratio	0.6	
Normal Consolidation	1.09	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	414.00	psf
Estimated Consolidation	**1.09**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1257.40	psf
PDM Thickness	6.37	ft
Stress Increase from Loading	637.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.27	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	6287.00	psf
Estimated Consolidation	**0.06**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2452.10	psf
PDM Thickness	6.37	ft
Stress Increase from Loading	637.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.52	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2452.10	psf
Estimated Consolidation	**0.52**	**ft**

Total Estimated Consolidation **1.68 Feet**

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Seaboard Conveyance Piping HCWU-26
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	6.37	637	0	637	637
Fill, moist	120	0	0	0	0	637
Fill, saturated	120	6.5	780.0	405.6	374.4	1011.4
Meadow Mat	80	1.7	136.3	106.3	30.0	1041.4
Meadow Mat	80	1.7	136.3	106.3	30.0	1071.4
Sand	130	5.5	715.0	343.2	371.8	1443.2
Varved Clay	120	7.5	896.2	466.0	430.2	1873.4
Varved Clay	120	7.5	896.2	466.0	430.2	2303.6
Varved Clay	115	14.2	1637.4	888.5	748.9	3052.5
Varved Clay	115	14.2	1637.4	888.5	748.9	3801.4

Organic Peat Layer - Meadow Mat

Layer Thickness	3.41	ft
Initial Midpoint Effective Stress	1041.39	psf
PDM Thickness	5.20	ft
Stress Increase from Loading	520.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.36	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	1041.39	psf
Estimated Consolidation	**0.36**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	14.94	ft
Initial Midpoint Effective Stress	1873.36	psf
PDM Thickness	5.20	ft
Stress Increase from Loading	520.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.16	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	9366.81	psf
Estimated Consolidation	**0.04**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	28.48	ft
Initial Midpoint Effective Stress	3052.48	psf
PDM Thickness	5.20	ft
Stress Increase from Loading	520.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.35	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	3052.48	psf
Estimated Consolidation	**0.35**	**ft**

Total Estimated Consolidation **0.74 Feet**

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PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)

Seaboard Conveyance Piping DRWL-10

PDM Placed to Existing Grade

Soil Profile Obtained from Slurry Wall Settlement Evaluation for Seaboard Barrier Wall Station 45+40

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	4	480	0	480	480
Fill, saturated	120	7	840	436.8	403.2	883.2
Meadow Mat	80	2	160	124.8	35.2	918.4
Meadow Mat	80	2	160	124.8	35.2	953.6
Sand	130	6	780	374.4	405.6	1359.2
Varved Clay	120	7.5	900	468	432	1791.2
Varved Clay	120	7.5	900	468	432	2223.2
Varved Clay	115	14.5	1667.5	904.8	762.7	2985.9
Varved Clay	115	14.5	1667.5	904.8	762.7	3748.6

Organic Peat Layer - Meadow Mat

Layer Thickness	4.00	ft
Initial Midpoint Effective Stress	918.40	psf
PDM Thickness	2.24	ft
Stress Increase from Loading	224.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.23	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	918.40	psf
Estimated Consolidation	**0.23**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1791.20	psf
PDM Thickness	2.24	ft
Stress Increase from Loading	224.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.08	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	8956.00	psf
Estimated Consolidation	**0.02**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2985.90	psf
PDM Thickness	2.24	ft
Stress Increase from Loading	224.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.16	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2985.90	psf
Estimated Consolidation	**0.16**	**ft**

Total Estimated Consolidation **0.41 Feet**

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PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
Seaboard Conveyance Piping DRWL-10
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	2.2	224	0	224	224
Fill, moist	120	4	480	0	480	704
Fill, saturated	120	7	840	436.8	403.2	1107.2
Meadow Mat	80	1.9	150.9	117.7	33.2	1140.4
Meadow Mat	80	1.9	150.9	117.7	33.2	1173.6
Sand	130	6	780	374.4	405.6	1579.2
Varved Clay	120	7.5	899.0	467.5	431.5	2010.7
Varved Clay	120	7.5	899.0	467.5	431.5	2442.3
Varved Clay	115	14.4	1658.1	899.7	758.4	2337.6
Varved Clay	115	14.4	1658.1	899.7	758.4	2769.1

Organic Peat Layer - Meadow Mat

Layer Thickness	3.77	ft
Initial Midpoint Effective Stress	1140.40	psf
PDM Thickness	14.76	ft
Stress Increase from Loading	1476.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.82	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	1140.40	psf
Estimated Consolidation	**0.82**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	14.98	ft
Initial Midpoint Effective Stress	2010.73	psf
PDM Thickness	14.76	ft
Stress Increase from Loading	1476.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.36	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	10053.66	psf
Estimated Consolidation	**0.09**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	28.84	ft
Initial Midpoint Effective Stress	2337.58	psf
PDM Thickness	14.76	ft
Stress Increase from Loading	1476.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	1.10	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2337.58	psf
Estimated Consolidation	**1.10**	**ft**

Total Estimated Consolidation **2.01** **Feet**

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Seaboard Conveyance Piping DRWL-11
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (RAR)
PDM Placed to Existing Grade
Soil Profile Obtained from Slurry Wall Settlement Evaluation for Seaboard Barrier Wall Station 45+40

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
Fill, moist	120	0	0	0	0	0
Fill, saturated	120	6.5	780	405.6	374.4	374.4
Meadow Mat	80	2.25	180	140.4	39.6	414
Meadow Mat	80	2.25	180	140.4	39.6	453.6
Sand	130	5.5	715	343.2	371.8	825.4
Varved Clay	120	7.5	900	468	432	1257.4
Varved Clay	120	7.5	900	468	432	1689.4
Varved Clay	115	14.5	1667.5	904.8	762.7	2452.1
Varved Clay	115	14.5	1667.5	904.8	762.7	3214.8

Organic Peat Layer - Meadow Mat

Layer Thickness	4.50	ft
Initial Midpoint Effective Stress	414.00	psf
PDM Thickness	5.85	ft
Stress Increase from Loading	585.00	psf
Compression Ratio	0.6	
Normal Consolidation	1.03	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	414.00	psf
Estimated Consolidation	**1.03**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	15.00	ft
Initial Midpoint Effective Stress	1257.40	psf
PDM Thickness	5.85	ft
Stress Increase from Loading	585.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.25	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	6287.00	psf
Estimated Consolidation	**0.06**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	29.00	ft
Initial Midpoint Effective Stress	2452.10	psf
PDM Thickness	5.85	ft
Stress Increase from Loading	585.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.49	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	2452.10	psf
Estimated Consolidation	**0.49**	**ft**

Total Estimated Consolidation **1.58 Feet**

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Seaboard Conveyance Piping DRWL-11
PRIMARY CONSOLIDATION SETTLEMENT CALCULATION SHEET (Existing Conditions)
PDM Placed to Final Grade

Layer	Unit Weight (pcf)	Layer Thickness (ft)	Total Stress (psf)	Pore Pressure (psf)	Layer Effective Stress (psf)	Initial Cumulative Effective Stress (psf)
PDM	100	5.85	585	0	585	585
Fill, moist	120	0	0	0	0	585
Fill, saturated	120	6.5	780.0	405.6	374.4	959.4
Meadow Mat	80	1.7	138.7	108.2	30.5	989.9
Meadow Mat	80	1.7	138.7	108.2	30.5	1020.4
Sand	130	5.5	715.0	343.2	371.8	1392.2
Varved Clay	120	7.5	896.5	466.2	430.3	1822.6
Varved Clay	120	7.5	896.5	466.2	430.3	2252.9
Varved Clay	115	14.3	1639.6	889.7	749.9	3002.8
Varved Clay	115	14.3	1639.6	889.7	749.9	3752.8

Organic Peat Layer - Meadow Mat

Layer Thickness	3.47	ft
Initial Midpoint Effective Stress	989.91	psf
PDM Thickness	5.32	ft
Stress Increase from Loading	532.00	psf
Compression Ratio	0.6	
Normal Consolidation	0.39	ft
Overconsolidation Ratio	1.00	
Past Effective Stress	989.91	psf
Estimated Consolidation	**0.39**	**ft**

Varved Clay Layer - Upper Stratum

Layer Thickness	14.94	ft
Initial Midpoint Effective Stress	1822.55	psf
PDM Thickness	5.32	ft
Stress Increase from Loading	532.00	psf
Compression Ratio (CR)	0.10	
Normal Consolidation	0.17	ft
Overconsolidation Ratio (OCR)	5.00	
Past Effective Stress	9112.76	psf
Estimated Consolidation	**0.04**	**ft**

Varved Clay Layer - Lower Stratum

Layer Thickness	28.51	ft
Initial Midpoint Effective Stress	3002.83	psf
PDM Thickness	5.32	ft
Stress Increase from Loading	532.00	psf
Compression Ratio (CR)	0.18	
Normal Consolidation	0.36	ft
Overconsolidation Ratio (OCR)	1.00	
Past Effective Stress	3002.83	psf
Estimated Consolidation	**0.36**	**ft**

Total Estimated Consolidation **0.79 Feet**

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**Partner responsible – Bruce S. Katcher*

August 26, 2016

Via Electronic and First Class Mail
Ms. Alison Hess, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 19th Floor
New York, NY 10007

Re: Standard Chlorine Chemical Co. Superfund Site - Proposed Plan Comments

Dear Ms. Hess:

Introduction

On July 27, 2016, the United States Environmental Protection Agency (EPA) announced the Proposed Plan to address environmental impacts at the Standard Chlorine Chemical Co. Inc. Site (SCCC Site) located in Kearny, New Jersey and requested that any comments on the Proposed Plan be submitted to EPA by August 26, 2016. These comments in support of the preferred remedy set forth in the Proposed Plan are submitted on behalf of our client Beazer East, Inc. (Beazer) and the other three members of the SCCC Site Performing Parties Group (Group): Cooper Industries, LLC; Tierra Solutions, Inc. (Tierra), on behalf of Occidental Chemical Corporation (OCC); and Apogent Transition Corp.

To date, the Group, working cooperatively with EPA, has invested millions of dollars and thousands of hours to investigate the SCCC Site and to develop and implement remedies that serve not only to protect human health and the environment but also allow for the SCCC Site to be redeveloped so as to return the SCCC Site to productive use and generate much-needed jobs and revenue for the region. Consistent with this approach, the Group agrees with EPA that preferred Alternative III, as set forth in the Focused Feasibility Study (FFS) for the SCCC Site previously submitted by the Group, satisfies the two threshold criteria used by EPA to evaluate Superfund remedial alternatives—(i) protection of human health and the environment and (ii) compliance with applicable or relevant and appropriate requirements (ARARs)—while providing the best balance of tradeoffs among the other five balancing criteria when compared to the other three alternatives set forth in the FFS.

Over the last several months the current owner and contracted purchaser of the adjacent Koppers Seaboard Site (Seaboard Site)—the Hudson County Improvement Authority (HCIA)

and Morris Kearny Associates, LLC (MKA), respectively—have commented that the preferred remedy somehow prevents HCIA from implementing the environmental remedy for the adjacent Seaboard Site previously approved by the New Jersey Department of Environmental Protection (NJDEP) and unreasonably interferes with MKA's redevelopment plans for the Seaboard Site. HCIA and MKA's various arguments in support of their position, however, lack technical support, ignore the lengthy history of response actions to date and HCIA's express authorization for response actions completed on the Seaboard Site, mischaracterize the approved remedies for both the SCCC Site and the Seaboard Site, and inaccurately portray themselves as innocent and powerless bystanders to the cleanup actions that have taken place on the Kearny Peninsula.

In short, the issues raised by HCIA and MKA to date are not based upon criteria that EPA should consider in formulating the Record of Decision (ROD) for the SCCC Site, but rather merely amount to a coordinated effort to increase their returns on investment in the Seaboard Site by shifting their redevelopment costs to the Group through the SCCC Site Superfund process. Accordingly, for the reasons outlined in more detail below, the Group urges EPA to reject the contentions raised by HCIA and MKA and issue a ROD that incorporates preferred Alternative III as described in the FFS and Proposed Plan.

Comment 1: EPA's Preferred Alternative III is the Optimal Remedy for the SCCC Site

The Proposed Plan for the SCCC Site recognizes and leverages extensive prior investigation and remediation activities conducted under the oversight and approval of both NJDEP and EPA. Specifically, due to the unique regulatory history of the SCCC Site, much investigation had already been completed and significant remedial work had been approved by NJDEP at the time EPA added the SCCC Site to the National Priorities List (NPL). For example, the existing slurry wall that surrounds the SCCC and Diamond Alkali properties, as well as 13 acres on the western portion of the Seaboard Site (hereinafter referred to as the "Barrier Wall"), was installed as one of a number of remedial actions approved by NJDEP as an "Interim Response Action" (IRA) pursuant to an October 20, 1989 Administrative Consent Order between the NJDEP and Standard Chlorine Chemical Co., Inc. In addition to the Barrier Wall, the IRA, which was initially submitted to NJDEP in March 2004 and, after several modifications requested by NJDEP, was approved in its final form in June 2010, included a hydraulic control and groundwater treatment system, dense non-aqueous phase liquid (DNAPL) collection system, on-site soils and sediments consolidation area, excavation and removal of near-shore sediments, installation of Site drainage features, and installation of caps and other measures. The IRA components, as noted in the NJDEP-approved IRA Workplan and the EPA-approved Engineering Evaluation and Cost Analysis (EE/CA) and as described in more detail in Comment 3, were selected and designed such that they would ultimately be incorporated into a final remedial action for the SCCC Site. The cost of implementing the IRA totaled over $15 million.

From and after late 2009, the parties performing the IRA, which at the time included SCCC, Beazer and Tierra, twice sought express permission from HCIA to align the Barrier Wall on the Seaboard Site. After receiving permission from HCIA in response to the first request, the IRA parties submitted a permit application signed by HCIA and received, in March 2010, a permit from the NJDEP Division of Land Use Regulation permitting them to install the Barrier Wall, including the portion of the Barrier Wall that "bumps out" onto the Seaboard Site owned by HCIA. Subsequently, in July 2010, these parties—to address NJDEP comments—sought and received written permission from HCIA to shift the Barrier Wall approximately fifty feet further to the east on the Seaboard Site. HCIA did not, in either instance, raise any of the claims about the details of construction or the location of the Barrier Wall on the Seaboard Site that it now asserts. Indeed, HCIA was given the opportunity not only to vet the location of the wall but also to comment on its design. And, importantly, HCIA was at the time already pursuing plans for redevelopment of the Seaboard Site.

Because construction of the NJDEP-approved IRA components had not been started at the time EPA finalized its listing of the SCCC Site on the NPL, each of the IRA remedial components was presented by EPA to the public in the EE/CA. On April 7, 2010, EPA published public notice of the EE/CA and described the remedial action to be undertaken at the SCCC Site. EPA also established a 30-day period for public comment on the remedial components presented in the EE/CA. The Barrier Wall configuration presented in the EE/CA included the "bump out" section located on the Seaboard Site. EPA did not receive any comments regarding the Barrier Wall configuration presented in the EE/CA. Upon completion of the public notice period, EPA approved implementation of the Barrier Wall and other EE/CA components pursuant to the requirements of the National Contingency Plan.

In recognition of these previously approved and implemented remedial actions, the Proposed Plan divides the SCCC Site into two areas. Area 1 is the area within the existing Barrier Wall that was previously installed as part of the IRAW-EE/CA work and that surrounds the entire former SCCC and adjacent Diamond Alkali properties, as well as a 13 acre portion of the western part of the Seaboard Site. Area 1 includes the surface soils, subsurface soils and groundwater of the entire SCCC property and the impacted subsurface soil and groundwater within the Barrier Wall in the western part of the Seaboard Site that was located to contain known contiguous impacts associated with the SCCC Site. Area 2 of the SCCC Site includes an area located outside of the Barrier Wall to the southwest of Area 1, and is comprised of a portion of the Seaboard Site outboard of the Barrier Wall and a portion of the NJDOT right-of-ways for the Belleville Turnpike and Newark Turnpike. DNAPL impacts associated with the SCCC Site were discovered in Area 2, several years after construction of the Barrier Wall was complete.

The FFS submitted by the Group proposed four alternative remedies, including a "No Action" alternative. For Area 1, EPA's preferred Alternative III includes, among other things, continued operation and maintenance of the Barrier Wall and associated hydraulic control treatment system (HCTS), additional targeted engineered cap/cover systems, and demolition of onsite structures with non-hazardous debris resulting from the building demolition consolidated on-Site within the building footprint. For Area 2, preferred Alternative III includes passive DNAPL recovery. Both areas will be subject to a Technical Impracticability Waiver (TI Waiver), which acknowledges that it is technically impracticable to remediate all impacted groundwater to ARARs within a reasonable period of time.

Detailed analyses as to why Alternative III is the preferred remedy for the SCCC Site are included in the FFS and the Proposed Plan and will not be repeated in this comment letter. In short, the Group agrees with EPA that the "No Action" alternative is not acceptable. Furthermore, the Group agrees that Alternative III is equivalent to the other two remedial options proposed to date with respect to the threshold criteria of protection of human health and the environment and compliance with ARARs, and that on balance (and as detailed in the FFS and the Proposed Plan) Alternative III scores better than the other two remedial options with respect to five other balancing criteria required to be considered by EPA when it selects a remedy pursuant to the federal Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), 42 U.S.C. §§ 9601 et seq.

In particular, the Group notes that Alternative III scored best with respect to the Short Term Effectiveness criterion because the remedy may be constructed in approximately six months. The ill-defined alternative remedy (see Comment 7 below) currently being advocated by HCIA and MKA, which contemplates relocation of the Barrier Wall and unnecessary remedial work in Area 2, would necessarily score worse than Alternative III on the Short Term Effectiveness criterion due to the extensive additional construction activity required to complete HCIA's and MKA's alternative remedy.

Comment 2: EPA's Preferred Alternative III Does Not Prevent Remediation of the Seaboard Site

At various times (verbally and in writing), both HCIA and MKA have contended that the current location of the Barrier Wall prevents completion of the remedy approved by NJDEP for the Seaboard Site. Their assertion, however, is incorrect and relies upon a gross mischaracterization of the applicable remedial requirements at the Seaboard Site. Moreover, their assertion contradicts the express terms of the November 2013 Remedial Action Work Plan Addendum (2013 RAWPA) for the Seaboard Site that was prepared by HCIA and approved by NJDEP. As both HCIA and MKA well know, the Seaboard Site 2013 RAWPA is undeniably predicated on the continued maintenance of the Barrier Wall in place and states expressly that

HCIA will propose specific means to protect or augment the Barrier Wall before placement of processed dredge material (PDM) on or near the Barrier Wall. (A link to a downloadable copy of the 2013 RAWPA is enclosed with these comments for ease of reference). In light of this, it is evident that HCIA has not complied with the requirements of the 2013 RAWPA regarding its potential impacts to the Barrier Wall. That HCIA now seeks to shift its obligations to protect the Barrier Wall to EPA or to the SCCC Site Group strikes the Group as nothing more than a reversal of position fueled by a thinly-veiled intent to shift development costs to other parties.

At the outset, it is critical to recognize that at the time HCIA prepared the 2013 RAWPA, there was already an established NJDEP-approved remedy for the Seaboard Site that in no way conflicted with the existence of the Barrier Wall in its current configuration. A new RAWPA for the Seaboard Site was sought by HCIA because HCIA ***wished*** to place additional PDM as fill across the entire site. In 2013, HCIA believed that raising the elevation of the Seaboard Site would enhance its potential development opportunities and ensure compliance with what HCIA anticipated was to be an increase in the Federal Emergency Management Agency's (FEMA) Advisory Base Flood Elevations (BFEs) for the area. In 2014, FEMA re-assessed the BFEs in the areas within the jurisdiction of the New Jersey Meadowlands Commission, including the SCCC Site and the Seaboard Site. However, the BFEs on the Seaboard Site were not increased (see FEMA Preliminary Flood Insurance Rate Maps 34003C0331J and 34003C0332J dated August 29, 2014). Accordingly, ***enhancing the opportunity for development and receiving tip fees for the upland disposal of PDM appear to be the only reasons for HCIA to seek a RAWPA to place additional fill material at the Seaboard Site***.

Contrary to HCIA's and MKA's assertions, the 2013 RAWPA for the Seaboard Site ***does not*** require HCIA to place additional fill across the entire Seaboard Site. Instead, the 2013 RAWPA explicitly recognizes that placing additional PDM on the Barrier Wall ***will*** compromise its integrity and therefore imposes a number of preconditions on HCIA that, importantly, treat the Barrier Wall as a permanent feature necessary for continued protection of human health and the environment. Specifically, Section 3.7 of the 2013 RAWPA requires HCIA, prior to placement of additional fill on the Barrier Wall or other remedial appurtenances, "to perform a detailed analysis to determine the appropriate means of ***protection/augmentation***" (emphasis added). Furthermore, Section 3.7 of the 2013 RAWPA clearly states that PDM placement cannot take place on the Barrier Wall (or any other SCCC Site-related appurtenance) without prior approval from the SCCC Site Cooperating Parties Group that was implementing the SCCC Site investigation and remedy at the time.

HCIA's and MKA's current assertion that the location of the Barrier Wall prevents completion of the Seaboard Site remedy contemplated by the NJDEP-approved 2013 RAWPA is wholly inconsistent with the fact that the 2013 RAWPA requires HCIA to propose methods to protect or augment the Barrier Wall before placement of fill on top of it. Moreover, HCIA's and

MKA's current assertion that EPA or the Group must agree to relocate or must determine where to relocate the Barrier Wall is inconsistent with the Seaboard Site 2013 RAWPA's requirement that it is HCIA (not EPA or the Group) that must develop and propose methods to protect or augment the Barrier Wall. Indeed, the 2013 RAWPA assumes that the Barrier Wall will remain in place or that HCIA will figure out how to protect or augment the Barrier Wall before it places PDM in a manner that could compromise the wall's integrity.

To date, however, HCIA has not submitted any engineering/geotechnical analysis or proposal to protect or augment the Barrier Wall. Accordingly, at this point the only thing that is preventing placement of additional fill at the Seaboard Site is HCIA's failure to comply with the 2013 RAWPA by not proposing a plan to protect or augment the Barrier Wall in its current location and seeking Cooperating Parties Group approval for implementation of its proposed plan. That HCIA has already placed fill on the Seaboard Site without completing these 2013 RAWPA-required analyses and proposals is not a problem of EPA's or the Group's making, and it is most certainly not a problem that EPA or the Group is required to solve.

Comment 3: "Interim" Does Not Mean "Temporary"

HCIA and MKA repeatedly emphasize in their comments that installation of the Barrier Wall was one of the remedial actions completed as part of the *Interim* Response Action (IRA) for the SCCC Site, giving undue weight to the use of the term "interim" in the IRA name, and going so far as to rename the Barrier Wall the "Interim Slurry Wall." It is clear, however, that like remedial actions at many other sites, in this instance completion of a remedy as part of an IRA does not reflect a determination about the permanence of the remedy, but rather merely demonstrates that the remedy was implemented proactively at a time before EPA issued a ROD or that all remedial investigation had been complete.

Notably, however, HCIA and MKA fail to acknowledge that between 2009 and 2010 HCIA twice gave express permission to align the Barrier Wall on the Seaboard Site. Additionally, in 2010, EPA them the same opportunity as every member of the public to object to the installation, location and design of the Barrier Wall. Indeed, on April 7, 2010, EPA published a notice in The Observer newspaper stating that EPA proposed installation of a hydraulic barrier and groundwater collection system, directing the public to an on-line copy of the 2010 EE/CA for more details, and establishing a 30-day public comment period for members of the public to comment or object to the proposed containment remedy. Figure 2-3 of the 2010 EE/CA clearly shows the alignment of the Barrier Wall as encompassing the western portion of the Seaboard Site. EPA did receive public comments during the 2010 comment period. EPA did not, however, receive any comments from HCIA or any other entity interested in redeveloping the Kearny Peninsula. After granting express permission for the Barrier Wall installation, and failing to object to its location when given an opportunity by EPA to do so, HCIA, and by

extension MKA, cannot now claim they were or have been treated unfairly. Nor can they claim that the wall's location must be moved to accommodate un-finalized development plans.

HCIA and MKA have not identified any report or correspondence implying that the Barrier Wall was intended to be a temporary measure. Instead, the breadth of the record for the SCCC Site – as well as the record of the remediation of the Seaboard Site – contemplates that the Barrier Wall is intended to act as a permanent remedy. Even the Seaboard Site's 2013 RAWPA, as noted above, is predicated on the continued maintenance of the Barrier Wall in place and requires HCIA to produce a plan to protect or augment the Barrier Wall as a precondition to placing additional fill on it.

Comment 4: The "Valley" on the Seaboard Site Was Created by HCIA and Is Not EPA's Problem to Solve

In its comments, HCIA asserts that the current location of the Barrier Wall has resulted in a "valley" on the Seaboard Site that threatens to erode the cap currently on the Seaboard Site. HCIA's argument, however, fails to mention that the "valley" exists because HCIA chose to place additional PDM as fill at the Seaboard Site on both sides of the Barrier Wall in an effort to enhance the site's development potential before preparing (let alone proposing to the Group) a plan to protect or augment the Barrier Wall, as required by the Seaboard Site's 2013 RAWPA. Accordingly, the "valley" that supposedly threatens the Seaboard Site cap is entirely of HCIA's making (and, presumably, could be solved by removal of some portion of the PDM that HCIA imprudently deposited). It would be improper for EPA to require the Group to address an environmental concern that was created by HCIA's voluntary actions on the Seaboard Site.

Comment 5: A TI Waiver for Area 2 Does Not Impede Development

HCIA and MKA urge EPA to deny a TI Waiver for Area 2 and argue that the ROD should include a requirement for the Group to provide a "clean corridor" for access and the installation of utilities. As an initial matter, neither HCIA nor MKA provide any technical basis for EPA to disagree with the conclusions of the TI Evaluation Report and Addendum submitted by the Group as part of the FFS. The TI Evaluation Report and Addendum evaluate in detail the applicability and appropriateness of a TI Waiver for Area 2 against the criteria established by EPA in the Agency's TI guidance documents to be relied upon in cases where other approaches are impracticable. Based on that evaluation and the FFS analysis, it is clear that Area 2 is eligible for a TI Waiver and that passive DNAPL recovery is the appropriate remedy for Area 2. HCIA and MKA fail to present any flaws in, or technical critiques of, the analyses presented by the Group in the TI Evaluation Report and Addendum. Instead, HCIA's and MKA's objections amount to nothing more than self-serving conclusions that the issuance of a TI Waiver in Area 2 would be "unacceptable."

Furthermore, HCIA and MKA's request for a "clean corridor" fails to recognize that the DNAPL impacts for which a TI Waiver is being sought lie atop a varved clay layer, approximately 15 feet or more below ground surface. It is highly unlikely that any need for access or utilities associated with HCIA's and MKA's proposed development will require excavation to that depth. Furthermore, given the industrial nature of the area, any excavation in Area 2 will no doubt be subject to a soil management plan designed to reduce the risk to human health and the environment. In the event of excavation in Area 2, a soil management plan would be a much more effective and efficient means to address potential environmental risk as compared to active remediation below Belleville Turnpike, a heavily traveled multi-lane roadway with accessibility and safety issues and physical constraints. In sum, the record supplied by HCIA and MKA provides virtually no technical basis for EPA to revise its approval of the TI Waiver for Area 2.

Comment 6: HCIA and MKA Are PRPs, Not Innocent Landowners

At various times, HCIA and MKA have argued that EPA has no legal right to require HCIA or MKA to keep the Barrier Wall in its current location at the Seaboard Site because a March 2010 access agreement between the Group and HCIA to install the Barrier Wall did not give the Group rights to encumber the Seaboard Site. HCIA's and MKA's interpretation of the March 2010 access agreement is inaccurate and an inappropriate attempt to draw EPA into an analysis of a private contract. But regardless, the terms of that agreement do not affect EPA's authority to require the Barrier Wall to remain in its location at the Seaboard Site. Under Section 104(e)(3)(D) of CERCLA, 42 U.S.C. § 9604(e)(3)(D), EPA has the authority to enter upon any property where entry is needed to effectuate a response action and under Section 104(e)(5)(B) of CERCLA, 42 U.S.C. § 9604(e)(5)(B), the Courts may enforce such access. HCIA is not exempt from this authority.

Moreover, as current (or soon to be) owners of a facility at which there has been a release of hazardous substances, *i.e.* the 13 acres of the Seaboard Site where SCCC Site related contaminants are currently located and Lot 32.01 of the SCCC property, HCIA and MKA are potentially responsible parties (PRPs) for the SCCC Site. Therefore, under Section 106 of CERCLA, 42 U.S.C. § 9606, EPA may order HCIA or MKA to conduct response actions and to grant access for response actions—in this case maintain the Barrier Wall in its current location at the Seaboard Site—that are intended to protect human health and the environment irrespective of the terms of any agreement between the Group and HCIA.

Perhaps recognizing that the March 2010 access agreement does not affect EPA's authority to require the Barrier Wall to remain in place at the Seaboard Site, as part of their arguments HCIA and MKA imply that they are "innocent landowners" of the 13 acres and therefore their rights should not be affected by any ROD that includes maintaining the Barrier

Wall on the Seaboard Site. A review of the circumstances at the time both HCIA and MKA entered into agreements to purchase the Seaboard Site and Lot 32.01 of the SCCC Site, however, indicates that neither HCIA nor MKA can qualify for any "innocent" landowner liability protections under CERCLA. By March 1988, when HCIA purchased the Seaboard Site, NJDEP had commenced a comprehensive dioxin investigation of the entire Kearny Peninsula, including the SCCC Site and the Seaboard Site. Furthermore, in 1988, SCCC was still operating at and upon the property that today comprises the SCCC Site, and it was clear from the physical condition of the area that there was a significant risk that releases from the SCCC Site had migrated to the Seaboard Site. HCIA nevertheless chose to purchase the Seaboard Site from one of the PRPs for the SCCC Site, Beazer. And HCIA later purchased Lot 32.01—a strip of land that itself bisects the SCCC Site property—which any reasonable purchaser would have determined to have been contaminated at the time of purchase.

As for MKA, by the time MKA entered into a contract in 2015 to purchase the Seaboard Site and Lot 32.01 of the SCCC Site from HCIA, the investigation and remediation of both the Seaboard Site and the SCCC Site were well underway. Most relevant to this issue, as noted previously, by 2015 the Barrier Wall had been placed on the Seaboard Site and NJDEP had approved a 2013 RAWPA for the Seaboard Site that contemplated that HCIA would develop a plan to protect or augment the Barrier Wall before the placement of additional fill on top of it. MKA surely reviewed the 2013 RAWPA before entering into a purchase agreement and, even if it did not, it cannot credibly claim that it did not have an opportunity to review the 2013 RAWPA. Even where CERCLA recognizes that certain parties are entitled to statutory protection as *bona fide* purchasers, that status is predicated upon the new owner undertaking proper stewardship and appropriate care with respect to the conditions known to exist at the property including safeguarding of remedial measures. Against this backdrop, HCIA and MKA's assertions that they are "innocent" landowners who should be exempt from maintaining an environmental control associated with the SCCC Site are legally insufficient and disingenuous.

Moreover, while it is true that EPA is required in ROD selection to give consideration to the "reasonably anticipated future use" of a Superfund Site, that directive does not equate to an obligation that EPA facilitate development by including measures in a ROD that "improve" the value of a property. Indeed, the law is very clear that response actions undertaken to improve the value of a property, or undertaken as part of redevelopment, are the responsibility under CERCLA of the landowner or developer alone, and not the obligation of other Site PRPs. *G.J. Leasing Co., Inc. v. Union Elec. Co.*, 54 F.3d 379, 386 (7th Cir. 1995) ("The statutory limitation to 'necessary' costs of cleaning up is important. Without it there would be no check on the temptation to improve one's property and charge the expense of improvement to someone else."); *City of Detroit v. Simon*, 247 F.3d 619, 630 (6th Cir. 2001) ("Several federal courts have recognized that recovery of environmental cleanup costs incurred to achieve a higher level than

the use of the property necessitates would violate CERCLA's requirement that recoverable response costs be 'necessary.'") To the extent HCIA and MKA seek to have EPA approve a relocation of the Barrier Wall, not for purposes related to protection of human health and the environment, but instead to facilitate MKA's redevelopment profit or HCIA's property sale proceeds, then the cost of that relocation should be borne by HCIA and MKA alone, as they are the landowner and developer PRPs solely responsible for those costs under the law.

Comment 7: HCIA and MKA Have Not Supplied a Tangible Remedial Alternative

HCIA and MKA have spent the past several months making general assertions that the current location of the Barrier Wall and the use of a TI Waiver for Area 2 are "unacceptable" and inconsistent with redevelopment of the Seaboard Site. Neither entity, however, has proposed a specific alternative for the Group and EPA to evaluate against the threshold criteria used by EPA to evaluate Superfund remedial alternatives. Instead, HCIA and MKA have urged EPA to incorporate into the ROD general language to support MKA's current development plan for the Seaboard Site. Given the many economic uncertainties surrounding the eventual viability of a development of this nature (*e.g.*, appropriate financing, viable tenants, additional infrastructure, etc.), it is not surprising that HCIA and MKA have declined to offer a tangible remedial alternative for consideration. Without a separate remedial alternative to consider, however, EPA lacks any basis to reject or even modify EPA's preferred Alternative III as requested by HCIA and MKA.

Furthermore, the economic uncertainties that are driving HCIA and MKA to seek non-specific alterations to the Proposed Plan underscore the risks associated with any modification that contemplates relocation of the Barrier Wall. The potential modification of the Barrier Wall would require the expenditure of a significant amount of resources, and may require additional evaluation of potential risk to human health and the environment. As noted previously, however, the development currently contemplated by MKA for the Seaboard Site and the SCCC Site is far from certain and could be abandoned or substantially modified at any time. In light of the fact that proposed development projects often face great alteration, delay, or fail entirely to come to fruition, it would be inappropriate for EPA to modify a ROD that already makes the property available for a significant development opportunity, simply because a developer foresees a potential incompatibility between the selected remedy and the developer's most profitable development approach for a segment of the project site. Indeed, a modification in the vein suggested by HCIA and MKA might require the expenditure of significant resources in design and evaluation, only to be subject to further modification due to an unanticipated change in development plans.

Should development of the Seaboard Site become a certainty, specific Barrier Wall modifications could be evaluated and included within a final remedial design. Such

modifications can be reviewed and adopted with EPA's approval at a later time—with the benefit of a remedial design and evaluation in hand. Indeed, in the Group's view, potential modification of the Barrier Wall after the ROD is issued would likely not even rise to the level of requiring an Explanation of Significant Differences, as it does not change the preferred Alternative III remedy of a hydraulic containment barrier wall, provided that any proposed specific Barrier Wall modification achieves the stated remedial objectives of the ROD.

Conclusion

The Group wholeheartedly supports redevelopment of the Kearny Peninsula. Indeed, the FFS submitted by the Group and incorporated into EPA's Proposed Plan contemplates redevelopment of the SCCC Site for industrial/commercial use, and the Group intends to continue discussions with the Town of Kearny, HCIA, MKA, and others to coordinate the Group's Superfund obligations with the proposed development of the SCCC Site and the Seaboard Site. The prospect of redevelopment of the Kearny Peninsula, however, does not give parties with a financial interest in redevelopment, like HCIA and MKA, the authority to hijack the Superfund process and demand remedies that are not focused on the protection of human health or the environment, but rather, designed to maximize a return on investment by shifting redevelopment costs to the Group.

The Group very much appreciates EPA's efforts to work with the Group to reach this stage of the Superfund process for the SCCC Site.

Sincerely,

Todd D. Kantorczyk
For MANKO, GOLD, KATCHER & FOX, LLP

TDK/dem/11941/1003

Enclosure: Link to 2013 RAWPA: https://mgkflaw.sharefile.com/d-scfedf8fadc94a008

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Thomas Gallagher (via electronic mail)
Ted Schwartz (via electronic mail)
Keith Morris (via electronic mail)
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August 9, 2016

Alison Hess, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 19th Floor
New York, NY 10007

Re: **Standard Chlorine Chemical Company Superfund Site, Kearny, NJ**
Final Draft Focused Feasibility Study – Remediation Plan
USEPA Public Comment Period

Dear Ms. Hess,

I am writing to you in regard to the EPA's Public Hearing on August 16, 2016 concerning the remediation of the Standard Chlorine Chemical Superfund Site located in Kearny, NJ. I am concerned about the proposed environmental remedy and its adverse impact on development of the Koppers Coke Site owned by the Hudson County Improvement Authority (HCIA) as set forth in their July 8, 2016 communication to USEPA, which is attached here too.

I support the redevelopment of the Koppers Coke Site which is recognized by the NJSEA as a "Vital Project" for the region and as planned by HCIA. Accordingly, I respectfully request the EPA to accommodate the concerns of HCIA in selecting a site remediation remedy.

Sincerely,

William Kennedy

William Kennedy, President

HUDSON COUNTY IMPROVEMENT AUTHORITY

Commissioners
Frank Pestana, Chairman
James P. Doran, Ed.D., Vice-Chairman
Stephen J. Gallo, Treasurer
Frank Lorenzo, Secretary
Fred M. Bado
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County Executive

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July 8, 2016

Via UPS Overnight Mail
Ms. Alison A. Hess, CPG
Senior Project Manager
United States Environmental Protection Agency
Emergency & Remedial Response Division
290 Broadway, 19th Floor
New York, NY 10007-1866P

Re: Standard Chlorine Company Superfund Site, Kearny, New Jersey; Review of June, 20, 2016 Final Draft Focused Feasibility Study

Dear Ms. Hess:

The Hudson County Improvement Authority (HCIA) understands that the United States Environmental Protection Agency (USEPA) has received a Final Draft Focused Feasibility Study (FFS), dated June 20, 2016, for remediation of the Former Standard Chlorine Chemical Company Superfund Site, Kearny, New Jersey (SCCC). The SCCC lies immediately adjacent to the Former Koppers Seaboard Site, Kearny, New Jersey (Koppers Site), owned by the HCIA. In addition, the SCCC extends into and covers approximately 13 acres in the westerly section of the Koppers Site (13 Acres) and SCCC "interim" remedial measures have been installed within the 13 Acres. Importantly, the Koppers Site is listed on the New Jersey Department of Environmental Protection (NJDEP) Known Contaminated Sites List and is under active remediation through a Licensed Site Remediation Professional (LSRP). Consequently, any proposed remedy for the 13 Acres must be approved by the LSRP and be consistent with the NJDEP requirements. Finally, the Koppers Site is under contract to be sold to and redeveloped by Morris Kearny Associates, LLC (Morris) in accordance with the February 2013 Koppers Coke Peninsula Redevelopment Plan prepared by the New Jersey Sports and Exposition Authority (NJSEA). In addition, on February 25, 2016, the NJSEA designated the Koppers Site as a "Vital Project" pursuant to NJSA 5:10A-11(f) whereby the NJSEA

retained sole and exclusive jurisdiction for the redevelopment of the Koppers Site. In this regard, any impediment to redevelop the 13 Acres will also require the consent and approval of the NJSEA.

Subsequent to a meeting with the USEPA, the HCIA issued an April 16, 2016 letter that commented upon the impact of the slurry wall that was installed circumscribing the 13 Acres. This HCIA letter stated that the location and construction of the existing SCCC slurry wall is an impediment to the completion of the Koppers Site remedial action. The letter also stated that the slurry wall had a significant negative impact to the planned re-development of the Koppers Site by Morris, HCIA's contracted purchaser. The HCIA letter concluded that the location and construction of the SCCC slurry wall must be reconsidered during the review of the SCCC RI/FFS and five alternative options were offered.

Based upon our review of the FFS, the following comments are offered for the consideration of the USEPA:

1. Although it is apparent from a review of the FFS that the SCCC responsible party group had a copy of the April 18, 2016 HCIA letter, the FFS does not provide any responses to the HCIA letter and the HCIA must insist that the Final FFS include specific and pertinent responses. There also must be an identification and evaluation of alternatives to the continued use of the 13 Acres slurry wall and the selection of a new "final" remedy for the 13 Acres that will permit redevelopment and provides containment and/or control of the SCCC plume.
2. The Alternatives Analyses of the FFS are based upon "where practicable and cost-effective". These terms are not defined in the FFS and are a subjective, not objective, means of analyses. The point scoring, used to evaluate Alternatives, is based upon this criterion and is therefore, also not an objective analysis. These terms are unacceptable to the HCIA and contrary to the publicly acknowledged and shared goal of the State of New Jersey, County of Hudson, New Jersey Sports & Exhibition Authority and the Town of Kearny to redevelop the SCCC and the Koppers Site for commercial and industrial development. Therefore, we strongly object to the inclusion in the FFS of the subjective terms "where practicable and cost-effective".
3. The FFS does not re-evaluate the Interim Remedy constructed under the NJDEP oversight. The Interim Remedy was constructed more than five years ago and does not account for current conditions including the substantive completion of remediation on the Koppers Site, including the 13 Acres and the presence of re-development plans for the Koppers Site. The slurry wall constructed in the 13 Acres is a significant impediment to site access to the Koppers Site and necessitated the construction of a permanent bridge over the slurry wall at significant cost to the HCIA in order to implement the NJDEP-approved remediation of the Koppers Site.
4. The Koppers Site and SCCC/ Tierra have proposed redevelopments. The Koppers Site has an actual contract for development while the SCCC/Tierra site has a development concept. Neither proposed development was substantially considered in the development of Remedial Alternatives for FFS. In accordance with March 2010 USEPA Guidance, a Reuse Assessment is to be completed and involves collecting and evaluating information to develop assumptions about reasonably anticipated future land uses at Superfund Sites. The submitted FFS does not include a Reuse Assessment. It is also apparent in the context of the USEPA Guidance that actual Reuse Plans have been developed and that USEPA must consider the impact of these Reuse Plans upon any proposed remedy. The FFS does not comply with USEPA Guidance and must be revised.
5. The FFS identifies a second area of impact to the Koppers Site near the southeast corner of the Site (Area 2). Area 2 includes the area stretching from the southwest corner of the Koppers Site southerly across New Jersey Route 7, a state highway. The FFS proposes no substantive remedy

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and requests the issuance of a Technical Impractability Determination (TI). The FFS argues that steep slopes, existence of a state highway and the presence of utilities prevent the use of any substantive remedy. There are numerous similar situations in the State of New Jersey where contamination has migrated off-site beneath a highway and is impacted by physical conditions and a TI has not been issued. Moreover, the TI proposal for Area 2 lumps together two physically dissimilar areas: land in southwest corner of the Koppers Site up to the boundary with the Route 7 and land from Route 7 South. The area immediately adjacent to the Koppers Site does not have steep slopes and is not impacted by the highway or utilities. This area can and should be remediated and the Alternatives Analysis of the FFS must be revised to address this area.

6. The contamination in Area 2, adjacent to the Koppers Site, significantly impacts the planned Morris development since an access road and water, sewer and electric lines for the Morris development will need to pass through this area. The planned remedy for Area 2 is the submission of a TI, rather any effective remediation. The lack of a remedy will cause significant health and safety concerns during the construction of the proposed access road and utilities for the Morris development and will result in significant additional cost to provide appropriate worker protections and temporary remediation during construction (i.e. containment structures, temporary treatment and liquid removals).
7. The SCCC responsible party group has no legal authority nor the consent of the HCIA or Morris to remediate the 13 Acres in a manner that limits or prohibits the redevelopment. The HCIA and Morris demand that the 13 acres within the slurry wall on the HCIA property and on Block 287, Lot 32.01, a former railroad property owned by HCIA that extends through SCCC, be absolutely and unequivocally remediated in a manner that supports commercial/industrial redevelopment without any regard to practicality or cost.
8. With respect to Area 2 (which is outside the slurry wall and includes a portion of the HCIA property in the southwestern corner and a portion of the NJDOT right-of-ways for the Belleville Turnpike and Newark Turnpike), the two alternatives presented in the FFS do not include expanding the wall or a barrier system or even NAPL recovery/hydraulic control. If there is no concern for DNAPL outside the slurry wall, it is not clear what benefit, if any, the slurry wall is providing for Area 1. However, if DNAPL removal is required, whatever technology is used should be considered for Area 1 in lieu of the slurry wall.
9. The FFS identifies that passive recovery of DNAPL using the recovery wells of the 13 Acres has resulted in a total of 5,497 gallons of recovered DNAPL recovered since startup in January 2012 through June 2015 This recovery would result in about 1,500 gallons per year which is not an effective means of final remediation. The recovery wells need to be replaced by actual extraction wells and a more effective active system which will likely obviate the continued need for the slurry wall as means of containment within the 13 Acres.
10. The FFS does not provide alternatives or measures to address and control potential vapor intrusion for future structures at the Koppers Site.
11. The FFS should include a requirement to construct clean corridor(s) for utilities that will service the Koppers Site and the SCCC.
12. The FFS contemplates a deed notice which extends onto the 13 acres. The HCIA objects to any deed notice that will be inconsistent with or more restrictive or limiting than the deed notice that the Koppers Site LSRP currently contemplates for the HCIA property. In this regard, HCIA and Morris hereby demand that the remedy for the contamination in the 13 Acres be modified so that

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the slurry wall (which was designed and constructed as an "interim" remedy) ether be removed or otherwise abandoned in place that will allow unrestricted filling and redevelopment.

13. The NJDEP-approved RAWP for the Koppers Site, including the 13 Acres, contemplates filling and a cap which, based on an independent geotechnical study, will implicate the integrity of the interim slurry wall system. In addition, the Koppers Site LSRP needs to design a remedy for the 13 Acres that will not render the property unusable for future redevelopment or for recreational use pursuant to N.J.S.A 58:10B-12(g)(1) and N.J.A.C. 7:26C-6.4(b) . The FFS does not address this issue and must be revised.
14. HCIA and Morris will incur substantial damages for any "taking" of the 13 Acres and Lot 32.01 since these areas serve as the gateway to the balance of the peninsula and therefore cannot be subject to any development restrictions.
15. We note that the proposed redevelopment of the SCCC extends across Lot 32.01 owned by HCIA and HCIA is under contract to sell that parcel to Morris. Further, Tierra and its parent recently filed for bankruptcy protection which likely will affect the timing, if not the ability, to acquire and redevelop the parcel owned by Tierra and the going-forward viability of the PPG. Finally, any proposed redevelopment of the SCCC site will require fill to meet the FEMA requirements which, again, will implicate the integrity of the slurry wall system.
16. HCIA has noted references in the FFS to multiple meetings and communications between USEPA and the PPG with respect to the remedial approach of the site. The HCIA was not consulted or invited to such meetings and raises objection to any process or conclusion that was made without HCIA's knowledge or input at least with respect to the remediation of the 13 Acres on HCIA's property and Lot 32.01. While HCIA has infrequently met with Beazer to discuss its concerns, it is not clear that HCIA's concerns have been communicated to the balance of the SCCC responsible party group or to the USEPA.
17. Figure 1-2 of the FFS contains the various tax parcel numbers which it does not identify. Further, our information regarding the designation of the various tax parcels is different than the information contained in the FFS. All affected tax parcels should be reviewed against current information.
18. Please know that the HCIA and Morris are continuing to review the technical aspects of the FFS and that we will be meeting with SCCC Responsible Party Group in the next few weeks to discuss certain technical elements of the proposed remediation and redevelopment. Accordingly, HCIA and/or Morris anticipate that additional technical comments may be provided after such meeting takes place.

The HCIA trusts that our comments are useful to the USEPA and will be considered during the review of SCCC FFS. The HCIA and Morris are available for further discussion on this matter. Thank you for your consideration.

Very truly yours,
Hudson County Improvement Authority

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Building On Common Ground

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August 24, 2016

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INTERNATIONAL UNION OF OPERATING ENGINEERS, LOCAL 825

ASSOCIATED CONSTRUCTION CONTRACTORS OF NEW JERSEY

CONSTRUCTION INDUSTRY COUNCIL OF WESTCHESTER & HUDSON VALLEY

THE CONSTRUCTION CONTRACTORS LABOR EMPLOYERS OF NEW JERSEY

Re: **Standard Chlorine Chemical Company Superfund Site, Kearny, NJ**

Dear Ms. Hess,

On behave of Engineers Labor-Employer Cooperative (ELEC 825), I am writing you today in support of this project. We are the management fund for the Operating Engineers Local 825. We represent over 6800 union members and signatory contractors. Our territory includes the entire State of New Jersey and Orange Rockland, Delaware, Sullivan, and Ulster counties in New York State.

We know that the benefits of this project are numerous, including, but not limited to the jobs created for our members and contractors who would work on this project. Local 825 members are exceptionally skilled and this project would provide many jobs during its construction phase.

Our workforce is highly trained and safety is always our top priority. We have successfully and safely built many projects like this throughout our entire territory, including environmentally sensitive areas like the New Jersey Meadowlands.

This project is not solely about construction jobs. Our members don't just work here. We live here and raise our families here, too. This vital project will have a positive economic impact in the economy of the region. In order for New Jersey to remain economically competitive and a great place to live, we need continue investing in development and infrastructure.

This project is a perfect example of the type of construction that is important to our organization and members. ELEC 825 strongly supports this project and respectfully request the EPA to reconsider the proposed plan and accommodate the concerns of the Hudson County Improvement Authority.

Yours truly,

Mark Longo
Director

HUDSON COUNTY IMPROVEMENT AUTHORITY

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Frank Pestana, Chairman
James P. Doran, Ed.D., Vice-Chairman
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Thomas A. DeGise
County Executive

Chief Executive Officer
Norman M. Guerra

Executive Director/CFO
Kurt A. Cherry

General Counsel
William J. Netchert, Esq.

August 16, 2016

Via E-mail & UPS Overnight Mail
Alison A. Hess, CPG
Senior Project Manager
US Environmental Protection Agency
Emergency & Remedial Response Division
290 Broadway, 19th Floor
New York, NY 10007-1866P

Re: Standard Chlorine Chemical Company ("SCCC") Proposed Plan
And Feasibility Study, Kearny, New Jersey;
Comments by the Hudson County Improvement Authority

Dear Ms. Hess:

This comment letter is prepared in furtherance of the 4/18/16 and 7/8/16 letters issued by the Hudson County Improvement Authority (HCIA) commenting upon the proposed remediation of the Standard Chlorine Chemical Company Superfund Site, Kearny, New Jersey (SCCC) (copies attached). The HCIA is the owner of the adjacent Koppers Seaboard Site (Koppers Site) and of property directly within the SCCC property and is, therefore, directly affected by the proposed SCCC remediation.

It is our understanding that the United States Environmental Protection Agency (EPA) in the Proposed Remediation Plan ("Plan") and Focused Feasibility Study ("FFS") for SCCC have been circulated for public comment. We have the utmost respect for the professionalism and dedication of the entire EPA Region 2 Superfund team and the hard work that has been necessary to move forward toward the Record of Decision milestone for this project. However, our review of the Plan and FFS indicates that HCIA's interests and concerns have not been adequately addressed. HCIA hereby requests that the EPA make modifications to its Plan and further requests that the modifications carry forward into the future Record of Decision to be published by the EPA.

As was noted in the HCIA's previous comment letters, the NJDEP approved remedy for the Koppers Site is being implemented. The structural incapability of the Interim Slurry Wall has forced a setback from the wall, causing a wide valley between the fill previously placed in adjacent areas. If this valley is not filled, it will allow storm water to erode the cap placed in both 13 acres and the adjacent areas. This part of the Koppers Remediation will, therefore, be compromised.

Additionally as previously detailed in our comment letters, the final solution for the remediation of the Koppers Site includes a billion dollar redevelopment and the Morris Companies is the contract purchaser of the Koppers Site for this purpose. The current location of the Interim Slurry Wall critically impacts that development. Even after Morris Companies' efforts to redesign its development, Morris's planned building is still impacted by the Interim Slurry Wall. The current design of the wall also has severe impact on the creation of roads and utility corridors critical for development of the entire peninsula. A new bridge spanning the Interim Slurry Wall and the wide valley caused by setbacks from the Interim Slurry Wall will need to be constructed for the access of both developments. Thus far the EPA has failed to incorporate in the FFS and Plan our proposal for several alternatives to address the Interim Slurry Wall problem.

Therefore HCIA strenuously objects to EPA's proposed decision not to re-evaluate negative impacts of the slurry wall which was constructed five years ago as an Interim Remedial Measure. As stated in HCIA's prior comments, this Interim Slurry Wall prevents the completion of the approved remediation for the Koppers Site and the Interim Slurry Wall must be replaced, realigned and/or relocated. By preventing the completion of the DEP approved remediation of the Koppers Site, the current plan fails in this instance to achieve in full EPA's goal to provide for the protection of human health and the environment.

HCIA is also concerned regarding the review of Area 2 within the Plan. This Area 2 is a second area of the Koppers Site that contains chlorinated contaminants in the ground water and further encumbers the Koppers Site. This Area was apparently missed during the implementation of the Interim Remedial Measure and was not enclosed by the Interim Slurry Wall. As we noted in our 7/8/2016 comments, the issuance of a Technical Impractability Determination (TI) for Area 2, rather than effective remediation, is unacceptable and calls into question what benefit, if any, the Interim Slurry Wall is providing for the 13 Acres.

HCIA also notes that the current owner of SCCC, the Town of Kearny, is planning a re-development which will require a common access through Area 2 with Morris Companies Project on the Koppers Site The lack of a substantive remedial action for the observed contamination in Area 2 critically impacts the access and planned utilities for these two planned billion dollar developments and must be addressed.

The following revisions are requested by the HCIA to the Plan:

1. **So that the record is clear, the HCIA requests that the Plan be modified to incorporate a specific requirement that the remedial alternative selected in the Plan and the ROD be designed to accommodate the DEP ordered remedy for the Koppers Site. The Plan must also require appropriate adjustments, supplements and modifications to the Interim Slurry Wall as may be required to complete NJDEP approved remedial action for the Koppers Site while maintaining effectiveness to contain the DNAPL plume originating at the SCCC site.**

Please note the HCIA has worked to facilitate ongoing communication between Morris Companies and the Participating Parties Group (PPG) responsible for the SCCC cleanup. Morris and PPG professionals have been working together to identify engineering solutions to the issue of the Interim Slurry Wall.

2. **The HCIA requests that the Plan and the ROD include a specific requirement that some form of appropriate remedial action, other than the issuance of a TI, be required for Area 2. Also, the Plan shall require that a clean corridor for the required access and utilities be constructed to support the planned developments on the Koppers Site and on SCCC.**

We anticipate that the EPA will incorporate HCIA's requested revisions into the Plan and into the ROD. As has been previously demonstrated, the HCIA is willing to work with EPA and looks forward to further substantive discussions.

Very truly yours,

Hudson County Improvement Authority

Michael F. O'Connor, Esq.
Office of Planning & Energy
Michaelo@hcia.org

cc: Norman M. Guerra, HCIA Chief Executive Officer
William J. Netchert, Esq., General Counsel
T. Schwartz, Esq.
J. Bruno, Esq.
S. Gray, Esq.
Enclosures

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HUDSON COUNTY IMPROVEMENT AUTHORITY

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Executive Director/CFO
Kurt A. Cherry

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William J. Netchert, Esq.

July 8, 2016

Via UPS Overnight Mail
Ms. Alison A. Hess, CPG
Senior Project Manager
United States Environmental Protection Agency
Emergency & Remedial Response Division
290 Broadway, 19th Floor
New York, NY 10007-1866P

Re: Standard Chlorine Company Superfund Site, Kearny, New Jersey;
Review of June, 20, 2016 Final Draft Focused Feasibility Study

Dear Ms. Hess:

The Hudson County Improvement Authority (HCIA) understands that the United States Environmental Protection Agency (USEPA) has received a Final Draft Focused Feasibility Study (FFS), dated June 20, 2016, for remediation of the Former Standard Chlorine Chemical Company Superfund Site, Kearny, New Jersey (SCCC). The SCCC lies immediately adjacent to the Former Koppers Seaboard Site, Kearny, New Jersey (Koppers Site), owned by the HCIA. In addition, the SCCC extends into and covers approximately 13 acres in the westerly section of the Koppers Site (13 Acres) and SCCC "interim" remedial measures have been installed within the 13 Acres. Importantly, the Koppers Site is listed on the New Jersey Department of Environmental Protection (NJDEP) Known Contaminated Sites List and is under active remediation through a Licensed Site Remediation Professional (LSRP). Consequently, any proposed remedy for the 13 Acres must be approved by the LSRP and be consistent with the NJDEP requirements. Finally, the Koppers Site is under contract to be sold to and redeveloped by Morris Kearny Associates, LLC (Morris) in accordance with the February 2013 Koppers Coke Peninsula Redevelopment Plan prepared by the New Jersey Sports and Exposition Authority (NJSEA). In addition, on February 25, 2016, the NJSEA designated the Koppers Site as a "Vital Project" pursuant to NJSA 5:10A-11(f) whereby the NJSEA

retained sole and exclusive jurisdiction for the redevelopment of the Koppers Site. In this regard, any impediment to redevelop the 13 Acres will also require the consent and approval of the NJSEA.

Subsequent to a meeting with the USEPA, the HCIA issued an April 16, 2016 letter that commented upon the impact of the slurry wall that was installed circumscribing the 13 Acres. This HCIA letter stated that the location and construction of the existing SCCC slurry wall is an impediment to the completion of the Koppers Site remedial action. The letter also stated that the slurry wall had a significant negative impact to the planned re-development of the Koppers Site by Morris, HCIA's contracted purchaser. The HCIA letter concluded that the location and construction of the SCCC slurry wall must be reconsidered during the review of the SCCC RI/FFS and five alternative options were offered.

Based upon our review of the FFS, the following comments are offered for the consideration of the USEPA:

1. Although it is apparent from a review of the FFS that the SCCC responsible party group had a copy of the April 18, 2016 HCIA letter, the FFS does not provide any responses to the HCIA letter and the HCIA must insist that the Final FFS include specific and pertinent responses. There also must be an identification and evaluation of alternatives to the continued use of the 13 Acres slurry wall and the selection of a new "final" remedy for the 13 Acres that will permit redevelopment and provides containment and/or control of the SCCC plume.
2. The Alternatives Analyses of the FFS are based upon "where practicable and cost-effective". These terms are not defined in the FFS and are a subjective, not objective, means of analyses. The point scoring, used to evaluate Alternatives, is based upon this criterion and is therefore, also not an objective analysis. These terms are unacceptable to the HCIA and contrary to the publicly acknowledged and shared goal of the State of New Jersey, County of Hudson, New Jersey Sports & Exhibition Authority and the Town of Kearny to redevelop the SCCC and the Koppers Site for commercial and industrial development. Therefore, we strongly object to the inclusion in the FFS of the subjective terms "where practicable and cost-effective".
3. The FFS does not re-evaluate the Interim Remedy constructed under the NJDEP oversight. The Interim Remedy was constructed more than five years ago and does not account for current conditions including the substantive completion of remediation on the Koppers Site, including the 13 Acres and the presence of re-development plans for the Koppers Site. The slurry wall constructed in the 13 Acres is a significant impediment to site access to the Koppers Site and necessitated the construction of a permanent bridge over the slurry wall at significant cost to the HCIA in order to implement the NJDEP-approved remediation of the Koppers Site.
4. The Koppers Site and SCCC/ Tierra have proposed redevelopments. The Koppers Site has an actual contract for development while the SCCC/Tierra site has a development concept. Neither proposed development was substantially considered in the development of Remedial Alternatives for FFS. In accordance with March 2010 USEPA Guidance, a Reuse Assessment is to be completed and involves collecting and evaluating information to develop assumptions about reasonably anticipated future land uses at Superfund Sites. The submitted FFS does not include a Reuse Assessment. It is also apparent in the context of the USEPA Guidance that actual Reuse Plans have been developed and that USEPA must consider the impact of these Reuse Plans upon any proposed remedy. The FFS does not comply with USEPA Guidance and must be revised.
5. The FFS identifies a second area of impact to the Koppers Site near the southeast corner of the Site (Area 2). Area 2 includes the area stretching from the southwest corner of the Koppers Site southerly across New Jersey Route 7, a state highway. The FFS proposes no substantive remedy

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and requests the issuance of a Technical Impractability Determination (TI). The FFS argues that steep slopes, existence of a state highway and the presence of utilities prevent the use of any substantive remedy. There are numerous similar situations in the State of New Jersey where contamination has migrated off-site beneath a highway and is impacted by physical conditions and a TI has not been issued. Moreover, the TI proposal for Area 2 lumps together two physically dissimilar areas: land in southwest corner of the Koppers Site up to the boundary with the Route 7 and land from Route 7 South. The area immediately adjacent to the Koppers Site does not have steep slopes and is not impacted by the highway or utilities. This area can and should be remediated and the Alternatives Analysis of the FFS must be revised to address this area.

6. The contamination in Area 2, adjacent to the Koppers Site, significantly impacts the planned Morris development since an access road and water, sewer and electric lines for the Morris development will need to pass through this area. The planned remedy for Area 2 is the submission of a TI, rather any effective remediation. The lack of a remedy will cause significant health and safety concerns during the construction of the proposed access road and utilities for the Morris development and will result in significant additional cost to provide appropriate worker protections and temporary remediation during construction (i.e. containment structures, temporary treatment and liquid removals).
7. The SCCC responsible party group has no legal authority nor the consent of the HCIA or Morris to remediate the 13 Acres in a manner that limits or prohibits the redevelopment. The HCIA and Morris demand that the 13 acres within the slurry wall on the HCIA property and on Block 287, Lot 32.01, a former railroad property owned by HCIA that extends through SCCC, be absolutely and unequivocally remediated in a manner that supports commercial/industrial redevelopment without any regard to practicality or cost.
8. With respect to Area 2 (which is outside the slurry wall and includes a portion of the HCIA property in the southwestern corner and a portion of the NJDOT right-of-ways for the Belleville Turnpike and Newark Turnpike), the two alternatives presented in the FFS do not include expanding the wall or a barrier system or even NAPL recovery/hydraulic control. If there is no concern for DNAPL outside the slurry wall, it is not clear what benefit, if any, the slurry wall is providing for Area 1. However, if DNAPL removal is required, whatever technology is used should be considered for Area 1 in lieu of the slurry wall.
9. The FFS identifies that passive recovery of DNAPL using the recovery wells of the 13 Acres has resulted in a total of 5,497 gallons of recovered DNAPL recovered since startup in January 2012 through June 2015 This recovery would result in about 1,500 gallons per year which is not an effective means of final remediation. The recovery wells need to be replaced by actual extraction wells and a more effective active system which will likely obviate the continued need for the slurry wall as means of containment within the 13 Acres.
10. The FFS does not provide alternatives or measures to address and control potential vapor intrusion for future structures at the Koppers Site.
11. The FFS should include a requirement to construct clean corridor(s) for utilities that will service the Koppers Site and the SCCC.
12. The FFS contemplates a deed notice which extends onto the 13 acres. The HCIA objects to any deed notice that will be inconsistent with or more restrictive or limiting than the deed notice that the Koppers Site LSRP currently contemplates for the HCIA property. In this regard, HCIA and Morris hereby demand that the remedy for the contamination in the 13 Acres be modified so that

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the slurry wall (which was designed and constructed as an "interim" remedy) ether be removed or otherwise abandoned in place that will allow unrestricted filling and redevelopment.

13. The NJDEP-approved RAWP for the Koppers Site, including the 13 Acres, contemplates filling and a cap which, based on an independent geotechnical study, will implicate the integrity of the interim slurry wall system. In addition, the Koppers Site LSRP needs to design a remedy for the 13 Acres that will not render the property unusable for future redevelopment or for recreational use pursuant to N.J.S.A 58:10B-12(g)(1) and N.J.A.C. 7:26C-6.4(b) . The FFS does not address this issue and must be revised.
14. HCIA and Morris will incur substantial damages for any "taking" of the 13 Acres and Lot 32.01 since these areas serve as the gateway to the balance of the peninsula and therefore cannot be subject to any development restrictions.
15. We note that the proposed redevelopment of the SCCC extends across Lot 32.01 owned by HCIA and HCIA is under contract to sell that parcel to Morris. Further, Tierra and its parent recently filed for bankruptcy protection which likely will affect the timing, if not the ability, to acquire and redevelop the parcel owned by Tierra and the going-forward viability of the PPG. Finally, any proposed redevelopment of the SCCC site will require fill to meet the FEMA requirements which, again, will implicate the integrity of the slurry wall system.
16. HCIA has noted references in the FFS to multiple meetings and communications between USEPA and the PPG with respect to the remedial approach of the site. The HCIA was not consulted or invited to such meetings and raises objection to any process or conclusion that was made without HCIA's knowledge or input at least with respect to the remediation of the 13 Acres on HCIA's property and Lot 32.01. While HCIA has infrequently met with Beazer to discuss its concerns, it is not clear that HCIA's concerns have been communicated to the balance of the SCCC responsible party group or to the USEPA.
17. Figure 1-2 of the FFS contains the various tax parcel numbers which it does not identify. Further, our information regarding the designation of the various tax parcels is different than the information contained in the FFS. All affected tax parcels should be reviewed against current information.
18. Please know that the HCIA and Morris are continuing to review the technical aspects of the FFS and that we will be meeting with SCCC Responsible Party Group in the next few weeks to discuss certain technical elements of the proposed remediation and redevelopment. Accordingly, HCIA and/or Morris anticipate that additional technical comments may be provided after such meeting takes place.

The HCIA trusts that our comments are useful to the USEPA and will be considered during the review of SCCC FFS. The HCIA and Morris are available for further discussion on this matter. Thank you for your consideration.

Very truly yours,
Hudson County Improvement Authority

Michael F. O'Connor, Esq.
Office of Planning & Energy
michaelo@hcia.org

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Cc: N. Guerra, HCIA
K. Morris, Morris
T. Schwartz, Scarinci and Hollenbeck
T. Terhune, Scarinci and Hollenbeck
T. Gallagher, Morris
J. Bolan, PS&S

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April 18, 2016

Ms. Alison A. Hess, CPG
Senior Project Manager
United States Environmental Protection Agency
Emergency & Remedial Response Division
290 Broadway, 19th Floor
New York, NY 10007-1866P

Re: Koppers Seaboard Site and Standard Chlorine Company Superfund Site, Kearny, New Jersey

Dear Ms. Hess:

As discussed at our meeting at the United States Environmental Protection Agency (USEPA) offices on March 30, 2016, the Hudson County Improvement Authority (HCIA), the owner of the Koppers Seaboard Site, Kearny, New Jersey (Koppers Site) has entered into a Purchase and Sale Agreement with Morris Kearny Associates, LLC (MKA) to develop the Koppers Site. An overview of the MKA Project is provided in **Attachment A**. Essentially, the MKA Project will include the construction of four new industrial warehouse buildings, totaling approximately 2.1 million square feet, along with associated paved parking lots, paved roads and utility infrastructure. The estimated economic impact of the MKA Project is more than a billion dollars. A current overall layout of the MKA Project is indicated in **Attachment B**.

As also shown on **Attachment B**, a 21 acre portion of the Koppers Site has a planned project location for New Jersey Transit. This project location was developed through a legal settlement of a property dispute between HCIA and NJ Transit regarding the cancelled Access to the Regions Core (ARC) project that was proposed by NJ Transit. In accordance with the settlement, some portion of the Koppers Site will need to be provided for use by NJ Transit and the NJ Transit project cannot be voluntarily removed from the Koppers Site.

It was understood based upon the discussion at the March 30, 2016 meeting that the USEPA was reviewing a Remedial Investigation and Focus Feasibility Study (RI/FFS) for the adjacent Standard Chlorine Chemical Company, Inc. Superfund Site (SCCC). This RI/FFS was directed by the USEPA and was intended to provide support for a Remedial Action Plan and Record of Decision to be prepared by the

USEPA for SCC. It was also understood that the USEPA would be interested in receiving input from the HCIA regarding the RI/FFS. As such, the HCIA is providing comments to the USEPA.

The Koppers Site is listed on the New Jersey Department of Environmental Protection (NJDEP) Known Contaminated Sites List and is under the jurisdiction of a NJDEP Licensed Site Remediation Professional, Mr. John Bolan. A remedial action work plan and several remedial action work plan addendums were approved and remediation has been implemented. Most of the remediation has been completed and processed dredged materials (PDM) created by an on-site dredged materials processing facility are being used for capping. The MKA Project Plan, indicated in **Attachment B**, is intended to become the final cap of the Koppers Site for remediation purposes.

HCIA is aware that a series of recovery wells tied to a treatment plant located on SCCC was constructed for the capture and containment of DNAPL within the westerly 13 acres of the Koppers Site. HCIA is also aware that the westerly 13 acres of the Koppers Site, the SCCC and Tierra Solutions Site are surrounded by a one foot thick cement bentonite slurry wall as a secondary means of containment. The slurry wall and recovery wells were installed as part of an Interim Remedial Measure (IRM) for the SCCC, directed by the NJDEP but with input from the USEPA. The approved remedial action for the Koppers Site calls for the filling of the westerly 13 acres. Analyses of the existing slurry wall by HCIA's consulting engineer indicate that the cement bentonite slurry wall could not support the load imposed by the filling for the Koppers Site remedial action and fill setbacks from the slurry wall are being temporarily used to prevent impacts to the slurry wall.

The existing slurry wall also has an impact to Building #4 of the MKA Project since a portion of the slurry wall would lie beneath the proposed building footprint. As shown in the three plans provided in **Attachment C**, MKA has attempted to move both Building #4 and the westerly boundary of the NJ Transit project location to avoid the slurry wall. Even with these movements and the required NJ Transit project location, a portion of Building #4 will still lie above the existing slurry wall (see sk 36-01-11-16 in **Attachment C**). The construction of Building #4 could cause damage to the existing SCCC slurry wall. Access roads serving the entire MKA Project will also need to cross over the existing slurry wall and utility infrastructure serving the entire MKA project will also need to pass through the existing slurry wall. Cement bentonite is not a self-healing type of slurry wall and will be subject to fracture and cracking under loads and penetration.

Therefore, it is apparent that the location and construction of the existing SCCC slurry wall is an impediment to the completion of the Koppers Site remedial action. Filling for remedial action and the completion of the MKA Project, intended to serve as the final cap, will be impacted. The positive economic impacts of the MKA Project will also be significantly reduced.

The location and construction of the SCCC slurry wall should be reconsidered during the review of the SCCC RI/FFS and require the re-study of the SCCC existing slurry wall, within the Koppers Site 13 acres, in view of the impediments discussed above. The RI/FFS should require that a new, more suitable means of secondary contaminant be employed in the Koppers Site westerly 13 acres. This new means of containment should consider the filling required for the Koppers Site remediation and the new construction required for the MKA Project as shown on sk 36-01-11-16. Some options available for consideration should include the following:

1. Removal of the slurry wall without replacement based on the effectiveness of existing groundwater extraction system (hydraulic containment)
2. Relocate Slurry Wall. Abandon the section adjacent to MKA Building #4 and install a cement bentonite or soil bentonite replacement section.
3. Reinforce or augment the slurry wall sections/areas using grout curtain, sheet piles, geomembrane , load transferring caps, increase the wall thickness or use soil-bentonite
4. Effective replacement of containment area by the use of additional extraction wells connected to the existing SCCC treatment plant
5. Consider repair and or relocation of slurry wall after damage is confirmed.

HCIA trusts that our comments are useful to the USEPA and will be considered during the review of SCCC RI/FFS. The HCIA and MKA are available for further discussion on this matter. Thank you for your consideration.

Very truly yours,

Norman M. Guerra
Chief Executive Officer

Cc: M. O'Connor, HCIA
K. Morris, Morris
T. Schwartz, Scarinci and Hollenbeck
T. Gallagher, Morris
J. Bolan, PS&S

ATTACHMENTS
Attachment A – Overview of MKA Project
Attachment B –MKA current Project Plan
Attachment C – Alternative MKA Plans to avoid slurry wall

BACKGROUND INFORMATION

REDEVELOPMENT OF KOPPERS PENINSULA, KEARNY, NEW JERSEY

The following is a summary of the Morris Koppers project for consideration in the Focus Feasibility Study ("FFS).

Morris Realty Associates, LLC ("Morris") is the preferred redeveloper of an approximately 175 acre parcel of land on the Koppers Peninsula in Kearny, New Jersey. The parcel is presently owned by the Hudson County Improvement Authority ("HCIA"), which conducted a Request for Proposals ("RFP") for its development and selected Morris as the preferred developer. Morris will be investing substantial sums of money, without any public funding subsidy, to transform this vacant, formerly industrial property along the Hackensack River, with a long history of contamination issues, into the most significant port-related distribution center and support facility in northern New Jersey.

The project, consisting of in excess of two million sq. ft. of warehouse facilities, will represent the most significant economic engine in the region, providing over 2,000 construction jobs and over 2,400 permanent jobs, and providing over $1,200,000,000 in overall economic activity in the area.

The redevelopment of this parcel may also include the co-development of a Micro-Grid system by NJ Transit, to provide power for its infrastructure and equipment. This project would be a very important system upgrade for NJ Transit and the region, as it will improve preparation and resilience in the face of major events like Superstorm Sandy. PSE&G will also be installing on a portion of the site the new transmission towers as part of its regional upgrade program to service the Hudson Generating Station.

Parcels adjacent to the HCIA parcel include a 25 acre parcel owned by the Town of Kearny, and a 25-acre parcel owned by Tierra Solutions. The Kearny and Tierra properties are undergoing remediation, however the Kearny site is also a Superfund site, under the jurisdiction of USEP A.

The Interim Remedial Action for this remediation included the installation of a barrier wall to collect ground water contamination. Part of the barrier wall occupies 13 acres of the HCIA parcel.

All of these parcels are located in the New Jersey Meadowlands District and have been declared by the New Jersey Meadowlands Commission ("NJMC") as "areas in need of redevelopment, and thus their development is regulated by the Koppers Coke Peninsula Redevelopment Plan adopted by the New Jersey Meadowlands Commission ("NJMC") on February 27, 2013. Recently the NJSEA determined the project to be a "vital project" for the region and assumed control over its planning and development.

Historically, the HCIA property was used for industrial operations that resulted in extensive contamination. Remediation has been ongoing for several years. The redevelopment of the site will provide for engineering controls to be installed by Morris to cap the site, as part of the remediation project.

Morris is developing plans for the construction of over 2 million square feet of warehouse distribution space which will be integrated with the NJ Transit property, the PSE&G power enhancement project, site remediation and Superfund projects.

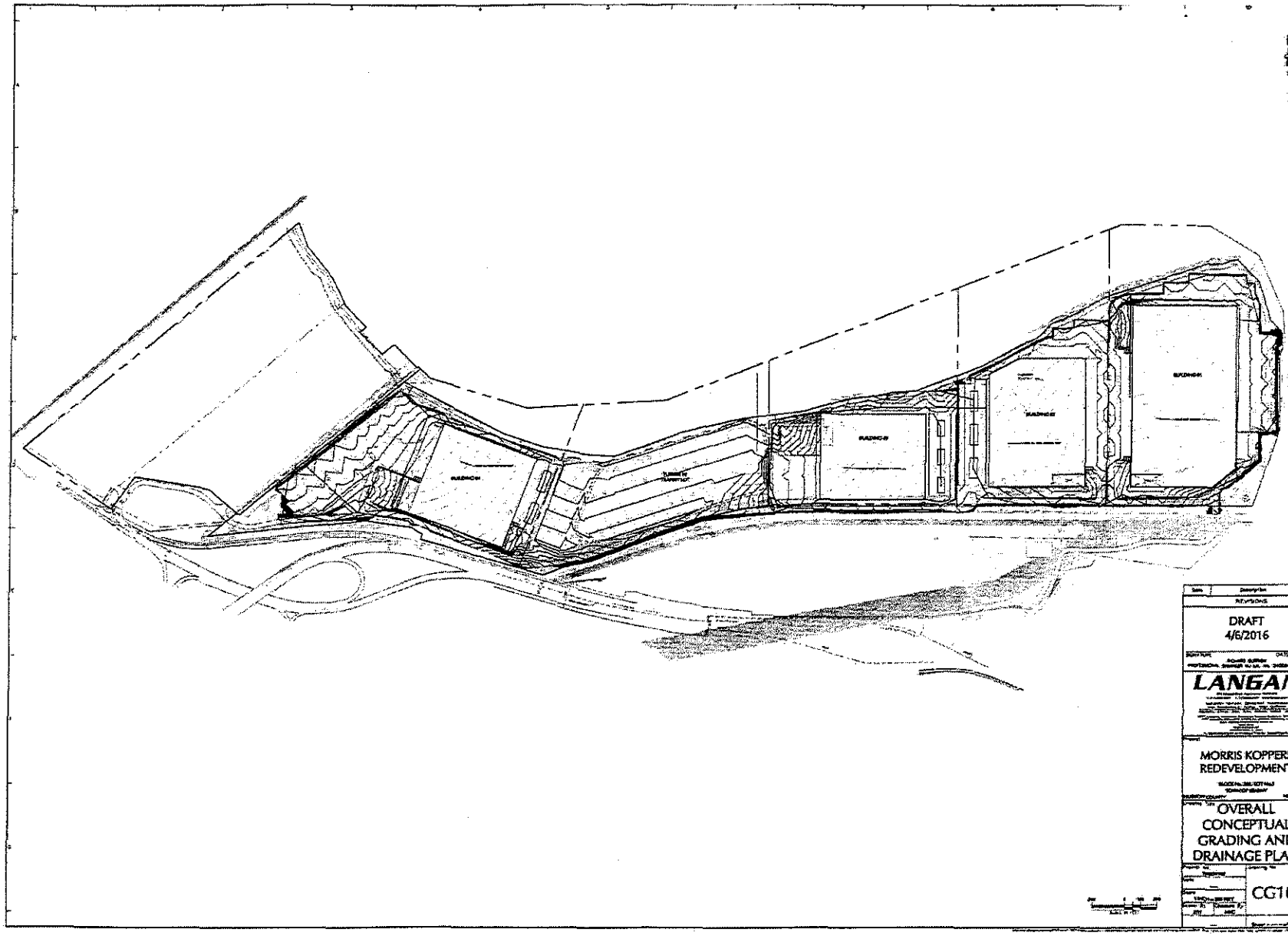
The Koppers Peninsula project is an immensely complicated project in terms of planning, zoning, engineering, infrastructure, environmental remediation and construction. The NJMC staff have a great deal of experience with this property and with the particular challenges of project development in the Meadowlands, such as the need to address environmental contamination, inadequate infrastructure, waterfront and riparian issues, geotechnical challenges due to marsh land and other complexities.

This is very unique project due to the scope of the project and integration with projects by NJ Transit, PSE&G, NJDOT and site remediation and development. Throughout the development of the project, Morris has worked closely with HCIA, NJ Transit, PSE&G, U.S. Senators Menendez and Booker, Hudson County Executive, Hudson County Freeholders Board, Assemblyman Vincent Prieto, Congressman Albio Sires, Office of the Governor – Authorities Unit, the Hudson and Essex County Building Trades, and other stakeholders – all of whom are significant supporters of the project. The project serves as an integral and forceful economic engine for the region, not to mention gentrification of the surrounding area.

Below is a description of the Planning, Construction, Use Concepts and details for Coordination and Inclusion in the FSS.

Attachments:

- A Map of Local Area
- Redevelopment Plan



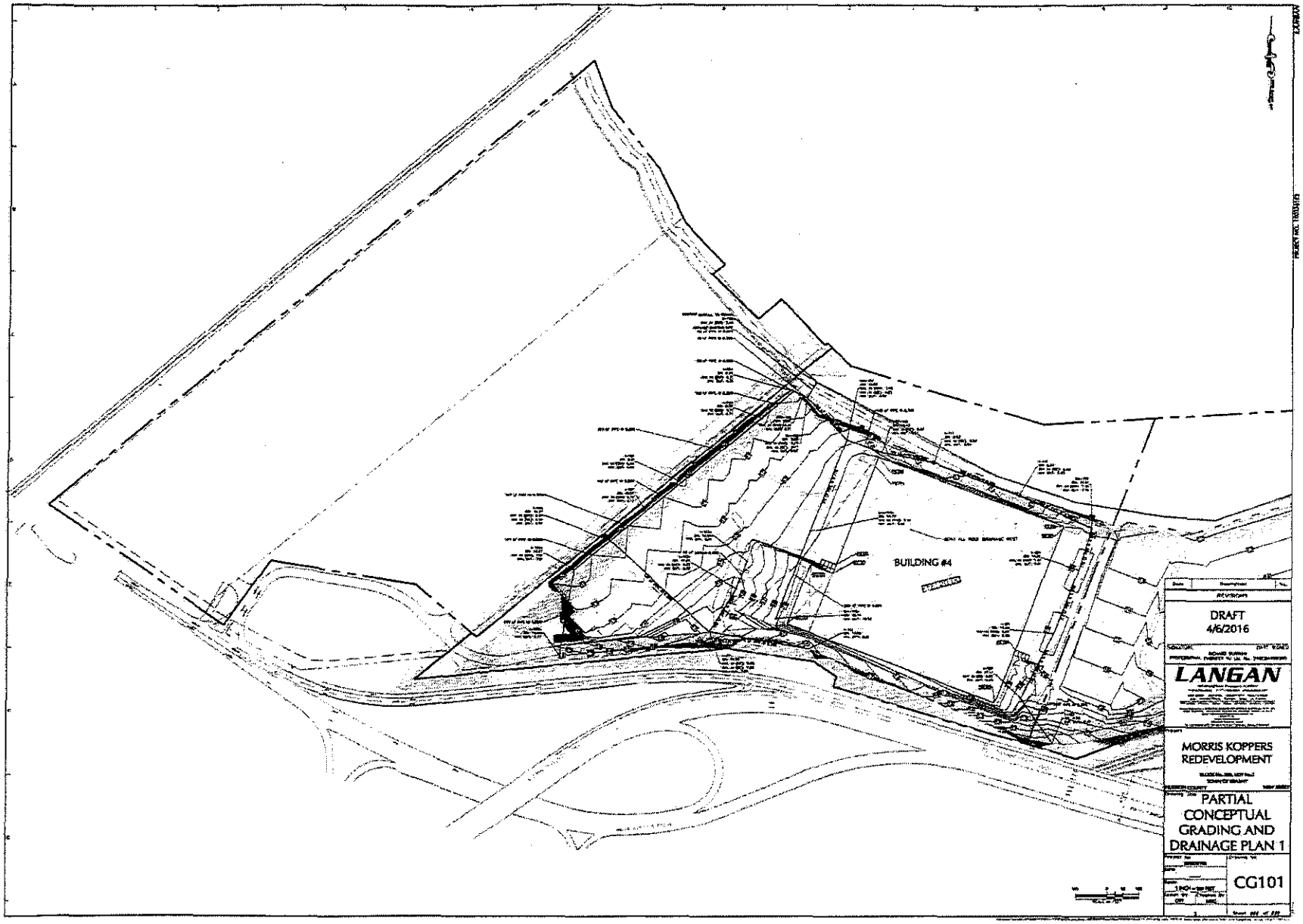
DRAFT
4/6/2016

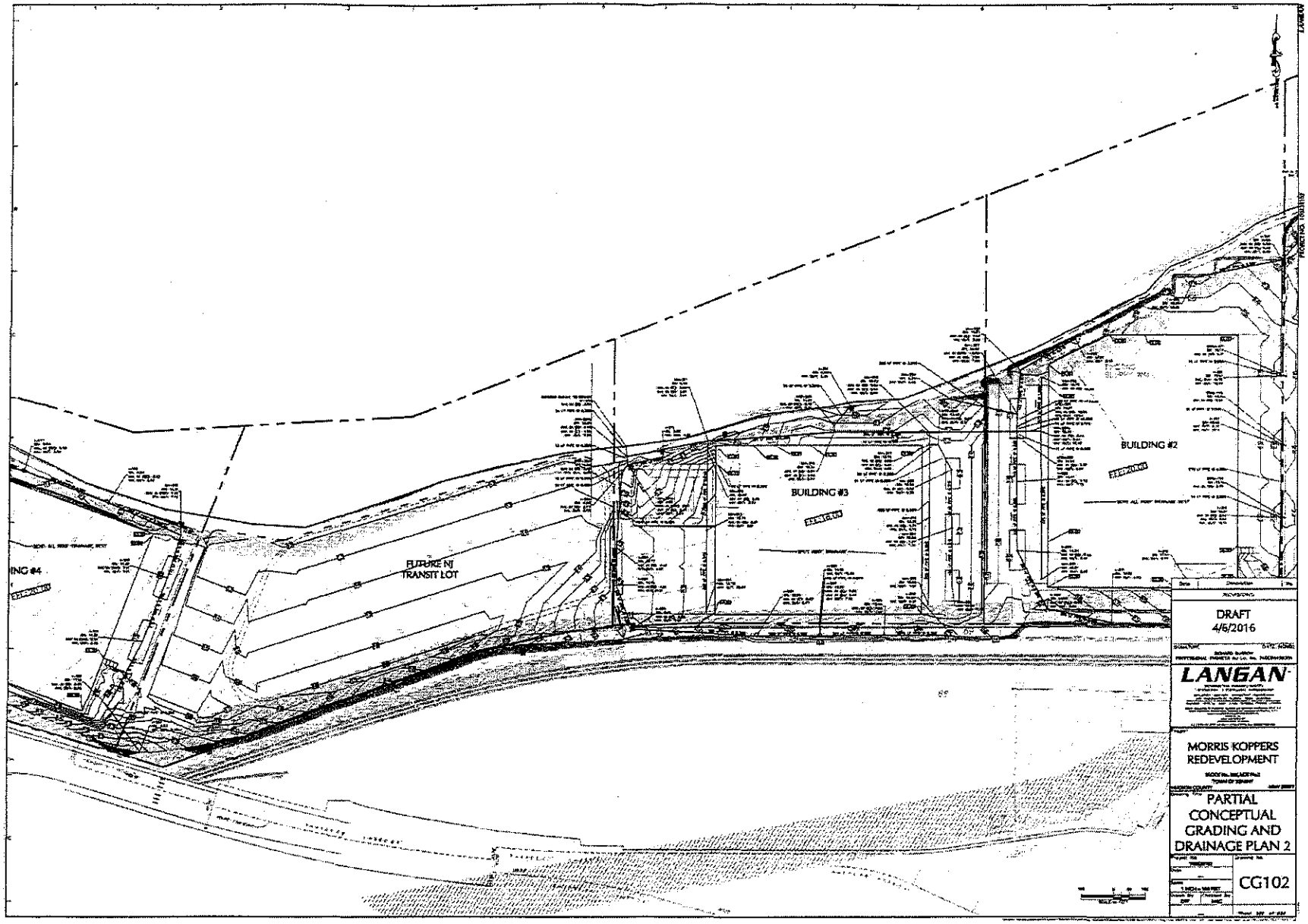
LANGAN

MORRIS KOPPERS
REDEVELOPMENT

OVERALL
CONCEPTUAL
GRADING AND
DRAINAGE PLAN

CG100


BUILDING #4
DRAFT
4/6/2016
LANGAN
MORRIS KOPPERS
REDEVELOPMENT
PARTIAL
CONCEPTUAL
GRADING AND
DRAINAGE PLAN 1
CG101



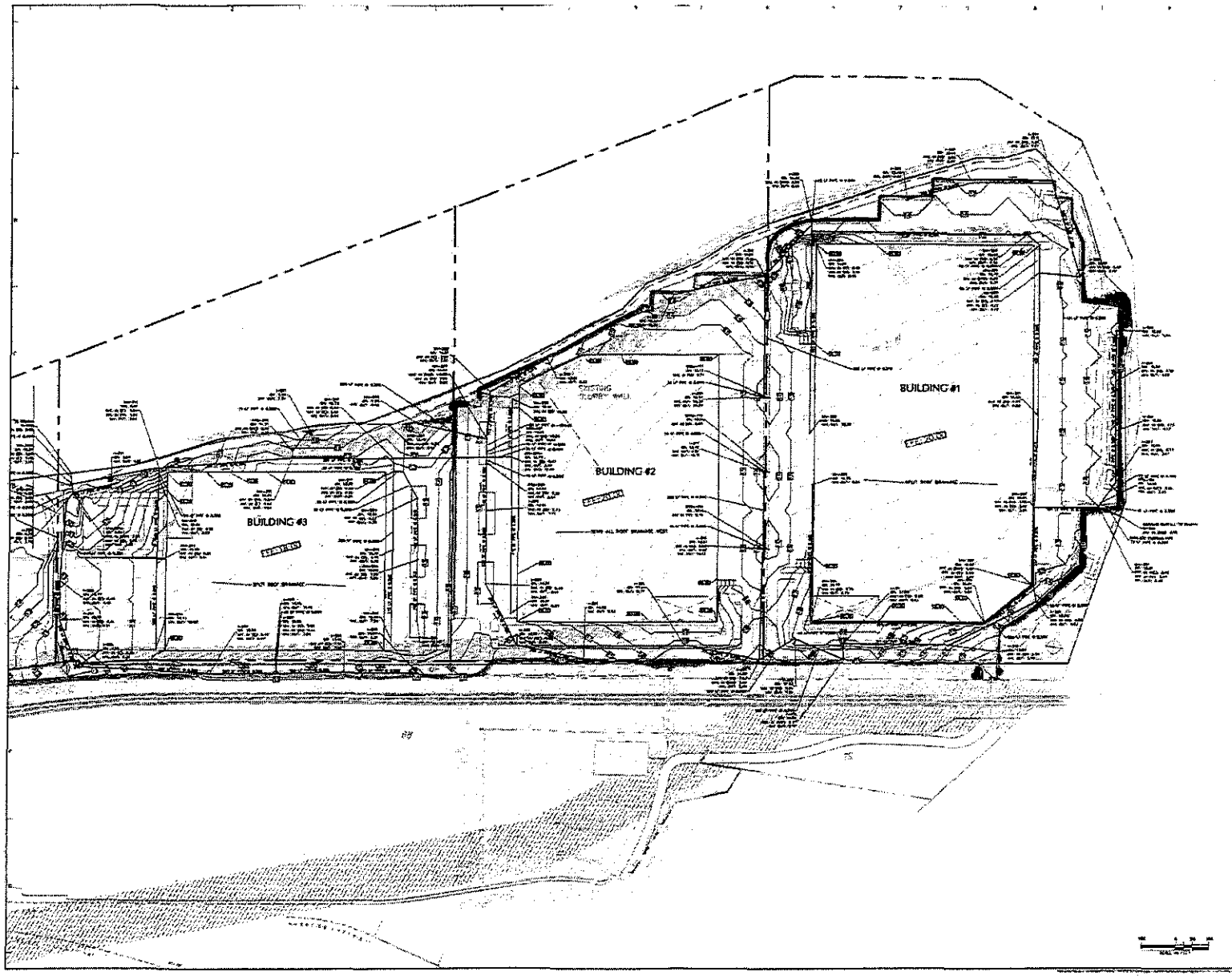
DRAFT
4/6/2016

LANGAN

MORRIS KOPPERS
REDEVELOPMENT

PARTIAL
CONCEPTUAL
GRADING AND
DRAINAGE PLAN 2

CG102



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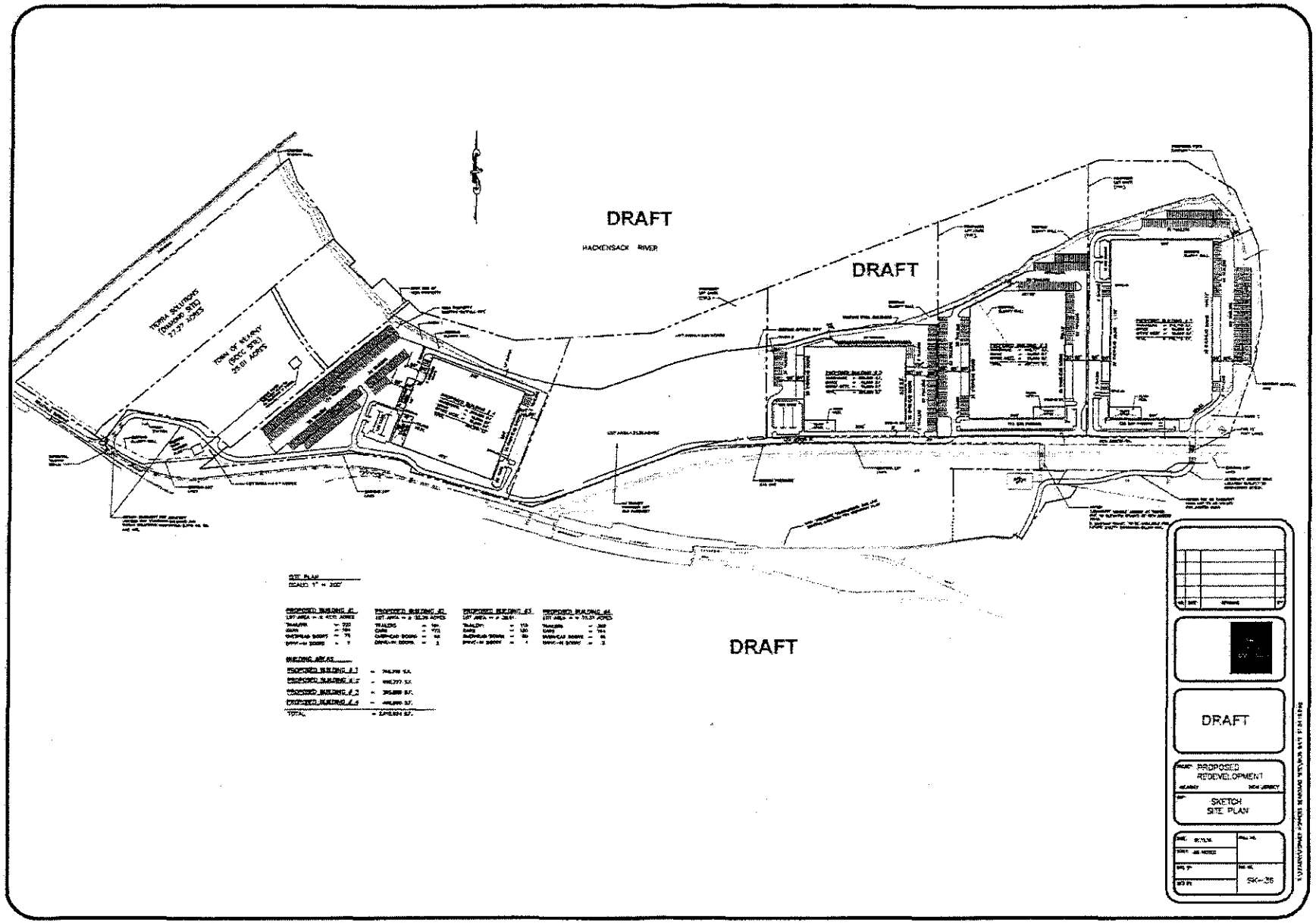
4/6/2016

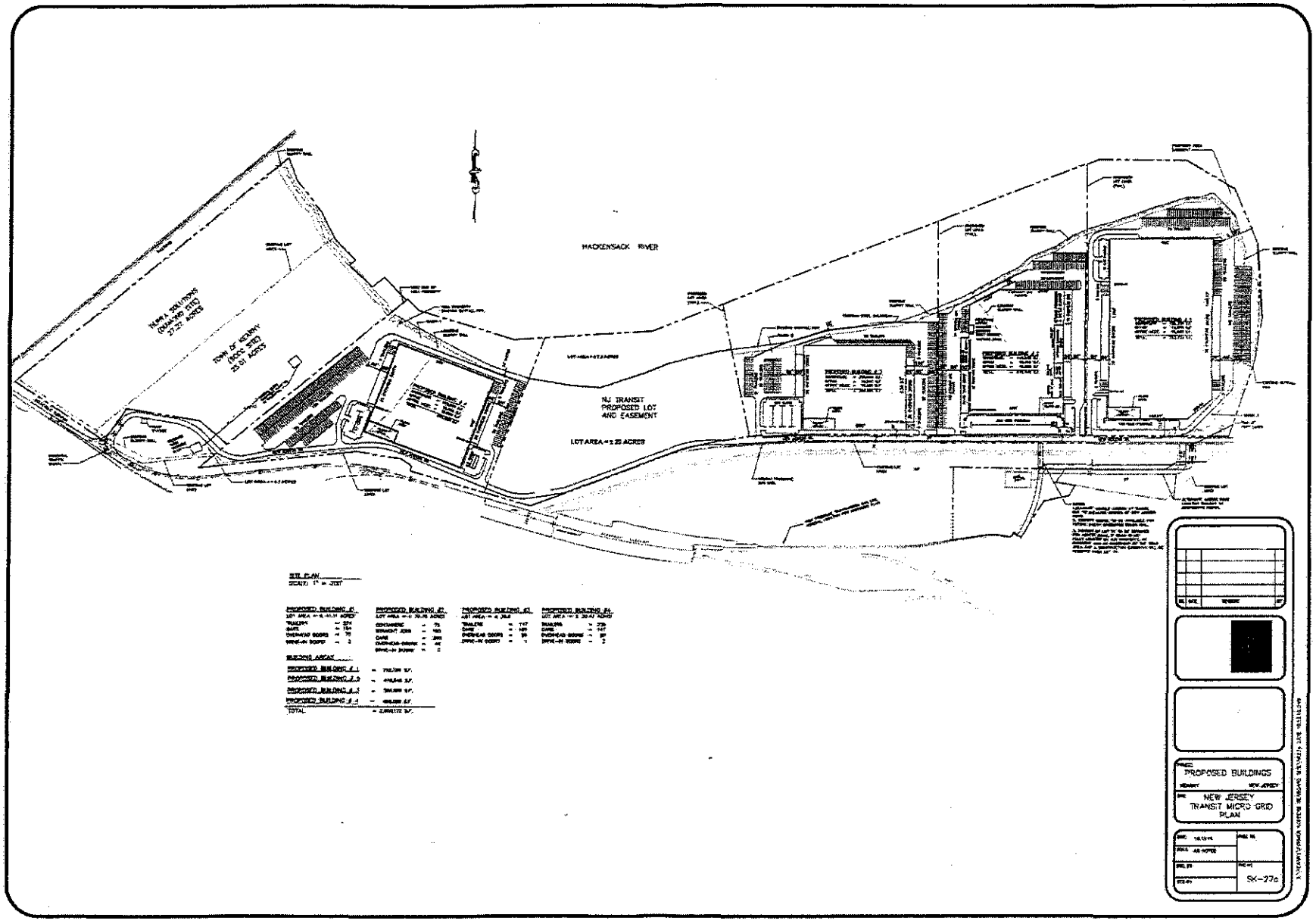
LANGAN

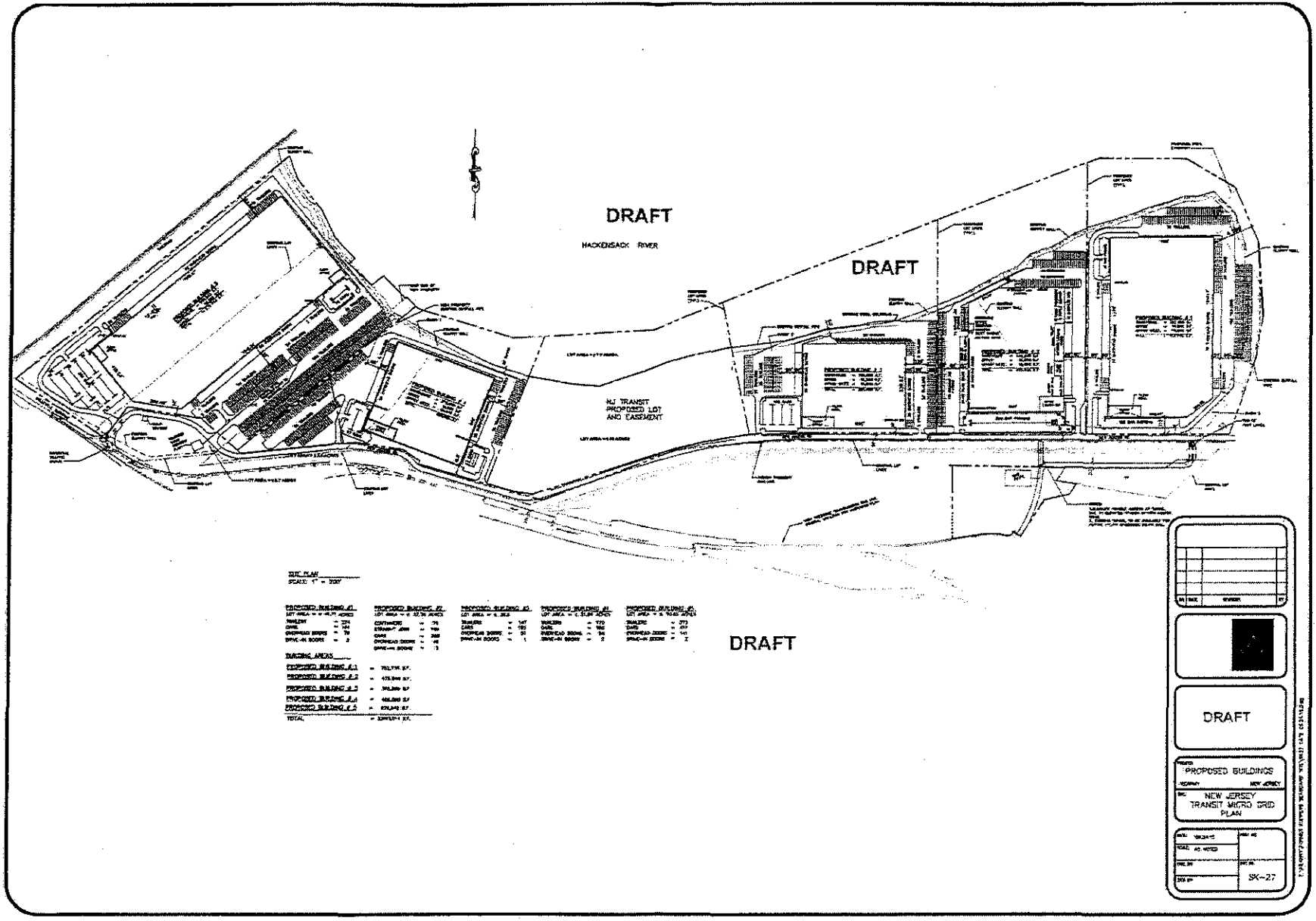
MORRIS KOPPERS
REDEVELOPMENT

PARTIAL
CONCEPTUAL
GRADING AND
DRAINAGE PLAN 3

CG103


DRAFT
HACKENSACK RIVER
DRAFT
DRAFT
DRAFT
PROPOSED
REDEVELOPMENT
SKETCH
SITE PLAN
SK-36


HACKENSACK RIVER
NJ TRANSIT
PROPOSED LOT
AND EASEMENT
LOT AREA = ± 2.25 ACRES
PROPOSED BUILDINGS
NEW JERSEY
TRANSIT MICRO GRID
PLAN
SK-27a


DRAFT
HACKENSACK RIVER
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NJ TRANSIT
PROPOSED LOT
AND EASEMENT
DRAFT
DRAFT
PROPOSED BUILDINGS
NEW JERSEY
TRANSIT MICRO GRID
PLAN
SK-27

My name is Daniel Ortega and I work for Engineers Labor-Employer Cooperative (ELEC 825). We are the management fund for the Operating Engineers Local 825. We represent over 6800 union members and together with our signatory contractors, we work to secure building projects, create jobs, maintain a credentialed workforce, promote economic development, and stimulate construction. Our territory includes the entire State of New Jersey and 5 counties on the Hudson Valley in New York State.

I am here today in support of this project. The benefits of this project are numerous, including, but not limited to the jobs created for our members and contractors who would work on this project. Local 825 members are exceptionally skilled in this type of work, and this project would provide many jobs during its construction phase.

Our workforce is highly trained and safety is always our top priority. Our training facilities have recently ranked among the best places for training and continuing education on this type of project and construction. We have successfully and safely built and been part of projects like this throughout our entire territory, including environmentally sensitive areas like the New Jersey Meadowlands.

This project is not solely about construction jobs. Our members don't just work here. We live here and raise our families here, too. We also know the benefits this vital project will have in the region and its positive economic impact in our economy. In order for New Jersey to remain economically competitive and a great place to live, we need continue investing in this kind of development.

This project is a perfect example of the type of construction project that is important to our organization and members. ELEC strongly supports this project and respectfully request the EPA to reconsider the proposed plan and accommodate the concerns of the Hudson County Improvement Authority.

Hess, Alison

From: Dave Pasi <pacerx@optonline.net>
Sent: Tuesday, August 16, 2016 3:17 PM
To: Hess, Alison
Subject: Standard Chlorine Superfund Site

Hello EPA,

I recently read an article detailing the extent of damage done by the companies that operated at the Standard Chlorine Superfund Site in Kearney, NJ. To say this is a crime against the environment and all who are affected by it's contamination is an understatement.

As is always the case, money is a factor in what type of cleanup will be done. The cheaper route of capping and installing barriers is akin to "sweeping the dirt under the carpet". It doesn't fix the problem, and will just be something that will have to be dealt with again in the future and at further cost. Additionally, barriers and capping are not a guaranteed way of containing dangerous chemicals as they can travel underground and poison other areas. The only morally right course of action is a total excavation of the contamination. Do it once and do it right. Then, it will never be problem again.

Society has done an unbelievable amount of damage to our planet. It's time to stop the abuse and repair, the RIGHT way, the damage we have done to our one and only, as well as fragile planet. I urge you to please do the right thing and demand nothing less than a full and complete cleanup of the site.

Thank You,
Dave Pasi
20 Lundy Terrace
Butler, NJ 07405
pacerx@optonline.net

Theodore A. Schwartz

From:	Theodore A. Schwartz
Sent:	Friday, August 19, 2016 3:11 PM
To:	'alison.hess@epa.gov'
Cc:	'mark.pedersen@dep.nj.gov'; Keith Morris; Michael O'Connor (michaelo@hcia.org)
Subject:	Supplemental Comments to EPA Public Comment Period on the Proposed Remedy for the SCCC Superfund Site
Attachments:	NJ Transit Letter.pdf; Key Environmental - Description of Interim Response.pdf

Through our research on the slurry wall issue that I discussed in my comments at the public hearing on behalf of Morris Kearny Associates, L.L.C. ("MKA"), we came across the attached letter dated August 11, 2010 addressed to Mr. Michael Brourman at Beazer East, Inc. from NJ Transit concerning the proposed construction by PPG of the slurry wall. The letter speaks for itself pointing out that the PPG's proposed construction and design of a cement bentonite slurry wall would not be adequate for placement of fill, and accordingly requested the use of soil bentonite as opposed to cement bentonite in the construction of the slurry wall.

> Construction of the proposed wall as currently designed would significantly interfere with . . . "any development of the Kopper's property within the area of the wall."

As noted, copies of the letter were furnished to USEPA and NJDEP officials, which clearly put them on notice of the geotechnical deficiencies of the proposed slurry wall. This communication further confirms and supports the comments I have made that the "interim" slurry wall is not compatible with the RAWP obligations of HCIA and the development of the Kopper's site. Despite the geotechnical concerns expressed by NJT, the wall was constructed by PPG as proposed. (See attached Construction Activity Report).

To further complicate matters, the proposed EPA remedial action plan for Area 1, in particular, the 13-acre area of the Kopper's site is questionable, as the existing slurry wall will not support the required placement of fill in this area for the selected remedy. This may also be true with respect to the portion of the wall located on the SCCC site. It should also be noted that these areas are required to be elevated pursuant to applicable NJDEP Flood Hazard Area regulations and the State Building Code which requires any building in the flood hazard area intended for human habitation to be constructed at least 1 foot above flood elevation (FEMA).

The content and engineering analysis contained in the NJT letter create serious doubts as to the adequacy of the referenced slurry wall and proposed EPA remedial action plans. As a consequence, I feel it is incumbent upon EPA to reconsider the slurry wall issue and make adjustments in the remedial action plan to provide for reconstruction and/or relocation of the existing slurry wall so as not to materially interfere with HCIA's remediation obligation and development of the Kopper's site. As expressed in MKA's prior comments we agree with EPA's remediation objectives except for the slurry wall issue and the need for a clean corridor, especially in area 2, for the installation of infrastructure improvements. In short, for the reasons stated above, the existing 13-acre slurry wall – which was originally intended as an "interim" measure-- should not be considered as a permanent remedy for the SCCC Site.

Thank you for your anticipated careful consideration of this issue.

Attachments

THEODORE A. SCHWARTZ | **Partner**
TSchwartz@sh-law.com | Bio | vCard
Direct Phone: 201-623-1217 | Direct Fax: 201-623-1218

SCARINCI | HOLLENBECK
1100 Valley Brook Ave. | P.O. Box 790 | Lyndhurst, NJ 07071 | map
P: 201.896.4100 | F: 201.896.8660

New York | New Jersey | Washington, D.C.

Connect with us on LinkedIn and visit Firm Insights

Theodore A. Schwartz

From:	Theodore A. Schwartz
Sent:	Friday, August 19, 2016 3:17 PM
To:	Hess, Alison
Subject:	FW: Supplemental Comments to EPA Public Comment Period on the Proposed Remedy for the SCCC Superfund Site
Attachments:	NJ Transit Letter.pdf; Key Environmental - Description of Interim Response.pdf

FYI—my computer initially had the wrong email address for you—sorry for any inconvenience

THEODORE A. SCHWARTZ | Partner
TSchwartz@sh-law.com | Bio | vCard
Direct Phone: 201-623-1217 | Direct Fax: 201-623-1218

SCARINCI | HOLLENBECK
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New York | New Jersey | Washington, D.C.

Connect with us on LinkedIn and visit Firm Insights.

From: Theodore A. Schwartz
Sent: Friday, August 19, 2016 3:11 PM
To: 'alison.hess@epa.gov' <alison.hess@epa.gov>
Cc: 'mark.pedersen@dep.nj.gov' <mark.pedersen@dep.nj.gov>; Keith Morris <kmorris@morriscompanies.com>; Michael O'Connor (michaelo@hcia.org) <michaelo@hcia.org>
Subject: Supplemental Comments to EPA Public Comment Period on the Proposed Remedy for the SCCC Superfund Site

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Thank you for your anticipated careful consideration of this issue.

Attachments

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ACCESS TO THE REGION'S CORE
Trans-Hudson Express (THE) Tunnel
A Partnership of NJ TRANSIT and the Port Authority of NY and NJ

RECEIVED AUG 16 2010

August 11, 2010

Mr. Mitchell Brourman
Environmental Manager
Beazer East, Inc.
C/O Three Rivers Management, Inc.
One Oxford Centre, Suite 300
Pittsburgh, PA 15219-6401

Subject: Peninsula Restoration Group Slurry Wall at Proposed Kearny Yard

Dear Mr. Brourman:

It is my understanding that you are the contact for the Peninsula Restoration Group (PRG) which we anticipate will soon begin to mobilize construction activities for the Standard Chlorine Chemical Company (SCCC) Remedial Action Workplan Addendum (RAWPA), which in part requires, construction of a 6,865 foot (170,000 square foot) slurry wall, with installation of various interior hydraulic control recovery wells to be installed upon completion of the slurry wall. NJ Transit proposes that the slurry wall height adjustments be carried out in order to offset planned surcharge induced settlement for the 850 foot long southern section of the PRG Wall along the Kearny Yard southern property line (PRG Design Drawing CBS-01, Station 54+70 to Station 46+20) and the 920 foot north-south section of the PRG wall (PRG Design Drawing CBS-01, Station 46+20 to Station 37+00). PRG Drawing CBS-01 and CBS-03 are provided in Attachment A for ready reference to the PRG proposed slurry wall configuration. THEP drawings entitled "Kearny Yard Earthwork Management, PRG Slurry Wall" plans and Sections A, B, and C, provided in Attachment B, indicate the alignment of the PRG Slurry Wall and sites where soil surcharges are planned and where revisions will be necessary.

The 850 foot segment of the PRG Slurry Wall along the southern property boundary lies under the future Kearny Yard Access Road connecting Kearny Yard with Route 7 South, and has soil surcharges ranging from 20 to 25 feet above existing grades. The 920 foot north-south eastern end of the PRG Slurry Wall will be installed under soil surcharges varying from 30 to 35 feet.

In accordance with the Technical Regulations (NJAC 7:26E), this documentation is intended to present proposed modifications to the slurry wall to interested parties, including but not limited to, PRG, the Hudson County Improvement Authority (HCIA), and the New Jersey Department of Environmental Protection (NJDEP) prior to submittal of the Kearny Yard Remedial Action Selection Report (RASR) in an effort to assist with the understanding NJ Transit's concerns regarding the approach to the remediation at the site and potential

impact to NJ TRANSIT's planned construction, and the project schedule in achieving key milestones for deliverables to NJDEP.

Our consultant, THE Partnership, has prepared proposed modifications to modify the design elements of the PRG Wall, to provide input to PRG in a timely manner to facilitate RAWPA implementation, and to coordinate the PRG remedy with NJ TRANSIT's proposed Kearny Yard improvements and remedies now contemplated. The proposals provided in this memorandum are based on geotechnical design calculations on surcharge related settlements, and predictions on anticipated rises in potentiometric groundwater elevations in the historic fill. This data will be refined as surcharge placement details become further refined and MODFLOW-based groundwater model simulations are completed, information that will be included as part of the RASR.

Proposed Kearny Yard construction in the area of the PRG Wall includes various features that will impact the proposed PRG wall design. Relevant design features impacting the wall are as follows:

- NJ TRANSIT plans to install a 24 foot wide access road connecting Kearny Yard to Route 7. The road elevation varies from EL. 310.00 ARC Project Datum (12.66 feet above mean sea level (msl) to EL. 330.00 (32.66 feet msl) for approximately 870 feet along the southern boundary of the Kearny Yard site, from the SCCC boundary/Kearny Yard boundary intersection (See PRG Drawing CBS-01, Station 54+70) to the intersection of the South Kearny Yard property line/Western Barrier Wall alignment intersection (See PRG Drawing CBS-01, Station 46+20).
- NJ TRANSIT plans to include installation of a terraced side slope, with a top elevation of 330.00 sloping down to match proposed Beazer grades. The terraced side slope embankment will support the Kearny Yard site development and shall be placed over the 920 foot (north-south-eastern end) of the PRG Slurry Wall. This Western Barrier Wall begins where the PRG Slurry Wall intersects the South Kearny Yard property line (See Attachment A, PRG Drawing CBS-01, Station 46+20) and terminates where the PRG wall intersects the existing Beazer slurry wall, approximately thirty (30) feet south of the existing steel sheet pile (SSP) wall (See Attachment A, PRG Drawing CBS-01, Station 37+00).
- The NJ Transit Remedial Investigation Report (RIR) recommended the Western Barrier Wall contain a slurry mixture of soil and bentonite, in lieu of cement and bentonite, given the substantial thickness of soft clays and peat sub soils beneath the footprint of the Western Barrier Wall and significant soil surcharges planned as part of site development plans.
- The NJ Transit RIR and RASR to follow provide specific recommendations on the elevation of the proposed Slurry Wall. The RIR indicates that the wall should be designed to account for anticipated settlement, to exceed the potentiometric head elevations resulting from soil surcharges, and that a wall height freeboard be considered. Calculations indicate that the PRG wall top elevation should be raised in heights varying from six (6) inches to 2.5 feet, with the most significant changes in

elevation required in the southeast corner, where the Western Barrier Wall intersects the southern property boundary.

The additional permanent fill and temporary surcharge fill is expected to produce considerable ground settlement in addition to the continuing settlement that the Beazer fill will also be producing during and after Kearny Yard construction. The additional settlement produced by the combined Beazer fill and Kearny Yard fill is predicted to vary by location along the eastern segment of the proposed PRG slurry wall. It is anticipated that 2 to 4 inches of settlement will be ultimately produced at the northern and southern ends of the eastern segment where little or no new Kearny yard fill will be placed directly on the slurry wall line. However, as much as 70 inches of settlement is expected to occur along the slurry wall line during construction at locations where up to 35 feet of combined permanent fill and temporary surcharge fill will be placed over Beazer's final grade. The area anticipated to present the greatest construction phase settlements will be along the northern half of the eastern PRG slurry wall segment, which is underlain by a an area of thick soft meadow mat materials that will produce large magnitudes of settlement and reach 100 percent consolidation in the meadow mat within just a few months after fill application. For your information, the modifications to the height of the slurry wall along each of the two sections of the wall being proposed herein are defined in Attachment C.

We respectfully request that the modifications described in this letter be implemented prior to start of the construction of the slurry wall at no expense to NJ Transit given that the recommendations are a mitigation to potential impact to NJ Transit's proposed project. Construction of the proposed wall as currently designed could significantly interfere with the proposed rail yard as well as any development of the Koppers property within the area of the wall. If you have any questions or comments regarding the requested revisions in order to mitigate impact please do not hesitate to contact Alan Kearns, at 973-792-3778, or Nicholas Caiazza, at 973-792-3740.

Sincerely,

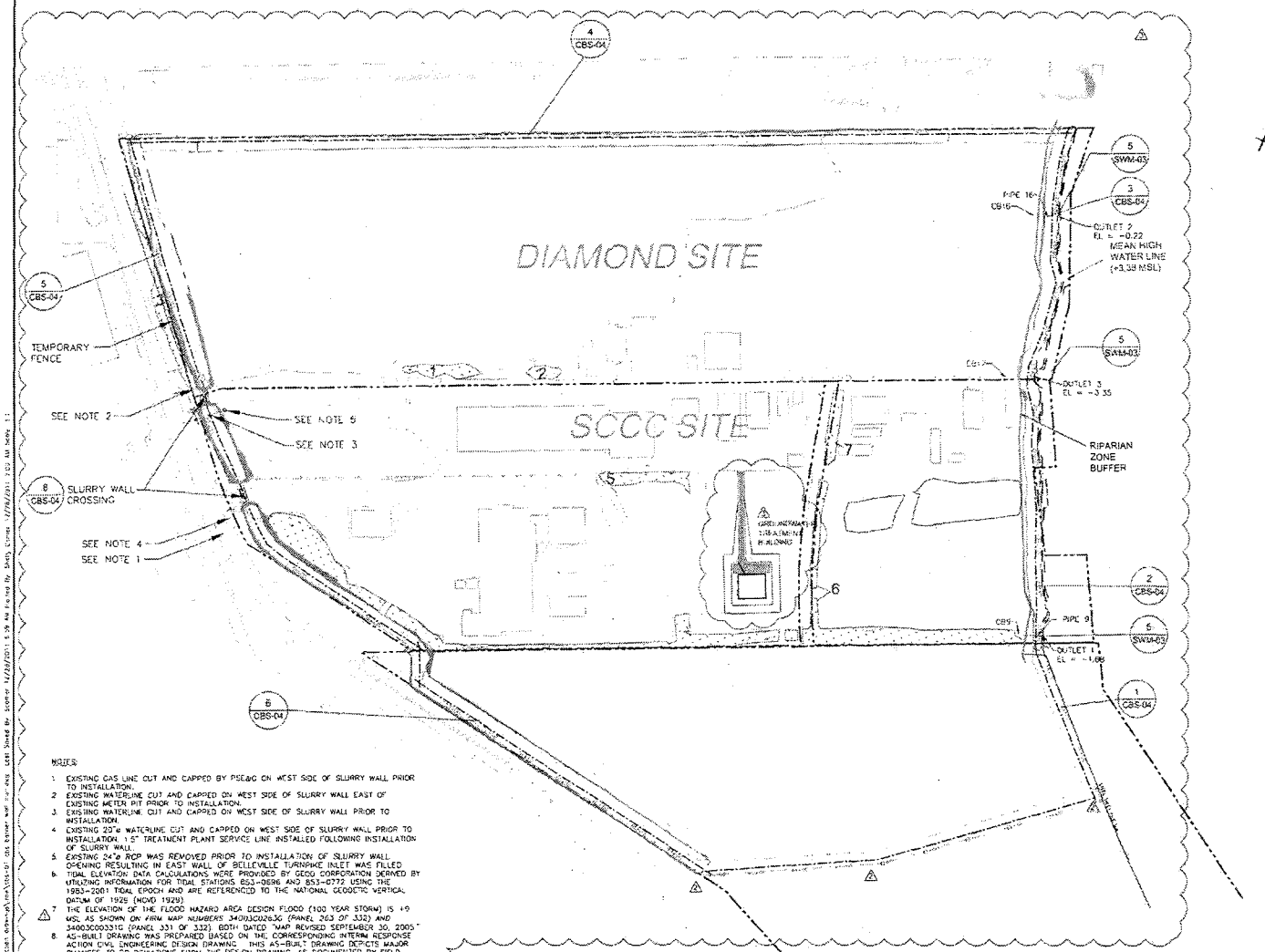
Lester J Eckrich

Lester J. Eckrich, P.E.
Senior Director, Design and Construction
NJ Transit
THE Tunnel Project

Attachment

cc: N. Guerra, HCIA
C. Kanakis, NJDEP
Angela Carpenter, USEPA
E. Als, USEPA
Allison Hess, USEPA
G. Gaeta
R. Parylak
A. Kearns
N. Caiazza
P. Dewes
ARCDCC

Attachment A



NOTES:

1. EXISTING GAS LINE CUT AND CAPPED BY PSE&G ON WEST SIDE OF SLURRY WALL PRIOR TO INSTALLATION.
2. EXISTING WATERLINE CUT AND CAPPED ON WEST SIDE OF SLURRY WALL EAST OF EXISTING METER PIT PRIOR TO INSTALLATION.
3. EXISTING WATERLINE CUT AND CAPPED ON WEST SIDE OF SLURRY WALL PRIOR TO INSTALLATION.
4. EXISTING 20"ø WATERLINE CUT AND CAPPED ON WEST SIDE OF SLURRY WALL PRIOR TO INSTALLATION. 1.5" TREATMENT PLANT SERVICE LINE INSTALLED FOLLOWING INSTALLATION OF SLURRY WALL.
5. EXISTING 24"ø RCP WAS REMOVED PRIOR TO INSTALLATION OF SLURRY WALL OPENING RESULTING IN EAST WALL OF BELLEVILLE TURNPIKE INLET WAS FILLED
6. TIDAL ELEVATION DATA CALCULATIONS WERE PROVIDED BY GEOD CORPORATION DERIVED BY UTILIZING INFORMATION FOR TIDAL STATIONS 853-0886 AND 853-0772 USING THE 1983-2001 TIDAL EPOCH AND ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 1929)
7. THE ELEVATION OF THE FLOOD HAZARD AREA DESIGN FLOOD (100 YEAR STORM) IS +9 MSL, AS SHOWN ON FIRM MAP NUMBERS 34039C0263G (PANEL 263 OF 332) AND 34003C0033G (PANEL 331 OF 332), BOTH DATED "MAP REVISED SEPTEMBER 30, 2005."
8. AS-BUILT DRAWING WAS PREPARED BASED ON THE CORRESPONDING INTERIM RESPONSE ACTION CIVIL ENGINEERING DESIGN DRAWING. THIS AS-BUILT DRAWING DEPICTS MAJOR CHANGES TO OR DEVIATIONS FROM THE DESIGN DRAWING, AS DOCUMENTED BY FIELD INSPECTION BY KEY'S COA PERSONNEL. AS-BUILT DIMENSIONS OR MEASUREMENTS MAY VARY SLIGHTLY FROM THOSE DEPICTED ON THIS AS-BUILT DRAWING.

LEGEND

- EXISTING ACCESS ROAD
- EXISTING NEW JERSEY TRANSIT RAILROAD (ACTIVE)
- EXISTING FENCE
- EXISTING STRUCTURES
- EXISTING UTILITY POLES
- EXISTING LIGHT STANDARD
- EXISTING OVERHEAD POWER LINE
- EXISTING WATER LINE
- EXISTING GAS LINE
- EXISTING STORM DRAIN
- EXISTING SANITARY SEWER
- PROPERTY BOUNDARY
- EXISTING GROUND SURFACE ELEVATION CONTOURS
- EXISTING VEGETATION
- EXISTING STREAM, POND AND RIVER BANK
- EXISTING STEEL SHEET PILE WALL
- STEEL SHEET PILE WALL LOCATION
- SLURRY WALL LOCATION
- RIPARIAN ZONE BUFFER (50 FT LANDWARD FROM MHW)
- 3.38 MEAN HIGH WATER (MHW)
- SLURRY WALL STATIONING (TYP.)
- WORKING PLATFORM SIDESLOPE AREAS (FINAL CONDITIONS)
- EXISTING WETLANDS
- WORKING PLATFORM
- TEMPORARY FENCE
- SWB SLURRY WALL CROSSING

0 120 240 FEET

REV #	DATE	DESCRIPTION	APPD
5	12/29/10	AS-BUILT	DAT
4	06/22/10	MODIFIED SEABOARD SLURRY WALL ALIGNMENT	AEB
3	03/23/10	GENERAL SHEET REVISIONS	AEB
2	12/22/09	ISSUED FOR BID	AEB
1			

REFERENCE:
1. EXISTING GROUND SURFACE CONTOURS PER AIR SURVEY, DULLES, VIRGINIA, APRIL 14, 2001. HORIZONTAL REFERENCE: NEW JERSEY STATE PLANE COORDINATES (NAD 1927). VERTICAL REFERENCE: NATIONAL GEODETIC VERTICAL DATUM (NGVD 1929).
2. PROPERTY BOUNDARY SHOWN HEREON FROM SHEET 1 OF 1 TITLED "SURVEY OF PROPERTY, TAX LOTS 32.02, 46, 47 & 47.01, BLOCK 287, TAX LOTS 48, 49, 50, 51, 52 AND 52.01, BLOCK 263, TOWN OF KEARNY, HUDSON COUNTY, NEW JERSEY," DATED JULY 1, 2005 (REVISION 2, JULY 23, 2005), PREPARED BY DYNISTRA ASSOCIATES, PC
3. EXISTING WETLANDS PER WETLAND DELINEATION BY PRINCETON HYDRO, LLC FOR KEY ENVIRONMENTAL, INC. PERFORMED IN MARCH 2009

ISSUE DATE:

KEY ENVIRONMENTAL, INC
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARED:
ALAN E. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER 24GE03878500

SIGNATURE DATE

CERTIFICATE OF AUTHORIZATION TO OFFER ENGINEERING SERVICES
24GA27961400

PENINSULA RESTORATION GROUP

DRAWN: DJB	DATE: 02/27/09	KEY ENVIRONMENTAL INCORPORATED
CHKD: BTS	DATE: 02/27/09	
APPD: AEB	DATE: 02/27/09	
SCALE: AS SHOWN		

INTERIM RESPONSE ACTION DESIGN
SCCC AND DIAMOND SITES
KEARNY, NEW JERSEY

SLURRY WALL PLAN

PROJECT NO. 09-803/804
CBS-01

3.0 DESCRIPTION OF INTERIM RESPONSE ACTION CONSTRUCTION ACTIVITIES

A detailed description of the interim response action construction activities is presented below. Detailed design drawings depicting the various features and aspects of construction are presented in Section 4C of the LURP Application.

3.1 PHYSICAL BARRIER WALL SYSTEM

The 2008 IRAW identified as part of the overall site remedy the installation of a barrier wall system along the northern, eastern and western boundaries of the Diamond Site, along the eastern and western boundaries of the SCCC Site, and through the adjacent Seaboard site approximately 400 feet south of the SCCC Site's southern property line. The barrier wall will be comprised of two (2) components:

1) A steel sheet pile (SSP) wall along the entire Sites' river shoreline (east side of the Sites; see Drawing SSP-01) to provide structural support to the riverfront and to provide erosion protection; and,
2) A cement-bentonite slurry (CBS) wall along the northern, eastern (inboard of the SSP wall) and western boundaries of the Diamond Site, the eastern (inboard of the SSP wall) and western boundaries of the SCCC Site, and through the adjacent Seaboard Site (see Drawing CBS-01), to prevent potential migration of DNAPL and dissolved phase constituents in shallow groundwater from the site to the Hackensack River and surrounding properties.

The SSP will be approximately 1,200 feet in length and will be connected to the existing SSP wall on the Seaboard Site. The wall will be positioned immediately inboard of the MHW line (+3.38 msl). The top of the wall will be constructed to a minimum elevation of +10 msl so as to be above the flood hazard design flood elevation (+9 msl) and the bottom of the wall will be keyed into the varved clay unit (Elevation -20 msl between Stations 0+00 and 6+38.4 and Elevation -24 msl between Stations 6+38.4 and 12+19). The steel sheets will be driven in "welded pairs" with sealable interlocks. The unwelded steel sheet pile interlocks will be sealed to provide compatibility with Site DNAPL and groundwater constituents. In accordance with 7:13-11.13(c), detailed structural calculations for the SSP wall are presented in Appendix C. Drawing SSP-01 shows the location of the SSP wall and Drawing SSP-02 presents a profile along the proposed wall alignment and further depicts the wall height and key-in depth. Additional details of SSP wall construction are provided on Drawings SSP-03 and SSP-04.

In general, the bottom of the CBS wall will be keyed to a depth of three (3) feet below the surface of the underlying low permeability varved clay layer to fully contain groundwater and DNAPL in the shallow fill and deeper sand units present across the Site. The top of the CBS

COMMENTS OF MORRIS KEARNY ASSOCIATES, LLC
ON
PROPOSED USEPA REMEDIATION PLAN FOR CLEAN UP OF THE STANDARD CHLORINE CHEMICAL SITE, KEARNY, NJ

Public Hearing – August 16, 2016

- I represent Morris Kearny Associates, LLC (MKA) – my comments concern EPA's proposed remediation plan for 13-acre area located on Koppers Coke Site.

- MKA is the Contract Purchaser of 175-acres Koppers Coke Site from HCIA for redevelopment of the site.

- I want to make it clear upfront that MKA supports EPA's remediation objective and our proposed modifications will not interfere with the protection of human health and th e environment.

- Redevelopment consists of 2 million sq. ft. of port related warehouse distribution centers comprising 4 buildings and associated infrastructure.

History of Site

- MKA will be investing substantial sums of money, without any public funding subsidy to transform this vacant, formerly industrial property along the Hackensack River, with a long history of contamination issues.

- The redevelopment is considered a "Vital Project" for the region by NJSEA and is included in the Koppers Coke Peninsula Redevelopment Plan of NJSEA.

- The redevelopment will create 1,500 – 1,800 permanent jobs and approximately 2,000 construction jobs – MKA is a union developer.

- The project will generate approximately 1.2 billion dollars in overall economic activity in the region, including substantial revenues to the Town of Kearny.

- The project is supported by Federal and State, and County officeholders along with the building trades of Hudson and Essex County and associated Unions.

- Issues of concern relate to the FFS and remedy for the SCC site in particular a 13-acre area that is located on the western portion of the Koppers Coke Site.

- The 13-acres consists of an interim underground slurry wall and associated monitoring and pumping wells. The FFS and proposed EPA remediation plan seeks to make the interim slurry wall a permanent environmental control without consideration of the matters of concern to

HCIA, NJSEA and MKA – all including redevelopment of the 13-acre area and RAWP compliance.

Why is this a concern?

- HCIA has been filling the Koppers Site to complete its final RAWP remediation of the Site by elevating it out of the flood plain and enabling the final engineering control to be installed pursuant to the site redevelopment plan.

- The slurry wall, due to its location, impacts the regulatory obligation of the HCIA to complete the installation of engineering controls required by the DEP approved RAWP for the Koppers remediation – placement of fill in the slurry wall area to enable the final engineering control – building foundation, parking and other environmental controls to be constructed.

- HCIA by letter of July 8, 2016 to EPA outlined in detail the revisions necessary to the FFS and remediation plan on its 13-acre area – we support their comments and suggested revisions.

- As noted in that communication the interim slurry wall as it presently exists does not have the structural integrity to support the completion of the placement of fill required of HCIA as called for in the approved RAWP, and accordingly prevents its implementation, the installation of the engineering controls – hardscape – impervious cap, etc., that accompany the development plan for the site. This has been confirmed by an independent geotechnical study.

- The slurry wall also materially affects the Building 4 Site foundation and parking and installation of infrastructure needed for the development of the Peninsula, which includes, among other things, an access road, water, sewer, gas, stormwater and electric services.

- Presently a wide valley exists where the slurry wall is located on the HCIA property – fill has not been placed in that area due to the lack of geotechnical integrity of the slurry wall to support the fill required to be placed by HCIA in accordance with the approved RAWP. As noted previously, the site LSRP has generated a geotechnical report that confirms this condition – without the placement of the required fill, the engineering controls to be installed by HCIA and/or the site development in that area are in jeopardy, including meeting flood hazard requirements to prevent flooding and infiltration.

- The remediation plan selected by EPA on the 13-acre area of the Koppers Site affected by SCC Superfund site is incompatible with the redevelopment of the Koppers Site as it materially interferes with the clean-up obligations of HCIA on the Koppers Site and its redevelopment.

- Further, the area has been declared as "an area in need of redevelopment" by NJSEA and the proposed remediation interferes with the Koppers Coke Peninsula Redevelopment Plan adopted by NJMC/NJSEA.

- I understand from our environmental consultant and LSRP of the Koppers Site remediation that the interim slurry wall can be relocated and constructed of different materials without impact to the SCC remediation.

- We have reviewed that certain Access Agreement, dated May 13, 2010, between HCIA and PPG (responsible remediation group) regarding access to the HCIA's 13-acre area where environmental controls and slurry wall were constructed by PPG.

- The Access Agreement does not give the PPG any rights to encumber the HCIA property – especially to the detriment of its planned future development. All that can be said is the slurry wall placement was a decision of PPG, not HCIA, as a temporary/interim remedy with no consideration of the site development and/or the need for HCIA to place fill in the 13-acre area in compliance with the approved RAWP – the PPG and its remediation activities have no right to interfere with the fee owner's (HCIA) ability to utilize its property – there is no recorded easement for the use of the 13-acres by PPG and there are no covenants running with the land – PPG has no right to interfere with the NJDEP/LSRP approved RAWP or the planned development – at the very least it is the obligation of PPG to make the necessary revisions in the FFS to the existing interim controls on the 13-acre area to accommodate the redevelopment and HCIA's ability to comply with the RAWP for the Koppers site – the financial responsibility lies squarely on PPG to accommodate the necessary revisions to its remediation plan for the planned development and remediation.

- The SCC responsible party group has no legal authority nor the consent of the HCIA to remediate the 13-acres in a manner that limits or prohibits the redevelopment and/or remediation.

- In fact, paragraph 2 of the Access Agreement specifically states that the Agreement cannot impede "in any manner, the ongoing NJDEP authorized remediation of the Koppers Seaboard Site". Further, paragraph 11.(d) of the Access Agreement provides that the Agreement cannot affect a September 22, 2003 Settlement Agreement and Release between HCIA, NJMC/NJSEA, Beazer and others which Settlement Agreement recognizes development of the Koppers Coke Site and its remediation by HCIA.

- The foundation under which EPA and PPG seek to have the interim plan on the HCIA 13-acres made permanent is materially flawed as noted earlier in reference to the 2010 Access Agreement and 2003 Settlement Agreement. Permanency of the proposed remediation plan would be violative of these Agreements and EPA cannot rely on them to impose the proposed remedy. EPA under these circumstances cannot take private property of a non-remediating party where a responsible party can provide an alternative irrespective of its "practicality and cost effectiveness". The EPA should require the PPG entity to seek another remedial alternative and obtain proper legal authority for its implementation.

- The HCIA and MKA insist that the 13-acres within the slurry wall on the HCIA property and on Block 287, Lot 32.01, a former railroad property owned by HCIA that extends through SCC, be absolutely and unequivocally remediated in a manner that supports commercial/industrial development without any regard to "practicality or cost effectiveness.

- The FFS contemplates a deed notice which extends onto the 13-acre area. The HCIA has objected to any deed notice that will be inconsistent with or more restrictive or limiting than the deed notice that the Koppers Site LSRP currently contemplates for the HCIA property. In this regard, HCIA and MKA insist that the remedy for the contamination in the 13-acre area be modified so that the slurry wall (which was designed and constructed as an "interim" remedy) either be removed or otherwise abandoned in place that will allow unrestricted filling and redevelopment.

- In addition, the Koppers Site LSRP needs to design a remedy for the 13-acre area that will not render the property unusable for future redevelopment, NJSEA development plan or for recreational use pursuant to N.J.S.A. 58:10B-12(g)(1) and N.J.A.C. 7:26C-6.4(b). The FFS does not address this issue and must be revised.

WILL BE SUBMITTING WRITTEN COMMENTS IN ADDITION TO TONIGHT'S PRESENTATION

ALBIO SIRES
8TH DISTRICT, NEW JERSEY

COMMITTEE ON FOREIGN AFFAIRS
SUBCOMMITTEES:
WESTERN HEMISPHERE, RANKING MEMBER
EUROPE, EURASIA, AND EMERGING THREATS

COMMITTEE ON TRANSPORTATION AND INFRASTRUCTURE
SUBCOMMITTEES:
HIGHWAYS AND TRANSIT
RAILROADS, PIPELINES, AND HAZARDOUS MATERIALS
ECONOMIC DEVELOPMENT, PUBLIC BUILDINGS, AND EMERGENCY MANAGEMENT

Congress of the United States
House of Representatives
Washington, DC 20515-3013

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HTTP://WWW.SIRES.HOUSE.GOV

July 29, 2016

Ms. Allison Hess
Remedial Protection Agency
U.S. EPA Region 2
290 Broadway
New York, NY 10007

Dear Ms. Hess:

Thank you for your work on the proposed plan to clean up the contaminated Standard Chlorine Chemical Company Superfund site in Kearny, New Jersey. While I am encouraged to see the Environmental Protection Agency (EPA) taking much-needed action to address the toxic pollution at the site, I have concerns that the proposed plan will not adequately remediate the contaminated waterway.

As EPA continues to work toward the final Record of Decision (ROD), I urge you to consider an alternative method of cleanup that would completely remove the contaminated soil. While this method may be more costly than a temporary cap, I believe it is the only viable method when considering public health, environmental impacts, and long-term benefits to the community.

As you know, industrial manufacturing, chemical refining, and blending activities that have taken place in Kearny since 1916 have heavily polluted the New Jersey Meadowlands and the banks of the Hackensack River. These activities have subjected the residents of Kearny to adverse health risks due to exposure to cancer-causing hazardous chemicals such as polychlorinated biphenyls (PCBs) and dioxin.

In order to achieve the most Remedial Action Objectives (RAOs) outlined in the proposed plan, including eliminating human exposure to contaminants in surface soil and subsurface soil, eliminating the transport of impacted surface soil by erosion and runoff wind, and preventing future unacceptable risks due to soil vapor intrusion into new buildings, full removal of the contaminants is necessary. The temporary nature of a cap will not allow for a comprehensive clean-up and raises concerns over the long-term benefits to the community. The Hackensack's proneness to flooding raises further concerns about the effectiveness of a cap intended to prevent the spread of hazardous waste.

The cleanup of the Standard Chlorine Superfund site is of upmost importance to my constituents and is long overdue. I implore EPA to consider full removal of the contaminants at the site. Thank you for your commitment to the health and well-being of the residents of Kearny. I look forward to working with you towards the effective remediation of the site.

Sincerely,

Albio Sires
Member of Congress

ALBIO SIRES
8TH DISTRICT, NEW JERSEY

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August 25, 2016

Alison Hess, Remedial Project Manager

U.S. Environmental Protection Agency

290 Broadway, 19th Floor

New York, NY 10007

Re: **Standard Chlorine Chemical Company Superfund Site, Kearny, NJ**

Final Draft Focused Feasibility Study – Remediation Plan

USEPA Public Comment Period

Dear Ms. Hess,

I write to express my concerns with the proposed plan for remediation of the Standard Chlorine Chemical Company (SCCC) Superfund site in Kearny, New Jersey. While I welcome the United States Environmental Protection Agency's (USEPA) actions to protect New Jersey residents, I respectfully request that you consider an alternative site remediation remedy that accommodates the concerns set forth by the Hudson County Improvement Authority (HCIA) in its July 8, 2016 communication to USEPA.

The Interim Remedial Action for the remediation of the SCCC Superfund site included a slurry wall, which extends onto 13 acres of the Koppers Seaboard site. This slurry wall causes a significant impediment to the completion of remedial action already approved for the Koppers Seaboard site by the New Jersey Department of Environmental Protection (NJDEP). The slurry wall, as built, cannot support the requisite fill and cap that is required to be placed on top of the slurry wall to meet NJDEP regulatory remediation requirements. I encourage the EPA to

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consider an alternative remedy that is approved by the Licensed Site Remediation Professional (LSRP) and consistent with the NJDEP requirements.

Additionally, the New Jersey Meadowlands Commission (NJMC) declared the Koppers Seaboard site as an "area in need of redevelopment" and a redevelopment project was determined to be a "vital project" by the New Jersey Sports and Exposition Authority. The NJMC also declared the SCCC Superfund site, which is owned by the Town of Kearny, as an "area in need of redevelopment" and the Town has designated a redeveloper for its site. As such, alternative remedies need to be considered so as to not unduly restrict or otherwise detrimentally effect future development of the Koppers Seaboard site or the SCCC Superfund site. Moreover, the submitted FFS does not include a Reuse Assessment, which is required to be completed as it evaluates information to develop assumptions about reasonably anticipated future land uses at Superfund Sites.

For decades, residents have been the victims of adverse health risks stemming from industrial manufacturing and chemical refining taking place in Kearny. The cleanup of the SCCC Superfund site is of upmost importance to my constituents and I am pleased to see the USEPA acting aggressively to protect New Jersey communities. As you continue to work toward the final Record of Decision (ROD), I trust you consider the comments and concerns expressed by the HCIA.

Sincerely,

Albio Sires

Albio Sires

Member of Congress

TODD W. TERHUNE | Partner
tterhune@sh-law.com
P: 201-806-3368 | F: 201-806-3534

August 25, 2016

By E-Mail and Fedex
Alison A. Hess, Remedial Project Manager
U.S. Environmental Protection Agency
290 Broadway, 19th Floor
New York, NY 10007-1866

RE: Standard Chlorine Superfund Site
Kearny, New Jersey

Dear Ms. Hess:

As you know, we are counsel to Morris Kearny Associates, LLC ("Morris"), the contract purchaser of the former Koppers Coke facility in Kearny, New Jersey ("Koppers Site"). We write this letter in response to: (i) the USEPA's July 2016 Proposed Plan describing the remedial alternatives considered for the Standard Chlorine Chemical Co. Inc. Superfund Site located in Kearny, New Jersey ("SCC Site") and the USEPA's preferred remedial alternative for the remediation of the SCC Site ("Proposed Plan"), and (ii) the July 26, 2016 Focused Feasibility Study Report and TI Report Addendum Submittal prepared by Key Environmental Incorporated with respect to the SCC Site.

As a threshold matter, we want to make it clear that Morris supports the USEPA's remediation objective for the SCC Site and applaud the extensive work that has been performed to date as an initial step to hopefully return the SCC Site and Koppers Site back to productive use. We are submitting this letter as a supplement to the comments made on behalf of Morris at the August 16, 2016 public hearing (the talking points for which are attached hereto as Exhibit A), the e-mail from Theodore Schwartz, Esq. to you dated August 19, 2016 (attached hereto as Exhibit B), and the prior written comments of the Hudson County Improvement Authority ("HCIA") dated April 18, 2016, July 8, 2016, and August 16, 2016 (attached hereto as Exhibit C), with the recognition and intention that the substantive points in the foregoing attachments are incorporated herein by reference.

In or about July 2014, in response to a Request for Proposal, Morris was selected by the HCIA, the owner of the Koppers Site, as the successful proposer to purchase and redevelop the Koppers Site. As you may know, the Koppers Site, together with neighboring parcels, were declared by the New Jersey Sports and Exposition Authority ("NJSEA") as "areas in need of

redevelopment" and thus the redevelopment of these parcels are governed by the Koppers Coke Peninsula Redevelopment Plan which was adopted on February 27, 2013. More recently, in April 2016, the NJSEA designated Morris' proposed redevelopment of the Koppers Site as a "Vital Project" pursuant to NJSA 5:10A-11(f) and declared that it "will maintain sole jurisdiction in its review" (see Exhibit D). Importantly, Morris' proposed redevelopment of the Koppers Site is anticipated to provide more than 2,000 construction jobs and an estimated 2,000 permanent jobs providing over $1 billion in overall economic activity in the area.

Morris has spent significant time and resources performing due diligence of this complicated brownfield property and, as part of that due diligence process, has reviewed the Proposed Plan and specifically the impact of the existing slurry wall which circumscribes approximately 13 acres on the western portion of the Koppers Site. Among other issues, Morris has identified the following two significant issues with respect to the existing slurry wall:

1. Effect of Slurry Wall Structural Deficiencies to Support HCIA Remediation and Site Redevelopment - Based on Morris' review, with the support of its technical experts, and as was articulated during the August 16 USEPA public hearing in Kearny, it has been determined that the existing cement bentonite slurry wall cannot support additional fill material which is necessary not only for the redevelopment of the Koppers Site but also for the capping which is necessary for the remediation of the Koppers Site by HCIA. This is a critical issue since the Koppers Site and the SCC Site are required to be raised above FEMA flood elevation pursuant to applicable NJDEP Flood Hazard Area regulations and the State Building Code which requires any building in the flood hazard area intended for human habitation to be constructed at least 1 foot above flood elevation.

Further, in a geotechnical report appended to a January 2010 Application for Zoning Certificate/Occupancy Certification prepared and submitted on behalf of the PRG to the NJSEA, in response to one of the requirements under NJMC District Zoning Regulation 19:4-4.4 seeking recommendations for the protection of adjacent property, the report expressly states "(t)he location of the CBS [cement bentonite slurry] wall has been selected so that installation will not impact adjacent property, structures and utilities"(emphasis added, see excerpt of report attached hereto as Exhibit E). Contrary to this conclusion, and for the reasons set forth in this letter, the slurry wall clearly has a significant adverse impact upon the adjacent Koppers Site.

Notably, Morris is not the first party to raise the issue with the structural design and construction of the slurry wall. By letter dated August 11, 2010 from NJ Transit to Beazer East, Inc., NJ Transit recommended that the proposed wall "contain a slurry mixture of soil and bentonite, in lieu of cement and bentonite, given the substantial thickness of soft clays and peat sub soils beneath the footprint of the [slurry wall] and significant soil surcharges planned as part of the site development plans" and opined that "construction of the proposed wall as currently designed could significantly interfere with . . . any development of the Kopper's [Site] within the area of the wall" (see Exhibit F). As noted, copies of the NJ Transit letter were furnished to USEPA and NJDEP officials, which clearly provided notice of the structural deficiencies of the proposed slurry wall prior to its construction. The NJ Transit letter further confirms and supports the comments Morris has made that the slurry wall is not compatible with the remediation obligations of the

HCIA and the redevelopment of the Koppers Site. Despite these concerns raised by NJ Transit, the slurry wall was constructed using cement and bentonite which cannot support the proposed loads anticipated for the remediation and redevelopment of the Koppers Site.

2. The Presence of the Slurry Wall on the 13 acres is not Legally Authorized - The proposal to maintain the existing slurry wall surrounding the 13 acres that extends onto the Koppers property is without legal authority, impedes the respective rights of the HCIA and Morris as current property owner and contract purchaser, respectively, and constitutes a trespass and a taking. The May 13, 2010 Access Agreement ("Access Agreement") between the HCIA and the parties remediating the SCC Site provides for a "non-exclusive, temporary right of access to, and ingress and egress from, through, upon, across, and over, a limited portion of [Block 287, Lot 32.01]" which is owned by HCIA and bisects the SCC Site. Critically, the Access Agreement does not expressly extend access to the 13 acres on the Koppers Site. Further, the Access Agreement "is intended solely to allow the PRG and the PRG Parties access to the Access Area for the limited purpose of conducting the Access Activities . . . and [a]ccess pursuant to this Agreement shall not impede, in any manner, the on-going NJDEP authorized remediation of the Koppers Seaboard Site." Finally, the September 22, 2003 Settlement Agreement and Release between HCIA, NJSEA, Beazer, and others recognizes the intended redevelopment of the Koppers Site and the NJDEP-approved remediation plan for the property. Permanency of the existing slurry wall is violative of these agreements and the USEPA cannot and should not endorse or approve a final remedy that includes the existing slurry wall in its current state and location without the property owner's express written consent.

As you know, both Morris and HCIA have repeatedly expressed significant concerns with the Proposed Plan (as it relates to the slurry wall circumscribing the 13 acres on the Koppers Site) and the USEPA has, for whatever reason, ignored the fact that there are alternative remedies that are equal to or better than the existing slurry wall to protect human health and the environment and have the added benefit of supporting both the remediation and redevelopment of the Koppers Site. While Morris appreciates that there is a cost to construct an alternative remedy, we know that an alternative remedy will certainly be less expensive to construct than the substantial damages that HCIA and Morris will consequently sustain as a result of USEPA's endorsement of the proposed plan for the slurry wall. Specifically, the Focused Feasibility Study Report provided to the USEPA under letter dated July 26, 2016, provides that "when practicable and cost effective, the remedial alternatives would be designed to accommodate other potential commercial/industrial development in Area 1, including the 13-acre portion of the HCIA property included in Area 1, while at the same time maintaining the protectiveness provided by the remedy" (emphasis added). We don't know what the phrase "when practicable and cost effective" means since these terms are vague, ambiguous, undefined and completely subjective. Accordingly, such phraseology should not be included in the Record of Decision and instead be replaced with a clear and objective standard given the implications to third parties and the public.

For the foregoing reasons, Morris urges the USEPA to reconsider the slurry wall issues and modify the remedial action plan to provide for the reconstruction and/or relocation of the existing slurry wall so as not to materially interfere with HCIA's remediation obligation and the redevelopment of the Koppers Site in a manner that remains protective of human health and the

environment. Morris also requests that the USEPA consider the need for a clean and unobstructed corridor through the SCC Site, especially in area 2, to allow for the future installation of infrastructure improvements (e.g., utilities) that will be required to redevelop and service the Koppers Site.

We appreciate the several occasions that you and your team have extended yourselves to discuss this important project and we again respectfully request that you earnestly consider the issues with the existing slurry wall and the significant adverse impact it will have on the remediation and redevelopment of the Koppers Site in the form of lost construction and permanent jobs and the greatly needed injection of over $1 billion in overall economic activity in the region.

Sincerely,

Todd W. Terhune
For the Firm

cc: Keith Morris, Esq., Morris Kearny Associates, LLC
Walter Mugdan, USEPA
Norman Guerra, HCIA
William Netchert, Esq., HCIA
Michael O'Connor, Esq., HCIA
Wayne Hasenbalg, NJSEA
Adam Levy, Esq., NJSEA
Marc Pedersen, NJDEP
Michelle Sebestyen, NJDEP
Kevin Rittenberry, Esq., NJ Transit
John Geitner, NJ Transit
John Bolan, LSRP
Senator Cory Booker
Senator Robert Menendez
Congressman Albio Sires
Assemblyman Vincent Prieto

4829-0565-2534, v. 1

EXHIBIT A

COMMENTS OF MORRIS KEARNY ASSOCIATES, LLC
ON
PROPOSED USEPA REMEDIATION PLAN FOR CLEAN UP OF THE STANDARD CHLORINE CHEMICAL SITE, KEARNY, NJ

Public Hearing – August 16, 2016

- I represent Morris Kearny Associates, LLC (MKA) – my comments concern EPA's proposed remediation plan for 13-acre area located on Koppers Coke Site.

- MKA is the Contract Purchaser of 175-acres Koppers Coke Site from HCIA for redevelopment of the site.

- I want to make it clear upfront that MKA supports EPA's remediation objective and our proposed modifications will not interfere with the protection of human health and th e environment.

- Redevelopment consists of 2 million sq. ft. of port related warehouse distribution centers comprising 4 buildings and associated infrastructure.

History of Site

- MKA will be investing substantial sums of money, without any public funding subsidy to transform this vacant, formerly industrial property along the Hackensack River, with a long history of contamination issues.

- The redevelopment is considered a "Vital Project" for the region by NJSEA and is included in the Koppers Coke Peninsula Redevelopment Plan of NJSEA.

- The redevelopment will create 1,500 – 1,800 permanent jobs and approximately 2,000 construction jobs – MKA is a union developer.

- The project will generate approximately 1.2 billion dollars in overall economic activity in the region, including substantial revenues to the Town of Kearny.

- The project is supported by Federal and State, and County officeholders along with the building trades of Hudson and Essex County and associated Unions.

- Issues of concern relate to the FFS and remedy for the SCC site in particular a 13-acre area that is located on the western portion of the Koppers Coke Site.

- The 13-acres consists of an interim underground slurry wall and associated monitoring and pumping wells. The FFS and proposed EPA remediation plan seeks to make the interim slurry wall a permanent environmental control without consideration of the matters of concern to

HCIA, NJSEA and MKA – all including redevelopment of the 13-acre area and RAWP compliance.

Why is this a concern?

- HCIA has been filling the Koppers Site to complete its final RAWP remediation of the Site by elevating it out of the flood plain and enabling the final engineering control to be installed pursuant to the site redevelopment plan.

- The slurry wall, due to its location, impacts the regulatory obligation of the HCIA to complete the installation of engineering controls required by the DEP approved RAWP for the Koppers remediation – placement of fill in the slurry wall area to enable the final engineering control – building foundation, parking and other environmental controls to be constructed.

- HCIA by letter of July 8, 2016 to EPA outlined in detail the revisions necessary to the FFS and remediation plan on its 13-acre area – we support their comments and suggested revisions.

- As noted in that communication the interim slurry wall as it presently exists does not have the structural integrity to support the completion of the placement of fill required of HCIA as called for in the approved RAWP, and accordingly prevents its implementation, the installation of the engineering controls – hardscape – impervious cap, etc., that accompany the development plan for the site. This has been confirmed by an independent geotechnical study.

- The slurry wall also materially affects the Building 4 Site foundation and parking and installation of infrastructure needed for the development of the Peninsula, which includes, among other things, an access road, water, sewer, gas, stormwater and electric services.

- Presently a wide valley exists where the slurry wall is located on the HCIA property – fill has not been placed in that area due to the lack of geotechnical integrity of the slurry wall to support the fill required to be placed by HCIA in accordance with the approved RAWP. As noted previously, the site LSRP has generated a geotechnical report that confirms this condition – without the placement of the required fill, the engineering controls to be installed by HCIA and/or the site development in that area are in jeopardy, including meeting flood hazard requirements to prevent flooding and infiltration.

- The remediation plan selected by EPA on the 13-acre area of the Koppers Site affected by SCC Superfund site is incompatible with the redevelopment of the Koppers Site as it materially interferes with the clean-up obligations of HCIA on the Koppers Site and its redevelopment.

- Further, the area has been declared as "an area in need of redevelopment" by NJSEA and the proposed remediation interferes with the Koppers Coke Peninsula Redevelopment Plan adopted by NJMC/NJSEA.

- I understand from our environmental consultant and LSRP of the Koppers Site remediation that the interim slurry wall can be relocated and constructed of different materials without impact to the SCC remediation.

- We have reviewed that certain Access Agreement, dated May 13, 2010, between HCIA and PPG (responsible remediation group) regarding access to the HCIA's 13-acre area where environmental controls and slurry wall were constructed by PPG.

- The Access Agreement does not give the PPG any rights to encumber the HCIA property – especially to the detriment of its planned future development. All that can be said is the slurry wall placement was a decision of PPG, not HCIA, as a temporary/interim remedy with no consideration of the site development and/or the need for HCIA to place fill in the 13-acre area in compliance with the approved RAWP – the PPG and its remediation activities have no right to interfere with the fee owner's (HCIA) ability to utilize its property – there is no recorded easement for the use of the 13-acres by PPG and there are no covenants running with the land – PPG has no right to interfere with the NJDEP/LSRP approved RAWP or the planned development – at the very least it is the obligation of PPG to make the necessary revisions in the FFS to the existing interim controls on the 13-acre area to accommodate the redevelopment and HCIA's ability to comply with the RAWP for the Koppers site – the financial responsibility lies squarely on PPG to accommodate the necessary revisions to its remediation plan for the planned development and remediation.

- The SCC responsible party group has no legal authority nor the consent of the HCIA to remediate the 13-acres in a manner that limits or prohibits the redevelopment and/or remediation.

- In fact, paragraph 2 of the Access Agreement specifically states that the Agreement cannot impede "in any manner, the ongoing NJDEP authorized remediation of the Koppers Seaboard Site". Further, paragraph 11.(d) of the Access Agreement provides that the Agreement cannot affect a September 22, 2003 Settlement Agreement and Release between HCIA, NJMC/NJSEA, Beazer and others which Settlement Agreement recognizes development of the Koppers Coke Site and its remediation by HCIA.

- The foundation under which EPA and PPG seek to have the interim plan on the HCIA 13-acres made permanent is materially flawed as noted earlier in reference to the 2010 Access Agreement and 2003 Settlement Agreement. Permanency of the proposed remediation plan would be violative of these Agreements and EPA cannot rely on them to impose the proposed remedy. EPA under these circumstances cannot take private property of a non-remediating party where a responsible party can provide an alternative irrespective of its "practicality and cost effectiveness". The EPA should require the PPG entity to seek another remedial alternative and obtain proper legal authority for its implementation.

- The HCIA and MKA insist that the 13-acres within the slurry wall on the HCIA property and on Block 287, Lot 32.01, a former railroad property owned by HCIA that extends through SCC, be absolutely and unequivocally remediated in a manner that supports commercial/industrial development without any regard to "practicality or cost effectiveness.

- The FFS contemplates a deed notice which extends onto the 13-acre area. The HCIA has objected to any deed notice that will be inconsistent with or more restrictive or limiting than the deed notice that the Koppers Site LSRP currently contemplates for the HCIA property. In this regard, HCIA and MKA insist that the remedy for the contamination in the 13-acre area be modified so that the slurry wall (which was designed and constructed as an "interim" remedy) either be removed or otherwise abandoned in place that will allow unrestricted filling and redevelopment.

- In addition, the Koppers Site LSRP needs to design a remedy for the 13-acre area that will not render the property unusable for future redevelopment, NJSEA development plan or for recreational use pursuant to N.J.S.A. 58:10B-12(g)(1) and N.J.A.C. 7:26C-6.4(b). The FFS does not address this issue and must be revised.

WILL BE SUBMITTING WRITTEN COMMENTS IN ADDITION TO TONIGHT'S PRESENTATION

EXHIBIT B

Todd Terhune

From:	Theodore A. Schwartz
Sent:	Friday, August 19, 2016 3:11 PM
To:	alison.hess@epa.gov
Cc:	mark.pedersen@dep.nj.gov; Keith Morris; Michael O'Connor (michaelo@hcia.org)
Subject:	Supplemental Comments to EPA Public Comment Period on the Proposed Remedy for the SCCC Superfund Site
Attachments:	NJ Transit Letter.pdf; Key Environmental - Description of Interim Response.pdf

Through our research on the slurry wall issue that I discussed in my comments at the public hearing on behalf of Morris Kearny Associates, L.L.C. ("MKA"), we came across the attached letter dated August 11, 2010 addressed to Mr. Michael Brourman at Beazer East, Inc. from NJ Transit concerning the proposed construction by PPG of the slurry wall. The letter speaks for itself pointing out that the PPG's proposed construction and design of a cement bentonite slurry wall would not be adequate for placement of fill, and accordingly requested the use of soil bentonite as opposed to cement bentonite in the construction of the slurry wall.

> Construction of the proposed wall as currently designed would significantly interfere with . . . "any development of the Kopper's property within the area of the wall."

As noted, copies of the letter were furnished to USEPA and NJDEP officials, which clearly put them on notice of the geotechnical deficiencies of the proposed slurry wall. This communication further confirms and supports the comments I have made that the "interim" slurry wall is not compatible with the RAWP obligations of HCIA and the development of the Kopper's site. Despite the geotechnical concerns expressed by NJT, the wall was constructed by PPG as proposed. (See attached Construction Activity Report).

To further complicate matters, the proposed EPA remedial action plan for Area 1, in particular, the 13-acre area of the Kopper's site is questionable, as the existing slurry wall will not support the required placement of fill in this area for the selected remedy. This may also be true with respect to the portion of the wall located on the SCCC site. It should also be noted that these areas are required to be elevated pursuant to applicable NJDEP Flood Hazard Area regulations and the State Building Code which requires any building in the flood hazard area intended for human habitation to be constructed at least 1 foot above flood elevation (FEMA).

The content and engineering analysis contained in the NJT letter create serious doubts as to the adequacy of the referenced slurry wall and proposed EPA remedial action plans. As a consequence, I feel it is incumbent upon EPA to reconsider the slurry wall issue and make adjustments in the remedial action plan to provide for reconstruction and/or relocation of the existing slurry wall so as not to materially interfere with HCIA's remediation obligation and development of the Kopper's site. As expressed in MKA's prior comments we agree with EPA's remediation objectives except for the slurry wall issue and the need for a clean corridor, especially in area 2, for the installation of infrastructure improvements. In short, for the reasons stated above, the existing 13-acre slurry wall – which was originally intended as an "interim" measure-- should not be considered as a permanent remedy for the SCCC Site.

Thank you for your anticipated careful consideration of this issue.

Attachments

THEODORE A. SCHWARTZ | **Partner**
TSchwartz@sh-law.com | Bio | vCard
Direct Phone: 201-623-1217 | Direct Fax: 201-623-1218

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EXHIBIT C

HUDSON COUNTY IMPROVEMENT AUTHORITY

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Thomas A. DeGise
County Executive

Chief Executive Officer
Norman M. Guerra

Executive Director/CFO
Kurt A. Cherry

General Counsel
William J. Netchert, Esq.

August 16, 2016

Via E-mail & UPS Overnight Mail
Alison A. Hess, CPG
Senior Project Manager
US Environmental Protection Agency
Emergency & Remedial Response Division
290 Broadway, 19th Floor
New York, NY 10007-1866P

Re: Standard Chlorine Chemical Company ("SCCC") Proposed Plan
And Feasibility Study, Kearny, New Jersey;
Comments by the Hudson County Improvement Authority

Dear Ms. Hess:

This comment letter is prepared in furtherance of the 4/18/16 and 7/8/16 letters issued by the Hudson County Improvement Authority (HCIA) commenting upon the proposed remediation of the Standard Chlorine Chemical Company Superfund Site, Kearny, New Jersey (SCCC) (copies attached). The HCIA is the owner of the adjacent Koppers Seaboard Site (Koppers Site) and of property directly within the SCCC property and is, therefore, directly affected by the proposed SCCC remediation.

It is our understanding that the United States Environmental Protection Agency (EPA) in the Proposed Remediation Plan ("Plan") and Focused Feasibility Study ("FFS") for SCCC have been circulated for public comment. We have the utmost respect for the professionalism and dedication of the entire EPA Region 2 Superfund team and the hard work that has been necessary to move forward toward the Record of Decision milestone for this project. However, our review of the Plan and FFS indicates that HCIA's interests and concerns have not been adequately addressed. HCIA hereby requests that the EPA make modifications to its Plan and further requests that the modifications carry forward into the future Record of Decision to be published by the EPA.

As was noted in the HCIA's previous comment letters, the NJDEP approved remedy for the Koppers Site is being implemented. The structural incapability of the Interim Slurry Wall has forced a setback from the wall, causing a wide valley between the fill previously placed in adjacent areas. If this valley is not filled, it will allow storm water to erode the cap placed in both 13 acres and the adjacent areas. This part of the Koppers Remediation will, therefore, be compromised.

Additionally as previously detailed in our comment letters, the final solution for the remediation of the Koppers Site includes a billion dollar redevelopment and the Morris Companies is the contract purchaser of the Koppers Site for this purpose. The current location of the Interim Slurry Wall critically impacts that development. Even after Morris Companies' efforts to redesign its development, Morris's planned building is still impacted by the Interim Slurry Wall. The current design of the wall also has severe impact on the creation of roads and utility corridors critical for development of the entire peninsula. A new bridge spanning the Interim Slurry Wall and the wide valley caused by setbacks from the Interim Slurry Wall will need to be constructed for the access of both developments. Thus far the EPA has failed to incorporate in the FFS and Plan our proposal for several alternatives to address the Interim Slurry Wall problem.

Therefore HCIA strenuously objects to EPA's proposed decision not to re-evaluate negative impacts of the slurry wall which was constructed five years ago as an Interim Remedial Measure. As stated in HCIA's prior comments, this Interim Slurry Wall prevents the completion of the approved remediation for the Koppers Site and the Interim Slurry Wall must be replaced, realigned and/or relocated. By preventing the completion of the DEP approved remediation of the Koppers Site, the current plan fails in this instance to achieve in full EPA's goal to provide for the protection of human health and the environment.

HCIA is also concerned regarding the review of Area 2 within the Plan. This Area 2 is a second area of the Koppers Site that contains chlorinated contaminants in the ground water and further encumbers the Koppers Site. This Area was apparently missed during the implementation of the Interim Remedial Measure and was not enclosed by the Interim Slurry Wall. As we noted in our 7/8/2016 comments, the issuance of a Technical Impractability Determination (TI) for Area 2, rather than effective remediation, is unacceptable and calls into question what benefit, if any, the Interim Slurry Wall is providing for the 13 Acres.

HCIA also notes that the current owner of SCCC, the Town of Kearny, is planning a re-development which will require a common access through Area 2 with Morris Companies Project on the Koppers Site The lack of a substantive remedial action for the observed contamination in Area 2 critically impacts the access and planned utilities for these two planned billion dollar developments and must be addressed.

The following revisions are requested by the HCIA to the Plan:

1. **So that the record is clear, the HCIA requests that the Plan be modified to incorporate a specific requirement that the remedial alternative selected in the Plan and the ROD be designed to accommodate the DEP ordered remedy for the Koppers Site. The Plan must also require appropriate adjustments, supplements and modifications to the Interim Slurry Wall as may be required to complete NJDEP approved remedial action for the Koppers Site while maintaining effectiveness to contain the DNAPL plume originating at the SCCC site.**

Please note the HCIA has worked to facilitate ongoing communication between Morris Companies and the Participating Parties Group (PPG) responsible for the SCCC cleanup. Morris and PPG professionals have been working together to identify engineering solutions to the issue of the Interim Slurry Wall.

2. **The HCIA requests that the Plan and the ROD include a specific requirement that some form of appropriate remedial action, other than the issuance of a TI, be required for Area 2. Also, the Plan shall require that a clean corridor for the required access and utilities be constructed to support the planned developments on the Koppers Site and on SCCC.**

We anticipate that the EPA will incorporate HCIA's requested revisions into the Plan and into the ROD. As has been previously demonstrated, the HCIA is willing to work with EPA and looks forward to further substantive discussions.

Very truly yours,

Hudson County Improvement Authority

Michael F. O'Connor, Esq.
Office of Planning & Energy
Michaelo@hcia.org

cc: Norman M. Guerra, HCIA Chief Executive Officer
William J. Netchert, Esq., General Counsel
T. Schwartz, Esq.
J. Bruno, Esq.
S. Gray, Esq.
Enclosures

920762.1

HUDSON COUNTY
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Executive Director/CFO
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William J. Netchert, Esq.

July 8, 2016

Via UPS Overnight Mail
Ms. Alison A. Hess, CPG
Senior Project Manager
United States Environmental Protection Agency
Emergency & Remedial Response Division
290 Broadway, 19th Floor
New York, NY 10007-1866P

Re: Standard Chlorine Company Superfund Site, Kearny, New Jersey;
Review of June, 20, 2016 Final Draft Focused Feasibility Study

Dear Ms. Hess:

The Hudson County Improvement Authority (HCIA) understands that the United States Environmental Protection Agency (USEPA) has received a Final Draft Focused Feasibility Study (FFS), dated June 20, 2016, for remediation of the Former Standard Chlorine Chemical Company Superfund Site, Kearny, New Jersey (SCCC). The SCCC lies immediately adjacent to the Former Koppers Seaboard Site, Kearny, New Jersey (Koppers Site), owned by the HCIA. In addition, the SCCC extends into and covers approximately 13 acres in the westerly section of the Koppers Site (13 Acres) and SCCC "Interim" remedial measures have been installed within the 13 Acres. Importantly, the Koppers Site is listed on the New Jersey Department of Environmental Protection (NJDEP) Known Contaminated Sites List and is under active remediation through a Licensed Site Remediation Professional (LSRP). Consequently, any proposed remedy for the 13 Acres must be approved by the LSRP and be consistent with the NJDEP requirements. Finally, the Koppers Site is under contract to be sold to and redeveloped by Morris Kearny Associates, LLC (Morris) in accordance with the February 2013 Koppers Coke Peninsula Redevelopment Plan prepared by the New Jersey Sports and Exposition Authority (NJSEA). In addition, on February 25, 2016, the NJSEA designated the Koppers Site as a "Vital Project" pursuant to NJSA 5:10A-11(f) whereby the NJSEA

retained sole and exclusive jurisdiction for the redevelopment of the Koppers Site. In this regard, any impediment to redevelop the 13 Acres will also require the consent and approval of the NJSEA.

Subsequent to a meeting with the USEPA, the HCIA issued an April 16, 2016 letter that commented upon the impact of the slurry wall that was installed circumscribing the 13 Acres. This HCIA letter stated that the location and construction of the existing SCCC slurry wall is an impediment to the completion of the Koppers Site remedial action. The letter also stated that the slurry wall had a significant negative impact to the planned re-development of the Koppers Site by Morris, HCIA's contracted purchaser. The HCIA letter concluded that the location and construction of the SCCC slurry wall must be reconsidered during the review of the SCCC RI/FFS and five alternative options were offered.

Based upon our review of the FFS, the following comments are offered for the consideration of the USEPA:

1. Although it is apparent from a review of the FFS that the SCCC responsible party group had a copy of the April 18, 2016 HCIA letter, the FFS does not provide any responses to the HCIA letter and the HCIA must insist that the Final FFS include specific and pertinent responses. There also must be an identification and evaluation of alternatives to the continued use of the 13 Acres slurry wall and the selection of a new "final" remedy for the 13 Acres that will permit redevelopment and provides containment and/or control of the SCCC plume.
2. The Alternatives Analyses of the FFS are based upon "where practicable and cost-effective". These terms are not defined in the FFS and are a subjective, not objective, means of analyses. The point scoring, used to evaluate Alternatives, is based upon this criterion and is therefore, also not an objective analysis. These terms are unacceptable to the HCIA and contrary to the publicly acknowledged and shared goal of the State of New Jersey, County of Hudson, New Jersey Sports & Exhibition Authority and the Town of Kearny to redevelop the SCCC and the Koppers Site for commercial and industrial development. Therefore, we strongly object to the inclusion in the FFS of the subjective terms "where practicable and cost-effective".
3. The FFS does not re-evaluate the Interim Remedy constructed under the NJDEP oversight. The Interim Remedy was constructed more than five years ago and does not account for current conditions including the substantive completion of remediation on the Koppers Site, including the 13 Acres and the presence of re-development plans for the Koppers Site. The slurry wall constructed in the 13 Acres is a significant impediment to site access to the Koppers Site and necessitated the construction of a permanent bridge over the slurry wall at significant cost to the HCIA in order to implement the NJDEP-approved remediation of the Koppers Site.
4. The Koppers Site and SCCC/ Tierra have proposed redevelopments. The Koppers Site has an actual contract for development while the SCCC/Tierra site has a development concept. Neither proposed development was substantially considered in the development of Remedial Alternatives for FFS. In accordance with March 2010 USEPA Guidance, a Reuse Assessment is to be completed and involves collecting and evaluating information to develop assumptions about reasonably anticipated future land uses at Superfund Sites. The submitted FFS does not include a Reuse Assessment. It is also apparent in the context of the USEPA Guidance that actual Reuse Plans have been developed and that USEPA must consider the impact of these Reuse Plans upon any proposed remedy. The FFS does not comply with USEPA Guidance and must be revised.
5. The FFS identifies a second area of impact to the Koppers Site near the southeast corner of the Site (Area 2). Area 2 includes the area stretching from the southwest corner of the Koppers Site southerly across New Jersey Route 7, a state highway. The FFS proposes no substantive remedy

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and requests the issuance of a Technical Impractability Determination (TI). The FFS argues that steep slopes, existence of a state highway and the presence of utilities prevent the use of any substantive remedy. There are numerous similar situations in the State of New Jersey where contamination has migrated off-site beneath a highway and is impacted by physical conditions and a TI has not been issued. Moreover, the TI proposal for Area 2 lumps together two physically dissimilar areas: land in southwest corner of the Koppers Site up to the boundary with the Route 7 and land from Route 7 South. The area immediately adjacent to the Koppers Site does not have steep slopes and is not impacted by the highway or utilities. This area can and should be remediated and the Alternatives Analysis of the FFS must be revised to address this area.

6. The contamination in Area 2, adjacent to the Koppers Site, significantly impacts the planned Morris development since an access road and water, sewer and electric lines for the Morris development will need to pass through this area. The planned remedy for Area 2 is the submission of a TI, rather any effective remediation. The lack of a remedy will cause significant health and safety concerns during the construction of the proposed access road and utilities for the Morris development and will result in significant additional cost to provide appropriate worker protections and temporary remediation during construction (i.e. containment structures, temporary treatment and liquid removals).
7. The SCCC responsible party group has no legal authority nor the consent of the HCIA or Morris to remediate the 13 Acres in a manner that limits or prohibits the redevelopment. The HCIA and Morris demand that the 13 acres within the slurry wall on the HCIA property and on Block 287, Lot 32.01, a former railroad property owned by HCIA that extends through SCCC, be absolutely and unequivocally remediated in a manner that supports commercial/industrial redevelopment without any regard to practicality or cost.
8. With respect to Area 2 (which is outside the slurry wall and includes a portion of the HCIA property in the southwestern corner and a portion of the NJDOT right-of-ways for the Belleville Turnpike and Newark Turnpike), the two alternatives presented in the FFS do not include expanding the wall or a barrier system or even NAPL recovery/hydraulic control. If there is no concern for DNAPL outside the slurry wall, it is not clear what benefit, if any, the slurry wall is providing for Area 1. However, if DNAPL removal is required, whatever technology is used should be considered for Area 1 in lieu of the slurry wall.
9. The FFS identifies that passive recovery of DNAPL using the recovery wells of the 13 Acres has resulted in a total of 5,497 gallons of recovered DNAPL recovered since startup in January 2012 through June 2015 This recovery would result in about 1,500 gallons per year which is not an effective means of final remediation. The recovery wells need to be replaced by actual extraction wells and a more effective active system which will likely obviate the continued need for the slurry wall as means of containment within the 13 Acres.
10. The FFS does not provide alternatives or measures to address and control potential vapor intrusion for future structures at the Koppers Site.
11. The FFS should include a requirement to construct clean corridor(s) for utilities that will service the Koppers Site and the SCCC.
12. The FFS contemplates a deed notice which extends onto the 13 acres. The HCIA objects to any deed notice that will be inconsistent with or more restrictive or limiting than the deed notice that the Koppers Site LSRP currently contemplates for the HCIA property. In this regard, HCIA and Morris hereby demand that the remedy for the contamination in the 13 Acres be modified so that

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the slurry wall (which was designed and constructed as an "interim" remedy) ether be removed or otherwise abandoned in place that will allow unrestricted filling and redevelopment.

13. The NJDEP-approved RAWP for the Koppers Site, including the 13 Acres, contemplates filling and a cap which, based on an independent geotechnical study, will implicate the integrity of the interim slurry wall system. In addition, the Koppers Site LSRP needs to design a remedy for the 13 Acres that will not render the property unusable for future redevelopment or for recreational use pursuant to N.J.S.A 58:10B-12(g)(1) and N.J.A.C. 7:26C-6.4(b) . The FFS does not address this issue and must be revised.
14. HCIA and Morris will incur substantial damages for any "taking" of the 13 Acres and Lot 32.01 since these areas serve as the gateway to the balance of the peninsula and therefore cannot be subject to any development restrictions.
15. We note that the proposed redevelopment of the SCCC extends across Lot 32.01 owned by HCIA and HCIA is under contract to sell that parcel to Morris. Further, Tierra and its parent recently filed for bankruptcy protection which likely will affect the timing, if not the ability, to acquire and redevelop the parcel owned by Tierra and the going-forward viability of the PPG. Finally, any proposed redevelopment of the SCCC site will require fill to meet the FEMA requirements which, again, will implicate the integrity of the slurry wall system.
16. HCIA has noted references in the FFS to multiple meetings and communications between USEPA and the PPG with respect to the remedial approach of the site. The HCIA was not consulted or invited to such meetings and raises objection to any process or conclusion that was made without HCIA's knowledge or input at least with respect to the remediation of the 13 Acres on HCIA's property and Lot 32.01. While HCIA has infrequently met with Beazer to discuss its concerns, it is not clear that HCIA's concerns have been communicated to the balance of the SCCC responsible party group or to the USEPA.
17. Figure 1-2 of the FFS contains the various tax parcel numbers which it does not identify. Further, our information regarding the designation of the various tax parcels is different than the information contained in the FFS. All affected tax parcels should be reviewed against current information.
18. Please know that the HCIA and Morris are continuing to review the technical aspects of the FFS and that we will be meeting with SCCC Responsible Party Group in the next few weeks to discuss certain technical elements of the proposed remediation and redevelopment. Accordingly, HCIA and/or Morris anticipate that additional technical comments may be provided after such meeting takes place.

The HCIA trusts that our comments are useful to the USEPA and will be considered during the review of SCCC FFS. The HCIA and Morris are available for further discussion on this matter. Thank you for your consideration.

Very truly yours,
Hudson County Improvement Authority

Michael F. O'Connor, Esq.
Office of Planning & Energy
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Cc: N. Guerra, HCIA
K. Morris, Morris
T. Schwartz, Scarinci and Hollenbeck
T. Terhune, Scarinci and Hollenbeck
T. Gallagher, Morris
J. Bolan, PS&S

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April 18, 2016

Ms. Alison A. Hess, CPG
Senior Project Manager
United States Environmental Protection Agency
Emergency & Remedial Response Division
290 Broadway, 19th Floor
New York, NY 10007-1866P

Re: Koppers Seaboard Site and Standard Chlorine Company Superfund Site, Kearny, New Jersey

Dear Ms. Hess:

As discussed at our meeting at the United States Environmental Protection Agency (USEPA) offices on March 30, 2016, the Hudson County Improvement Authority (HCIA), the owner of the Koppers Seaboard Site, Kearny, New Jersey (Koppers Site) has entered into a Purchase and Sale Agreement with Morris Kearny Associates, LLC (MKA) to develop the Koppers Site. An overview of the MKA Project is provided in **Attachment A**. Essentially, the MKA Project will include the construction of four new industrial warehouse buildings, totaling approximately 2.1 million square feet, along with associated paved parking lots, paved roads and utility infrastructure. The estimated economic impact of the MKA Project is more than a billion dollars. A current overall layout of the MKA Project is indicated in **Attachment B**.

As also shown on **Attachment B**, a 21 acre portion of the Koppers Site has a planned project location for New Jersey Transit. This project location was developed through a legal settlement of a property dispute between HCIA and NJ Transit regarding the cancelled Access to the Regions Core (ARC) project that was proposed by NJ Transit. In accordance with the settlement, some portion of the Koppers Site will need to be provided for use by NJ Transit and the NJ Transit project cannot be voluntarily removed from the Koppers Site.

It was understood based upon the discussion at the March 30, 2016 meeting that the USEPA was reviewing a Remedial Investigation and Focus Feasibility Study (RI/FFS) for the adjacent Standard Chlorine Chemical Company, Inc. Superfund Site (SCCC). This RI/FFS was directed by the USEPA and was intended to provide support for a Remedial Action Plan and Record of Decision to be prepared by the

USEPA for SCC. It was also understood that the USEPA would be interested in receiving input from the HCIA regarding the RI/FFS. As such, the HCIA is providing comments to the USEPA.

The Koppers Site is listed on the New Jersey Department of Environmental Protection (NJDEP) Known Contaminated Sites List and is under the jurisdiction of a NJDEP Licensed Site Remediation Professional, Mr. John Bolan. A remedial action work plan and several remedial action work plan addendums were approved and remediation has been implemented. Most of the remediation has been completed and processed dredged materials (PDM) created by an on-site dredged materials processing facility are being used for capping. The MKA Project Plan, indicated in **Attachment B**, is intended to become the final cap of the Koppers Site for remediation purposes.

HCIA is aware that a series of recovery wells tied to a treatment plant located on SCCC was constructed for the capture and containment of DNAPL within the westerly 13 acres of the Koppers Site. HCIA is also aware that the westerly 13 acres of the Koppers Site, the SCCC and Tierra Solutions Site are surrounded by a one foot thick cement bentonite slurry wall as a secondary means of containment. The slurry wall and recovery wells were installed as part of an Interim Remedial Measure (IRM) for the SCCC, directed by the NJDEP but with input from the USEPA. The approved remedial action for the Koppers Site calls for the filling of the westerly 13 acres. Analyses of the existing slurry wall by HCIA's consulting engineer indicate that the cement bentonite slurry wall could not support the load imposed by the filling for the Koppers Site remedial action and fill setbacks from the slurry wall are being temporarily used to prevent impacts to the slurry wall.

The existing slurry wall also has an impact to Building #4 of the MKA Project since a portion of the slurry wall would lie beneath the proposed building footprint. As shown in the three plans provided in **Attachment C**, MKA has attempted to move both Building #4 and the westerly boundary of the NJ Transit project location to avoid the slurry wall. Even with these movements and the required NJ Transit project location, a portion of Building #4 will still lie above the existing slurry wall (see sk 36-01-11-16 in **Attachment C**). The construction of Building #4 could cause damage to the existing SCCC slurry wall. Access roads serving the entire MKA Project will also need to cross over the existing slurry wall and utility infrastructure serving the entire MKA project will also need to pass through the existing slurry wall. Cement bentonite is not a self-healing type of slurry wall and will be subject to fracture and cracking under loads and penetration.

Therefore, it is apparent that the location and construction of the existing SCCC slurry wall is an impediment to the completion of the Koppers Site remedial action. Filling for remedial action and the completion of the MKA Project, intended to serve as the final cap, will be impacted. The positive economic impacts of the MKA Project will also be significantly reduced.

The location and construction of the SCCC slurry wall should be reconsidered during the review of the SCCC RI/FFS and require the re-study of the SCCC existing slurry wall, within the Koppers Site 13 acres, in view of the impediments discussed above. The RI/FFS should require that a new, more suitable means of secondary contaminant be employed in the Koppers Site westerly 13 acres. This new means of containment should consider the filling required for the Koppers Site remediation and the new construction required for the MKA Project as shown on sk 36-01-11-16. Some options available for consideration should include the following:

1. Removal of the slurry wall without replacement based on the effectiveness of existing groundwater extraction system (hydraulic containment)
2. Relocate Slurry Wall. Abandon the section adjacent to MKA Building #4 and install a cement bentonite or soil bentonite replacement section.
3. Reinforce or augment the slurry wall sections/areas using grout curtain, sheet piles, geomembrane , load transferring caps, increase the wall thickness or use soil-bentonite
4. Effective replacement of containment area by the use of additional extraction wells connected to the existing SCCC treatment plant
5. Consider repair and or relocation of slurry wall after damage is confirmed.

HCIA trusts that our comments are useful to the USEPA and will be considered during the review of SCCC RI/FFS. The HCIA and MKA are available for further discussion on this matter. Thank you for your consideration.

Very truly yours,

Norman M. Guerra
Chief Executive Officer

Cc: M. O'Connor, HCIA
K. Morris, Morris
T. Schwartz, Scarinci and Hollenbeck
T. Gallagher, Morris
J. Bolan, PS&S

ATTACHMENTS
Attachment A – Overview of MKA Project
Attachment B –MKA current Project Plan
Attachment C – Alternative MKA Plans to avoid slurry wall

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BACKGROUND INFORMATION

REDEVELOPMENT OF KOPPERS PENINSULA, KEARNY, NEW JERSEY

The following is a summary of the Morris Koppers project for consideration in the Focus Feasibility Study ("FFS).

Morris Realty Associates, LLC ("Morris") is the preferred redeveloper of an approximately 175 acre parcel of land on the Koppers Peninsula in Kearny, New Jersey. The parcel is presently owned by the Hudson County Improvement Authority ("HCIA"), which conducted a Request for Proposals ("RFP") for its development and selected Morris as the preferred developer. Morris will be investing substantial sums of money, without any public funding subsidy, to transform this vacant, formerly industrial property along the Hackensack River, with a long history of contamination issues, into the most significant port-related distribution center and support facility in northern New Jersey.

The project, consisting of in excess of two million sq. ft. of warehouse facilities, will represent the most significant economic engine in the region, providing over 2,000 construction jobs and over 2,400 permanent jobs, and providing over $1,200,000,000 in overall economic activity in the area.

The redevelopment of this parcel may also include the co-development of a Micro-Grid system by NJ Transit, to provide power for its infrastructure and equipment. This project would be a very important system upgrade for NJ Transit and the region, as it will improve preparation and resilience in the face of major events like Superstorm Sandy. PSE&G will also be installing on a portion of the site the new transmission towers as part of its regional upgrade program to service the Hudson Generating Station.

Parcels adjacent to the HCIA parcel include a 25 acre parcel owned by the Town of Kearny, and a 25-acre parcel owned by Tierra Solutions. The Kearny and Tierra properties are undergoing remediation, however the Kearny site is also a Superfund site, under the jurisdiction of USEP A.

The Interim Remedial Action for this remediation included the installation of a barrier wall to collect ground water contamination. Part of the barrier wall occupies 13 acres of the HCIA parcel.

All of these parcels are located in the New Jersey Meadowlands District and have been declared by the New Jersey Meadowlands Commission ("NJMC") as "areas in need of redevelopment, and thus their development is regulated by the Koppers Coke Peninsula Redevelopment Plan adopted by the New Jersey Meadowlands Commission ("NJMC") on February 27, 2013. Recently the NJSEA determined the project to be a "vital project" for the region and assumed control over its planning and development.

Historically, the HCIA property was used for industrial operations that resulted in extensive contamination. Remediation has been ongoing for several years. The redevelopment of the site will provide for engineering controls to be installed by Morris to cap the site, as part of the remediation project.

Morris is developing plans for the construction of over 2 million square feet of warehouse distribution space which will be integrated with the NJ Transit property, the PSE&G power enhancement project, site remediation and Superfund projects.

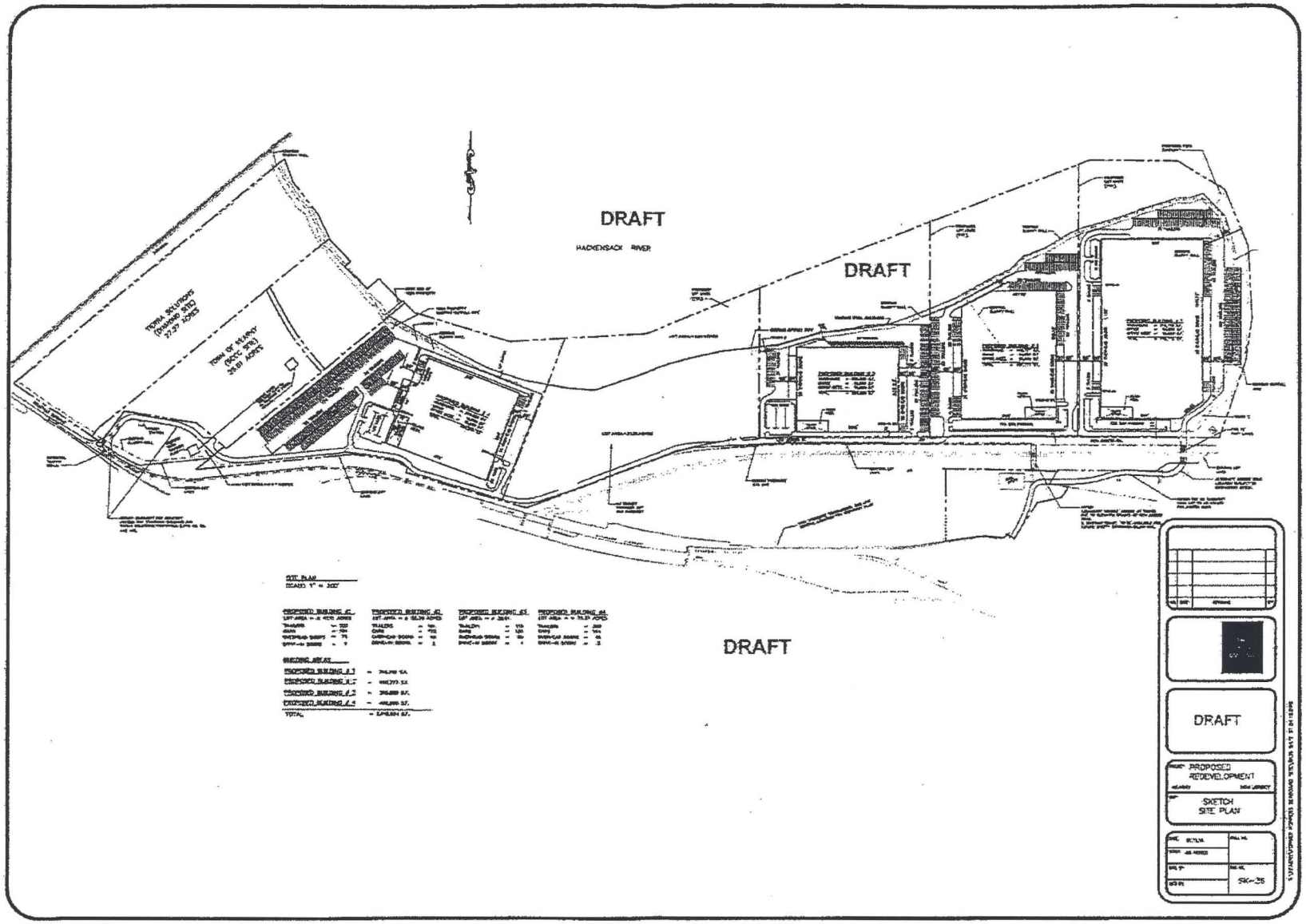
The Koppers Peninsula project is an immensely complicated project in terms of planning, zoning, engineering, infrastructure, environmental remediation and construction. The NJMC staff have a great deal of experience with this property and with the particular challenges of project development in the Meadowlands, such as the need to address environmental contamination, inadequate infrastructure, waterfront and riparian issues, geotechnical challenges due to marsh land and other complexities.

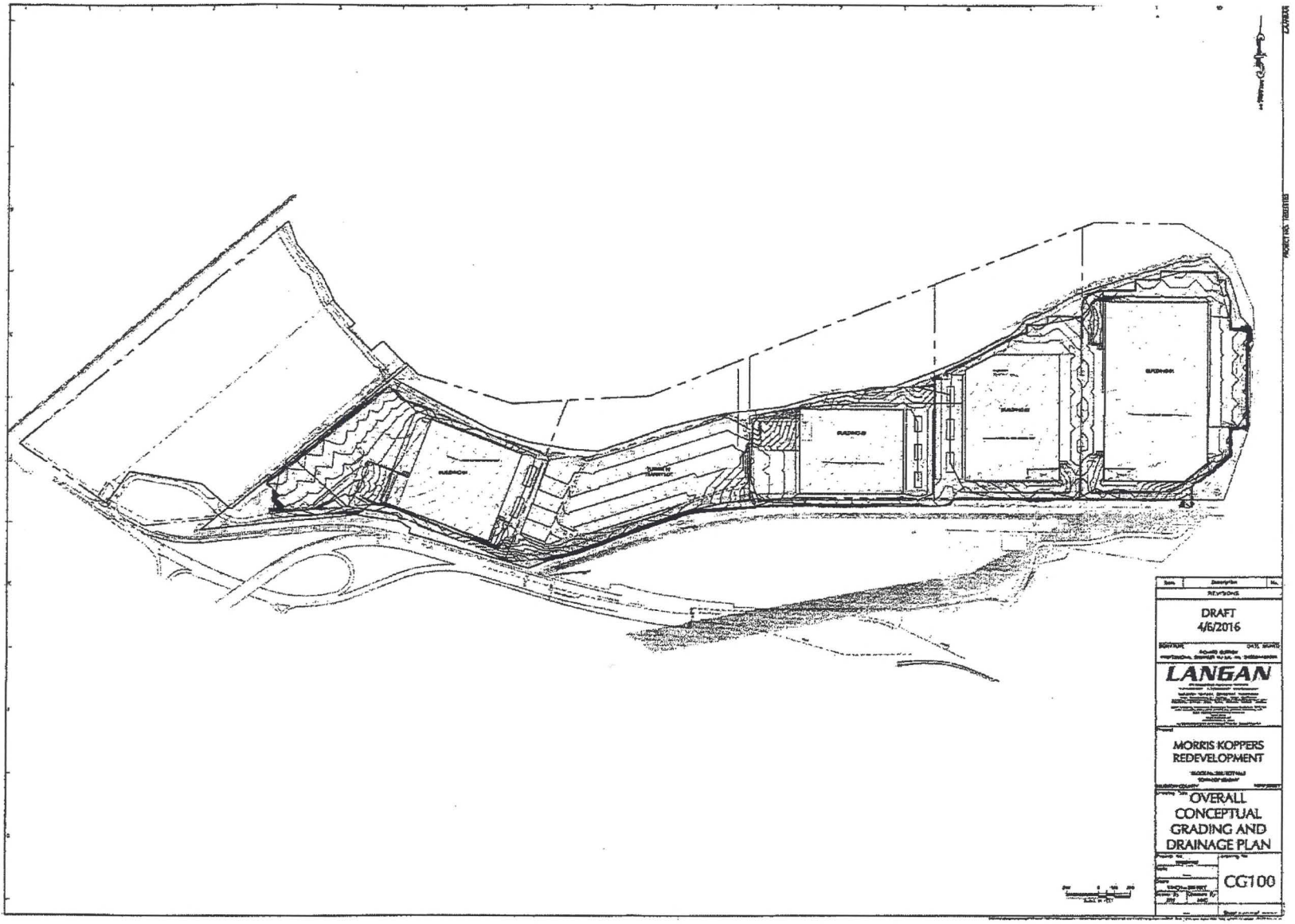
This is very unique project due to the scope of the project and integration with projects by NJ Transit, PSE&G, NJDOT and site remediation and development. Throughout the development of the project, Morris has worked closely with HCIA, NJ Transit, PSE&G, U.S. Senators Menendez and Booker, Hudson County Executive, Hudson County Freeholders Board, Assemblyman Vincent Prieto, Congressman Albio Sires, Office of the Governor – Authorities Unit, the Hudson and Essex County Building Trades, and other stakeholders – all of whom are significant supporters of the project. The project serves as an integral and forceful economic engine for the region, not to mention gentrification of the surrounding area.

Below is a description of the Planning, Construction, Use Concepts and details for Coordination and Inclusion in the FSS.

Attachments:

- A Map of Local Area
- Redevelopment Plan


DRAFT
HACKENSACK RIVER
DRAFT
DRAFT
DRAFT
PROPOSED REDEVELOPMENT
SKETCH SITE PLAN
SK-35



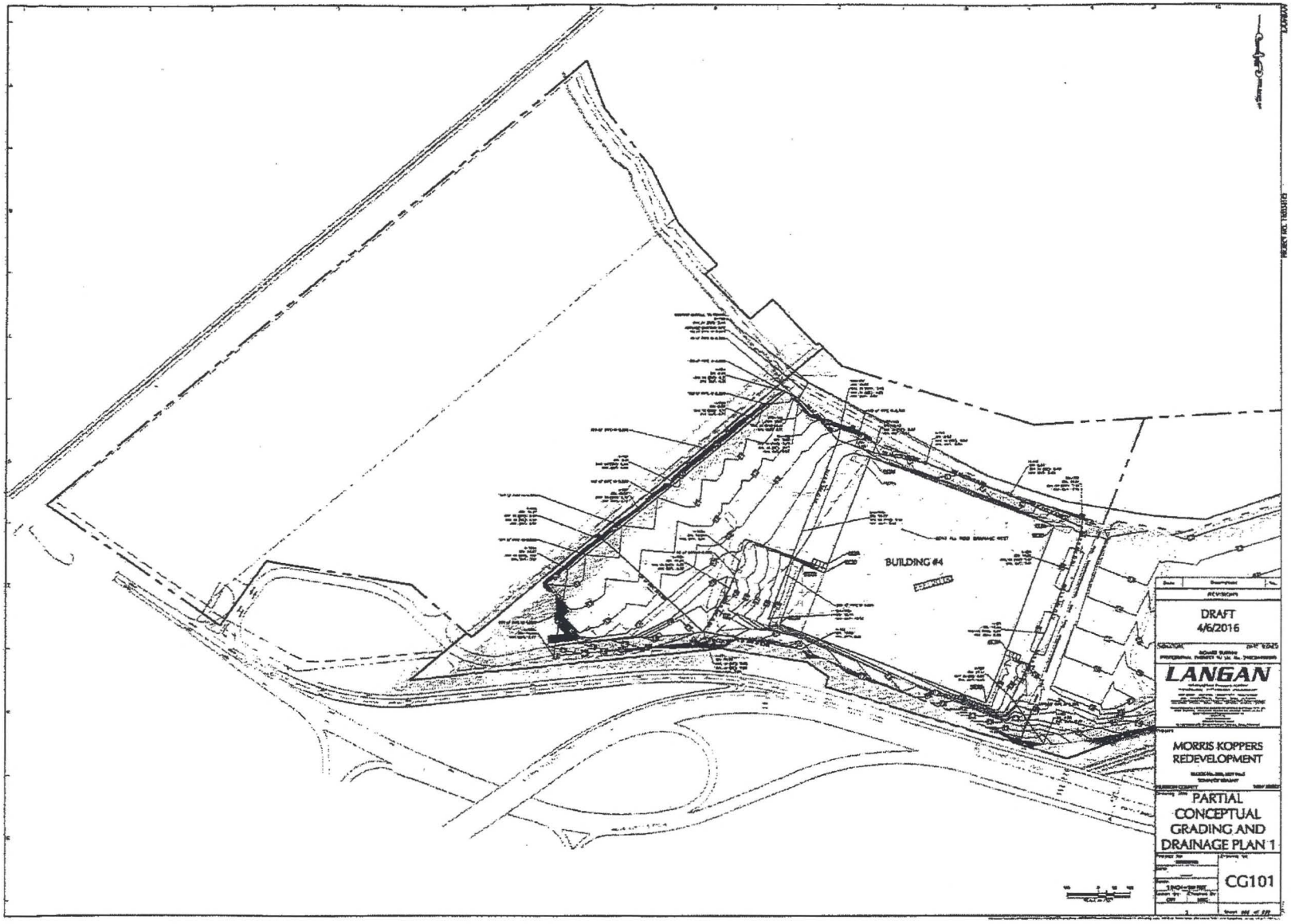
DRAFT
4/6/2016

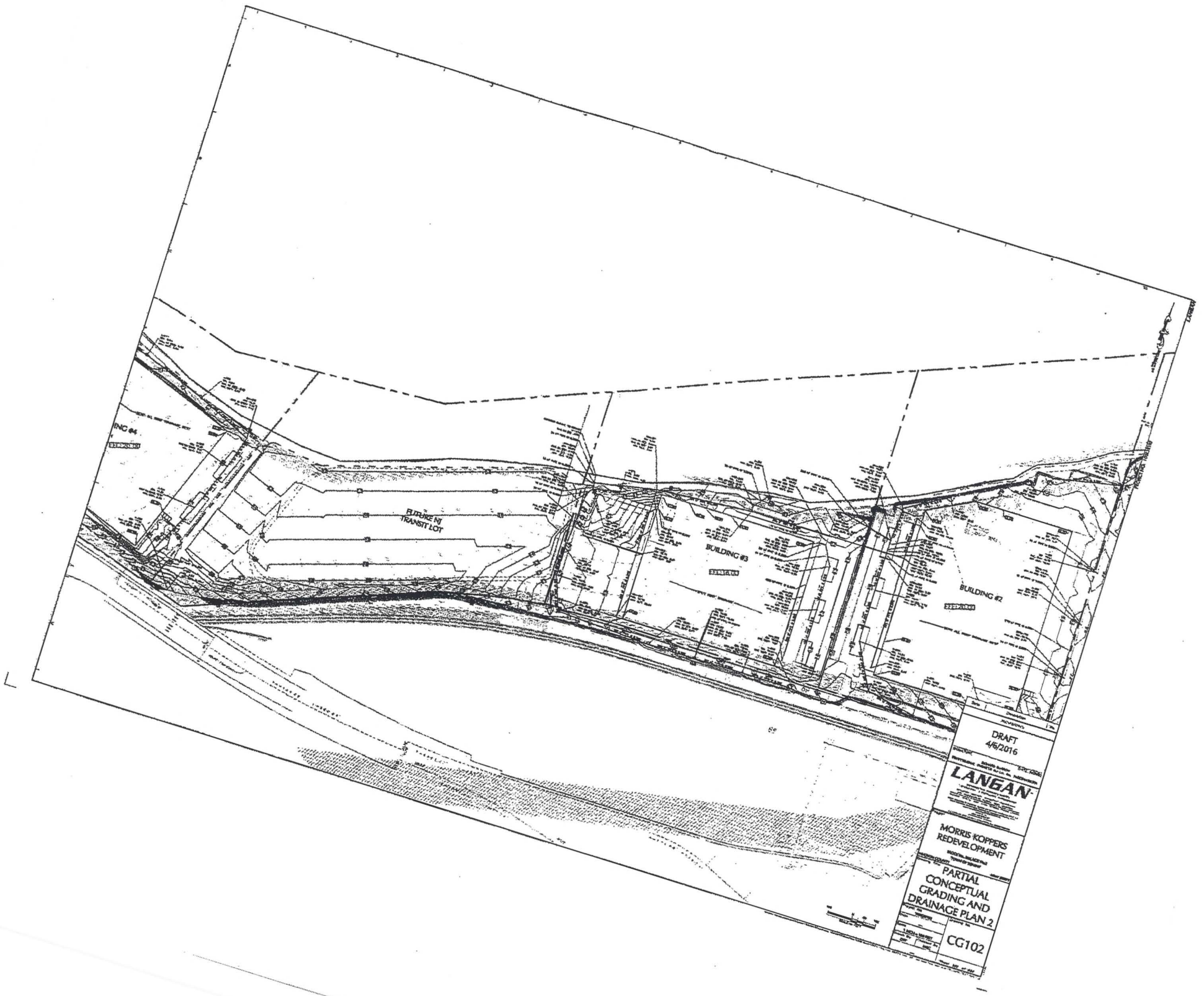
LANGAN

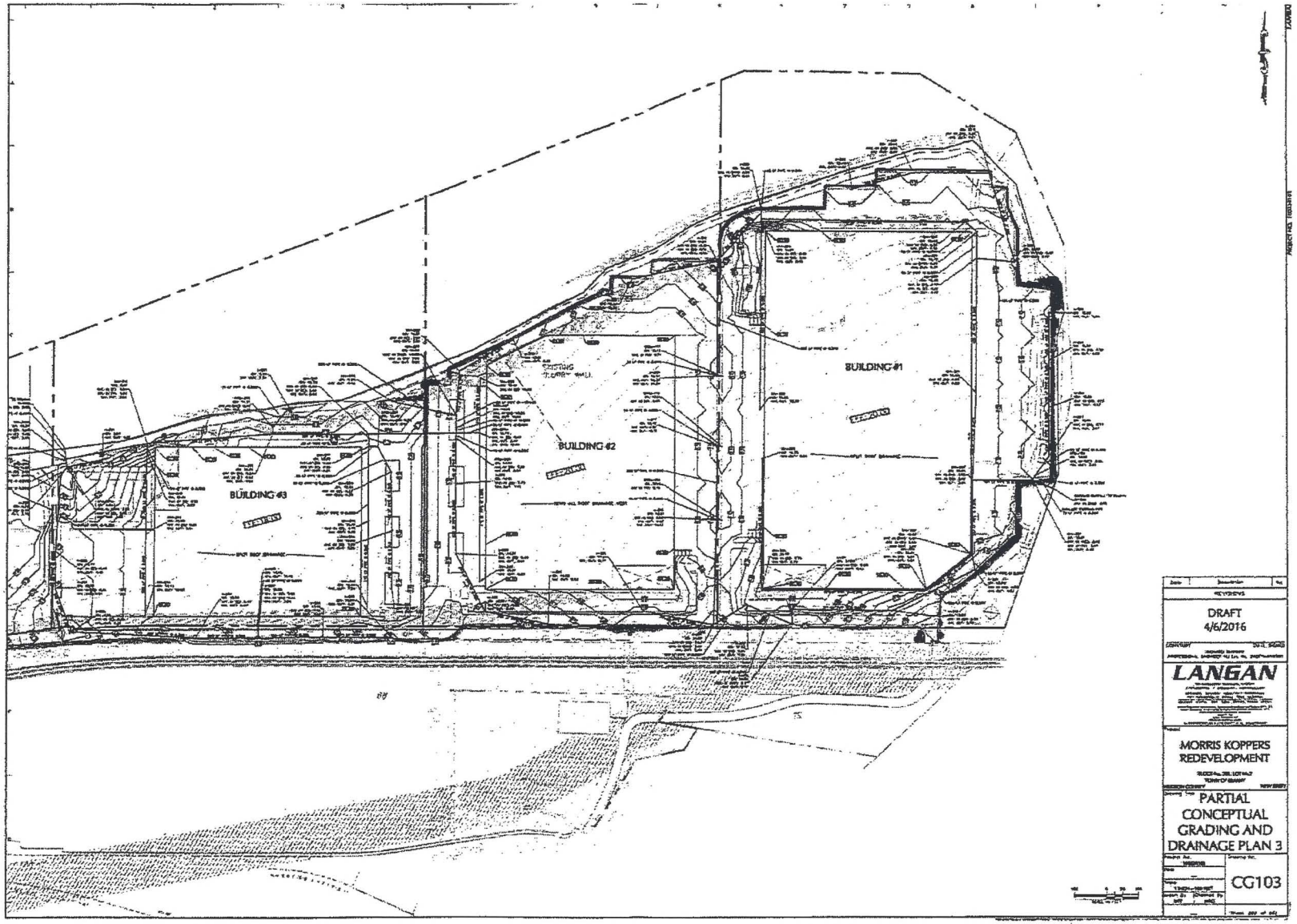
MORRIS KOPPERS
REDEVELOPMENT

OVERALL
CONCEPTUAL
GRADING AND
DRAINAGE PLAN

CG100


BUILDING #4
DRAFT
4/6/2016
LANGAN
MORRIS KOPPERS
REDEVELOPMENT
PARTIAL
CONCEPTUAL
GRADING AND
DRAINAGE PLAN 1
CG101


FUTURE NJ TRANSIT LOT
BUILDING #3
BUILDING #2
DRAFT
4/6/2016
LANGAN
MORRIS KOPPERS REDEVELOPMENT
PARTIAL CONCEPTUAL GRADING AND DRAINAGE PLAN 2
CG102



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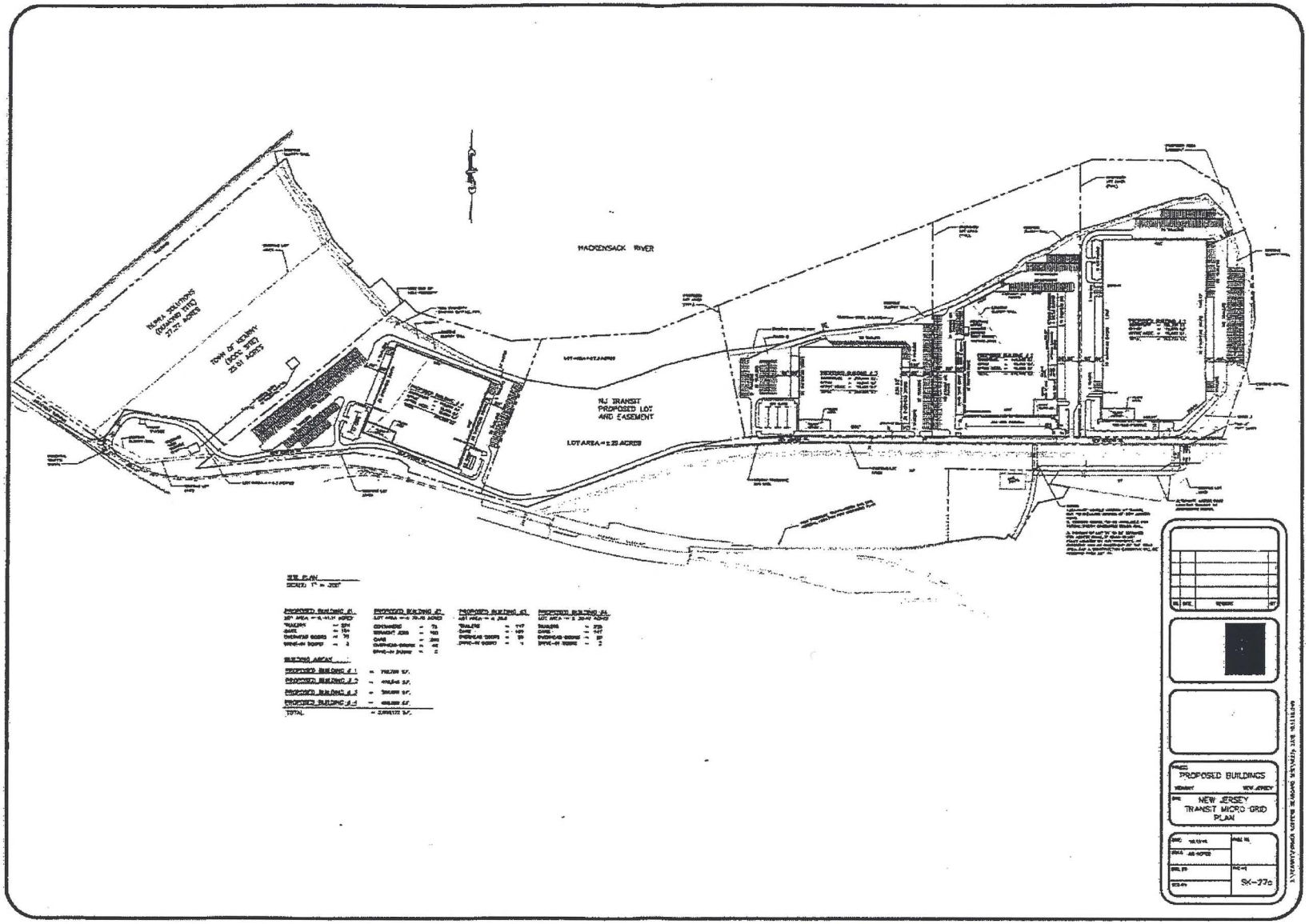
4/6/2016

LANGAN

MORRIS KOPPERS
REDEVELOPMENT

PARTIAL
CONCEPTUAL
GRADING AND
DRAINAGE PLAN 3

CG103


HACKENSACK RIVER
NJ TRANSIT
PROPOSED LOT
AND EASEMENT
LOT AREA = ± 25 ACRES
PROPOSED BUILDINGS
NEW JERSEY
TRANSIT MICRO-GRID
PLAN
SK-776

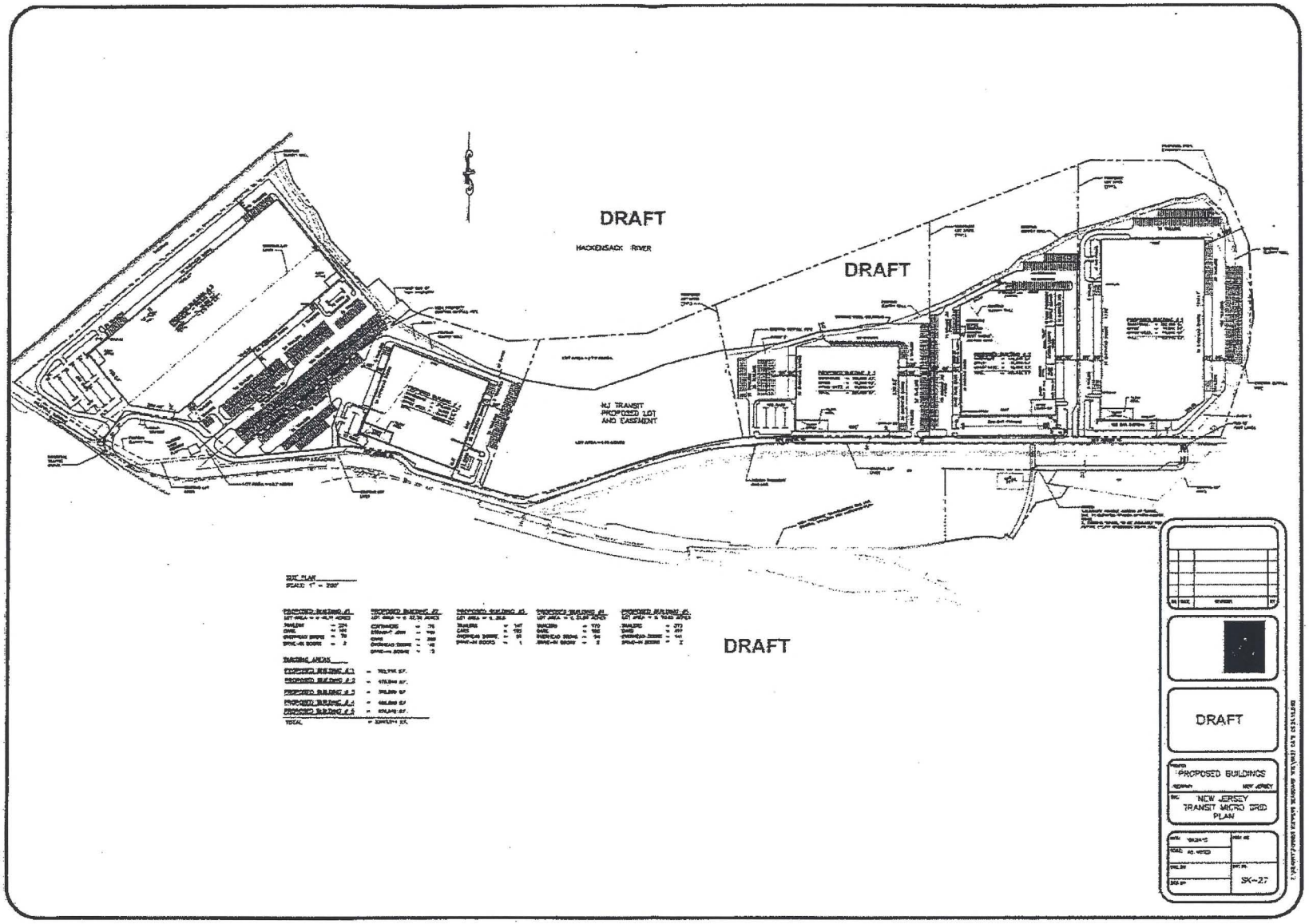

DRAFT
HACKENSACK RIVER
DRAFT
NJ TRANSIT
PROPOSED LOT
AND EASEMENT
DRAFT
DRAFT
PROPOSED BUILDINGS
NEW JERSEY
TRANSIT MICRO GRID
PLAN
SK-27

EXHIBIT D

NEW JERSEY SPORTS & EXPOSITION AUTHORITY
NJSEA
We Bring the World to New Jersey

WAYNE HASENBALG
President and Chief Executive Officer
Direct: 201-460-4155
Fax: 201-507-8130 / efax: 201-328-3294
whasenbalg@njsea.com

April 7, 2016

Theodore A. Schwartz, Esq.
Scarinci Hollenbeck
1100 Valley Brook Avenue
PO Box 790
Lyndhurst, NJ 07071

Re: Koppers Coke Redevelopment Project
Vital Project Designation

Dear Mr. Schwartz:

I am in receipt of your letter dated January 28, 2016, sent on behalf of your client, Morris Kearny Associates, LLC ("Morris"), which requests that Morris' proposed Koppers Coke Redevelopment Project be designated a "Vital Project" in order for the NJSEA to maintain jurisdiction over the Project.

In accordance with Section 11(f) of the Hackensack Meadowlands Consolidation Act at N.J.S.A. 5:10A-1 *et seq.*, the NJSEA "shall maintain sole jurisdiction over any project it deems, in its sole discretion, to be vital to the public safety, general welfare, development, or redevelopment of the district." Additionally, Resolution 2015-59, adopted by the NJSEA Board of Commissioners on November 19, 2015, establishes guidelines by which the President/CEO of the NJSEA may designate "Vital Projects" within the District.

The NJSEA has reviewed your request and prepared the attached report entitled, *Vital Project Assessment for the Koppers Coke Redevelopment Project*, dated February 25, 2016. Based upon this assessment, Morris' proposed Koppers Coke Redevelopment Project is deemed to be a "Vital Project" under N.J.S.A. 5:10A-11(f) and therefore the NJSEA will maintain sole jurisdiction in its review.

Sincerely,

Wayne Hasenbalg
President and CEO

Enclosure
cc: Mayor Alberto Santos, Town of Kearny
Michael Martello, Kearny Construction Official
Michael O'Connor, HCIA

VITAL PROJECT ASSESSMENT
for the Koppers Coke Redevelopment Project

February 25, 2016

The Hackensack Meadowlands Consolidation Act ("Act") at N.J.S.A. 5:10A-11(a), and Resolution 2015-55, adopted by the NJSEA Board of Commissioners on October 22, 2015, states that a constituent municipality within the Hackensack Meadowlands District ("District") that adopts and maintains the District master plan, zoning regulations, codes and standards shall review and approve or reject applications for development within the District. Accordingly, on October 27, 2015, the Town of Kearny adopted Ordinance No. 2015-(O)-54 as a means to assume certain zoning jurisdiction within the in-District portion of the municipality.

The Act at N.J.S.A. 5:10A-11(f) also provides that the "commission may maintain sole jurisdiction over any project it deems, in its sole discretion, to be vital to the public safety, general welfare, development, or redevelopment of the District." Additionally, Resolution 2015-59, adopted by the NJSEA Board of Commissioners on November 19, 2015, establishes guidelines by which the President/CEO of the NJSEA may designate "Vital Projects" within the District.

Vital Project Request

The NJSEA received a letter dated January 28, 2016, from Theodore A. Schwartz, Esq., on behalf of his client, Morris Kearny Associates, LLC ("Morris"), requesting that Morris' proposed Koppers Coke Redevelopment Project ("Project") be designated by the NJSEA as a "vital project" in order for the NJSEA to maintain jurisdiction over the Project.

Morris is the contract purchaser of a 175-acre parcel known as the Koppers Seaboard Site, which is presently owned by the Hudson County Improvement Authority ("HCIA") and located in-District within the Town of Kearny. Morris was the successful respondent to HCIA's Request for Proposals ("RFP") for qualified developers for the acquisition and development of the Koppers Seaboard Site. A key objective of HCIA's RFP is to facilitate redevelopment that creates jobs and tax ratables for the Town of Kearny and Hudson County.

Project Description

Morris plans to undertake a redevelopment project on the 175-acre parcel located within the District's Koppers Coke Peninsula Redevelopment Area. The Project will include the construction of approximately 2,000,000 square feet of warehouse and distribution facilities and NJ Transit's proposed Micro-Grid system's main facility[1], which will promote energy resiliency during natural disaster events, in addition to infrastructure and site improvements associated with the various elements of the project. The Project will result in substantial economic growth and job creation within the region and additionally will have a beneficial environmental impact, as it will facilitate the completion of the ongoing remediation of the contamination on the site.

Criteria for Designation of Vital Projects within the District

In accordance with Resolution 2015-59, which was adopted by the NJSEA Board of Commissioners on November 19, 2015, the President and CEO of the NJSEA, or his designee, shall be guided by the following criteria when exercising the authority granted under N.J.S.A. 5:10A-11(f) to designate "Vital Projects" within those District municipalities that have opted to take over zoning approvals within the in-District portion of that municipality in accordance with N.J.S.A. 5:10A-11(a):

1. *The NJSEA shall maintain sole jurisdiction over certain public projects as follows:*

    A. *Public projects proposed by federal, state, and county governmental/quasi-governmental agencies including, but not limited to, NJDOT, NJTA, NJ Transit, County authorities and agencies, NJDEP, BCUA, MCT, USACE, PANYNJ, Amtrak, and other railroad entities. (Existing exemptions from NJSEA regulations under N.J.A.C. 19:4-3.2 and N.J.S.A. 5:10A-11(c) are unaffected.)*

The present owner of the subject 175-acre property is the Hudson County Improvement Authority, a public entity. Morris was the successful respondent to HCIA's RFP seeking qualified developers to facilitate redevelopment that creates

[1] The Federal Transit Administration (FTA) and NJ Transit are in the process of completing an Environmental Impact Statement (EIS) in accordance with the National Environmental Policy Act of 1969 (NEPA) for NJ Transit's Micro-Grid system main facility. The proposed location of the Micro-Grid system main facility on the Koppers Seaboard Site will be evaluated as part of this process. See *NJ TransitGrid Traction Power System Agency and Public Coordination Plan*, December 2015.

jobs and tax ratables for the Town of Kearny and Hudson County. In addition, the Project includes the main facility associated with NJ Transit's proposed Micro-Grid system.

2. *The NJSEA may maintain sole jurisdiction over certain vital projects, per N.J.S.A. 5:10A-11(f), which meet one or more of the following criteria:*

    A. *Projects that enhance public safety.*
    B. *Projects that promote the general welfare.*
    C. *Projects that have a substantial impact on the environment.*
    D. *Development projects of regional economic importance.*
    E. *Development projects with regional impacts on flood control, stormwater infrastructure and/or other critical infrastructure.*
    F. *Development projects with significant regional traffic/transportation impacts.*
    G. *Redevelopment projects within a District redevelopment area.*

The Project satisfies criteria A, B, C, D, E, F, and G for the following reasons:

A. The Project will promote public safety by facilitating the completion of the remediation of contamination on the Koppers Seaboard Site through the placement of the final capping layers required as part of its NJDEP-approved 2007 Remedial Action Work Plan Addendum (RAWPA) for the Koppers Seaboard Site.

B. A major component of the Project will include the development of NJ Transit's Micro-Grid System. The purpose of NJ Transit's Micro-Grid system is to enhance the resiliency of the electricity supply to the NJ Transit and Amtrak infrastructure that serves key commuter markets in New Jersey and New York to minimize public transportation service disruptions. The proposed Project, designed in cooperation with the U.S. Department of Energy Sandia National Laboratories, will include an approximate 104-megawatt (MW) natural gas-fired electric power generating plant (referred to as the Micro-Grid's Main Facility) and associated infrastructure to enable trains to operate during widespread power failures on a portion of the NJ TRANSIT and Amtrak systems, including some sections of the Northeast Corridor (NEC) and Morris & Essex (M&E) line, and the Hudson-Bergen Light Rail (HBLR) System. The electrical microgrid, which will supply highly-reliable power during storms or other times when the centralized power grid is compromised to allow for the continuous operation of NJ Transit trains on critical corridors, will keep the region's economic engine moving and thereby promote the general welfare of the public.

C. The redevelopment project will have a beneficial environmental impact, as it will facilitate the completion of the remediation of the contamination on the Koppers Seaboard Site. The Project will include the placement of the final capping layers required as part of its NJDEP-approved 2007 Remedial Action Work Plan Addendum (RAWPA) for the Koppers Seaboard Site.

D. By redeveloping a significant portion of the Koppers Coke Redevelopment Area with 2,000,000 square feet of warehouse and distribution facilities and NJ Transit's Micro-Grid facility, the project will provide a major positive economic benefit to the region—by establishing significant ratables for the Town of Kearny; creating both permanent jobs and temporary construction jobs; and, according to Morris, generating close to $1 billion in overall economic value for the region.

E. The proposed construction of NJ Transit's Micro-Grid facility at the Koppers Seaboard Site will have a positive impact on critical rail infrastructure in the region by enhancing the resiliency of the electricity supply to NJ Transit and Amtrak trains.

F. The Project will have a significant positive impact on regional transportation by incorporating NJ Transit's Micro-Grid facility, which will supply highly-reliable power during storms or other times when the centralized power grid is compromised to allow for the continuous operation of NJ Transit and Amtrak trains on critical corridors.

G. Morris' proposed redevelopment project will be located within the Hackensack Meadowlands District's Koppers Coke Peninsula Redevelopment Area.

3. *The President and CEO or his designee will assess projects on a case-by-case basis, in accordance with the above criteria. The evaluation shall consider a project's impact with respect to land, water, air, solid waste, aquatic and terrestrial wildlife, social and economic conditions, and aesthetics at the project site and surrounding region.*

The redevelopment project has been assessed in accordance with the criteria of Resolution 2015-59, as described above, and is projected to have a positive impact on the site and surrounding region.

Conclusion

Based upon this assessment of the criteria listed above, evaluated in accordance with Resolution 2015-59, the proposed Koppers Coke Redevelopment Project will have an overall positive impact on the regional economy, transportation network, and environment.

Accordingly, Morris' proposed Koppers Coke Redevelopment Project is deemed to be a "Vital Project" under the provisions of N.J.S.A. 5:10A-11(f), thereby allowing the NJSEA to maintain sole jurisdiction in its review.

Sara J. Sundell, P.E., P.P.
Chief Engineer/Director of
Land Use Management

Wayne Hasenbalg
President/CEO

EXHIBIT E

Application for:

ZONING CERTIFICATE / OCCUPANCY CERTIFICATION

Prepared for:

NEW JERSEY MEADOWLANDS COMMISSION

INTERIM RESPONSE ACTION

STANDARD CHLORINE CHEMICAL COMPANY SITE AND DIAMOND SITE

KEARNY, HUDSON COUNTY, NEW JERSEY

Prepared on behalf of:

The Peninsula Restoration Group
(Standard Chlorine Chemical Company, Inc., Tierra Solutions, Inc. and Beazer East, Inc.)

Prepared by:

Key Environmental, Inc.
456 US Highway 22 West, Suite 3
Whitehouse Station, New Jersey 08889

January 2010

KEY ENVIRONMENTAL INCORPORATED

APPLICATION PACKAGE CONTENTS

This Zoning Certificate Application package is organized as follows:

Section 1 - APPLICATION FORM

Section 2 - PROJECT NARRATIVE AND OVERVIEW

Section 3 - SITE PLAN REQUIRMENTS

Attachment A - Engineering Design and Stormwater Management Report

Attachment B - Soil Erosion and Sediment Control Plan

Attachment C - Geotechnical Report

Attachment D - Boundary Survey

Attachment E - Wetland Delineation Report

Attachment F - Previous and Existing Permits and Communication

Attachment G - Operations and Maintenance Manual

Attachment H - Site Plans

ATTACHMENT

C

GEOTECHNICAL REPORT

KEY ENVIRONMENTAL INCORPORATED

construction. Control measures will be implemented by the time the excavation reaches the water level in order to maintain the integrity of the in-situ material. While excavations are open, primarily for pipe and drainage structure installation, the water level will be continuously maintained at least 1 foot below the working level. The Contractor selected by the Group to construct the Interim Remedial Action will be responsible for taking appropriate measures to minimize the entry of surface water into excavations and the attendant need for water treatment. Water that accumulates in excavations will be pumped to either a temporary or permanent groundwater treatment system.

During pipe placement, no more than fifty (50) lineal feet of open trench will be allowed at the end of a workday to minimize the accumulation of either surface water or groundwater in the excavation.

G. An analysis of the effects of the proposed fill operation on future construction type/costs.

The purpose of the stockpile proposed for the area of the future Groundwater Treatment Building is to pre-load this area to induce settlement of the underlying meadow mat and varved clay strata prior to building construction. The Diamond and SCCC Consolidation Areas (CAs) are being constructed to consolidate and cap South Ditch soft soils, cuttings from the slurry wall installation and excavated river sediments per the NJDEP-approved Interim Response Action Workplan (IRAW). As a final Response Action Workplan has not yet been prepared, the final use for the Site is not known at this time.

H. Recommendations on the engineering properties of all soils subjected to loading condition.

Refer to the responses to Items A and F.

I. Recommendations for the protection of adjacent property and existing structures and utilities from settlement, mud waving, movement, etc.

The location of the CBS wall has been selected so that installation will not impact adjacent property, structures or utilities.

Settlement that may occur as a result of materials placed in the Diamond or SCCC CAs is estimated to be minimal (see Appendix A) and will have no impact on adjacent property or existing structures. The final surfaces of the Diamond and SCCC CAs have been graded such that positive drainage will still be provided should settlement occur within these fill areas.

EXHIBIT F

ACCESS TO THE REGION'S CORE
Trans-Hudson Express (THE) Tunnel
A Partnership of NJ TRANSIT and the Port Authority of NY and NJ

RECEIVED AUG 16 2010

August 11, 2010

Mr. Mitchell Brourman
Environmental Manager
Beazer East, Inc.
C/O Three Rivers Management, Inc.
One Oxford Centre, Suite 300
Pittsburgh, PA 15219-6401

Subject: Peninsula Restoration Group Slurry Wall at Proposed Kearny Yard

Dear Mr. Brourman:

It is my understanding that you are the contact for the Peninsula Restoration Group (PRG) which we anticipate will soon begin to mobilize construction activities for the Standard Chlorine Chemical Company (SCCC) Remedial Action Workplan Addendum (RAWPA), which in part requires, construction of a 6,865 foot (170,000 square foot) slurry wall, with installation of various interior hydraulic control recovery wells to be installed upon completion of the slurry wall. NJ Transit proposes that the slurry wall height adjustments be carried out in order to offset planned surcharge induced settlement for the 850 foot long southern section of the PRG Wall along the Kearny Yard southern property line (PRG Design Drawing CBS-01, Station 54+70 to Station 46+20) and the 920 foot north-south section of the PRG wall (PRG Design Drawing CBS-01, Station 46+20 to Station 37+00). PRG Drawing CBS-01 and CBS-03 are provided in Attachment A for ready reference to the PRG proposed slurry wall configuration. THEP drawings entitled "Kearny Yard Earthwork Management, PRG Slurry Wall" plans and Sections A, B, and C, provided in Attachment B, indicate the alignment of the PRG Slurry Wall and sites where soil surcharges are planned and where revisions will be necessary.

The 850 foot segment of the PRG Slurry Wall along the southern property boundary lies under the future Kearny Yard Access Road connecting Kearny Yard with Route 7 South, and has soil surcharges ranging from 20 to 25 feet above existing grades. The 920 foot north-south eastern end of the PRG Slurry Wall will be installed under soil surcharges varying from 30 to 35 feet.

In accordance with the Technical Regulations (NJAC 7:26E), this documentation is intended to present proposed modifications to the slurry wall to interested parties, including but not limited to, PRG, the Hudson County Improvement Authority (HCIA), and the New Jersey Department of Environmental Protection (NJDEP) prior to submittal of the Kearny Yard Remedial Action Selection Report (RASR) in an effort to assist with the understanding NJ Transit's concerns regarding the approach to the remediation at the site and potential

impact to NJ TRANSIT's planned construction, and the project schedule in achieving key milestones for deliverables to NJDEP.

Our consultant, THE Partnership, has prepared proposed modifications to modify the design elements of the PRG Wall, to provide input to PRG in a timely manner to facilitate RAWPA implementation, and to coordinate the PRG remedy with NJ TRANSIT's proposed Kearny Yard improvements and remedies now contemplated. The proposals provided in this memorandum are based on geotechnical design calculations on surcharge related settlements, and predictions on anticipated rises in potentiometric groundwater elevations in the historic fill. This data will be refined as surcharge placement details become further refined and MODFLOW-based groundwater model simulations are completed, information that will be included as part of the RASR.

Proposed Kearny Yard construction in the area of the PRG Wall includes various features that will impact the proposed PRG wall design. Relevant design features impacting the wall are as follows:

- NJ TRANSIT plans to install a 24 foot wide access road connecting Kearny Yard to Route 7. The road elevation varies from EL. 310.00 ARC Project Datum (12.66 feet above mean sea level (msl) to EL. 330.00 (32.66 feet msl) for approximately 870 feet along the southern boundary of the Kearny Yard site, from the SCCC boundary/Kearny Yard boundary intersection (See PRG Drawing CBS-01, Station 54+70) to the intersection of the South Kearny Yard property line/Western Barrier Wall alignment intersection (See PRG Drawing CBS-01, Station 46+20).
- NJ TRANSIT plans to include installation of a terraced side slope, with a top elevation of 330.00 sloping down to match proposed Beazer grades. The terraced side slope embankment will support the Kearny Yard site development and shall be placed over the 920 foot (north-south-eastern end) of the PRG Slurry Wall. This Western Barrier Wall begins where the PRG Slurry Wall intersects the South Kearny Yard property line (See Attachment A, PRG Drawing CBS-01, Station 46+20) and terminates where the PRG wall intersects the existing Beazer slurry wall, approximately thirty (30) feet south of the existing steel sheet pile (SSP) wall (See Attachment A, PRG Drawing CBS-01, Station 37+00).
- The NJ Transit Remedial Investigation Report (RIR) recommended the Western Barrier Wall contain a slurry mixture of soil and bentonite, in lieu of cement and bentonite, given the substantial thickness of soft clays and peat sub soils beneath the footprint of the Western Barrier Wall and significant soil surcharges planned as part of site development plans.
- The NJ Transit RIR and RASR to follow provide specific recommendations on the elevation of the proposed Slurry Wall. The RIR indicates that the wall should be designed to account for anticipated settlement, to exceed the potentiometric head elevations resulting from soil surcharges, and that a wall height freeboard be considered. Calculations indicate that the PRG wall top elevation should be raised in heights varying from six (6) inches to 2.5 feet, with the most significant changes in

elevation required in the southeast corner, where the Western Barrier Wall intersects the southern property boundary.

The additional permanent fill and temporary surcharge fill is expected to produce considerable ground settlement in addition to the continuing settlement that the Beazer fill will also be producing during and after Kearny Yard construction. The additional settlement produced by the combined Beazer fill and Kearny Yard fill is predicted to vary by location along the eastern segment of the proposed PRG slurry wall. It is anticipated that 2 to 4 inches of settlement will be ultimately produced at the northern and southern ends of the eastern segment where little or no new Kearny yard fill will be placed directly on the slurry wall line. However, as much as 70 inches of settlement is expected to occur along the slurry wall line during construction at locations where up to 35 feet of combined permanent fill and temporary surcharge fill will be placed over Beazer's final grade. The area anticipated to present the greatest construction phase settlements will be along the northern half of the eastern PRG slurry wall segment, which is underlain by a an area of thick soft meadow mat materials that will produce large magnitudes of settlement and reach 100 percent consolidation in the meadow mat within just a few months after fill application. For your information, the modifications to the height of the slurry wall along each of the two sections of the wall being proposed herein are defined in Attachment C.

We respectfully request that the modifications described in this letter be implemented prior to start of the construction of the slurry wall at no expense to NJ Transit given that the recommendations are a mitigation to potential impact to NJ Transit's proposed project. Construction of the proposed wall as currently designed could significantly interfere with the proposed rail yard as well as any development of the Koppers property within the area of the wall. If you have any questions or comments regarding the requested revisions in order to mitigate impact please do not hesitate to contact Alan Kearns, at 973-792-3778, or Nicholas Caiazza, at 973-792-3740.

Sincerely,

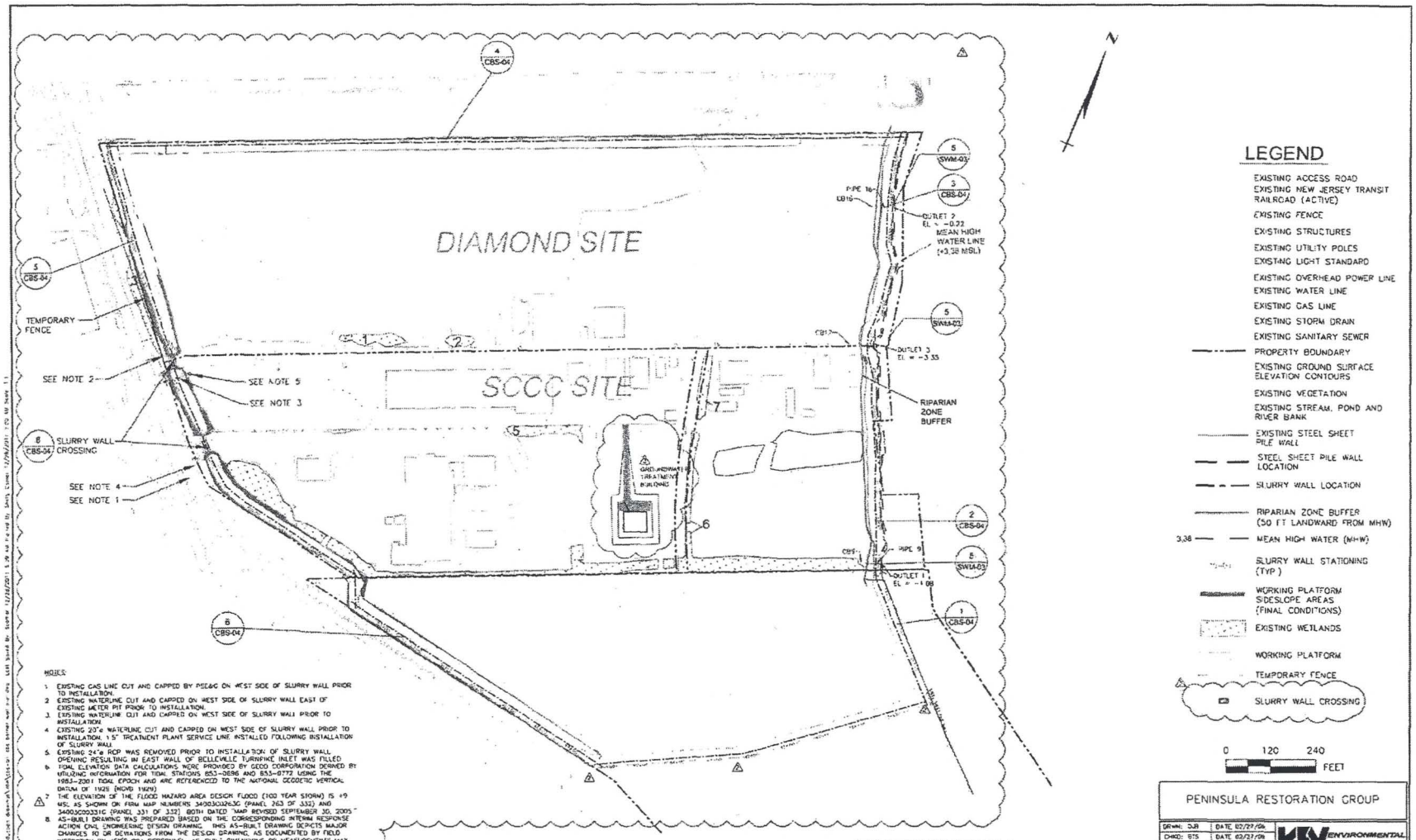
Lester J Eckrich

Lester J. Eckrich, P.E.
Senior Director, Design and Construction
NJ Transit
THE Tunnel Project

Attachment

cc: N. Guerra, HCIA
C. Kanakis, NJDEP
Angela Carpenter, USEPA
E. Als, USEPA
Allison Hess, USEPA
G. Gaeta
R. Parylak
A. Kearns
N. Caiazza
P. Dewes
ARCDCC

Attachment A



LEGEND

- EXISTING ACCESS ROAD
- EXISTING NEW JERSEY TRANSIT RAILROAD (ACTIVE)
- EXISTING FENCE
- EXISTING STRUCTURES
- EXISTING UTILITY POLES
- EXISTING LIGHT STANDARD
- EXISTING OVERHEAD POWER LINE
- EXISTING WATER LINE
- EXISTING GAS LINE
- EXISTING STORM DRAIN
- EXISTING SANITARY SEWER
- PROPERTY BOUNDARY
- EXISTING GROUND SURFACE ELEVATION CONTOURS
- EXISTING VEGETATION
- EXISTING STREAM, POND AND RIVER BANK
- EXISTING STEEL SHEET PILE WALL
- STEEL SHEET PILE WALL LOCATION
- SLURRY WALL LOCATION
- RIPARIAN ZONE BUFFER (50 FT LANDWARD FROM MHW)
- 3.38 MEAN HIGH WATER (MHW)
- SLURRY WALL STATIONING (TYP.)
- WORKING PLATFORM SIDESLOPE AREAS (FINAL CONDITIONS)
- EXISTING WETLANDS
- WORKING PLATFORM
- TEMPORARY FENCE
- SLURRY WALL CROSSING

0 120 240 FEET

NOTES:

1. EXISTING GAS LINE CUT AND CAPPED BY PSE&G ON WEST SIDE OF SLURRY WALL PRIOR TO INSTALLATION.
2. EXISTING WATERLINE CUT AND CAPPED ON WEST SIDE OF SLURRY WALL EAST OF EXISTING METER PIT PRIOR TO INSTALLATION.
3. EXISTING WATERLINE CUT AND CAPPED ON WEST SIDE OF SLURRY WALL PRIOR TO INSTALLATION.
4. EXISTING 20"ø WATERLINE CUT AND CAPPED ON WEST SIDE OF SLURRY WALL PRIOR TO INSTALLATION. 16" TREATMENT PLANT SERVICE LINE INSTALLED FOLLOWING INSTALLATION OF SLURRY WALL.
5. EXISTING 24"ø RCP WAS REMOVED PRIOR TO INSTALLATION OF SLURRY WALL OPENING RESULTING IN EAST WALL OF BELLEVILLE TURNPIKE INLET WAS FILLED
6. TIDAL ELEVATION DATA CALCULATIONS WERE PROVIDED BY GEOD CORPORATION DERIVED BY UTILIZING INFORMATION FOR TIDAL STATIONS 853-0696 AND 853-0772 USING THE 1983-2001 TIDAL EPOCH AND ARE REFERENCED TO THE NATIONAL GEODETIC VERTICAL DATUM OF 1929 (NGVD 1929)
7. THE ELEVATION OF THE FLOOD HAZARD AREA DESIGN FLOOD (100 YEAR STORM) IS +9 MSL AS SHOWN ON FIRM MAP NUMBERS 34003C0263G (PANEL 263 OF 332) AND 34003C0333G (PANEL 331 OF 332) BOTH DATED "MAP REVISED SEPTEMBER 30, 2005"
8. AS-BUILT DRAWING WAS PREPARED BASED ON THE CORRESPONDING INTERIM RESPONSE ACTION CIVIL ENGINEERING DESIGN DRAWING. THIS AS-BUILT DRAWING DEPICTS MAJOR CHANGES TO OR DEVIATIONS FROM THE DESIGN DRAWING AS DOCUMENTED BY FIELD INSPECTION BY KEY'S COA PERSONNEL. AS-BUILT DIMENSIONS OR MEASUREMENTS MAY VARY SLIGHTLY FROM THOSE DEPICTED ON THIS AS-BUILT DRAWING

REV #	DATE	DESCRIPTION	APPD
4	12/29/11	AS-BUILT	CAZ
3	06/22/10	MODIFIED SEAWARD SLURRY WALL ALIGNMENT	ACB
2	03/23/10	GENERAL SHEET REVISIONS	ACB
1	12/22/09	ISSUED FOR BID	ACB

REFERENCE:

1. EXISTING GROUND SURFACE CONTOURS PER AIR SURVEY, GILLES, VIRGINIA, APRIL 14, 2001. HORIZONTAL REFERENCE: NEW JERSEY STATE PLANE COORDINATES (NAD 1927). VERTICAL REFERENCE: NATIONAL GEODETIC VERTICAL DATUM (NGVD 1929).
2. PROPERTY BOUNDARY SHOWN HEREON FROM SHEET 1 OF 1 TITLED "SURVEY OF PROPERTY, TAX LOTS 37.02, 46, 47 & 47.01, BLOCK 287, TAX LOTS 48, 49, 50, 51, 52 AND 306, BLOCK 283, TOWN OF KEARNY, HUDSON COUNTY, NEW JERSEY," DATED JULY 1, 2006 (REVISION 2 JULY 25, 2006), PREPARED BY DYKSTRA ASSOCIATES, PC
3. EXISTING WETLANDS PER WETLAND DELINEATION BY PRINCETON HYDRO, LLC FOR KEY ENVIRONMENTAL, INC. PERFORMED IN MARCH 2009

ISSUE DATE:

KEY ENVIRONMENTAL, INC
200 THIRD AVENUE
CARNEGIE, PA 15106

PLAN PREPARER:
ALAN C. BRIGGS PROFESSIONAL ENGINEER
N.J. LICENSE NUMBER: 24GE03878300

SIGNATURE DATE

CERTIFICATE OF AUTHORIZATION TO OFFER ENGINEERING SERVICES
24GA27961400

PENINSULA RESTORATION GROUP

DRWN: DJB	DATE: 02/27/09
CHKD: BTS	DATE: 02/27/09
APPD: ACB	DATE: 02/27/09
SCALE: AS SHOWN	

KEY ENVIRONMENTAL INCORPORATED

INTERIM RESPONSE ACTION DESIGN
SCCC AND DIAMOND SITES
KEARNY, NEW JERSEY

SLURRY WALL PLAN

PROJECT NO. 09-803/804

CBS-01

Hess, Alison

From: Glen Van Olden <Glen@hepscd.org>
Sent: Monday, August 08, 2016 10:10 AM
To: Hess, Alison
Subject: Comments - Standard Chlorine Clean up & Capping, 1025-1035 Belleville Tpk, Block 287, Lots 32.01, 32.02, 46, 47, 47R, 48-52, 52R, Kearny, NJ
Attachments: CCF08082016_0002.pdf

Alison – On 9/30/09 this agency received the soil erosion and sediment control application for the "Interim Response Action" at this location which was eventually certified on 10/30/2009. Once all work had been completed and the site restabilized our final Report of Compliance was issued on January 2, 2013 thus closing out that file. See attached documents.

It is essential that a new formal application for soil erosion and sediment control certification, once plans are developed, be submitted in a timely manner so a proper review can be performed pursuant to the NJ Soil Erosion and Sediment Control Act, (Chapter 251, P.L. 1975 (NJSA 4:24-39 et. seq.)
Several adjacent properties remain active and will soon be brought to residential standards for redevelopment and mustn't be impacted by concurrent work at the SSSC site. Proper erosion control installations and timely capping and restabilization will assist in obtaining that goal.

Please contact me if additional clarification is needed.

Thank You,

Glen Van Olden, Director
Hudson-Essex-Passaic
Soil Conservation District - NJDA
80 Orchard Street
Bloomfield, NJ 07003
862-333-4505 (X312) ph., 862-333-4507 fax
glen@hepscd.org
www.hepsoilnj.org

PLEASE NOTE OUR NEW CONTACT INFORMATION -

New Jersey Natural Resources Conservation Program

HUDSON-ESSEX-PASSAIC SOIL CONSERVATION DISTRICT

15 BLOOMFIELD AVENUE
NORTH CALDWELL, NJ 07006
Telephone: (973) 364-0786
Fax: (973) 364-0784
information@hepscd.org

October 30, 2009

Ms. Margaret W. Kelly, Esq.
Standard Chlorine Chemical, Inc.
1025-1035 Belleville Tpk.
Kearny, NJ 07032

Re: **Interim Response Action SCCC & Diamond Site**
1015, 1025-1035 Belleville Tpk, Kearny, NJ
Block 287, Lots 32.01, 32.02, 46, 47, 47R, 48-52,52R
HEP File #209-H-2713, Plan dated: 9/1/09

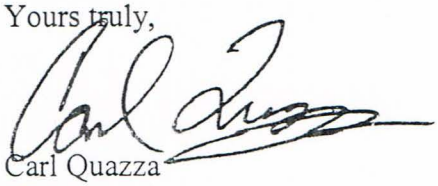
Dear Sir/Madam:

The District has completed the review of the soil erosion and sediment control plan for the above referenced project and hereby reports that the plan meets the Standards for Soil Erosion and Sediment Control in New Jersey (N.J.A.C.290-1.1 et seq., promulgated pursuant to the New Jersey Soil Erosion and Sediment Control Act, N.J.S.A.4-24-39 et seq.). Accordingly, the plan is **certified** by the Hudson-Essex-Passaic Soil Conservation District subject to the following conditions:

- The District must be notified by mail 48 hours prior to the commencement of any construction activity.
- A copy of the certified plan must be kept on the job site at all times.
- The applicant or contractor must request a final inspection (once landscaping and final soil stabilization is complete) prior to seeking a temporary or permanent Certificate of Occupancy.
- The District must be provided with written notification of any conveyance of this project, subject property, or portions thereof, including individual residential lots if applicable. Said notice must provide the names, addresses, and telephone numbers of subsequent owners.
- The District must be informed of address and or telephone number changes of owners, agents responsible for site construction, and job supervisors.

Please be advised that the Soil Erosion and Sediment Control Act authorizes the issuance of stop construction orders and penalties of up to $3000 per day for violations of the certified plan or for failure to comply with the aforementioned requirements. Please be further advised that any conveyance of this project or portions thereof will transfer full responsibility for compliance with the certified plan to subsequent owners. Please contact the District if you require assistance implementing the certified soil erosion and sediment control plan. This certification is valid for **3-1/2 years** from the date of this letter and is limited to the controls specified in this plan. It is not authorization to engage in proposed land use unless such use has been previously approved by the municipality or other controlling agency.

Yours truly,



Carl Quazza
Chairman

RFA # 09-07-10-015

rec'd 9/30/09

New Jersey Natural Resources Conservation Program

For District Use Only

209-H-2713
Certified: 10/30/09

APPLICATION FOR SOIL EROSION AND SEDIMENT CONTROL PLAN CERTIFICATION

The enclosed soil erosion and sediment control plan and supporting information are submitted for certification pursuant to the Soil Erosion and Sediment Control Act, Chapter 251, P.L. 1975 as amended (NJSA 4:24-39 et. seq.) An application for certification of a soil erosion and sediment control plan shall include the items listed on the reverse side of this form. NJMC

Name of Project: Interim Response Action SCCC and Diamond Site		Project Location: Municipality: Town of Kearny, Hudson County, NJ	
Project Street Address: 1015, 1025-1035 Belleville Turnpike		Block: 287	Lot: See attached Supplement 1
Project Owner(s) Name: See attached Supplement 1 (Peninsula Restoration Group)			Phone # / Fax #: See attached Supplement 1
Project Owner(s) Street Address (No P.O. Box Numbers): See attached Supplement 1		City: See attached Supplement 1	State / Zip
Total Area of Project (Acres): 51.9	Total Area or Land to be Disturbed (Acres): 18.7	No. Dwelling or other Units: Cat. D - remediation 2	Fee: $ 4950
Plans Prepared by*: Key Environmental, Inc.			Phone # 908-534-4501 / Fax # 908-534-6785
Street Address: 456 US Highway 22 West, Suite 3		City: Whitehouse Station	State: NJ Zip: 08889

Engineering related items of the Soil Erosion and Sediment Control Plan MUST be prepared by or under the direction of and be sealed by a Professional Engineer or Architect licensed in the State of New Jersey, in accordance with NJAC 13:27-6.1 et. seq.)

Agent Responsible During Construction: Applicants			
Street Address: See attached Supplement 1			
City: See attached Supplement 1	State / Zip	Phone: See attached Supplement 1	Fax #

The applicant hereby certifies that all soil erosion and sediment control measures are designed in accordance with current **Standards for Soil Erosion and Sediment Control In New Jersey** and will be installed in accordance with those Standards and the plan as approved by the Soil Conservation District and agrees as follows:

1. To notify the District in writing at least 48 hours in advance of any land disturbance activity. Failure to provide such notification may result in additional inspection fees.
2. To notify the District upon completion of the Project (Note: No certificate of occupancy can be granted until a report of compliance is issued by the District.
3. To maintain a copy of the certified plan on the project site during construction.
4. To allow District agents to go upon project lands for inspection.
5. That any conveyance of this project or portion thereof prior to its completion will transfer full responsibility for compliance with the certified plan to any subsequent owners.
6. To comply with all terms and conditions of this application and certified plan including payment of all fees prescribed by the district fee schedule hereby incorporated by reference.

The applicant hereby acknowledges that structural measures contained in the Soil Erosion and Sediment Control Plan are reviewed for adequacy to reduce offsite soil erosion and sedimentation and not for adequacy of structural design. The applicant shall retain full responsibility for any damages which may result from any construction activity notwithstanding district certification of the subject soil erosion and sediment control plan. It is understood that approval of the plan submitted with this application shall be valid only for the duration of the initial project approval granted by the municipality. All municipal renewals of this project will require submission and approval by the district. In no case shall the approval extend beyond three and one half years at which time resubmission and certification will be required. Soil Erosion and Sediment Control Plan certification is limited to the controls specified in the plan. It is not authorization to engage in the proposed land use unless such use has been previously approved by the municipality or other controlling agency. It is further understood that all documents, site plans, design reports etc. submitted to the district shall be made available to the public (upon request) pursuant to the Open Public Records Act, N.J.S.A. 47:1A-1 et seq.

1. Applicant Certification* Signature: [signature] Date: 8/11/09 8/12/09 Applicant Name (Print): David Rabbe / Margaret W. Kelly, Esq.	3. Plan determined complete: Signature of District Official / Date
2. Receipt of fee, plan and supporting documents is hereby acknowledged: Tierra Johnson SCC, Inc Signature of District Official / Date 9/30/09	4. Plan certified, denied or other actions noted above. Special Remarks: Signature of District Official / Date

*If other than project owner, written authorization of owner must be attached.

SSCC251 AP10 4/99

Hudson, E ex & Passaic Soil
Conservation District
15 Bloomfield Avenue
North Caldwell, NJ 07006
(973)364-0786
Fax (973)364-0784

New Jersey Natural Resources Conservation Program

State Soil Conservation Committee

REPORT OF COMPLIANCE

This certifies that the Soil Erosion and Sediment Control measures to the extent indicated comply with the Soil Erosion and Sediment Control Plans as certified by the Soil Conservation District pursuant to Chapter 251, P.L. 1975 as amended, the Soil Erosion and Sediment Control Act, (NJSA 4:24-39 et seq.)

Municipality: KEARNY, NJ

Project Name: INTERIM RESPONSE ACTION - STANDARD CHLORINE/ DIAMOND SITE

SCD Application No: 209-14-2713

Block(s): 287 **Lot(s):** 32.01 – **Street Address:** 1025-1035 Belleville TPK.

Block(s): **Lot(s):** 50 **Street Address:**

☐ CONDITIONAL COMPLIANCE* (CRC) ☑ REPORT OF COMPLIANCE - NO CONDITIONS (ROC)

Date: 1/02/13 **Signature of District Official:** [signature]

***CONDITIONS:**

1. Establishment of permanent stabilization of all disturbed areas in accordance with the certified soil erosion and sediment control plan.

Conditions above must be satisfied no later than

☑ **FINAL REPORT OF COMPLIANCE**
(invalid if checked in addition to the CRC and/or ROC boxes unless authorized by district official)

Date: 1/02/13 **Signature of District Official:** [signature]

Distribution:
Municipal Construction Office, Developer/Owner, District, Other