July 1, 2025

Attn: Aaron Fischer
Division of Environmental Remediation
New York State Department of Environmental Conservation
625 Broadway
Albany, New York 12233

Re: Treatability Study Work Plan for In-Situ Stabilization/Solidification and In-Situ Geochemical Stabilization
459 Smith Street (Former Citizens MGP Site – Parcel III)
Brooklyn, NY
BCP Site No. C224012B
Langan Project No. 170420201

Dear Mr. Fischer,

This Treatability Study Work Plan (TSWP) for In-Situ Stabilization/Solidification (ISS) and In-Situ Geochemical Stabilization (ISGS) was prepared by Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C. (Langan) on behalf of HR DC Smith Street Owner LP (the Volunteer) for Parcel III of the Former Citizens Manufactured Gas Plant (MGP) site to evaluate feasibility and determine design parameters for ISS and ISGS as supplemental remedial measures to address remaining MGP-related source material.

This TSWP describes the scope of work required for the collection of soil, groundwater, and/or NAPL samples from within the NYSDEC-specified treatment areas on Parcel III. The samples will be submitted to treatability and/or analytical laboratories for the completion of bench-scale treatability studies. The results of the treatability studies will be documented in a forthcoming remedial design document and will be used for the development of a full-scale design for the implementation of ISS and/or ISGS. Additional remedial design investigations may be implemented prior to submission of the remedial design document to determine areas within the required treatment zone that will be addressed using ISS and ISGS, respectively (i.e. to demonstrate areas of the site in which subsurface conditions prevent the use of a certain remedial technology).

CERTIFICATION

I, Gerald F. Nicholls, certify that I am currently a New York State (NYS) registered professional engineer and that this Treatability Study Work Plan was prepared in accordance with all applicable statutes and regulations and in substantial conformance with the DER Technical Guidance for Site Investigation and Remediation (DER-10) and Green Remediation (DER-31).

Gerald Nicholls	7/1/2025	
NYS Professional Engineer #092433	Date	Signature

SITE BACKGROUND AND ENVIRONMENTAL HISTORY

Site Location and Description

The site is located at 459 Smith Street in the Gowanus neighborhood of Brooklyn, New York. The site occupies a total area of 169,713.48 square feet (about 3.90 acres) and is identified as Block 471, Lot 200 on the Kings County Tax Map. The total tax parcel area occupies 164,864.54 square feet (about 3.78 acres).

The site is bound by the Citizens Manufactured Gas Plant (MGP) BCP site (BCP Site No. C224012) to the north, the Gowanus Canal, a US EPA superfund site, to the east, Huntington Street to the south, and Smith Street and an elevated segment of the Metropolitan Transportation Authority – New York City Transit (MTA-NYCT) subway to the west.

The New York City Department of Environmental Protection (NYCDEP) Bond-Lorraine sewer transects the site from the southwestern to northeastern corners of the site and a New York City Department of Transportation (NYCDOT) mapped street (Nelson Street) transects the site from Smith Street to the northern-adjoining property.

The site is vacant and was formerly used by National Grid as a staging area to support their remediation of the site and adjoining properties, including the Gowanus Canal, and is surrounded by wooden and chain-link perimeter fencing. A site location map and site plan are included in Figure 1.

Site History

According to the 2023 Draft Construction Completion Report (CCR) prepared by Arcadis (on behalf of National Grid), the site and the surrounding area were originally part of the wetlands system adjacent to Gowanus Creek. The area was artificially filled during construction of the Gowanus Canal in the 1860s.

The site was occupied by a fertilizer plant from as early as 1886 until some point between 1904 and 1915, when the former Citizens MGP Site on the northern-adjoining property expanded south to include the site. On-site MGP operations continued to expand between 1915 and 1948 and included construction of a tar separator, tar handling facilities, oil storage tanks, and a one-million-gallon oil tank. The former MGP buildings and structures were demolished in the early 1960s. Circa 1971, the site was redeveloped with manufacturing buildings occupied by Antarenni Industries, Inc. and Vitamaster Industries Inc. until circa 2009 when the warehouse was demolished.

Remaining Subsurface Structures

Several subsurface obstructions from former MGP structures are present on Parcel III of the Former Citizens Gas Works MGP site that make ISS impractical to implement. Subsurface obstructions include the following and are shown on Figure 2:

- Concrete foundations supported by piles (timber, concrete, and steel filled with concrete);
- Historical MGP-related structures (i.e., oil tank foundations) and remnant foundation elements from the former warehouse;
- Critical infrastructure, including the NYCDEP Bond-Lorraine Combined Sewer;
- Timber cribbing from the former bulkhead along the Gowanus Canal; and
- Structural elements of the newly installed bulkhead barrier wall.

Supplemental Remediation Requirements

National Grid implemented the NYSDEC-approved 100% Remedial Design between July 2019 and April 2022. Remedial activities performed by National Grid included the complete or partial removal of shallow and intermediate MGP-related source areas, and former MGP structures and underground facilities. As documented in the February 2023 draft Interim Site Management Plan (ISMP) prepared by Arcadis, remaining soil at the site still exceeds the unrestricted use (UU) soil cleanup objectives (SCOs) and recoverable Dense Non-aqueous Phase Liquid (DNAPL) also remains in the intermediate and deep zone soils (between about el -20 and el -110 feet NAVD88). The nature and extent of the remaining contamination are demonstrated in the figures and tables attached to the draft ISMP.

The NYSDEC and US EPA issued a joint letter on March 31, 2023, which requires supplemental remediation to address the potential recontamination of the Gowanus Canal by preventing the migration of coal tar-related contaminants anticipated to remain within the site. The NYSDEC and US EPA are requiring that remaining MGP-related source material (non-aqueous phase liquid [NAPL] or grossly contaminated material [GCM]) be addressed to an elevation of about el -23 feet NAVD88, which is consistent with the base of the proposed multi-layer remedial cap in the Canal that will be installed as part of the US EPA's remediation of the Gowanus Canal superfund site, plus a 2-foot buffer.

The required treatment depths between surface grade and el -23 feet were defined in NYSDEC's October 23, 2024 "Maximum Remedial Depth" figure, which was issued in response to National Grid's initially proposed supplemental remediation measures. NYSDEC's response letter also memorialized the requirement to treat remaining NAPL/GCM-related source material using ISS and/or ISGS technology. The extent of the required treatment area was outlined in a subsequent response letter issued by the NYSDEC on June 18, 2024, and was further refined following correspondence between the NYSDEC and National Grid on August 27, 2024.

The treatability study is aimed at establishing the feasibility of ISS and ISGS as a treatment for MGP-impacted soil. Previous environmental and geotechnical investigations and any supplemental remedial design investigations will be used to inform feasibility of supplemental remediation methods in the forthcoming Remedial Design Document.

FIELD INVESTIGATION

The proposed bench-scale treatability studies will require the advancement of soil borings and the collection of soil, groundwater, and/or NAPL samples. The field investigation will be performed in accordance with this section and samples will be submitted to treatability and analytical laboratories, as applicable.

The bench-scale treatability study for ISGS is anticipated to be completed by Resolution Partners, LLC, a testing laboratory in Madison, Wisconsin, in coordination with the company supplying and implementing the proprietary ISGS solution (Innovative Environmental Technologies, Inc. [IET], located in Pipersville, Pennsylvania). The bench-scale treatability study for ISS is anticipated to be completed by Langan's Treatability Facility at the New Jersey Institute of Technology (NJIT), located in Newark, New Jersey.

Pre-Screening for ISGS Feasibility

Due to the varied geology and documented NAPL distribution throughout the site, three areas within the required treatment area were selected for pre-screening in coordination with IET. Screening areas were selected based on three predominant soil types (i.e. fill, sand, or clay) identified during previous investigations at the site. The results of the pre-screening investigation will be used to refine the design parameters for the ISGS treatability study. The objectives of the pre-screening exercise are:

1) To confirm the soil types across the target treatment area and to identify areas with similar soil characteristics to inform the number of treatability studies to be completed; and
2) To verify the feasibility of ISGS treatment through the introduction of ISGS solution into site-derived soil and NAPL samples collected during the pre-screening investigation.

<u>Soil Investigation</u>

An environmental drilling contractor will advance three soil borings (ISGS-01 through ISGS-03) from surface grade to depths between about 32 and 40 feet bgs (between about el -15 and el -23 feet NAVD88 [the maximum treatment depth required by the NYSDEC]) using a direct-push drill rig. The proposed soil boring locations and associated pre-screening intervals are shown on Figure 3 and were selected by IET to target specific soil types (i.e. fill, sand, or clay) based on the cross-sections provided in the October 2005 Final Remedial Investigation Report, prepared by GEI Consultants.

A Langan field representative will document the work, screen the soil for environmental impacts, and collect soil samples. Soil will be screened continuously to the boring termination depth for volatile organic compounds (VOCs) using a photoionization detector (PID) equipped with a 10.6 electron volt (eV) bulb, and for visual and olfactory indications of environmental impacts.

Recovered soil will be characterized from surface grade to the boring termination depth and soil samples will be collected from the intervals specified in Figure 3. Multiple soil samples may be collected from each soil boring based on soil types and degree of NAPL-related impacts observed. Each soil sample will consist of about 250 grams of recovered soil and will be collected into laboratory-supplied containers for transport to IET's testing laboratory in Pipersville, Pennsylvania.

Following soil sample collection, boreholes will be filled from the boring termination depth to surface grade using grout and/or hydrated bentonite. Excess soil/fill generated from the pre-screening investigation will be containerized in United Nations/Department of Transportation (UN/DOT)-approved 55-gallon drums for future waste characterization and off-site disposal.

NAPL Investigation

A NAPL sample will be collected from existing recovery well CGRW-22I (an existing NAPL recovery well on Parcel III that is partially screened within the treatment interval). About 200 milliliters (ml) of free-phase NAPL will be collected from the recovery well using a pump or a 2-inch diameter polyethylene bailer. Samples will be placed into high density polyethylene (HDPE) containers that will be sealed and labeled for transport to IET's testing laboratory in Pipersville, Pennsylvania.

Laboratory Analysis

The pre-screening exercise will be performed by IET by introducing the ISGS reagent into the soil and/or NAPL samples to document short-term, qualitative changes in viscosity and/or solidification for the purposes of demonstrating feasibility prior to implementation of the bench-scale treatability study for ISGS. The site-derived soils and/or NAPLs to be tested by IET using the ISGS reagent may include (but are not limited to):

- Sands, silts, and clays with varying degrees of NAPL-related impacts
- Non-impacted soil with observed organic content (i.e. sandy loams)
- Free-phase NAPL
- Mechanically mixed soils with the addition of recovered free-phase NAPL

The results of the pre-screening exercise will be used to select the number and location of samples for the treatability study and will be summarized in the Treatability Study Report.

A request may be submitted to the NYSDEC to complete the pre-screening exercise prior to approval of this workplan.

Treatability Study Sample Collection

The bench-scale treatability studies for ISS and ISGS will require the collection of bulk soil, groundwater, and NAPL samples as described in this section. Three soil borings will be advanced

for implementation of the bench-scale treatability study for ISS and based on the results of the pre-screening exercise, IET will recommend the number and location of samples to be collected under a separate mobilization for implementation of the bench-scale treatability study for ISGS. The proposed ISS sample locations are shown on Figure 3.

Soil Investigation

An environmental drilling contractor will advance soil borings (ISS-01, ISS-02, and ISS-03 for the ISS treatability study and additional soil borings for the selected ISGS treatment zones) from surface grade to depths between about 32 and 40 feet bgs (between about el -15 and el -23) using a direct-push drill rig. Due to the volume of soil required for the bench-scale treatability studies, multiple borings may be advanced adjacent to the proposed sample locations until the minimum required sample volume is collected. A Langan field representative will document the work, screen the soil for environmental impacts, and collect soil samples. Soil will be screened continuously to the boring termination depth for VOCs using a PID equipped with a 10.6 eV bulb, and for visual and olfactory indications of environmental impacts. All soil borings will be logged and each soil boring log will include a soil description, a description of environmental impacts (if encountered), and the depth intervals where bulk soil samples are collected for the bench-scale treatability studies. Soil boring logs will be submitted to the NYSDEC following the sampling event.

Up to three bulk soil samples will be collected for the ISS treatability study from the targeted treatment intervals (between surface grade and el -23 feet NAVD88 for ISS). The number of bulk soil samples to be collected for the ISGS treatability study will be determined based on the results of the pre-screening exercise and samples will be collected from the target treatment interval (between the groundwater table and el -23 feet NAVD88 for ISGS). To the extent practicable, bulk soil samples will be biased to intervals exhibiting the greatest degree of environmental impacts.

ISS Samples

A minimum of 30 kilograms (kg) of soil will be collected for each predominant soil type (i.e. fill, sand, and/or clay) identified during advancement of the three ISS soil borings (ISS-01 through ISS-03). For each predominant soil type identified, about 10 kg of soil will be collected from each soil boring and homogenized in the field to create one bulk soil sample per strata. Gravel and/or cobbles measuring greater than 0.5 inches in diameter will be removed from the bulk soil samples prior to homogenizing. Bulk soil samples for ISS will be collected into Ziploc® bags and placed into sealed five-gallon plastic buckets for overnight delivery to Langan's Treatability Facility at NJIT. Upon arrival at Langan's Treatability Facility, soil samples will be placed in refrigerated storage until the treatability study begins.

A portion of each of the three homogenized bulk soil samples for ISS will be collected into laboratory-supplied containers that will be sealed, labeled, and placed in a cooler containing ice (to maintain a temperature of approximately 4 degrees Celsius) for transport to a New York State Department of Health (NYSDOH) Environmental Laboratory Approval Program (ELAP)-certified analytical laboratory for analysis of the following baseline parameters: Part 375/target compound list (TCL) VOCs, semivolatile organic compounds (SVOCs), total petroleum hydrocarbons (TPH) (diesel range organics [DRO] and oil range organics [ORO]), and total organic carbon (TOC).

ISGS Samples

A minimum of 15 kg (about 9 liters [L]) of soil will be collected from each of the recommended soil boring locations identified after the pre-screening exercise (one bulk soil sample per soil boring location). Bulk soil samples will be biased toward the intervals exhibiting the greatest degree of environmental impacts and will be homogenized in the field. Gravel and/or cobbles measuring greater than 0.5 inches in diameter will be removed from the bulk soil samples prior to homogenizing. The bulk soil samples for ISGS will be placed into laboratory-supplied, 1-liter (L) containers for overnight delivery to ReSolution Partners, LLC. Upon arrival at ReSolution Partners, LLC, soil samples will be placed in refrigerated storage until the treatability study begins.

Following soil sample collection, boreholes will be filled from the boring termination depth to surface grade using grout and/or hydrated bentonite.

A summary of soil samples anticipated to be collected (excluding baseline samples) during the soil investigation is provided below:

Sample Type and Treatability Study Laboratory	Sample Rationale	Soil Boring IDs	Proposed Sample ID	Minimum Sample Weight Required
ISS – Langan's Treatability Facility at NJIT	One sample per predominant strata identified	Homogenized samples between soil borings ISS-01, ISS-02, and ISS-03	ISS-FILL	30 kg
			ISS-SAND	30 kg
			ISS-CLAY	30 kg
ISGS – ReSolution Partners, LLC	One sample per soil boring selected by IET	To be determined (TBD) based on pre-screening results	ISGS-##	15 kg
			ISGS-##	15 kg
			ISGS-##	15 kg

Groundwater Investigation

Up to three bulk groundwater samples will be collected for ISS from monitoring well CGMW-34S (an existing monitoring well screened in the target treatment zone). The number and location of bulk groundwater samples to be collected for ISGS will be determined based on the results of the pre-screening exercise. Prior to sampling, the monitoring wells will be gauged for static water levels and presence of NAPL, purged, and physical and chemical parameters (e.g., temperature, dissolved oxygen, oxygen reduction potential, turbidity) will be allowed to stabilize to the ranges specified in the USEPA's Low Stress Purging and Sampling Procedure for the Collection of Groundwater Samples From Monitoring Wells, Dated July 30, 1996 and Revised January 19, 2010. Samples will be collected with a peristaltic pump (or equivalent) with dedicated polyethylene tubing.

ISS Samples

About 50 L (about 13 gallons) of groundwater will be collected for each bulk soil sample (for a total of up to three bulk groundwater samples). Each bulk groundwater sample will be collected into three, five-gallon HDPE containers for transport to Langan's Treatability Facility for use during the ISS treatability study.

One groundwater sample will also be collected from monitoring well CGMW-34S for analysis of the following baseline parameters by a NYSDOH ELAP-certified analytical laboratory: Part 375/TCL VOCs, SVOCs, TPH (DRO and ORO), total and dissolved metals, chloride, and TOC.

ISGS Samples

For each bulk soil sample collected for the ISGS treatability study, 47.5 L of groundwater will be collected into five, 9.5-L stainless-steel canisters for transport to ReSolution Partners, LLC. ReSolution Partners, LLC will collect a portion of one sample set to establish pre-treatment conditions. The baseline analyses will include BTEX, PAHs, and TPH, and the sample analysis will be performed by Microbac Laboratories, Inc., a NYSDOH ELAP-certified laboratory located in Pittston, PA.

NAPL Investigation

NAPL samples will be collected from existing recovery well CGRW-22I (a well partially screened within the treatment interval on Parcel III) as part of the ISGS treatability study. NAPL samples will not be collected as a component of the bench-scale treatability study for ISS.

About 1 L of free-phase NAPL will be collected for each bulk soil sample for implementation of the bench-scale treatability study for ISGS. Each NAPL sample will be collected into one, laboratory-supplied 1-L container for transport to ReSolution Partners, LLC.

Community Air Monitoring Plan (CAMP)

Air monitoring will be implemented during ground-intrusive investigation activities in accordance with the site-specific CAMP included as Attachment 1, including the Special Requirements for Work within 20 feet of Potentially Exposed Individuals or Structures. At a minimum, the CAMP will include one upwind and one downwind CAMP station around each distinct area of intrusive work. If two drilling activities are ongoing, CAMP monitoring will be expanded to accommodate the area.

Management of Investigation-Derived Waste

Excess investigation-derived waste (IDW), including soil cuttings, purged groundwater, and decontamination fluids, will be containerized in properly labeled and sealed UN/DOT-approved 55-gallon drums for future waste characterization and off-site disposal at a facility permitted to accept the waste. The drums will be staged in a secure area on-site, pending receipt of laboratory data and off-site disposal to an appropriate facility.

BENCH-SCALE TREATABILITY STUDIES

Bench-scale treatability studies will be conducted for ISS and ISGS (if determined to be feasible based on the pre-screening tests) for the development of a full-scale remediation design.

In-Situ Stabilization/Solidification Treatability Studies

Langan's Treatability Facility will use the bulk soil and groundwater samples to evaluate the application of ISS as a supplemental remedial element to address NAPL/GCM impacts remaining on-site. The bench-scale treatability study will include:

<u>Solidification Test</u>

A 7-day screening test will be setup using the homogenized soil prepared in the field. During the screening test, soil will be mixed with site groundwater and different doses of Portland I/II cement and the corresponding soil-cement mixture will be packed into molds. Mold strength will be measured periodically for 7 days during the curing process using a pocket penetrometer. The results of the 7-Day test will be used to refine the dosage of binder needed to setup ISS molds for the solidification test (28-Day Test). Separate tests will be setup for each predominant soil type (i.e. each homogenized bulk soil sample).

<u>Solidification Test Setup and ISS Mold Analysis</u>

A solidification test will be conducted to determine the dosage of reagent required to achieve the targeted unconfined compressive strength (UCS) and hydraulic conductivity which are analyzed by methods ASTM D1633 and ASTM D5084, respectively. The homogenized soil sample will be tested by creating test molds using different dosages of Portland I/II cement (e.g. 5%, 10% and 15%, respectively), along with additives such as bentonite. Control molds, consisting of site soil

without the addition of Portland cement or the selected additives, will also be prepared. The test molds will be constructed in duplicates, as needed, to verify the results of the solidification testing.

Samples will be analyzed for UCS (via ASTM Method D1633) and hydraulic conductivity (via ASTM Method D5084) at 7-, 14-, and 28-days, at a minimum. At the end of the curing period (up to 28 days), select molds will be submitted to a geotechnical laboratory for analysis of moisture content, density, UCS, and hydraulic conductivity. The grout mixes used for preparation of the test ISS molds will also be characterized for viscosity, density, and pH.

Modifications to the ISS treatability study may be required based on field and laboratory observations, and baseline sampling and screening. Modifications to the work plan (if required) will be communicated to the NYSDEC.

Data Analysis and Report

Results of the ISS treatability study, including test methods, observations, photographs, screening results, and laboratory analytical data will be tabulated, evaluated, and documented in a Treatability Study Report, which will be included in a forthcoming remedial design document to define the ISS design parameters.

In-Situ Geochemical Stabilization Treatability Studies

ReSolution Partners, LLC will use the bulk soil, groundwater, and NAPL samples to evaluate the application of ISGS as a supplemental remedial element to address NAPL/GCM impacts remaining on-site. The bench-scale treatability study will include:

Baseline Analysis

A portion of each bulk soil and groundwater sample will be analyzed to establish pre-treatment conditions for the following parameters; benzene, toluene, ethylbenzene, and xylenes (BTEX) via USEPA method 8260, polycyclic aromatic hydrocarbons (PAHs) via USEPA 8270 SIM, and TPH (DRO and ORO) analysis. The sample analysis will be performed by Microbac Laboratories, Inc. (Microbac), a NYSDOH ELAP-certified analytical laboratory located in Pittston, Pennsylvania (ELAP ID No. 12150).

Column Evaluation

The primary objective of the ISGS test columns is to determine the degree to which the selected ISGS application reduces the leachable TPH, BTEX and PAH concentrations under dynamic (flowing) conditions relative to an unamended control under the same conditions. The columns will also be used to estimate the hydraulic conductivity change of the treated soil as a result of ISGS addition. The ISGS test columns will be constructed of 10.2 centimeter (cm)-diameter by 15-cm-long clear polyvinyl chloride (PVC).

Six columns will be prepared per sample set, as follows:

- Two unamended control columns
- Two with 4.5% by mass ISGS solution at a dose specified IET
- Two with 10% by mass ISGS solution at a dose specified by IET

ReSolution Partners, LLC will homogenize the bulk soil samples by mixing the soil by hand immediately prior to column packing. The unamended soil and amended soil will be placed into the columns in 2- to 3-cm lifts with site groundwater, and the columns will be tapped to facilitate packing to a target of 1.5 to 1.8 kg/L (soil bulk density). If necessary, stirring will be applied to the lifts to facilitate the release of air bubbles. The amount of groundwater and solids added to the columns will be measured to estimate the bulk density of the columns fill. Adding groundwater during the filling process will ensure that the columns are saturated as the ISGS reacts with the NAPL. Columns will react for 72 hours without flow to allow the ISGS encapsulation to proceed.

After the 72-hour reaction period, groundwater will be introduced to the top of the column to flush unreacted permanganate (MnO4) from the NAPL-spiked soil. Flushing will continue until effluent is visually free of unreacted MnO4. The flushed volume and MnO4 concentrations will be measured to estimate the reacted and retained mass of MnO4.

When flushing is complete, all columns will begin downward flow of groundwater under a constant head of water. The flow rates will vary between the columns and may vary within a column over time. The flow rate will be measured gravimetrically each business day. Initial estimates of column pore volumes suggest that approximately 6 pore volumes (1.5 L) will have to be collected to meet the sample size requirements for the analytical program. Samples will therefore be collected from the columns at approximately 6, 18 and 36 pore volumes. Each sample is a composite of previous six pore volumes: 0 to 6, 12 to 18 and 30 to 36. Additional samples will be tested for pH and ORP at approximately 9 and 24 pore volumes.

Samples will be collected in evacuated multi-layer bags with aliquots processed for analysis of BTEX, TPH, PAH, pH and ORP. ReSolution Partners will complete pH and ORP measurements, and Microbac Laboratories will complete analyses of BTEX, PAHs, and TPH under a standard 10-business day turnaround time (TAT). Individual compounds will be reported for BTEX and PAHs.

Concentration as a function of liquids to solids (L:S) will assess reductions relative to the control columns operated under conditions comparable to the ISGS-amended columns. The total mass of contaminants leached from the control and ISGS columns will also be determined.

Permeability Trials and Microscope Examination

Following the column evaluation, a permeability assessment will be completed, where the columns' plumbing will be modified to complete falling head permeability tests on all columns.

After conclusion of the permeability testing, a microscopic evaluation will be conducted. The columns will be opened and examined microscopically and digitally photographed. Photographs in support of the visual observations will be provided as part of the project reporting.

Following the microscope examination, 2-cm-thick portions of each of the column solids will be analyzed by Microbac for manganese via USEPA method 6010. The results from the unamended columns subtracted from the amended column results will provide a measure of retained manganese and provide a measure of the degree of manganese heterogeneity within the columns.

Data Analysis and Report

ReSolution Partners will provide a final report to Langan after completion of the bench-scale treatability study for ISGS. The final report will include the results of ISGS dose trials, column trials, and analytical data, as well as a description of test methods, tabulations of results, and charts. These results, along with soil boring logs and field data, will be incorporated into a forthcoming remedial design document to determine if ISGS is a feasible solution to address NAPL/GCM impacts remaining on-site.

REPORTING

A summary of drilling, soil sampling, and CAMP implementation (including CAMP station locations and results) will be documented in daily reports, which will be submitted to the NYSDEC and the NYSDOH by the end of the following day along with tabulated CAMP data. The results of the treatability study sampling will be submitted to the NYSDEC in a forthcoming remedial design document, which will describe the completed scope of work and present the field and analytical results of the sampling, the final Treatability Study Report, and an ISS and ISGS remedial design to address remaining NAPL/GCM-impacted soil/fill within the treatment areas on-site.

SCHEDULE

The treatability study is being conducted to establish the feasibility of ISS and ISGS as a treatment for MGP-impacted soil on-site. Previous environmental and geotechnical investigations and any supplemental remedial design investigations will be used to inform feasibility of supplemental remediation methods in the forthcoming Remedial Design Document. The table below presents an estimated schedule for the proposed investigations and reporting.

Activity	Proposed Completion Dates (weeks after NYSDEC approval of the TSWP)
Pre-Screening Exercise/Treatability Study Field Investigation	2-4 weeks
ISS Treatability Study/Report	10-12 weeks
ISGS Treatability Study/Report	14-16 weeks
ISGS/ISS Remedial Design Document	20-22 weeks

CLOSING

We respectfully request approval of this Treatability Study Work Plan. Please contact us with any questions or comments.

Sincerely,
Langan Engineering, Environmental, Surveying, Landscape Architecture and Geology, D.P.C.

Gerald Nicholls, PE, CHMM
Associate Principal

Enclosure(s):
- Figure 1 Site Location Map and Site Plan
- Figure 2 Subsurface Obstructions
- Figure 3 Proposed Sample Location Plan
- Attachment 1 Community Air Monitoring Plan

cc:
- H. Dudek, S. Deyette – NYSDEC
- Y. Schwimmer, M. Loeb – HR DC Smith Street Owner, LP
- P. Van Rossem, A. Prophete – National Grid
- M. Benoit, T. Young – Arcadis
- D. Yudelson – Sive, Paget & Riesel
- P. McMahon, M. Au, S. Simpson – Langan

FIGURES

GOWANUS GREEN
(PARCELS I & II)
NYSDEC SITE NO. C224012

459 SMITH STREET
(PARCEL III)
NYSDEC SITE NO. C224012B

D5

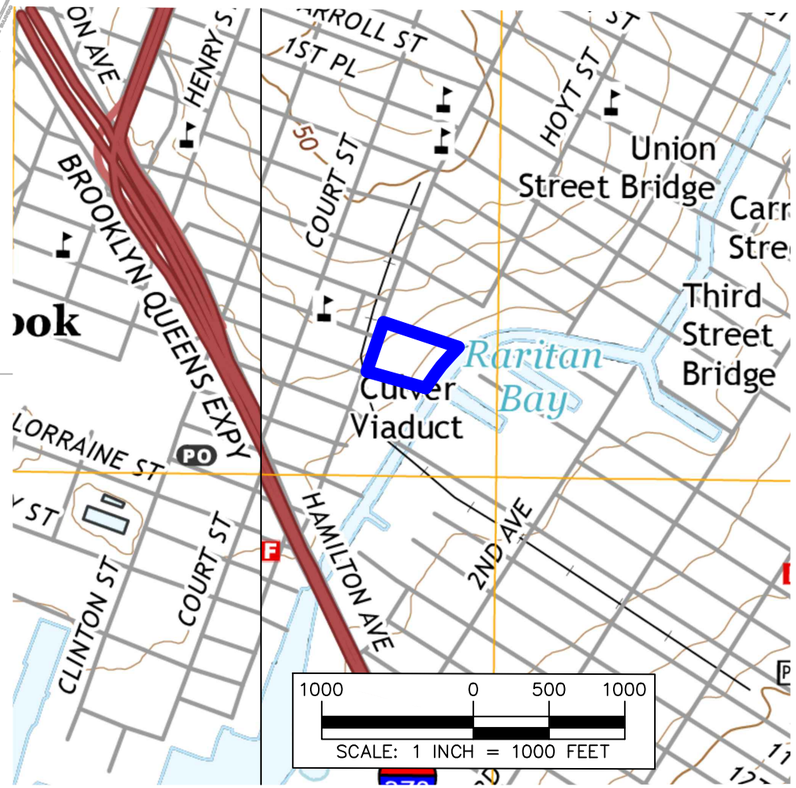
D6W

D6E

LEGEND:

APPROXIMATE 459 SMITH STREET SITE BOUNDARY

PROPOSED BUILDING FOOTPRINTS



NOTES:

1. SITE LOCATION BASE MAP IS REFERENCED FROM THE UNITED STATES GEOLOGICAL SURVEY (USGS) 7.5 MINUTE SERIES BROOKLYN, N.Y. QUADRANGLE MAP, DATED 2016.
2. SITE PLAN BASE MAP REFERENCED FROM DRAWING ENTITLED "ARCHITECTURAL SURVEY" PREPARED BY LEONARD J. STRANDBERG AND ASSOCIATES, CONSULTING ENGINEERS AND LAND SURVEYORS, P.C., LAST UPDATED DECEMBER 13, 2021
3. ALL ELEVATIONS SHOWN HEREIN REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88).

60 0 30 60
SCALE: 1 INCH = 60 FEET

LANGAN
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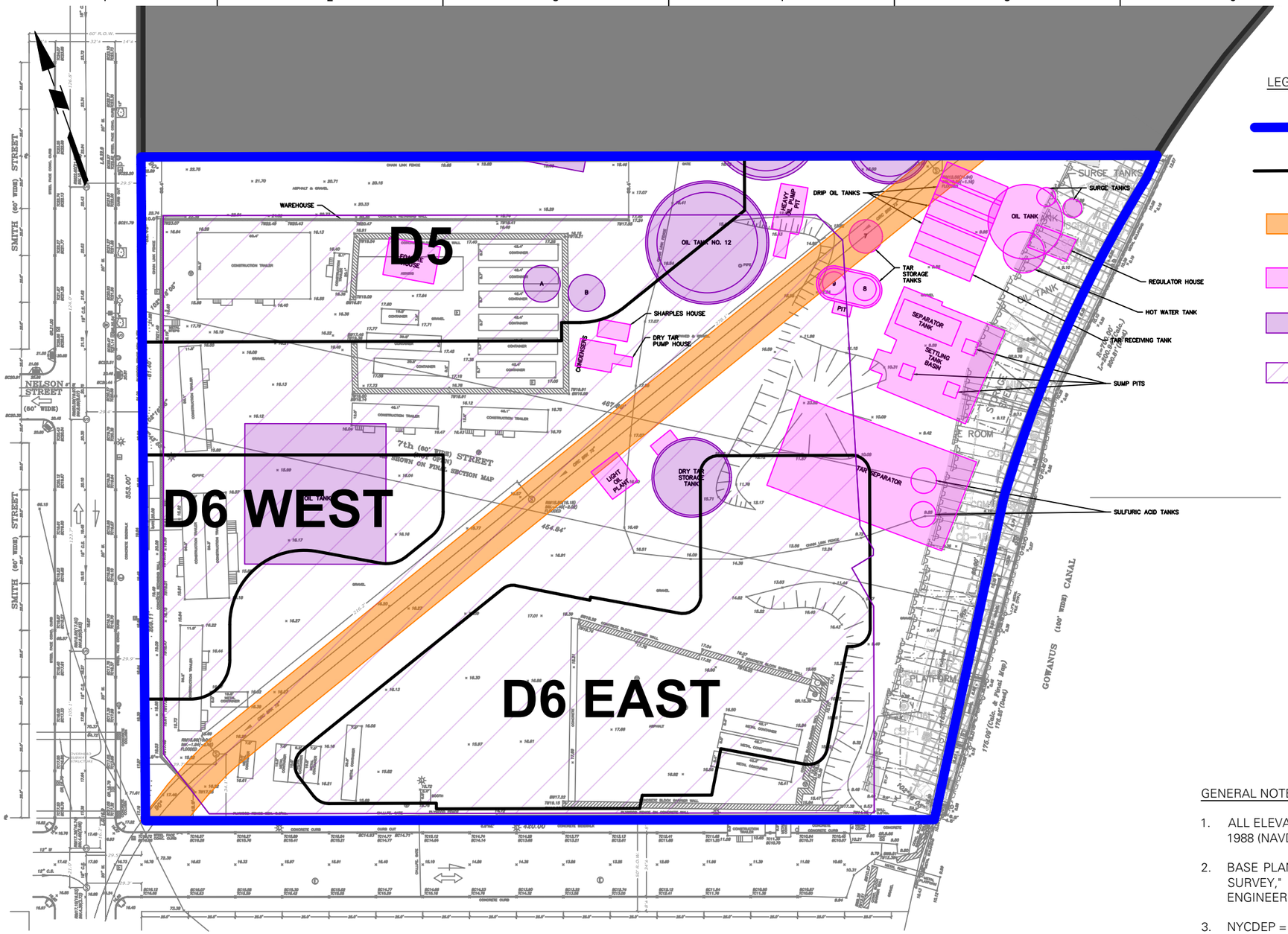
Project	459 SMITH STREET NYSDEC BCP NO. C224012B BLOCK NO. 471, LOT NO. 200 KINGS NEW YORK
Figure Title	SITE LOCATION MAP AND SITE PLAN
Project No.	170420201
Date	8/8/2024
Drawn By	SS
Checked By	MA
Figure	1

Filename: \\langan.com\data\NYC\data2\170420201\Cadd Data - 170420201\SheetFiles\Environmental\Treatability Study - Parcels I, II and III\Figure 1 - Site Plan.dwg Date: 10/7/2024 Time: 14:20 User: ssimpson Style Table: Langan.stb Layout: 459 Smith TSWP



LEGEND

- APPROXIMATE SITE BOUNDARY
- PROPOSED BUILDING FOOTPRINTS
- EXISTING INFRASTRUCTURE (NYCDEP BOND–LORRAINE COMBINED SEWER)
- PHYSICAL OBSTRUCTIONS – CONCRETE FOUNDATION
- PHYSICAL OBSTRUCTIONS – PILE SUPPORTED CONCRETE
- APPROXIMATE EXTENTS OF FORMER PILE–SUPPORTED WAREHOUSE

GENERAL NOTES:

1. ALL ELEVATIONS SHOWN HEREIN REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 98.453 FEET BELOW THE NEW YORK CITY TRANSIT DATUM.
2. BASE PLANS FOR 459 SMITH STREET TAKEN FROM DRAWING ENTITLED "ARCHITECTURAL SURVEY," PREPARED BY LEONARD J. STRANDBERG AND ASSOCIATES, CONSULTING ENGINEERS AND LAND SURVEYORS, P.C., LAST UPDATED AUGUST 2021.
3. NYCDEP = NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL CONSERVATION

REFERENCE DRAWINGS:

1. APPROXIMATE OBSTRUCTION LOCATIONS PROVIDED BY ARCADIS.

WARNING: IT IS A VIOLATION OF THE NYS EDUCATION LAW ARTICLE 145 FOR ANY PERSON, UNLESS HE IS ACTING UNDER THE DIRECTION OF A LICENSED PROFESSIONAL ENGINEER, LAND SURVEYOR OR GEOLOGIST, TO ALTER THIS ITEM IN ANY WAY.

60 0 30 60
SCALE: 1 INCH = 60 FEET

LANGAN
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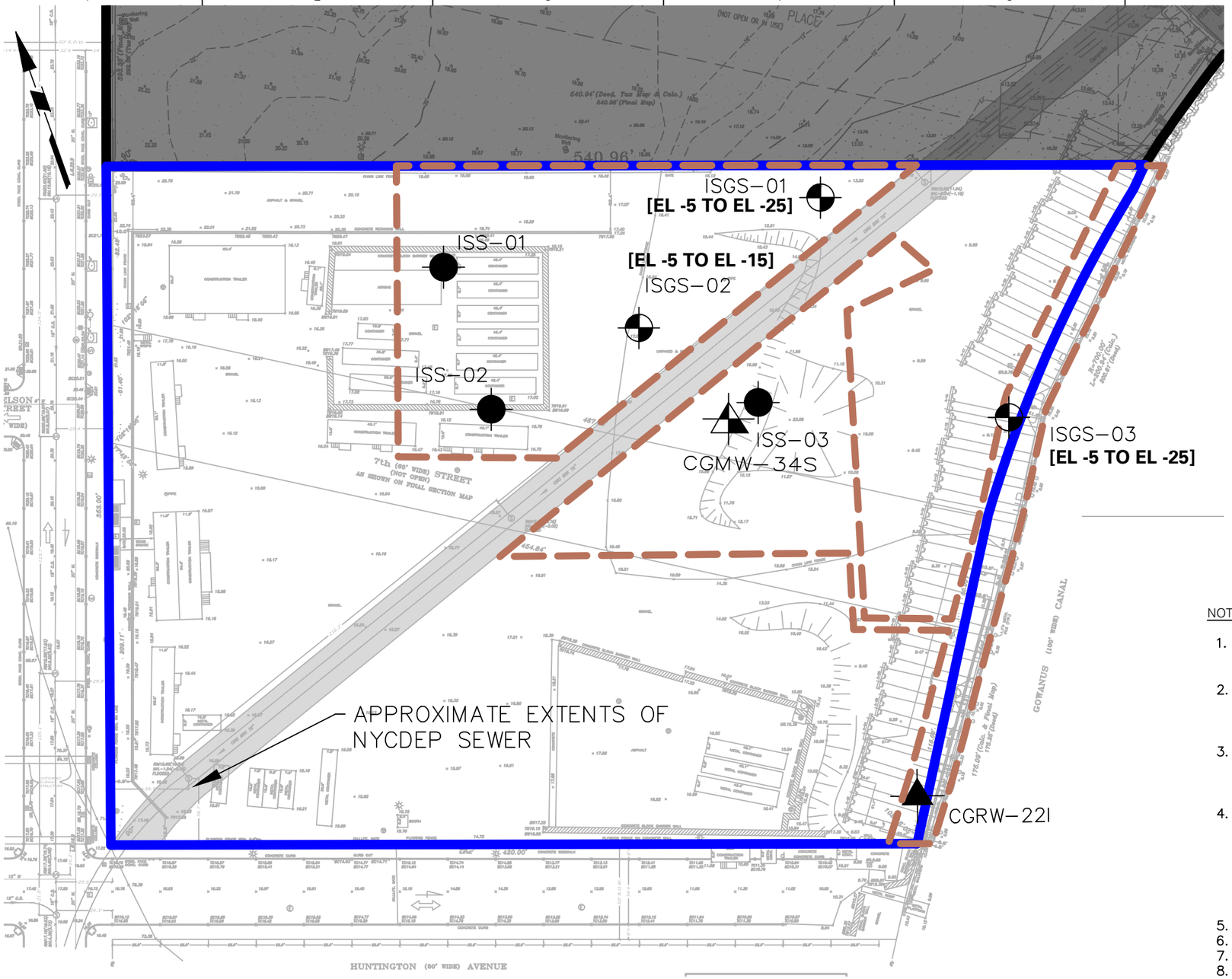
Project
459 SMITH STREET
NYSDEC BCP No. C224012B
BLOCK No. 471 LOT No. 200
KINGS NEW YORK

Figure Title
SUBSURFACE OBSTRUCTIONS

Project No. 170420201
Date 8/8/2024
Drawn By SS
Checked By MA

Figure 2
Sheet 2 of 3

Filename: \\langan.com\data\NYC\data2\170420201\Cadd Data - 170420201\SheetFiles\Environmental\Treatability Study - Parcels I, II and III\Figure 2 - Subsurface Obstructions (459 Smith)_040725.dwg Date: 4/10/2025 Time: 11:57 User: ssimpson Style Table: Langan.stb Layout: ANSIB-BL



LEGEND:

- APPROXIMATE SITE BOUNDARY
- APPROXIMATE EXTENTS OF REQUIRED TREATMENT AREA
- PROPOSED ISGS PRE-SCREENING SAMPLE LOCATION
- PROPOSED ISS TREATABILITY STUDY SAMPLING LOCATION
- EXISTING GROUNDWATER MONITORING WELL
- EXISTING NAPL RECOVERY WELL

NOTES:

1. ALL ELEVATIONS SHOWN HEREIN REFERENCE THE NORTH AMERICAN VERTICAL DATUM OF 1988 (NAVD88), WHICH IS 98.453 FEET BELOW THE NEW YORK CITY TRANSIT DATUM.
2. BASE PLANS FOR 459 SMITH STREET TAKEN FROM DRAWING ENTITLED "ARCHITECTURAL SURVEY," PREPARED BY LEONARD J. STRANDBERG AND ASSOCIATES, CONSULTING ENGINEERS AND LAND SURVEYORS, P.C., LAST UPDATED AUGUST 2021.
3. PROPOSED TREATMENT AREAS ARE APPROXIMATE AND ARE BASED ON THE TREATMENT AREAS OUTLINED IN NYSDEC'S JUNE 18, 2024 LETTER. AREAS WITHIN THE TREATMENT ZONE WHERE ISS MAY NOT BE FEASIBLE WILL BE ADDRESSED THROUGH ISGS TREATMENT.
4. ELEVATIONS SHOWN FOR ISGS PRE–SCREENING LOCATIONS WERE PROVIDED BY INNOVATIVE ENVIRONMENTAL TECHNOLOGIES, INC. (IET) AND ARE INTENDED TO TARGET THREE PREDOMINANT SOIL TYPES (I.E. FILL, SOIL AND CLAY) BASED ON THE CROSS–SECTIONS GENERATED DURING PREVIOUS INVESTIGATIONS. FOLLOWING IMPLEMENTATION OF THE PRE–SCREENING EXERCISE, SAMPLE LOCATIONS WILL BE SELECTED FOR IMPLEMENTATION OF THE BENCH–SCALE TREATABILITY STUDY FOR ISGS.
5. ISS = IN–SITU STABILIZATION/SOLIDIFICATION
6. ISGS = IN–SITU GEOCHEMICAL STABILIZATION
7. NAPL = NON–AQUEOUS PHASE LIQUID
8. NYCDEP = NEW YORK CITY DEPARTMENT OF ENVIRONMENTAL PROTECTION
9. NYSDEC = NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION

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SCALE: 1 INCH = 60 FEET

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Project	459 SMITH STREET NYSDEC BCP NO. C224012B BLOCK No. 471, LOT No. 200 KINGS NEW YORK
Figure Title	PROPOSED SAMPLE LOCATION PLAN
Project No.	170777301
Date	8/30/2024
Drawn By	SS
Checked By	MA
Figure	3

Filename: \\langan.com\data\NYC\data2\170420201\Cadd Data - 170420201\SheetFiles\Environmental\Treatability Study - Parcels I, II and III\Figure 3 - TSWP - Sampling Plan _2024-10-07 459 Smith.dwg Date: 10/9/2024 Time: 11:31 User: mau Style Table: Langan.stb Layout: Supplemental Remedial Alt - 459 Smith Only

ATTACHMENT 1 – COMMUNITY AIR MONITORING PLAN

COMMUNITY AIR MONITORING PLAN

for

459 SMITH STREET
BROOKLYN, NEW YORK
NYSDEC BCP SITE NO. C224012B

Prepared For:

HR DC Smith Street Owner, LP
52 Sutton Place
Lawrence, NY 11559

Prepared By:

Langan Engineering, Environmental, Surveying,
Landscape Architecture and Geology, D.P.C.
368 Ninth Avenue, 8th Floor
New York, New York 10001

April 2025
Langan Project No. 170420201

LANGAN

1.0 Introduction

This site-specific community air monitoring plan (CAMP) was prepared in general compliance with the New York State Department of Health (NYSDOH) Generic CAMP and is intended to mitigate potential exposures of sensitive receptors to nuisance odors and dust resulting from ground-intrusive work. This CAMP is intended for use during implementation of the Treatability Study Work Plan (TSWP) for in-situ solidification/stabilization (ISS) and in-situ geochemical stabilization (ISGS), which includes but is not limited to, soil boring advancement and soil, groundwater, and non-aqueous phase liquid sampling.

2.0 Community Air Monitoring

Monitoring for particulates and odors will be conducted during ground-intrusive work by a Langan field representative under the supervision of the remedial engineer (RE). The CAMP will include real-time monitoring for volatile organic compounds (VOCs) and particulates at the downwind perimeter of each designated work area when ground-intrusive work is in progress. Continuous monitoring will be required for all ground-intrusive work. Ground-intrusive work includes, but is not limited to, soil boring advancement and excavation. The work zone is defined as the general area in which machinery is operating in support of the investigation. At a minimum, the CAMP will include two perimeter CAMP stations (one upwind and one downwind) and one handheld photoionization detector (PID) within the work zone at each distinct area of intrusive work. Perimeter CAMP stations will be set to an inlet height between 3 and 5 feet above ground surface. CAMP stations will monitor for VOCs with a PID; and dust emissions with equipment using real-time monitoring capable of measuring PM-10 (e.g., DustTrak or equivalent). The site perimeter will also be visually monitored for fugitive dust emissions.

The day-to-day location of CAMP stations will be fluid and dynamic based on wind direction and work zone location and will take into account the location of sensitive receptors and/or ground-level air intakes (if any). In accordance with the CAMP, downwind CAMP monitoring data will be compared to upwind CAMP monitoring data, to provide a real-time comparison to ambient conditions. CAMP data will be provided with the daily field reports.

An on-site supply of odor/vapor suppressing foam (Atmos® [formerly Rusmar] AC-645, Atmos® Seal 900, or RE-approved equivalent) will be maintained for active mitigation within any areas where nuisance odors are identified during the investigation.

CAMP Action Levels

For VOC monitoring, the following actions will be taken based on VOC levels measured:

- If total VOC levels exceed 5 parts per million (ppm) above background for the 15-minute average at the perimeter, work activities will be temporarily halted and monitoring continued. If levels

readily decrease (per instantaneous readings) below 5 ppm above background, work activities will resume with continued monitoring.

- If total VOC levels at the downwind perimeter of the hot zone persist at levels in excess of 5 ppm above background but less than 25 ppm, work activities will be halted, the source of vapors identified, corrective actions taken to abate emissions, and monitoring continued. After these steps work activities will resume provided that the total organic vapor level 200 feet downwind of the hot zone or half the distance to the nearest potential receptor or residential/commercial structure, whichever is less – but in no case less than 20 feet, is below 5 ppm above background for the 15-minute average.

- If the downwind total VOC level persist above 25 ppm at the perimeter of the site, activities will be shut down.

For dust monitoring with field instrumentation, the following actions will be taken based on instrumentation measurements:

- If the downwind particulate level is 100 micrograms per cubic meter (µg/m^3) greater than background (upwind perimeter) for the 15-minute period or if airborne dust is observed leaving the work area, then dust suppression must be employed. Work may continue with dust suppression techniques provided that downwind particulate matter less than 10 microns (PM10) levels do not exceed 150 µg/m^3 above the background level and provided that no visible dust is migrating from the work area.

- If, after implementation of dust suppression techniques, downwind PM10 levels are greater than 150 µg/m^3 above the background level, work must be stopped and a re-evaluation of activities initiated. Work can resume provided that dust suppression measures and other controls are successful in reducing the downwind PM10 concentration to within 150 µg/m^3 of the upwind level and in preventing visible dust migration.

3.0 Odor, Vapor, and Dust Suppression Techniques

Work practices to minimize odors and vapors include covering drums and open boreholes, plugging monitoring wells, and minimizing the handling of contaminated material. Offending odor and organic vapor controls may include the application of foam suppressants or tarps over the odor or VOC source areas. Foam suppressants may include biodegradable foams applied over the source material for short-term control of the odor and VOCs.

4.0 Monitoring of Nearby Occupied Structures

This section applies where structures within about 20 feet of the ground-intrusive work may be occupied

during the planned investigation. Where this condition exists, the following will be considered for incorporation into the CAMP:

- One of the CAMP monitoring stations will be placed between the work area and nearest outside wall of the occupied structure. If site conditions warrant, a third station may be used to accomplish this task.
    - If 15-minute-average total VOC concentrations exceed 1 ppm above background near the outside wall or next to intake vents of the occupied structure, periodic VOC monitoring will be performed within the occupied structure.
    - If 15-minute-average total PM10 concentrations exceed 150 µg/m^3 above background near the outside wall or next to intake vents of the occupied structure, work activities will be temporarily suspended until suppression techniques are implemented and concentrations return to background.
- Where nuisances have developed during investigation work and cannot be corrected using the techniques described in Section 3.0, use of additional engineering controls may be considered, such as vapor/dust barriers or ventilation devices.
- Consideration should be given to scheduling or sequencing ground-intrusive activities during periods when potentially exposed populations may not be occupying the structure.

5.0 Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures

When work areas are within 20 feet of potentially exposed populations or occupied structures, the continuous monitoring locations for VOCs and particulates must reflect the nearest potentially exposed individuals and the location of ventilation system intakes for nearby structures. The use of engineering controls such as vapor/dust barriers, temporary negative-pressure enclosures, or special ventilation devices should be considered to prevent exposures related to the work activities and to control dust and odors. Consideration should be given to implementing the planned activities when potentially exposed populations are at a minimum, such as during weekends or evening hours in non-residential settings.

- If total VOC concentrations opposite the walls of occupied structures or next to intake vents exceed 1 ppm, monitoring should occur within the occupied structure(s). Depending upon the nature of contamination, chemical-specific colorimetric tubes of sufficient sensitivity may be necessary for comparing the exposure point concentrations with appropriate pre-determined response levels (response actions should also be pre-determined). Background readings in the occupied spaces must be taken prior to commencement of the planned work. Any unusual background readings should be discussed with NYSDOH prior to commencement of the work.
- If total particulate concentrations opposite the walls of occupied structures or next to intake vents

exceed 150 µg/m³, work activities should be suspended until controls are implemented and are successful in reducing the total particulate concentration to 150 µg/m³ or less at the monitoring point.

- Depending upon the nature of contamination and investigation activities, other parameters (e.g., explosivity, oxygen, hydrogen sulfide, carbon monoxide) may also need to be monitored. Response levels and actions should be pre-determined, as necessary.

6.0 Special Requirements for Indoor Work with Co-Located Residences or Facilities

Unless a self-contained, negative-pressure enclosure with proper emission controls will encompass the work area, all individuals not directly involved with the planned work must be absent from the room in which the work will occur. Monitoring requirements shall be as stated above under "Special Requirements for Work Within 20 Feet of Potentially Exposed Individuals or Structures" except that in this instance "nearby/occupied structures" would be adjacent occupied rooms. Additionally, the location of all exhaust vents in the room and their discharge points, as well as potential vapor pathways (openings, conduits, etc.) relative to adjoining rooms, should be understood and the monitoring locations established accordingly. In these situations, it is strongly recommended that exhaust fans or other engineering controls be used to create negative air pressure within the work area during remedial activities. Additionally, it is strongly recommended that the planned work be implemented during hours (e.g., weekends or evenings) when building occupancy is at a minimum.

7.0 Reporting

A summary of CAMP findings, including triggered action levels, will be provided daily to the New York State Department of Environmental Conservation (NYSDEC) and NYSDOH project managers as part of daily reporting. In addition to a summary of CAMP findings, daily reports will include:

- The NYSDEC assigned project number
- An update of progress made during the reporting day including a photograph log
- Locations of work
- References to an alpha-numeric map for site activities
- A summary of complaints (if any) with relevant details (names, phone numbers)
- A summary of CAMP findings, including exceedances, wind direction, work areas, location of CAMP monitoring stations and other relevant site information (exceedances of the 15-minute time weighted average will be reported to the NYSDEC as soon as they are calculated)
- An explanation of notable site conditions

Daily reports are not intended to be the mode of communication for notification to the NYSDEC of

emergencies (accident, spill), requests for changes to the TSWP, or other sensitive or time critical information; however, such conditions must also be included in the daily reports. Emergency conditions and changes to the TSWP will be addressed directly to NYSDEC Project Manager via personal communication.