Quality Assurance Project Plan/
Field Sampling Plan for Emerging Contaminants in Soil

Far Rockaway—Phase I Development Site
Queens, NY 11691

Block 15537: Portion of Lot 1 (Tentative Lot 101)
BCP Site No. C241224

April 2019

Prepared For:

New York State Department of Environmental Conservation
Division of Environmental Remediation
One Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101

Prepared by:

CA RICH Consultants, Inc.
17 Dupont Street
Plainview, NY 11803-1614

April 19, 2019

New York State Department of
Environmental Conservation
Division of Environmental Remediation
One Hunters Point Plaza
47-40 21st Street
Long Island City, NY 11101

Attention: Christopher Allan, Environmental Engineer

Re: Emerging Contaminants Work Plan
Far Rockaway Project—Phase I Development
20-02 Mott Avenue
Far Rockaway, Queens, New York
BCP Site No. C241224

Dear Mr. Allan:

CA RICH Consultants, Inc. (CA RICH) is pleased to provide you with this Emerging Contaminants Work Plan for the sampling of soils for PFAS and 1,4-Dioxane during the waste characterization sampling activities.

We look forward to moving ahead with the necessary remedial activities under the Brownfield Cleanup Program. If you have questions or require any additional detail, please do not hesitate to call our Office.

Respectfully submitted,

CA RICH CONSULTANTS, INC.

Jason T. Cooper, PG
Senior Project Manager

1.0 Introduction

CA RICH Consultants, Inc. (CA RICH) on behalf of Redfern FRP LLC, FRV Phase 1 Moderate LLC, FRV Phase 1 LIHTC LLC, FRV Phase I Commercial LLC, and Rockaway Village Housing Development Fund Corporation, has prepared this Quality Assurance Project Plan/Field Sampling Plan (QAPP/FSP) to describe the measures that will be taken to ensure that the data generated during sampling of emerging contaminants (ECs) in soil during the waste characterization for the Far Rockaway Phase 1 Development Site (BCP Site No. C241224) are of quality sufficient to meet project-specific data quality objectives (DQOs). The Site is located in the Far Rockaway section of Queens and is bound by Mott Avenue to the south, Redfern Avenue to the west and Central Avenue to east. Undeveloped land and asphalt paved areas border the Site to the north. This QAPP/FSP also includes field sampling procedures.

Redfern FRP LLC, FRV Phase 1 Moderate LLC, FRV Phase 1 LIHTC LLC, FRV Phase I Commercial LLC, and Rockaway Village Housing Development Fund Corporation are Volunteers in the Brownfield Cleanup Program. This QAPP/FSP was prepared in accordance with the guidance provided in NYSDEC Technical Guidance DER-10 Technical Guidance for Site Investigation and Remediation (DER-10), the NYSDEC BCP Guide, and the United States Environmental Protection Agency's (USEPAs) Guidance for the Data Quality Objectives (DQOs) Process (EPA QA/G-4).

1.1 Purpose

The QAPP/FSP describes in detail the field sampling and quality assurance/quality control (QA/QC) methods to be used during EC soil sampling tasks performed during the waste characterization sampling.

This QAPP/FSP provides guidelines and procedures to be followed by field personnel during performance of sampling during the waste characterization. Information contained in this QAPP/FSP relates to:

- Sampling objectives (Section 2);
- Project organization (Section 3);
- Sample media, sampling locations, analytical suites, sampling frequencies and analytical laboratory (Section 4);
- Field sampling procedures (Section 5);
- Sample handling, sample analysis, and quality assurance/quality control (Section 6); and
- Site control procedures and decontamination (Section 7).

2.0 Sampling Objectives

The objective of the proposed sampling is to meet the emerging contaminant sampling requirements of NYSDEC to obtain a current representation of the environmental conditions at the Site. The sampling of other media and analyses was addressed in approved March 2019 Remedial Investigation QAPP.

Samples procedures are discussed in Section 5 of this QAPP/FSP. A discussion of the DQOs and quality assurance/quality control is provided in Section 6.

3.0 Project Organization

Mr. Jason Cooper will serve as the Project Manager (PM) and will be responsible for the overall scheduling and performance of all the sampling activities and coordinating schedules.

Ms. Jessica Proscia will serve as the Quality Assurance Officer (QAO) for this project. Her duties will include:

- Review of laboratory data packages
- Interface with laboratory
- Performance of Field Audits

Ms. Lori Beyer of L.A.B. Validation will serve as the data validator.

Resumes of the above-mentioned personnel were included in the Appendix C of the Remedial Investigation Work Plan approved in March 2019. Experienced CA RICH staff will complete the field activities described in this EC Work Plan.

4.0 Sample Media, Locations, Analytical Suites, and Frequency

This QAPP/FSP is specifically designed for the collection of soil samples for the emerging contaminants 1,4-dioxane and Per- and Polyfluoroalkyl substances (PFAS), which include the 21 compounds listed in the NYSDEC March 2019 Groundwater Sampling for Emerging Contaminants Guidance (NYSDEC March 2019 Guidance). These compounds and their associated laboratory reporting limits for soil are listed in the following table.

Analyte	Laboratory Reporting Limit	Units
Perfluorobutanoic acid (PFBA)	0.200	ug/kg
Perfluoropentanoic acid (PFPeA)	0.200	ug/kg
Perfluorohexanoic acid (PFHxA)	0.200	ug/kg
Perfluoroheptanoic acid (PFHpA)	0.200	ug/kg
Perfluorooctanoic acid (PFOA)	0.200	ug/kg
Perfluorononanoic acid (PFNA)	0.200	ug/kg
Perfluorodecanoic acid (PFDA)	0.200	ug/kg
Perfluoroundecanoic acid (PFUnA)	0.200	ug/kg
Perfluorododecanoic acid (PFDoA)	0.200	ug/kg
Perfluorotridecanoic acid (PFTriA)	0.200	ug/kg
Perfluorotetradecanoic acid (PFTeA)	0.200	ug/kg
Perfluorobutanesulfonic acid (PFBS)	0.200	ug/kg
Perfluorohexanesulfonic acid (PFHxS)	0.200	ug/kg
Perfluoroheptanesulfonic Acid (PFHpS)	0.200	ug/kg
Perfluorooctanesulfonic acid (PFOS)	0.500	ug/kg
Perfluorodecanesulfonic acid (PFDS)	0.200	ug/kg
Perfluorooctanesulfonamide (FOSA)	0.200	ug/kg
N-methylperfluorooctanesulfonamidoacetic acid (NMeFOSAA)	2.00	ug/kg
N-ethylperfluorooctanesulfonamidoacetic acid (NEtFOSAA)	2.00	ug/kg
6:2 FTS	2.00	ug/kg

8:2 FTS	2.00	ug/kg
1,4-Dioxane	0.100	ug/kg

A discussion of the sampling schedule is provided below, while the assumed number of field samples to be collected, including quality control (QC) samples, is shown in Tables 1 and 2. Specifics regarding the collection of samples at each location and for each task are provided in Section 5 of this QAPP/FSP.

Soil samples collected from boring SB-1 through SB-13 during the Remedial Investigation will be re-sampled along with additional samples (EC-1 through EC-3) from the former dry cleaner area. The proposed sample locations are depicted on Figure 2.

The summary table below provides details for soil sampling locations (including depth intervals represented as feet below land surface) that are proposed to be used to characterize the emerging contaminants conditions in the soil at the Site.

Locations	Depth Intervals (Feet below grade)	Analysis	Number of Samples
SB-1	1-2', 14-15', and 18-19'	PFAS & 1,4-Dioxane	3
SB-2	1-2', 14-15', and 18-19'	PFAS & 1,4-Dioxane	3
SB-3	1-2', 14-15', and 18-19'	PFAS & 1,4-Dioxane	3
SB-4	1-2', 14-15', and 18-19'	PFAS & 1,4-Dioxane	3
SB-5	18-19'	PFAS & 1,4-Dioxane	1
SB-6	1-2', 14-15', and 18-19'	PFAS & 1,4-Dioxane	3
SB-7	18-19'	PFAS & 1,4-Dioxane	1
SB-8	1-2', 14-15', and 18-19'	PFAS & 1,4-Dioxane	3
SB-9	1-2', 14-15', and 18-19'	PFAS & 1,4-Dioxane	3
SB-10	18-19'	PFAS & 1,4-Dioxane	1
SB-11	1-2', 14-15', and 18.5-19.5'	PFAS & 1,4-Dioxane	3
SB-12	1-2', 14-15', and 18-19'	PFAS & 1,4-Dioxane	3
SB-13	17-18'	PFAS & 1,4-Dioxane	1
EC-1	8-9' and 14-15'	PFAS & 1,4-Dioxane	2
EC-2	8-9' and 14-15'	PFAS & 1,4-Dioxane	2
EC-3	8-9' and 14-15'	PFAS & 1,4-Dioxane	2
		Total samples =	37

For aqueous Field Blanks, PFAS will be analyzed by USEPA Method 537 Modified and 1,4-Dioxane will be analyzed by USEPA Method 8270D SIM. The Alpha Analytical Standard Operating Procedures (SOPs) for completing ECs analysis, list of all emerging contaminants compounds to be analyzed, and report limits/minimum detection limits for emerging contaminant compounds were submitted in the approved March 2019 Remedial Investigation Work Plan.

5.0 Field Sampling Procedures

This section provides a detailed discussion of the field procedures to be used during sampling soil for ECs. As discussed, the sample locations are shown on Figure 2 and are will be located in a similar location as the previously completed March 2019 Remedial Investigation. Additional details regarding sampling procedures and protocols are described in CA RICHs QAPP included in Appendix A of the approved RIWP.

Soil borings will be advanced using a GeoProbe® Direct-Push drill rig. Should the sampling location need to be located at a distance greater than ten feet from the original proposed location due to access constraints, CA RICH will contact the NYSDEC case manager to confirm. Samples of the soil profile will be collected continuously from land surface to a maximum depth of approximately 18-19 feet below grade for emerging contaminant soil sample collection. The above table in Section 4 discusses the proposed sample locations.

The soil from each five foot interval will be observed for lithology and evidence of contamination (e.g., staining, odors, and/or visible free product) and placed immediately thereafter into large Zip-loc™ bags for recording headspace using a PID. After a minimum of 15 minutes for equilibration with the headspace in the Zip-loc™ bag, each sample will be screened for organic vapors using a PID equipped with a 10.6 eV lamp. Samples for possible VOC analysis will be placed in a laboratory-supplied jar or encore sampler prior to screening, due to the potential for loss of VOCs through volatilization. Soil samples will be collected according to Section 3.2.2 of the RIWP. These samples will be placed in the laboratory-supplied containers and shipped to the laboratory under chain of custody procedures in accordance with CA RICH's QAPP located in the Appendix A of the approved March 2019 RIWP.

All soil samples collected as part of the emerging contaminant workplan will be analyzed for the NYSDEC-required PFAS and 1,4-Dioxane. Additional necessary precautions will be taken when sampling for ECs in the field, including but not limited to:

- Using the proper field clothing or personal protective equipment (i.e. no materials will contain Gore-Tex or Tyvek);
- Avoid making contact with aluminum foil, low density polyethylene (LDPE), glass, or polytetrafluoroethylene materials;
- Following PFAS field sampling guidelines (i.e. using sampling materials made from high density polyethylene [HDPE], silicon, or stainless steel and avoid using equipment containing Teflon and using sharpies, permanent markers, adhesives, and waterproof/plastic clipboards and notebooks); and
- Utilizing regular ice cubes for sample preservation and only Alconox or Liquinox for decontamination. "Blue Ice Packs" will not be used to chill the samples.

All samples will be collected and placed in the laboratory-supplied containers and shipped to the laboratory on ice under chain of custody procedures in accordance with CA RICH's QAPP submitted with the March 2019 approved RIWP.

All soil cuttings shall be returned to their respective bore holes. Soil removal at the Site is expected as part of remediation and construction activities. Contaminated soil cuttings, if encountered, will be placed in sealed and labeled U.S. Department of Transportation (DOT) approved 55-gallon drums pending characterization and off-site disposal at a permitted facility.

6.0 Sample Handling and Analysis

To ensure quality data acquisition and collection of representative samples, there are selective procedures to minimize sample degradation or contamination. These include procedures for preservation of the samples, as well as sample packaging, shipping procedures, and QA/QC.

6.1 Field Sample Handling

A discussion of the proposed number and types of samples to be collected during each task, as well as the analyses to be performed, can be found in Section 4.0 of this QAPP/FSP. The types of containers, volumes, and preservation techniques for the aforementioned testing parameters are presented in Table 3.

6.2 Sample Custody Documentation

The purpose of documenting sample custody is to ensure that the integrity and handling of the samples is not subject to question. Sample custody will be maintained from the point of sampling through the analysis (and return of unused sample portion, if applicable).

Each individual collecting samples is personally responsible for the care and custody of the samples. All sample labels should be pre-printed or filled out using waterproof ink. The technical staff will review all field activities with the Field Team Leader to determine whether proper custody procedures were followed during the field work and to decide if additional samples are required.

All samples being shipped offsite for analysis must be accompanied by a properly completed chain of custody form. The sample numbers will be listed on the chain of custody form. When transferring the possession of samples, individuals relinquishing and receiving will sign, date, and note the time on the record. This record documents transfer of custody of samples from the sampler to another person, to/from a secure storage area, and to the laboratory.

Samples will be packaged for shipment and dispatched to the appropriate laboratory for analysis with a separate signed custody record enclosed in each sample box or cooler. Shipping containers will be locked and/or secured with strapping tape in at least two locations for shipment to the laboratory.

6.3 Sample Shipment

Laboratory analysis will be completed by Alpha Analytical Laboratories of Westborough, Massachusetts. Sample packaging and shipping procedures are based upon USEPA specifications, as well as DOT regulations. The procedures vary according to potential sample analytes, concentration, and matrix and are designed to provide optimum protection for the samples and the public. Sample packaging and shipment must be performed using the general outline described below.

All samples will be shipped or picked up by a courier within 24 hours of collection and will be preserved appropriately from the time of sample collection. A description of the sample packing and shipping procedures is presented below:

1. Prepare cooler(s) for shipment:
   - Tape drain(s) of cooler shut;
   - Affix “This Side Up” arrow labels and “Fragile” labels on each cooler; and
   - Place mailing label with laboratory address on top of cooler(s).
2. Arrange sample containers in groups by sample number.
3. Ensure that all bottle labels are completed correctly. Place clear tape over bottle labels to prevent moisture accumulation from causing the label to peel off.
4. Arrange containers in front of assigned coolers.
5. Place packaging material approximately at the bottom of the cooler to act as a cushion for the sample containers.

6. Arrange containers in the cooler so that they are not in contact with the cooler or other samples.
7. Fill remaining spaces with packaging material.
8. Ensure all containers are firmly packed in packaging material.
9. If needed, loose ice cubes should be repackaged in Zip-lock™ bags and placed on top of the packaging material. Blue ice or freezer packs will not be used when shipping sampling to be analyzed for PFAS.
10. Sign chain of custody form (or obtain signature) and indicate the time and date it was relinquished to courier as appropriate.
11. Separate chain of custody forms. Seal proper copies within a large Zip-loc™ bag and tape to inside cover of cooler. Retain copies of all forms.
12. Close lid and latch.
13. Secure each cooler using custody seals.
14. Tape cooler shut on both ends.
15. Relinquish to overnight delivery service as appropriate or provide to laboratory courier. Retain air bill receipt for project records.
(Note: All samples requiring overnight delivery will be shipped for “NEXT A.M.” delivery).

6.4 Quality Assurance/Quality Control

Lori Beyer of L.A.B. Validation Services will review the analytical data for quality assurance and quality control in accordance with NYSDEC standards. The professional profile for Lori Beyer was provided in Appendix C of the approved RIWP.

The primary intended use for the emerging contaminant data is to characterize Site conditions and determine if remediation needs to be undertaken at the Site. The primary DQO of the soil, program is that data be accurate and precise, and hence representative of the actual Site conditions. Accuracy refers to the ability of the laboratory to obtain a true value (i.e., compared to a standard) and is assessed through the use of laboratory quality control (QC) samples, including laboratory control samples and matrix spike samples, as well as through the use of surrogates, which are compounds not typically found in the environment that are injected into the samples prior to analysis. Precision refers to the ability to replicate a value and is assessed through both field and laboratory duplicate samples.

Sensitivity is also a critical issue in generating representative data. Laboratory equipment must be of sufficient sensitivity to detect target compounds and analytes at levels below NYSDEC standards and guidelines whenever possible. Equipment sensitivity can be decreased by field or laboratory contamination of samples, and by sample matrix effects. Assessment of instrument sensitivity is performed through the analysis of reagent blanks, near-detection-limit standards, and response factors. Potential field and/or laboratory contamination is assessed through use of trip blanks, method blanks, and equipment rinse blanks (also called “field blanks”).

Table 1 lists the requirements for field and laboratory QC samples that will be analyzed to assess data accuracy and precision, as well as to determine if equipment sensitivity has been compromised. Table 2 lists the number/type of field and QA/QC samples that will be collected during the RI. Table 3 lists the preservation, holding times and sample container information.

All analyses will be performed in accordance with the NYSDEC Analytical Services Protocol (ASP), using USEPA SW-846 methods.

All laboratory data are to be reported in NYSDEC ASP Category B deliverables and will be delivered to NYSDEC in electronic data deliverable (EDD) format as described on NYSDEC’s website (http://www.dec.ny.gov/chemical/62440.html). A Data Usability Summary Report (DUSR) will be prepared meeting the requirements in Section 2.2(a) 1.ii and Appendix 2B of DER-10 for all data packages generated for the emerging contaminants soil sampling.

7.0 Site Control Procedures

Site control procedures, including decontamination and waste handling and disposal, are discussed below. Site control procedures have been developed to minimize both the risk of exposure to contamination and the spread of contamination during field activities at the Site. All personnel who come into designated work areas, including contractors and observers, will be required to adhere strictly to the conditions imposed herein and to the provisions of a Site-Specific Health and Safety Plan (HASP). The HASP is included as Appendix B in the RIWP.

7.1 Decontamination

In an attempt to avoid the spread of contamination, all drilling and sampling equipment must be decontaminated at a reasonable frequency in a properly designed and located decontamination area. Detailed procedures for the decontamination of field and sampling equipment are included in Appendix A of the approved March 2019 RIWP. The location of the decontamination area will be determined prior to the start of field operations. The decontamination area will be constructed to ensure that all wash water generated during decontamination can be collected and containerized for proper disposal. As mentioned above, only Alconox or Liquinox will be used during decontamination procedures when groundwater sampling is underway.

7.2 Waste Handling and Disposal

As the Site is scheduled for soil removal, all soil cuttings will be placed back into their respective soil boring. However, if contaminated soils are encountered, then they shall be consolidated, and stored in appropriate labeled bulk containers (drums, etc.), and temporarily staged at an investigation derived waste storage area onsite. CA RICH will then coordinate waste characterization and disposal by appropriate means.

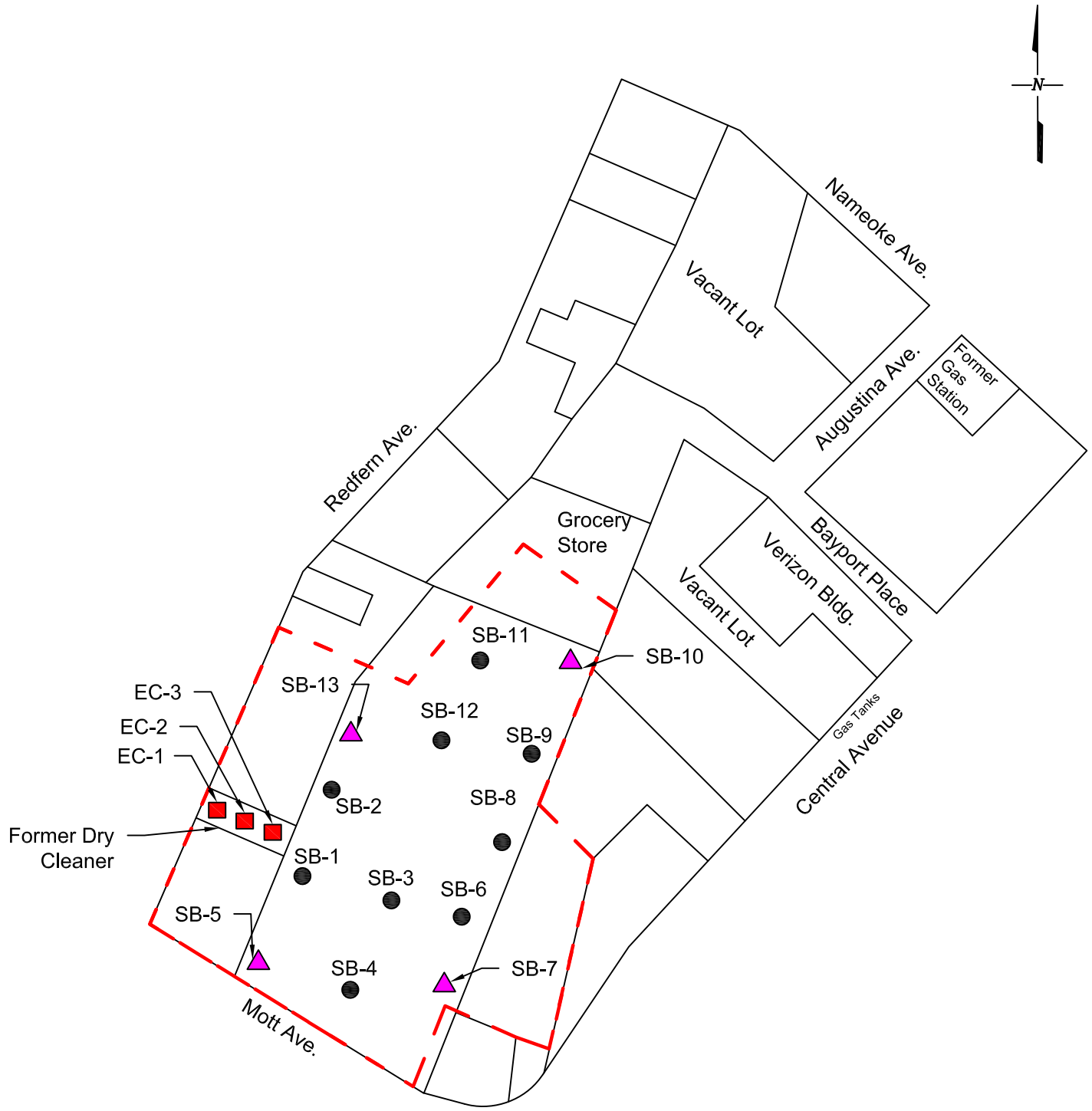
FIGURES

N

USGS 7.5 Minute Topographic Quadrangle Map, Rockaway 2013. Adjacent 7.5 Minute Topographic Quadrangles: NE Lynbrook, SE Lawrence, NW Jamaica—all 7.5 Minute.

CA RICH CONSULTANTS, INC.
17 Dupont Street,
Plainview, NY 11803

TITLE: **Site Location on USGS 7.5 Minute Topographic Quadrangle Map**		DATE: **01/23/2019**
		SCALE: **Not to Scale**
FIGURE: **1**	**Far Rockaway Project** **Far Rockaway, New York** **BCP Site No. C241224**	DRAWN BY: **T.B.**
DRAWING:		APPR. BY: **J.C.**



Legend

- Soil Boring (3 samples/boring)
- Soil Boring (1 sample/boring)
- Soil Boring in former Dry Cleaner(2 samples/boring)
- BCP Site Boundary

Approx. Scale (ft)

0 250 500

CA RICH CONSULTANTS, INC.

Environmental Specialists Since 1982

17 Dupont Street, Plainview, New York 11803

TITLE: Proposed Soil Sample Location Map PFA's and 1,4 Dioxane		DATE: 4/19/2019
		SCALE: As Shown
FIGURE: 2	Far Rockaway Project Far Rockaway, NY BCP Site No. C241224	DRAWN BY: J.T.C./T.R.B.
DRAWING NO: 2019-13		APPR. BY: J.T.C.

H:\Drawings\Phipps Far Rockaway\2019-13

TABLES

Table 1. Field and Laboratory QC Summary

QC Check Type	Minimum Frequency	Use
Field QC		
Duplicate	1 per 20 samples	Precision
Trip Blank	None for PFAS and 1,4-Dioxane	
Field Blank	1 per 20 samples	Sensitivity
Laboratory QC		
Matrix Spike/Matrix Spike Duplicate	1 per 20 samples	Accuracy/Precision
Field Duplicates	1 per 20 samples	Precision
Field Blank	1 per day at minimum with at least 1 per 20	Sensitivity

Table 2 Emerging Contaminant Sampling Summary

Sample Matrix	Target Analytes	Field Samples	Duplicates	Trip Blanks	Field Blanks	Matrix Spike	Matrix Spike Duplicate	Total Samples
Soil	PFAS	37	2	NA	2*	2	2	45
	1,4-Dioxane	37	2	NA	2*	2	2	45

Totals are estimated based on scope of work as written. Actual sample quantities may vary based on field conditions. QA/QC samples will be adjusted accordingly.
*-Estimate two days to complete sampling. Should more days be required, then additional field blanks will be collected.

Table 3 Preservation, Holding Times and Sample Containers

Analysis	Matrix	Bottle Type	Preservation	Holding Time
PFAS via USEPA 537(M) -Isotope Dilution	Soil	250 mL HDPE jar	Cool to 4°C	14 days to extract, 28 days to analysis
1,4 Dioxane via 8270 SIM	Soil	4 oz wide mouth glass jar	Coo to 4°C	14 days to extract 40 days to analysis