Interim Remedial Measure
Final Engineering Report
837 Bailey Avenue Off-Site
Buffalo, New York

Remedial Action Contract D009807-08
NYSDEC Superfund Standby Contract
Site Number C915298A

May 2022

Prepared for:

NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
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Engineer's Construction Certification

I, Ashlee C. Smith, am currently a registered professional engineer licensed by the State of New York, I had primary direct responsibility for implementation of the remedial program activities, and I certify that the Remedial Design was implemented and that all construction activities were completed in substantial conformance with the Department-approved Remedial Design.

I certify that the data submitted to the Department with this Final Engineering Report demonstrates that the remediation requirements set forth in the Remedial Design and in all applicable statutes and regulations have been or will be achieved in accordance with the time frames, if any, established for the remedy.

I certify that all documents generated in support of this report have been submitted in accordance with the DER's electronic submission protocols and have been accepted by the Department.

I certify that all data generated in support of this report have been submitted in accordance with the Department's electronic data deliverable and have been accepted by the Department.

I certify that all information and statements in this certification form are true. I understand that a false statement made herein is punishable as a Class “A” misdemeanor, pursuant to Section 210.45 of the Penal Law. I, Ashlee C. Smith, of Ecology and Environment Engineering and Geology, P.C. am certifying as Owner’s Designated Site Representative for the site.

Ashlee C. Smith, P.E.

Date: October 21, 2022

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List of Abbreviations and Acronyms

ASTM	American Society for Testing and Materials
BCP	Brownfield Cleanup Program
CAMP	Community Air Monitoring Plan
CCRs	construction completion reports
CPP	Community Protection Plan
CY	cubic yards
DER	Division of Environmental Remediation
DER-10	NYSDEC Program Policy DER-10, Technical Guidance for Site Investigation and Remediation
DIRs	daily inspection reports
DUSR	data usability summary report
E & E	Ecology and Environment Engineering and Geology, P.C.
Encorus	Encorus Group Engineering, P.C.
E&SC	erosion and sediment control
FOs	field orders
sHASP	site-specific Health and Safety Plan
IRM	interim remedial measure
Lu	Joseph C. Lu Engineering, P.C.
NFA	no further action
NVES	National Vacuum Environmental Services Corporation
NYCRR	New York Codes, Rules, and Regulations
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
IRM	interim remedial measure
PDI	pre-design investigation
PM	project manager
ppm	parts per million
QA	quality assurance
QC	quality control

QAPP	Quality Assurance Project Plan
Ravi	Ravi Engineering and Land Surveying P.C.
ROW	right of way
SAP	Sampling and Analysis Plan
SCOs	soil cleanup objectives
TCP	Traffic Control Plan
TestAmerica	Eurofins Environment Testing America, dba Eurofins TestAmerica of Buffalo, New York
TUO	temporary use and occupancy
USEPA	United States Environmental Protection Agency
VMU	vibration monitoring unit
WSP	WSP USA, Inc.

1 Background and Site Description

This Final Engineering Report provides information and details on the completion of the remedial construction work associated with the New York State Department of Environmental Conservation (NYSDEC) Site No. C915298A, 837 Bailey Avenue Off-Site Interim Remedial Measure (IRM) in Buffalo, Erie County, New York. The subject remediation activities were part of an IRM by NYSDEC Division of Environmental Remediation (DER) to address off-site contamination of residential and commercial properties adjacent to the 837 Bailey Avenue Brownfield Cleanup Program (BCP) Site (Site No. C915298).

Pre-design investigation (PDI), design, and construction oversight services were provided by Ecology and Environment Engineering and Geology, P.C. (E & E) under the stand-by engineering contract D009807-08 with NYSDEC. Remedial construction services were provided by National Vacuum Environmental Services Corporation (NVES) under call-out contract C100512 with NYSDEC.

Remediation was performed to meet residential soil cleanup objectives (SCOs) for lead and arsenic in accordance with Section 6.3 of the Decision Document issued by NYSDEC in July 2019, “Off-site soil samples along the northern side of the site showed metals above the residential SCOs. As discussed in Section 5, the BCP-site applicant is a volunteer, therefore, the NYSDEC will address the off-site impacted areas.” (NYSDEC 2019) and 6 New York Codes, Rules, and Regulations (NYCRR) Part 375-6.8(b) Residential Use SCOs.

1.1 Site Location and Description

The 837 Bailey Ave. Site (the BCP Site) is approximately 8.7 acres and is located in an urban area in the City of Buffalo near the intersection of Dingens Street and Bailey Avenue (see Figure 1). A mix of commercial and residential properties surround the site. The Buffalo River is located approximately 0.75 miles south of the property, and the I-190 (Niagara Thruway) is located approximately 0.5 miles east of the property. The site is comprised of filled land with no building structures and is mostly fenced. The subject property was used as an auto salvage/wrecking facility from at least 1940 to 2014, an automotive repair facility from at least 1946 to 1986, a tire recapping facility until at least 1950, and a filling station from at least 1946 to 1950.

The properties that are the subject of this FER consist of six off-site residential parcels at the southeast corner of Bailey Avenue and Dingens Street (north of the

site), as well as ten residential and commercial properties located along and near the north side of Peru Place (south of the site).

Of the northern properties, herein referred to as such, there are three parcels on Bailey Avenue (853, 861, and 863 Bailey Ave.) and four parcels on Dingens Street (11, 15, 17, and 19 Dingens St.) (see Figure 1). After PDI sampling occurred at 19 Dingens St., the homeowner declined any remedial actions on their property. No further actions were done at this property beyond minor restoration activities related to restoration of the adjacent 17 Dingens St. property with the approval of the 19 Dingens St. homeowner.

Of the southern properties, herein referred to as such, there are two parcels on Bailey Avenue (825, and 817 Bailey Ave.) and eight parcels on Peru Place (16, 18, 20, 24, 26, 28, 32, and 36 Peru Pl.) (see Figure 1).

Most of the offsite properties subject to this IRM are residential, with 817 Bailey Ave. being the only commercial property.

1.2 Site Investigations and Remedial History

In 2019, NYSDEC issued a decision document and approved a Remedial Alternatives Analysis Report that presented the selected remedial plan for the on-site cleanup of the 837 Bailey Avenue site under the BCP. The plan required:

- Removal and off-site disposal of hotspot locations of soil/fill contaminated with metals (arsenic, barium, cadmium, copper, lead, and mercury) and polycyclic aromatic hydrocarbons;
- Removal and off-site disposal of debris piles;
- Construction of a soil cover over the entire site within the site fenced area; and
- Filing of an Environmental Easement that would restrict site use to commercial or industrial uses (based on local zoning), prohibit the use of groundwater, and require compliance with the site management plan.

The specified work at the on-site portion of the 837 Bailey Avenue BCP site was satisfactorily completed by the BCP participant and NYSDEC issued a Certificate of Completion in December 2019. Residual contamination at the site is being managed under a Site Management Plan.

During the BCP on-site investigation, soil samples were collected, based on the distribution of metal contaminants in the site soil, from the back yards of three residential properties (11 and 15 Dingens St., and 863 Bailey Ave.) bordering the north side of the site to help assess the potential for off-site contamination. Analysis revealed the presence of metals, specifically lead and arsenic, at levels above NYSDEC SCOs.

1.3 Selection of the Site Remedy

Because the 837 Bailey Avenue BCP Site was cleaned up under the BCP, the volunteer completing the action was not required to clean up properties beyond the boundaries of the site. As such, NYSDEC was responsible for the remediation of any areas outside of the boundaries of the site that exceeded the SCOs established for the project. As no potentially responsible parties had been identified as legally liable for off-site contamination, NYSDEC acted to implement an IRM for off-site remediation using the New York State Superfund. The SCOs determined for this remedial measure are 16 parts per million (ppm) of arsenic and 400 ppm of lead based on 6 NYCRR Part 375-6.8(b) Residential Use SCOs.

During the remedial investigation of the 837 Bailey Ave. Site, soil samples were collected at the adjacent residential properties to the north of the site to determine the potential for offsite migration of contaminants. Analytical results from these samples showed metal concentrations above residential use SCOs. Based on these results NYSDEC contracted E & E to conduct additional sampling of these northern properties and to also conduct investigative sampling of the properties adjacent to the south side of the site with the intent to remediate affected properties through excavation and disposal of contaminated material.

The initial remedial design work included the properties on the north side of the 837 Bailey Ave. BCP Site. On March 5, 2021, NYSDEC issued an Amendment Approval Letter to include additional remediation of the properties along the south side of the site along Bailey Ave. and Peru Pl.

1.4 Major Elements of Remediation

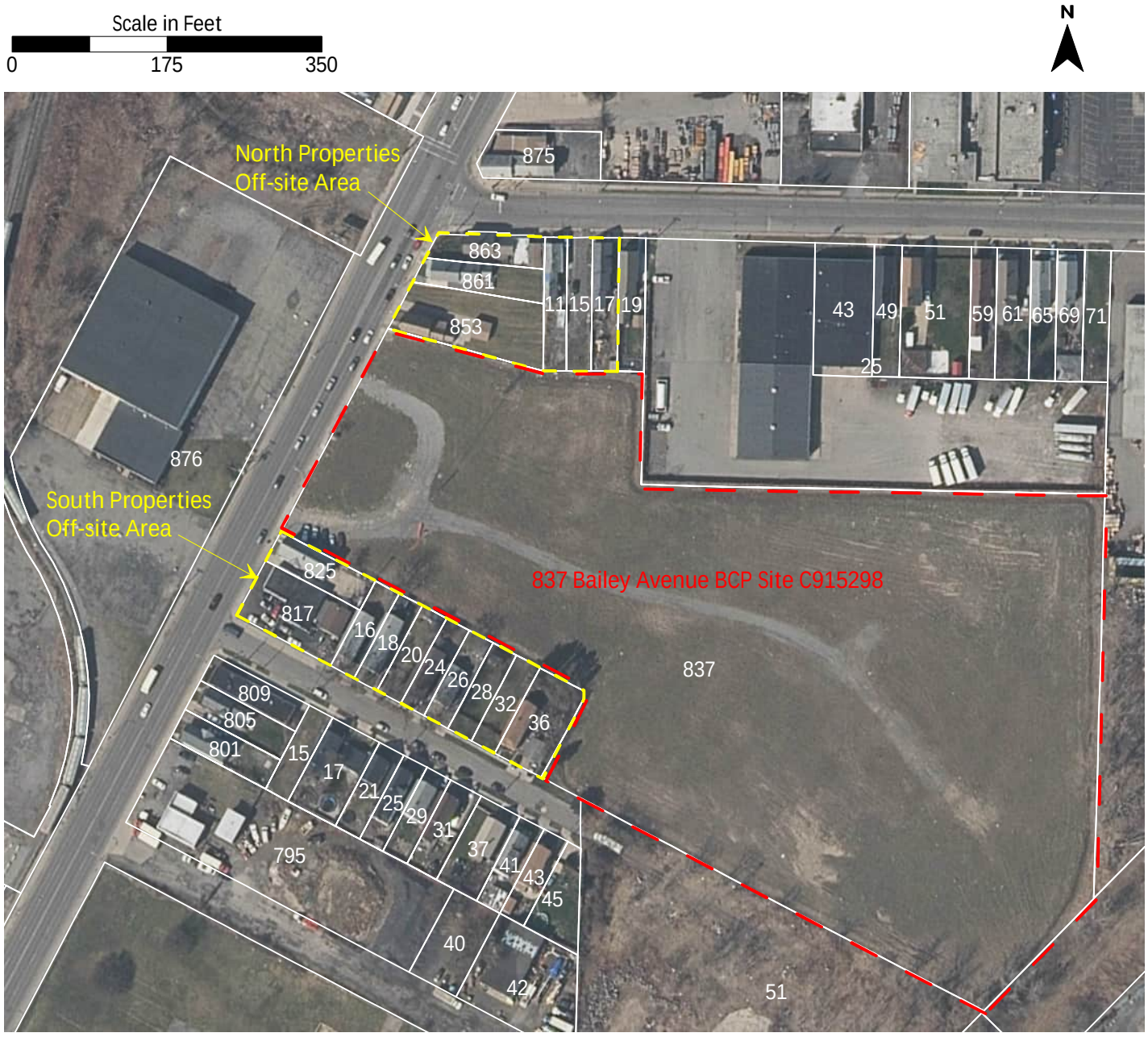
The remedial activities performed for this project included pre-design activities, soil excavation, and in-kind restoration of remediated properties to pre-remedial conditions as follows:

- Pre-Design Investigations
  - Soil borings and collection/analysis of samples;
  - Site surveys; and
  - Structural surveys of buildings.
- Excavation Activities
  - Mobilization and demobilization;
  - Removal of trees and shrubs;
  - Selective demolition (e.g., driveways, sidewalks, concrete pads, and fencing);
  - Protection and/or removal and staging of property features for reuse (e.g., sheds and playsets);
  - Excavation of on-site arsenic- and lead-contaminated soils; and

- Transport and off-site disposal of excavated soils and demolition debris.

■ Restoration Activities

- Placement, grading, and compaction of backfill;
- Placement of topsoil and soil amendments;
- Revegetation of disturbed areas (sod lawn installation);
- Replanting of shrubs and trees; and
- Restoration of sidewalks, driveways, decks, sheds, and other property features.



Source: New York State GIS Clearinghouse
(http://gis.ny.gov/)

Figure 1-1
837 Bailey Avenue Off-site
Interim Remedial Measures Area
Site No. C915298A
Buffalo, New York

ecology and environment
engineering and geology, p.c.

2 Summary of Pre-Remedial Activities

2.1 Community and Property Owner Outreach

E & E assisted NYSDEC with development of factsheets throughout the remedial work. Three factsheets were developed and mailed to local residents, businesses, and municipalities impacted by the work. The first factsheet was sent out in May 2020 before remedial activities began, to describe the purpose of the PDI activities and remediation. In April 2021, before the 2021 remedial activities began, a second factsheet was distributed to describe where remediation was to be performed. In December 2021 at the conclusion of remedial activities a final factsheet was distributed to describe the conclusion of work in the area.

Prior to the PDI and remedial design, E & E obtained written consent from each homeowner granting temporary use and occupancy (TUO) to NYSDEC and their contractors to collect soil samples, perform surveys, and inspect the property in order to prepare a property-specific design. E & E reviewed the analytical results and developed property-specific remedial plans, then met with homeowners to discuss the results and review the remediation process. Homeowners provided written consent to NYSDEC and its contractors allowing TUO of the property to implement the final remedial designs.

E & E provided a dedicated homeowner liaison to meet with residents throughout the construction activities. The homeowner liaison made phone calls to residents with construction status updates, received calls when questions or issues arose, documented discussions and meetings with homeowners for NYSDEC, and communicated homeowner concerns to the project team to expedite a resolution. This liaison also participated in construction progress meetings every week to stay informed on construction activities and provide routine updates to the project team regarding communications with residents.

Copies of property access agreements signed by homeowners are included in Appendix A of the property specific construction completion reports (CCRs) in Appendix A.

2.2 Pre Design Investigation

2.2.1 Sampling and Analysis

E & E completed two PDIs to define the nature and extent of lead and arsenic contamination at each property. The PDIs were split between the northern properties and the southern properties. PDI data was used to determine the excavation depths and limits at each property.

Sampling was performed in accordance with the Sampling and Analysis Plan (E & E 2020a), which describes the procedures used to determine sample locations, sampling methodology, investigation-derived waste disposal, quality assurance (QA)/quality control (QC) procedures, and the analytical data review process. E & E provided analytical results in NYSDEC Electronic Data Deliverable format and uploaded the data to the NYSDEC EQuIS environmental database.

The Northern Properties PDI report and the Southern Properties PDI reports (E & E 2022a, 2022b) describe the field activities and findings of the investigations.

2.2.2 Waste Profile Sampling

To aid the Contractor in obtaining a waste profile, E & E collected samples at varying depths from areas planned for excavation at the remedial properties. These samples were collected in accordance with NYSDEC Technical Guidance for Site Investigation and Remediation (DER-10) (NYSDEC 2010) and analyzed for the parameters specified in the waste profile application. Copies of the associated analytical results are provided in Appendix B.

2.2.3 Existing Condition Property Surveys

E & E subcontracted Ravi Engineering & Land Surveying, P.C. (Ravi) of Rochester, New York, a New York licensed land surveyor, to provide baseline property boundary and topographic surveys for the 17 residential and commercial properties slated for remediation. Initial surveys established site benchmarks, individual property boundaries, public rights-of-way, public underground utilities, and roads within the designated areas. Additionally, all observable site features relevant to the remediation and restoration work were identified and located. These included, but were not limited to, sheds, fences, decks, landscaping, trees, driveways, walkways, sidewalks, and private on-site utilities. Landscaping items were not identified by type but included planting bed boundaries or individual trees where applicable. The topography of each property was surveyed in 6-inch contour intervals. Locations where soil samples were collected during the PDI were also surveyed and coordinate points were provided to E & E. Initial surveys were used to develop remedial plans. Surveys were performed with horizontal coordinates in New York State Plane West Zone using the North American Datum 1983 and vertical elevations relative to North American Vertical Datum of 1988.

2.2.4 Existing Condition Structural Assessments

E & E subcontracted Joseph C. Lu Engineering, P.C. (Lu) of Rochester, New York and WSP USA, Inc. (WSP) of Buffalo, New York to conduct baseline structural assessments for the 17 residential and commercial properties slated for remediation. The inspection and evaluations were conducted by New York State licensed structural engineers. During the baseline structural assessments, Lu and WSP observed and documented existing conditions of residences, garages, sheds, and ancillary structures. During the assessments, structural components on the exterior and interior of the structures were examined. Non-structural components potentially subject to impacts during construction were also observed. Most structures were in good condition except for minor deficiencies consisting of non-structural/cosmetic issues and minor deterioration of foundation wall mortar joints in basements. Based on the completed surveys, recommendations were provided to E & E for protective measures to be used during remediation and earthmoving activities. Reports for all structural assessments performed are available upon request. Requests should be made via the NYS Freedom of Information Law process (https://www.dec.ny.gov/public/373.html).

2.2.5 Landscape and Tree Inventory

Prior to the start of construction, E & E completed an inventory of existing plants and trees for each remedial property. Remedial design drawings for each property included a table of inventoried plant/tree species, and the locations of shrub beds and trees were identified on the excavation figures included on the remedial design drawings. Buffer zones were established around trees that were to be protected in place during remedial activities to prevent damage to tree roots or tree stability.

2.3 Remedial Designs

A phased remediation approach was implemented for both design and construction to streamline the project schedule and minimize disruption to the local community.

The design drawings were prepared in two phases; the northern properties, and the southern properties. The remedial designs for the northern properties included six of the seven properties sampled during the PDI (11, 15, 17 Dingens St., and 853, 861, 863 Bailey Ave.). The homeowner of 19 Dingens St. declined remediation of their property after sampling was completed. The remedial designs for the southern properties initially included five properties (817 Bailey Ave., and 18, 20, 24, 26 Peru Pl.). The homeowners at 825 Bailey Ave, 16, 28, 32, and 36 Peru Pl. initially declined the remedial work. These homeowners agreed to the remedial work after the 2021 construction activities had begun, and remedial designs were developed later than the initial five southern properties.

The phases allowed for remediation to begin on the northern properties while design activities continued on the southern properties. The following steps were taken to prepare remedial design drawings for each phase:

- Following review of the analytical results for samples collected during the PDI, E & E submitted preliminary figures identifying the preliminary excavation limits to NYSDEC and the New York State Department of Health (NYSDOH) for review;
- E & E developed excavation and restoration plans for individual properties and submitted the plans to NYSDEC and NYSDOH for review;
- NYSDEC and NYSDOH confirmed that each design was sufficient for NYSDOH to provide the homeowner with a no further action (NFA) determination once the remediation was complete;
- E & E met with each homeowner to have them review and sign off on final draft plans; and
- E & E issued the final design drawings and Remedial Construction Work Plan for construction;

Excavation depths and limits were based on the SCOs for lead (400ppm) and arsenic (16ppm). Excavation depths were initially determined at each sample depth interval on a given property by reviewing the concentrations of lead and arsenic and establishing the depth to which excavation was necessary to achieve the remedial goals. This depth was maintained until the next sampling location was reached that indicated a change in excavation to a shallower depth. Exceptions to this were at the remedial boundaries and adjacent to residences or large structures such as garages. Analytical results from adjacent properties were reviewed when determining excavation depths and limits and occasionally showed that extension of an excavation area across property boundaries was necessary. E & E conservatively considered that post-excavation sampling was not required by NYSDEC or NYSDOH following excavation when defining excavation depths unless a clean bottom sample had not been obtained during the PDI sampling. This approach minimized the duration of open cuts and allowed property owners to maintain continuous access to their property/home during remediation.

The final designs were issued as follows:

- 11, 15, 17 Dingens St, and 853, 861, 863 Bailey Ave. were issued on October 1, 2020;
- 817 Bailey Ave., and 18, 20, 24, 26 Peru Pl. were issued on May 24, 2021;
- 16 Peru Pl. was issued on June 18, 2021;
- 28, 32, 36 Peru Pl. were issued on June 25, 2021; and
- 825 Bailey Ave. was issued on July 12, 2021.

Copies of the final designs are included in Appendix C.

3 Project Administration and Construction Oversight

E & E developed multiple plans and specifications for the implementation of the project. Remedial construction activities were performed by NVES.

3.1 Governing Documents

Multiple plans were developed to describe different aspects of the remediation during the PDI, remedial design, and remedial construction phases of the project. An overview of each plan is provided below with the full plan documents included in the appendices.

3.1.1 Site Specific Health and Safety Plan

Prior to construction, E & E prepared a site-specific Health and Safety Plan (sHASP) (E & E 2020b). The standards and requirements documented in the sHASP were based on: (a) Occupational Safety and Health Administration Standards and Regulations contained in Title 29, Code of Federal Regulations Parts 1910 and 1926; (b) applicable sections of the New York State Labor Law; (c) the U.S. Environmental Protection Agency's (USEPA) Office of Emergency and Remedial Response Program; and (d) the National Institute for Occupational Safety and Health's procedures to provide safe operations at abandoned hazardous waste disposal sites. These standards and requirements included:

- Project health and safety responsibilities and organization;
- Site-specific safety plan and hazard assessment;
- Training and medical surveillance documentation;
- Personnel and equipment decontamination procedures;
- Emergency and first aid requirements; and
- Logs, reports, and recordkeeping.

The sHASP also described decontamination procedures for project personnel and equipment and provided guidelines for the disposal of used personal protective equipment. E & E provided copies of annual health and Hazardous Waste Operations and Emergency Response (HAZWOPER) refresher training certifications

for their personnel to NYSDEC for on-site record keeping purposes. E & E conducted daily safety meetings to communicate appropriate procedures and operations.

NVES submitted a health and safety plan prior to the start of construction. E & E's subcontractors also submitted HASPs prior to work on-site. NVES maintained responsibility for all work zone health and safety requirements and controls during construction, with the exception of air and vibration monitoring, which were performed by E & E.

3.1.2 Quality Assurance Project Plan

E&E's Quality Assurance Project Plan (QAPP) developed for NYSDEC contract No. D009807 was utilized for this project (E & E 2020c). The QAPP describes the specific policies, objectives, organization, functional activities, and QA/QC activities designed to achieve the project data quality objectives.

3.1.3 Project Work Plan

E & E developed a Remedial Construction Work Plan to describe the procedures, roles, and responsibilities for the engineer, contractors, subcontractors, and NYSDEC. The work plan includes general and detailed project specifications for excavation, backfill, asphalt paving, gravity sewer piping, fencing, transport and disposal, and concrete and details for erosion and sediment control. E & E issued the work plan in October 2020 after approval by NYSDEC. A copy of the work plan is included in Appendix D.

3.1.4 Traffic Control Plan

A Traffic Control Plan (TCP) (E & E 2021) was developed for work along the Peru Place right of way (ROW) in conjunction with the City of Buffalo ROW permit. The plan detailed equipment and procedures to temporarily close down the street or lane of traffic to allow work to be done safely in a property ROW. The TCP was developed by E & E and issued in May 2021.

3.1.5 Community Protection Plan

The Community Protection Plan (CPP) (E & E 2020d) provides procedures for establishing an exclusion zone around a property undergoing excavation to deter any person not involved in remedial efforts from entering the work area. The CPP also accounts for homeowner safety and access to their residence during construction. The CPP includes procedures for personnel and construction equipment entering and exiting the exclusion zone. The plan was developed by E&E and issued in September 2020 after approval by NYSDEC.

3.1.6 Sampling and Analysis Plan

The Sampling and Analysis Plan (SAP) (E & E 2020a) was prepared for the collection of data at the remedial properties during the PDI for development of the designs. The SAP procedures were also followed for collection of post-excavation confirmation and ash samples obtained during construction. The SAP was developed by E & E and issued in June 2020 after approval by NYSDEC.

3.1.7 Community Air Monitoring Plan

E & E submitted a Community Air Monitoring Plan (CAMP) to NYSDEC in September 2020 (E & E 2020e) in accordance with the requirements in DER-10 (NYSDEC 2010). Real-time dust monitoring during construction was completed in accordance with the requirements identified in the CAMP.

Real-time air monitoring for dust, including continuous aerosol monitoring for particulate matter measuring 10 microns or less, was performed at properties under remediation using DustTrak dust meters. Action levels for airborne contaminants were established in accordance with applicable regulatory guidelines and are detailed in the project CAMP. Each monitor was equipped with data-logging capabilities, and the data were downloaded and reviewed by trained personnel daily. A log of the location, time, type, and value of each reading was maintained daily along with a map of the work area depicting monitoring locations, wind direction, and other appropriate symbols. Audible alarms were included with each monitor for when emissions exceeded regulatory levels. The CAMP was suspended during rain and snow events. Fugitive dust emissions that could impact areas outside the site, such as emissions caused by the movement of trucks and equipment, were visually monitored. Corrective actions were taken by NVES whenever dust was visually observed during the work. Copies of CAMP daily air monitoring results are included in Appendix E.

3.1.8 On-Site (Property) Air Monitoring

E & E performed and documented real-time dust monitoring upwind and downwind of intrusive activities as individual properties were remediated. E & E maintained a log of the downloaded data for each day during which there was a potential for airborne contaminant releases to downwind communities and residences within designated work areas. A minimum of four real-time dust monitors were set up each day around the excavation area to monitor dust emissions during intrusive work—one upwind, and three downwind. Actual dust monitoring locations for individual properties were determined daily and were subject to change throughout the day based on actual field conditions, such as wind direction, location of excavation activities, and location of the nearest downwind receptor. The location of each monitor was recorded on a map, which were provided in E & E's daily inspection reports (DIRs).

3.1.9 Vibration Monitoring Plan

E & E submitted a Vibration Monitoring Plan to NYSDEC in September 2020 (E & E 2020f). Monitoring was performed during construction in accordance with the plan. Vibration monitoring was conducted during excavation, backfilling and asphalt installation.

Four vibration monitoring units (VMUs) were set up daily prior to the start of work. Monitoring locations were typically as follows: two units at the houses closest to the access roads, and two units adjacent to the residential structures closest to the work. VMU locations were subject to change throughout the day as

remedial activities moved to different areas. E & E documented VMU locations on a map provided in the DIRs. The reports included any triggers that exceeded the recommended vibration levels. When an exceedance was reported, E & E determined if any mitigation measures were necessary to reduce potential impacts on structures from vibrational energy. Occasionally, exceedances of the action level for ground movement were recorded during remedial activities as a result of construction equipment or personnel directly hitting a VMU or when work activities were performed immediately adjacent to a VMU. These exceedances were generally isolated incidents and not indicative of overall work performed.

Daily vibration monitoring reports are included in Appendix F.

3.2 Remedial Program Elements

Remedial construction activities utilized a multitude of contractors to provide the necessary services and products to complete work at the remedial properties. Remedial construction activities were conducted over two seasons; the 2020 construction season was from October to November 2020 and the 2021 construction season was from April to October 2021. Prior to initiation of excavation activities, the required excavation areas had to be cleared and grubbed, ingress and egress points and haul roads established as necessary, and the staging area prepared.

3.2.1 NYSDEC Standby Callout Contractor Services

3.2.1.1 National Vacuum Environmental Services Corporation

NVES provided remedial construction services as a New York State Standby Response Service Contractor (Callout ID 138061). NYSDEC had a standby contract with NVES (C100512) and provided the callout authorization for the 837 Bailey Off-Site IRM work on April 1, 2020.

NVES provided various site services during remedial construction that included site security and fencing; traffic controls; field offices and support areas; temporary utilities; erosion, sediment, and surface water controls; disposal of contractor generated solid waste; staging/stockpiling areas; and sanitary facilities. NVES rented space for the staging area from Pinto Construction Services who provided security and fencing for the staging area.

NVES conducted the majority of the remedial construction including excavation and restoration activities. NVES subcontractors and vendors and the services and materials provided included:

- Tree Care of New York (Alden, NY): Tree removal in 2020.
- Woodchuck Tree Service (Grand Island, NY): Tree removal in 2021.
- On the Mark Utility Locating Services, Inc. (Rochester, NY): Private utility mark-out.
- J&D Seal Tech Corporation (Buffalo, NY): Asphalt placement for the northern properties.

- Deweys Paving (Buffalo, NY): Asphalt placement for southern sroperties.
- Emerald Services of Western NY, Inc. (Buffalo, NY): Concrete placement.
- Faery's Nursery & Landscaping (Ransomville, NY): Landscaping.
- Rich's Sports Fields, Inc. (Lancaster, NY): Sod placement.
- Davidson Fencing, Inc. (Niagara Falls, NY): Fencing placement.
- Lakeside Builders (Medina, NY): Carpentry.
- Mark Cerrone, Inc. (Niagara Falls, NY): Non-hazardous soil and debris transport.
- Republic Services, Allied Waste Niagara Falls Landfill LLC (Niagara Falls, NY): Non-hazardous soil and debris disposal.
- Ebenezer Yard Materials Recycling Center (West Seneca, NY): Concrete recycling.
- Albrecht Transport (Middleport, NY): Shed delivery and relocation.
- Homestead Designs (Clarence, NY): Sheds.
- Gernatt Asphalt Products, Inc. (West Seneca, NY): Common fill, river rock.
- Shelby Crushed Stone Inc. (Medina, NY): Topsoil in 2020.
- Buffalo and Orchard Park Topsoil (Orchard Park, NY): Topsoil in 2021.
- New Enterprise Stone & Lime Co., Inc. (Buffalo, NY): Stone, asphalt binder, asphalt topcoat.
- Lakeside Sod Supply Co. Inc. (Clarence Center, NY): Sod.
- C.J. Krantz Topsoil (Clarence Center, NY): Organic Nutrasoil.
- Lafarge North America (Tonawanda, NY): Concrete.
- A-Verdi Storage Containers Buffalo (West Seneca, NY): Field trailers and storage containers.
- Modern Disposal Services (Model City, NY): Sanitary facilities and construction debris dumpster.

3.2.1.2 Eurofins TestAmerica Laboratories

Eurofins Environment Testing America, dba Eurofins TestAmerica of Buffalo, New York (TestAmerica), NYSDEC's Standby Callout Laboratory under NYSDEC contract C100700, provided analytical testing services and supplies for initial and data-gap samples during the PDI, clean backfill source sampling, and for post-excavation and ash sampling during construction activities.

3.2.2 Site Preparation

NVES rented space from Pinto Construction Services at 132 Dingens Street, Buffalo, NY for the project staging area. NVES began mobilization activities on October 12, 2020. Mobilization equipment included an equipment trailer, front loader, haul road mats, sanitary facilities, and field office trailers. Various other equipment was brought on site as needed throughout the project including excavators, skid steers, vibratory rollers, an arrow board, tow-behind trailers, dumpsters, pressure washers, and storage containers. NVES established office trailers and equipment and material stockpiling areas at the staging area in agreement with Pinto Construction.

NVES implemented erosion and sediment control related work in accordance with the work plan provided by E & E. The initial work included installation of silt fence around the excavated material stockpile. This boundary was reestablished when the stockpile was moved to different locations throughout the excavation work.

Prior to any clearing, grubbing, or excavation work, public utilities were marked out by the respective utility owners through Dig Safe. On The Mark Utility Locating Services, Inc. marked out private utilities at each property.

Trees were cleared, including stump grinding, during the 2020 construction season by Tree Care of New York. During the 2021 construction season, trees were cleared and stumps ground down by Woodchuck Tree Service. Tree debris was chipped and taken offsite by the respective contractors.

Temporary safety fencing was installed at the end of each workday to prevent public access to excavation areas.

NVES utilized 8-foot by 14-foot Dura-Base mats as a haul road. The mats were used to access the backyards of the properties and were cleaned periodically throughout construction. Contaminated material was cleaned off the mats prior to being used to import clean material to the site.

NVES obtained all necessary permits for work. The permits included a ROW permit to allow for excavation and restoration work to occur within the City of Buffalo ROW, a tree removal permit to allow for removal of trees within the City of Buffalo ROW, and a building permit for 17 Dingens St. to allow for installation of a replacement front porch that extended into the City of Buffalo ROW. Copies of these permits are included in Appendix G

3.2.3 General Site Conditions

Remedial construction occurred at 15 residential properties and one commercial property. Work began in 2020 with the six northern properties. Work in 2021 began with completion of the northern properties and the start and completion of the southern properties.

NVES utilized traffic control devices including an arrow board, traffic cones, signs, and flagmen to close off and direct traffic around sections of Dingens Street and Bailey Avenue when construction activities required equipment to be staged in or near the road.

NVES utilized outdoor water spigots on the remedial properties and a hydrant in front of the 837 Bailey Ave property for a water supply for cleaning and watering of sod and plantings. E & E tracked usage of water from the remedial properties with flow meters attached to the spigots. Totals were logged at the end of each day. At the end of construction activities homeowners were reimbursed through water credit for the cost of the water usage using the rate the City of Buffalo Water Board charged the property.

Periodically throughout construction, when equipment was being transferred from one area to another, or when equipment switched from excavation to backfill materials it was power washed to clean any off any potentially contaminated materials. Washing activities occurred on the haul road mats located on the remedial properties. After cleaning, the haul roads were then washed off into the to-be-excavated areas.

4 Remedial Engineering Services

4.1 Engineering Services during Remedial Construction

4.1.1 Ecology and Environment Engineering and Geology, P.C.

E & E provided engineering services during remedial design and construction including development of all Design Documents. E&E prepared and submitted DIRs to the NYSDEC project manager (PM) during field work. Each DIR documented the remedial construction monitoring performed during the day, tracked material delivery and disposal, provided photos of major aspects of the work, and described issues or concerns that needed to be addressed as well as interactions with homeowners, the public, or municipalities. Copies of the DIRs are included in Appendix H.

In addition to the DIRs, the E & E PM and staff communicated with NYSDEC by telephone or email on a regular basis during field work.

E & E utilized several subcontractors throughout the project to conduct various project work not covered in the call-out contract with NVES:

- Ravi provided property surveys, surveys of excavation depths and limits, sample location surveys, and post-construction final surveys.
- Encorus Group Engineering, P.C. (Encorus) of Springville, New York performed geotechnical analysis of source material, and compaction and concrete strength testing during construction.
- Lu performed pre-construction structural inspections of structures on the remedial properties.
- WSP performed pre-construction structural inspections of structures on the remedial properties.

4.2 Project Administration

4.2.1 Pre-Construction Meetings

During the 2020 construction season multiple pre-construction discussions were had between E & E, NYSDEC, and NVES. During the 2021 construction season a pre-construction meeting was held on February 1, 2021. The meetings were held virtually via conference call and attendees typically included representatives of

NYSDEC, NYSDOH, E & E, and NVES. E & E recorded and distributed meeting minutes of the pre-construction meetings to all attendees. Copies of the pre-construction meeting minutes are included in Appendix I.

4.2.2 Progress Meetings

Progress meetings were held periodically throughout the 2020 and 2021 construction seasons, generally every two weeks. The meetings were held virtually via conference call and attendees typically included representatives of NYSDEC, NYSDOH, E & E, and NVES. E & E recorded and distributed meeting minutes of each meeting to all attendees. Copies of the progress meeting minutes are included in Appendix I.

4.2.3 Field Orders

Field orders (FOs) were issued by E & E as needed throughout the project to address changes to the designs. Most FOs covered minor changes to property restoration features implemented with the approval of the homeowner, that did not impact removal of contaminated soil. Some FOs covered removal and replacement of property features not initially included in the design for removal, but became necessary to remove and replace during construction activities such as driveways or sidewalks. Copies of these FOs are provided in Appendix C of the property specific CCRs in Appendix A The final FOs for each property include all changes to the design for the property including those covered in previous FOs. One FO was issued during construction that was not directly related to a specific property; this FO is included in Appendix J.

4.2.4 Sampling and Analysis

E & E collected, documented, and shipped samples in coordination with NYSDEC's callout laboratory for sampling and analysis necessary to complete the work. Sampling activities included performing QA/QC for sample analytical data, providing analytical results in NYSDEC Electronic Data Deliverable format, and uploading the results to NYSDEC's EQuIS database. Other sampling activities included the following:

- Testing imported fill materials for DER-10 parameters (including common fill, topsoil, stone aggregate, and sod);
- Characterizing contaminated soil and materials for waste profiling prior to disposal;
- Collecting post-excavation confirmation samples at select properties to confirm design excavation depths where a clean bottom was not identified during the PDI; and
- Collection of ash samples at select properties to assess lead and arsenic concentrations in the ash found onsite.

Imported fill material samples were collected in accordance with DER-10 requirements utilizing grab and composite samples. Post-excavation and ash samples were collected in accordance with the E & E SAP.

All samples were delivered to TestAmerica for analysis. Post-excavation and ash samples were analyzed for lead and arsenic while imported fill materials were analyzed for the full suite of DER-10 parameters in accordance with design documents.

4.2.5 Data Validation

All laboratory deliverables were reviewed in accordance with the QAPP (E & E 2020c). The data were qualified following general guidelines in the USEPA Region 2 standard operating procedures for data validation (EPA 2015). Data suability summary reports (DUSRs) were prepared as specified in NYSDEC's DER-10 "Guidance for the Development of Quality Assurance Plans and DUSRs" (NYSDEC 2010) for each property. The data review included an evaluation of the following:

- Holding times;
- Initial and continuing calibration;
- Reporting limits/dilutions;
- Calibration blanks and method blanks;
- Matrix spike/Matrix spike duplicate samples;
- Laboratory control samples;
- Field duplicates; and
- Interference checks.

E & E's data validation chemist prepared the DUSRs. Any deviations from acceptable quality control specifications are discussed in the DUSRs. Qualifiers were added to the data, if appropriate, to indicate potential concerns with data usability. No issues were encountered regarding data usability. Copies of the laboratory reports for imported fill material, and laboratory reports for post-excavation, and ash samples are included in Appendix K. Laboratory reports and DUSRs for the PDI sampling, and DUSRs for the post-excavation and ash samples are included in the PDI reports (E & E 2022a, 2022b).

4.2.6 Erosion and Sediment Control

As per the Work Plan, NVES was responsible for adherence to the New York State Standards and Specifications for Erosion and Sediment Control (E&SC), installation and maintenance of site stormwater controls, and erosion and sediment control practices at each property for the duration ow work activities. E & E was responsible for review of all erosion and sediment controls and conducted inspections periodically at a minimum of once a week. Any corrective

actions required were reported to NVES. Copies of E&SC periodic inspection forms are included in Appendix L.

4.3 Changes to the Project Schedule

The initial notice to proceed issued to E & E by NYSDEC included remedial work for the northern properties. 19 Dingens St. declined remedial work after PDI sampling activities were completed. Construction on the northern properties began on October 20, 2020.

During the 2020-2021 winter shutdown period, NYSDEC authorized E & E to extend the remedial design and construction activities to the southern properties. Initially, the homeowners for five of the properties agreed to the remediation with one property not responding and four declining. 825 Bailey Ave. signed on to the project on April 15, 2021, 16 Peru Pl. signed on to the project on May 20, 2021, and 28, 32, and 36 Peru Pl. signed on to the project by June 11, 2021. The addition of these properties extended the duration of construction activities beyond the original anticipated construction schedule. Construction activities began at the southern properties on June 4, 2021.

5 Contaminated Soil Removal

5.1 Removal of Contaminated Soils and Materials

The primary remedial work at the site involved excavation, removal, and disposal of contaminated soil from the properties adjacent to the Site where concentrations above the SCO for lead (400 ppm) or arsenic (16 ppm) were found. The extent of excavation was determined based on sampling conducted during the PDI and, where initial sampling was not sufficient, verified with post-excavation confirmation samples. Incidental work included the removal of waste and debris and clearing and grubbing. Remedial efforts concerning soil remediation are discussed in the sections below:

5.1.1 Excavation of Non-Hazardous Soils

The design drawings outlined the limits of excavation at each property. Prior to the start of excavation, Ravi marked out the limits of excavation on each property based on the coordinate points on the design drawings.

Each of the delineated areas were excavated by NVES to the depths indicated on the design drawings. Excavation activities began in fall 2020 with the backyards of 853 and 861 Bailey Ave. Excavation activities continued in the spring of 2021, after a winter shutdown, with the remainder of 853 and 861 Bailey Ave along with excavation of the remaining remedial properties.

Completed excavation areas were surveyed by Ravi prior to backfilling to verify that vertical and horizontal excavation limits had been achieved. Depth verification reports detailing the results of the bottom of excavation surveys are included in Appendix E of the property specific CCRs included in Appendix A. There were a few exceptions to the depth verifications:

- On two occasions Ravi was unable to conduct depth verification surveys. In these instances, the E & E onsite engineer collected photographic documentation and measurements to verify the excavation depth:
  - On 04/29/2021, E & E hand verified excavation depth of the front yard of 861 Bailey Ave.
  - On 05/10/2021, E & E hand verified excavation depth in the backyard of 15 Dingens St. in line with directly south of the southern edge of the 17 Dingens St. house.

- On one occasion, at 863 Bailey Ave., due to GPS errors in data processing, Ravi was unable to electronically verify excavation depths were reached; however, the onsite surveyor verified depths at the time of survey data collection.
- Design depths were not reached in part of the front yard of 853 Bailey Ave. due to encountering a buried foundation wall of a front porch. The foundation was left in place and the surrounding soil was excavated to depth.

To prevent excavation and hauling equipment from contacting contaminated areas, mats were placed across each property and moved as the work area shifted. Three contaminated material stockpiles were established onsite throughout the project and temporary haul roads, consisting of stone and mats, were installed to access them. The stockpiles were placed at 15 Dingens St., 20 Peru Pl., and 32 Peru Pl. Contaminated material stockpiles had silt fence installed around the perimeter and were covered with polyethylene sheeting and secured at the end of each workday. Only one stockpile was constructed/in use at a time. Material was direct loaded onto trucks from the stockpiles for disposal.

5.1.1.1 Ash Fill

During the remediation of the 837 Bailey Ave site and during this project's PDI, ash and cinder fill material was identified and typically correlated with high levels of lead and/or arsenic. During excavation activities, this ash and cinder fill material was encountered at 11, 15, and 17 Dingens St., and 24, 26, 28, 32, and 36 Peru Pl. Some material was found fully on the remedial properties and was removed while some extended past the property line and was removed up to that limit, with exceptions for *deminimus* quantities of material kept in place to prevent disturbance of structure foundations. This resulted in deeper excavation in some locations than indicated on the design drawings. Further details on locations of observed fill material that extended past the property lines are provided in Appendix J with analytical results of said material provided in Appendix A, DUSRs for the ash material are included in the appendices of the north and south property PDI reports (E & E 2022a, 2022b).

5.1.2 Post-Excavation Sampling of Non-hazardous Soil

Based on the PDI results and in consultation with NYSDEC and NYSDOH, two properties required collection of post-excavation confirmation samples before backfilling activities could take place. The E & E onsite engineer collected these samples in accordance with the SAP. Samples were analyzed for lead and arsenic by TestAmerica and results were reviewed and validated by E & E. The sample locations, depth intervals, and analytical results for the post-excavation samples are shown in Table 5-1. None of the samples showed concentrations above the SCOs for lead or arsenic and did not require deeper excavation. Copies of the analytical results are included in Appendix K. DUSRs for the results are included in the appendices of the north and south property PDI reports (E & E 2022a, 2022b). All in-field decisions were approved by NYSDEC and NYSDOH.

Table 5-1 Post-Excavation Sampling Locations and Results

Location	Depth Interval (inches)	Analytical Results – Arsenic (ppm)	Analytical Results – Lead (ppm)
817 Bailey-01	09” – 12”	9.2	210.0
	12” – 18”	6.6	125.0
	18” – 24”	3.5	20.4
	24” – 30”	6.7	18.0
	30” – 36”	9.1	27.8
26 Peru-04	24” – 30”	3.3	24.8
	30” – 36”	9.0	155.0

5.2 Transport and Disposal of Project-generated Waste Streams

Contaminated material was excavated and transported to an appropriately permitted disposal facility. The excavated material was transported to and disposed of at Allied Waste Niagara Falls Landfill LLC in Niagara Falls, New York. Concrete material, when possible, was recycled and disposed of at Ebenezer Yard Materials Recycling Center in West Seneca, New York.

The material and debris totals generated from the Site are provided on Table 5-2.

NVES subcontracted Mark Cerrone Inc., a NYSDEC Part 364- and USEPA-permitted transporter, as a waste hauler to transport the non-hazardous solid waste generated at the Site to the disposal facility. NVES, also a NYSDEC Part 364- and USEPA-permitted transporter, utilized some of their own trucks to transport material to the disposal facility and concrete recycling center. As part of the project’s green remediation efforts, all soil disposed of at the landfill was designated for reuse as alternative daily cover.

Table 5-2 Waste Material Totals

Disposed Materials	Disposal Locations	Quantity of Materials Disposed
Non-Hazardous soils and debris	Allied Waste Niagara Falls Landfill LLC, Niagara Falls, NY	2,966.78 Tons
Recycled Concrete	Ebenezer Yard Materials Recycling Center, West Seneca, NY	28.00 Tons

5.2.1 Waste Profiles for Disposal Facility Acceptance

In accordance with the Work Plan, NVES submitted waste profiles to the disposal facility for approval. Profiles included the estimated volume of material to be disposed of and analytical results from the soil samples collected during the PDI. Copies of the waste profiles and disposal facility approvals are included in Appendix B.

5.2.2 Volume of Soil Excavated

The remedial design estimated 1,518 cubic yards (CY) of material would be excavated from the remedial properties, equating to an estimated 2,550 tons of material. The total quantity of excavated material as measured by scale tickets was 2,996.78 tons, equating to 1,766 CY. This weight includes the weight of soil from the originally planned excavation areas along with the weight of any additional excavation as described in Section 5.1.1 and any additional debris. The soils transported and disposed of were weighed by a scale at the disposal facility.

Table 5-3 shows the total quantities of non-hazardous soil and debris disposed of by year. As shown in the table, the volume of material excavated was approximately 14% more than the design estimate.

Table 5-3 Non-hazardous Soil and Debris Volume Totals

Units	Design Totals	2020 Totals	2021 Totals	Project Totals
CY	1,518	316.1	1,449.8	1,765.9
Tons	2,550	531.03	2,435.75	2,996.78

5.2.3 Certificates of Disposal and/or Destruction

The disposal facility provided waste disposal manifests and scale tickets for each truck load disposed of at the facility. Copies of the manifests and scale tickets along with a summary table of quantities are included in Appendix N. The concrete recycling facility provided a receipt of disposal, a copy of this receipt is included in Appendix N.

5.2.4 Green Remediation

Green remediation practices were implemented, to the extent practicable, to meet the environmental performance goals of NYSDEC Program Policy DER-31/Green Remediation. Practices and procedures implemented for this project include the following:

- Minimizing equipment engine idling and emissions during site work;
- Implementing an onsite recycling program for both E & E and contractor generated wastes;
- Recycling concrete, when able, removed from properties during excavation; and

- Reusing contaminated soil disposed of at the landfill as alternative daily cover.

6 Project Area Restoration

Properties were restored to pre-remedial lines and grades, to the extent practicable, with the exception of areas shown on the design drawings or to provide positive drainage away from structures. Each excavation area was backfilled to final grades with a combination of common fill, topsoil, stone, asphalt, concrete, and/or sod. The project Work Plan established requirements for the installation and compaction of clean backfill materials and restoration of the remedial properties.

6.1 Fill Materials

Fill materials were delivered directly to the individual property work area. In some instances, material was delivered to the staging area and temporarily stockpiled in designated locations. Backfilling activities began in 2020 with restoration of the backyards of 861 and 853 Bailey Ave. Backfilling activities continued in 2021 with restoration of the remainder of 861 and 853 Bailey Ave. and the rest of the northern properties followed by the southern properties. A summary table and copies of the facility/scale tickets of all imported material are included in Appendix O. Fill materials were obtained from the following sources:

6.1.1 Common Fill

Common fill was supplied by Gernatt Asphalt Products, Inc. Prior to approval for use at the site, samples were collected and submitted for chemical and physical testing in accordance with the Work Plan. E & E collected samples of the material from stockpiles at Gernatt and submitted them to TestAmerica to be analyzed for parameters listed in Appendix 5b of DER-10. Samples were also submitted to Encorus for soil classification according to American Society for Testing and Materials (ASTM) D 2487 and laboratory curve determination (Proctor test) according to ASTM D 1557. Copies of the common fill test results are included in Appendix P.

Common fill was installed in accordance with the Work Plan and design drawings. Common fill was delivered periodically throughout construction as excavation activities were completed. Common fill was compacted in lifts as it was placed using a roller. After backfill was completed on a property, compaction testing was performed by Encorus. The compacted backfill requirements established for the site were 85% of the maximum dry density per ASTM D1557 with the final lift requiring between 80% and 85% of the maximum dry density. Copies of the results of the onsite compaction tests performed by Encorus are included in Appendix Q. Per the direction of NYSDEC no compaction testing of the common fill was conducted

during the 2020 construction season (See 837 Bailey Ave – FO 001 in Appendix J for details.). The quantity of imported common fill is shown in Table 6-1.

Table 6-1 Imported Material Totals

Material	2020 Totals (Tons)	2021 Totals (Tons)	Project Totals (Tons)
Common Fill	271.05	1,192.35	1,463.4
Topsoil	244.32	767	1,011.32
1-inch Run of Crusher Stone	62.52	732.64	795.16
#1 Washed Stone	0	10.63	10.63
River Rock	0	22.15	22.15

6.1.2 Stone Aggregate

New Enterprise Stone & Lime Co. supplied 1-inch run of crusher stone and #1 washed stone, and Gernatt Asphalt Products, Inc. supplied river rock. Prior to approval for use at the site, chemical and physical testing was performed for the run of crusher stone in accordance with the Work Plan. E & E collected samples of material from stockpiles at New Enterprise and submitted them to TestAmerica to be analyzed for the parameters listed in Appendix 5b (unrestricted use) of DER-10. Samples were submitted to Encorus for soil classification according to ASTM D 2487 and laboratory curve determination (Proctor test) according to ASTM D 1557. Copies of the run of crusher test results are included in Appendix P. Washed stone and river rock did not require physical or chemical testing as no compaction was required and the material was washed with no fine material present. The quantity of imported stone products is shown in Table 6-1. Stone aggregate was installed in accordance with the Work Plan and design drawings.

6.1.2.1 1-inch Run of Crusher Stone

Run of crusher stone was utilized as the subbase for hardscape features, stabilization material for haul roads, or as subbase backfill for gravel areas. Woven geotextile fabric was placed at the bottom of the excavation area prior to placement of the run of crusher stone. The stone was compacted when it was placed as subbase for hardscape features using a vibratory roller and walk behind plate tamper. After stone backfill and compaction was completed, compaction testing was performed by Encorus. The compacted requirements established for the site were 92% of the maximum dry density per ASTM D1557 for walkways and 95% of the maximum dry density for driveways and structures. Copies of the results of the onsite compaction tests performed by Encorus are included in Appendix Q.

6.1.2.2 #1 Washed Stone

Washed stone was utilized as the top layer on some restored gravel areas and as drainage areas along hardscape features. Woven geotextile fabric was placed at the bottom of the excavation area prior to placement of the washed stone.

6.1.2.3 River Rock

River rock was utilized as the top layer on some restored gravel areas. Woven geotextile fabric was placed at the bottom of the excavation area prior to placement of the river rock.

6.1.3 Topsoil

Shelby Crushed Stone Inc. supplied topsoil for the 2020 construction season and Buffalo and Orchard Park Topsoil supplied topsoil for the 2021 construction season. Prior to approval for use at the site, physical and chemical testing was performed for the topsoil from Buffalo and Orchard Park Topsoil in accordance with the Work Plan. NYSDEC authorized the use of topsoil from Shelby Crushed Stone based on the previous years of chemical testing conducted on their topsoil for the FMC Middleport residential remediation project. E & E collected samples from unscreened topsoil stockpiles and submitted to TestAmerica for analysis for the parameters listed in Appendix 5b of DER-10. Samples were submitted to Encorus for soil classification according to ASTM D 2487 and laboratory curve determination (Proctor test) according to ASTM D 1557. Copies of the topsoil test results are included in Appendix P.

Topsoil was installed in accordance with the Wok Plan and design drawings. Topsoil was delivered periodically throughout construction as common fill was placed and compacted. No compaction was required for topsoil; however, light compaction occurred during placement and provided an erosion control measure. The quantity of imported topsoil is shown in Table 6-1.

At the request of the homeowner, organic nutri-soil was placed in the planting beds at 19 Dingens St. after installation of the new wood stockade fence in the 17 Dingens St. backyard. The planting beds of 19 Dingens St. were partly excavated during removal of the old 17 Dingens St. wood fence that had extended over the property line. The organic nutria-soil was supplied by C.J. Krantz Topsoil and delivery and placement of this soil occurred on June 24, 2021.

6.2 Sod

Lakeside Sod Supply Co. Inc supplied sod. Rich's Sports Fields, Inc. installed the sod at most of the properties with NVES installing sod in some small areas. NYSDEC authorized the use of sod from Lakeside Sod Supply Co. based on the previous years of chemical testing conducted on their sod for the FMC Middleport residential remediation project.

Sod was installed in accordance with the Work Plan and design drawings. NVES utilized hydrants and metered house spigots to water the newly placed sod until it was firmly rooted (approximately four weeks). After the sod was rooted, homeowners were provided with detailed instructions regarding proper care of their lawn, and the homeowners then resumed responsibility for watering and maintaining the sod.

6.3 Concrete

All cast-in-place concrete features were installed in accordance with the Work Plan and design drawings. Concrete locations were marked out by the surveyor and NVES placed and compacted 1-inch run of crusher stone as subbase for the concrete areas. Compaction testing was performed on all subbase areas by Encorus prior to placement of concrete. Emerald Services of Western NY, Inc. installed all concrete features. E & E oversaw construction for conformance with the Work Plan. LaFarge North America supplied the concrete mix. Locations of restored concrete features varied from the pre-existing conditions however, the replacement concrete area did not exceed the pre-existing concrete area.

Concrete placement was to a thickness of 6 inches in driveway aprons or where sidewalks crossed driveways; all other locations had a thickness of 4 inches. Encorus was onsite for the majority of the concrete pours to test the concrete for slump, air content, and temperature. On occasions where Encorus was unable to collect these measurements, LaFarge verified their batch met the design requirements or provided one of their QA/QC personnel to collect said measurements. Concrete cylinders were also collected each day concrete was poured. Lab and field cured concrete cylinders were broken at 7, 14, and 28 days to test for compressive strength, as required by the Work Plan. Final compressive strength exceeded the required 4,000 psi for all concrete pours. Copies of these test results and the field testing are included in Appendix Q.

Concrete features installed during the project included pads, walkways, steps, driveway aprons, driveways, and sidewalks.

6.4 Asphalt

All asphalt installations were done in accordance with the Work Plan and design drawings. NVES placed and compacted 1-inch run of crusher stone as a subbase for asphalt areas. Compaction testing was performed on all subbase areas by Encorus prior to placement of asphalt. J&D Seal Tech Corporation installed asphalt for the Northern Properties and Deweys Paving installed asphalt for the Southern Properties. Asphalt type 3 binder and type 7F topcoat was supplied by New Enterprise Stone & Lime Co.

Asphalt driveways were installed with a minimum thickness of 2-inch of type 3 binder course and a minimum thickness of 1-inch of type 7F top course. No asphalt installation occurred during the 2020 construction season. Asphalt was placed by hand and with small skid steer type equipment. J&D and Dewey compacted the binder and topcoat courses. Encorus was onsite during installation to monitor the asphalt temperature during paving and to conduct in-place density testing of the binder course. The asphalt compaction requirements established for the site were 92% – 97% of the maximum theoretical density using nuclear method according to ASTM D 2950 and correlating with ASTM D 1188 or ASTM D 2726. Copies of the results of the onsite density tests performed by Encorus are included in Appendix Q.

The 18 Peru Pl. homeowner requested that an asphalt parking area be installed at 18 and 20 Peru Pl. The homeowner exchanged a reduction of concrete at their properties for an equivalent cost of asphalt and acquired the necessary permits from the City of Buffalo for the installation.

In accordance with the Work Plan, installed asphalt was subject to an initial curing time of 14 days, with restrictions of mechanical or vehicular use. Foot traffic was restricted for a minimum of 24 hours immediately after installation. Homeowners were informed on the care and use of their new asphalt pavement, including during the initial 14-day curing period.

6.5 Fencing

Fence posts and panels were installed by Davidson Fencing, Inc. at all properties requiring replacement fencing. Fencing was installed in accordance with the Work Plan and City of Buffalo codes. Fencing was installed as shown on the design drawings with the exception of changes approved and issued as part of FOs. Changes were made upon the request of property owners, and in coordination with E & E and NYSDEC.

Installed fencing consisted of 6-foot-tall, wood stockade fencing and gates, 7-foot-tall chain link fencing and gates, 6-foot-tall chain link fencing, 5-foot-tall chain link fencing and gates, 4-foot-tall chain link fencing and gates, and 4-foot-tall, black vinyl-coated, chain link fencing and gates. Details on the locations and types of restored fencing can be found in Appendix F of the property specific CCRs included in Appendix A.

6.6 Landscaping

Landscaping was completed by Faery's Nursery & Landscaping at all properties requiring replacement landscaping in accordance with the Work Plan and design drawings. Landscaping for the project included the installation of planting beds, landscape edging, plants, shrubs, and trees. As stated on the final design drawings, replacement trees, plants, and shrubs were selected by the homeowner in coordination with E&E and the landscaper, based on the value of the property's pre-existing inventory. Replacement species were reviewed and approved by E & E prior to installation. Locations of replacement species and planting beds were determined by the homeowner in coordination with E & E and the landscaper. Locations of shrub beds and trees are shown on the final surveys performed by Ravi following the completion of property restoration. Final surveys can be found in Appendix F of the property specific CCRs included in Appendix A.

As part of the tree removal permit obtained from the City of Buffalo for removal of trees in the right of way along Peru Pl., the City required replacement of an equivalent value of trees at a location of their choosing. In agreement with the City, E & E directed NVES and Faery's to plant six trees at Houghton Park in Buffalo, NY. Faery's completed installation of these trees on October 19, 2021. The City of

Buffalo Forester approved the planting locations and species and provided confirmation and acceptance of the successful planting on October 25, 2021 via email.

6.7 Other Restoration Items

Excavation activities required the removal of the back deck, front porch and stairs, and side stairs from 17 Dingens St. and the side stairs from 18 Peru Pl. Lakeside Builders constructed and installed replacements to these features.

Excavation activities were required beneath the sheds at 17 and 11 Dingens St., 825 Bailey Ave., and 20 Peru Pl. Albretch Transport salvaged the shed at 17 Dingens St. and transported it to the staging area for storage during excavation activities and reinstalled it once the shed subbase was placed and compacted. The sheds at the other three properties were disposed of with the shed contents temporarily stored by NVES in locked storage containers at the staging area or by the homeowners. Their poor condition did not allow them to be salvaged and returned. Replacement sheds were constructed by Homestead Designs with input by the homeowners and installed onsite by Albretch Transport.

6.8 Final Surveys and Cut-Depth Verification Reports

A cut-depth verification report was completed for each property and can be found in Appendix E of the property specific CCRs included in Appendix A.

Prior to the start of remedial activities, E & E's subcontracted land surveyor, Ravi, marked out the limits of excavation for each cut-depth area as shown on the design drawings. Ravi surveyed the cut areas after excavation was completed and compared depths to the pre-construction surveys to verify that excavation depths had been met.

Excavation at each property met or exceeded the design depth at all surveyed locations, with a few exceptions mentioned in Section 5.1.1. The depth to which material was removed at each pre-design sample location is shaded in the table of analytical results included in Appendix B of the property specific CCRs included in Appendix A.

Final surveys were performed following the completion of restoration activities at each property. The extent of cut areas and final grades of the restored areas were surveyed. A final survey for each property can be found in Appendix F of the property specific CCRs included in Appendix A.

6.9 Demobilization of Equipment and Support Facilities

NVES demobilized equipment throughout construction activities as tasks requiring certain equipment were completed.

During the 2020 winter shutdown, NVES demobilized all materials and equipment from the site and staging area. NVES placed a storage container in the backyard of 11 Dingens St. that contained the contents of their shed as the shed was

not replaced until the 2021 construction season. During the winter shutdown, stone was placed beneath the storage container and over any disturbed soil that was not sodded, and haul road mats on 15 Dingens St. were left in place. The office trailers at the staging area were also left in place over the winter shutdown. NVES completed demobilization and disconnected electricity to the office trailers on November 16, 2020.

During the 2021 construction season NVES completed final demobilization of equipment, office trailers, and stockpiled material from the site and staging area on October 28, 2021.

7 Project Completion

When a group of properties were substantially completed, the E & E onsite engineer conducted a site walkthrough with E & E and NVES personnel to identify any remaining punch-list items. The punch-list was shared with NVES and NYSDEC and included in the DIR on the inspection day. Updates of the lists were sent out periodically to all interested parties. The substantial completion walkthrough for the northern properties was performed August 09, 2021. The substantial completion walkthrough for the southern properties was performed October 11, 2021. Copies of the substantial completion punch-lists are included in Appendix R.

Final completion of the northern properties was achieved October 22, 2021 with the completion of the last of the associated punch-list items. Final completion of the southern properties was achieved on October 28, 2021 with the completion of the last of the associated punch-list items.

The warranty period for newly installed restoration items, including landscaping, fences, concrete, asphalt, and sod, is one year from the date of installation. The newly installed sod was watered and maintained by NVES for a duration of four weeks until the sod was satisfactorily rooted. After four weeks the homeowners took over responsibility for watering and maintaining their sod. Warranties do not include plant or sod death due to lack of watering or mistreatment by property owners.

During the initial homeowner meetings each homeowner was given a care and maintenance agreement that they signed. This agreement provided the homeowner with instructions on caring for and maintaining new property features including new sod, new plants, protected existing plants, new asphalt, and new fencing.

7.1 Engineering & Institutional Controls

In accordance with the selected remedy and approved remedial designs, all properties were fully remediated and restored to achieve the remedial goals for lead (400 ppm) and arsenic (16 ppm). Excavated areas were backfilled with material meeting the DER-10 soil cleanup objectives for residential use. The information included in this report supports the issuance of an NFA determination by NYSDEC and NYSDOH for each property remediated and no institutional or engineering controls are required. NFA letters were issued for all remediated properties in December 2021.

8 References

Ecology and Environment Engineering and Geology, P.C. 2020a. Pre-Interim Remedial Design Investigation Sampling and Analysis Plan, 837 Bailey Avenue Offsite IRM. Prepared for New York State Department of Environmental Conservation, Albany, New York, June 2020.

_____. 2020b. Site-Specific Health and Safety Plan, 837 Bailey Ave IRM. Prepared for New York State Department of Environmental Conservation, Albany, New York, June 2020.

_____. 2020c. Master Quality Assurance Project Plan (QAPP) for New York State Department of Environmental Conservation Projects. Prepared for New York State Department of Environmental Conservation, Albany, New York, May 2020.

_____. 2020d. Community Protection Plan for Remedial Action, 837 Bailey Ave. Off-Site Site, Buffalo, New York. Prepared for New York State Department of Environmental Conservation, Albany, New York, September 2020.

_____. 2020e. Community Air Monitoring Plan for Remedial Action at the 837 Bailey Ave. Off-Site Site. Prepared for New York State Department of Environmental Conservation, Albany, New York, September 2020.

_____. 2020f. Vibration Monitoring Plan for Remedial Action at the 837 Bailey Ave. Off-Site Site. Prepared for New York State Department of Environmental Conservation, Albany, New York, September 2020.

_____. 2021. Traffic Control Plan for Remediation of 837 Bailey IRM, 16, 18, 20, 24, and 26 Peru Place. Buffalo, New York, May 2021.

_____. 2022a. *Pre-Design Investigation Report, 837 Bailey Avenue Offsite IRM, North Properties, Buffalo, New York.* Prepared for New York State Department of Environmental Conservation, Albany, New York, May 2022.

_____. 2022b. *Pre-Design Investigation Report, 837 Bailey Avenue Offsite IRM, South Properties, Buffalo, New York.* Prepared for New York State

Department of Environmental Conservation, Albany, New York, May 2022.

New York State Department of Environmental Conservation (NYSDEC). 2010. *DER-10, Technical Guidance for Site Investigation and Remediation*, Division of Environmental Remediation, Albany, New York, May 2010.

_____. 2019. *Decision Document, 837 Bailey Ave. Brownfield Cleanup Program, Buffalo, Erie County, Site No. C915298.* July 2019.

U.S. Environmental Protection Agency (EPA) Region 2. 2015. *Hazardous Waste Support Section, SOP No. HW-3a Revision 0, ISM02.2, ICP-AES Data Validation*. New York, New York, December 2012.

A Property Specific Construction Completion Reports

B

Waste Profile and Disposal Facility Approval

C Remedial Design Drawings

D Project Work Plan

E CAMP Reports

F Vibration Monitoring Reports

G Project Permits

H Daily Inspection Reports

Progress Meeting Minutes Property Specific Construction Completion Reports

J

Field Orders

K Analytical Results and Data Usability Summary Reports

Lab Report	Contents
J175041-1 Ny_CatB Final Report	Gernatt – Common Fill source sampling New Enterprise Stone and Lime Co – 1inch run of crusher stone source sampling
J175485-1 Ny_CatB Final Report	Buffalo and Orchard Park Topsoil – Topsoil source sampling
J185707-1 Ny_CatB Final Report	26 Peru post-excavation samples and ash sample
J186727-1 Ny_CatB Final Report	817 Bailey post-excavation samples
J184654-2 Ny_CatB Final Report	11, 15 Dingens ash samples
J188170-1 Ny_CatB Final Report	36 Peru ash sample

*Note that DUSRs for the post-excavation and ash samples are included in the appendices of the associated PDI reports (E & E 2022a, 2022b).

L Erosion and Sediment Control Inspection Reports

M Ash-Fill Observation Memo

N Disposal Manifests and Scale Tickets

O Backfill Delivery Tickets

P Clean Backfill Physical Testing Results

Q Encorus Testing Reports

R Substantial Completion Punch-list