DEPARTMENT OF THE ARMY
US ARMY CORPS OF ENGINEERS, NEW YORK DISTRICT
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24 March 2025

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Mr. Patrick Powers
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Bureau of Environmental Exposure Investigation
Empire State Plaza – Corning Tower, Room 1787
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SUBJECT: Final Ash Landfill Biowall Recharge Work Plan for the Former Seneca Army Depot in Romulus, NY; EPA Site ID# NY0213820830 and NY Site ID# 8-50-006

Dear Ms. Treinen, Mr. Powers, and Mr. Sergott:

On behalf of the Army, please find attached for your records the Final Ash Landfill Biowall Recharge Work Plan for the Former Seneca Army Depot, located in Romulus, New York. The document details the biowall recharge field activities to be conducted as part of ongoing O&M of the implemented site remedy.

If you have any questions about the attached document, please call me at 917-936-6273.

Sincerely,

HEINS.THOMAS.ROBERT.1599821364

Digitally signed by HEINS.THOMAS.ROBERT.1599821364
DN: CN=HEINS.THOMAS.ROBERT.1599821364, OU=USA, OU=PKI, OU=DoD, O=U.S. Government, C=US
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Thomas R. Heins, P.E.

Corps of Engineers, Project Manager
US Army BRAC Base Environmental Coordinator

cc: C. Heaton, CEHNC
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ASH LANDFILL BIOWALL RECHARGE WORK PLAN FINAL

Long-Term Monitoring/Land Use Control Management Former Seneca Army Depot Romulus, New York

PREPARED FOR:

U.S. ARMY CORPS OF ENGINEERS,
ENGINEERING AND SUPPORT CENTER,
HUNTSVILLE
5021 Bradford Drive East
Huntsville, Alabama 35805

CONTRACT NO. W912DY22D0131
TASK ORDER NO. W912DY22F0374

March 2025

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Ash Landfill Biowall Recharge Work Plan
Long-Term Monitoring/Land Use Control Management
Former Seneca Army Depot
Romulus, New York

Contract No. W912DY22D0131
Task Order No. W912DY22F0374

Prepared for

U.S. Army Corps of Engineers
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March 2025

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LIST OF ACRONYMS AND ABBREVIATIONS

µg/L	Microgram(s) per liter
bgs	Below ground surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	Contaminant of concern
CVOC	Chlorinated volatile organic compound
cy	Cubic yard(s)
DCE	Dichloroethene
DO	Dissolved oxygen
DPT	Direct push technology
EA	EA Engineering, Science, and Technology, Inc., PBC
EPA	U.S. Environmental Protection Agency
EVO	Emulsified vegetable oil
IBC	Intermediate bulk container
ICWP	Incinerator Cooling Water Pond
LTM	Long-term monitoring
LUC	Land use controls
mg/L	Milligram(s) per liter
mV	Millivolt(s)
NCFL	Non-combustible fill landfill
NTCRA	Non-Time Critical Removal Action
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
ORP	Oxidation-reduction potential
OU	Operable unit
PAH	Polycyclic aromatic hydrocarbon
Parsons	Parsons Engineering Science, Inc.
QAPP	Quality Assurance Protection Plan
RA	Remedial action
RDR	Remedial Design Report
RI	Remedial investigation
ROD	Record of Decision

ROI	Radius of influence

LIST OF ACRONYMS AND ABBREVIATIONS (continued)

SEAD	Former Seneca Army Depot
SWMU	Solid waste management unit
TAGM	Technical and Administrative Guidance Memorandum
TCE	Trichloroethene
TOC	Total organic carbon
USACE	U.S. Army Corps of Engineers
VC	Vinyl chloride
VOC	Volatile organic compound
ZVI	Zero valent iron

1. INTRODUCTION

1.1 SITE SPECIFIC PROJECT BACKGROUND

This Work Plan is for the Ash Landfill Operable Unit (OU), Former Seneca Army Depot (SEAD), located in Romulus, New York (**Figure 1**). This Work Plan describes the technical approach that will be implemented at the Ash Landfill for a recharge of the site's existing biowalls.

A biowall recharge was recommended following the Year 18 review due to geochemical conditions in the biowalls trending in a direction where a second recharge is necessary (EA 2024b). The recharge will extend the lifespan of the remedial action (RA) completed in October and November 2006 in accordance with the Final Record of Decision (ROD) for the Ash Landfill (Parsons 2004), the Remedial Design Work Plan (Parsons 2006a), and the Remedial Design Report (RDR) (Parsons 2006b).

1.2 WORK PLAN ORGANIZATION

The purpose of this Work Plan is to detail the means and methods that will be implemented during biowall recharge field activities. The Work Plan is organized into the following sections as follows:

- Section 1 – Introduction (current section)
- Section 2 – Site Background
- Section 3 – Biowall Recharge Field Activities
- Section 4 – Reporting
- Section 5 – References

2. SITE BACKGROUND

2.1 SITE DESCRIPTION

SEAD is a 10,634-acre former military facility located in Seneca County near Romulus, New York, that was owned by the United States Government and operated by the Department of the Army from 1941 until 2000. SEAD is located between Seneca Lake and Cayuga Lake and is bordered by New York State Highway 96 to the east, New York State Highway 96A to the west, and sparsely populated farmland to the north and south.

The Ash Landfill OU is composed of five historic solid waste management units (SWMUs). The five SWMUs that comprise the Ash Landfill OU are the Incinerator Cooling Water Pond (SEAD-3), the Ash Landfill (SEAD-6), the non-combustible fill landfill (NCFL) (SEAD-8), the former Debris Piles (SEAD- 14), and the former Abandoned Solid Waste Incinerator Building (SEAD-15) (**Figure 2**).

2.2 RECORD OF DECISION AND REMEDIAL OBJECTIVES

The selected remedy for the Ash Landfill OU consisted of one source control and one migration control. The goal of the selected remedy was to remove potential sources of soil and groundwater contamination. The selected remedy consists of the following elements (Parsons 2004):

- Excavation and off-site disposal of Debris Piles, and establishment and maintenance of vegetative soil cover for the ash landfill and NCFL for source control.
- Installation of three in-situ permeable reactive barrier walls, maintenance of the proposed walls and existing walls for migration control of the groundwater plume.
- Back filling and re-grading the Incinerator Cooling Water Pond (SEAD-3) to fill the pond during the excavation of the debris piles.
- Development of a Contingency Plan to include one of the following options; provision of an alternative water supply for potential downgradient receptors (farmhouse) or air sparging of the plume in the event that groundwater conditions downgradient of the recommended remedial action described above exceed trigger values.
- Land Use Controls (LUCs) to attain the remedial objectives.
- Completion of a review of the selected remedy every five-years (at minimum), in accordance with Section 121(c) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCL). If a wall material other than iron is selected, the Army will conduct a review of the remedy's effectiveness one year after the walls are installed. Subsequent annual reviews will be performed until the first five year review. The typical five year review schedule will be followed thereafter.

Site specific remedial action objectives were established for the Ash Landfill OU between New York State Department of Environmental Conservation (NYSDEC), United States Environmental Protection Agency (EPA), and the United States Army Corps of Engineers (USACE) (Parson 2004). The remedial action objectives for soil are the following:

- Mitigate exposure pathways for dermal contact on ingestion of VOCs, metals, and PAHs for current and intended future site use scenarios, thereby decreasing risk to human health and ecological receptors.

The remedial action objectives for groundwater are the following:

- Comply with applicable or relevant and appropriate requirements for New York States Class GA groundwater quality standards and federals Maximum Contaminant Levels.
- Reduce and improve non-carcinogenic and cancer risk levels for current and intended future receptors.
- Prevent Exposure of off-site receptors through possible off-site migration of volatile organic compound (VOC) plume.

2.3 SUMMARY OF THE REMEDIAL ACTION

2.3.1 Biowalls

Three biowall pairs were installed as part of the remedial action to address groundwater contamination on-site and installation activities are documented in the Construction Completion Report (Parsons 2007). The biowalls were constructed by excavating linear trenches to competent bedrock then backfilling each trench to the ground surface with a mixture of bark and tree mulch, soybean oil and sand. The biowall installation was completed in October 2006.

Biowalls A1/A2, B1/B2, and C1/C2 were constructed perpendicular to groundwater flow and the longitudinal direction of the chlorinated solvent plume at the locations prescribed in the RDR, shown on **Figure 2** (Parsons 2006b). The entire length of Biowalls A1/A2 and the northern portion of B1/B2 were combined into a single double-width trench (minimum of 6 feet in width) due to unstable soil conditions that caused sidewall collapse and trench widening. Approximately 2,840 linear feet of biowalls were constructed in the areas downgradient of the Ash Landfill at depths ranging from 7 to 18.5 feet bgs.

A 12-inch soil cover was placed over the entire length of the biowalls to impede surface water from preferentially infiltrating into the biowalls. Trench spoils were used as the cover material and were compacted with a backhoe.

2.3.2 Incinerator Cooling Water Pond

As specified in the RDR, the ICWP was re-graded to meet the surrounding grade to prevent the accumulation of water in this inactive pond area. Prior to regrading, the vegetation on the berms surrounding the ICWP was removed with an excavator. The soil berm was then regraded with a bulldozer to match the surrounding grade. The ICWP was seeded with a standard meadow mix to promote revegetation and to prevent erosion.

2.3.3 Ash Landfill and NCFL Vegetative Cover

A soil cover comprised of mulch, biowall trench spoils that met the site cleanup criteria, and off-site topsoil was placed over the 2.2 acres of the Ash Landfill. The Ash Landfill was covered with 4,380 cubic yards (cy) of fill to achieve a minimum cover thickness of 12 inches. Biowall trench spoils that met the site cleanup criteria and off-site topsoil were also placed over the 3.4-acre NCFL. The NCFL was covered with 6,015 cy of fill to achieve a minimum cover thickness of 12 inches. The purpose of the covers is to prevent terrestrial wildlife from directly contacting or incidentally ingesting impacted soils.

2.3.4 Debris Pile Removal

During the RA, approximately 200 cy of debris was removed from Debris Piles B and C. Approximately 1,000 cy of debris was removed from within and beyond the staked limits of Debris Pile A. The total volume of debris removed was approximately 1,200 cy (1,548 tons).

2.4 DESCRIPTION OF TECHNOLOGY USED IN BIOWALLS

Biologically mediated reductive dechlorination is the most important process for natural or enhanced biodegradation of highly chlorinated solvents (EPA 1998) (**Figure 3**). The biowalls installed at the site were constructed to enhance biodegradation. Complete dechlorination of TCE and other chlorinated solvents to the non-regulated end product ethene/ethane is the goal of anaerobic biodegradation.

Biodegradation causes measurable changes in groundwater geochemistry that can be used to evaluate the effectiveness of substrate addition in stimulating biodegradation. For anaerobic reductive dechlorination to be an effective process, groundwater geochemical conditions must be anoxic and ideally in the sulfate-reducing or methanogenic geochemical range. Thus, groundwater in which anaerobic reductive dechlorination is occurring should have the following geochemical signature:

- Depleted concentrations of dissolved oxygen (DO), nitrate, and sulfate
- Elevated concentrations of manganese, ferrous iron, methane, carbon dioxide, chloride, and alkalinity
- Reduced ORP.

Based on long-term monitoring (LTM) data, the biowall system was recharged in 2017 and is described in Biowall Recharge Completion Report (Parsons 2018).

3. BIOWALL RECHARGE

3.1 OVERVIEW

The primary objective of this biowall recharge is to replenish the organic carbon content in the Ash Landfill biowalls. The biowalls were previously recharged in 2017 which prolonged the operational lifespan of the remedy by an additional 7 years prior to requiring further recharge. The biowall recharge is intended to extend remedy effectiveness by another 5-7 years.

The 2017 recharge was accomplished through the installation and use of 68 biowall recirculation wells (**Figure 4**) within the biowalls to recirculate a mixture of site groundwater, emulsified vegetable oil (EVO), and pH buffer. (Parsons 2018). This recharge event will be a one pore volume injection of a dilute EVO solution using the existing biowall wells and via direct push (DPT) injection points equally spaced between the biowall wells. During the installation of recirculation wells as part of the 2017 recharge event, an increase of fines was observed within the wall, likely attributed to the lack of a geotextile fabric on top of the biowalls. The increase of fines within the walls lead to a reduced pore volume than originally proposed. To account for the potential of an additional increase of fines within the biowalls, the recharge amendment will be applied using DPT injection points between biowall wells to ensure uniform lateral distribution across the biowalls.

3.2 MOBILIZATION, MATERIAL STORAGE, AND LAYDOWN AREA

An area approximately 100 feet by 100 feet located north of Smith Vineyard Road and east of A1/A2 biowalls will be used as a material storage and equipment laydown area (**Figure 5**). Staged equipment will include two 6,300-gal water tanks, a 20,000-gallon water tank, three 275-gallon intermediate bulk container (IBC) totes for mixing the EVO solution, four 2-inch trash pumps for mixing and injecting, hoses for the mixing and injection process, and a telehandler forklift for moving material and injection totes across the site. All materials that will be utilized to create the EVO substrate will be delivered to the site on pallets and will be staged next to the water tanks prior to use.

3.3 BIOWALL RECHARGE APPROACH AND PROCESS MONITORING

The biowall recharge will consist of injecting one pore volume of EVO solution consisting of potable water, EVO, pH buffer, dechlorinator, and oxygen scavenger into each biowall (**Table 1**). Pore volumes for each biowall were calculated during the first biowall recharge event in 2018 (Parsons 2018). To ensure the pore volume is achieved in each biowall, the target volume will be 10% greater than the calculated pore volume. The EVO solution will be injected under low pressure into the existing biowall wells as well as through DPT injection points equally spaced between the biowall wells. Due to the presence of fines observed within the biowalls during the first biowall recharge (Parson 2018), the spacing injection points between each biowall well will be determined during the initial injection test. The initial injection test will help determine if physical conditions of the wall have changed since the 2017 biowall recharge as well as what radius of influence (ROI) will be achieved within the biowalls.

The initial injection test injection volume will be based on two DPT injection points spaced approximately 15 feet apart between two biowall wells. Two 1-inch temporary wells will be installed within the biowall, 5 and 10 feet (TW-05 and TW-10), away from an existing biowall well (BW-B1-15) and 440-gallons of EVO solution will be injected into the biowall well (**Figure 6**). Prior to the start of the initial injection test, baseline parameters will be recorded from each of the two temporary wells utilizing a peristaltic pump to collect groundwater. Parameters will include a visual inspection and specific conductivity reading using a Horiba-U-52 or similar water quality meter. When the EVO reaches a temporary well the water extracted will be white in color and have elevated conductivity readings when compared to the baseline parameters. Once the process monitoring injection begins, parameters will be collected every 5 minutes at TW-05. Once the EVO solution is observed in TW-05, parameters will begin to be collected at the same intervals at TW-10. If the EVO solution is observed in TW-10 following the 440-gallon injection, the recharge will consist of two DPT injection points between biowall wells spaced approximately 15-feet apart, herein referred to as Recharge Approach A (**Figures 7 through 9**). If the EVO solution is observed in TW-05 and not TW-10, the spacing of DPT injections points will be reduced to 11.5 feet to account for the smaller observed ROI, herein referred to as Recharge Approach B (**Figures 10 through 12).** Recharge Approach A and Recharge Approach B will be discussed in **Sections 3.4**.

3.4 RECHARGE APPROACH A AND B

Recharge Approach A will consist of injecting one pore volume of 5.5% EVO solution into 68 biowall wells and 131 DPT injection points across the A1/A2, B1/B2, and C1/C2 biowalls (**Figures 7 through 9**). Injection volumes for each biowall well and DPT injection point varies between the three biowalls and is based on the pore volume and number of total injection locations. Details on biowall specific injection volumes for Recharge Approach A are detailed in **Table 2**.

Recharge Approach B will consist of injecting one pore volume of 5.5% EVO solution into 68 biowall wells and 190 DPT injection points across the A1/A2, B1/B2, and C1/C2 biowalls (**Figures 10 through 12**). Injection volumes for each biowall well and DPT injection point varies between the three biowalls and is based on the pore volume and number of total injection locations. Details on biowall specific injection volumes for Recharge Approach A are detailed in **Table 3**.

By adding DPT injection points and decreasing the point spacing with Recharge Approach B, it will ensure uniform distribution of the EVO solution throughout the entire volume of the biowall if the expected lateral distribution is not achieved during the initial injection test.

3.5 EQUIPMENT SETUP AND EVO SOLUTION PREPARATION

Water will be delivered to the site from a New York State Department of Health (NYSDOH) certified bulk water hauler and will be staged in the 20,000-gallon tank prior to mixing. The water will then be transferred to the 6,300-gallon tanks where the EVO solution will be mixed to create a 5.5% EVO solution. The EVO solution will be prepared by using a 2-inch trash pump to mix 4615-gallons of water, 275-gallons of EVO, 110-gallons of pH buffer, 5-gallons of oxygen scavenger, and 0.5 ounces (2 teaspoons) of dechlorinator. The EVO solution will be recirculated until DO reaches 1.0 mg/L. EVO Solution Mixing Logs will be completed for each mixed batch. Mixing logs are provided in **Attachment 1**.

Once mixing is complete, the EVO solution will be injected into the biowall wells and DPT points using a 2-inch trash pump. Well heads and DPT tooling will be equipped with pressure gauges, flow meters, and totalizers to monitor injection performance and production at each injection location.

3.6 INJECTION PROCESS

From the laydown area, the EVO solution will be transferred to 275-gallon IBC totes and the totes will be placed next to the biowall wells or DPT points using a telehandler forklift. DPT points will be installed by driving a five-foot perforated drill rod until refusal which marks the bottom of the biowall. Both biowall wells and DPT points will be equipped with a well head consisting of a pressure gauge, gate valve, flow meter, and totalizer. The following data will be collected at each injection location and recorded in an EVO Solution Injection Log (**Attachment 2**):

- Injection location identification
- Depth and/or screen interval
- Injection date
- Injection start and end times
- Start and end totalizer readings (if possible, totalizer readings will be zeroed prior to starting injection)
- Injection pressures,
- Flow rates
- Totalizer readings will be recorded every 5 minutes.

3.7 PERFORMANCE MONITORING

Performance of the biowall recharge will be monitored during regularly scheduled LTM activities which includes a biowall process monitoring component. LTM sampling is currently scheduled for late Summer 2025. The biowall process monitoring includes sampling groundwater at 5 biowall process monitoring wells (MWT- 23, MWT-26, MWT-27, MWT-28, and MWT-29) (**Figure 2**). Biowall process monitoring wells are sampled for nitrate, sulfate, and chloride by EPA SW846 Method 9056A, total organic carbon (TOC) by EPA SW846 Method 9060A, and dissolved gases (methane, ethane, and ethene) by Method RSK 175. In addition, a HACH® DR/890 or similar colorimeter will be used in the field to measure manganese by EPA Method 8034 and ferrous iron by EPA Method 8146. LTM sampling will be conducted in accordance with the approved Quality Assurance Protection Plan for SEAD (EA 2023 and 2024a).

Groundwater geochemistry will be used to evaluate the effectiveness of the biowall recharge. Geochemical conditions favorable to reductive dechlorination include:

- Dissolved oxygen (DO) less than 1 milligram per liter (mg/L)
- Sulfate less than 20 mg/L
- Methane greater than 1,000 micrograms per liter (µg/L)
- ORP less than -100 mV.
- TOC greater than 20 mg/L.

- The presence of ferrous iron and manganese at concentrations greater than upgradient locations.

4. REPORTING

4.1 DAILY FIELD REPORTS

Daily Field Reports will be prepared for each day involving any field activity. Daily Field Reports will be prepared by the on-site Field Lead/Site Superintendent and submitted in electronic format at the end of each field day. Recorded information will include the following:

- Contractor/subcontractor and their area of responsibility.
- Description of work performed to include what, where, and by whom.
- Any problems encountered and responses.
- Quantity of materials received at the site.
- Planned field activities for the following day.

4.2 TRIP REPORT

Following the completion of the biowall recharge, a Trip Report will be prepared to summarize field activities conducted during the field effort and will include all associated field forms related to the biowall recharge.

4.3 ASH LANDFILL ANNUAL REPORT

The 2025 Ash Landfill Annual Report will include discussion of the biowall recharge and results of the 2025 LTM sampling activities.

5. REFERENCES

EA Engineering, Science, and Technology, Inc., PBC (EA). *Final 2023 Uniform Federal Policy Quality Assurance Protection Plan, Long-Term Monitoring/Land Use Controls Management Former Seneca Army Depot*. June.

———. 2024a. *Final Uniform Federal Policy Quality Assurance Protection Plan Addendum No. 1, Long-Term Monitoring/Land Use Controls Management Former Seneca Army Depot*. June

———. 2024b. *Draft Ash Landfill Annual Report and Year 18 Review. Long-Term Monitoring/Land Use Controls Management Former Seneca Army Depot.* October.

Parsons 2004. *Record of Decision for the Ash Landfill Operable Unit, Final*. July.

———. 2006a. *Remedial Design Work Plan for the Ash Landfill Site at Seneca Army Depot Activity*. July.

———. 2006b. *Revised Final Remedial Design Report for the Ash Landfill Operable Unit.* August.

———. 2007. *Draft Final Construction Completion Report for the Ash Landfill Operable Unit, Seneca Army Depot Activity*. April.

———. 2018. *Draft Biowall Recharge Completion Report. Ash Landfill Operable Unit. Seneca Army Depot Activity*. October.

U.S. Environmental Protection Agency (EPA). *1998. Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water. EPA/600/R-98/128. September.*

Tables

Table 1. Biowall Construction Information

Biowall ID	Length (feet)	Average Width (feet)	Total Volume (cubic feet)	Biowall Pore Volume (gallons)	Target Volume (gallons)
A1/A2	375	12	36000	32314	35545
B1/B2	140	15	9450	7069	7776
B1	535	10	24075	18008	19809
B2	540	10	24300	18176	19994
C1	560	6	21840	16336	17970
C2	560	6	21840	16336	17970

Table 2. Recharge Approach A

Biowall Identification	Biowall Pore Volume (gallons)	Target Volume (gallons)	Number of Wells	Number of DPT Points	Volume Per Location
A1/A2	32314	35545	9	16	1422
B1/B2	7069	7776	4	6	778
B1	18008	19809	15	30	440
B2	18176	19994	14	29	465
C1	16336	17970	13	25	473
C2	16336	17970	13	25	473

Table 3. Recharge Approach B Injection Volumes

Biowall Identification	Biowall Pore Volume (gallons)	Target Volume (gallons)	Number of Biowalls	Number of DPT Points	Volume Per Location
A1/A2	32314	35545	9	24	1077
B1/B2	7069	7776	4	9	598
B1	18008	19809	15	42	348
B2	18176	19994	14	39	377
C1	16336	17970	13	38	352
C2	16336	17970	13	38	352

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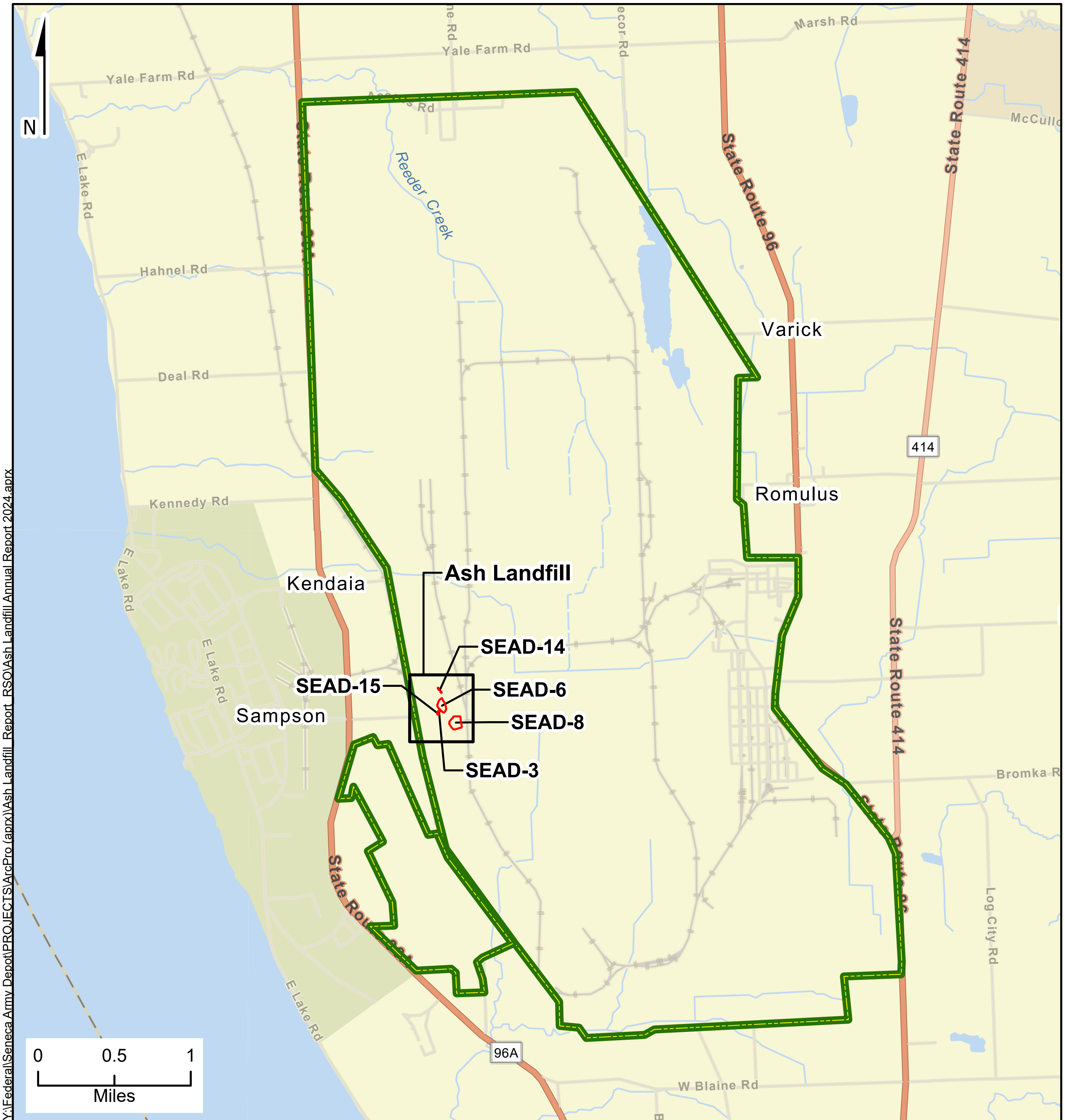
Figures



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VICINITY MAP

Legend

SEAD Boundary

Ash Landfill SEAD Sites

Figure 1

Ash Landfill Site Location

Seneca Army Depot (SEAD)

Romulus, Seneca County, New York

Map Date: 8/14/2024

Projection: NAD 1983 2011 State Plane

New York Central FIPS 3102 Ft US

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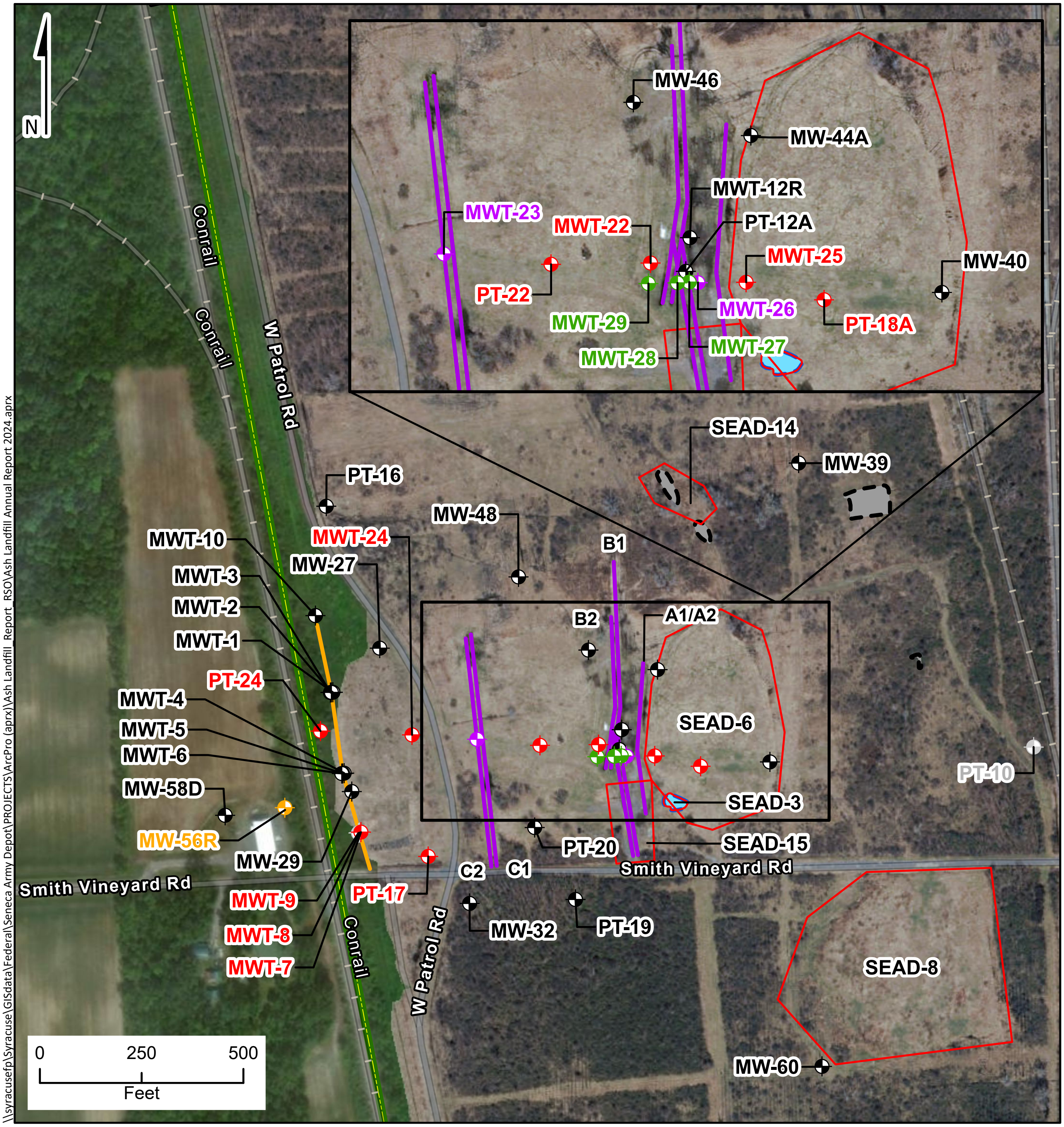
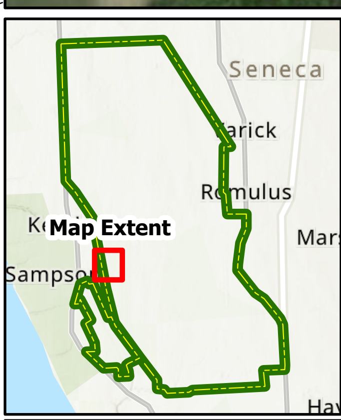




Legend

- SEAD Boundary
- Ash Landfill Operable Unit
- Former Debris Piles
- Former Cooling Pond
- Biowalls
- ZVI Wall

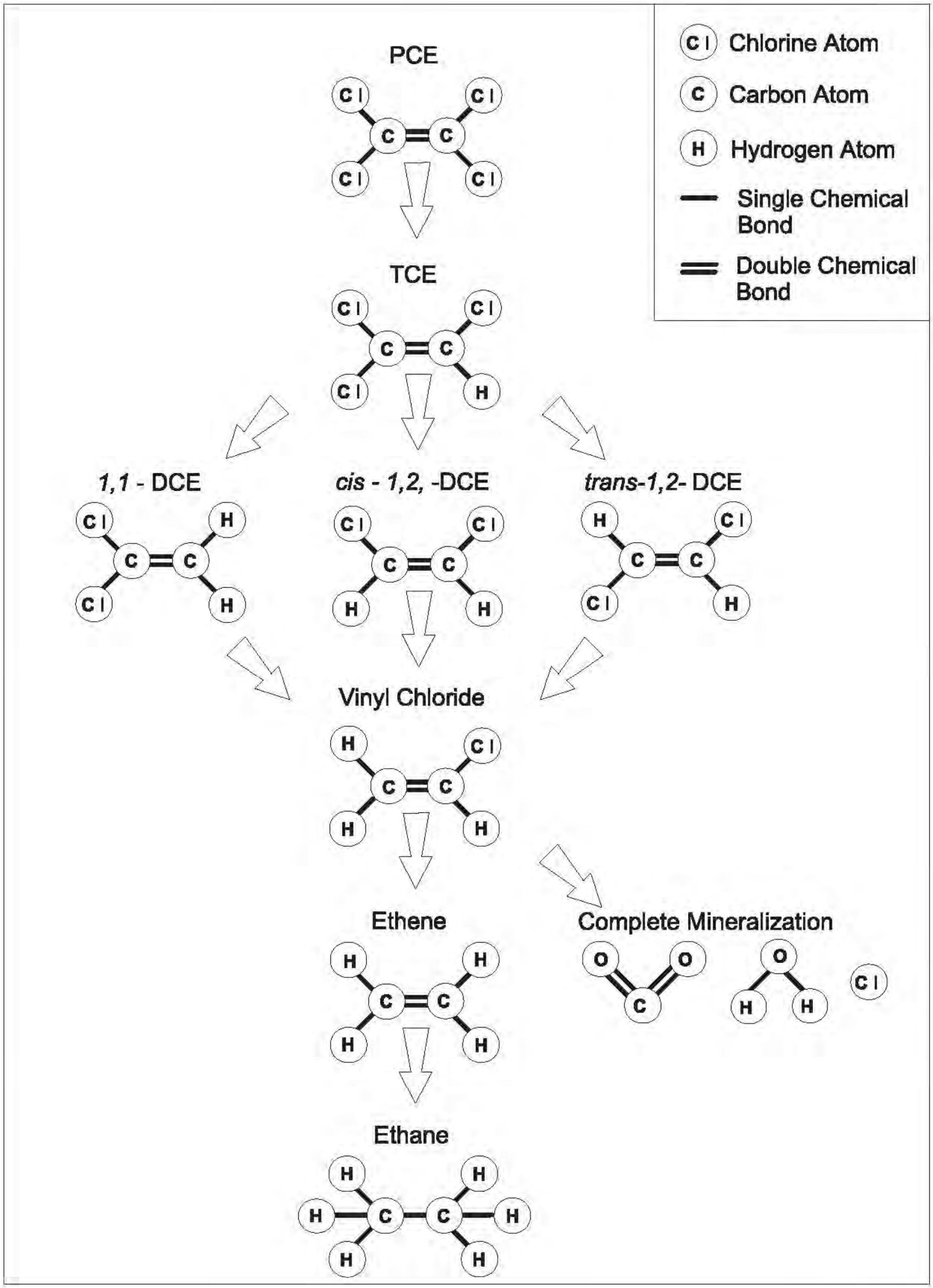
Monitoring Well Network

- Biowall Process Monitoring
- Long-Term Plume Monitoring
- Long-Term Plume/Biowall Process Monitoring
- Off-Site Performance Monitoring
- Additional RSO Sampling
- Other Site Well

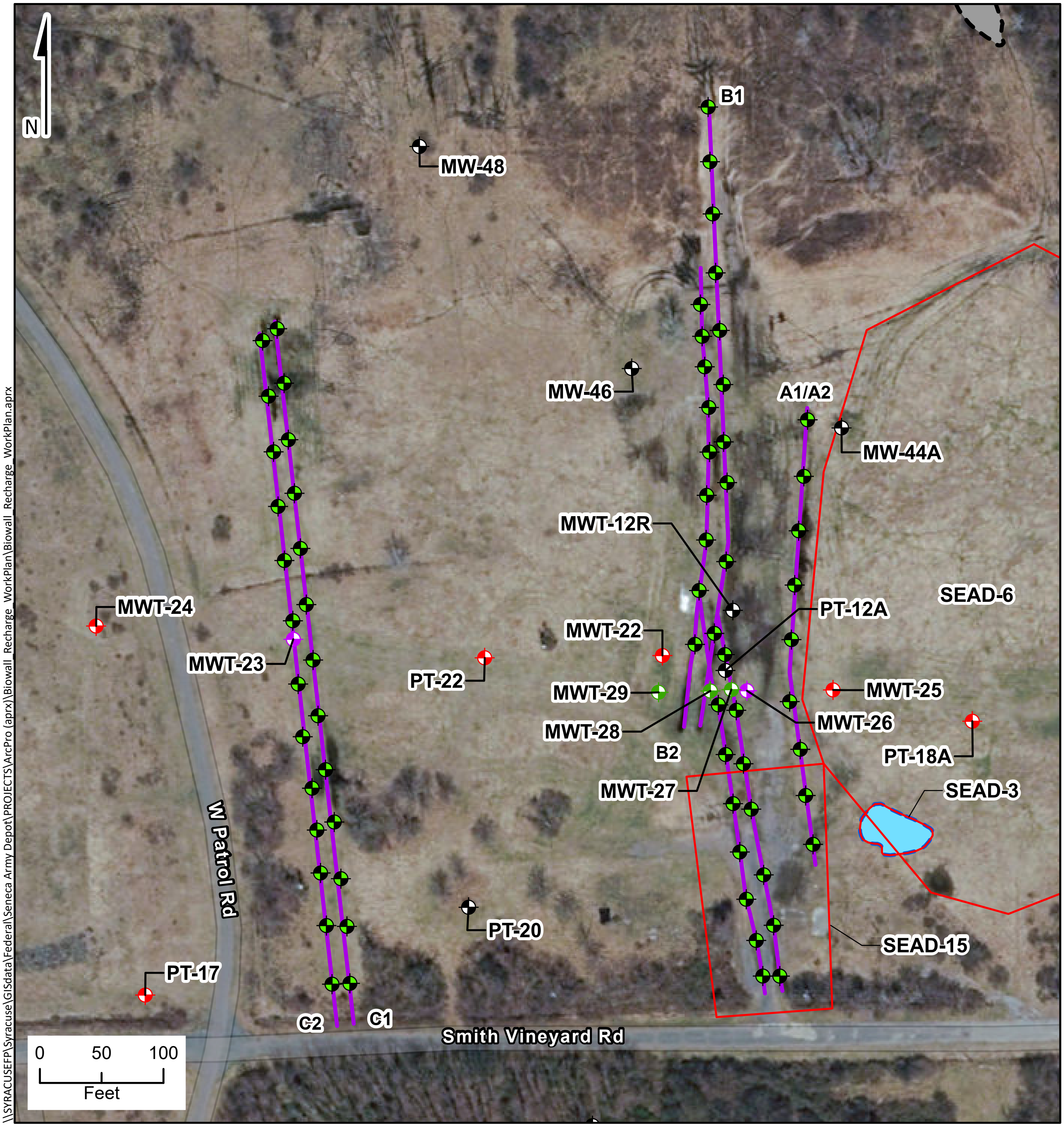
Figure 2
Ash Landfill Site Layout
Seneca Army Depot (SEAD)
Romulus, Seneca County, New York

Map Date: 8/29/2024
Projection: NAD 1983 2011 State Plane New York Central FIPS 3102 Ft US

Figure 3
Reductive Dechlorination of Chlorinated Ethenes



(USEPA, 1998)



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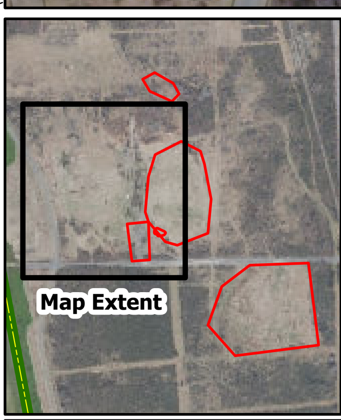


Legend

- SEAD Boundary
- Ash Landfill Operable Unit
- Former Debris Piles
- Former Cooling Pond
- Biowalls
- ZVI Wall

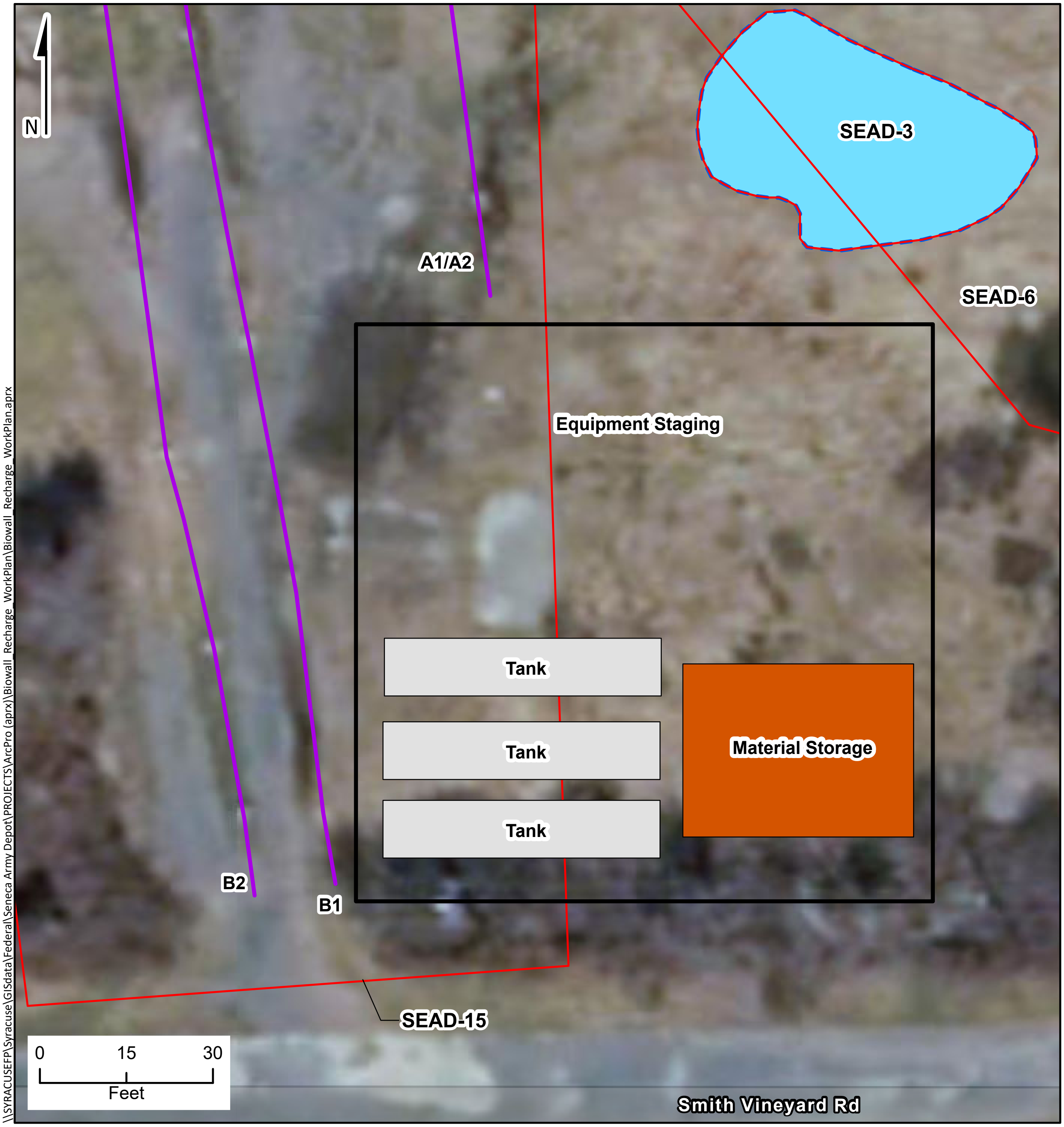
Monitoring Well Network

- Biowall Process Monitoring
- Long-Term Plume Monitoring
- Long-Term Plume/Biowall Process Monitoring
- Additional RSO Sampling
- Biowell Recirculation Well Location

Figure 4
Biowall Well Locations

Seneca Army Depot (SEAD)
Romulus, Seneca County, New York

Map Date: 12/16/2024
Projection: NAD 1983 2011 State Plane
New York Central FIPS 3102 Ft US



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Legend

- Ash Landfill Operable Unit
- Laydown Area
- Material Storage
- Tank
- Former Cooling Pond
- Biowalls

Figure 5
Laydown Area

Seneca Army Depot (SEAD)
Romulus, Seneca County, New York

Map Date: 12/16/2024
Projection: NAD 1983 2011 State Plane New York Central FIPS 3102 Ft US

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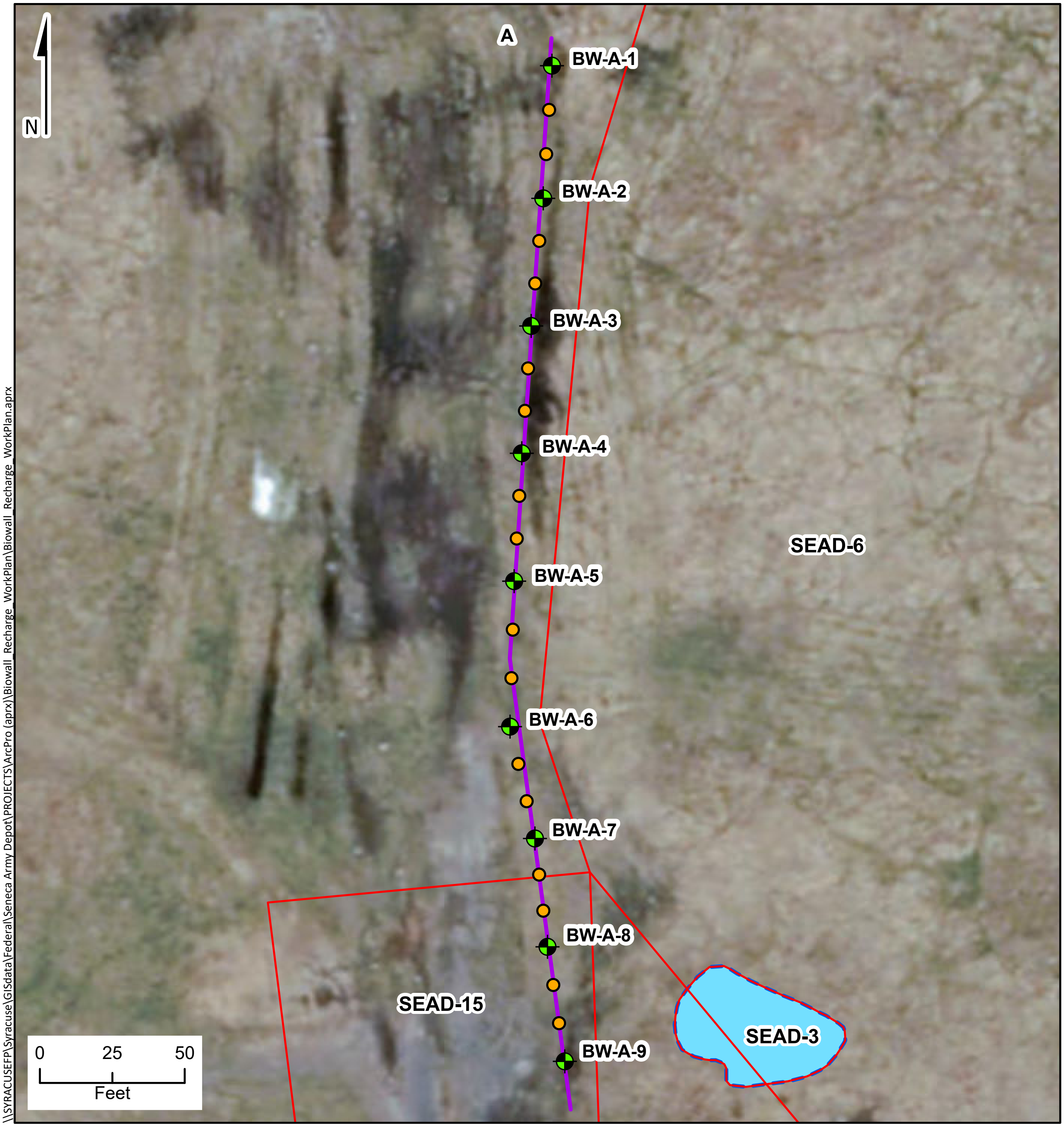
Legend

- Ash Landfill Operable Unit
- Biowalls
- Direct Point Injection Wells
- Initial Injection Test Well
- Biowell Recirculation Well Location

Figure 6
Initial Injection Test Locations
Seneca Army Depot (SEAD)
Romulus, Seneca County, New York

Map Date: 12/16/2024
Projection: NAD 1983 2011 State Plane
New York Central FIPS 3102 Ft US



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Legend

- SEAD Boundary
- Ash Landfill Operable Unit
- Former Cooling Pond
- Biowalls
- Biowell Recirculation Well Location
- Direct Point Injection Wells

Figure 7

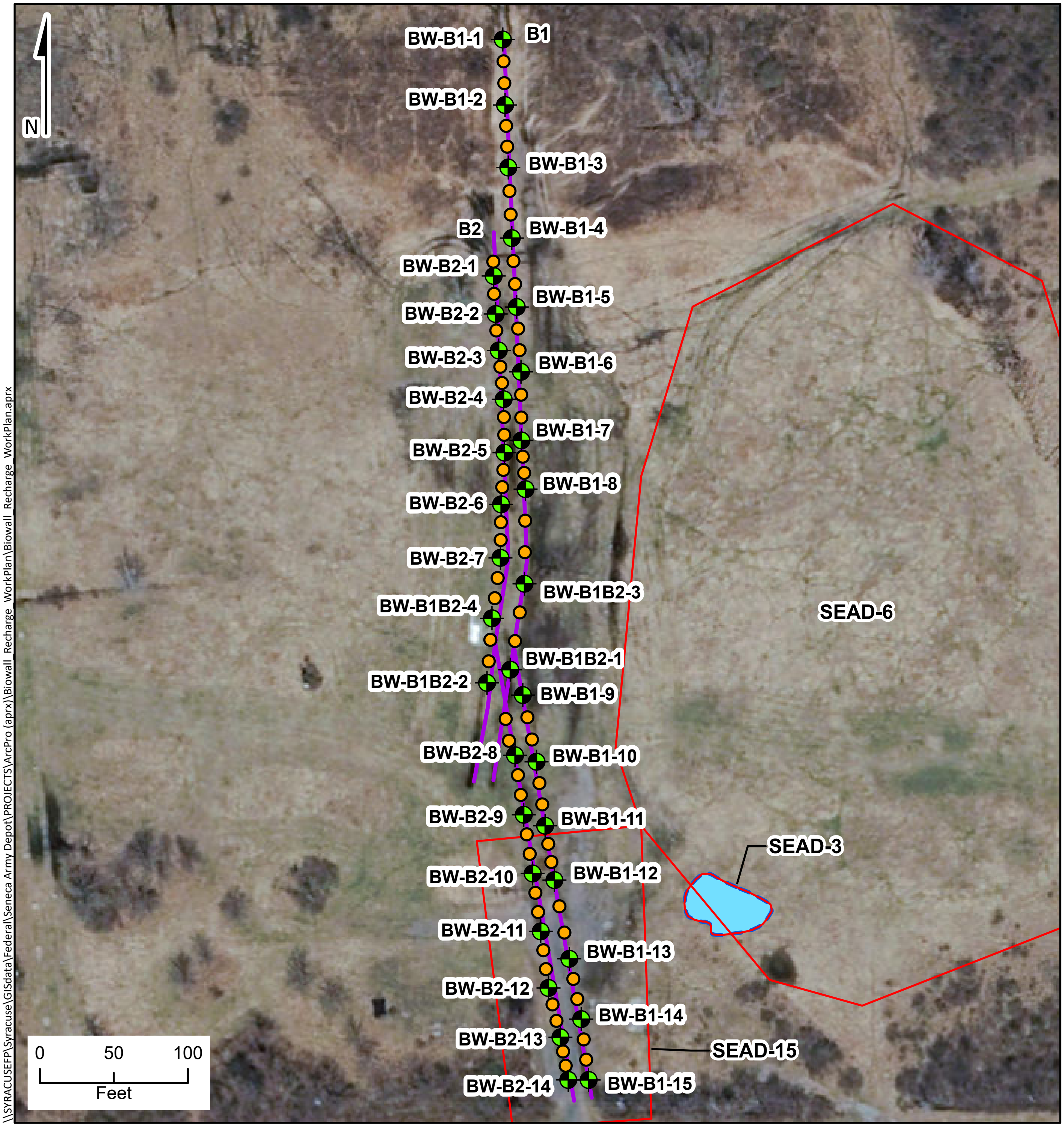
Recharge Approach A Biowall A DPT Locations

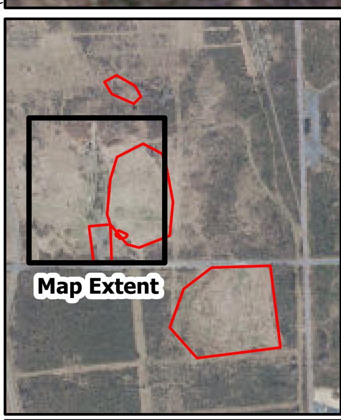
Seneca Army Depot (SEAD)

Romulus, Seneca County, New York

Map Date: 12/11/2024

Projection: NAD 1983 2011 State Plane New York Central FIPS 3102 Ft US





Legend

- SEAD Boundary
- Ash Landfill Operable Unit
- Former Cooling Pond
- Biowalls
- Biowell Recirculation Well Location
- Direct Point Injection Wells

Figure 8
Recharge Approach A Biowall B1/B2 DPT Locations
Seneca Army Depot (SEAD)
Romulus, Seneca County, New York

Map Date: 12/10/2024
Projection: NAD 1983 2011 State Plane
New York Central FIPS 3102 Ft US

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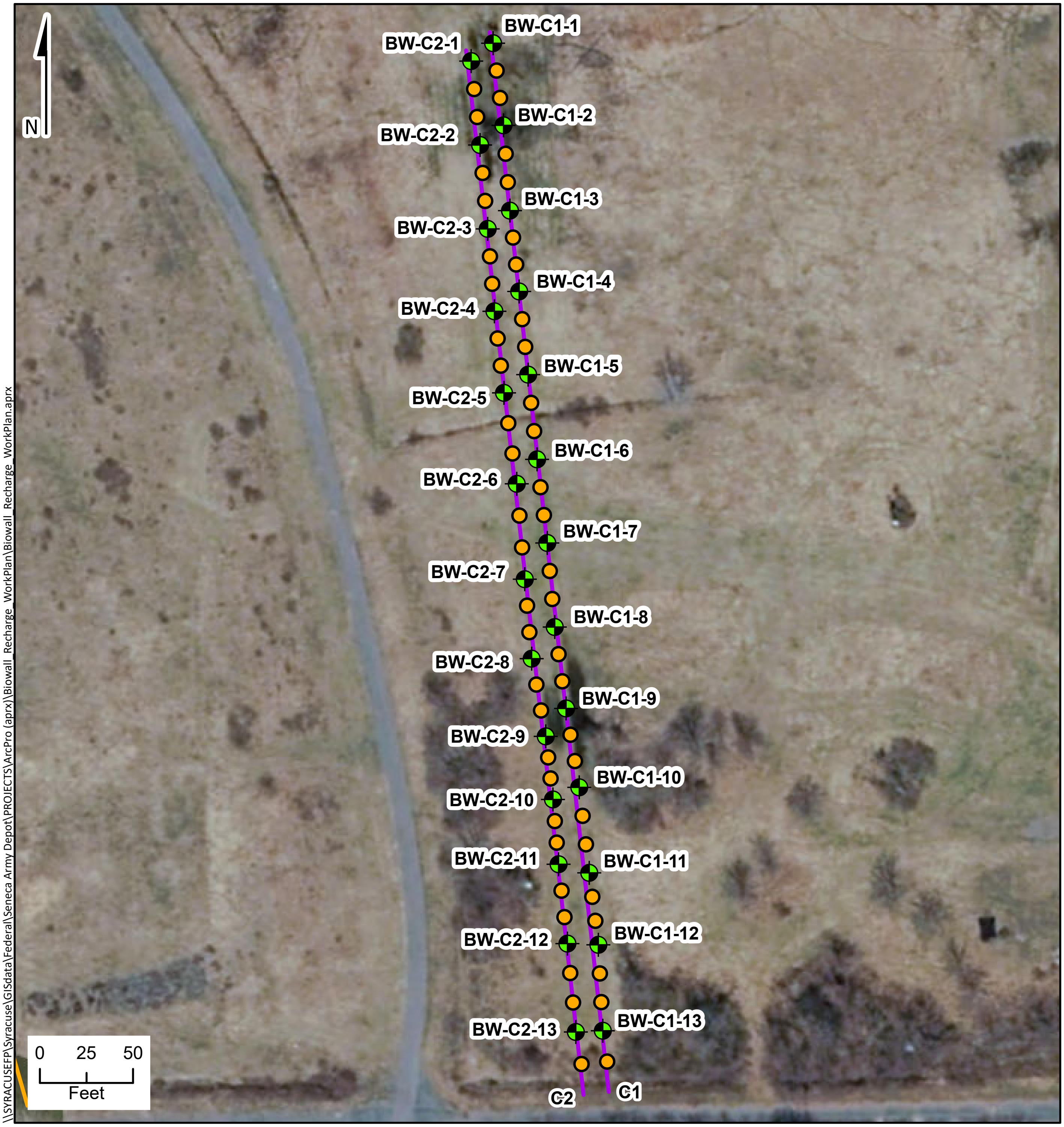

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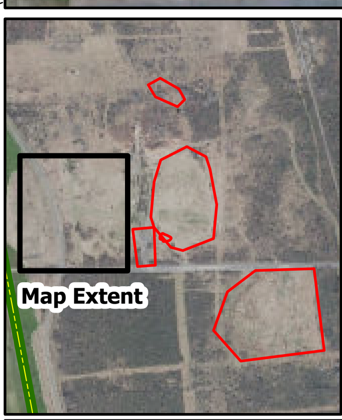


Legend

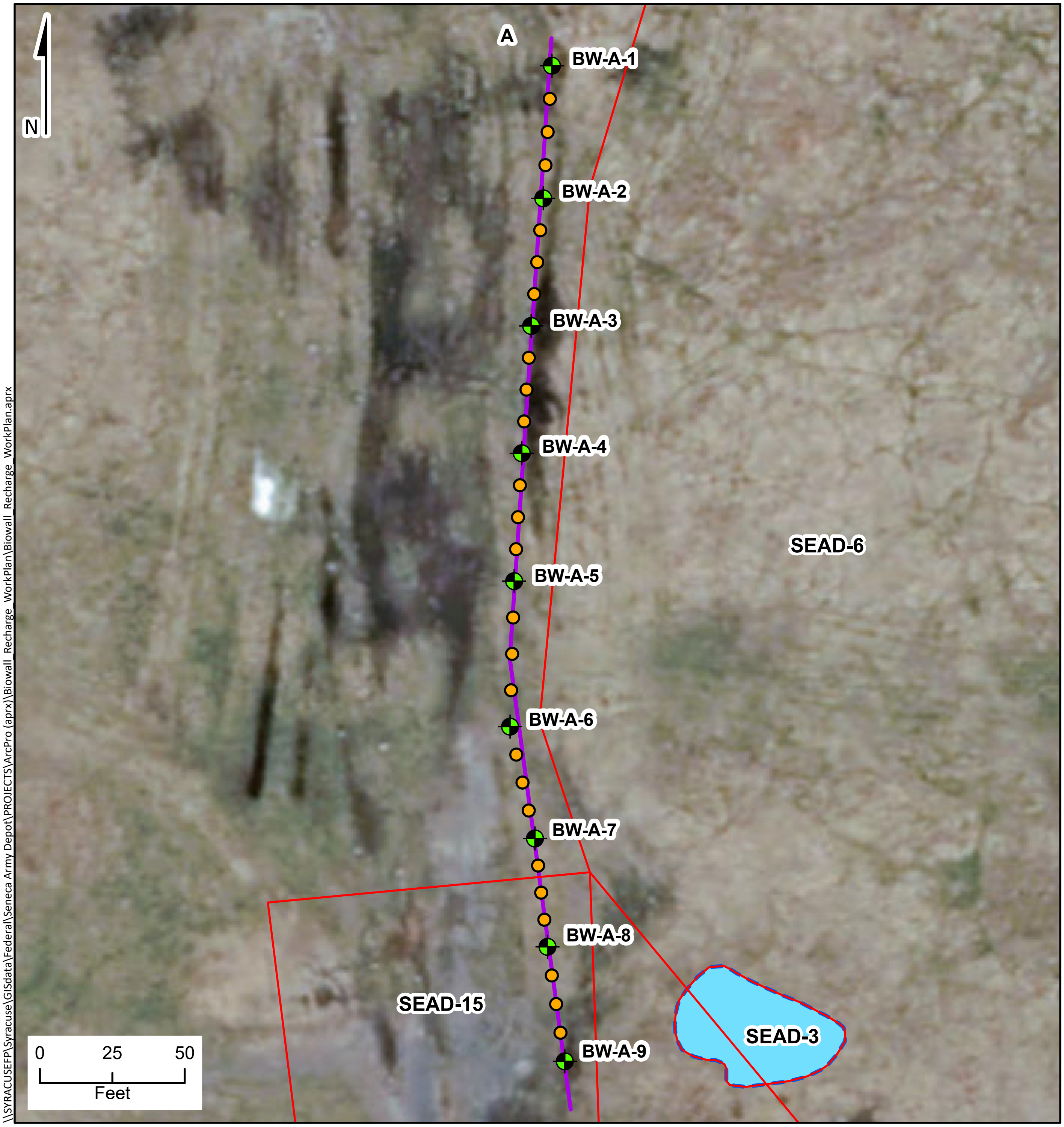
- SEAD Boundary
- Biowalls
- Biowell Recirculation Well Location
- Direct Point Injection Wells

Figure 9

Recharge Approach A Biowall C1/C2 DPT Locations

Seneca Army Depot (SEAD)
Romulus, Seneca County, New York

Map Date: 12/10/2024
Projection: NAD 1983 2011 State Plane
New York Central FIPS 3102 Ft US



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Legend

- SEAD Boundary
- Ash Landfill Operable Unit
- Former Cooling Pond
- Biowalls
- Biowell Recirculation Well Location
- Direct Point Injection Wells

Figure 10

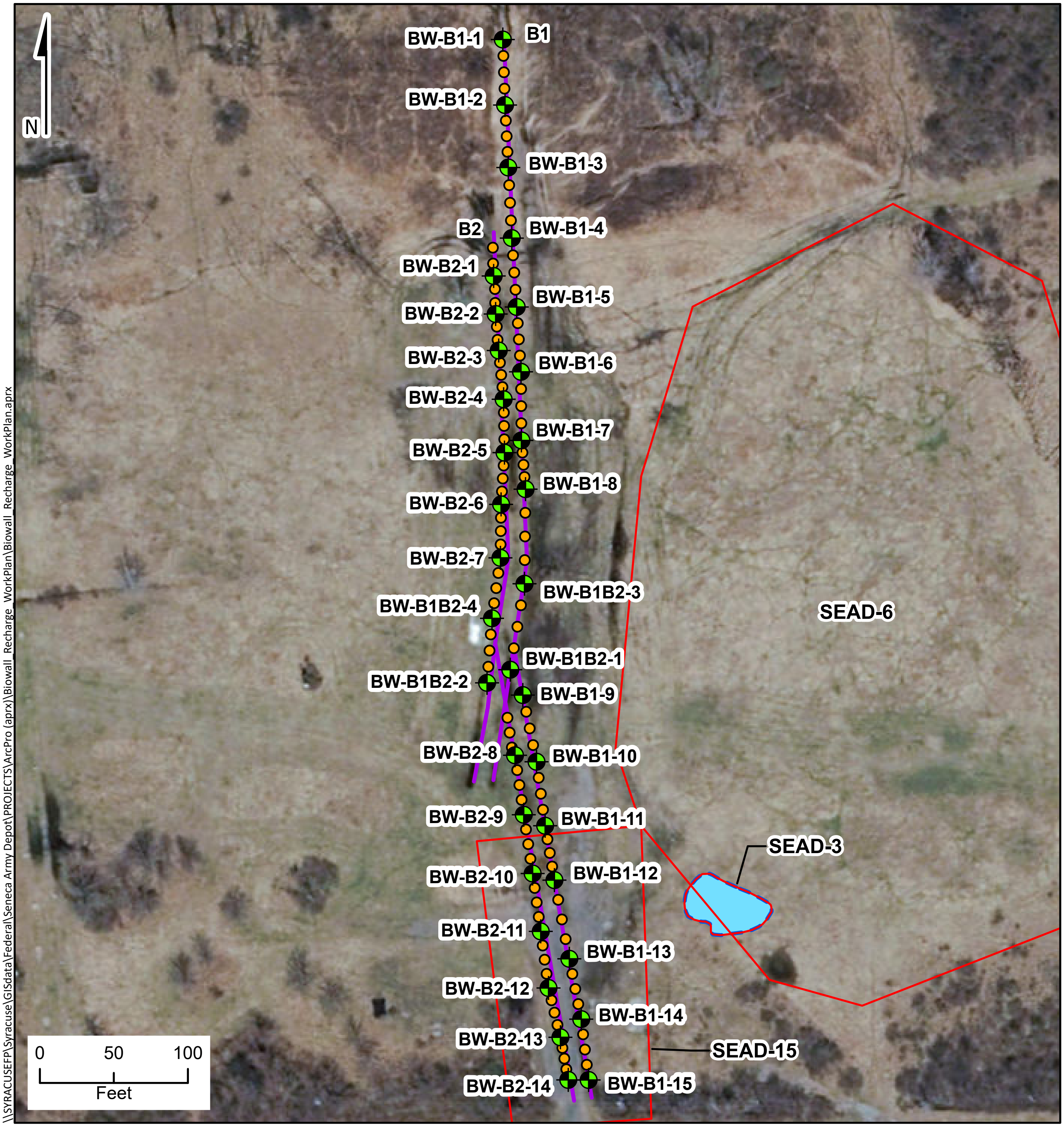
Recharge Approach B Biowall A DPT Locations

Seneca Army Depot (SEAD)

Romulus, Seneca County, New York

Map Date: 12/12/2024

Projection: NAD 1983 2011 State Plane New York Central FIPS 3102 Ft US



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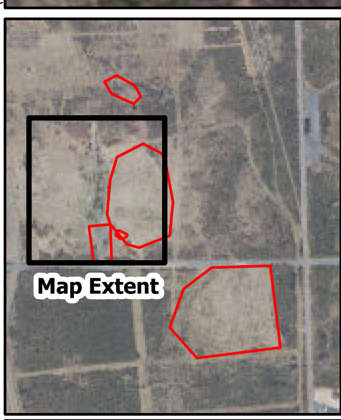


Legend

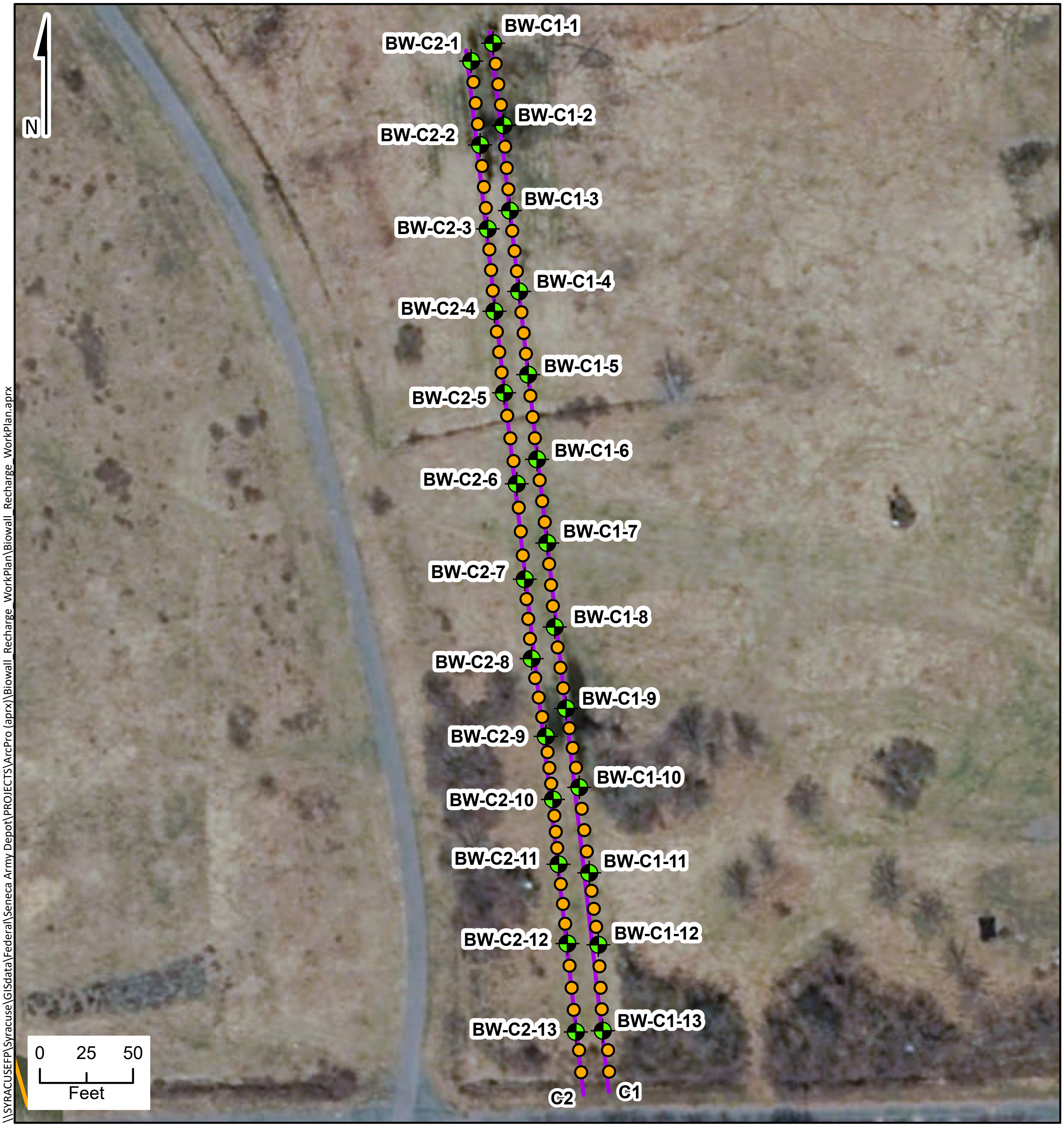
- SEAD Boundary
- Ash Landfill Operable Unit
- Former Cooling Pond
- Biowalls
- Biowell Recirculation Well Location
- Direct Point Injection Wells

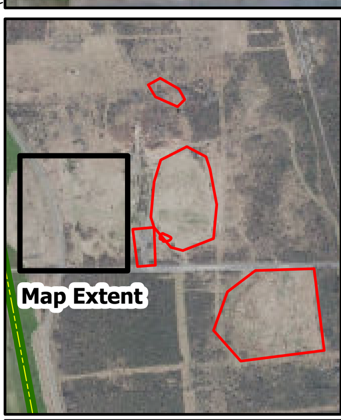
Figure 11

Recharge Approach B Biowall B1/B2 DPT Locations

Seneca Army Depot (SEAD)
Romulus, Seneca County, New York

Map Date: 12/12/2024
Projection: NAD 1983 2011 State Plane
New York Central FIPS 3102 Ft US





Legend

- SEAD Boundary
- Biowalls
- Biowell Recirculation Well Location
- Direct Point Injection Wells

Figure 12
Recharge Approach B Biowall C1/C2 DPT Locations
Seneca Army Depot (SEAD)
Romulus, Seneca County, New York

Map Date: 12/12/2024
Projection: NAD 1983 2011 State Plane
New York Central FIPS 3102 Ft US

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Attachment 1

EVO Solution Mixing Log

EVO Solution Mixing Log

Date:

Recirculation Start Time:

Recirculation End Time:

6000 Gallon EVO Solution Mixture
4615 Gallons Water
275-Gallons EVO
110-Gallons pH Buffer
5-gallons Oxygen Scavenger
0.5-ounces Declorinator

Mixing Checklist

Product	Added
Water	
EVO	
pH Buffer	
Oxygen Scavenger	
Dechlorinator	

Water Quailty Criteria
DO <1.0 mg/L

Final Water Quality Paramters	Value

Notes:

Attachment 2

EVO Solution Injection Log

EVO Solution Injection Log

Date: ______________________________

Operator: ______________________________

Biowall ID: ______________________________

Biowall Well / DPT ID: ______________________________ **Totalizer Start:** ____________________

Gallons of EVO Solution: ______________________________ **Totalizer End:** ____________________

Start/End Time ______________________________ **Total Gallons Injected:** ____________________

Reading Time	Injection Flow Rate (GPM)	Injection Pressure (psi)	Notes

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