RAMBOLL

ENVIRONMENT
& HEALTH

Ms. Pamela Tames
USEPA – Region 2
290 Broadway, 20^{th} Floor
New York, NY 10007-1866

RESPONSE TO MAY 31, 2019 USEPA CORRESPONDENCE
FORMER ROWE INDUSTRIES SUPERFUND SITE, SAG HARBOR, NEW YORK
NYSDEC SITE ID: 152106

Dear Ms. Tames:

November 1, 2019

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Ref. 1690014195

On behalf of Kraft Heinz Foods Company, Inc. (Kraft Heinz), this letter has been prepared in response to the United States Environmental Protection Agency (USEPA) correspondence dated October 10, 2019, regarding the referenced former Rowe Industries Superfund Site located in Sag Harbor, New York. The October 10, 2019 USEPA correspondence provided comments to the August 2019 *Work Plan for In-Situ Groundwater Remediation, Former Drum Storage Area (FDSA), Rowe Industries Site*, prepared by Ramboll US Corporation (Ramboll). The purpose of the August 2019 Work Plan was to recommend a preferred remedial alternative for treating residual chlorinated volatile organic compounds (CVOCs) in groundwater within the FDSA.

The USEPA comments are identified below in *italic* font, and the corresponding responses are provided below each comment. An updated *Work Plan for In-Situ Groundwater Remediation* is also enclosed, which incorporates the responses to USEPA's comments.

1. *Section 3, page 2, 2nd paragraph. The Work Plan states that "As such, the goal of the recommended remedial action will be to reduce groundwater concentrations of COCs near the focused recovery wells such that COC concentrations above MCLs are contained within the Site." It should be noted that the remedial action objective in the Record of Decision (ROD) for the groundwater remains "Restoration of groundwater quality to its intended use of potential drinking water by reducing contaminant levels to State and Federal drinking water standards" and pertains to the entire site including the Sag Harbor Industries property and the adjacent residential properties. The ROD has not been changed.*

   Acknowledged.

2. *Please add turbidity and specific conductance to the field sampling parameters.*

   The field sampling parameters turbidity and specific conductance have been added to Section 3.5 of the Work Plan.

3. *Add an injection point in the area of the C3-2 and SB-13 soil boring locations.*

   An injection point has been added in the area of the C3-2 and SB-13 soil boring locations, and Figure 2 of the Work Plan has been updated accordingly.

4. *No injection points should be located within a 10-foot radius of monitoring wells and/or focused recovery wells.*

   Based on locations of site wells, it is not possible to maintain a 10-foot radius from all monitoring wells and/or focused recovery wells without adversely impacting subsurface distribution of amendment within the groundwater treatment zone. However, in response to this comment, the revised Figure 2 of the Work Plan provides increased distances between the wells and injection points when compared with the August 2019 Work Plan.

5. *Identify the local NYSDEC "s" number of the USGS well.*

   The local NYSDEC "s" number has been added to the USGS well identifier, as shown in Section 3.2.

6. *EPA will review the analytical results prior to approval of the change to the annual monitoring schedule of the monitoring wells.*

   Acknowledged.

Section 3.5 of the Work Plan indicates that, during and after the injections, the focused recovery wells will be turned off to prevent removal of the injected reagents. However, extraction well RW-2 will remain active and follow the current monitoring and operation schedule until post-injection monitoring confirms that tetrachloroethene (PCE) concentrations have stabilized. With USEPA concurrence, the focused recovery wells will be turned off approximately one week prior to completion of the pre-injection groundwater monitoring event, to allow for return of groundwater levels to ambient conditions. We are currently developing a proposed amendment injection schedule and will submit the proposed schedule to your attention under separate cover by mid-November.

If you have any questions regarding these responses to the USEPA's comments, please do not hesitate to contact us at your convenience. Thank you very much for your assistance with this matter.

Yours sincerely,

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Enclosure: Work Plan for *In-Situ* Groundwater Remediation

cc: Payson Long, NYSDEC
Kevin Kyrias-Gann

Prepared for:
Kraft Heinz Food Company, Inc.

Prepared by:
Ramboll US Corporation
Milwaukee, Wisconsin

Date:
November 2019

Project Number:
1690014195

WORK PLAN FOR *IN-SITU* GROUNDWATER REMEDIATION

FORMER DRUM STORAGE AREA
ROWE INDUSTRIES SITE
SAG HARBOR, NEW YORK

CONTENTS

FIGURES

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ACRONYMS AND ABBREVIATIONS

AMSL	above mean sea level
ARARs	Applicable or Relevant and Appropriate Requirements
bgs	below ground surface
CVOCs	chlorinated volatile organic compounds
cDCE	cis-1,2-dichloroethene
COCs	contaminants of concern
Dhc	*Dehalococcoides*
DO	dissolved oxygen
EVO	emulsified vegetable oil
ERD	enhanced reductive dechlorination
FP&T	focused pump and treat
FDSA	former drum storage area
FSP&T	full-scale pump and treat
ISB	*in-situ* bioremediation
ISCR	*in-situ* chemical reduction
Kraft	Kraft Heinz Foods Company, Inc.
LBGHES	LBG Hydrogeologic and Engineering Services, P.C.
MCL	Maximum Contaminant Level
µg/L	micrograms per liter
NOAA	National Oceanic and Atmospheric Administration
ORP	oxidation reduction potential
Ramboll	Ramboll US Corporation
ROD	Record of Decision
SVE	soil vapor extraction
PCE	tetrachloroethene
TOC	total organic carbon
TCE	trichloroethene
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
VC	vinyl chloride
VOC	volatile organic compound
WSP	WSP USA
ZVI	zero valent iron

1. INTRODUCTION

On behalf of Kraft Heinz Foods Company, Inc. (Kraft Heinz), Ramboll US Corporation (Ramboll) has prepared this *Work Plan for In-Situ Groundwater Remediation* (Work Plan) for treating contaminants of concern (COCs) (primarily tetrachloroethene [PCE]) in groundwater at the former drum storage area (FDSA) on the Rowe Industries Superfund Site (the "Site") located in Sag Harbor, New York (Figure 1). This Work Plan has been prepared as a follow-up to the February 2019 *Supplemental Characterization and Groundwater Remediation Study, Former Drum Storage Area (FDSA), Rowe Industries Site*, prepared by WSP USA (WSP), and as requested by the United States Environmental Protection Agency (USEPA) in its subsequent correspondence dated May 31, 2019.

2. BACKGROUND

2.1 Previous Unsaturated Zone Treatment within the FDSA

Excavation of contaminated soil from the surface to 4 feet below ground surface (bgs) was completed in the FDSA in 1998. To treat remaining contamination in the unsaturated zone, a soil vapor extraction (SVE) system operated from 1998 to 2003. In January 2005, LBG Hydrogeologic and Engineering Services, P.C. (LBGHES) submitted to the USEPA a report titled, "*Addendum to Soil Remedial Action Report, Closure Request for Source Soils in the Former Drum Storage Area*." The 2005 LBGHES report demonstrated soil quality in the unsaturated zone of the FDSA had achieved Applicable or Relevant and Appropriate Requirements (ARARs), and the USEPA subsequently approved the report conclusions. Remaining cleanup efforts within the FDSA therefore focus on treating COCs in the saturated zone.

As part of the information presented in the January 2005 LBGHES report, exceedances of the ARAR for PCE in soil were identified from soil samples collected at borings C3-2 and C3-4 in January 2003. Residual PCE in these borings was located at depths below the annual high water table, such that the PCE is located within the saturated soil for a portion of the year and is not considered to represent the vadose zone. The January 2005 LBGHES report concluded that this residual PCE would be more effectively treated by a groundwater remedy.

2.2 Previous and Existing Saturated Zone Treatment within and Downgradient of the FDSA

In November 2000, a focused pump and treat (FP&T) remediation system began operating with four focused recovery wells (FRW-1, 2, 3, and 4) within the FDSA. The primary objective of groundwater extraction from the focused recovery wells is to prevent COCs from migrating beyond the FDSA. Since 2000, ongoing groundwater monitoring has confirmed that COCs in groundwater have not migrated beyond the FDSA.

In December 2002, a site full-scale pump and treat (FSP&T) system consisting of nine recovery wells (identified as RW-1 through RW-9), an equalization tank, bag filters, tower air stripper, and transfer tank was installed and began operation for the purpose of recovering dissolved-phase COCs in groundwater downgradient of the FDSA. In 2008, the focused recovery wells were re-routed so that extracted groundwater would be treated by the FSP&T system. By January 2011, all of the recovery wells on and downgradient of the Site had achieved contaminant concentrations below ARARs. In accordance with the Site's Consent Decree, eight of the recovery wells located downgradient of the FDSA were shut down with USEPA's approval between July 2005 and January 2014 once the water quality in the wells had achieved ARARs for at least 3 consecutive years. Wells FRW-1 through FRW-4, and also well RW-2, currently remain in operation.

In November 2004, approximately 10,800 pounds of EHC® product, which contained a micron-scale zero-valent iron (ZVI) and a carbon substrate, was injected into the saturated zone of the FDSA to enhance abiotic and biotic reductive dechlorination. The EHC® injection facilitated limited degradation of PCE to degradation products cis-1,2-dichloroethene (cDCE) and vinyl chloride (VC). However, COC concentrations in groundwater persist at concentrations above ARARs. The *in-situ* groundwater remedial actions recommended in this Work Plan are intended to further treat COC-impacted groundwater within the FDSA.

2.3 June 2018 Characterization Work

In June 2018, WSP conducted work in the FDSA to improve the characterization of the lithology and identify the location and magnitude (i.e., concentration and areal extent) of residual COCs to facilitate an informed decision for future remediation efforts in the saturated zone of the FDSA. The methodologies and results of these investigations are documented in WSP's February 2019 *Supplemental Characterization and Groundwater Remediation Study, Former Drum Storage Area*.

3. RECOMMENDED *IN-SITU* GROUNDWATER REMEDIATION

As discussed in Section 2.1, SVE and excavation were previously implemented to address impacted unsaturated soil within the FDSA. Since 2000, groundwater extraction and treatment has been conducted to address saturated soil and groundwater within the FDSA. In 2005, *in-situ* chemical reduction (ISCR) was implemented to supplement the groundwater extraction and treatment. Based on results from recent monitoring of the FDSA groundwater during dry/low flow conditions in the Summer/Fall, regularly saturated zones in the subsurface have been remediated such that concentrations are near ARARs without operation of the focused recovery wells. Additionally, results from soil sampling near the focused recovery wells indicate that remaining elevated concentrations of PCE are located within the soil zone from 6 to 10 feet above mean sea level (AMSL); this zone is only partially saturated throughout the year depending on focused recovery wells efficiency and water table fluctuations in response to recharge. Typically, the highest water table conditions occur in the Winter/Spring, which are the seasons when elevated PCE concentrations have been detected.

As noted in the 1992 Record of Decision (ROD) for the Rowe Industries Site, groundwater clean-up to Safe Drinking Water Act Maximum Contaminant Levels (MCLs) is not always feasible under certain site conditions. In the case of the Rowe Industries Site, multiple technologies have been successfully implemented over the past 30 years to reduce contaminant mass and meet groundwater clean-up objectives within the original plume area. During that time, local ordinances and public water supply connections have removed the drinking water exposure pathway and significantly reduced risks associated with groundwater concentrations above MCLs. As such, the goal of the recommended remedial action will be to reduce groundwater concentrations of COCs near the focused recovery wells such that COC concentrations above MCLs are contained within the Site. The following subsections describe the scope for implementation and monitoring of the recommended remedial alternative.

3.1 Recommended Groundwater Treatment Area

The target groundwater treatment area within the FDSA is provided on Figure 2 and is based on evaluation of recent groundwater monitoring data from the FDSA in terms of the primary COC (PCE). The following ranges of PCE concentrations were detected in groundwater samples obtained during 2018 from wells within the target treatment area:

- FRW-1: 7 to 110 micrograms per liter (µg/L);
- FRW-2: <5 to 140 µg/L;

- FRW-3: 6.2 to 170 µg/L;
- FRW-4: <0.5 to 21 µg/L;
- MW-98-01A: 0.77J[1] to 18 µg/L; and
- MW-98-05AR: 18 to 73 µg/L.

For monitoring wells located outside of the target treatment area, downgradient monitoring well MW-45A did not contain detectable concentrations of PCE (or any other CVOCs) during 2018. Hydraulically downgradient well MW-98-04 contained 29 µg/L PCE in March 2018, 2.2 µg/L PCE in June 2018, and 2.63 µg/L PCE in September 2018. Other than the March 2018 result, groundwater samples from well MW-98-04 had not contained PCE concentrations greater than the MCL of 5 µg/L PCE since February 2016 (the February 2016 sample slightly exceeded the MCL, with a detected PCE concentration of 8.5 µg/L).

3.2 Relationship Between Precipitation and Groundwater Elevations

As indicated in Section 2.1 and illustrated on Figures 3 through 5, residual PCE is located at depths below the annual high water table, such that substrate injections for the purpose of in-situ groundwater remediation should therefore occur during high water table conditions. An evaluation of local precipitation and associated groundwater elevation patterns is therefore warranted and provided as follows.

Figure 6 provides water table elevation data for select wells plotted against local precipitation data from 2003 to present. Specifically, water table elevations AMSL are plotted for FDSA monitoring wells MW-98-04 and MW-45A, and United States Geological Survey (USGS) well number 405756072173502 S 8833.2. The USGS well is located 1.22 miles to the southeast (heading 161.79 degrees) of the FDSA and is screened from 10 to 15 feet bgs. Monitoring well MW-98-04 is screened from 17 to 27 feet bgs, and MW-45A is screened from 14 to 29 feet bgs. The identified water table elevations for the USGS well represent monthly mean values, whereas the specific values in blue and gray font represent field measurements from a specific date for monitoring wells MW-98-04 and MW-45A, respectively. The precipitation values represent monthly totals based on data[2] obtained from the Bridgehampton, New York National Oceanic and Atmospheric Administration (NOAA) station. This NOAA station is located 2.26 miles to the southeast (heading 166.25 degrees) of the FDSA.

A general correlation between the precipitation and water table elevations can be observed based on evaluation of the information depicted on Figure 6. For example, extended periods of relatively low precipitation (e.g., maximum values less than 0.4 feet per month) during most of 2010, 2011 and 2012 resulted in concurrent long-term declines in water table elevations at monitoring wells MW-98-04 and MW-45A and also the USGS well. These observed declines in water table elevations were then apparently reversed once the maximum precipitation rates increased to greater than 0.4 feet per month after late 2012.

Upon USEPA's approval of the *Work Plan for In-Situ Groundwater Remediation*, water table elevations at monitoring wells MW-45A and MW-98-04 will be monitored on a monthly basis to verify that the injections will be conducted during high water table conditions. The FRW wells will be shut down in September 2019 such that the groundwater extraction system will not depress groundwater elevations within the FDSA, which will allow for an understanding of ambient groundwater elevations

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[1] "J flagged" by the project laboratory as estimated concentration between the limit of detection and limit of quantification.

[2] Precipitation data from the Bridgehampton, New York NOAA station are unavailable for 2016 and early 2017.

prior to implementation of amendment injection. However, extraction well RW-2 will remain active and follow the current monitoring and operation schedule. The monthly monitoring of groundwater elevations at these two wells will continue for a minimum of 6 months after completion of the injections and will be terminated based on evaluation of the water table elevation data and with USEPA's approval.

3.3 Enhanced Reductive Dechlorination Process

As indicated in WSP's February 2019 *Supplemental Characterization and Groundwater Remediation Study*, the recommended groundwater remedy for the FDSA is enhanced reductive dechlorination (ERD). ERD processes include ISCR or *in-situ* anaerobic bioremediation (ISB). In both cases, chlorinated compounds are degraded to non-toxic daughter products under reducing conditions. With chemical reduction, electrons are transferred from the reductant to the substrate. The substrate gains electrons and is reduced, while the reductant loses electrons and is oxidized. The chemical structure of the chlorinated solvent determines how susceptible it will be to reduction or oxidation. In general, solvents with carbon atoms that are electron rich are more susceptible to oxidation; carbon atoms that are electron deficient are more susceptible to reduction. The more chlorines added to a solvent molecule, the more oxidized it is and the more resistant to further oxidation but more susceptible to reduction.

ZVI has been employed successfully in low pH environments as a stand-alone remedy to support abiotic volatile organic compound (VOC) degradation. Chemical reduction of the VOCs can occur on the ZVI particle surface, and hydrogen produced during iron corrosion can serve as an electron donor for biological dechlorination. In addition, hydroxyl ions produced from corrosion of ZVI increase pH within the treatment area to levels favorable for dechlorination. This abiotic process is suited to aquifers that contain relatively high accumulations of daughter products. β-*elimination* and hydrogenolysis mechanisms promoted by ZVI predominantly degrade to chloroacetylene, with substantially lower production of cDCE and VC.

Chlorinated volatile organic compounds (CVOCs) can also be degraded by anaerobic microbes known as reductive dechlorinators to non-toxic daughter products. Such biodegradation requires reducing conditions to stimulate anaerobic bacteria to dechlorinate the CVOC. The approach is designed to provide a carbon or electron donor source to create reducing conditions necessary to enhance anaerobic biodegradation. Examples of effective electron donors that degrade the CVOCs when delivered to the subsurface include molasses/water mixture, whey, high fructose corn syrup, or sodium lactate. Such anaerobic bioremediation processes have been successful and well documented at a wide variety of sites, and guidance documents are available that describe the process in detail.

The anaerobic microbes use CVOCs during dehalorespiration via reductive dechlorination. There are a variety of bacteria that dehalorespire only on PCE or trichloroethene (TCE), producing toxic cDCE in the process. In contrast, the dechlorinating microorganisms *Dehalococcoides* (*Dhc*) are the only known microorganisms capable of further dechlorination to non-toxic ethene. Although *Dhc* microorganisms are widely distributed in the environment, research indicates that they are not ubiquitous. If *Dhc* is absent from a site, incomplete dechlorination and accumulation of cDCE is anticipated to occur, or extended acclimation periods will be required to allow low concentrations or poorly distributed *Dhc* populations to achieve functional cell densities. If the results of groundwater monitoring during the course of anaerobic bioremediation indicate insufficient *Dhc* bacterial populations, then the biostimulation is often combined with bioaugmentation using commercially-available microbes.

In order to effectively anaerobically bioremediate a particular area, it is critical to:

- Select the optimal chemical additives.
- Properly distribute the chemical and biological additives to stimulate the dechlorination process within the contaminated area.
- Bioaugment (if necessary) the site with dechlorinating microbes.
- Maintain the enhanced subsurface conditions for sufficient time to fully dechlorinate the dissolved and adsorbed CVOCs.

Chemical reduction by amendments such as ZVI have the advantage of being able to treat high concentrations of CVOCs while producing limited amounts of intermediates, such as VC. Biological reduction by amendments such as emulsified vegetable oil (EVO) or lactates have the advantage of being able to treat low concentrations of CVOCs. The state of the soil and groundwater remediation practice is evolving, in recognition that combining chemical and biological reduction can function synergistically by creating a reducing environment that thermodynamically promotes biological reductive dechlorination. This combined approach is intended to promote rapid abiotic degradation within the treatment zone, and to also enhance long-term biological dechlorination.

3.4 Recommended FDSA Groundwater Remediation

The ISCR/ISB injections will be implemented within the approximate 2,000 square foot area identified on Figure 2. The recommended vertical treatment zone will total 15 feet and will extend from approximately 16 feet to 31 feet below grade (approximately 15 feet AMSL to 0 feet AMSL) (to the top of the primary clay lens underlying the FDSA). It is therefore important to note that the forthcoming amendment injection event will treat approximately 50 percent greater aquifer volume than the 2005 amendment injection event (based on a 15-foot rather than previous 10-foot vertical treatment zone). Assuming a soil density of 100 pounds per cubic foot, the soil mass within the 15-foot treatment zone totals approximately 1,500 tons and the proposed ZVI application mass (5,800 pounds) equates to a ZVI application rate of approximately 0.19 weight percent with respect to soil within the treatment zone.

Based on the assumed soil density of 100 pounds per cubic foot, the soil mass within the 10-foot 2005 EHC injection treatment zone totaled approximately 1,000 tons and the applied ZVI mass (maximum of 3,670 pounds) equated to a ZVI application rate of 0.18 weight percent with respect to soil within the treatment zone. It should be noted that the ZVI application rate used during the 2005 EHC injection event varied throughout the injection zone. The forthcoming amendment injection event will utilize a uniform ZVI application rate of approximately 0.19 weight percent with respect to soil within the treatment zone.

The accompanying carbon substrate contains approximately 60 percent long-chain and 5 percent short-chain fermentable carbon, which is a mixture of glycerol and fatty acids. The carbon substrate also includes a phosphate pH buffer. The carbon substrate will be mixed as a 15-weight percent solution with water to form approximately 5,800 gallons (i.e., 14,500 pounds) of combined carbon substrate and ZVI. Based on the assumed effective aquifer porosity of 25 percent, the effective aquifer pore volume within the 15-foot injection treatment zone totals approximately 56,100 gallons and the proposed amendment injection volume (5,800 gallons) is equivalent to approximately 10.3 percent of the target treatment pore space. These injection parameters may be modified somewhat based on further communication with the remedial contractor and conditions encountered in the field. The viscosity of the amendment to be used as part of the forthcoming injection event is on the order of 20 percent less than the viscosity of the EHC injected in 2005; this reduced viscosity should facilitate enhanced amendment distribution in the subsurface.

Based on the assumed effective aquifer porosity of 25 percent, the effective aquifer pore volume within the 10-foot 2005 EHC injection treatment zone totaled approximately 37,400 gallons and the applied substrate volume (3,600 gallons) equated to approximately 9.6 percent of the target treatment pore space.

The addition of ZVI to the carbon substrate provides a number of advantages for enhanced reductive dechlorination. The ZVI will provide an immediate reduction in ORP. The carbon substrate will provide short-term and long-term electron donors to support anaerobic bacteria growth, which also assists in creating a reducing environment. In addition, the corrosion of iron metal yields ferrous iron and hydrogen, both of which are possible reducing agents. The hydrogen gas produced is also an excellent energy source for a wide variety of anaerobic bacteria.

The carbon substrate and ZVI will be delivered to the site separately and mixed with potable water and emplaced in the subsurface simultaneously. A small quantity of guar will likely also be supplied, which will assist in keeping the ZVI suspended during the mixing and injection process. The dilution factor (i.e., water content) can be adjusted to achieve optimal dispersion and distribution based on site-specific parameters such as injection point spacing, permeability of the formation, and contaminant concentrations.

A commercially-available enriched dechlorinating culture will be co-injected with these electron donors. The *Dhc* microbes present in the culture will facilitate complete dechlorination of PCE to non-toxic ethene. The culture is delivered to the site in sealed stainless-steel cylinders. Each cylinder is equipped with an inlet and outlet port. Nitrogen gas is connected to the inlet port and is used to force the culture solution into the injection line and evacuate the canister. The canister is also equipped with a sight glass that allows the field crew to monitor the amount of culture that has been injected. The culture will be premixed with the carbon substrate solution in holding tanks prior to injection or directly into the injection lines during the injection process. Approximately 5 liters of the *Dhc* culture will be injected, which should provide a desired bacterial population of 1×10^7 cells per liter within the treatment zone.

Approximately 15 to 18 borings will be advanced on approximate 12-foot centers within the treatment area. The injections will be performed from the bottom of the borehole working upwards in 1 to 2-foot intervals to facilitate adequate and uniform vertical distribution of reagent. Each boring will be sealed at the completion of the injections using granular bentonite, and subsequently hydrated. It is estimated that the injections can be completed within a 4 to 5-day timeframe.

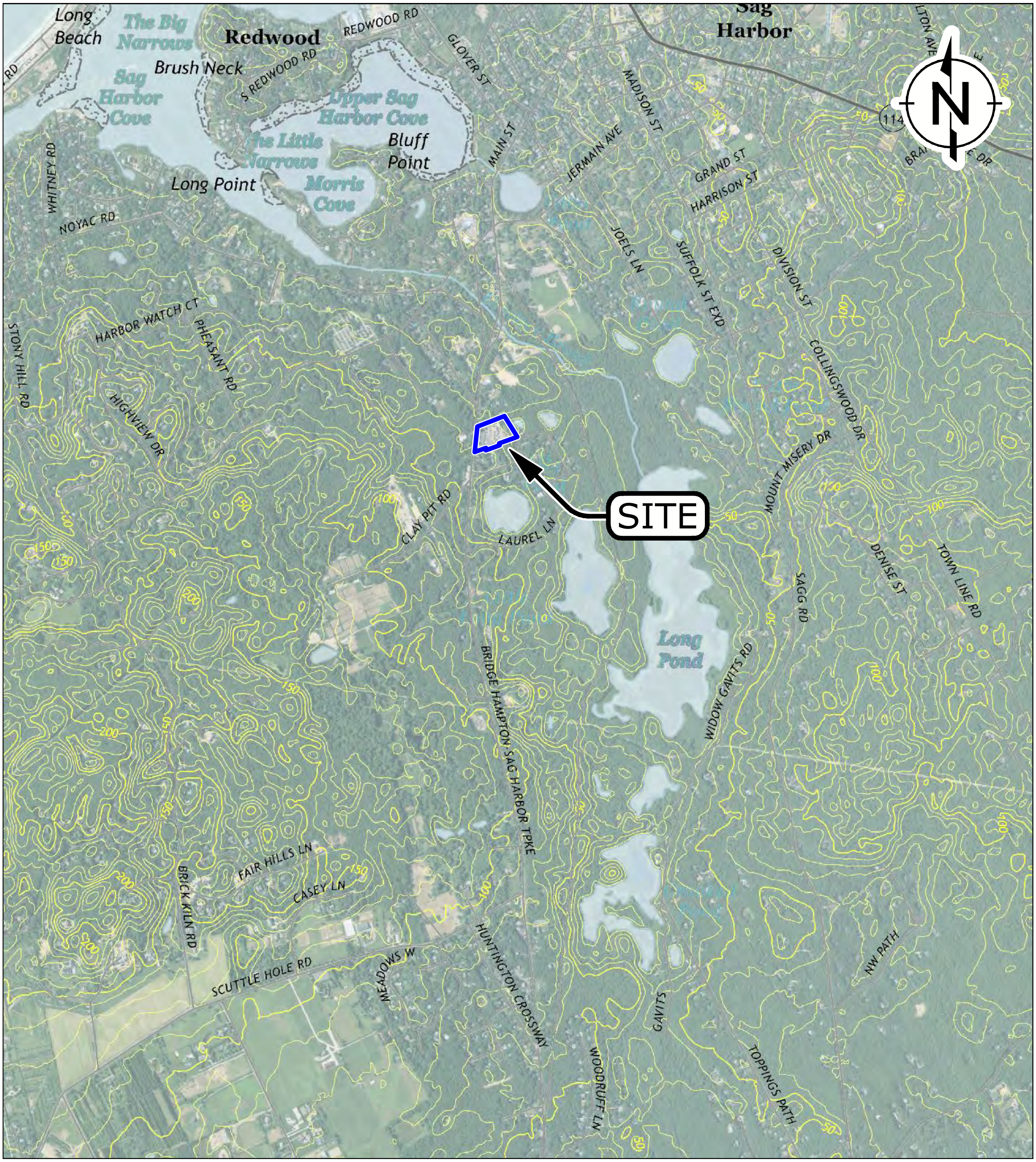
3.5 Recommended Groundwater Monitoring Program

To evaluate the effectiveness of the recommended ISCR/ISB remedial actions, baseline and post-injection sampling of wells FRW-1 through FRW-4, MW98-05AR, and MW-98-01A will include analysis of the following parameters: VOCs (Method 8260), sulfate (Method 300), ethene/ethane/methane (Method 8015), dissolved iron (Method 6010B/200.7), total organic carbon (TOC) (Method 9060), and nitrate+nitrite (Method 353.2). For data quality purposes, one field duplicate sample will be submitted for laboratory analysis of the parameters identified above. The field parameters turbidity, specific conductance, DO, pH, ORP, and temperature will also be analyzed in the field as part of each sampling event. Additionally, monitoring wells MW98-04 and MW-45A will be monitored for VOCs. A baseline groundwater monitoring event is recommended to be conducted just prior to the ISCR/ISB injection event, to document ambient groundwater conditions within the groundwater treatment zone.

After completion of the ISCR/ISB injection event, groundwater monitoring described above will be conducted on a quarterly basis for 1 year (four sampling events), followed by 2 years of semi-annual monitoring (four additional sampling events), followed by annual groundwater monitoring thereafter. Wells MW-28A/B, 44A/B/C, 58A/B, 59A/B, 98-04B, 45B, and N-32 and 32B will continue to be sampled on their regular annual monitoring schedule. The frequency of groundwater monitoring and scope of laboratory analyses may be modified during the course of the groundwater monitoring program in response to monitoring results and field observations. A report documenting the results of each monitoring event will be submitted to the USEPA.

During and after the injections, the focused recovery wells will be turned off to prevent removal of the injected reagents. However, extraction well RW-2 will remain active and follow the current monitoring and operation schedule until post-injection monitoring confirms that PCE concentrations have stabilized.

FIGURES



CONTOUR INTERVAL 10 FEET

0 1/2 1 MILE

0 2000 4000 FEET

LEGEND:

PROPERTY BOUNDARY (APPROXIMATE)

QUADRANGLE LOCATION

SOURCE:
2016 USGS 7.5 Minute Series Sag Harbor, New York Topographic Quadrangle.
Site Location; N: 40.9831° W: 72.3008° WGS84

RAMBOLL

SITE LOCATION MAP

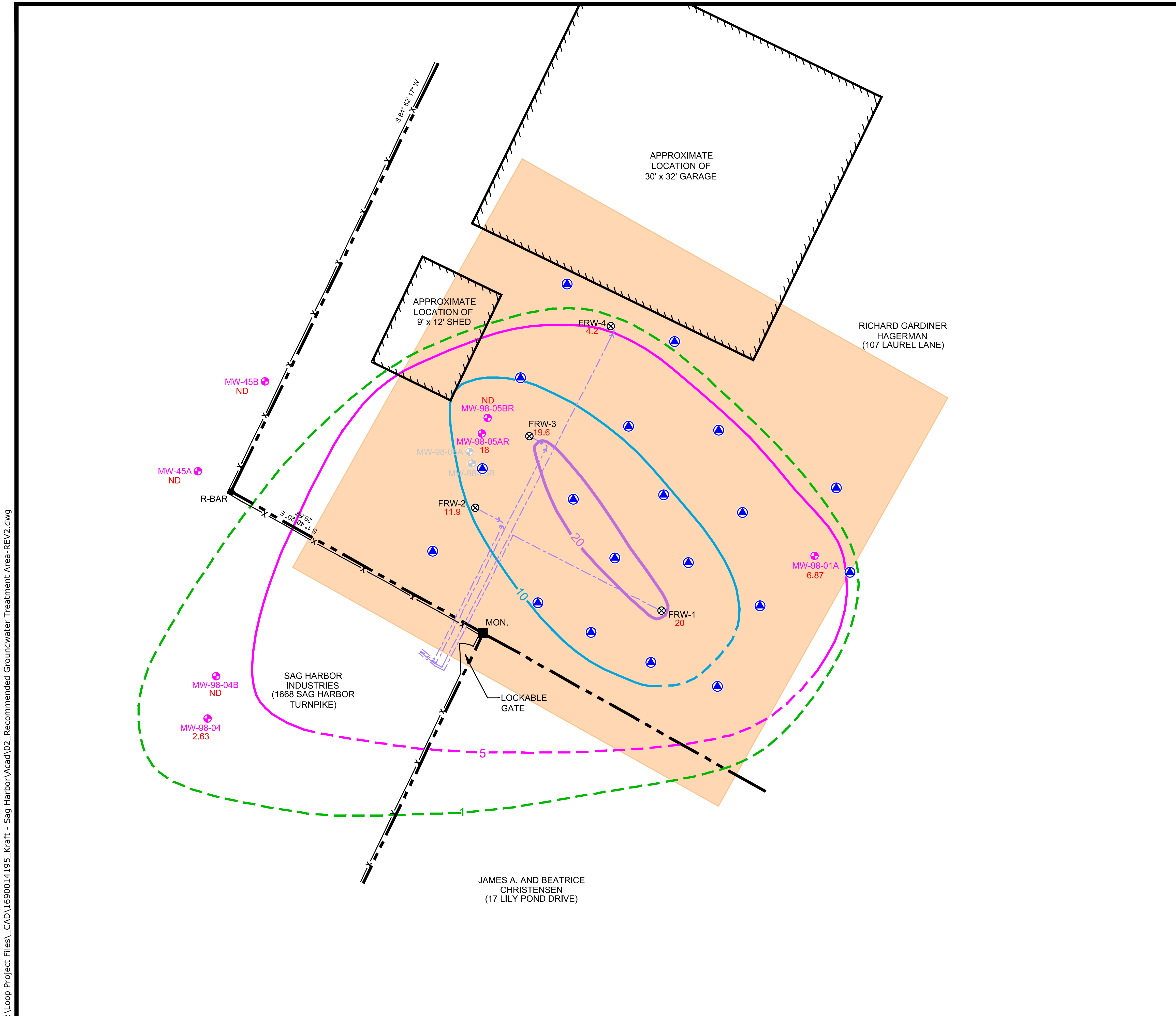
FORMER ROWE INDUSTRIES SUPERFUND SITE
1668 SAG HARBOR TURNPIKE
SAG HARBOR, NEW YORK

FIGURE
1

DRAFTED BY: HJW | DATE: 8/23/19

1690014195

L:\Loop Project Files_CAD\1690014195_Kraft - Sag Harbor\Acad\01_Site Location Map.dwg



LEGEND

- PROPERTY BOUNDARY
- CHAIN LINK FENCE
- APPROXIMATE LOCATION OF FOCUSED REMEDIATION GROUNDWATER RECOVERY PIPING
- FRW-3 — FOCUSED REMEDIATION RECOVERY WELL (APPROXIMATE LOCATION)
- MW-98-04 — GROUNDWATER MONITOR WELL
- 2.63 — PCE CONCENTRATION (ppb)
- ND — NOT DETECTED
- MW-98-05B — DAMAGED MONITOR WELL DECOMMISSIONED IN DECEMBER 2015
- 1 — PCE CONCENTRATION CONTOURS (ppb) (DASHED WHERE INFERRED)
- RECOMMENDED GROUNDWATER TREATMENT AREA
- PROPOSED INJECTION POINT LOCATION

NOTES:

1. PCE CONCENTRATION CONTOURS WERE PLOTTED FROM GROUNDWATER SAMPLES COLLECTED AT WELLS THAT HAVE SHALLOW SCREEN INTERVALS THAT SPAN THE WATER TABLE. MONITOR WELLS MW98-04B, MW98-05BR AND MW-45B ARE SCREENED DEEPER THAN THE OTHER MONITOR WELLS SHOWN ON THIS FIGURE AND DO NOT HAVE SCREENS THAT SPAN THE WATER TABLE; THEREFORE, PCE CONCENTRATIONS SHOWN AT THESE WELLS ARE NOT USED FOR CONTOURING.
2. 'R' IN WELL DESIGNATION INDICATES REPLACEMENT WELL.

0 10
SCALE IN FEET

RECOMMENDED GROUNDWATER TREATMENT AREA

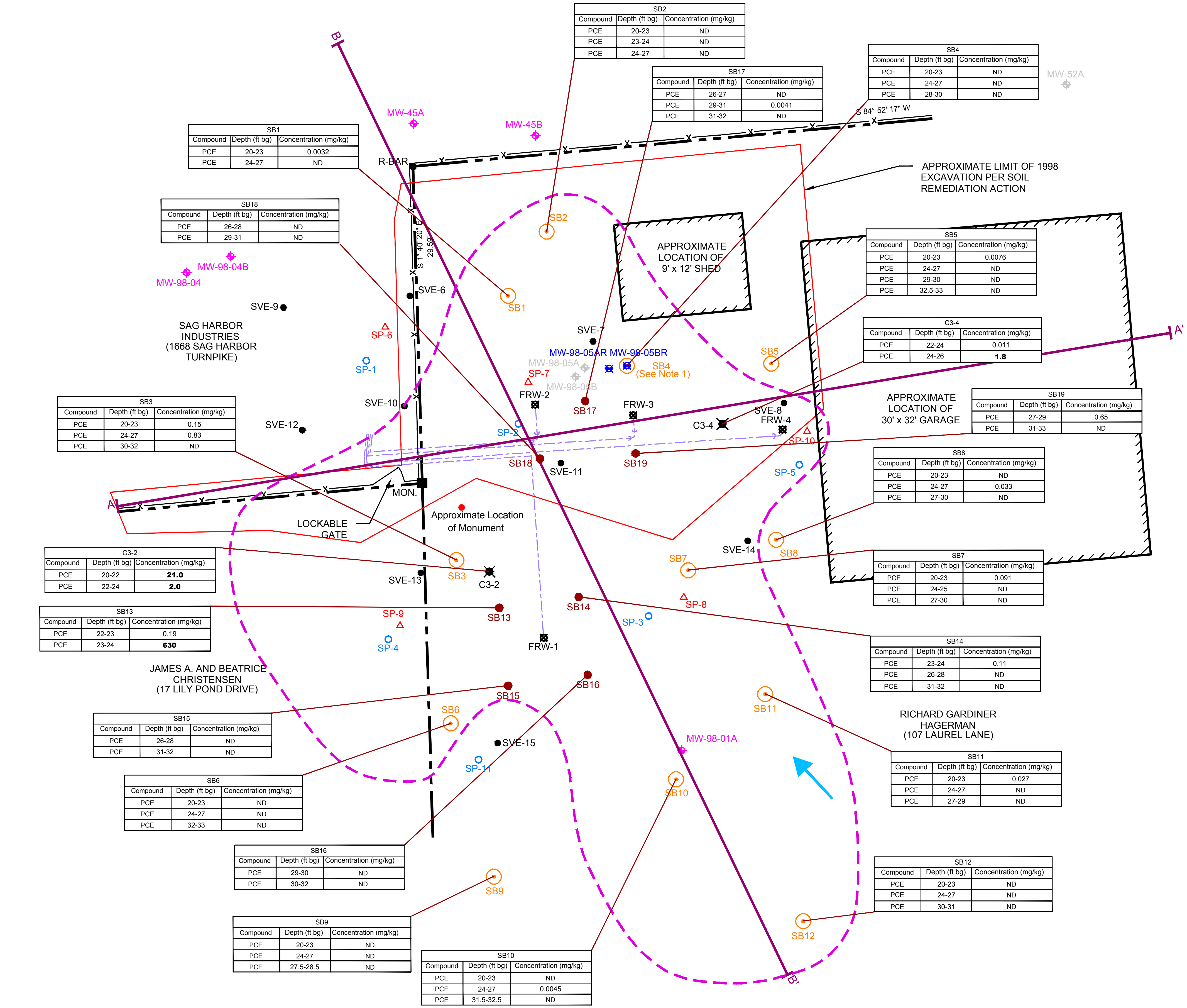
FORMER ROWE INDUSTRIES SUPERFUND SITE
1668 SAG HARBOR TURNPIKE
SAG HARBOR, NEW YORK

RAMBOLL

FIGURE
2

DRAFTED BY: HJW | DATE: 10/31/19 | 1690014195

SOURCE: WSP USA, SEPTEMBER 2018 PCE PLUME MAP, 11/06/2018.



SB2		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	ND
PCE	23-24	ND
PCE	24-27	ND

SB17		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	26-27	ND
PCE	29-31	0.0041
PCE	31-32	ND

SB4		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	ND
PCE	24-27	ND
PCE	28-30	ND

SB1		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	0.0032
PCE	24-27	ND

SB18		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	26-28	ND
PCE	29-31	ND

SB5		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	0.0076
PCE	24-27	ND
PCE	29-30	ND
PCE	32.5-33	ND

C3-4		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	22-24	0.011
PCE	24-26	**1.8**

SB19		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	27-29	0.65
PCE	31-33	ND

SB3		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	0.15
PCE	24-27	0.83
PCE	30-32	ND

SB8		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	ND
PCE	24-27	0.033
PCE	27-30	ND

C3-2		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-22	**21.0**
PCE	22-24	**2.0**

SB7		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	0.091
PCE	24-25	ND
PCE	27-30	ND

SB13		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	22-23	0.19
PCE	23-24	**630**

SB14		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	23-24	0.11
PCE	26-28	ND
PCE	31-32	ND

SB15		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	26-28	ND
PCE	31-32	ND

SB11		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	0.027
PCE	24-27	ND
PCE	27-29	ND

SB6		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	ND
PCE	24-27	ND
PCE	32-33	ND

SB16		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	29-30	ND
PCE	30-32	ND

SB12		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	ND
PCE	24-27	ND
PCE	30-31	ND

SB9		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	ND
PCE	24-27	ND
PCE	27.5-28.5	ND

SB10		
Compound	Depth (ft bg)	Concentration (mg/kg)
PCE	20-23	ND
PCE	24-27	0.0045
PCE	31.5-32.5	ND

N

LEGEND

- PROPERTY BOUNDARY
- CHAIN LINK FENCE
- APPROXIMATE LOCATION OF FOCUSED REMEDIATION GROUNDWATER RECOVERY PIPING
- APPROXIMATE EXTENT OF CLAY LENS (~25 - 33 ft.bg.)
- FRW-3 FOCUSED REMEDIATION RECOVERY WELL (APPROXIMATE LOCATION)
- MW-98-04 GROUNDWATER MONITOR WELL LOCATION
- JANUARY 2003 BORING LOCATION
- DECEMBER 2015 BORING LOCATION
- MW-98-05B DECOMMISSIONED MONITOR WELL
- REPLACEMENT MONITOR WELL INSTALLED IN DECEMBER 2015
- SP-10 SHALLOW AIR SPARGE WELL LOCATION
- SP-5 DEEP AIR SPARGE WELL LOCATION
- SVE-9 SVE WELL LOCATION
- JUNE 2018 SOIL BORING
- GENERAL DIRECTION OF GROUNDWATER FLOW

NOTES:
1. BORING SB4 WAS COMPLETED AS MW-98-05BR.
2. A BOLD VALUE INDICATES AN EXCEEDANCE OF THE ARAR.

0 10
SCALE IN FEET

FDSA TETRACHLOROETHENE CONCENTRATIONS IN SOIL

FORMER ROWE INDUSTRIES SUPERFUND SITE
1668 SAG HARBOR TURNPIKE
SAG HARBOR, NEW YORK

RAMBOLL

FIGURE 3

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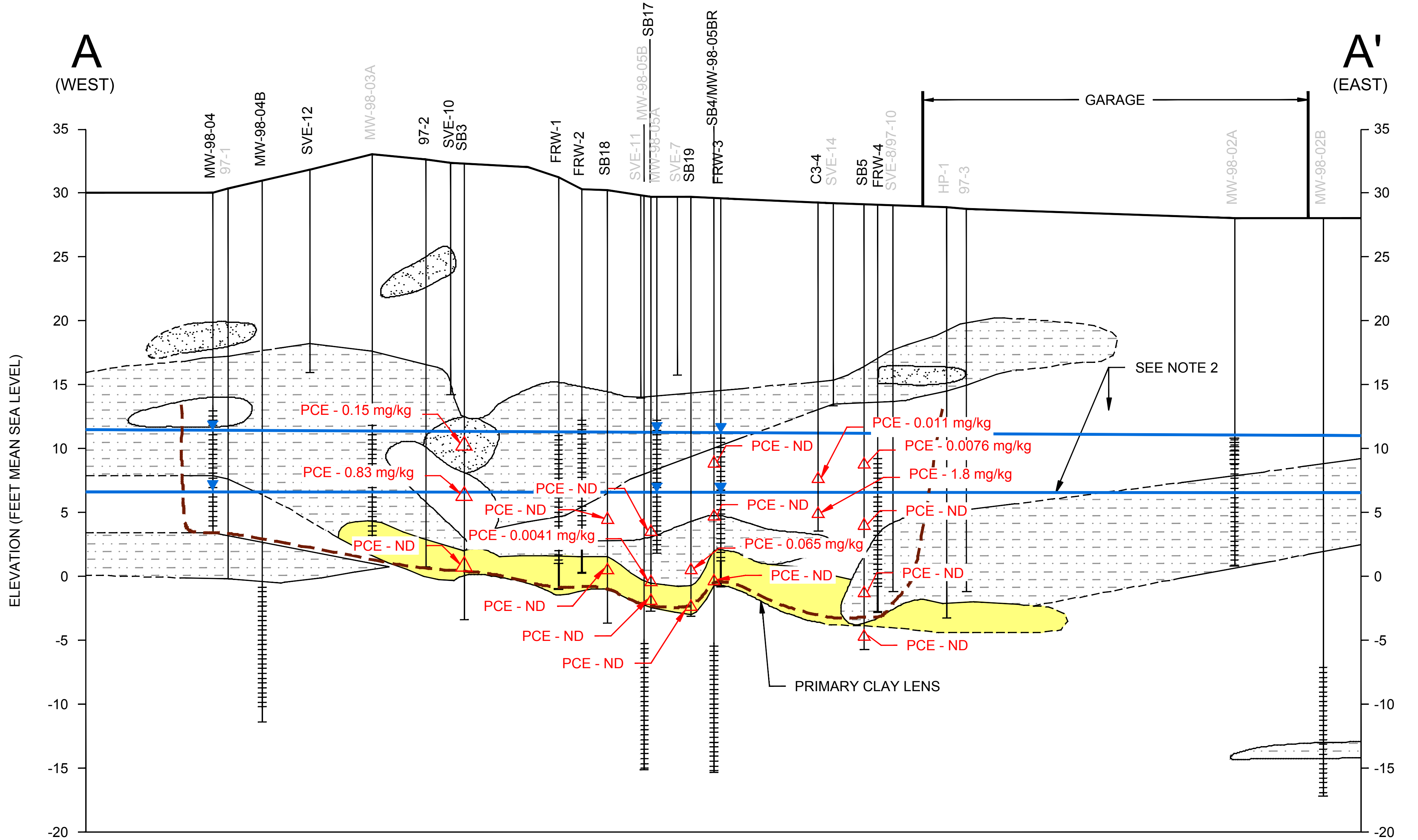
SOURCE: WSP USA, FDSA CONCENTRATIONS IN SOIL, 02/21/2019.

L:\Loop Project Files_CAD\1690014195_Kraft - Sag Harbor\Acad\03_PCE Concentrations in Soil.dwg



LEGEND

WATER TABLE ELEVATION

SCREEN SETTING

DEPTH OF BORING

FINE TO COARSE SAND

FINE TO COARSE SAND AND SILTY CLAY

FINE SAND AND SILT

SILT AND CLAY

MW-98-03A UNLOCATED OR DECOMMISSIONED MONITOR WELL, NOT USED IN DETERMINING GROUNDWATER ELEVATION, ONLY GEOLOGY

ESTIMATED GEOLOGIC BOUNDARY

APPROXIMATE BOUNDARY WHERE PCE CONCENTRATIONS IN THE GROUNDWATER EXCEED THE ARAR AT LEAST PART OF THE TIME

SATURATED SOIL SAMPLE LOCATION

NOTES:
1. HORIZONTAL CROSS SECTION LINES ARE DEPICTED ON FIGURE 1.
2. LOW AND HIGH GROUNDWATER ELEVATIONS SHOWN ARE FOR RECORDED WATER ELEVATION DATA FROM 2003 TO 2018 AND RANGE FROM APPROXIMATELY 6.1 FT TO 11 FT ABOVE MEAN SEA LEVEL.
3. BOLD VALUE INDICATES AN EXCEEDANCE OF THE ARAR.

0 10 HORIZONTAL SCALE IN FEET

0 10 VERTICAL SCALE IN FEET

FDSA CROSS-SECTION A-A'
FORMER ROWE INDUSTRIES SUPERFUND SITE
1668 SAG HARBOR TURNPIKE
SAG HARBOR, NEW YORK

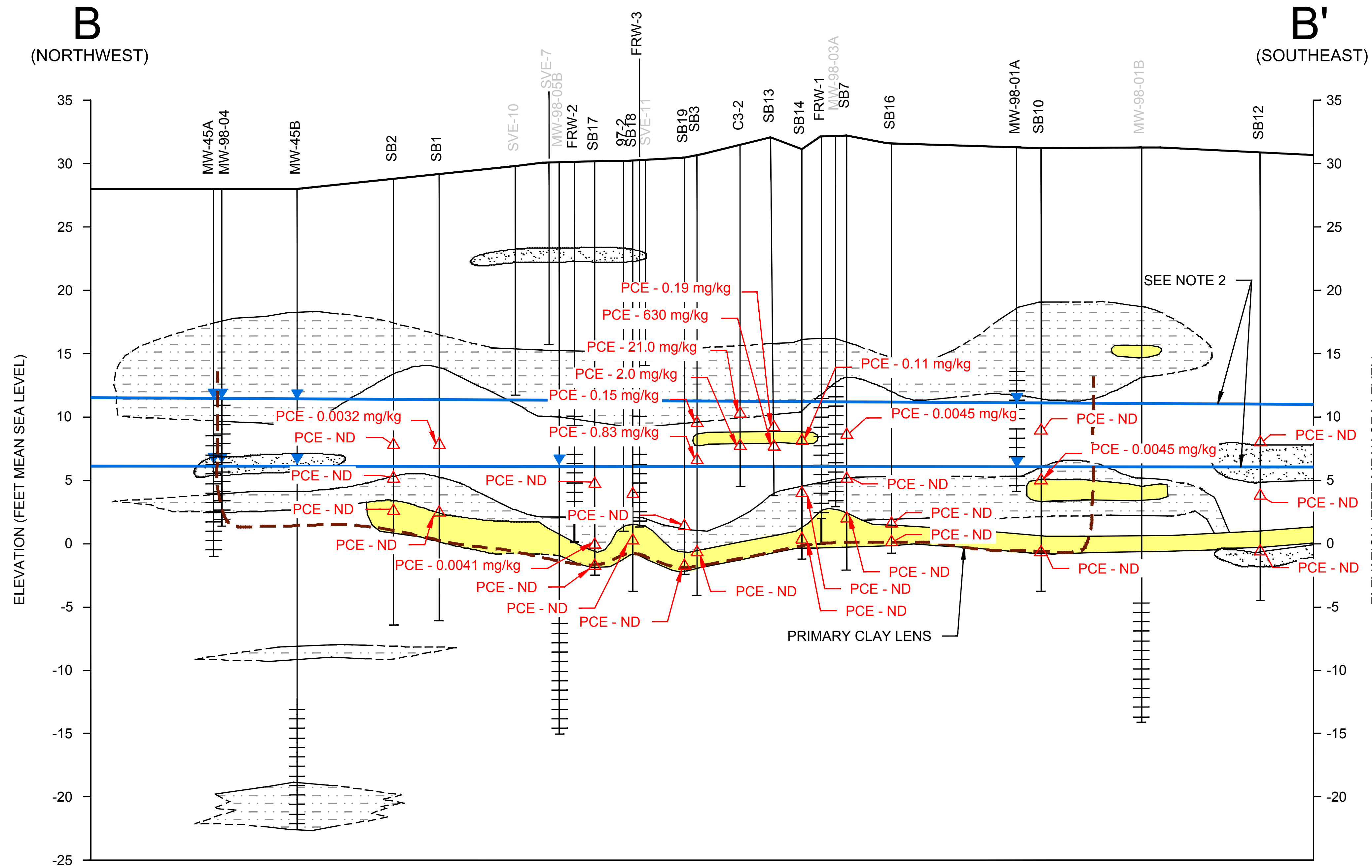
RAMBOLL

FIGURE
4

DRAFTED BY: HJW | DATE: 8/23/19 | 1690014195

SOURCE: WSP USA, FDSA CROSS-SECTION A-A', 02/21/2019.

L:\Loop Project Files_CAD\1690014195_Kraft - Sag Harbor\Acad\04_Cross-Section A-A'.dwg



<u>LEGEND</u>

WATER TABLE ELEVATION

SCREEN SETTING

DEPTH OF BORING

FINE TO COARSE SAND

FINE TO COARSE SAND AND SILTY CLAY

FINE SAND AND SILT

SILT AND CLAY

MW-98-03A UNLOCATED OR DECOMMISSIONED MONITOR WELL, NOT USED IN DETERMINING GROUNDWATER ELEVATION, ONLY GEOLOGY

ESTIMATED GEOLOGIC BOUNDARY

APPROXIMATE BOUNDARY WHERE PCE CONCENTRATIONS IN THE GROUNDWATER EXCEED THE ARAR AT LEAST PART OF THE TIME

SATURATED SOIL SAMPLE LOCATION

NOTES:

1. HORIZONTAL CROSS SECTION LINES ARE DEPICTED ON FIGURE 1.
2. LOW AND HIGH GROUNDWATER ELEVATIONS SHOWN ARE FOR RECORDED WATER ELEVATION DATA FROM 2003 TO 2018 AND RANGE FROM APPROXIMATELY 6.1 FT TO 11 FT ABOVE MEAN SEA LEVEL.
3. BOLD VALUE INDICATES AN EXCEEDANCE OF THE ARAR.

0 10 HORIZONTAL SCALE IN FEET

0 10 VERTICAL SCALE IN FEET

FDSA CROSS-SECTION B-B'
FORMER ROWE INDUSTRIES SUPERFUND SITE
1668 SAG HARBOR TURNPIKE
SAG HARBOR, NEW YORK

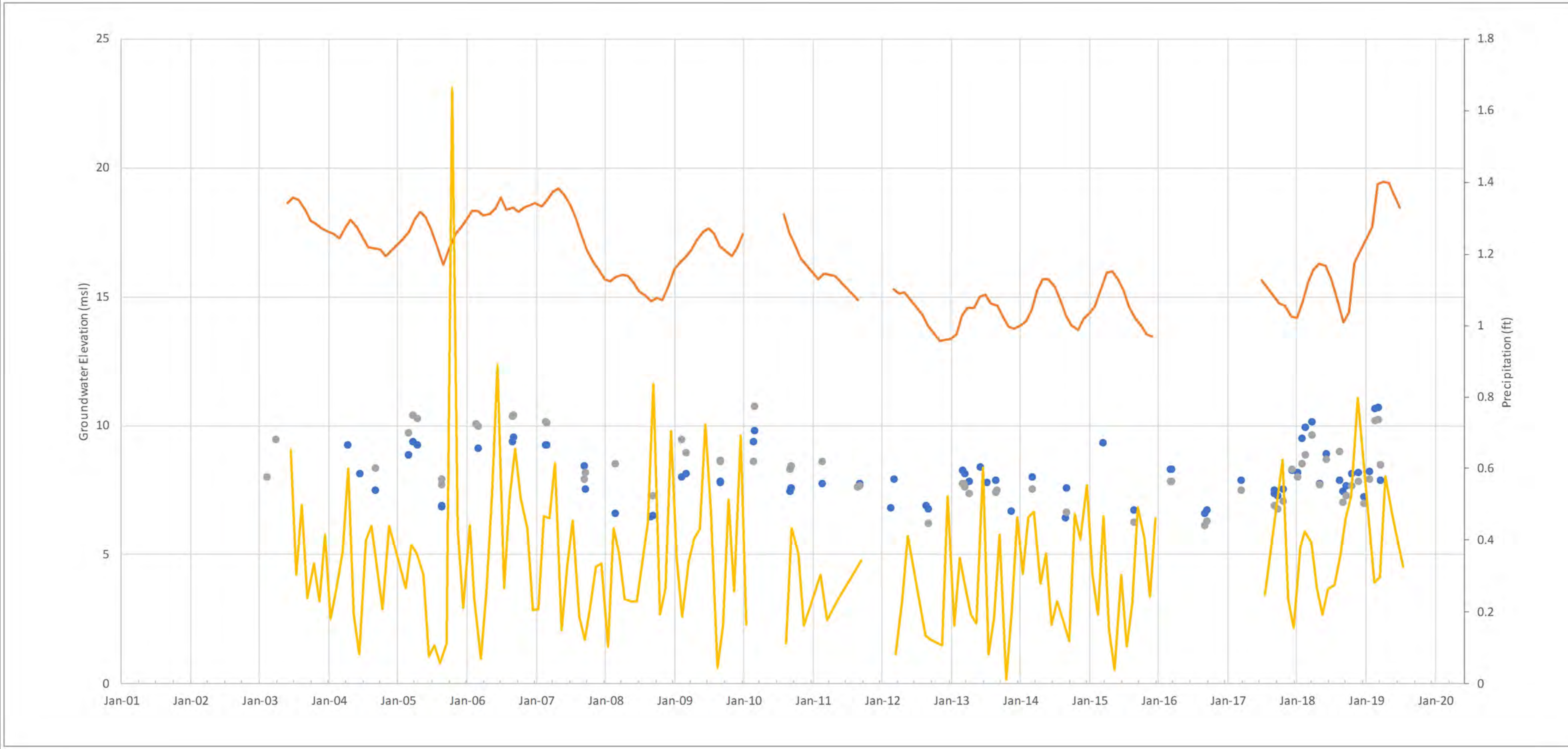
RAMBOLL

FIGURE
5

DRAFTED BY: HJW | DATE: 8/23/19 | 1690014195

SOURCE: WSP USA, FDSA CROSS-SECTION B-B', 12/19/2018.

L:\Loop Project Files_CAD\1690014195_Kraft - Sag Harbor\Acad\05_Cross-Section B-B'.dwg



LEGEND

- USGS WELL
- MW-98-04
- MW-45A
- PRECIPITATION

WATER TABLE ELEVATIONS AND MONTHLY TOTAL PRECIPITATION

FORMER ROWE INDUSTRIES SUPERFUND SITE
1668 SAG HARBOR TURNPIKE
SAG HARBOR, NEW YORK

FIGURE **6**

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L:\Loop Project Files_CAD\1690014195_Kraft - Sag Harbor\Acad\06_Water Table Elevations and Monthly Total Precipitation.dwg