# FIFTH FIVE-YEAR REVIEW REPORT FOR SEALAND RESTORATION SUPERFUND SITE TOWN OF LISBON, ST. LAWRENCE COUNTY, NEW YORK

**Prepared by**

**U.S. Environmental Protection Agency**
**Region 2**
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June 6, 2018
**Date**

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**List of Abbreviations & Acronyms**

| | |
|---|---|
| CIC | Community Involvement Coordinator |
| COPC | Contaminant of potential concern |
| CPAH | Carcinogenic polycyclic aromatic hydrocarbons |
| EPA | United States Environmental Protection Agency |
| MCL | Maximum Contaminant Level |
| µg/L | Microgram per liter |
| Mg/kg | Milligrams per kilogram |
| NYSDEC | New York State Department of Environmental Conservation |
| O&M | Operation & maintenance |
| PCB | Polychlorinated biphenyl |
| PCE | Tetrachloroethylene |
| PRP | Potentially Responsible Party |
| RA | Remedial action |
| RD | Remedial design |
| RI/FS | Remedial investigation/feasibility study |
| ROD | Record of Decision |
| SCO | Soil Cleanup Objective |
| USFWS | United States Fish and Wildlife Service |
| VOC | Volatile organic compound |

## I. INTRODUCTION

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

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

This is the fifth FYR for the Sealand Restoration site. The triggering action for this statutory FYR is the signature date of the last review. The approval date of the last review was September 27, 2013. The FYR has been prepared because hazardous substances, pollutants or contaminants remain at the site above levels that allow for unlimited use and unrestricted exposure (UU/UE)

The work at the site is being conducted as two operable units (OUs). OU1 consisted of an interim source control measure and OU2 addresses subsurface soils, contaminated groundwater and leachate. Both OUs are being addressed under this FYR.

The site's fifth FYR team was led by John DiMartino (Remedial Project Manager) and included Rachel Griffiths (hydrogeologist), Michael Clemetson (ecological risk assessor), Abbey States (human health risk assessor), and Larisa Romanowski (community involvement coordinator). The FYR began on February 20, 2018.

### Site Background

The Sealand Restoration site is in the Town of Lisbon, St. Lawrence County, New York (see Appendix A, Figure 1). The site is situated south of Pray Road, 2.5 miles southwest of the Village of Lisbon. The property, which was formerly a dairy farm, consists of two parcels of land, approximately 210 acres in total area.

The area surrounding the site is predominantly farmland, with a significant amount of wetlands drained by intermittent low-flow streams. The area is sparsely populated; however, residential homes and farmhouses can be found as close as 100 feet from the facility's property line. In the late 1970's Sealand Restoration Inc. began land-spreading wastes in open fields; the wastes were characterized as a petroleum oil-based liquid, containing generally low levels of metals and polychlorinated biphenyls (PCBs). Other areas of contamination included the cell disposal area, located in the southern part of the site (see Figure 2) and drum storage area located in the northern part of the facility, near a house and barn.

Appendix B, attached, summarizes the documents utilized to prepare this FYR.

Appendix C, attached, summarizes the site's topography, geology, and hydrogeology. For more

detail related to background, physical characteristics, geology/hydrogeology, land/resource use, and history related to the site, please refer to www.epa.gov/superfund/sealand-restoration

**Five-Year Review Summary Form**

| SITE IDENTIFICATION | | |
|---|---|---|
| **Site Name:** Sealand Restoration | | |
| **EPA ID:** NYD980535181 | | |
| **Region:** 2 | **State:** NY | **City/County:** Lisbon/St. Lawrence County |
| **SITE STATUS** | | |
| **NPL Status:** Final | | |
| **Multiple OUs?** Yes | **Has the site achieved construction completion?** Yes | |
| **REVIEW STATUS** | | |
| **Lead agency:** EPA<br>***[If "Other Federal Agency", enter Agency name]*:** | | |
| **Author name (Federal or State Project Manager):** John DiMartino | | |
| **Author affiliation:** EPA | | |
| **Review period:** 09/27/2013 - 04/30/2018 | | |
| **Date of site inspection:** 4/26/2018 | | |
| **Type of review:** Policy | | |
| **Review number:** 5 | | |
| **Triggering action date:** 9/27/2013 | | |
| **Due date (*five years after triggering action date*):** 9/27/2018 | | |

## II. RESPONSE ACTION SUMMARY

**Basis for Taking Action**

Based upon the results of the OU2 supplemental remedial investigation (RI), human health and ecological risk assessments were performed. Under the human health risk assessment's future land-use scenario, cancer risks of $2.3 \times 10^{-4}$ and $1.5 \times 10^{-4}$ were estimated for the adult and young child receptor, respectively. These risks, which were at the upper boundary of the acceptable cancer range, were mostly attributable to the ingestion of groundwater, with arsenic acting as the

major contributor. The noncancer health effect hazard index (HI) for adults and young children ingesting groundwater was estimated to be 578 and 1,350, respectively, which were well above threshold level of 1. All but 0.1% of the noncarcinogenic hazard was attributed to the use of groundwater. Acetone accounted for 99% of the noncarcinogenic hazard of the groundwater.

Twenty-nine constituents of ecological concern were identified and evaluated for potential impacts to the selected target species and aquatic biota in general. However, only two of the calculated exposure values for the target species exceeded appropriate levels for any of the constituents of ecological concern for the site. These are lead and di-n-butylphthalate. However, the data used to calculate the exposure values for di-n-butylphthalate were based on high detection limits in samples where di-n-butylphthalate was not detected. Detected concentrations of di-n-butylphthalate do not predict unacceptable exposure values. Although lead exposure in surface soil in some areas of the Site exceed ranges and typical values detected in soil samples, background levels of lead also produce unacceptable exposure levels. Concentrations of other constituents of ecological concern are at levels which did not pose an unacceptable environmental hazard.

The following contaminants of concern that were identified during the RI include acetone, tetrachloroethene (PCE), trichloroethene (TCE), vinyl chloride (VC), cis-1,2-dichloroethene (cis-1,2-DCE), 1,1,1-trichloroethane (1,1,1-TCA), 1,1-dichloroethane (1,1-DCA), and chloroethane.

## Response Actions

Response actions conducted in 1984 and 1989-90 identified and removed a total of 1,680 buried drums and 4,900 cubic yards of contaminated soils in this area.

In 1980, the New York State Department of Environmental Conservation (NYSDEC) determined that Sealand Restoration was out of compliance with its permit and ordered the facility to cease operation. In 1981, officials from Sealand Restoration signed an Administrative Consent Order with NYSDEC, under which the company agreed to take measures to address contamination at the site. However, shortly after signing this Order, Sealand Restoration, Inc. defaulted on the Order and filed for bankruptcy.

In 1984, St. Lawrence County received a $100,000 Local Assistance Grant from the New York State Legislature to perform a limited cleanup at the site. The cleanup included the removal of 133 surface drums, 60 full or partially full buried drums, 42 empty buried drums, and 150 cubic yards of contaminated soil from the cell disposal area.

From 1987 through 1988, utilizing funds from the State of New York totaling $90,000, St. Lawrence County implemented the recommended cleanup plan for the drum storage area, including: (1) removal and off-site disposal of 200 drums and the tar-like sludge from the drum storage area located near the barn including approximately 20 cubic yards of contaminated soils; (2) off-site disposal of the 5,000 gallons of waste oil in the waste oil tank; (3) dismantling and off-site disposal of the waste oil tank; (4) removal and off-site disposal of the tanker trailer; and (5) removal of small quantities of acids and miscellaneous contaminated debris (hoses, buckets, etc.).

From March 1989 to March 1990, a contractor for NYSDEC, implemented the remaining elements of the recommended cleanup plan, removing 1,445 drums, 4,762 cubic yards of contaminated soil, and 375,000 gallons of liquid from the cell disposal area, at a cost of approximately $15 million. The disposal cell was backfilled with clean soil and covered with a multilayered cap. A leachate monitoring/collection system was installed to monitor the leachate periodically and facilitate its collection, if necessary.

In August 1990, the Sealand Restoration site was included on the National Priorities List.

On September 28, 1990, EPA issued its first Record of Decision (ROD) for the site. This ROD memorialized EPA's finding that NYSDEC's OU1 removal actions, conducted in the drum storage area and cell disposal area, for the site were appropriate. The ROD also called for a supplemental RI/FS (OU2) to determine if there was a need for further cleanup work at the site.

Based upon the results of the supplemental RI (and human health and ecological risk assessments), which revealed the presence of several localized areas of groundwater contamination characterized by high levels of acetone and a volatile organic compound (VOC) plume downgradient of these areas, a ROD for OU2 was issued by the EPA on September 29, 1995. The remedial action objectives (RAOs) established for OU2 were:

- Minimize the migration of contaminated groundwater
- Restore on-site groundwater quality.

The ROD called for:

- Extraction of contaminated groundwater in the vicinity of the former cell disposal area, specifically "hot spots" in the shallow aquifer and contaminated groundwater in the bedrock aquifer, on an expedited basis;
- Ex-situ biological treatment of the extracted groundwater, followed by reinjection to the groundwater or discharge to surface water;
- Long-term monitoring of groundwater and surface water;
- Taking steps to secure that institutional controls (the placement of restrictions on the installation and use of groundwater wells at the Site and limitations on the future use of the Site) be implemented; and
- Implementation of a hydrologic and vegetation monitoring program to monitor impacts to potentially affected wetlands.

Also, the ROD called for, concurrent with the action to remediate the groundwater hot-spots, a study to determine if natural attenuation can reduce the remaining contaminants in the groundwater to maximum contaminant levels (MCLs) within an acceptable time frame. If, after implementing the hot-spot groundwater remediation, groundwater monitoring results indicate that the contaminants in the groundwater continue to exceed MCLs, and if the results of the study indicate that natural attenuation has little potential to reduce groundwater contamination to MCLs, a long-term action would be implemented. The long-term action would include:

- Extraction of contaminated groundwater in the vicinity of the former cell disposal area;

- Ex-situ biological treatment of the extracted groundwater, followed by reinjection to the groundwater or, if groundwater reinjection is not feasible, discharge to surface water;
- Chemical pretreatment, if needed, to remove inorganics prior to the biological treatment unit; and
- Long-term monitoring of groundwater and surface water.

Studies performed after the 1995 ROD resulted in modifications to the OU2 ROD. Pre-design sampling indicated that the acetone was no longer above the cleanup levels identified in the 1995 ROD. Consequently, no action to address the acetone hot spots was necessary. This decision was documented in the November 2001 Explanation of significant differences (ESD). In addition, the results of the natural attenuation study called for in the 1995 ROD indicated that while groundwater natural attenuation processes were occurring in the downgradient areas of the site, additional measures were necessary to enhance the effectiveness of the natural attenuation processes. As was noted above, the 1995 ROD required groundwater extraction and treatment if it was determined that natural attenuation could not restore groundwater to meet groundwater standards within a reasonable time frame. However, based upon aquifer testing, it was determined that the aquifer has a low permeability, which would allow the groundwater to be pumped only at a very low rate (0.05 to 0.1 gallon per minute). This would necessitate the installation of an inordinate number of extraction wells to capture the plume. Because of these findings, alternative groundwater technologies were evaluated. Based upon the technologies evaluation, a treatability study was performed to evaluate the effectiveness of a permeable reactive barrier (PRB).[1] The treatability study concluded that a PRB would be effective at the site. This finding was documented in the November 2001 ESD.

**Status of Implementation**

In September 1997, five PRPs agreed to conduct the work required in the 1995 ROD. A Consent Decree formalizing this settlement was entered by the United States District Court, Northern District of New York in February 1998.

A PRB design was approved by the EPA in September 2002. An attempt was made in October and November 2003 to construct the wall using trench boxes to hold the trench open; however, this attempt was not successful (water infiltration into the trench could not be controlled). An evaluation of other PRB installation methods was performed. Based upon this assessment, a biopolymer slurry trenching method (to prevent water infiltration) was successfully used to construct the PRB from June to July 2005.

The PRB system consists of an approximately two-foot wide, 130-foot long trench on the downgradient side of the former cell disposal area to a depth of approximately 20 feet below the ground surface. The trench is filled with a GAC/sand mixture to adsorb the VOCs that are present in the groundwater. The contaminants that are adsorbed onto the carbon are expected to degrade

[1] A PRB is a subsurface structure which allows contaminated groundwater to naturally flow through a permeable media (granular activated carbon [GAC]) which can remove contaminants from the groundwater.

over time by microorganisms that are present on the carbon. Three piezometers were installed within the PRB to monitor its performance.

**Institutional Controls**

The 1995 ROD called for the placement of restrictions on the installation and use of groundwater wells at the site and limitations on the future use of the site. The performing PRPs were not successful in their attempts to obtain a deed restriction on the site property due to uncertainties related to the ownership of the property. These PRPs, instead, filed a "Notice to Successors-in-Title" with regard to the property with the St. Lawrence County Real Property Office (County) on March 11, 2010. This filing was intended to provide perpetual notice to prospective purchasers of the restrictions and limitations set forth in the remedy for the site.

On July 15, 2016, EPA entered into a memorandum of agreement (MOA) with the County, in part to establish an enforceable proprietary control at the site. In accordance with the terms of the MOA, the County commenced a real property tax foreclosure proceeding against Sealand Restoration, Inc., and took title to the two parcels that comprise the former Sealand Restoration operations at the site on July 27, 2016.

On September 7, 2016, the County conveyed an environmental easement to NYSDEC, which identified EPA as a third-party beneficiary. The easement contains the restrictions set forth in the remedy, including the prohibition against any use of a delineated portion of the site that breaches the integrity of the cap on the former disposal cell area or the PRB, disturbs or disrupts the existing monitoring systems, or otherwise increases the potential hazard to human health or the environment. The easement also prohibits the extraction or use of groundwater at the site until groundwater standards are met.

A tax sale auction occurred on September 10, 2016, and the property was sold to the highest bidder. As per the MOA, EPA was subsequently paid 50% of the sale proceeds.

Table 1, below, summarizes the status of the institutional controls.

**Table 1**: **Summary of Implemented Institutional Controls**

| Media, engineered controls, and areas that do not support UU/UE based on current conditions | ICs needed? | ICs called for in the decision documents? | Impacted Parcel(s) | IC Objective | Title of IC Instrument Implemented and Date (or planned) |
|---|---|---|---|---|---|
| Groundwater and land use | Yes | Yes | Site property | Prohibit any use of the Property that breaches the integrity of the cap on the former disposal cell area or the PRB, disturbs the function of the | A 9/7/16 "Declaration of Covenants, Restrictions and Environmental Easement" between St. |

| | | | | | |
|---|---|---|---|---|---|
| | | | | monitoring system, and prohibits the extraction or use of groundwater at the site until groundwater standards are met. | Lawrence County and NYSDEC |

**Systems Operation/Operation & Maintenance**

An inspection/maintenance plan has been developed for the site that includes making repairs to the cap to control the effects of settling, subsidence and erosion; preventing run-on; regular inspections; as well as, mowing and fence maintenance.

Because the surface sources of the surface water contamination were eliminated and because it did not appear that contaminated groundwater was contributing contamination to the surface water, surface water monitoring was not incorporated into the monitoring plan.

Groundwater monitoring is performed to evaluate the effectiveness of the PRB and the natural attenuation processes.

In the 2015 Annual Report, submitted in summer 2016, the PRPs' consultant requested that statistical analysis be eliminated from the reporting requirements and that site monitoring be decreased from semiannual to an annual basis. The consultant noted that the assessment of trends for VOC data since 2005 in all site monitoring wells included in the statistical analysis (*i.e.*, all monitoring wells downgradient of the PRB) were either decreasing, showed no trend, or were all below the detection limits. The report also noted that hydraulic flow patterns have remained consistent in the easterly direction over the past nine years with no evidence of mounding at the PRB wall and that the PRB continues to be an effective remedy as evidenced by non-detections of VOCs at PRB-5 (the monitoring well just downgradient of the PRB, see Figures 3 and 4). In June 2016, EPA approved the change in the sampling with the caveat that if future monitoring data indicated an unexpected change in groundwater flow or groundwater quality or chemistry, the monitoring program would be revisited and revised accordingly.

During the review period, monitoring was performed on a semiannual basis (April and October) from 2013-2016 and then annually starting in May 2017. The groundwater is sampled for a select list of VOCs, total arsenic, and total manganese. Samples are collected from a monitoring well located in the leachate monitoring system concurrent with the site-wide groundwater sampling effort. Piezometers located within the PRB and adjacent monitoring wells are used to monitor groundwater elevations in the trench

Inspection and maintenance activities are performed in conjunction with the groundwater monitoring activities. During each groundwater monitoring event, an inspection log is completed to identify potential problems with site conditions. These logs are submitted to the EPA as part of the sampling reports.

Inspection and maintenance activities include ensuring that the monitoring wells are secured, locked and in good condition; ensuring that there is no ponding of water, subsidence, tree or scrub growth or signs of erosion in the vicinity of the PRB; ensuring that vegetative ground cover is in good condition and ensuring the integrity of the site fencing, gates and locks. Maintenance is performed as necessary.

Potential site impacts from climate change have been assessed, and the performance of the remedy is currently not at risk due to the expected effects of climate change in the region and near the site.

## III. PROGRESS SINCE THE LAST REVIEW

The protectiveness determinations from the last FYR are summarized in Table 2, below. While the previous FYR had no recommendations, there were some suggestions. The current status of the suggestions is summarized in Table 3, below.

**Table 2**: **Protectiveness Determinations/Statements from 2013 Five-Year Review**

| Operable Unit (OU) | Protectiveness Determination | Protectiveness Statement |
|---|---|---|
| 01 | Protective | The implemented remedy at OU1 protects human health and the environment. |
| 02 | Protective | The implemented remedy at OU2 protects human health and the environment. |
| Sitewide | Protective | The implemented remedy is functioning as intended by the decision documents and is protective of human health and the environment. |

**Table 3: Suggestions from 2013 Five-Year Review**

| Comment/Suggestion | Status |
|---|---|
| The concrete collar surrounding piezometer PRB-4 heaved approximately 2-4 inches due to the freeze/frost cycle. An inspection revealed the well casing had not moved. A new collar and surface seal need to be installed. | The concrete collar was repaired during the May 2016 field sampling event. A new collar and surface seal were installed. |

## IV. FIVE-YEAR REVIEW PROCESS

### Community Notification, Involvement & Site Interviews

On October 2, 2017, EPA Region 2 posted a notice on its website indicating that it would be reviewing site cleanups and remedies at 32 Superfund sites in New York and New Jersey, including the Sealand Restoration site. The announcement can be found at the following web address: https://www.epa.gov/sites/production/files/2017-10/documents/five_year_reviews_fy2018_final.pdf.

In addition to this notification, a notice of the commencement of the FYR was sent to local public officials. The notice was provided to the Town of Lisbon by email on March 22, 2018 with a request that the notice be posted in the municipal offices and on the Town of Lisbon webpage. The purpose of the public notice was to inform the community that EPA would be conducting a FYR to ensure that the remedy implemented at the site remains protective of public health and is functioning as designed. In addition, the notice included contact information, including addresses and telephone numbers, for questions related to the FYR process or the site.

Once the FYR is completed, the results will be made available on EPA's Sealand Restoration, Inc. webpage (www.epa.gov/superfund/sealand-restoration) and at the site repositories, which are the Lisbon Town Hall, 6963 County Route 10, Lisbon, NY 13658 and the EPA Region 2, Superfund Records Center, 290 Broadway, 18th Floor, New York, NY 10007.

### Data Review

Groundwater sampling events were conducted on a semi-annual basis for hydraulic and water quality monitoring, and as of May 2017 the groundwater sampling program was reduced to an annual basis. Eight sampling events occurred during the current FYR period (October 2013, May/October 2014, April/October 2015, May/October 2016, and May 2017). Groundwater sampling includes a select list of VOCs, metals (arsenic, calcium, magnesium, and manganese), and natural attenuation parameters.

Historical sampling results indicate the following VOCs are present within the site: PCE; TCE; VC; cis-1,2-DCE; 1,1,1-TCA; 1,1-DCA; and chloroethane. Concentrations of metals (total arsenic, total and dissolved manganese, and total and dissolved magnesium) have been detected across the site and are not site related.

#### *Shallow Overburden*

The results of the leachate samples collected from the leachate management system (LMS) indicate that, while the concentrations of the primary VOCs present within the former disposal cell (1,1,1-TCA, 1,1-DCA, cis-1,2-DCE, PCE, TCE and vinyl chloride [VC]) have decreased slightly during the review period, they are still above NYSDEC Class GA groundwater criteria (New York State water quality standards and guidance values).

Groundwater samples collected from monitoring well MW-5S, located downgradient of the LMS, indicated concentrations above the Class GA groundwater criteria (5 µg/L for each COC with

exception of VC [2 µg/L]) throughout the review period. As of May 2017, concentrations exceeding the Class GA criteria included 1,1,1-TCA (12 µg/L), 1,1-DCA (29 µg/L), cis-1,2-DCE (9.9 µg/L), PCE (220 µg/L), and TCE (51 µg/L). These concentrations are lower overall when compared to data from 2005.

There are three piezometers installed within the PRB from north to south (PRB-1, PRB-2, and PRB-3) and two situated approximately three feet upgradient (PRB-4) and downgradient (PRB-5) of the PRB. No VOCs above the Class GA criteria were detected in groundwater samples from piezometers PRB-1, PRB 3, and PRB-5 in the May 2017 sampling event. During the review period, 1,1-DCA and TCE have been detected marginally above the criteria of 5 µg/L at concentrations of 6.3 µg/L (April 2015) and 8.5 µg/L (October 2016), respectively. Analytical results from PRB-3 and PRB-5 indicate that concentrations of VOCs were below detection limits throughout the review period.

The groundwater sample collected from piezometer PRB-2 (within the PRB) during the May 2017 event indicated the presence of 1,1-DCA (18 µg/L), cis-1,2-DCE (5.4 µg/L), PCE (13 µg/L), and TCE (8.6 µg/L) above the Class GA criteria of 5 µg/L. Samples collected immediately upgradient of the PRB (adjacent to PRB-2) at piezometer PRB-4 showed VOC detections above Class GA criteria of 5 µg/L for 1,1,1-TCA (12 µg/L), 1,1-DCA (23 µg/L), cis-1,2-DCE (12 µg/L), PCE (210 µg/L), and TCE (92 µg/L) in May 2017. Again, no VOCs were detected above standards at the immediate downgradient piezometer PRB-5 indicating the PRB is functioning as intended. Concentrations of VOCs at these locations have fluctuated with no clear trend throughout the review period.

Downgradient of the PRB, seven shallow overburden wells are monitored (MW-7S, EW-2, DM-8S, EW-3, MW-8S, MW-14S and DM-10S) within approximately 80 feet of the PRB. VOCs were not detected above Class GA criteria during any of the monitoring events completed during this review period at monitoring well locations MW-7S, EW-2, DM-8S, MW-14S, and DM-10S.

Monitoring wells MW-8S and EW-3 indicated the presence of chlorinated VOCs similar to those detected in the former disposal cell leachate. Contaminant impacts in the vicinity of MW-8S and EW-3 in the shallow overburden downgradient of the PRB predate its installation. Since the PRB was installed in 2005, effectively cutting off the upgradient source, concentrations in MW-8S and EW-3 wells have shown decreasing trends that appear to be attributable to natural attenuation mechanisms as displayed on Figures 5 and 6, respectively (for illustrative purposes the figures present sampling results from 2005 – 2017 as well as just the current review period). As of the May 2017 sampling event, only two VOCs (1,1-DCA at 8.9 µg/L and TCE at 13 µg/L) still exceeded the Class GA criteria of 5 µg/L at EW-3. The May 2017 sampling results from MW-8S indicate that only 1,1-DCA exceeded its Class GA criteria of 5 µg/L at a concentration of 6.9 µg/L. These concentrations are representative of the review period, and both monitoring well locations exhibited decreasing trends of VOCs since the PRB was installed. Attenuation of VOCs downgradient of the PRB is corroborated by the presence of ethane and ethene, end products of the reductive dechlorination process.

Monitoring wells MW-10S and MW-11S are located approximately 250 feet downgradient of the former disposal cell. VOCs were not detected in monitoring wells MW-10S and MW-11S during any of the monitoring events.

Locations with concentrations of metals in excess of Class GA criteria in the shallow overburden groundwater zone include DM-8S (arsenic and magnesium), MW-7S (manganese), and MW-8S (arsenic, magnesium, and manganese). Class GA criteria for metals are 25 micrograms per liter (µg/L) for arsenic, 300 µg/L for manganese, and a guidance value of 35,000 µg/L for magnesium. The locations of metals exceedances do not correlate with COC exceedances, and do not exhibit a clear temporal trend.

Although some VOCs were detected in piezometer PRB-2 within the PRB, this has not impacted the MNA component of the remedy, as concentrations at piezometer PRB-5 were non-detect. Decreasing concentrations were observed in monitoring wells EW-3 and MW-8S immediately downgradient of piezometer PRB-2, and the baseline concentrations from 2005 indicate that the downgradient extent of contamination predates the PRB. No detections of contaminants or detections above Class GA criteria at the farthest downgradient monitoring wells (MW-10S/D and MW-11S/D) indicate that the plume is not migrating outside of the PRB, and that natural attenuation processes continue to successfully and completely degrade contaminants.

***Deep Overburden***

Three monitoring wells (MW-6I, DM-7, and MW-5I) are located upgradient of the PRB in the deep overburden depth interval, one of which (MW-5I) is situated immediately downgradient of the leachate management system (LMS). No VOCs were detected at MW-6I or DM-7 during the review period. At MW-5I, the only VOC that exceeded its Class GA criteria of 5 µg/L during the review period was chloroethane (detected at 68 µg/L in May 2017). Chloroethane has been the only exceedance of Class GA criteria at this location since 2005, and concentrations have fluctuated but exhibit an overall decreasing trend. The presence of ethane at MW-5I also indicates that groundwater from the former disposal cell area is attenuating by the time that it reaches the deep overburden depth interval.

Downgradient of the PRB, four monitoring wells (MW-7I, DM-8D, MW-8I, and DM-10D) are located within approximately 80 feet of the PRB. VOCs were not detected during any of the monitoring events in monitoring wells MW-7I, DM-8D, and DM-10D. In May 2017, 1,1-DCA (9.4 µg/L), and VC (2.24 µg/L) were the only detections in MW-8I that exceeded Class GA criteria of 5 µg/L and 2 µg/L, respectively. Throughout the review period, concentrations of cis-1,2-DCE (maximum concentration of 6.5 µg/L in April 2015) sporadically exceeded the Class GA criteria of 5 µg/L. These concentrations appear to be consistent with past detections and indicate an apparent decreasing trend when compared to historical data.

Locations with concentrations of metals in excess of Class GA criteria in the deep overburden groundwater zone include MW-5I, MW-6I, and DM-8D (magnesium) and MW-8I (arsenic, magnesium, and manganese). Class GA criteria for metals are 25 µg/L for arsenic, 300 µg/L for manganese, and a guidance value of 35,000 µg/L for magnesium. The locations of metals exceedances do not correlate with COC exceedances, and do not exhibit a clear temporal trend.

***Bedrock***

Five monitoring wells are monitored in the bedrock (monitoring wells MW-5D, MW-7D, MW-8D, MW-10D and MW-11D) downgradient of the former disposal cell. Groundwater samples collected from these monitoring wells did not exhibit any VOCs at concentrations that exceeded Class GA criteria during the review period. The presence of 1,1-DCA was detected at estimated concentrations in monitoring well MW-11D during most sampling events, but below Class GA criteria. The presence of low concentrations of 1, 1-DCA and ethane, dechlorination products, in conjunction with the absence of PCE or TCE indicate that attenuated groundwater from the upper water-bearing units has migrated to the bedrock depth interval.

No locations within the bedrock groundwater zone contained metals in excess of Class GA criteria.

**Site Inspection**

An inspection of the site was conducted on April 26, 2018. In attendance were John DiMartino (EPA) and John Pentilchuk (PRP's contractor, GHD). All site monitoring wells were inspected to verify that the locks, covers, surface seals, protective casings, and risers were intact and in good repair and no deficiencies were noted. The site fence (gates, locks) was inspected and all components are intact and in good working condition. The former cell disposal area and the PRB were then inspected and no evidence of soil subsidence, erosion or ponding of water was observed at either location.

## V. TECHNICAL ASSESSMENT

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

The remedy is functioning as intended by the RODs and ESD. The source control remedy consisted of the excavation of the contaminated cell disposal area and drum storage area, which were then backfilled and covered with a multilayered cap. This effort removed the sources of contamination in surface soils; the remaining surface soils meet New York State soil cleanup objectives. The former disposal cell has been capped to reduce migration of remaining soil contamination to groundwater. The groundwater remedy called for in the OU2 ROD, as modified by the ESD, encompasses a PRB in combination with natural attenuation to restore the groundwater to federal and state standards. The implemented response actions at the site prevent direct contact with the contaminated groundwater and soils and treat and prevent the migration of contaminated groundwater. Sampling results indicate that natural attenuation of the contaminants in the groundwater is occurring, and that the PRB appears to be functioning as intended. In addition, groundwater sampling results indicate that groundwater contamination is primarily present in the shallow overburden and despite a downward hydraulic gradient, there are limited impacts in the deep overburden. Groundwater migration into the bedrock includes only reductive dechlorination end-products from the processes occurring in the upper units. Institutional controls restricting the future use of the site protect the integrity of the remedy and prevent exposure to contaminated groundwater.

The remedy has eliminated exposure to ecological receptors by controlling the sources of contamination. The soil pathway has been addressed by maintaining the existing final cover on the disposal cell disposal area. The PRB addresses the potential contaminant migration to the adjacent surface water bodies.

***QUESTION B:*** *Are the exposure assumptions, toxicity data, cleanup levels, and RAOs used at the time of the remedy selection still valid?*

The exposure assumptions that were used to estimate the potential cancer and noncancer risks, cleanup levels and RAOs remain valid. Toxicity data for TCE and PCE have been updated since the time of remedy selection. The new oral reference dose and associated screening values do not impact the remedy selection or cleanup levels. Although specific parameters may have changed since the time the risk assessment was completed, the process that was used remains valid and is not expected to affect the remedy.

The soil and groundwater uses are not expected to change during the next five-year review period. In the 2003 FYR, vapor intrusion was evaluated based on the conservative (health protective) assumption that residences are located above the maximum detected concentrations in groundwater. The review indicated that the maximum detected concentrations of TCE and VC exceeded the upper bound of the acceptable risk range (set at 10-4 and a hazard of 1). Concentrations of these compounds have decreased over time, and VC in the shallow groundwater is now below the target groundwater vapor intrusion screening level of 15 µg/L. Concentrations of other VOCs in most of the shallow monitoring wells are below target residential groundwater screening levels, except for wells in the immediate vicinity of the PRB and leachate monitoring system which had consistent exceedances of TCE and PCE during the five-year review period. This does not indicate that a vapor intrusion problem would occur if a building were to be erected over the plume near the capped area and the vicinity of the PRB. However, further evaluation of the vapor intrusion pathway is recommended if development of the property were to occur, including site-specific considerations, such as the type of building, the location of the building relative to screening level exceedances and the subsurface characteristics at the site. Development of the property is not expected in the next five years. The land use and groundwater will be evaluated in the next FYR.

The source control remedial objective of reducing direct exposure to contaminated soils through excavation of contaminated materials, clean backfill and multilayered cap is still valid. The remedial objective for groundwater is to restore groundwater quality to levels consistent with state and federal standards and is being addressed by the PRB and natural attenuation.

Several VOCs, as well as arsenic, magnesium and manganese, remain in excess of state and federal MCLs both in the former source area and downgradient of the PRB. Arsenic, magnesium and manganese are not site-related. The evaluation of the groundwater focused on two primary exposure pathways - direct ingestion (as a potable water source) and the possibility of vapor intrusion if buildings were to be constructed over the plume. The evaluation of the direct contact pathway showed that since there are no wells in the contaminated area, there is no exposure.

As documented in the 1995 ROD, the results of the ecological risk assessment, which evaluated soil, sediment, surface water, vegetation and food, indicated that there are no unacceptable risks associated with ecological receptors contaminant exposure. Although the ecological risk assessment screening values used to support the 1995 ROD may not necessarily reflect the current values, the remedy is protective of ecological resources as the exposure to ecological receptors has been controlled by the cap and the PRB.

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

At this time, there is no information that could call into question the protectiveness of the remedy.

## VI. ISSUES/RECOMMENDATIONS

**Table 4: Issues and Recommendations**

| Issues/Recommendations |
|---|
| **OU(s) without Issues/Recommendations Identified in the Five-Year Review:** |
| **OU 01 has no issues/recommendations** |

## VII. PROTECTIVENESS STATEMENT

**Table 5: Protectiveness Statements**

| Protectiveness Statement(s) | |
|---|---|
| *Operable Unit:* OU1 | *Protectiveness Determination:* **Protective** |
| *Protectiveness Statement:* The remedy for OU1 is protective of human health and the environment. | |
| *Operable Unit:* OU2 | *Protectiveness Determination:* **Protective** |
| *Protectiveness Statement:* The remedy for OU2 is protective of human health and the environment. | |
| **Sitewide Protectiveness Statement** | |
| *Protectiveness Determination:* **Protective** | |
| *Protectiveness Statement:* The sitewide remedy is protective of human health and the environment. | |

## VIII. NEXT REVIEW

The next FYR report for the Sealand Restoration site is required five years from the completion date of this review.

## APPENDIX A: FIGURES

**FIGURE 1: SITE LOCATION**

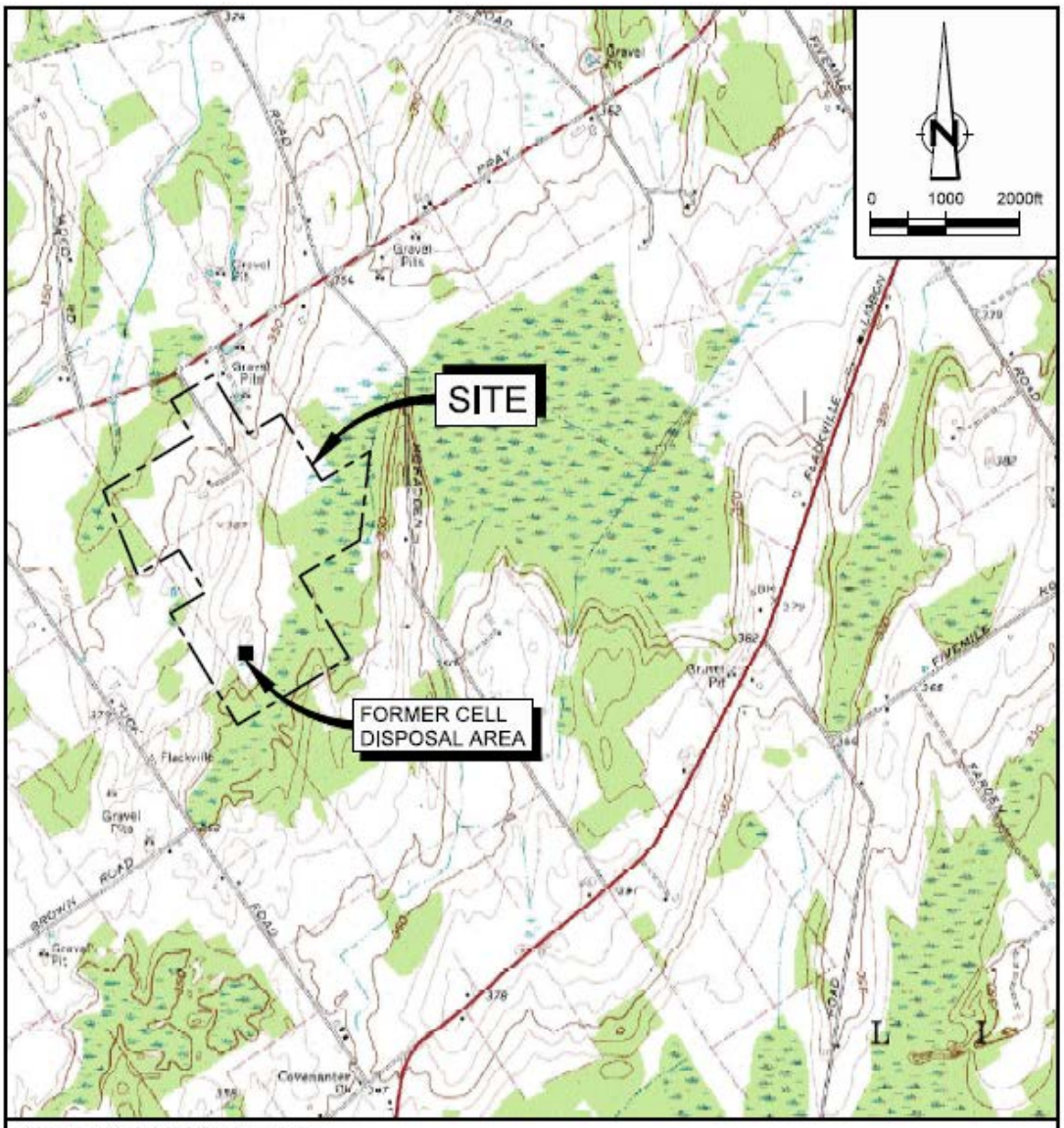

**FIGURE 2: SITE PLAN**

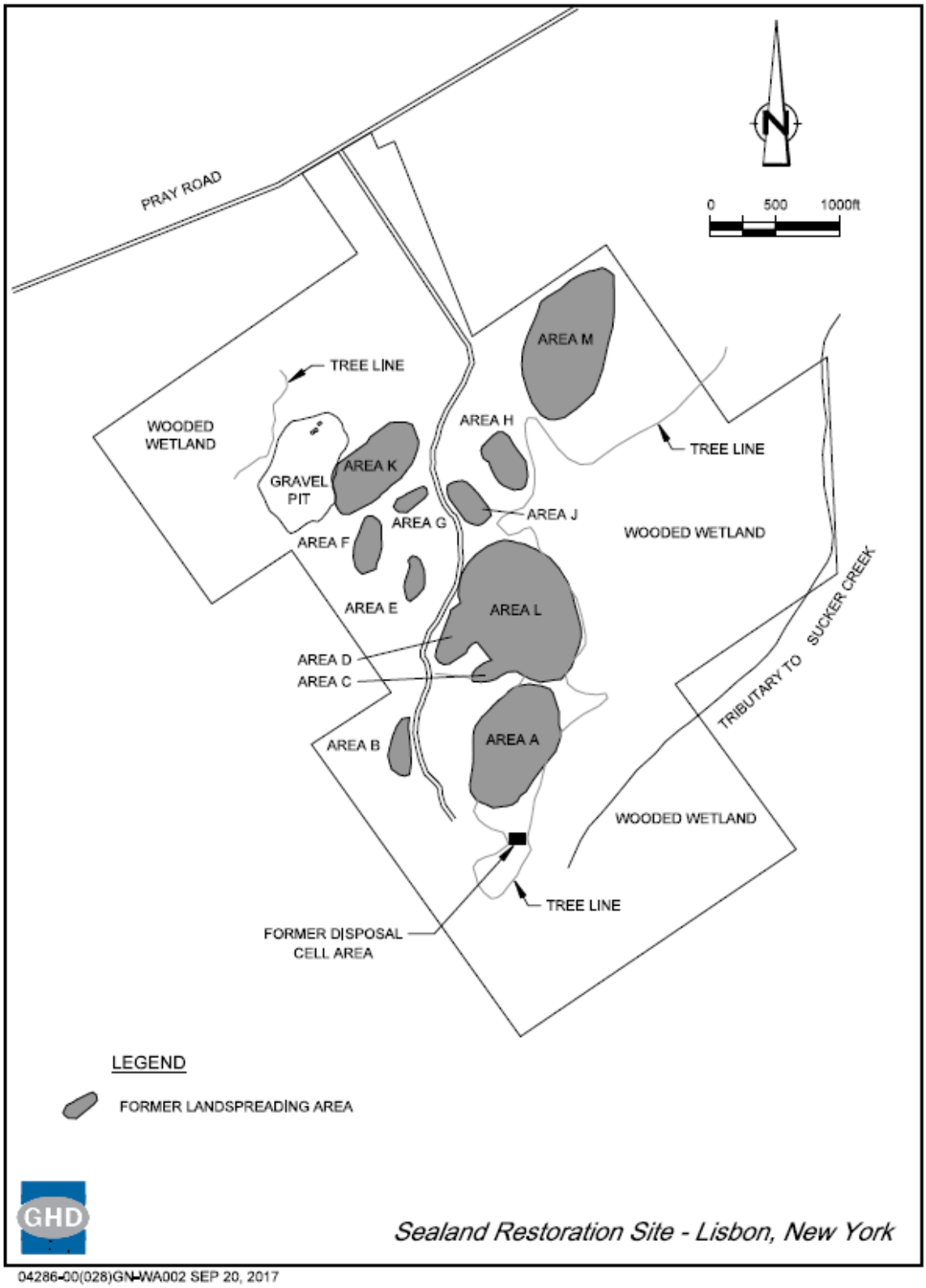


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**FIGURE 3: LOCATION OF PRB AND MONITORING WELLS**

**FIGURE 4: SHALLOW OVERBURDEN GROUNDWATER FLOW DIRECTION**

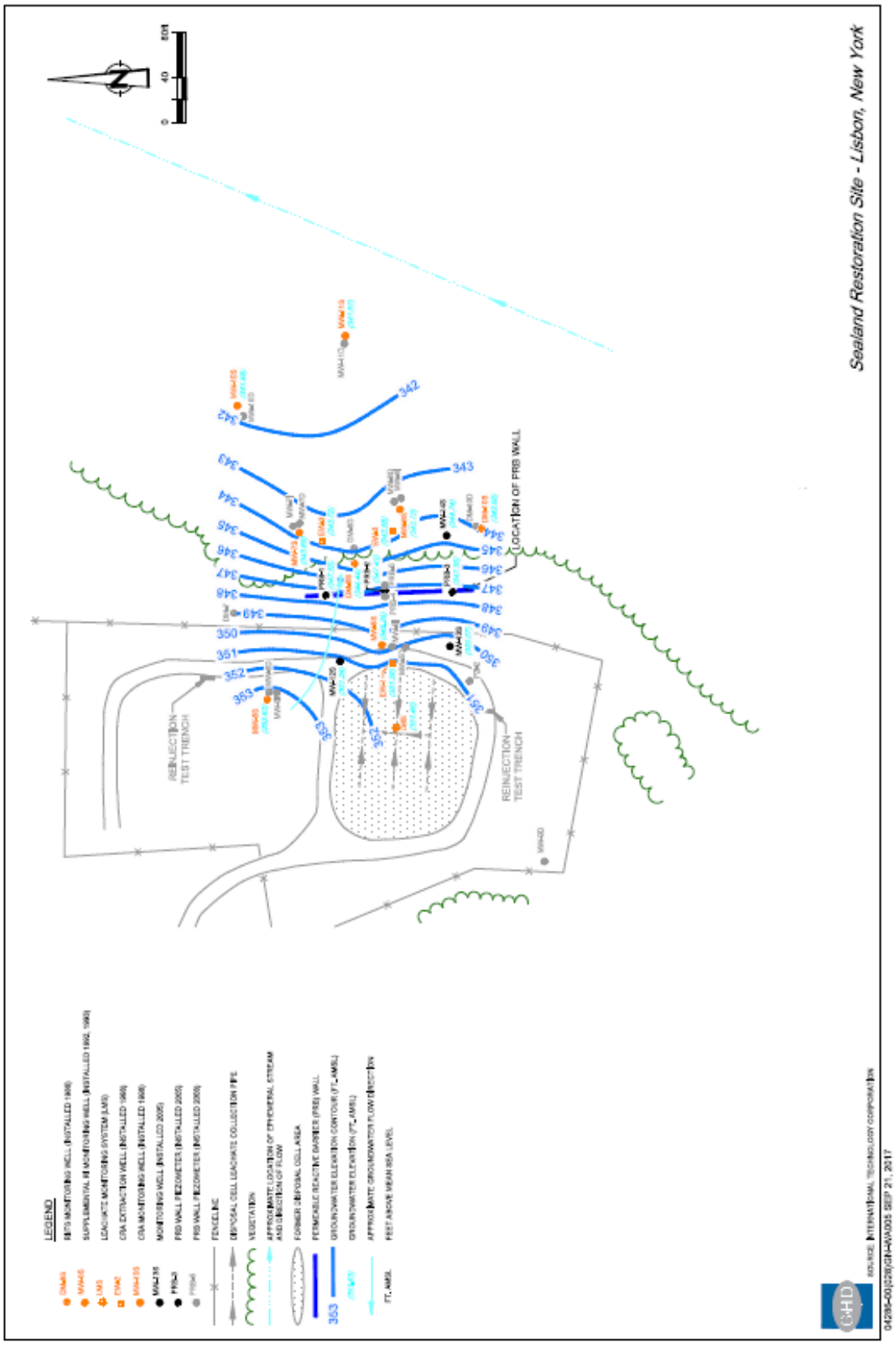
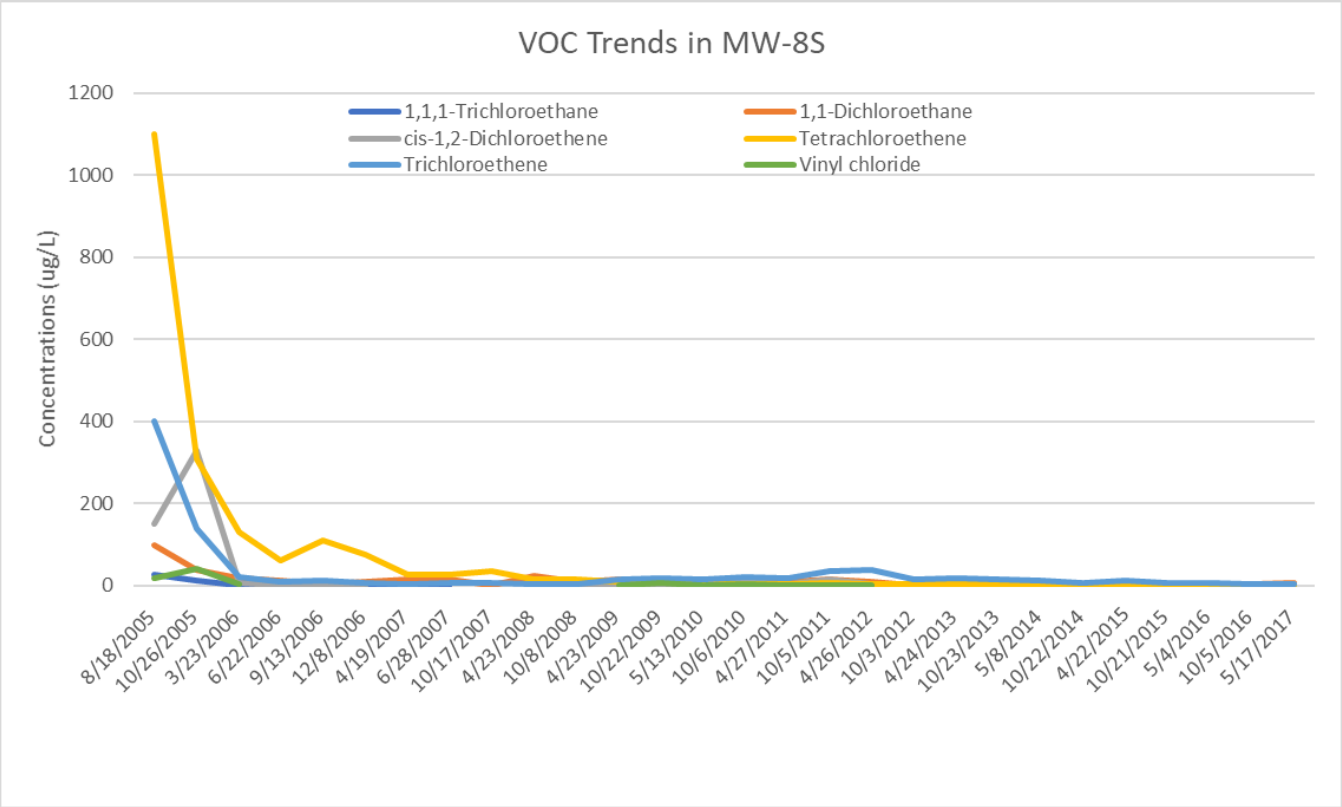


**FIGURE 5: VOC TRENDS IN MW-8S (2005-2017, 2013-2017)**



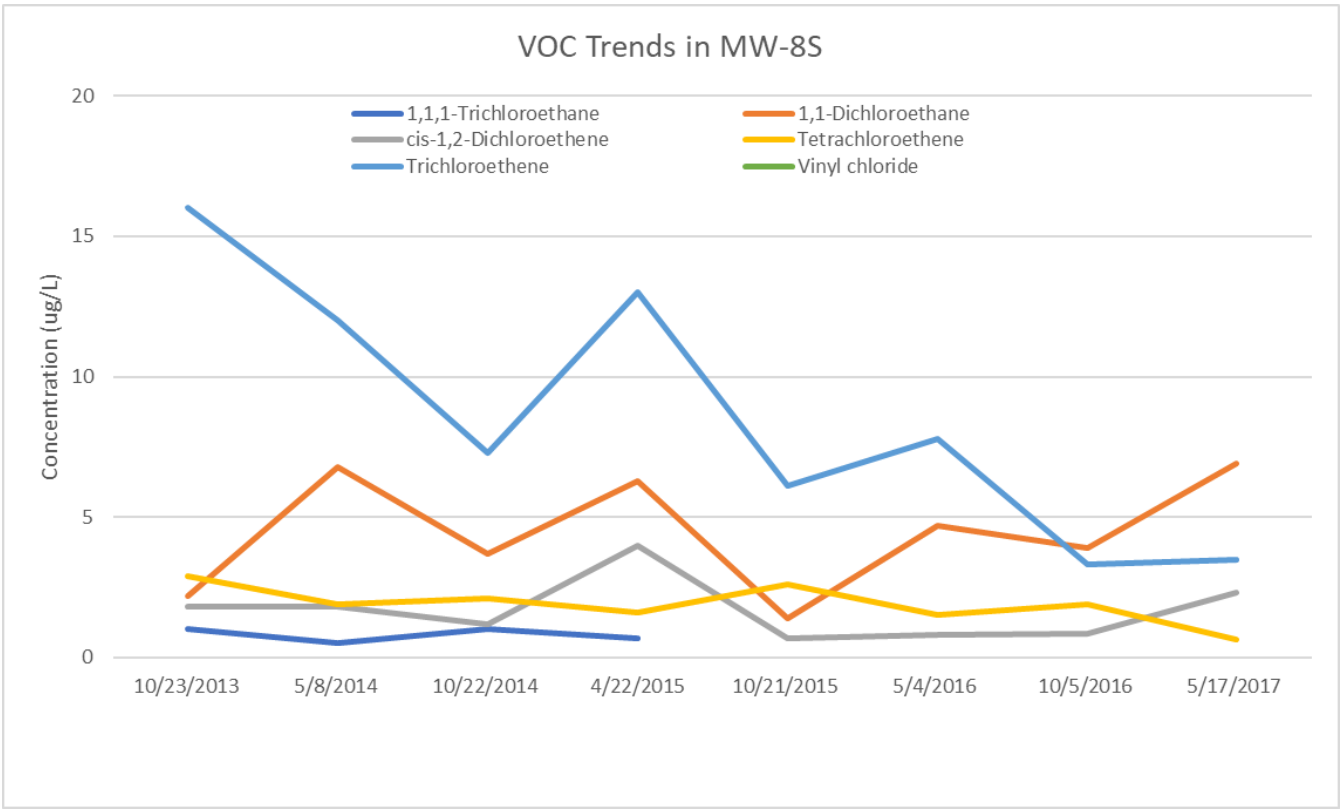
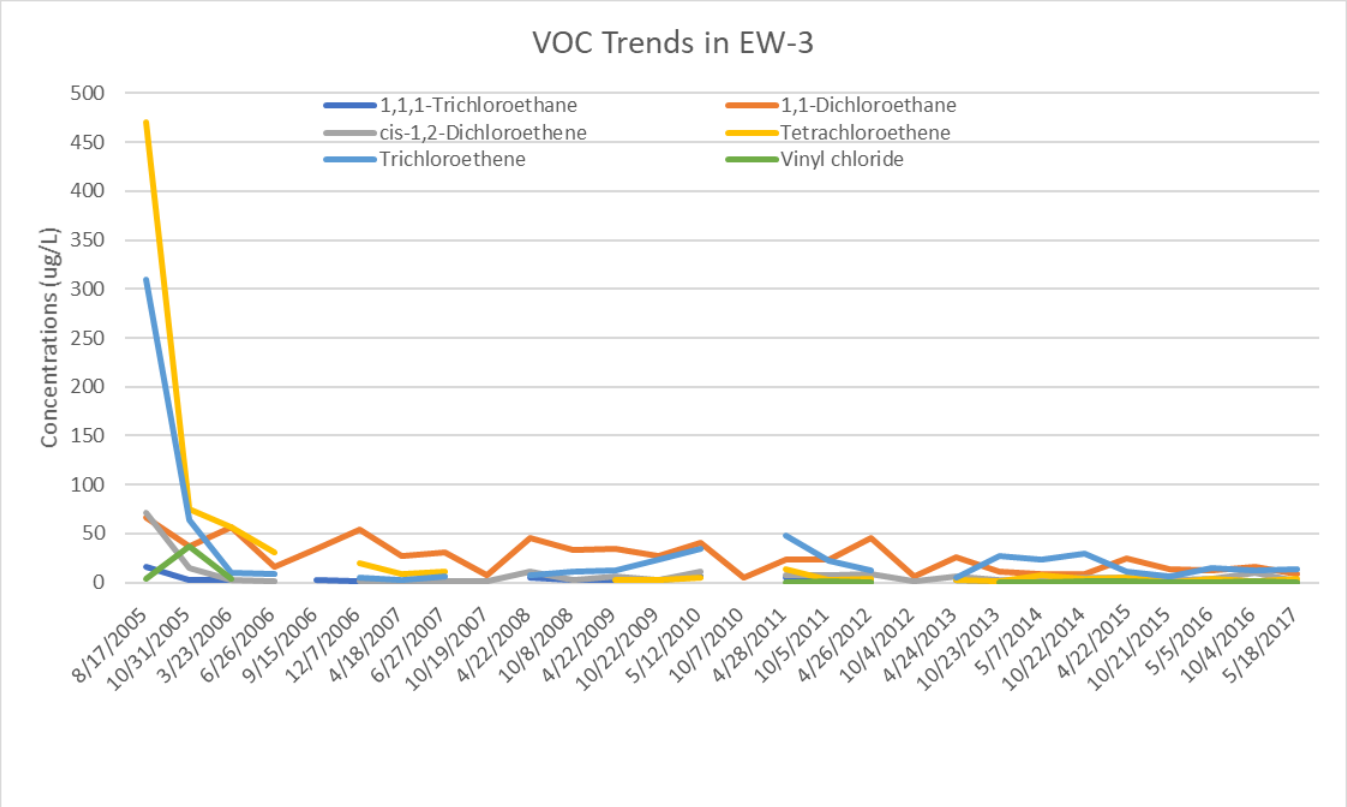
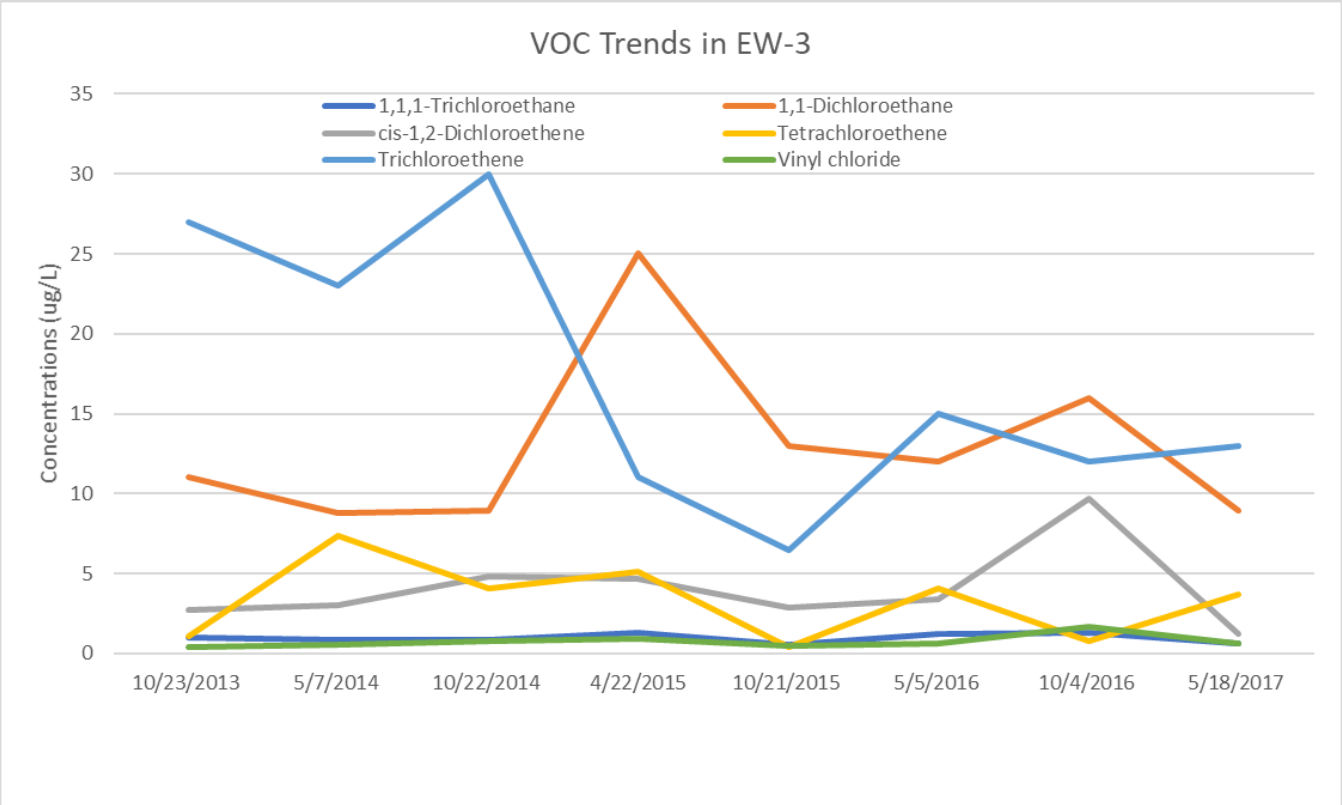



**Figure 6 – VOC TRENDS IN EW-3 (2005-2017 AND 2013-2017)**



## APPENDIX B: REFERENCES

| Table 3: Documents, Data and Information Reviewed in Completing the 5th Five-Year Review | |
|---|---|
| **Document Title (Author)** | **Submittal Date** |
| Record of Decision, EPA | 1990 |
| Record of Decision, EPA | 1995 |
| Five-Year Review Report, EPA | 1998 |
| Monitored Natural Attenuation Remedial Design Activities, Conestoga-Rovers & Associates | 1999 |
| Remedial Design Investigation Report, Conestoga-Rovers & Associates | 1999 |
| Addendum, Monitored Natural Attenuation Evaluation Remedial Design Activities, Conestoga-Rovers & Associates | 1999 |
| Evaluation of Additional Remedial Alternatives, Conestoga-Rovers & Associates | 2000 |
| Alleged Gravel Pit Investigation Report, Conestoga-Rovers & Associates | 2000 |
| Treatability and Permeable Reactive Barrier Material Section Study, Conestoga-Rovers & Associates | 2001 |
| Explanation of Significant Differences, EPA | 2001 |
| Final (100%) Remedial Design Report, Conestoga-Rovers & Associates | 2002 |
| October 2002 Leachate Monitoring System Pumping Letter Report, Conestoga-Rovers & Associates | 2002 |
| Five-Year Review Report, EPA | 2003 |
| Permeable Reactive Barrier Wall Installation Alternatives Report, Conestoga-Rovers & Associates | 2004 |
| Remedial Construction Report, Sealand Restoration Site, Conestoga-Rovers & Associates | 2006 |
| Operation and Maintenance Manual, Lisbon, New York, Sealand Restoration Site, Conestoga-Rovers & Associates | 2006 |
| Data Evaluation Report, Numbers 1-6, Tetra Tech EC, Inc. | 2006-2008 |
| September 2012 Groundwater Sampling Results, Arcadis | 2012 |
| Analytical Data Assessment and Validation Reports - Groundwater Sampling Event, Conestoga-Rovers & Associates | 2013-2017 |
| Five-Year Review Report, EPA | 2013 |

| | |
|---|---|
| Annual Reports, Sealand Restoration Site, Conestoga-Rovers & Associates | 2013-2017 |
| EPA guidance for conducting five-year reviews and other guidance and regulations to determine if any new Applicable or Relevant and Appropriate Requirements relating to the protectiveness of the remedy have been developed since the EPA issued the RODs | |

## APPENDIX C: SITE TOPOGRAPHY, GEOLOGY, AND HYDROGEOLOGY

A topographic ridge extends in a northeast-southwest direction through the site. The topographic ridge forms a surface water flow divide between the two wetlands that exist along the northwestern and southeastern portions of the site. Surface water west of the topographic ridge discharges to the northwestern wetland. The northwestern wetland drains northward beneath Pray Road and discharges to Sucker Brook located north of the site. Surface water east of the topographic ridge discharges to the southeastern wetland. The southeastern wetland drains to the northeast beneath McFadden Road to a larger wetland region, which ultimately discharges to Sucker Brook. Ephemeral streams exist within both the northwestern and southeastern wetlands that flow under wet conditions and serve to drain the wetlands.

The site geology generally consists of an overburden unit overlying dolostone bedrock. The overburden consists of fluvial sand deposits overlying a glacial till. The fluvial sand deposits are comprised of brown and gray sand with a trace to some silt. The brown fluvial sand typically overlies the gray fluvial sand. The fluvial sand deposit ranges in thickness from 0 feet to approximately 35 feet with an average thickness of approximately 15 feet. The fluvial sand deposits generally are not present along the topographic ridge extending through the central portion of the site.

A brown and gray glacial till underlies the fluvial sands. The overlying brown till is sandy and of slightly more coarse texture than the gray till. The gray till consists of very dense sand and silt with some gravel and cobbles. The glacial till deposit ranges in thickness from 0 to 53 feet with an average thickness of approximately 17 feet. Intermittent localized fluvial sand lenses are present within the glacial till. The glacial till forms a topographic ridge extending through the central portion of the site.

Within the overburden, groundwater flow occurs under unconfined conditions. The overburden groundwater flow directions correspond to topographic relief and surface water drainage patterns. Groundwater flow occurs from elevated areas associated with the above-noted topographic ridge extending through the central portion of the site toward recessed areas associated with wetlands to the southeast. Groundwater flow at the site is sustained by precipitation recharge and surface water runoff from the topographic ridge.

Groundwater flow in the shallow bedrock generally occurs under confined conditions with a northeastern flow direction over the entire site.

The topographic ridge through the central portion of the site represents a groundwater recharge area and the wetlands represent groundwater discharge areas. A former disposal cell is located on the east side of the topographic ridge within a groundwater recharge area. The southeastern wetland represents a groundwater discharge area and is located approximately 100 feet east of the former disposal cell.

In the vicinity of the former disposal cell, groundwater flow in the shallow overburden is eastward toward the wetland east of the former disposal cell. East of the wetland, groundwater flow is westward toward the wetland, demonstrating that the wetland serves as a point of groundwater discharge. Groundwater flow in the deep overburden and bedrock in the vicinity of the former disposal cell also is directed toward the wetland. Groundwater flow from the bedrock flows upward to the shallow overburden, further demonstrating groundwater discharges to the wetland.