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SITE INVESTIGATION WORK PLAN
FINAL

SAEGERTOWN PFAS SITE

CRAWFORD COUNTY, PENNSYLVANIA

PADEP Contract No.: SAP4000023226
General Environmental Technical Assistance Contract
Work Requisition No.: GTAC7-6-182

Prepared for:

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Commonwealth of Pennsylvania
Department of Environmental Protection

Submitted by:
OBG | Baker Environmental Solutions Joint Venture
Moon Township, Pennsylvania

September 2023

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WORK PLAN

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SAEGERTOWN BOROUGH
CRAWFORD COUNTY, PENNSYLVANIA

PADEP Contract No. SAP4000023226
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Submitted to:

Commonwealth of Pennsylvania
Department of Environmental Protection
Northwest Regional Office
Environmental Cleanup and Brownfields Program
Hazardous Sites Cleanup Section
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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

LIST OF ATTACHMENTS

1.0 INTRODUCTION

OBG | Baker Environmental Solutions Joint Venture (OBG | Baker) has prepared this Site Investigation Work Plan for the Pennsylvania Department of Environmental Protection (PADEP or Department) as authorized by PADEP Work Requisition, Number 7-6-182, Contract Number SAP4000023226 (GTAC-7), pursuant to the Pennsylvania Hazardous Sites Cleanup Act (HSCA), Act 108, October 18, 1988. This Work Plan presents the scope of work and schedule to perform a comprehensive investigation of the soil and groundwater media at the Saegertown Per- and Polyfluoroalkyl Substances (PFAS) Site (site), located in Saegertown Borough, Crawford County, Pennsylvania (Figure 1).

The Work Plan was prepared based on a review of available historical information and a scoping meeting/site visit with the Department in 2022 and the findings from the subsequent two comprehensive groundwater sampling events completed in October 2022 and January 2023. The associated Sampling and Analysis Plan (SAP) and Quality Assurance Protocols (QAP) are included in Attachment A. Project personnel are required to review the information presented in this Work Plan/SAP/QAP, as well as the site-specific Health and Safety Plan (HASP), prior to conducting the field activities.

2.0 SITE DESCRIPTION AND BACKGROUND

The Saegertown PFAS Site (site) is located in a former industrial park in the Borough of Saegertown (Borough), Crawford County, Pennsylvania. The property was formerly owned by the General American Transportation Company (GATX) and had been declared a U.S. Environmental Protection Agency (EPA) Superfund Site in 1993 until a remedial action was completed in 1996, and the site was delisted in 1997. The site is within the historical boundaries of the Saegertown Industrial Area Superfund Site but is on a parcel that was remediated by EPA and released for unrestricted use. The remaining active portion of the Superfund Site is the adjacent Parker/Lord property. The Department is aware that Lord Corp. has Chlorinated Volatile Organic Compound (CVOC) groundwater contamination issues but cannot confirm if they also have PFAS contamination issues. Lord Corp. uses between 80 - 89% of the water pumped from all the Saegertown Borough supply wells.

Saegertown Borough purchased the delisted property and started work on installing and permitting two public water supply wells (PW-6 and PW-7) on the property around 2008. The two wells were approved by the Department for construction in July 2010, and for operation in October 2011.

Although it was reported that multiple sludge ponds were remediated by the EPA (shown on historical drawings), the Department believes these are points of interest that warrant further investigation. The sludge pond source is believed to be from washing out rail cars over several years.

In October 2020, representatives from the Department's Bureau of Safe Drinking Water conducted a site visit at the Borough's water system to collect samples to be analyzed for the presence of PFAS in the drinking water supply. PFAS is a large group of man-made chemicals that include Perfluorooctane Sulfonate (PFOS) and Perfluorooctanoic Acid (PFOA). The samples were analyzed by the Department's Bureau of Laboratories (BOL).

The results of the sampling indicated PFOS levels of 187.1 nanograms per liter (ng/L) and PFOA levels of 5.5 ng/L for a total of 192.6 ng/L of PFAS at Entry Point 105, which is an entry point to the general drinking water distribution line that consists of water collected alternately from either PW-6 or PW-7.

At the time of the collection, water was being pumped from PW-6. The sum of the analytical results exceeded the EPA's Combined Lifetime Health Advisory Level (HAL) for PFOS and PFOA of 70 ng/L. None of the Borough's other entry points had detections of PFAS.

Samples were also collected from both PW-6 and PW-7 in November 2020 with both wells exhibiting exceedances of the combined HAL with concentrations of 90 ng/L and 174.8 ng/L, respectively. Per Department mandates, the Borough completed follow up confirmation sampling. In January 2021, the Borough collected a sample from Entry Point 105, which was again using PW-6 at the time of sampling. The sample results contained one data qualifier that required additional information to be submitted by the Department-accredited laboratory. The results indicated PFOS levels of 120.0 ng/L and PFOA levels of Non-Detect (ND) for a total of 120.0 ng/L of PFAS. This total confirmed an exceedance of the EPA HAL for PFOS and PFOA at Entry Point 105 receiving water from PW-6.

PFAS levels in Saegertown Borough Public Water Supply Well #6 (PW-6) have been decreasing and could be attributed to a reduced pumping rate (future review of historical pumping records may provide more information). Wells PW-6 and PW-7 are currently offline with PW-6 being only used in high demand since testing positive for PFAS (Wells PW-1 and PW-2 are primary producers in interim, although others are used).

Quarterly sampling of the wells has been completed since the PFAS detections. The initial event was completed by the Department and all ensuing events have been completed by Groundwater Resources, LLC (Borough consultant). Samples from Saegertown Borough wells PW-6 and PW-7 are identified as Entry Point ('EP') -105 sample ID (Note; effluent is from each well, is not blended, and operates independently of each other). The 'EP' samples were collected after chlorination of the line and were collected from a spigot in the adjacent fire department building. Observation wells near wells PW-6 and PW-7 were installed to monitor drawdown when pumping tests were performed on wells PW-6 and PW-7. Pumping tests were part of the drinking water permit process and not part of the investigation.

A Department presentation during the site kickoff described potential PFAS sources as the firefighter training area and three former sludge lagoons (use of PFAS for training has not been substantiated). The Department did not rule out there could be other PFAS sources in the site area. Groundwater flow is believed to be toward French Creek as stated by Groundwater Resources and historical documents from the Superfund investigation.

OBG | Baker was directed to complete two comprehensive groundwater sampling events of the 14 applicable wells on site in October 2022 and January 2023. Findings from the sampling indicated that PFOS continues to be the primary PFAS constituent of concern on site and there may be multiple source areas of PFAS contamination flowing ultimately toward French Creek.

2.1 **Project Objectives**

Based on the identified scope of work, the primary project objectives are to:

- Investigate vadose zone soils in an attempt to identify PFAS contaminant source(s).
- Collect and analyze groundwater grab samples to strategically identify the number and locations of groundwater monitoring wells for installation.

- Install ten (proposed) shallow groundwater monitoring wells in strategic locations that will be used to aid in identification of PFAS source areas and better refinement of groundwater flow across the site.

- Perform two rounds of groundwater gauging and sampling of the 24 site wells (10 new wells and 14 existing wells) for 24 PFAS constituents.

- Prepare and submit a Site Investigation Report detailing the field activities and findings from the soil, groundwater grab, and groundwater well sampling activities.

- Provide recommendations for additional site activities, if any.

3.0 SCOPE OF WORK

To accomplish the overall project objectives and to facilitate project planning and management, this project will be performed in accordance with the following tasks:

- Task 1000 – Project Management
- Task 1010 – Project Planning
- Task 1040 – Procurement
- Task 1050 – Mobilization/Demobilization
- Task 2000 – Data Evaluation
- Task 2070 – Report Preparation
- Task 2071 – Letter Report Preparation
- Task 2200 – Project Meetings
- Task 3000 – Utility Clearance/Site Survey
- Task 3010 – Sample Collection (Soil and Groundwater Grab Collection)
- Task 3020 – Laboratory Analysis
- Task 3030 – Monitoring Well Installation
- Task 3060 – Groundwater Monitoring
- Task 3080 – Investigation Derived Waste Management

Field activities will generally be performed in accordance with OBG | Baker's Standard Operating Procedures (SOPs).

3.1 Task 1000 - Project Management

The Project Management task involves activities associated with the overall technical and administrative aspects of the project. These activities may include, but are not limited to, the following:

- Internal communication and coordination with project staff
- Control budget and schedule and track progress of work tasks
- Change order preparation (if required) and personnel, laboratory, and subcontractor scheduling/planning for assignments
- Monthly progress report preparation
- Communications and meetings with the Department

In addition, this task includes program management efforts by OBG | Baker's Program Manager, Scott Moffett. Under this task, Mr. Moffett will provide technical oversight and program support including reviewing activities and resolution of issues (as necessary) to be consistent with overall Department expectations and requirements. For cost estimating purposes, this task is assumed to start from the notice to proceed through completion of the scope of work included herein.

3.2 Task 1010 - Project Planning

Project Planning primarily includes the efforts associated with development of the draft and final versions of the Site Investigation Work Plan, Cost Estimate, HASP, and SAP/QAP, as well as the completion of all project-planning documents. The HASP will be prepared as a standalone document to this Work Plan and the SAP/QAP are included herein as Attachment A.

3.3 Task 1040 – Procurement

Procurement activities under this task will consist of securing subcontractors required by OBG | Baker to complete the activities associated with the scope of work. Separate bid packages, including a Request for Quote (RFQ), will be prepared for the drilling activities (soil borings, groundwater grab borings, and well installations), laboratory analytical testing, and Investigation-Derived Waste (IDW) management activities. No pre-bid meeting at the site will be required to complete these subcontracted activities.

A geophysical survey for utility clearances is not anticipated as part of this scope of work but has been included for contingency to mitigate potential project downtime between proposed site activities. It is anticipated that the utility clearance personnel and Saegertown Borough personnel will provide sufficient demarcation and documentation to eliminate the need for a geophysical survey. However, if it apparent that these parties are incapable of clearing some of the proposed drilling locations, the Department will be contacted that a geophysical survey will be needed, and a geophysical survey company will be subcontracted to clear utilities in the designated areas.

Subcontractor bids will be evaluated and documented (Subcontractor Abstract) and recommendations will be presented (Subcontractor Approval Form) to the Department Regional Project Officer and Contract Manager for approval in accordance with Department guidelines for both subcontracted activities.

3.4 Task 1050 – Mobilization / Demobilization

This task will include the mobilization and demobilization (mob/demob) of OBG | Baker personnel and equipment to the site for the field activities. This task will also include the associated field vehicle charges with not only the mob/demob from OBG | Baker's office (Moon Township, Pennsylvania), but also charges associated with the daily use of field vehicles on site during the field activities.

Prior to mobilization, a brief orientation/kickoff meeting with OBG | Baker personnel will be held to review project objectives, site history, property layout/boundaries, health and safety issues and field procedures. Labor is included in this task to allow a thorough review of all project-related documents by the field personnel prior to mobilization. In addition, other ancillary activities in this task include equipment acquisition/coordination, subsequent equipment cleaning/restocking, and inventory review for the subsequent sampling activities.

A summary of the anticipated mob/demobs that will take place through completion of the investigation field activities is summarized below. It should be noted that multiple day drilling and sampling activities (e.g., three days of soil borings) include only one mobilization/demobilization as it is intended that field personnel will procure hotel accommodations near the site (Meadville, PA).

- One mob/demob for OBG | Baker Project Manager to meet the Department (and Borough representatives, if available) on site and stake out the proposed soil and groundwater grab boring locations.
- One mob/demob (contingent on success of above bullet) for on-site project meeting with utility company representatives and Saegertown Borough representatives to clear proposed drilling locations and identify public Right-of Ways (ROWs).
- One mob/demob by Project Manager for kickoff of drilling activities
- One mob/demob for Environmental Scientist for soil boring activities (3 day effort)
- Two mob/demobs for Environmental Scientist for groundwater grab activities (7 day effort)
- One mob/demob for Environmental Scientist for monitoring well installations (5 day effort)
- One mob/demob for support staff to complete monitoring well development (3 day effort; concurrent near end of well installation activities)
- Two mob/demobs for two-man survey crew for surveying the 10 newly-installed monitoring wells on site (2 day effort)
- One mob/demob for Environmental Scientist and support staff for Groundwater Monitoring Event #1 (2 personnel; 3 day effort)
- One mob/demob for Environmental Scientist and support staff for Groundwater Monitoring Event #2 (2 personnel; 3 day effort; waste removal oversight also during this mob/demob).

3.5 Task 2000 – Data Evaluation

This task involves data management activities and evaluation of the data collected during the soil boring/sampling activities, groundwater grab sampling activities, and the two comprehensive groundwater sampling events of the 14 current wells and ten proposed groundwater monitoring wells. One of the objectives of this task is to ensure proper sample analysis and data generation to provide appropriate information for the sufficient characterization of current site conditions. Data evaluation will take place once all analytical and hydrogeological data are received and tabulated by OBG | Baker after the completion of the groundwater grab sampling activities and also at the end of the well sampling activities. This task may include, but not be limited to, the following activities:

- Communications and coordination of data with the Department Regional Project Officer.
- Database preparation and population using an electronic deliverable format.
- Data and Quality Assurance/Quality Control (QA/QC) evaluation.
- Create project-specific tables and figures (e.g., 'hits' tables, etc.) of the groundwater grab results for Letter Report No. 1 and a project meeting between OBG | Baker and the Department.
- Create project-specific tables and figures (e.g., 'hits' tables, etc.) for the Site Investigation Report.
- Comparison of groundwater analytical results to EPA's HAL and Pennsylvania's Maximum Contaminant Levels (MCLs).
- Verification and completeness of well survey data.
- Development of groundwater elevation contour maps from both groundwater sampling events.
- Development of other associated figures (e.g., contaminant 'hit box' figures).
- Evaluation and interpretation of geologic, hydrogeologic, field, QA/QC, and laboratory analytical data.

The groundwater analytical results will be compared to the applicable EPA HALs and the Pennsylvania MCLs for the 24 PFAS constituents as done for the two recent groundwater sampling events in October 2022 and January 2023. The soil analytical results will be tabulated and used as an aid in identification of potential PFAS source areas. Currently, perfluorobutanesulfonic acid (PFBS), PFOS, and PFOA are the only three PFAS analytes to have criteria available for comparison (Medium-Specific Concentrations [MSCs]).

3.6 <u>Task 2070 – Report Preparation</u>

This task includes work efforts related to preparation of the Site Investigation Report. The report will include a summary of the field drilling and sampling activities and the methodologies for the collection of the soil, groundwater grabs, and groundwater well samples.

Soil, groundwater grab, and groundwater well analytical results will be evaluated, tabulated, and the findings presented in text, tables, and figures with comparisons to applicable regulatory criteria. Test boring logs, well construction logs, and groundwater flow mapping also will be included in the report. All draft and final documents will be submitted electronically (PDF) to the Department.

3.7 <u>Task 2071 – Letter Report Preparation</u>

One letter report will be developed within this scope of work. The letter report (Letter Report No. 1) will provide a summary of the analytical results from the soil and groundwater grab samples and a presentation of the proposed final number, locations, and construction of the groundwater monitoring wells. As this is strictly a data summary report, the report will be limited to a presentation of the laboratory analytical results of all sampled media compared to the appropriate criteria and applicable support documents.

For the purpose of the letter report, laboratory analytical results will be reduced and presented in a tabular format highlighting applicable criteria groundwater exceedances (i.e., 'hits' tables). This will allow for a more purposeful and succinct meeting of the analytical results between the Department and OBG | Baker. As its purpose, there will be no detailed descriptions of field activities/methodologies, interpretation of the data, conclusions, or recommendations provided in this brief letter report as these will be provided later in the full Site Investigation Report. Supporting documents will include scaled site figures in the letter report depicting the locations of all sample locations across the site including test boring and monitoring well locations. All draft and final documents will be submitted electronically (PDF) to the Department.

3.8 Task 2200 – Project Meetings

For the scope of work included herein, two project meetings are anticipated. The first project meeting (virtual) will be to discuss the findings from Letter Report No. 1 described in the section above. The focus of the meeting will be to come to an agreement on the final number, construction, and locations of the proposed groundwater monitoring wells.

A second project meeting will serve multiple functions and take place concurrent with the first round of groundwater well sampling activities. One task of the meeting will be an inspection of the site and all test borings and monitoring well locations by the OBG | Baker Project Manager for proper installation, improper settling, and waste handling. In addition, an unannounced field inspection and review of quality control sampling and handling procedures will take place between the OBG | Baker Project Manager and the OBG | Baker field personnel. While on site, a brief meeting with Saegertown Borough personnel also will take place to address any concerns or comments from the recent extensive drilling and sampling that took place near their borough building and also off property.

3.9 Task 3000 – Utility Clearance/Site Survey

3.9.1 Utility Clearances

Utility companies (e.g., pipeline, gas, electric, water, sewer, and telephone) suspected of having underground lines near proposed boring locations will be contacted by OBG | Baker prior to the start of the intrusive field activities through the Pennsylvania One Call System (811).

With proposed boring locations spread across multiple residential, commercial, and industrial properties, an on-site meeting with the Department, Saegertown Borough personnel, and relevant utility clearance companies will take place to demarcate proposed soil and groundwater grab boring locations. The purpose of the meeting is to receive guidance from applicable personnel to locate borings clear of underground/above ground utilities and also preferably in ROW locations to mitigate the need for off-site access agreements between the Department and applicable property owners.

A subsequent utility clearance meeting will take place on site prior to beginning the monitoring well construction activities. The purpose of this meeting will be similar to the previous meeting and will include OBG | Baker, the Department, Saegertown Borough personnel, and applicable utility companies. The purpose of the meeting will be to receive guidance from applicable personnel to locate the proposed groundwater monitoring wells clear of underground/above ground utilities and again preferably in ROW locations to mitigate the need for off-site access agreements between the Department and applicable property owners.

As noted in the Procurement section of the Work Plan, a geophysical survey for utility clearances is not anticipated as part of this scope of work but has been included for contingency to mitigate potential project downtime between proposed site activities. It is anticipated that the local utility clearance representatives and Saegertown Borough personnel will provide sufficient demarcation and documentation to eliminate the need for a geophysical survey. However, if it apparent that these parties are incapable of clearing some of the proposed drilling locations, the Department will be contacted that a geophysical survey will be needed, and a geophysical survey company will be subcontracted to clear utilities in the designated areas.

3.9.2 Site Survey

The 14 wells included in the comprehensive groundwater sampling in October 2022 and January 2023 were previously surveyed by OBG | Baker in October 2022 (excluding the Saegertown Beverage Well [SBW]). Once the ten monitoring wells proposed herein (MW-1 through MW-10) have been installed, a OBG | Baker survey crew will again remobilize to the site to survey the new wells.

Each of the monitoring wells will be opened and assessed for competency and functionality. Because the wells will be locked and the exact locations unknown to the surveyors prior to mobilization, the surveying activities will be scheduled to be completed concurrent with either the well development activities or the first round of comprehensive groundwater sampling. This will allow personnel knowing the well locations to be on site during the well survey.

The well survey activities under this task will include locating the horizontal position and establishing elevations of the ten proposed monitoring wells. The horizontal data will be to the nearest 0.1-foot and referenced to the Pennsylvania State Plane Coordinate System, North American Datum (NAD) 1983. The vertical data will be to the nearest 0.01-foot and referenced to the North American Vertical Datum (NAVD) 1988. The surveying activities will be conducted under the direction of a professional land surveyor licensed to practice surveying in the Commonwealth of Pennsylvania.

3.10 Task 3010 – Sample Collection

3.10.1 Soil Investigation

As summarized on Table 1, a total of 15 soil borings (and two contingency borings) are proposed as part of the investigation. The 15 borings (SB-1 through SB-15 on Figure 3) will be advanced in areas on site that may aid in identifying potential PFAS contaminant source areas. As shown on the figure, some of the proposed soil borings are also locations of proposed groundwater grab samples (SB-6, SB-7, SB-9, SB-10, SB-11, SB-14, and SB-15) as part of the overall groundwater investigation.

A direct-push drilling rig (Geoprobe® or similar) will be utilized to collect Macro-core samples of unconsolidated material in the overburden in an attempt to identify potential PFAS source areas and also for lithologic descriptions. New, inner acetate sample sleeves will be used for each driven Macro-Core. The drive shoe will be cleaned with detergent and potable water between borings.

The samples will be collected continuously in four or five-foot increments from the ground surface to the desired depth. Due to the unconsolidated nature of the overburden soils (e.g., sand, silt, gravel), it is likely that an outer four-inch diameter surface casing may need to be advanced during boring advancement to mitigate borehole collapse during sample acquisition.

The sampling will be conducted as summarized below:

1. Push the sampling device (Macro-Core or equivalent) to the desired depth.

2. Bring the sampler to the surface, remove the acetate liner from the sampler, and drill small-diameter holes in the liner at approximate one-foot intervals for field screening using the Photoionization Detector (PID).

3. The field screening will be conducted by inserting the tip of the PID wand into the drilled holes. The highest reading for each interval will be recorded in the field logbook.

4. Upon completion of the field screening, slice the liner with a cutting tool to expose the sample core.

5. Thoroughly homogenize the applicable sample interval for analysis to ensure that the sample is as representative as possible of the sample interval.

6. Transfer the proper sample volume into appropriate, laboratory-supplied containers and place the sample in a cooler with ice.

7. Record all pertinent sampling information such as soil description, sample depth, sample number, sample location, and time of sample collection in the field logbook.

Subsequent to sampling, the boreholes will be backfilled with drill cuttings and any remaining void will be backfilled with bentonite to the ground surface. Concrete will be used to fill the top six inches of the borehole if the boring was drilled through asphalt or concrete.

Two soil samples will be selected for chemical analyses from each of the direct push borings, as follows:

- One worst-case sample based on PID readings and/or visual evidence of staining/odor (with understanding that VOC contamination may be used as a marker to aid in PFAS transport under worst case scenarios).

- One “clean” sample from below the contaminated zone as determined in the field based on PID readings and/or visual evidence of staining/odor.

In lieu of any detected PID readings or visual evidence of staining/odor, the default samples for laboratory analyses generally will be collected from the ground surface (0 - 1 ft. bgs) and directly above the soil-groundwater interface (approximately 8 - 10 feet bgs). Each of the soil samples will be analyzed for the designated 26 PFAS constituents only.

In lieu of any detected PID readings or visual evidence of PFAS contamination (e.g., staining/odor), borings will be terminated once groundwater is encountered (approximately 8 to 10 feet bgs). The exception to terminating the boring at the groundwater interface is if the boring is designated as a groundwater grab boring location (see Section 3.10.2 below). The sampling methodologies described above should provide a sufficient vertical profile of potential contaminant impact.

After sampling, the boreholes will be backfilled with retrieved soil cuttings unless evidence of notable contamination is present, in which case the cuttings will be drummed accordingly. Any remaining void will be backfilled with bentonite to grade.

3.10.2 Groundwater Grab Investigation

As summarized on Table 1, a total of 25 groundwater grab borings (and three contingency groundwater grab borings) are proposed as part of the investigation. The 25 groundwater grab borings (GWG-1 through GWG-25 on Figure 4) will be advanced in areas on site that will aid in identifying potential PFAS contaminant source areas, PFAS plume movement, and preferable locations of the ensuing ten monitoring wells to be installed for groundwater characterization.

Dependent upon the location, geology, hydrogeology, and difficulty of drilling, the collection of groundwater grab samples may be collected using multiple methods. If boring advancement to the desired depth is not difficult and groundwater production appears sufficient, the groundwater grab samples may be collected by advancing a second borehole adjacent to the initial soil boring used for logging lithology and environmental screening.

The samples may be collected using a five-foot long, stainless steel, discrete sampler that is advanced to the desired depth. The cover of the sampler will then be retracted, thus allowing groundwater to flow into the device for sampling. The samples will be retrieved using a peristaltic pump and new, disposable, polyethylene tubing for each sample. Prior to sample collection, a minimum of three well volumes of groundwater will be purged from the borehole to reduce the turbidity to the extent practical. The samples will be placed into appropriate, laboratory-supplied containers with the appropriate preservatives. Each of the groundwater grab samples will be analyzed for the 26 designated PFAS constituents as done for the soil samples described above. Decontamination of the sampler and drilling tools will be completed between groundwater grab borings.

If groundwater production is limited or other conditions deter the methodology above, a temporary two-inch diameter PVC well screen and riser will be lowered to the bottom of the open borehole (or casing if needed to mitigate borehole collapse during boring advancement).

Other site work can be completed while allowing time for groundwater to flow into the screen/riser until sufficient volume is present to retrieve the groundwater grab sample (using peristaltic pump or disposable bailer). After collection of the sample, the temporary PVC well screen and riser will be removed from the borehole and disposed accordingly.

Regardless of which of the two sampling methods above are used, the open boreholes will be backfilled with native material to grade (and bentonite, if necessary to fill remaining void). Concrete patching (six-inch thick) will be completed at the surface in any areas where borings were advanced through concrete or asphalt.

3.11 Task 3020 – Laboratory Analysis

All soil and groundwater samples (including QA/QC samples) will be submitted to a subcontracted laboratory for analysis that is accredited by the Department’s Laboratory Accreditation Program. It is assumed that the laboratory will supply the coolers and bottleware needed to store and ship the samples to the laboratory and also provide laboratory-grade PFAS free certified water for quality control samples.

All soil and groundwater samples will be analyzed for 26 PFAS analytes using EPA Method 537 IDA. The list of the 26 PFAS analytes is provided on Table 2.

In addition, one composited aqueous and one composited non-aqueous waste profile sample also will be collected for an extensive analytical suite from the purge water/decontamination fluids and also the drummed soil cuttings from borehole advancements. The anticipated analyses are presented in the waste management section of the Work Plan.

Sample tracking and management will involve coordinating with the laboratory and tracking the samples from the time of collection through receipt of analytical results. OBG | Baker will coordinate daily sample shipments to the lab and track sample data to ensure the samples have been received and processed in a timely manner. Therefore, this task will involve the following specific activities in the preparation for, and collection of, the laboratory analyses described above.

- Pre-field coordination with lab over analyses, bottleware, coolers, preservatives, etc.
- Accepting bottleware delivery and sample bottle count for completeness, breakage assessment, sorting, and labeling
- Communications and coordination with the laboratory contact
- Sample shipment/delivery to the lab
- Sample tracking and management
- Laboratory analyses
- Monitoring incoming data for completeness

It is anticipated that the standard 14-day turnaround time on analyses will be completed by the subcontracted laboratory.

3.11.1 Quality Assurance/Quality Control

In addition to the soil, groundwater and waste profile samples designated for laboratory analysis, QA/QC samples also will be collected for analysis. The analytical suite for the QA/QC samples will be consistent with the associated investigative samples. A description of the anticipated QA/QC samples to be collected during the investigation is provided below.

Duplicates: Duplicate analytical samples are proposed to be collected at an approximate rate of ten percent of investigative samples per sampling media. Therefore, a total of three duplicate (and one contingent) samples are proposed to be collected during the soil sampling activities, three duplicates during the groundwater grab sample activities, two duplicates from the well installation activities, and three duplicates for each of the two groundwater sampling events.

Field Blanks – To document both the quality of the PFAS-free, certified water used for the decontamination activities, verify laboratory analysis integrity, and document the quality of the water provided by the laboratory, a total of three field blanks will be collected as part of the investigation. One PFAS-free, certified water field blank will be collected for analysis during the soil sampling activities, one from the well installation activities, and one for each of the two groundwater sampling events. The analysis of the field blank during sampling will document the integrity/quality of the water used for the decontamination process.

The field blanks will be collected by pouring laboratory-grade, PFAS-free certified water (supplied by the laboratory) into the appropriate sample containers for laboratory analyses. The analysis of the field blank from each event will document the integrity/quality of the water supplied by the lab in case erroneous detections are observed from the laboratory analytical results of the equipment rinsate samples.

Equipment Rinsates: To document sufficient decontamination practices of non-disposable sampling equipment, one equipment rinsate sample will be collected for each non-disposable sampling device used during the investigation. Equipment rinsate samples are proposed to be collected at an approximate rate of five percent of investigative samples. Rinsate samples will be collected using PFAS-free, certified water supplied by the laboratory.

For the investigation, it is anticipated that two equipment rinsates will be collected during the soil investigation, two during the groundwater grab investigation, and one from the well installation soil sampling activities. Because only dedicated equipment is anticipated to be used during the monitoring (and pumping) well sampling activities, no equipment rinsate will be collected.

MS/MSD Samples: Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will be prepared in the field using the same procedures as duplicate samples and analyzed for the same parameters as the corresponding original samples. MS/MSD samples will be prepared at a frequency of approximately five percent for each group of samples of a similar matrix. Therefore, two MS and two MSDs will be collected during the soil investigation and another two of each will be collected during each of the two groundwater sampling events. The laboratory will use the samples for internal QA/QC. In addition, the results will be used to evaluate the matrix effect of the sample upon the analytical methodology.

3.12 Task 3030 – Monitoring Well Installation

As presented above, the results of the soil and groundwater grab investigations will be used as the foundation to determine the number, location, and construction specifications for the groundwater monitoring wells to be installed for the investigation. Because of this, no site figures have been included in this Work Plan depicting proposed monitoring well locations. However, as an estimate for planning and costing purposes, it is projected that ten shallow, overburden monitoring wells will be installed as part of the groundwater investigation and will be designated as BMW-1 through BMW-10. Proposed well installation procedures are described below.

The well borings will be drilled using direct-push drilling methods with the continuous advancement of an outer four-inch diameter steel casing to mitigate borehole collapse. During direct-push drilling, continuous soil core samples will be collected for lithologic identification and field screening. In addition, two soil samples will be collected from each boring for laboratory analysis as previously described.

As directed by the OBG | Baker on-site geologist, the wells will be constructed using two-inch Inside Diameter (ID), Schedule 40, Polyvinyl Chloride (PVC) well casing and screen materials. Well screens (0.010-inch slot) will be ten feet in length and installed such that the well screen will ‘straddle’ the encountered water table (‘straddle’ meaning portions of the well screen are both above and below the encountered water table to allow for seasonal fluctuations).

The annular space around the well screen will be backfilled with well-graded, fine sand applicable to the screen size. The sand will extend to approximately two feet above the top of the screened interval. The annular space above the sand pack will be backfilled with bentonite and hydrated with potable water to prevent surface and near subsurface water from infiltrating into the screened groundwater-monitoring zone.

The well construction materials will be installed through the outer steel casing as it is withdrawn from the borehole. Lithologic information and well construction details will be recorded in the field log book and on Test Boring/Well Construction Records.

3.12.1 Well Completion and Development

Currently, the number of wells that will be completed with either a flushmount or stickup protective casing is unknown as their number and locations have yet to be finalized. For wells located in high traffic areas, flush-mounted, protective manhole covers will be placed over the PVC riser and surrounded by a concrete pad. The remaining wells will have two to three-feet of "stickup" above ground surface. Steel protective casing will be placed over the PVC riser and surrounded by a concrete pad. Regardless of casing used, the concrete pads will be approximately two feet square and four inches thick. Approximately two feet of the steel casing will extend into the subsurface (the casing is five feet long), centered in the middle of the concrete pad. The protective casing will be painted a bright color to aid in visibility. Each riser will be fitted with an expandable, water-tight locking cap and uniformly-keyed lock.

Each new well will be developed using pumping and surging methods by OBG | Baker personnel. Alternatively, the wells may be developed using bailers if the recharge rate of the aquifer is not suitable for pumping. Typical limits placed on well development may include any, or a combination, of the following:

- Clarity of water based on visual determination
- A maximum time period (typically two hours)
- A maximum borehole volume (typically five borehole volumes plus the amount of any water added during the drilling or installation process)

Because the water quality of the monitoring well development waters has yet to be determined, the well development water will be containerized accordingly for later characterization by OBG | Baker and disposal by the waste management subcontractor.

3.13 Task 3060 – Groundwater Monitoring

Groundwater samples will be collected from the proposed ten monitoring wells (BMW-1 through BMW-10) to be installed as part of the Site Investigation and also from the 14 wells on site previously sampled in October 2022 and January 2023 listed below. The parenthetical identifications listed will be used moving forward in the investigation and all associated reporting.

- Saegertown Borough Public Water Supply Well #1 (a.k.a., PW-1)
- Saegertown Borough Public Water Supply Well #2 (a.k.a., PW-2)
- Saegertown Borough Public Water Supply Well #6 (a.k.a., PW-6)
- Saegertown Borough Public Water Supply Well #7 (a.k.a., PW-7)
- Saegertown Borough Monitoring Well OB-6-50 (a.k.a., OB-6-50)
- Saegertown Borough Monitoring Well OB-6-100 (a.k.a., OB-6-100)
- Saegertown Borough Monitoring Well OB-7-50 (a.k.a., OB-7-50)
- Saegertown Borough Monitoring Well OB-7-100 (a.k.a., OB-7-100)
- Saegertown Borough Monitoring Well MW-1 (a.k.a., BMW-1)
- Parker/Lord Monitoring Well GM-24S (a.k.a., MW-24S)
- Parker/Lord Monitoring Well GM-24D (a.k.a., MW-24D)
- Parker/Lord Monitoring Well GM-15S (a.k.a., MW-15S)
- Parker/Lord Monitoring Well GM-15D (a.k.a., MW-15D)
- Saegertown Beverage Well (a.k.a., SBW)

Two groundwater sampling events will be included in the groundwater monitoring scope of work. Both sampling events will include all 14 of the wells cited above and the ten wells installed as part of the Site Investigation.

Two methodologies will be used to collect the samples from the 24 wells based on their construction and appurtenances; one method will be samples collected from taps previously and recently installed on the four Saegertown public supply wells (PW-1, PW-2, PW-6, and PW-7) and the Saegertown Beverage supply well (SBW). The second methodology will be using low-flow sampling techniques to sample OB-6-50, OB-6-100, OB-7-50, OB-7-100, BMW-1, MW-24S, MW-24D, MW-15S, MW-15D, and the ten newly-installed monitoring wells.

The collection at the taps is able to be completed as all of five of the wells have pumping systems and discharge lines. It has already been confirmed that all sample taps were installed in line prior to the chlorination treatment of the pumping effluent. At each of these five well locations (PW-1, PW-2, PW-6, PW-7, and SBW), the pump will be allowed to run for several minutes prior to collecting a representative sample. Field personnel will estimate the pumping timeframe by the well's construction and also the appearance of the effluent.

Regardless of the sample collection methodology, special care must be taken when sampling for PFAS constituents. Some typical sampling equipment/materials and personnel protective equipment are known to contain PFAS and must not be used during the sampling activities. A PFAS Sampling Checklist and sample collection considerations page have been provided as Attachment B. The considerations and checklist will be reviewed by field personnel. The subcontracted laboratory also will be made aware that the scope includes PFAS analyses (special bottleware/caps must be used for sample collection and internal specialized equipment).

Since supply well PW-6 and PW-7 share the same effluent discharge piping and sample tap, it is anticipated that Groundwater Resources, LLC (Borough consultant) again will be on site during the sampling and will be responsible for operating each of the pumps individually to allow OBG | Baker personnel to collect the representative groundwater samples from the one sample tap. The tap is located prior to the chlorination process.

In the section below, multiple options are available to purge and sample the monitoring wells. In instances where non-dedicated, non-disposable sampling equipment is used (e.g., submersible bladder pump), all equipment that comes in contact with the groundwater will need to be decontaminated before the purging / sampling of the well. Decontamination activities are performed to mitigate the potential for cross contamination between wells during groundwater monitoring. Each piece of sampling equipment that contacts the groundwater will be decontaminated by placing the equipment in a bucket filled with non-phosphate soap and potable water and scrubbed thoroughly followed by a thorough PFAS-free water rinse. These wash waters will be containerized for later characterization and appropriate disposal. If dedicated purge methods are used (e.g., peristaltic pump or disposable bailer), no decontamination of equipment will be needed between wells.

As summarized in the waste management section, the purged groundwater and decontamination fluids will be containerized in a storage tank for later characterization and disposal by the waste management subcontractor.

3.13.1 Groundwater Sampling Methodology

A complete round of groundwater level measurements from the monitoring wells will be collected and recorded in the field notebook prior to initiating the purging and sampling activities for both rounds of sampling. As noted above, care will be taken to collect the water levels from wells with dedicated pump systems, if attainable. In all instances, Groundwater Resources, LLC will be on site to open the wells for access to the inner casing. The owner of Saegertown Beverage will need to provide access to his well for the measurements.

Of the 24 wells designated to be sampled in the scope, nine of the monitoring/observation wells will be purged and sampled following typical sampling methodologies as described below. These nine wells include Saegertown Borough well BMW-1, MW-24S, MW-24D, MW-15S, MW-15D, OB-6-50, OB-6-100, OB-7-50, and OB-7-100.

The monitoring wells will be purged prior to sampling to collect a representative groundwater sample from the aquifer. It is understood that the nine wells are two-inch diameter and will be able to be purged and sampled following the same methodologies.

To mitigate the volume of waste (purge) water generated for disposal, groundwater purging and sampling activities will initially be attempted with a peristaltic pump with dedicated discharge tubing. At each well, the tubing will be lowered to the approximate mid-point of the well's screened interval (determined through review of well construction diagrams). If construction specs are not available, the pump tubing will be placed approximately five feet from the well bottom with the assumption that the well was constructed with a 10-foot long well screen.

The pumping rate will be set to create a low sustainable flow. A water level meter will be used concurrently to monitor the water level within the well casing. Ideally, the water level should remain in 'steady state' during low-flow pumping and not be drawn down. If drawdown in the well occurs, the pump flow rate will be reduced until the water level in the well casing stabilizes. Typically, flow rates of less than one liter per minute are used initially. However, the flow is dependent upon the hydrogeologic characteristics of the well sampled.

Water Quality Parameters (WQPs) including pH, Oxidation-Reduction Potential (ORP), specific conductance, dissolved oxygen, temperature, and turbidity will be measured at approximate five-minute intervals during purging and recorded in the field logbook. The field testing will be conducted within a flow-through cell that limits exposure of the groundwater to the atmosphere while the field measurements (including flow rate calculated with a graduated bucket and stopwatch) are recorded. These same field measurements also will be collected at each of the five water supply wells immediately after sample collection.

In general, purging will be considered complete when three successive WQP readings have stabilized within 0.1 Standard Units for pH, 10 millivolts for ORP, 3% for specific conductance, 10% for dissolved oxygen, and turbidity is less than 10 Nephelometric Turbidity Units (NTUs). Temperature readings will be recorded, but not used for stabilization evaluation. Temperatures measured at the surface are affected to some extent by the difference between ambient air and groundwater temperatures and thus can vary over short periods. If after two hours of purging (or three well volumes, whichever is sooner), the WQPs have not reached a stable plateau, purging will be discontinued, and the sample will be collected.

Upon WQP stabilization, the groundwater samples will be collected from the end of the pump tubing and placed into appropriate sample containers with the appropriate preservatives. For low-flow sampling, the same equipment used for purging will also be used for sampling.

If purging and sampling are not capable of being completed with the peristaltic pump, purging will attempt to be completed with a submersible bladder pump system. If used, the submersible pump installation and operational methodology is consistent with the peristaltic pump description above.

If low-flow techniques are not viable in a particular well, purging and sampling of the well may be performed with dedicated, disposable polyethylene bailers with dedicated, disposable retrieval line. A minimum of three well volumes will be evacuated from the well prior to sampling. However, if production is insufficient, the well will be bailed (purged) dry and allow time to recover (at least 75% of lost head) prior to initiating groundwater sampling. It is not believed this methodology will need to be implemented as groundwater production is believed to be sufficient in the area to support low-flow purging techniques.

At the direction of the Department, each of the groundwater samples will be analyzed for 26 PFAS analytes using EPA Method 537 IDA. The appropriate sample containers will be filled and subsequently placed on ice in a cooler immediately after collection for shipment via overnight courier (e.g., FedEx) to the subcontracted laboratory. As noted in the checklist and considerations attachment, chemical or blue ice must not be used for sample shipment as well as any other PFAS-containing items (e.g., sharpies for marking cooler).

3.14 Task 3080 – Investigation-Derived Waste Management

Wastes will be generated from completion of the project tasks described herein. A summary of the wastes anticipated to be generated during the investigation activities is provided below:

- Ancillary wastes (Macro-core samplers, disposable gloves, paper towels, tubing, bailers, etc.) from the investigation activities that are not believed to pose a threat to the environment will be disposed as municipal trash by OBG | Baker at the completion of the field activities. A rolloff dumpster will be provided by the IDW subcontractor if use of the Borough's dumpster is not available for use.

- Liquid wastes from decontamination activities and groundwater grab sampling activities will be containerized in a 1,000-gallon storage tank on site for later characterization by OBG | Baker personnel and disposal by the IDW subcontractor.

- Solids generated from the decontamination of non-disposable drilling and sampling equipment will be placed in properly-labeled, steel, 55-gallon drums on site for later characterization by OBG | Baker personnel and disposal by the IDW subcontractor.

- Contaminated soil cuttings (if encountered) generated from the drilling and sampling equipment will be placed in properly-labeled, steel, 55-gallon drums on site for later characterization by OBG | Baker personnel and disposal by the IDW subcontractor.

- Soil cuttings from test borings and groundwater grab borings that exhibit no evidence of contaminant impact (odor, staining, etc.) will be returned to the borehole of origin after boring completion.

- Soil cuttings from monitoring well installation activities will be containerized in properly-labeled, steel, 55-gallon drums on site for later characterization by OBG | Baker personnel and disposal by the IDW subcontractor. These cuttings will be drummed as most wells are anticipated to be in locations of identified PFAS groundwater impact.

- All development and purge waters generated from the monitoring well installation and sampling activities will be containerized in the same 1,000-gallon storage tank used for the decontamination and groundwater grab sampling activities.

- All purge water generated from the sampling activities of pumping wells PW-1, PW-2, PW-6, PW-7, and SBW will be allowed to discharge to the drain in their respective buildings.

At the request of the Department, the soil drums will be containerized in a conex box on site until disposal. The 1,000-gallon aqueous storage tank will be staged adjacent to the conex box. The conex box, construction and debris box/dumpster (C&D box), and storage tank will be staged at the edge of the gravel parking lot of the Saegertown Borough building.

Due to the anticipated high transportation disposal costs for PFAS-impacted media (more than $1,100 for transportation alone to Michigan from the 2022-23 groundwater sampling event's IDW disposal), IDW and the conex box will remain on site until completion of the second round of groundwater sampling. At that time, the OBG | Baker field personnel will be on site to oversee the removal of the drums, storage tank, and conex box.

Because the IDW subcontractor has yet to be identified, the analytical suite necessary for the IDW characterization is currently unknown. However, it is anticipated that the IDW aqueous samples will be analyzed minimally for 26 PFAS analytes, Target Analyte List (TAL) Metals, Target Compound List (TCL) Volatile Organic Compounds (VOCs), TCL Semi-volatile Organic Compounds (SVOCs), general chemistry, flashpoint, pH, reactive cyanide, reactive sulfide, corrosivity, and specific gravity. One composite, representative aqueous sample will be collected from the 1,000-gallon aqueous storage tank after completion of the initial groundwater sampling event. No characterization sample of the storage tank from the second round of sampling will be needed as the waste profile will already be in place from the first sampling event.

With respect to drummed solid wastes, it is anticipated that a composite sample from the drums will be collected by OBG | Baker personnel and be analyzed for the extensive analytical suite presented above for the aqueous wastes and also Toxicity Characteristic Leaching Procedure (TCLP) analysis for VOCs, SVOCs, and metals.

4.0 PROJECT MANAGEMENT AND SCHEDULE

This section provides an overview of the project management and staff and proposed work schedule.

4.1 Personnel

The primary participants for this project and their responsibilities are shown below. It should be noted that availability of specific field personnel is dependent on timing of the actual field work and may be subject to change.

- Scott Moffett, P.G., P.M.P. – GTAC Program Manager
- Christopher Kupfer, P.G. – Project Manager
- Joe Burawa, P.G. – Project QC Officer
- Environmental Scientist/Health and Safety Officer – To Be Determined
- Environmental Specialist – To Be Determined

OBG | Baker's Project Manager, Mr. Christopher Kupfer, will be responsible for managing the overall technical and administrative efforts associated with this project, including interface and final negotiations with the Department. Mr. Joe Burawa will be responsible for managing OBG | Baker support personnel and ensuring that the field tasks and QA/QC procedures are implemented according to the Work Plan, SAP, QAP, and HASP. Mr. Kupfer will oversee preparation of the report with support from staff geologists/scientists, data management professionals, CAD technicians, and clerical staff. Mr. Scott Moffett (GTAC Program Manager) will provide senior review and technical guidance. Resources required to support this investigation will be obtained through Mr. Moffett.

4.2 Project Schedule

The Site Investigation activities described herein are estimated to be completed in approximately nine months from the notice to proceed. The proposed project schedule is presented on Figure 5. Included in this schedule is a breakdown of the major field tasks and their estimated start and completion dates.

TABLES

Table 1

Proposed Sampling Summary
Site Investigation
Saegertown PFAS Site
Crawford County, Pennsylvania

TASK	SAMPLE TYPE	MATRIX	Number of Borings	ESTIMATED NUMBER OF PFAS SAMPLES FOR ANALYSIS USING EPA METHOD 537.1						NOTES / COMMENTS
				Investigative	Duplicates	Field Blanks	Equipment Rinsate	MS/MSD	Waste Characterization	
Soil Investigation	Investigative	Soil	15	30	3	1	2	2/2		Soil samples to be collected for analysis at surface and above the soil/groundwater interface. If contaminant impact is observed in the vadose zone, an at-depth sample from the impacted zone will replace the surface soil sample for analysis.
	Contingent		2	4	1	0	0	0/0		Two contingent borings are included to allow for additional soil sampling if field observations (e.g., obvious contamination) warrant an expansion of scope.
Groundwater Grab Investigation	Investigative	Groundwater	25	25	3	0	2	2/2		One groundwater grab sample from the shallow overburden aquifer will be collected from each groundwater grab boring.
	Contingent		3	3	0	0	0	0/0		Three contingent groundwater grab samples are included to allow for additional groundwater sampling if field observations (e.g., obvious contamination) during the soil investigation task warrant an expansion of scope.
Groundwater Monitoring Well Installaiton	Investigative	Soil	10	20	2	1	1	0/0		Soil samples to be collected for analysis at surface and above the soil/groundwater interface. If contaminant impact is observed in the vadose zone, an at-depth sample from the impacted zone will replace the surface soil sample for analysis.
Groundwater Well Sampling - Round #1	Investigative	Groundwater	N/A	24	3	1	0	2/2		Saegertown Supply Wells PW-1, PW-2, PW-6, PW-7, OB-6-50, OB-6-100, OB-7-50, OB-7-100, MW-1, MW-15S, MW-15D, MW-24S, MW-24D, Saegertown Beverage Well + 10 Site Invest. Monitoring Wells
Groundwater Well Sampling - Round #2	Investigative	Groundwater	N/A	24	3	1	0	2/2		Saegertown Supply Wells PW-1, PW-2, PW-6, PW-7, OB-6-50, OB-6-100, OB-7-50, OB-7-100, MW-1, MW-15S, MW-15D, MW-24S, MW-24D, Saegertown Beverage Well + 10 Site Invest. Monitoring Wells
IDW Characterization	Investigative	Aqueous	N/A						1	Flashpoint, pH, reactive cyanide, reactive sulfide, TCL 11 RCRA Metals, TCL SVOCs, TCL VOCs, corrosivity, specific gravity (1)
		Non-Aqueous	N/A						1	Flashpoint, pH, reactive cyanide, reactive sulfide, TCLP 11 RCRA Metals, TCLP SVOCs, TCLP VOCs, corrosivity, specific gravity (1)

(1) - Waste characterization profile may expand based on requirements of IDW subcontractor.
QA/QC - Quality Assurance / Quality Control
IDW - Investigation Derived Waste
RCRA - Resource Conservation and Recovery Act
N/A Not Applicable
TCL - Target Compound List
TCLP - Toxicity Characteristic Leaching Procedure
SVOCs - Semi-Volatile Organic Compounds
VOCs- Volatile Organic Compounds

Table 2
PFAS Constituents Evaluated for Site Investigation
Saegertown PFAS Site

CAS No.	PFAS Constituent	Acronym
757124-72-4	4:2 Fluorotelomer sulfonic acid	4:2 FTS
27619-97-2	6:2 Fluorotelomer sulfonic acid	6:2 FTS
39108-34-4	8:2 Fluorotelomer sulfonic acid	8:2 FTS
13252-13-6	Hexafluoropropylene Oxide Dimer Acid	HFPO-DA (GenX)
62037-80-3	Hexafluoropropylene Oxide Dimer Acid Ammonium Salt	HFPO-DA Ammonium Salt (GenX)
2991-50-6	N-Ethyl-N-[(heptadecafluorooctyl)sulphonyl]glycine	NEtFOSAA
2355-31-9	N-methyl perfluorooctanesulfonamidoacetic acid	NMeFOSAA
375-73-5	Perfluorobutanesulfonic acid	PFBS
375-22-4	Perfluorobutanoic acid	PFBA
335-77-3	Perfluorodecanesulfonic acid	PFDS
335-76-2	Perfluorodecanoic acid	PFDA
307-55-1	Perfluorododecanoic acid	PFDoA
375-92-8	Perfluoroheptanesulfonic acid	PFHpS
375-85-9	Perfluoroheptanoic acid	PFHpA
355-46-4	Perfluorohexanesulfonic acid	PFHxS
307-24-4	Perfluorohexanoic acid	PFHxA
68259-12-1	Perfluorononanesulfonic acid	PFNS
375-95-1	Perfluorononanoic acid	PFNA
754-91-6	Perfluorooctanesulfonamide	PFOSA
1763-23-1	Perfluorooctanesulfonic acid	PFOS
335-67-1	Perfluorooctanoic acid	PFOA
2706-91-4	Perfluoropentanesulfonic acid	PFPeS
2706-90-3	Perfluoropentanoic acid	PFPeA
376-06-7	Perfluorotetradecanoic acid	PFTA
72629-94-8	Perfluorotridecanoic acid	PFTrDA
2058-94-8	Perfluoroundecanoic acid	PFUnDA

CAS - Chemical Abstract Service Identification Number
PFAS - Per- and Polyfluorinated Substances

FIGURES

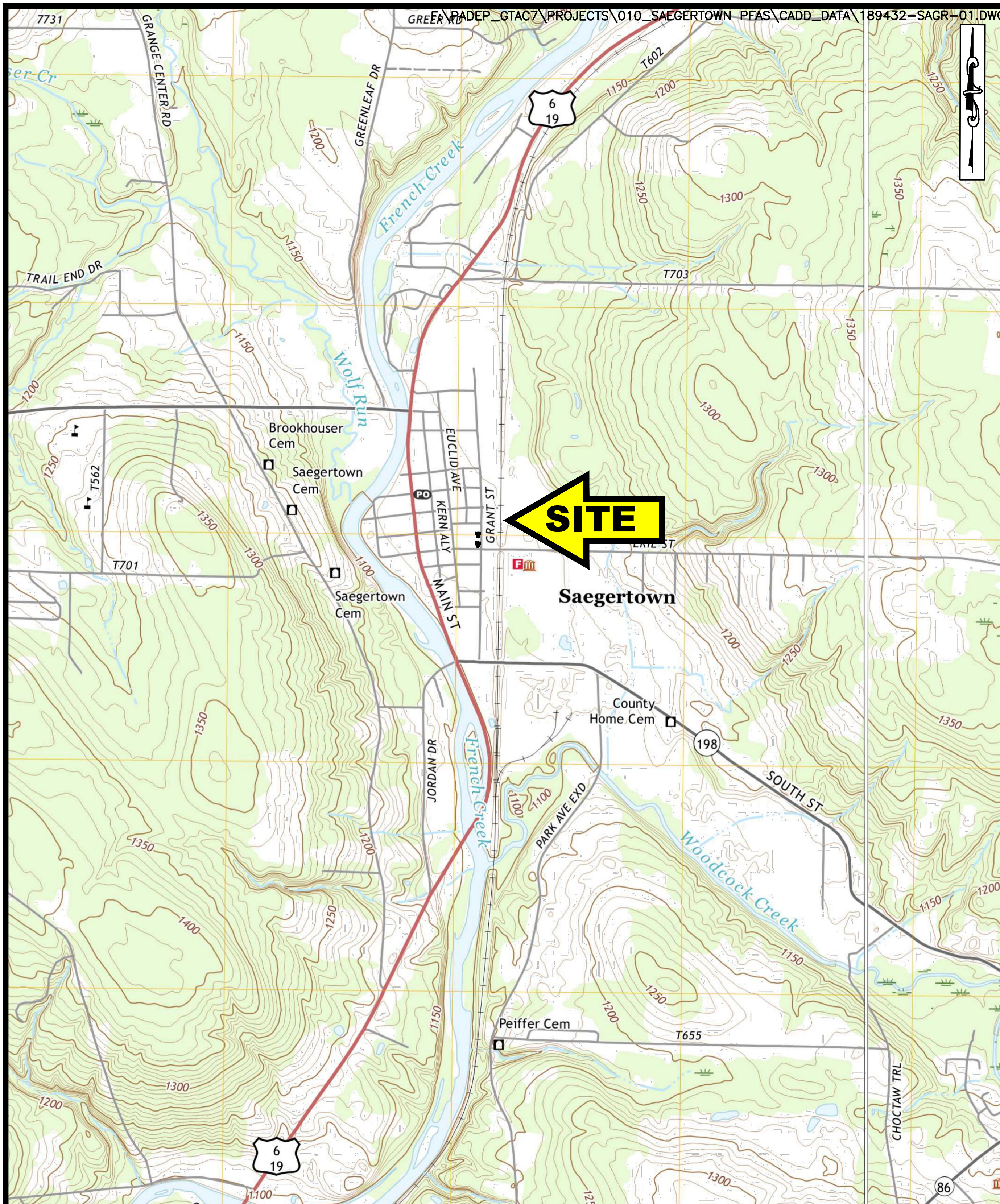

FIGURE 1
GENERAL SITE LOCATION MAP
SAEGERTOWN PFAS SITE
SAEGERTOWN BOROUGH,
CRAWFORD COUNTY, PENNSYLVANIA

SOURCE:
USGS: MEADVILLE, PA, 2019
BLOOMING VALLEY PA, 2019

QUADRANGLE LOCATION

SCALE: 0 — 2000	DATE: JUNE 2022
S.O. NO.: 189432	FILE: 189432-SAGR-01
DSN/DWN: CHK/RRR	CHK: CHK

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OBG|Baker Environmental Solutions Joint Venture

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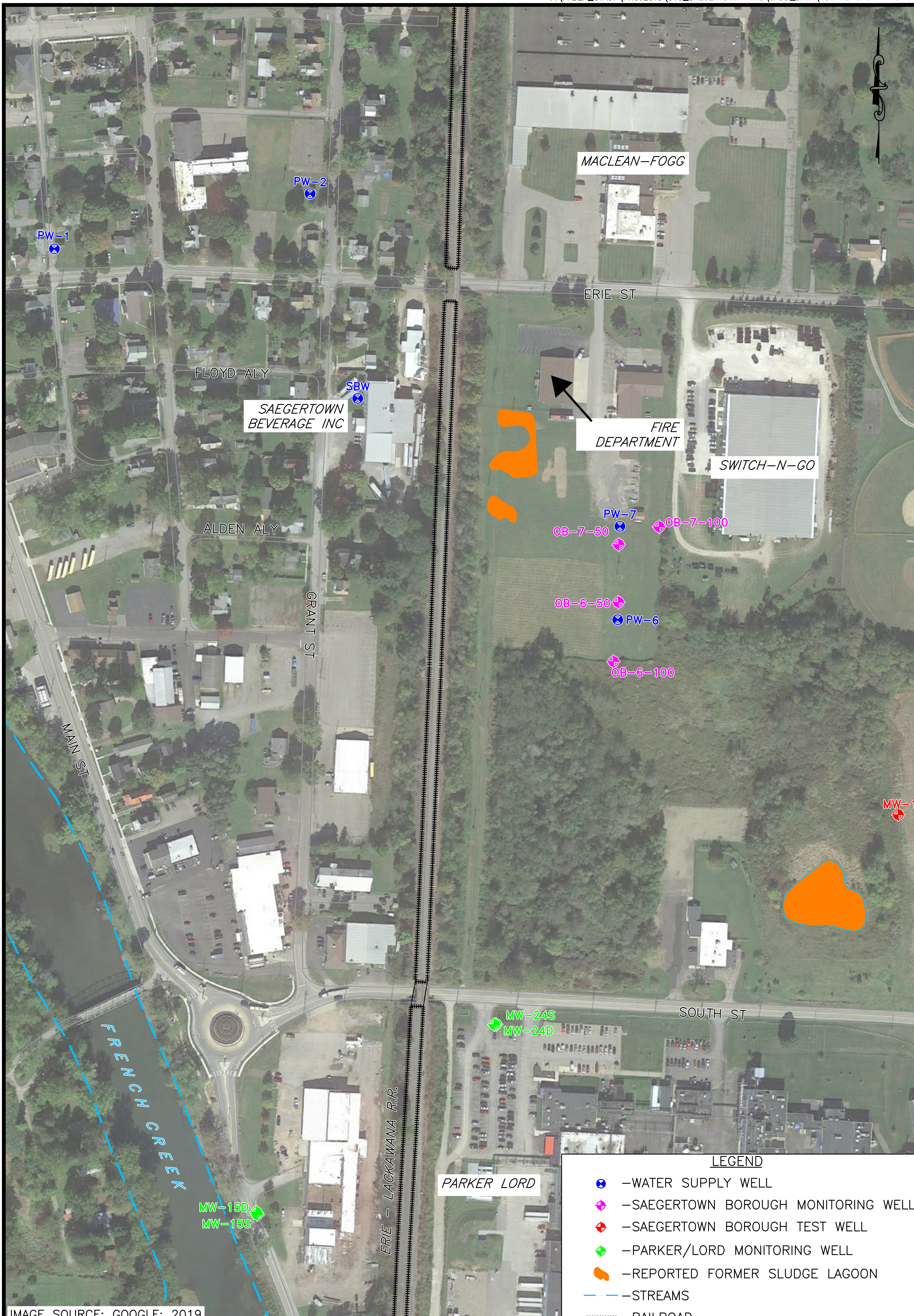

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FILE:	189432-SAGR-04

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FIGURE 2
WELL LOCATION MAP
SAEGERTOWN PFAS SITE
SAEGERTOWN BOROUGH,
CRAWFORD COUNTY, PENNSYLVANIA

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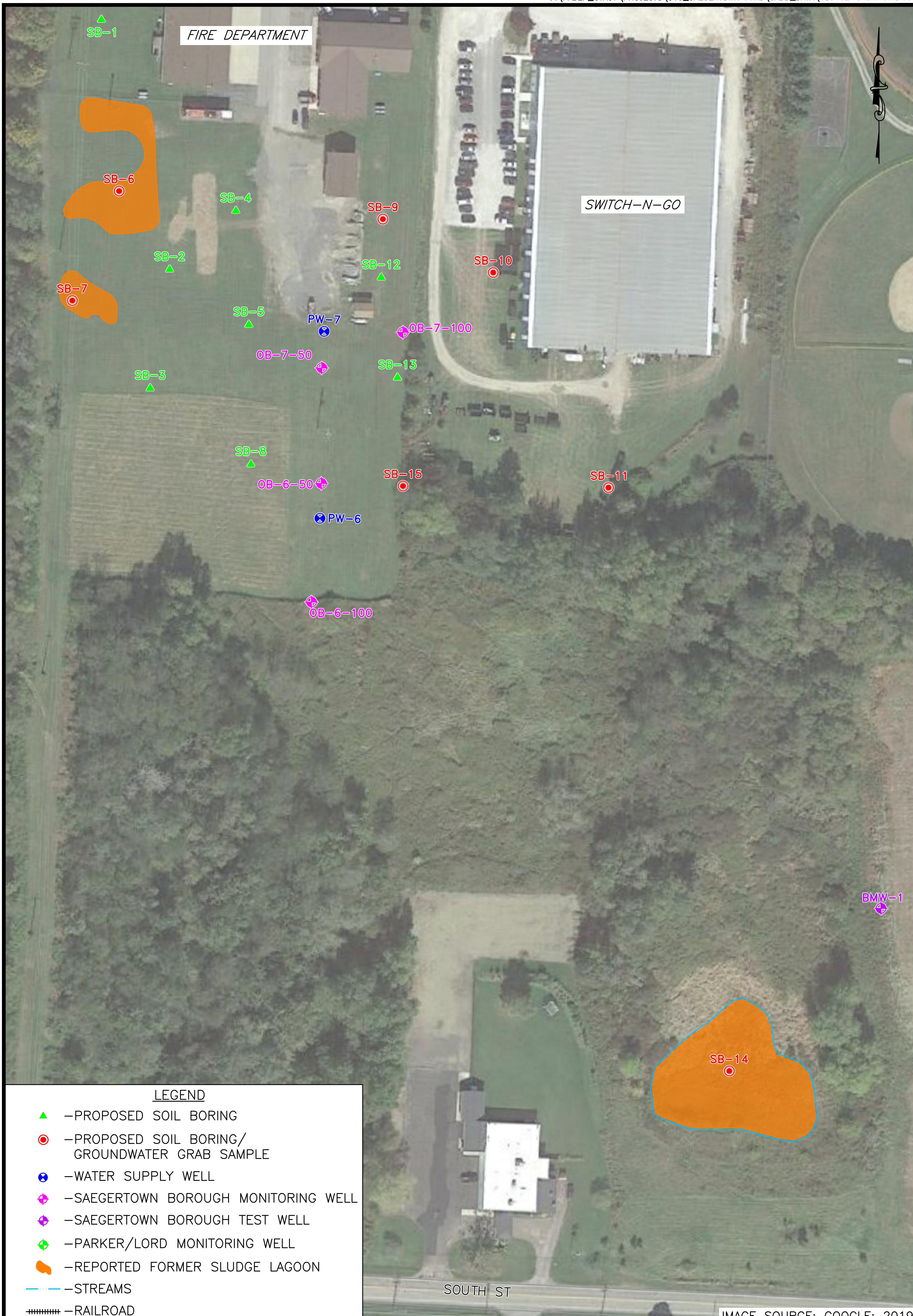

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DSN/DWN: CHK/RRR

FILE: 189432-SAGR-07

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FIGURE 3
PROPOSED SOIL BORING LOCATION MAP
SAEGERTOWN PFAS SITE
SAEGERTOWN BOROUGH,
CRAWFORD COUNTY, PENNSYLVANIA

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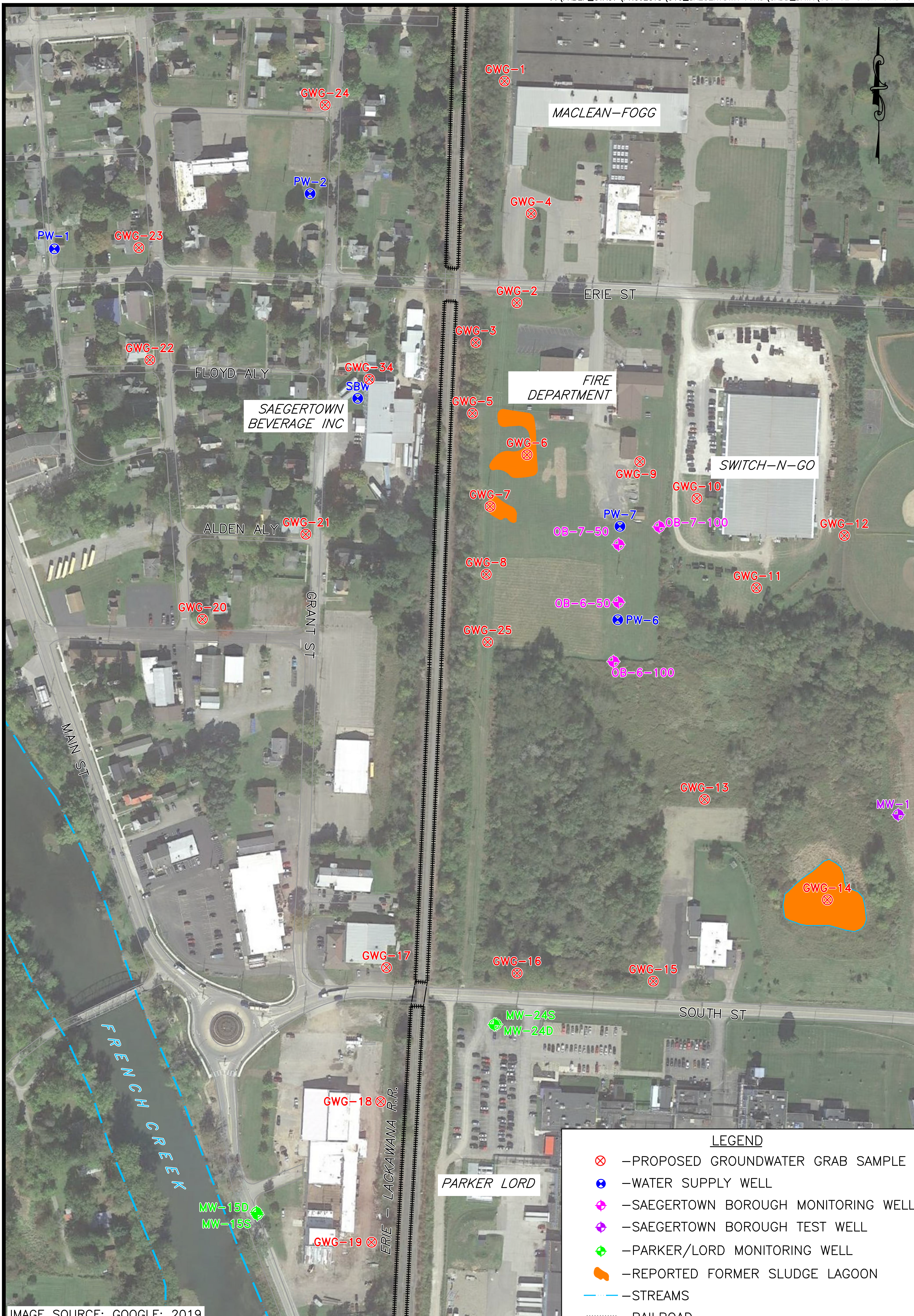

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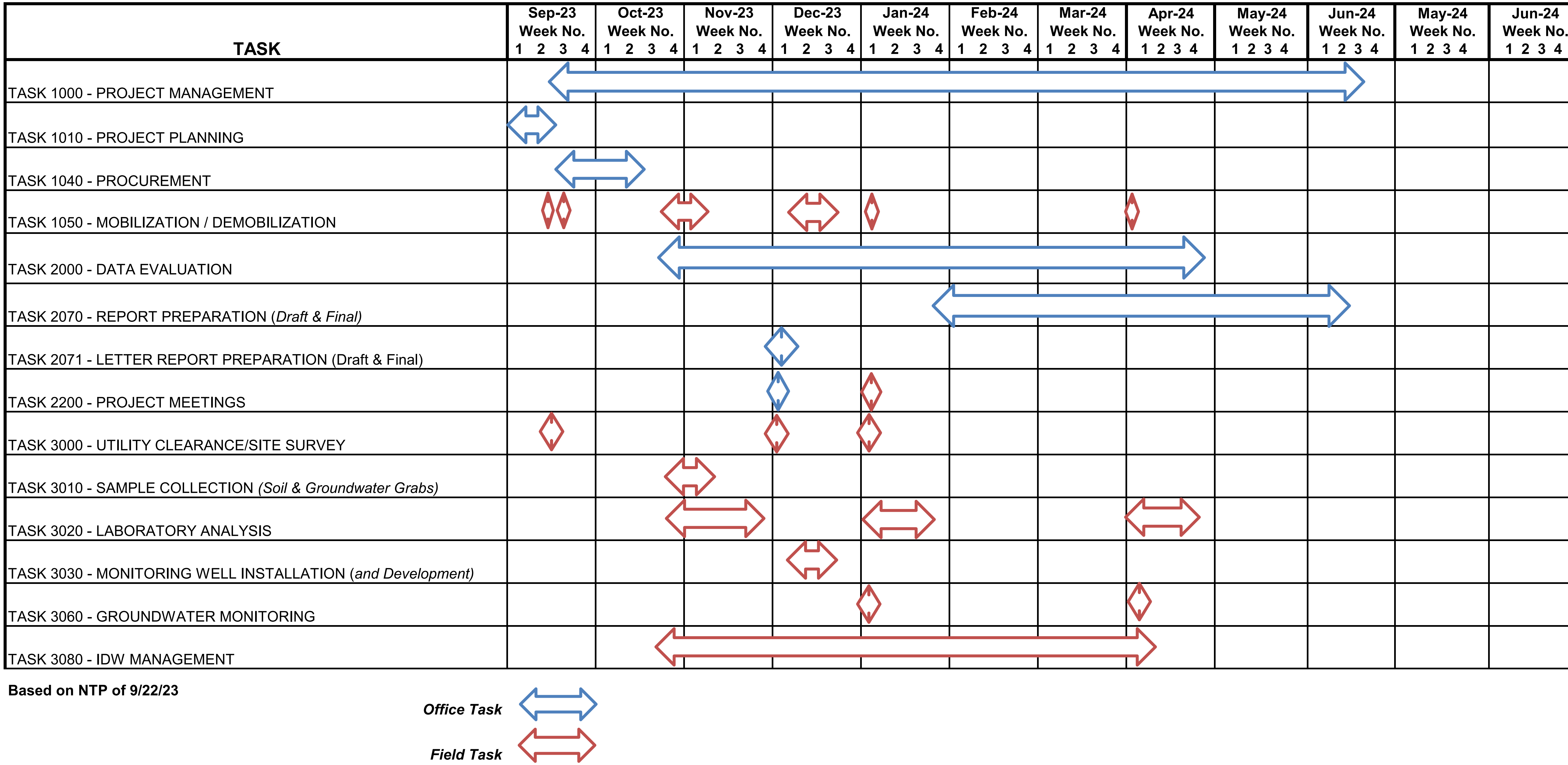
FIGURE 4
PROPOSED GROUNDWATER GRAB LOCATION MAP
SAEGERTOWN PFAS SITE
SAEGERTOWN BOROUGH,
CRAWFORD COUNTY, PENNSYLVANIA

Figure 5

Proposed Project Schedule
Site Investigation
Saegertown PFAS Site



ATTACHMENT A

Sampling and Analysis Plan and Quality Assurance Protocols

FINAL
SAMPLING AND ANALYSIS PLAN
AND QUALITY ASSURANCE PROTOCOLS

SAEGERTOWN PFAS SITE

SAEGERTOWN BOROUGH
CRAWFORD COUNTY, PENNSYLVANIA

PADEP Contract No.: SAP4000023226
Interim Response and Remediation Services Contract
Work Requisition No.: 7-6-182

Prepared for:

Commonwealth of Pennsylvania
Department of Environmental Protection
Hazardous Sites Cleanup Section
Environmental Cleanup and Brownfields Program
230 Chestnut Street
Meadville, Pennsylvania 16335

Submitted by:

OBG | Baker Environmental Solutions Joint Venture
Airside Business Park, 100 Airside Drive
Moon Township, Pennsylvania 15108

OBG | Baker Project No. 189432

September 2023

Prepared By:	**Approved By:**
Christopher H. Kupfer, P.G.	**Scott K. Moffett, P.G., P.M.P.**
Project Manager	**Program Manager**
OBG | Baker	**OBG | Baker**
Environmental Solutions Joint Venture	**Environmental Solutions Joint Venture**

NOTICE

The Pennsylvania Department of Environmental Protection (Department) has funded the information in this document under Contract No. SAP 4000023226 to OBG | Baker Environmental Solutions Joint Venture (OBG | Baker). This document has been formally released by OBG | Baker to the Department.

TABLE OF CONTENTS

Page No.

1.0 INTRODUCTION

OBG | Baker Environmental Solutions Joint Venture (OBG | Baker) has prepared this Sampling and Analysis Plan (SAP) and Quality Assurance Protocols (QAP) for the Pennsylvania Department of Environmental Protection (Department), as authorized by Work Requisition Number 7-6-182, Contract Number SAP4000023226 (GTAC-7), pursuant to the Pennsylvania Hazardous Sites Cleanup Act (HSCA), Act 108, October 18, 1988. The Plan is associated with the Site Investigation activities to be conducted at the Saegertown Per- and Polyfluoroalkyl Substances (PFAS) Site (site) located in Saegertown Borough, Crawford County, Pennsylvania.

1.1 Site Description and Background

Pertinent information related to the site description and background is presented in the Work Plan.

1.2 Plan Purpose and Objectives

The primary purpose of this SAP/QAP is to: (1) provide guidance and establish requirements for soil and groundwater sampling at the site and (2) establish laboratory Quality Assurance (QA)/Quality Control (QC) protocols associated with the sampling. The SAP/QAP is to be used in conjunction with the Work Plan and Health and Safety Plan (HASP).

1.3 Key Personnel and Responsibilities

The following personnel are designated to carry out the stated job functions for both on-site and off-site activities associated with implementing this SAP/QAP. Field personnel listed as "To Be Determined" will be filled with a qualified person available at the time of project start.

- Project Manager: Mr. Christopher Kupfer, P.G.
- Project QC Officer: Mr. Joe Burawa, P.G.
- Health and Safety Manager: Mr. Matthew Guard, C.S.P., A.S.P.
- Field Geologist: To Be Determined
- Environmental Specialist: To Be Determined

Project Manager. The Project Manager, Mr. Christopher Kupfer, is responsible for managing the overall technical and administrative efforts associated with this project including implementing this SAP/QAP. The Project Manager will serve as the Department Regional Project Officer's single-point-of-contact for this project and provide the managerial administrative skills to ensure that resource allocations, planning, execution, and reporting meet the Department's expectations. In addition, the Project Manager will be readily available to respond to Department questions, concerns, and comments and be proactive in alerting the Department to potential project issues.

Project personnel and specialty subcontractors working on the project will report to the Project Manager and act under his direction.

Project QC Officer. The Project QC Officer, Mr. Joe Burawa, will report functionally to the Project Manager and provide overall direction to the field QC function, monitor and report adherence to project-required plans, and conduct audits and surveillance as necessary. The Project Manager will empower the Project QC Officer to enforce QC issues in the field including the authority to suspend work if QC issues are being compromised. Any deficiencies will be immediately reported for consultation and assignment of corrective actions.

Health and Safety Manager. The Health and Safety Manager, Mr. Matthew Guard, has overall responsibility for administering and directing OBG | Baker's Corporate Health and Safety Program including ensuring that personnel working on this project are in compliance with project and corporate health and safety requirements. In addition, the Health and Safety Manager has the requisite authority to oversee and execute health and safety activities for this project.

Field Geologist. The Field Geologist (to be determined) will report directly to the Project Manager and be responsible for completing the investigation activities and managing all aspects of project implementation in the field including quality, safety, and coordination of activities associated with task-specific groups or specialty subcontractors.

Environmental Specialist. The Environmental Specialist (to be determined) will be responsible for aiding the field geologist during the well developments and both rounds of the groundwater sampling activities.

2.0 SAMPLING AND ANALYSIS PLAN

2.1 Site Background

Pertinent background information related to the site location and physical setting, historical area operations and investigation history is presented in the Work Plan.

2.2 Project Objectives

The project objectives are summarized in the Work Plan.

2.3 Investigation Procedures

The following sections present the investigation procedures that will be used during the field activities. Supplemental information regarding the sampling and field procedures can be found in the OBG | Baker Standard Operating Procedures (SOPs) referenced herein. Support activities, sampling locations, sample matrices, and analytical parameters are discussed in the Work Plan. The proposed sampling summary of soil and groundwater are provided as Table 1 in the associated Work Plan, and the list of PFAS constituents evaluated for the investigation are summarized on Table 2 of the associated Work Plan.

2.3.1 Soil Sampling

Surface and subsurface soil samples will be collected from the investigation. The following sections describe the sample collection and field screening methods to be used as well as the criteria for selecting samples for chemical analyses.

Subsurface soil samples will be collected using a Geoprobe® (or equivalent) and direct push methods. The samples will be collected continuously in four or five-foot increments from the ground surface to the desired depth. Due to the unconsolidated nature of the overburden soils (e.g., sand, silt, gravel), it is anticipated that an outer four-inch diameter surface casing will need to be advanced during boring advancement to mitigate borehole collapse during sample acquisition.

The Work Plan details the depth to which each boring will be advanced. The sampling will be conducted as summarized below:

1. Push the sampling device (Macro-Core or equivalent) to the desired depth.

2. Bring the sampler to the surface, remove the acetate liner from the sampler, and drill small-diameter holes in the liner at approximate one-foot intervals for field screening using the Photoionization Detector (PID).

3. The field screening will be conducted by inserting the tip of the PID wand into the drilled holes. The highest reading for each interval will be recorded in the field logbook.

4. Upon completion of the field screening, slice the liner with a cutting tool to expose the sample core.

5. Thoroughly homogenize the applicable sample interval for analysis to ensure that the sample is as representative as possible of the sample interval.

6. Transfer the proper sample volume into appropriate, laboratory-supplied containers and place the sample in a cooler with ice.

7. Record all pertinent sampling information such as soil description, sample depth, sample number, sample location, and time of sample collection in the field logbook.

Subsequent to sampling, the boreholes will be backfilled with drill cuttings (if not contaminated) and any remaining void will be backfilled with bentonite to the ground surface. Concrete will be used to fill the top six inches of the borehole if the boring was drilled through asphalt or concrete.

Unless otherwise specifically noted in the Work Plan, two soil samples will be selected for chemical analyses from each of the direct push borings, as follows:

- One worst-case sample based on PID readings and/or visual evidence of staining/odor

- One "clean" sample from below the contaminated zone as determined in the field based on PID readings and/or visual evidence of staining/odor

In lieu of any detected PID readings or visual evidence of staining/odor, the default samples for laboratory analyses generally will be collected from the ground surface (0 - 1 ft. below ground surface [bgs]) and directly above the soil-groundwater interface (approximately 8 - 10 feet bgs). Each of the soil samples will be analyzed for PFAS only via EPA Method 537 IDA.

In lieu of any detected PID readings or visual evidence of PFAS contamination (e.g., staining/odor), borings will be terminated once groundwater is encountered (approximately 8 to 10 feet bgs). The sampling methodologies described above should provide a sufficient vertical profile of potential contaminant impact.

After sampling, the boreholes will be backfilled with retrieved soil cuttings unless evidence of notable contamination is present, in which case the cuttings will be drummed accordingly. Any remaining void will be backfilled with granular bentonite to grade (and concrete at the surface, if encountered).

2.3.2 Groundwater Grab Sampling

Dependent upon the location, geology, hydrogeology, and difficulty of drilling, the collection of groundwater grab samples may be collected using multiple methods. If boring advancement to the desired depth is not difficult and groundwater production appears sufficient, the groundwater grab samples may be collected by advancing a second borehole adjacent to the initial boring. The samples may be collected using a 5-foot long, stainless steel, discrete sampler that is advanced to the desired depth. The cover of the sampler will then be retracted, thus allowing groundwater to flow into the device for sampling. The samples will be retrieved using a peristaltic pump and new, disposable, polyethylene tubing for each sample.

Prior to sample collection, a minimum of three well volumes of groundwater will be purged from the borehole to reduce the turbidity to the extent practical. The samples will be placed into appropriate, laboratory-supplied containers with the appropriate preservatives. Decontamination of the sampler and drilling tools will be completed between groundwater grab borings.

If groundwater production is limited or other conditions deter the methodology above, a temporary two-inch diameter PVC well screen and riser will be lowered to the bottom of the open borehole (or casing if needed to mitigate borehole collapse during boring advancement).

Other site work will be completed while allowing time for groundwater to flow into the screen/riser until sufficient volume is present to retrieve the groundwater grab sample (using peristaltic pump or disposable bailer). After collection of the sample, the temporary PVC well screen and riser will be removed from the borehole and disposed accordingly.

Regardless of which of the two sampling methods above are used, the open boreholes will be backfilled with native material to grade (and bentonite, if necessary to fill remaining void). Concrete patching (six-inch thick) will be completed at the surface in any areas where borings were advanced through concrete or asphalt.

2.3.3 Monitoring Well Installation

A number of overburden monitoring wells will be installed at the site. Specific well installation procedures are described below.

The well borings will be drilled using direct-push drilling methods with the continuous advancement of an outer four-inch diameter steel casing to mitigate borehole collapse. During direct-push drilling, continuous soil core samples will be collected for lithologic identification and field screening.

As directed by the OBG | Baker on-site geologist, the wells will be constructed using two-inch Inside Diameter (ID), Schedule 40, Polyvinyl Chloride (PVC) well casing and screen materials. Well screens (0.010-inch slot) will be ten feet in length and installed such that the well screen will 'straddle' the encountered water table ('straddle' meaning portions of the well screen are both above and below the encountered water table).

The annular space around the well screen will be backfilled with well-graded, fine sand. The sand will extend to approximately two feet above the top of the screened interval. The annular space above the sand pack will be backfilled with bentonite and hydrated with potable water to prevent surface and near subsurface water from infiltrating into the screened groundwater-monitoring zone.

The well construction materials will be installed through the outer steel casing as it is withdrawn from the borehole. Lithologic information and well construction details will be recorded in the field log book and on Test Boring/Well Construction Records.

2.3.3.1 Well Completion and Development

For wells located in high traffic areas, flush-mounted, protective manhole covers will be placed over the PVC riser and surrounded by a concrete pad. The remaining wells will have two to three-feet of "stickup" above ground surface. Steel protective casing will be placed over the PVC riser and surrounded by a concrete pad. The pads will be approximately two feet square and four inches thick. Approximately two feet of the steel casing will extend into the subsurface (the casing is five feet long), centered in the middle of the concrete pad. The protective casing will be painted a bright color to aid in visibility. Each riser will be fitted with an expandable, water-tight locking cap and uniformly-keyed lock.

Each new well will be developed using pumping and surging methods by OBG | Baker personnel. Alternatively, the wells may be developed using bailers if the recharge rate of the aquifer is not suitable for pumping. Typical limits placed on well development may include any, or a combination, of the following:

- Clarity of water based on visual determination
- A maximum time period (typically two hours)
- A maximum borehole volume (typically five borehole volumes plus the amount of any water added during the drilling or installation process)

2.3.4 Groundwater Sampling

Groundwater samples will be collected from the proposed ten monitoring wells (BMW-1 through BMW-10) to be installed as part of the Site Investigation and also the 14 wells on site previously sampled in October 2022 and January 2023 listed below. The parenthetical identifications listed will be used moving forward in the investigation and all associated reporting.

- Saegertown Borough Public Water Supply Well #1 (a.k.a., PW-1)
- Saegertown Borough Public Water Supply Well #2 (a.k.a., PW-2)
- Saegertown Borough Public Water Supply Well #6 (a.k.a., PW-6)
- Saegertown Borough Public Water Supply Well #7 (a.k.a., PW-7)
- Saegertown Borough Monitoring Well OB-6-50 (a.k.a., OB-6-50)
- Saegertown Borough Monitoring Well OB-6-100 (a.k.a., OB-6-100)
- Saegertown Borough Monitoring Well OB-7-50 (a.k.a., OB-7-50)
- Saegertown Borough Monitoring Well OB-7-100 (a.k.a., OB-7-100)
- Saegertown Borough Monitoring Well MW-1 (a.k.a., MW-1)
- Parker/Lord Monitoring Well GM-24S (a.k.a., MW-24S)
- Parker/Lord Monitoring Well GM-24D (a.k.a., MW-24D)
- Parker/Lord Monitoring Well GM-15S (a.k.a., MW-15S)
- Parker/Lord Monitoring Well GM-15D (a.k.a., MW-15D)
- Saegertown Beverage Well (a.k.a., SBW)

Two groundwater sampling events will be included in the groundwater monitoring scope of work. Both sampling events will include all 14 of the wells cited above and the ten wells installed as part of the Site Investigation.

Two methodologies will be used to collect the samples from the 24 wells based on their construction and appurtenances; one method will be samples collected from taps previously and recently installed on the four Saegertown public supply wells (PW-1, PW-2, PW-6, and PW-7) and the Saegertown Beverage supply well (SBW). The second methodology will be using low-flow sampling techniques to sample OB-6-50, OB-6-100, OB-7-50, OB-7-100, BMW-1, MW-24S, MW-24D, MW-15S, MW-15D, and the ten newly-installed monitoring wells.

The collection at the taps is able to be completed as all of five of the wells have pumping systems and discharge lines. It has already been confirmed that all sample taps were installed in line prior to the chlorination treatment of the pumping effluent. At each of these five well locations, the pump will be allowed to run for several minutes prior to collecting a representative sample. Field personnel will estimate the pumping timeframe by the well's construction and also the appearance of the effluent.

Regardless of the sample collection methodology, special care must be taken when sampling for PFAS constituents. Some typical sampling equipment/materials and personnel protective equipment are known to contain PFAS and must not be used during the sampling activities. A PFAS Sampling Checklist and sample collection considerations page have been provided as an attachment to the Work Plan. The considerations and checklist will be reviewed by field personnel and the drilling subcontractor. The subcontracted laboratory also will be made aware that the scope includes PFAS analyses (special bottleware/caps must be used for sample collection and internal specialized equipment).

Since supply well PW-6 and PW-7 share the same effluent discharge piping and sample tap, it is anticipated that Groundwater Resources, LLC (Borough consultant) again will be on site during the sampling and will be responsible for operating each of the pumps individually to allow OBG | Baker personnel to collect the representative groundwater samples from the one sample tap. The tap is located prior to the chlorination process.

In the section below, multiple options are available to purge and sample the monitoring wells. In instances where non-dedicated, non-disposable sampling equipment is used (e.g., submersible bladder pump), all equipment that comes in contact with the groundwater will need to be decontaminated before the purging / sampling of the well. Decontamination activities are performed to mitigate the potential for cross contamination between wells during groundwater monitoring. Each piece of sampling equipment that contacts the groundwater will be decontaminated by placing the equipment in a bucket filled with non-phosphate soap and potable water and scrubbed thoroughly followed by a thorough PFAS-free water rinse. These wash waters will be containerized for later characterization and appropriate disposal. If dedicated purge methods are used (peristaltic pump, disposable bailer, etc.), no decontamination of equipment will be needed between wells.

As summarized in the IDW Management section of the Site Investigation Work Plan, the purged groundwater and decontamination fluids will be containerized in a steel storage tank for later characterization by OBG | Baker personnel and disposal by the IDW subcontractor.

2.3.4.1 Groundwater Sampling Methodology

A complete round of groundwater level measurements from the monitoring wells will be collected and recorded in the field notebook prior to initiating the purging and sampling activities for both rounds of sampling. As noted above, care will be taken to collect the water levels from wells with dedicated pump systems, if attainable. In all instances, Groundwater Resources, LLC will be on site to open the wells for access to the inner casing. The owner of Saegertown Beverage will need to provide access to his well (SBW) for the measurements.

Of the 24 wells designated to be sampled in the scope, nine of the monitoring/observation wells will be purged and sampled following typical sampling methodologies as described below. These nine wells include Saegertown Borough well BMW-1, MW-24S, MW-24D, MW-15S, MW-15D, OB-6-50, OB-6-100, OB-7-50, and OB-7-100.

The monitoring wells will be purged prior to sampling to collect a representative groundwater sample from the aquifer. It is understood that the nine wells are two-inch diameter and will be able to be purged and sampled following the same methodologies.

To mitigate the volume of waste (purge) water generated for disposal, groundwater purging and sampling activities will initially be attempted with a peristaltic pump with dedicated discharge tubing. At each well, the tubing will be lowered to the approximate mid-point of the well's screened interval (determined through review of well construction diagrams). If construction specs are not available, the pump tubing will be placed approximately five feet from the well bottom with the assumption that the well was constructed with a ten-foot long well screen.

The pumping rate will be set to create a low sustainable flow. A water level meter will be used concurrently to monitor the water level within the well casing. Ideally, the water level should remain in 'steady state' during low-flow pumping and not be drawn down. If drawdown in the well occurs, the pump flow rate will be reduced until the water level in the well casing stabilizes. Typically, flow rates of less than one liter per minute are used initially. However, the flow is dependent upon the hydrogeologic characteristics of the well sampled.

Water Quality Parameters (WQPs) including pH, Oxidation-Reduction Potential (ORP), specific conductance, dissolved oxygen, temperature, and turbidity will be measured at approximate five-minute intervals during purging and recorded in the field logbook. The field testing will be conducted within a flow-through cell that limits exposure of the groundwater to the atmosphere while the field measurements (including flow rate calculated with a graduated bucket and stopwatch) are recorded. These same field measurements also will be collected at each of the five water supply wells immediately after sample collection.

In general, purging will be considered complete when three successive WQP readings have stabilized within 0.1 Standard Units for pH, 10 millivolts for ORP, 3% for specific conductance, 10% for dissolved oxygen, and turbidity is less than 10 Nephelometric Turbidity Units (NTUs). Temperature readings will be recorded, but not used for stabilization evaluation. Temperatures measured at the surface are affected to some extent by the difference between ambient air and groundwater temperatures and thus can vary over short periods. If after two hours of purging (or three well volumes, whichever is sooner), the WQPs have not reached a stable plateau, purging will be discontinued, and the sample will be collected.

Upon WQP stabilization, the groundwater samples will be collected from the end of the pump tubing and placed into appropriate sample containers with the appropriate preservatives. For low-flow sampling, the same equipment used for purging will also be used for sampling.

If purging and sampling are not capable of being completed with the peristaltic pump, purging will attempt to be completed with a submersible bladder pump system. If used, the submersible pump installation and operational methodology is consistent with the peristaltic pump description above.

If low-flow techniques are not viable in a particular well, purging and sampling of the well may be performed with dedicated, disposable polyethylene bailers with dedicated, disposable retrieval line. A minimum of three well volumes will be evacuated from the well prior to sampling. However, if production is insufficient, the well will be bailed (purged) dry and allow time to recover (at least 75% of lost head) prior to initiating groundwater sampling. It is not believed this methodology will need to be implemented as groundwater production is believed to be sufficient in the area to support low-flow purging techniques.

At the direction of the Department, each of the groundwater samples will be analyzed for 26 PFAS analytes using EPA Method 537 IDA. The appropriate sample containers will be filled and subsequently placed on ice in a cooler immediately after collection for shipment via overnight courier (e.g., FedEx) to the subcontracted laboratory. As noted in the checklist and considerations attachment, chemical or blue ice must not be used for sample shipment as well as any other PFAS-containing items (e.g., sharpies for marking cooler).

2.3.5 Quality Assurance/Quality Control

In addition to the soil, groundwater and waste profile samples designated for laboratory analysis, QA/QC samples also will be collected for analysis. The analytical suite for the QA/QC samples will be consistent with the associated investigative samples. A description of the anticipated QA/QC samples to be collected during the investigation is provided below.

Duplicates: Duplicate analytical samples are proposed to be collected at an approximate rate of ten percent of investigative samples per sampling media. Therefore, a total of three duplicate samples (and one contingent sample) are proposed to be collected during the soil sampling activities, three duplicates during the groundwater grab sample activities, and three duplicates for each of the two groundwater sampling events.

Field Blanks – To document both the quality of the PFAS free certified water used for the decontamination activities, verify laboratory analysis integrity, and document the quality of the water provided by the laboratory, a total of three field blanks will be collected as part of the investigation. One PFAS-free, certified water field blank will be collected for analysis during the soil sampling activities and one for each of the two groundwater sampling events. The analysis of the field blank during sampling will document the integrity/quality of the water used for the decontamination process.

The field blanks will be collected by pouring laboratory-grade, PFAS-free certified water (supplied by the laboratory) into the appropriate sample containers for laboratory analyses. The analysis of the field blank from each event will document the integrity/quality of the water supplied by the lab in case erroneous detections are observed from the laboratory analytical results of the equipment rinsate samples.

Equipment Rinsates: To document sufficient decontamination practices of non-disposable sampling equipment, one equipment rinsate sample will be collected for each non-disposable sampling device used during the investigation. Equipment rinsate samples are proposed to be collected at an approximate rate of five percent of investigative samples. Rinsate samples will be collected using PFAS-free, certified water supplied by the laboratory.

For the investigation, it is anticipated that two equipment rinsates will be collected during the soil investigation and another two during the groundwater grab investigation. Because only dedicated equipment is anticipated to be used during the monitoring (and pumping) well sampling activities, no equipment rinsate will be collected.

MS/MSD Samples: Matrix Spike/Matrix Spike Duplicate (MS/MSD) samples will be prepared in the field using the same procedures as duplicate samples and analyzed for the same parameters as the corresponding original samples. MS/MSD samples will be prepared at a frequency of approximately five percent for each group of samples of a similar matrix. Therefore, two MS and two MSDs will be collected during the soil investigation and another two of each will be collected during each of the two groundwater sampling events. The laboratory will use the samples for internal QA/QC. In addition, the results will be used to evaluate the matrix effect of the sample upon the analytical methodology.

2.4 Sample Designation

In order to identify and accurately track the various samples that may be collected during the investigation, each sample will be designated with a unique identification number, which will be recorded in the field logbook, on the chain-of-custody form, and the label affixed to the sample container(s).

Sample Media or Type/Location - Depth and/or QA/QC Qualifier

An explanation of each of these identifiers is provided below.

Sample Media or Type	SB = Soil boring sample GWG = Groundwater grab sample from boring MW = Groundwater sample from monitoring well (use current well ID) EB = Equipment rinsate blank FB = Field Blank
Location	Each sample location will be identified with a unique identification number.
Depth	Depth indicators will be used for soil samples. The number will reference the ending/bottom depth interval of the sample. Samples for analysis will be collected in one-foot increments. For example: Soil: 01 = Ground surface to 1 foot bgs 03 = 2 to 3 feet bgs 05 = 4 to 5 feet bgs
QA/QC	D = Field Duplicate Sample MS/MSD = Matrix Spike/Matrix Spike Duplicate Sample

Under this sample designation format, the sample number SB01-05D refers to:

SB01-05D	Soil boring sample
SB01-05D	Soil boring number 01
SB01-05D	Sample depth interval of 4 to 5 feet bgs
SB01-05D	Field duplicate (QA/QC) sample

The sample number MW05D refers to:

MW-5D	Groundwater sample from a monitoring well
MW-5D	Monitoring well #5
MW-5D	Field duplicate (QA/QC) sample

This sample designation format will be followed throughout the field sampling activities. Required deviations to this format in response to field conditions will be documented in the field logbook.

2.5 Decontamination

Reusable sampling equipment (e.g., stainless steel spoons, MacroCore barrel samplers/shoes, etc.) that comes into direct contact with the sample will be decontaminated between samples as follows:

- Wash equipment thoroughly with laboratory detergent and potable water using a brush to remove any particulate matter or surface film
- Rinse equipment thoroughly with potable water
- Rinse equipment again with PFAS-free water (provided by laboratory)
- Air dry equipment

Drilling equipment (e.g., MacroCore, outer casing, drill rods, etc.) will be decontaminated between soil and monitoring well borings at a central decontamination pad using a high-pressure, hot water wash. The pad will be capable of containing water and sediment. In addition, the pad will be equipped with a sump and sump pump suitable to pump the spent decontamination water into a storage tank or open-top, steel 55-gallon drums.

It is anticipated that only dedicated, disposable sampling equipment will be used for a majority of the groundwater sampling and will not require any decontamination between wells.

2.6 Monitoring and Data Collection Equipment

Field measurements collected during sampling will include water levels, pH, specific conductance, temperature, dissolved oxygen, and Oxidation-Reduction Potential (ORP). The monitoring and data collection equipment will be operated in accordance the manufacturer’s instructions.

2.7 Survey

The site survey activities will include locating the horizontal position and establishing elevations of the new monitoring wells. The horizontal data will be to the nearest 0.1-foot and referenced to the Pennsylvania State Plane Coordinate System, North American Datum (NAD) 1983. The vertical data will be to the nearest 0.01-foot and referenced to the North American Vertical Datum

(NAVD) 1988. The surveying activities will be conducted under the direction of a professional land surveyor licensed to practice surveying in the Commonwealth of Pennsylvania.

The remaining test boring and groundwater grab sample locations will be surveyed by OBG | Baker for horizontal position within the Pennsylvania State Plane Coordinate System, NAD 1983 using mapping-grade GPS equipment. The horizontal accuracy will be within approximately two feet.

2.8 Site Management

The responsibilities and reporting requirements of on-site personnel are discussed below.

2.8.1 Field Team Responsibilities

The investigation and sampling activities will be coordinated and conducted by a Field Geologist and an Environmental Specialist. The 'to-be-determined' field personnel will ensure that these activities are conducted in accordance with the Work Plan, HASP, and this SAP/QAP.

2.8.2 Reporting Requirements

The lead field personnel will report a summary of each day's field activities to the Project Manager in a Daily Activity Report (DAR), which will include, but not be limited to, the following information:

- Personnel on site
- Description of work performed
- Problems encountered, and solutions identified/employed
- Equipment on site
- Summary of travel expenses
- Summary of materials or purchases
- Subcontractor quantities
- Identified out-of-scope items/activities

The Project Manager will review the DAR and submit to the Department's Regional Project Officer. The lead field person will receive direction from the Project Manager regarding any changes in the scope of work. Any changes in scope will be discussed with and agreed upon with the Regional Project Officer.

3.0 QUALITY ASSURANCE/QUALITY CONTROL PROTOCOLS

This section presents the organization, objectives, functional activities, and specific QA/QC activities associated with the investigation activities.

3.1 Organization and Responsibility

The OBG | Baker project management organization is designed to provide a line of functional responsibility and authority supported by a management control structure and independent quality assurance review. This control structure provides for:

- Clearly identified lines of communication and coordination
- Project budget and schedule monitoring
- Key technical resources management
- Financial management and progress reporting
- Quality control

Key project personnel and their responsibilities are presented in Section 1.3.

3.2 Data Quality Objectives

DQOs are qualitative or quantitative statements developed by the users to specify the quality of data needed from a particular data collection activity to support specific uses. DQOs consider analytical method precision, accuracy, representativeness, completeness, and comparability as discussed below.

Precision

Precision is a measure of the amount of variability and bias inherent in a data set. Furthermore, precision describes the reproducibility of measurements of the same parameter for samples collected under similar conditions.

Field duplicate precision monitors the consistency with which environmental samples were obtained and analyzed. In general, field duplicate results for solid matrix and aqueous matrix samples are precise if the Relative Percent Difference (RPD) is less than or equal to 35 percent and 20 percent, respectively. Field precision will be assessed through collection and measurement of field duplicate samples at a rate of 1 duplicate per 10 analytical samples per matrix.

Laboratory precision QC samples will be analyzed with a minimum frequency of 5 percent (i.e., 1 QC sample per 20 environmental samples per matrix). Laboratory precision will be measured via comparison of RPD values and precision control limits specified in the analytical method or by the laboratory's QA/QC program. Laboratory limits at the time of analysis will be used to assess the data.

The RPD between the sample (or spike) and duplicate (or duplicate spike) will be calculated using the following formula:

$$RPD = \frac{\text{Amount in Sample 1} - \text{Amount in Sample 2}}{0.5(\text{Amount in Sample 1} + \text{Amount in Sample 2})} \times 100$$

Accuracy

Accuracy is the degree of agreement between an observed value and an accepted reference value. Accuracy in the field will be assessed using equipment Rinsate and field blanks and will be ensured through adherence to all sample handling, preservation, and holding time requirements.

Accuracy in the laboratory will be measured through the comparison of a spiked sample result with a known or calculated value and is expressed as a percent recovery (%R). Percent recoveries will be derived from the analysis of known amounts of compounds spiked into deionized water (i.e., Laboratory Control Sample [LCS] analysis) or into actual samples (i.e., surrogate or internal MS analysis). LCS analysis, which may also be referred to as blank spike analysis, measures the accuracy of laboratory operations. Surrogate and MS analyses measure the accuracy of laboratory operations as affected by sample matrix. LCS and MS analyses will be performed at a frequency of 1 per 20 associated samples of similar matrix. Surrogate spike analysis is performed for all organic chromatographic analyses. Laboratory accuracy will be assessed via comparison of calculated %R values with accuracy control limits specified in the analytical method or by the laboratory's QA/QC program. Laboratory recovery limits at the time of analysis will be used to assess the data.

The %R for a spiked sample will be calculated by using the following formula:

$$\%R = \frac{\text{Amount in Spiked Sample} - \text{Amount in Sample}}{\text{Known Amount Added}} \times 100$$

The %R for LCS and surrogate compound results will be determined according to the following equation:

$$\%R = \frac{\text{Experimental Concentration}}{\text{Known Amount Added}} \times 100$$

Completeness

Completeness is a measure of the amount of usable, valid, analytical data obtained, compared with the amount expected to be obtained. Completeness is typically expressed as a percentage.

The ideal objective for completeness is 100 percent (i.e., every sample planned to be collected is collected; every sample submitted for analysis yields valid data). However, samples can be rendered unusable during shipping or preparation (e.g., bottles broken or extracts accidentally destroyed), errors can be introduced during analysis (e.g., loss of instrument sensitivity, introduction of ambient laboratory contamination), or strong matrix effects can become apparent (e.g., extremely low MS recovery). These instances result in data that do not meet QC criteria. Completeness will be calculated for each chemical category (e.g., VOCs, SVOCs, metals, etc.) per media. If critical data points are lost, re-sampling and/or re-analysis may be required. For this project, the completeness goal is 95 percent or greater.

Following completion of the analytical testing, the percent completeness will be calculated using the following equation:

$$\text{Completeness} = \frac{\text{(Number of Valid Measurements)}}{\text{(Number of Measurements Planned)}} \times 100$$

Representativeness

Representativeness is an expression of the degree to which the data accurately and precisely depict the actual characteristics of a population or environmental condition existing at an individual sampling point. Use of standardized sampling, handling, analytical, and reporting procedures ensures that the final data accurately represent actual site conditions.

Representativeness in this sampling and analysis program will be ensured by following the Work Plan, SAP, and QAP and using proper sampling techniques. From the analytical end, representativeness will be ensured by using the proper analytical procedures, meeting sample holding times, and analyzing and assessing field duplicate samples.

Comparability

Comparability is defined as the confidence with which one data set can be compared with another (e.g., between sampling points; between sampling events). Comparability will be achieved by using standardized sampling and analysis methods and data reporting formats (including use of consistent units of measure). In addition, consideration will be given to seasonal conditions and other environmental variations that could exist to influence analytical results.

3.3 Sampling Procedures

Specific sampling procedures will be determined at the time of sample collection based on site-specific conditions. However, it is anticipated that the soil samples will be collected with the direct-push Macro-Core sampler and groundwater grab samples with wither a discrete groundwater sampler or a temporary well screen and peristaltic pump.

For the two groundwater well sampling events, samples will be collected from taps at wells with dedicated pumping systems and using a peristaltic pump as the default option from the monitoring wells (dedicated, disposable bailers as a backup). Detailed sampling procedures are presented above in Section 2.3.1 for soil sampling, Section 2.3.2 for groundwater grab sampling, and Section 2.3.4 for well sampling.

3.4 Sample Custody Procedures

Each sample will be given a unique designation, which will be recorded in the field logbook, on the chain-of-custody form, and the label affixed to the sample container(s). The samples will be stored on ice in coolers at approximately four degrees Celsius and submitted to a qualified laboratory for analysis. Chain-of-custody forms and the PFAS sampling checklist will be completed and enclosed in the shipping packages. In addition, chain-of-custody seals will be used on the coolers in accordance with the selected laboratory's requirements.

3.5 Analytical Procedures

General procedures for field analyses and laboratory analyses are provided below.

3.5.1 Field Analyses

Field instruments will be used to support the sampling activities presented herein. Any required instrumentation will be operated in accordance with the manufacturer's instructions.

3.5.2 Laboratory Analyses

The proposed laboratory analyses of groundwater will be exclusively for 26 PFAS constituents. Sample analyses will be conducted in accordance with standard U.S. Environmental Protection Agency (EPA) methods and procedures (537 IDA for PFAS analyses).

3.6 Data Reduction, Validation, and Reporting

Data reduction, validation, and reporting will ensure that documents produced as part of the sampling investigation can be accounted for upon project completion. Accountable documents include, but are not limited to, field logbooks, correspondence, chain-of-custody forms, data packages, and photographs. The Project Manager will be responsible for maintaining a project file in which all accountable documents will be inventoried. The project records will be retained for the period required by the Master Agreement.

3.6.1 Field Data Procedures

Field sampling activities will be documented in bound field logbooks in which information pertinent to sample collection will be entered in indelible ink. Appropriate information, as applicable, will be entered to reconstruct the sampling event including site name at the top of each page, names of field personnel and visitors on site, sample identification, brief descriptions of samples collected, date and time of collection, sampling methodology, sampling remarks and observations, field measurements, conditions and observations, description of activities, list of photographs taken, sketch of site conditions, and sampler's initials and date at the bottom of each page.

3.6.2 Laboratory Data Procedures

The following procedures summarize practices routinely used by laboratory staff for data reduction, validation, and reporting. Numerical analyses, including manual calculations, will be documented and subjected to QC review. Records of analyses must be legible and complete enough to permit reconstruction of the work by a qualified individual other than the originator.

Laboratory Data Validation

Laboratory data validation begins with the receipt of samples and documentation of proper sample custody. It continues with raw data reduction to the reporting of data.

Data processing will be checked by an individual other than the analyst who performed the data processing. The checker will review the data for the following:

- Use of proper equations
- Correctness of numerical input
- Correctness of computations
- Correct interpretation of raw data (e.g., chromatographs, strip charts, etc.)

Entries made in bench books, data sheets, computation sheets, etc. will be made in ink. No entry will be rendered unreadable, and changes will be lined-through and initialed by the person making the correction.

Analytical Data Package Requirements

For each analytical method run, the laboratory will report all required analytes for each sample as a detected concentration or as not detected at the specific limits of quantitation. In addition, applicable method detection limits and instrument detection limits will be required for every analysis. Each analytical method run will be clearly identified as belonging to a specific analytical batch. Samples must be reported with dates of collection, preparation, and analysis. The laboratory also will report dilution factors for each sample.

3.7 Preventative Action Procedures

General preventative action procedures for field instruments and laboratory instruments are provided below.

3.7.1 Field Instruments

Specific preventive maintenance procedures recommended by the manufacturer will be followed for field instruments. The instruments will be checked and calibrated before use. In addition, the calibration will be checked anytime there is a questionable response from the instrument. Calibration will be documented in the field logbooks or on appropriate forms.

3.7.2 Laboratory Instruments

A routine preventive maintenance program will be implemented by the laboratory to minimize the occurrence of instrument failure and other system malfunctions. Section supervisors and/or analysts (organic, inorganic) will perform routine scheduled maintenance and coordinate with the vendor for the repair of instruments. Laboratory instruments will be maintained in accordance with the manufacturer's specifications and the requirements of the specific method employed. This maintenance will be carried out on a regular, scheduled basis and documented in the laboratory instrument service logbook for each instrument. Emergency repair or scheduled manufacturer’s maintenance will be provided under a repair and maintenance contract with factory representatives.

3.8 Corrective Action Procedures

A corrective action protocol that is both technically effective and administratively compatible to ensure accurate and timely correction of non-conformance is imperative.

3.8.1 Field Procedures

The lead field person is responsible for coordination and implementation of the sampling activities and may be required to adjust the field program to accommodate site-specific needs. If it becomes necessary to modify the program, the lead field person will consult the Project Manager and the Department’s Regional Project Officer regarding an appropriate corrective action. Agreed upon corrective actions for the program will be documented in the field logbook.

3.8.2 Laboratory Procedures

Non-conformance is any event which is beyond the limits established for laboratory performance such as data which fall outside accepted bounds for accuracy and precision due to improper equipment calibration/maintenance or improper data verification. Any activity in the laboratory which affects data quality can result in a non-conformance.

Non-conformance associated with the statistical analysis and review of data are straightforward to identify. The Laboratory QA Coordinator will be responsible for the assessment of QC sample information. The Project Manager and the Department’s Regional Project Officer will be notified of any non-conformances.

Corrective actions will be designed to correct the associated problems and to minimize the possibility of their recurrence. Examples of corrective actions include modifying non-conforming procedures; tagging, repairing, or replacing deficient equipment; training or replacing unqualified personnel; re-analyzing affected samples; marking rejected data; and re-issuing affected reports.

3.9 Quality Assurance Reports

The Project Manager will be responsible for assessing the performance of measurement systems and data quality. The Project Manager will keep in contact with the Department's Regional Project Officer through informal verbal reports (or other appropriate means) during the project as well as through routine progress reports.

ATTACHMENT B

PFAS Sampling Checklist and Considerations

PFAS Sampling Checklist

Date: ______________________

Weather (*temp./precipitation*): _______________________ Site Name: ________________________________

Field Clothing and PPE:

- ☐ No clothing or boots containing Gore-Tex™
- ☐ All safety boots made from polyurethane and PVC
- ☐ No materials containing Tyvek®
- ☐ Field crew has not used fabric softener on clothing
- ☐ Field crew has not used cosmetics, moisturizers, hand cream, or other related products this morning
- ☐ Field crew has not applied unauthorized sunscreen or insect repellant

Field Equipment:

- ☐ No Teflon® or LDPE containing materials on-site
- ☐ All sample materials made from stainless steel, HDPE, acetate, silicon, or polypropylene
- ☐ No waterproof field books on-site
- ☐ No plastic clipboards, binders, or spiral hard cover notebooks on-site
- ☐ Coolers filled with regular ice only. No chemical (blue) ice packs in possession

Sample Containers:

- ☐ All sample containers made of HDPE or polypropylene
- ☐ Caps are unlined and made of HDPE or polypropylene

Wet Weather (as applicable):

- ☐ Wet weather gear made of polyurethane and PVC only

Equipment Decontamination:

- ☐ "PFC-free" water on-site for decontamination of sample equipment. No other water sources to be used.
- ☐ Alconox and Liquinox to be used as decontamination materials

Food Considerations:

- ☐ No food or drink on-site with exception of bottled water and/or hydration drinks (i.e., Gatorade and Powerade) that is available for consumption only in the staging area

If any applicable boxes cannot be checked, the Field Lead shall describe the noncompliance issues below and work with field personnel to address noncompliance issues prior to commencement of that day's work. Corrective action shall include removal of noncompliance items from the site or removal of worker offsite until in compliance.

Describe the noncompliance issues (include personnel not in compliance) and action/outcome of noncompliance:

____

____

____

Field Lead Name: ________________________________

Field Lead Signature: _______________________________ Time: _____________________

PFAS Sampling – Prohibited and Acceptable Items

Prohibited	Acceptable
Field Equipment	
Teflon® containing materials	High-density polyethylene (HDPE) materials
Low density polyethylene (LDPE) materials	Acetate Liners
	Silicon Tubing
Waterproof field books	Loose paper (non-waterproof)
Plastic clipboards, binders, or spiral hard cover notebooks	Aluminum field clipboards or with Masonite
Chemical (blue) ice packs	Regular ice
Field Clothing and PPE	
New cotton clothing or synthetic water resistant, waterproof, or stain-treated clothing, clothing containing Gore-Tex™	Well-laundered clothing made of natural fibers (preferable cotton)
Clothing laundered using fabric softener	No fabric softener
Boots containing Gore-Tex™	Boots made with polyurethane and PVC
Tyvek®	Cotton clothing
No cosmetics, moisturizers, hand cream, or other related products as part of personal cleaning/showering routine on the morning of sampling	**Sunscreens** - Alba Organics Natural Sunscreen, Yes To Cucumbers, Aubrey Organics, Jason Natural Sun Block, Kiss my face, Baby sunscreens that are "free" or "natural" **Insect Repellents** - Jason Natural Quit Bugging Me, Repel Lemon Eucalyptus Insect repellant, Herbal Armor, California Baby Natural Bug Spray, BabyGanics **Sunscreen and insect repellant -** Avon Skin So Soft Bug Guard Plus – SPF 30 Lotion
Sample Containers	
LDPE or glass containers	HDPE or polypropylene
Teflon-lined caps	Unlined polypropylene caps
Rain Events	
Waterproof or resistant rain gear	Gazebo tent that is only touched or moved prior to and following sampling activities
Equipment Decontamination	
Decon 90®	Alconox® and/or Liquinox®
Water from an on-site well	Potable water from municipal drinking water supply
Food Considerations	
All food and drink, with exceptions noted on right	Bottled water and hydration fluids (i.e, Gatorade® and Powerade®) to be brought and consumed only in the staging areas

Any potable water used on site must first be analyzed to be deemed PFAS-free before use