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Task Order No.: 68HE0221F0065

Remedial Acquisition Framework: Design and Engineering Services

Final Technical Approach Plan

Newtown Creek Site, Operable Unit 1, Supplemental Characterization of Shallow Groundwater Discharge

Brooklyn and Queens, New York

April 1, 2022

CDM Smith

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Acronyms

AOC	Administrative Order on Consent
CDM Smith	CDM Federal Programs Corporation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CLP	Contract Laboratory Program
CM	creek mile
COC	contaminant of concern
CSM	conceptual site model
DES	Design and Engineering Services
DMP	Data Management Plan
DO	dissolved oxygen
EDD	electronic data deliverable
EPA	Environmental Protection Agency
FS	feasibility study
IDW	investigation-derived waste
HASP	Health and Safety Plan
HPFM	heat pulse flow meter
LSASD	Laboratory Services and Applied Sciences Division
NAPL	non-aqueous phase liquid
NCG	Newtown Creek Group
NPL	National Priorities List
NYCDEP	New York City Department of Environmental Protection
NYSDEC	New York State Department of Environmental Conservation
NOAA	National Oceanic and Atmospheric Administration
ORP	oxidation-reduction potential
OU	operable unit
PCB	polychlorinated biphenyl
PPE	personal protective equipment
PM	project manager
QA	quality assurance
QAPP	Quality Assurance Project Plan
QC	quality control
QMP	Quality Management Plan
RCRA	Resource Conservation and Recovery Act
RI	remedial investigation
RSCC	regional sample control coordinator
SMIA	Significant Maritime and Industrial Area
TCLP	toxicity characteristic leaching procedure
TO	task order
TSCA	Toxic Substances Control Act
UFP	Uniform Federal Policy
WMP	Waste Management Plan

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Section 1

Introduction

CDM Federal Programs Corporation (CDM Smith) received Task Order (TO) 68HE0221F0065 under the Design and Engineering Services (DES) Contract (Contract No. 68HE0318D0003) to perform supplemental investigation to characterize shallow lateral groundwater discharge to the Newtown Creek Superfund Site (the site) located in Brooklyn and Queens, New York. This technical approach comprises CDM Smith's plan for completing the investigation. CDM Smith developed the technical approach per the scope of work (SOW) provided in the request for proposal issued by EPA on June 1, 2021, and the requirements of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) (as amended), U.S. Environmental Protection Agency (EPA) Guidance for Conducting Remedial Investigations and Feasibility Studies (under CERCLA) (EPA 1988), and other applicable federal, state, and local requirements.

All work performed under this task order will be compliant with the DES contract Quality Management Plan (QMP) (CDM Smith 2019). The DES Region 2 quality assurance officer will maintain quality assurance (QA) oversight for the task order duration. The CDM Smith project manager (PM) is responsible for implementing quality control (QC) measures for all activities outlined in this document.

1.1 Site Description and History

The Newtown Creek Superfund Site is located in Kings County and Queens County, New York City, New York. The creek is a 3.8-mile-long tidally influenced tributary to the Lower East River and forms a partial border between the boroughs of Queens and Brooklyn. The overall study area includes Newtown Creek and its five tributaries, including Whale Creek, Dutch Kills, East Branch, English Kills, and Maspeth Creek. Figure 1-1 shows the location and extent of the study area. The site is within the Newtown Creek Significant Maritime and Industrial Area (SMIA)—one of six designated SMIAs in NYC. The Newtown Creek SMIA, encompassing more than 780 acres, is the largest SMIA in NYC and includes portions of the Greenpoint, Williamsburg, Long Island City, and Maspeth industrial areas.

Historically, Newtown Creek drained the uplands of western Long Island and flowed through wetlands and marshes. However, because of heavy industrial development and governmental activities dating from the 1800s, formerly wet areas are now filled. Newtown Creek has since been channelized, and its banks are now stabilized with bulkheads and riprap. Various contaminated sites along the creek have contributed to the contamination at Newtown Creek. In the mid-1800s, the area adjacent to the creek was one of the busiest industrial areas in New York City. Industrial facilities were located along its banks, including more than 50 oil refineries, petrochemical plants, fertilizer and glue factories, sawmills, and lumber and coal yards. Newtown Creek was crowded with commercial vessels, including large ships that imported raw materials and fuel and exported oil, chemicals, and metals. These heavy industrial development and governmental activities subsequently led to industrial pollution. Compounding the issue, in 1856 the city began dumping raw sewage directly into the water. During World War II, this creek was one of the busiest ports in the nation. The historic development changed the nature of Newtown Creek from a natural drainage condition to one that is governed largely by engineered and institutional systems. Today, factories and facilities still operate along its banks.

The site was added to the EPA National Priorities List (NPL) in 2010. In July 2011, a Consent Order was issued by EPA for the performance of a Remedial Investigation (RI) and Feasibility Study (FS) for a group of parties potentially responsible for the investigation and cleanup of the site (to be conducted under EPA oversight). Initially, the site was addressed as one operable unit (OU); in 2018, a second OU was added. The current structure is as follows:

- **OU1** includes the entire study area, as defined in the 2011 Administrative Order on Consent (AOC) between EPA, the New York City Department of Environmental Protection (NYCDEP), and the five Newtown Creek Group (NCG) respondents. A full RI/FS for OU1 is ongoing under EPA oversight with the NCG respondents responsible for collection of data and preparation of reports.

- **OU2** relates to current and reasonably anticipated future releases of CERCLA hazardous substances from combined sewer overflow discharges to the study area, as described in a 2018 AOC between EPA and NYCDEP.

1.2 Report Organization

This technical approach comprises the following seven sections:

- **Section 1 – Introduction** provides a description of the site and a summary of the site history.

- **Section 2 – Technical Approach** provides the objective and purpose of the work to be conducted and the guiding concepts used in developing the technical approach for the investigation activities.

- **Section 3 – Development of Governing Documents** provides an overview of the planning documents that will be developed and used to govern the work to be performed.

- **Section 4 – Data Collection** describes the field data collection efforts that will be performed, including determination of monitoring well locations, installation of the monitoring well network, hydraulic characterization, and water quality characterization.

- **Section 5 – Approach to Data Reporting** presents the work to be performed in managing and reporting the data, including laboratory coordination, data validation, and the data usability assessment and evaluation to be presented in the data summary report.

- **Section 6 – Schedule** presents the project schedule.

- **Section 7 – References** provides a list of references used in the preparation of this report.

Section 2

Technical Approach

2.1 Objective and Purpose

The RI/FS for OU1 of the Newtown Creek site has been ongoing since 2011. As the OU1 RI/FS progressed and the understanding of the conceptual site model (CSM) improved, it was determined that there is a need for additional characterization of shallow lateral groundwater discharge to the Newtown Creek study area.

EPA requires a field investigation focused on improving the understanding and better quantification of the shallow lateral groundwater discharge to the study area. The supplemental data from the field investigation will be used to:

- Improve characterization of shallow lateral groundwater contaminant loading to the study area, including discharge of contaminants of concern (COCs).
- Improve the CSM for shallow lateral groundwater flow and contaminant discharge to the study area.
- Provide critical information regarding the shallow lateral groundwater flow characterization to support decisions for the FS.

In order to assist in development of the technical approach, a Draft Technical Approach Plan was submitted to the NCG, NYCDEP and State and Federal Partners for review on December 9, 2021. In addition, two technical work groups were conducted as virtual meetings and held on February 3 and February 9, 2022. Participants included members from EPA, CDM Smith, NCG, Anchor QEA, NYCDEP, New York State (NYS) Department of Environmental Conservation, National Oceanic and Atmospheric Administration, and various contractors representing members of NCG and NYCDEP. The outcomes of those meetings are reflected in the approach described herein.

2.2 Conceptual Site Model and Guiding Concepts

The overall CSM for the study area (including groundwater) was developed and presented in the most recent version of the OU1 RI Report (Anchor QEA, LLC 2021). The CSM notes, "Groundwater is a potential ongoing source of contaminants to the Study Area. Groundwater discharge to the Study Area occurs at the base of the Study Area and through vertical permeable shorelines to the surface water (i.e., lateral discharge). Groundwater discharge to the base of the Study Area may provide chemical loads to subsurface sediment via transport into the interstitial spaces (as porewater) and sorption onto the solid matrix."

Following review of the RI and subsequent studies, EPA identified the lack of data characterizing shallow lateral groundwater flow and COC loading into the study area as an important data gap in the CSM as it represents a potential ongoing source of contamination to the study area.

This data gap was identified due to increased estimates of overall groundwater discharge to the study area, acknowledgement of the importance of shallow lateral groundwater flow as a percentage of total groundwater flow to the study area through cross-sectional analysis, and multiple lines of evidence indicating the uncertainty associated with the source of freshwater to the Study Area. In addition, EPA believes that the RI efforts to date have adequately characterized the GW discharging upwards into the study area sediments, but not the shallow groundwater discharging laterally into the study area.

Since there has not been direct sampling and analysis of shallow groundwater or collection of shallow groundwater levels and flow data along the edge of the study area, these data were identified as information data gaps in the RI. These data gaps drive the need to perform additional groundwater studies below upland sites. Data generated will be used in updating the existing CSM for use in the FS, which will address the potential ongoing source of contamination to the Study Area.

The following concepts were used to guide the development of the technical approach included within this document:

- RI/FS modeling will not be delayed by this supplemental data collection and analysis effort; therefore, such modeling will proceed according to the schedule agreed to by EPA and the NCG.

- If viable existing data (e.g., tidal information, presence of remedial systems, monitoring well construction) is found, it will be used to the extent feasible and as limited by the age of the data and other factors that could limit usefulness and acceptability. The extent and availability of existing data is unknown but is likely limited, thereby emphasizing the need for supplemental data collection.

- Investigation locations will be determined by an unbiased approach. To the extent practicable, the locations will be equally spaced, representative of shoreline conditions throughout the study area, and focus on areas where access is available to stay within the overall project schedule.

- Locations may be included that are fully within the expected extent of an existing groundwater remediation system control—regardless of possible location adjustment—so that the hydraulic control can be confirmed by shoreline monitoring.

- The investigation will focus on shallow lateral groundwater discharge; however, additional information that can be gathered opportunistically during the various work elements will be collected to provide supplemental data for other aspects of the Newtown Creek efforts. For example, this may include observations and samples of non-aqueous phase liquid (NAPL) in upland wells or at seep observations points and hydraulic heads from various intervals.

- Investigation will be developed to provide multiple rounds of sampling to assess potential seasonal variations within the groundwater discharge.

Section 3

Development of Governing Documents

Planning documents will be developed to govern investigation activities, sample collection, sample analysis, data management, and investigation-derived waste (IDW) handling and disposal. These documents include the Quality Assurance Project Plan (QAPP), Health and Safety Plan (HASP), Data Management Plan (DMP), and the Waste Management Plan (WMP).

3.1 Quality Assurance Project Plan

The Uniform Federal Policy (UFP)-QAPP will describe, in comprehensive detail, the necessary QA, QC, and technical activities that must be implemented to confirm that the results of the work performed will satisfy the stated performance criteria. The UFP-QAPP will integrate technical and QC aspects of the project throughout its life cycle, including planning, implementation, assessment, and corrective actions. The UFP-QAPP will be prepared per EPA-505-B-04-900A/B/C, *Uniform Federal Policy for Quality Assurance Project Plans* (Version 1, March 2005) and the *Optimized UFP-QAPP Worksheets* (issued May 2012). Planning will be conducted and documented in the UFP-QAPP in accordance with EPA-240-B-06-001 EPA QA/G4, *Guidance on Systematic Planning Using the Data Quality Objectives Process* (issued February 2006). CDM Smith will submit a draft UFP-QAPP for EPA review and comment. A final UFP-QAPP will be prepared to address EPA's comments on the draft submittal.

3.2 Health and Safety Plan

The HASP specifies employee training, protective equipment, medical surveillance requirements, standard operating procedures, and a contingency plan. The HASP will cover the required elements in 29 CFR 1910.120(l)(1) and 29 CFR 1910.120(l)(2). CDM Smith will submit the HASP to EPA. Additionally, CDM Smith will develop a short site reconnaissance HASP to perform the initial site visit.

3.3 Data Management Plan

The DMP will detail the standard processes, procedures, and tools that CDM Smith will use to support response activities, including requirements for EPA data deliverables. The DMP will be developed using EPA's and CDM Smith guidance, CDM Smith's Region 2 DMP template, or region-specific data management plans. Guidance documents include EPA's *Policy to Assure the Competency of Organizations Generating Environmental Measurement Data Under Agency-Funded Assistance Agreements* (EPA 2013) and CDM Smith's Quality Procedure QP 2.11, Environmental Data Management in the Quality Management Plan (CDM Smith 2019). CDM Smith will submit a draft DMP for EPA review. A final DMP will address EPA's comments on the draft submittal.

3.4 Waste Management Plan

The WMP will consist of procedures outlining the safe handling of contaminated drummed materials and containerized liquids; off-site transportation and disposal of materials; and documentation for manifesting, Department of Transportation shipping papers, and chain-of-custody. CDM Smith will submit a draft WMP for EPA review. The final WMP will address EPA's comments on the draft submittal.

Section 4

Data Collection

The field data collection efforts described in this section (and subsequent analysis and reporting) have two objectives — (1) improving the understanding of, and (2) enhancing the quantification of shallow lateral groundwater discharge into the study area. Data collection efforts will follow the general process illustrated below:

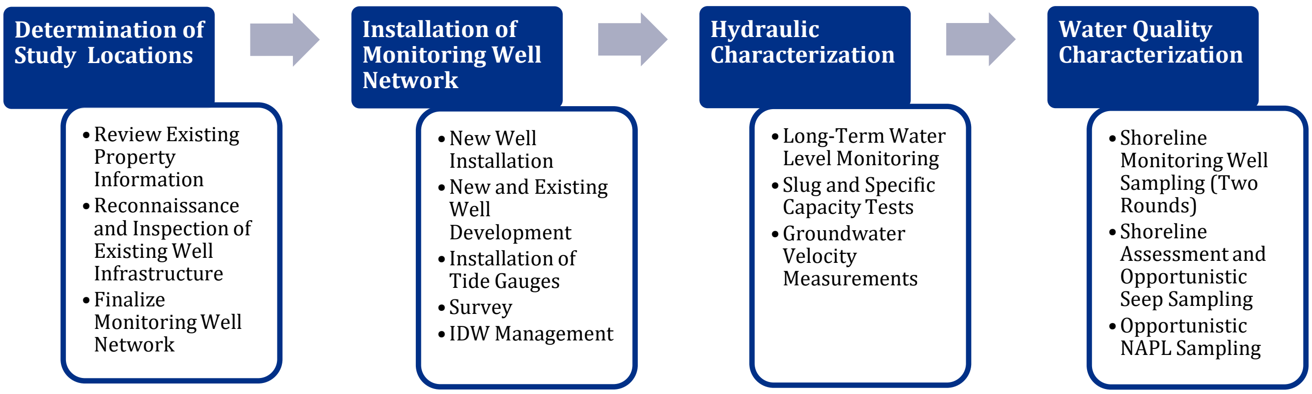

Table 4-1 summarizes the planned field activities, including a description of the activities, the associated data usability objectives, and the total environmental samples.

4.1 Determination of Study Locations

The first step in the data collection efforts is to select study locations within various portions of the study area to adequately define representative lateral groundwater flow conditions. A study location is defined as an area where monitoring well pairs or well clusters may be installed; therefore, each study location will have more than one monitoring well. An iterative approach was taken to this process and is currently underway. The initial selection of potential study locations was based on a systematic, unbiased sampling design. Defined spacing balances an adequate representation of conditions with a reasonable number of study locations. Thus, the target spatial density is defined as:

- One study location per each 0.4 mile of main stem shoreline from creek mile (CM) 0 to CM 2.8 (the confluence of East Branch and English Kills)
- At least one study location on each side of each tributary, located halfway along tributaries less than 0.8 mile long (all tributaries except English Kills) and at locations 0.4 mile apart for English Kills
- One study location near the upstream extent of each tributary

This target spatial density calculated 32 initial shoreline study locations—7 on each side of the main stem (total of 14 main stem locations); 3 each for Whale Creek, Dutch Kills, and Maspeth Creek (total of 9); 4 for East Branch; and 5 for English Kills.

If factors were present that made it highly difficult or impossible to conduct the necessary field efforts, then the location of each study location was adjusted. Adjustments were typically less than ±0.1 mile along the main stem and in English Kills, and less than one quarter of the length of the other tributaries. When determining site/property access, emphasis was placed on conducting field work where access has already been granted and/or where access is believed to be achievable within the proposed schedule.

Once the 32 initial study locations were identified, a desktop review was performed of existing mapping and publicly available aerial photography for each selected property. The physical characteristics (buildings or other physical barriers, open space for wells) and the shoreline type was reviewed.

The shoreline type is particularly important, as different shoreline structures significantly impact the ability and mechanics of groundwater to discharge into Newtown Creek. To ensure the representativeness of the study locations, an initial review of the various shoreline structures was performed. The structures were categorized as follows:

- **Permeable** – Riprap, Bare Ground, Pile-Supported Concrete, Precast Concrete Blocks, Vertical Wood Bulkheads (approximately 17 study locations)
- **Shallow Barrier** – Vertical Concrete, Vertical Concrete with Wood Bulkhead, Shallow Remediation Barrier/Grout Curtain (approximately 5 study locations)
- **Deep Barrier** – Steel Sheet Pile Bulkhead (approximately 10 study locations)

Monitoring Infrastructure

A minimum of two shallow monitoring wells are necessary for each study location— (1) a shoreline monitoring well location as close to the shoreline edge as possible, and (2) a paired inland shallow monitoring well location for characterizing representative inland shallow groundwater levels and hydraulic characteristics. *Inland* is defined as 50 to 100 feet upland (perpendicular to the shoreline) of the shoreline monitoring well location.

A deeper monitoring well will be installed at 20–30% of the shoreline monitoring well locations to characterize vertical gradients in various areas of the site and help quantify flow in areas with shallow or deep barriers. A distribution of study locations will be selected for installing deep monitoring wells based on a review of existing well infrastructure, review of shoreline types, review of existing cross sections and plan views and informed by spatial density along the creek.

New and existing monitoring wells will be included in the program. There are numerous existing monitoring wells upland of the Newtown Creek Study area as many of the properties have been part of environmental studies in the past. Existing monitoring wells, including those used for the Newtown Creek RI efforts, that are serviceable and reliable will be used to limit the installation of new wells.

The process (subsequently described) for ensuring serviceability and reliability of existing monitoring wells will include review of existing property and well construction information as well as reconnaissance and inspection of existing well infrastructure.

4.1.1 Review of Existing Property Information

Following the selection of potential study locations, CDM Smith and EPA began the process of identifying property owners, requesting information, and reviewing existing data and maps from the upland properties. It must be determined if existing wells are usable and applicable to the goals of the investigation. This is an iterative process—some identified locations will be deemed unusable and alternative locations will be added.

4.1.2 Reconnaissance and Inspection of Existing Well Infrastructure

Following review of property information, EPA began visiting each study location to inspect existing monitoring wells and/or determine locations for proposed new monitoring wells. Existing monitoring wells will be located and inspected for serviceability, reliability, and appropriateness for use in this study. This will include visual inspection of the surface completion, measurements of water levels, depth to bottom, indication of sedimentation in well, and evidence of visual contamination (e.g., NAPL).

4.1.3 Finalize Planned Monitoring Well Network

The monitoring well network (as initially planned) will be established following review of existing data and reconnaissance of the existing wells. This will include both usable existing and newly installed monitoring wells. The network will be modified if the existing wells are deemed unusable. **Table 4-2** summarizes the current status of the proposed monitoring well network. **Figures 4-1a through 4-1c** present the currently proposed study locations which will make up the monitoring well network. These are living documents that will be modified throughout this iterative process and finalized in the project QAPP.

4.2 Installation of Monitoring Well Network

Once the monitoring well network has been finalized, installation of the new monitoring wells and development of the existing monitoring wells will commence. The subsections below briefly describe the process for installing the monitoring well network. Detailed information on the methodologies to perform these activities will be included in the QAPP.

4.2.1 Well Installation

Prior to installation of the monitoring wells, CDM Smith and the drilling subcontractor will ensure all proposed drilling locations are marked, are accessible by the subcontractor's equipment, and are free from overhead utility lines. The subcontractor will contact the appropriate local utility or "one-call" service to locate subsurface utility lines in the vicinity of proposed borehole locations. In addition to the "one-call" service, the drilling subcontractor will contact a representative from the utility company to verify the locations of any pipes and electrical lines that may be present beneath the site. CDM Smith will contact the property owner to obtain additional utility information. Utilities will be marked in the field and locations will be documented via photographs and field notes. If the utility locating service indicates the proposed drilling location must be moved, then CDM Smith will move the location in consultation with EPA.

Monitoring wells will be installed via hollow-stem auger methods with 4.25-inch inner-diameter augers. Continuous split spoons will be collected, screened via photoionization detector (PID), and logged for lithology by the on-site geologist. Soil borings will be advanced at each monitoring well location to the depth of the proposed well and until upper glacial aquifer soils are encountered to provide a thorough understanding of the vertical stratigraphic profile. Representative geotechnical samples (to be analyzed for grain size) will be collected from each hydrogeologic unit encountered and Shelby tube samples for flexible wall vertical permeameter testing will be collected from fine grained soils to provide information on vertical hydraulic conductivity (**Table 4-3**). At study locations with planned deep well installations these samples may be biased to evaluate the hydraulic conductivity of the zone between the shallow and deep well screens.

Monitoring wells will be installed as 2-inch Schedule 40 polyvinyl chloride (PVC) well casings fitted with machine-slotted, flush-threaded, Schedule 40 PVC screen. If possible, pre-packed well screens will be installed to standardize monitoring well installations. Two slot sizes will be employed to account for the potential fine and coarse grained lithologies likely to be encountered; “10 slot” (0.10”) for fine grained deposits and “20 slot” (0.20”) for coarse grained material. Lithologic conditions observed in the field will be used to indicate which screen size to install.

The screened intervals of the monitoring wells will account for tidal fluctuations. Wells will be completed with heavy-duty, 6-inch-diameter, flush-mount curb boxes or 4-foot stickup well completions and fitted with lockable compression plugs. Drilling methods may be revised as determined by subsurface conditions.

Shallow monitoring wells will be installed at shoreline and inland locations where no existing monitoring wells meet the criteria for inclusion in the program. To provide consistency between installations, facilitate adequate well development, and ensure representative hydraulic testing (slug and specific capacity tests), shallow wells will ideally be installed with 10-foot screen lengths set approximately 3 feet below the observed local low groundwater level. If the saturated thickness above a low permeability layer (confining or semi-confining unit) is less than 10 feet, a shorter screen will be used.

Deep monitoring wells will be installed following review of the lithologic profile and will generally be designed as 10-foot screens targeting a zone not less than 5-ft below the paired shallow well and should not extend more than 15-feet below an adjacent barrier wall or profile of the adjacent shoreline.

Table 4-2 indicates the current number of newly installed shallow monitoring wells and deep monitoring wells.

NAPL

If NAPL is encountered during boring advancement, the shallow well screen will be set to straddle the water table with the screen interval extending approximately 3 feet above the water table. Soil samples collected during soil boring advancement will be evaluated for the presence of NAPL. Jar shake tests will be performed consistent with the protocols prepared for the Remedial Investigation sampling. If the saturated thickness of the shallow unit is greater than 7 feet a longer well screen will be installed to construct the saturated portion of the well consistent with other wells that do not have observed NAPL.

4.2.2 Well Development and Redevelopment

Newly installed monitoring wells will be developed following installation and existing monitoring wells will be redeveloped for use as part of the monitoring network. Cement-bentonite grout (used in newly installed wells) will be allowed to set for a minimum of 48 hours before well development proceeds. Monitoring well development will remove sand, silt, and water (used during drilling from the well) and "set" the sand pack to provide a good hydraulic connection between the well and the aquifer materials. During the well development process turbidity, pH, temperature, conductivity, salinity, oxidation-reduction potential (ORP), and dissolved oxygen (DO) will be monitored; and specific capacity will be calculated at set intervals at consistent discharge rates to assist in determining of a monitoring well has been adequately developed.

Development will continue to the extent practicable until 1) a turbidity of 50 Nephelometric Turbidity units is achieved or until all parameters have stabilized (within 10 percent for measurements on successive casing volumes); 2) monitored specific capacity has stabilized within 20 percent or as approved by the on-site geologist or engineer.

4.2.3 Tide Gauges

Two new tide gauges will be installed within the creek in an area that is accessible and safe from damage. The locations will be determined based on access constraints, but the preferred place will be on two portions of the main stem. The tide gauges will also be fitted with a PVC stilling well to allow long-term transducer deployment.

4.2.4 Survey

The elevations and locations of the new monitoring wells, tide gauges, and existing monitoring wells used in the study will be surveyed. The surveyor will mark the new locations at the high point of the inner casing. The survey data are needed for calculating water level elevations, which are essential for defining and estimating shallow groundwater flow directions and rates.

4.2.5 Investigation-Derived Waste Management

All IDW will be properly containerized, characterized, and disposed of at an off-site EPA-approved waste disposal facility. The IDW that will be generated during the investigation field activities will consist of soil, drill water, well development water, well purge water, decontamination water, disposable personal protective equipment (PPE), and general municipal refuse. Used PPE and general refuse will be collected in garbage bags and disposed of as solid municipal waste. Containers will be labeled with the site name, monitoring well number, description of contents, and date of collection.

Waste samples will be collected to determine proper disposal methods, which will depend upon the requirements specified by the contracted IDW disposal firm. At a minimum, a representative sample will be sent to the laboratory for three reasons: to be assessed for total polychlorinated biphenyls (PCBs), to perform a toxic characteristic leaching procedure (TCLP), and to conduct any additional analyses required by the disposal facility(ies). Soil IDW with PCB concentrations exceeding the Toxic Substances Control Act (TSCA) permissible PCB concentration (i.e., 50 parts per million) will be sent to an approved TSCA or Resource Conservation and Recovery Act (RCRA) Subtitle C landfill for disposal. Nonhazardous soils will be sent to an RCRA Subtitle D landfill for disposal. It is anticipated that most soil IDW will be disposed at the local municipal landfill. Water IDW will be disposed of in accordance with requirements of TSCA and the local publicly owned treatment works. CDM Smith will coordinate disposal requirements with the appropriate disposal facilities. All off-site disposal facilities will be cleared under EPA's Off-Site Rule (OSR) (40 CF 300.440), which requires an OSR form for EPA's review.

4.3 Hydraulic Characterization

Following installation of the monitoring well network, data collection efforts will be initiated to better characterize the hydraulic properties of the shallow fill materials within the network. The locations of the various efforts are not identified at this time, as the approach will be tailored to the final monitoring network. The locations and detailed information on the methodologies to perform these activities will be included in the QAPP.

4.3.1 Continuous Water Level Monitoring

Continuous water level monitoring will be performed to analyze and estimate shallow groundwater flow directions and gradients, the effects of tidal variations, seasonal changes, and impacts of remediation systems.

Continuous read transducers will be installed in each monitoring well and tidal gauge (in a stilling well) and time synchronous water levels will be recorded for 12 months on a five-minute frequency. The continuous surface water level readings will be coincident with the continuous groundwater level measurements.

Periodic synoptic water level measurements will be used to check that the transducers are functioning properly and download and backup the data. Water level measurements will be collected from each monitoring well using an electronic water level indicator from a depth indicated by the surveyor's mark on the inner casing. Water level gauging will be performed with an oil-water interface probe to evaluate the presence and thickness of NAPL that accumulates in the well. The data from pressure transducers in monitoring wells with a measurable thickness of NAPL will be provided in the Data Summary Report (DSR) but not corrected to equivalent fresh groundwater levels. That correction will be made as part of the data evaluation process.

In addition to water levels, the transducers will monitor temperature, conductivity, and salinity. These factors will aid in ascertaining tidal impacts and characterizing the vertical variation in salinity at the freshwater/saltwater interface throughout the upper and lower stretches of the creek.

Additionally, a BaroTROLL data logger will be deployed to collect barometric data. Precipitation and temperature data will be obtained using a local meteorologic station.

4.3.2 Slug Tests and Transmissivity Testing

Following the initial well installation and development phase slug tests will be performed at every monitoring well included in the monitoring network. This includes the shoreline, inland, and deeper (paired) monitoring wells. Slug tests will not be performed on wells with measurable

NAPL. The slug test data will be used for initial bulk estimates of horizontal hydraulic conductivity. Slug testing will be performed according to the guidelines in *The Design, Performance, and Analysis of Slug Tests* 2nd edition (Butler 2019), which includes elements such as testing each well with multiple initial displacements, evaluating normalized recovery curves prior, and performing the analysis based on aquifer and well type. Slug tests will be conducted using a standard mechanical slug testing kit (Midwest Geosciences Ho Slugs or similar) to perform up to three falling and three rising head tests. Test data will be analyzed by the Kansas Geological Survey model.

In addition to the slug testing, short-term specific-capacity tests will be conducted in all shallow and deep shoreline wells. Short-term specific-capacity tests will include pumping at a constant sustained rate that is sufficient to stress the well and allow for drawdown to stabilize. The testing at each well will be conducted following well development and will be limited to 2 hours in length. Continuous water level elevations and responses will be recorded pre-, post- and across the duration and recovery of the specific capacity tests.

The specific-capacity tests will improve the basis for estimating horizontal hydraulic conductivity because these tests create a greater amount of hydraulic stress than slug tests.

4.3.3 Groundwater Velocity Measurements

CDM Smith will conduct downhole groundwater velocity measurements at select monitoring wells included in the monitoring network. This includes the shoreline, inland, and deeper (paired) monitoring wells. CDM Smith will utilize a combination of heat-pulse flowmeters (HPFMs) and passive flux meters to conduct these measurements. The groundwater velocity data will be used as complementary information to the other groundwater hydraulic data and related analyses previously described.

Heat-Pulse Flowmeters

Heat Pulse Flow Meter (HPFM) monitoring will be performed to provide empirical data to quantify groundwater rates and direction. Calculated flow velocities and seepage rates rely on assumptions for hydraulic conductivity and effective porosity; because these properties are challenging to accurately quantify, large ranges are applied during analyses. Empirical measurements will provide useful data for narrowing the estimated ranges of parameter values and for comparing to calculated estimates of groundwater flow rates and velocities. Velocity measurements will be performed at inland and shoreline locations to provide empirical data to evaluate groundwater flow toward the shoreline and enable comparisons with flow and velocity measurements close to the shore, where they are more likely to be influenced by tidal forces.

Velocity measurements will be performed at all wells at Study Locations where there are paired shallow/deep shoreline and inland monitoring well sets. In addition, HPFM measurements at shoreline shallow wells from other Study Locations will be considered following review of the final monitoring well network and shoreline structures encountered.

HPFM monitoring will include measurements from several tidal periods at each well and longer term HPFM monitoring will be performed over entire tidal cycles at the shallow shoreline locations selected that are impacted by tidal changes. The continuous water level monitoring data will be reviewed to determine which wells to perform velocity measurements over a full tidal cycle.

A GeoFlo® Model 40 HPFM will be used to perform groundwater velocity measurements according to ASTM Special Technical Publication 963 (Kerfoot 1988). Calibration of the HPFM tool will be performed with the specific well screens that will be installed. The HPFM Detailed information on the use of HPFMs will be included in the QAPP.

Passive Flux Meters

Passive Flux Meter (PFM) monitoring will be performed to provide additional empirical data quantifying shallow groundwater flow. PFMs provide high-resolution assessment of groundwater flow rates across distinct intervals of the screened interval.

PFMs will be deployed in locations where HPFM monitoring has been performed over a complete tidal cycle if possible and will be selected in conjunction with EPA, following review of the initial continuous water-level monitoring data. Detailed information regarding the type and deployment of the PFMs will be included in the QAPP.

4.4 Water Quality Characterization

Data collection efforts will be initiated to collect analytical data from the groundwater, seeps, and other opportunistic samples within the study area. Detailed information on the methodologies to perform these activities will be included in the QAPP.

4.4.1 Monitoring Well Sampling

CDM Smith will obtain shallow groundwater samples from all shoreline monitoring wells during two separate sampling events. The first round of sampling will be performed following installation and development of the monitoring well network, and the second round will follow approximately six months later. The data collected from these two events is assumed to satisfy the study objectives of the groundwater quality characterization. The need for an additional round of sampling will be evaluated following review of data from the two sampling events.

During each round, samples will be collected using low-flow/low-stress purging and sampling methods. Prior to purging each monitoring well, water/oil level and total depth measurements will be collected using an electronic water level indicator (and oil water interface probe) and the headspace will be measured with a PID.

Groundwater purging will continue until field parameters (including pH, ORP, DO, conductivity, salinity, and turbidity) have stabilized and samples will be collected and analyzed as indicated in **Table 4-3**.

NAPL

If sufficient NAPL is present with which to obtain a product sample (i.e., >0.2'), collection of a sample will be attempted using a bailer. If necessary, the water and product will be transferred to a container with a bottom drain such that multiple attempts can be performed to acquire sufficient product and the water can be decanted off.

Physical analyses will include measurement of viscosity at groundwater temperatures, density at groundwater temperatures, and interfacial tension (water and oil). If sufficient NAPL is obtained, chemical analysis will be performed on the NAPL and will include PAHs/alkyl PAHs, PCBs, EPH, TPH-DRO, and TOC and are summarized in **Table 4-3**.

Groundwater samples will be collected below NAPL if present, by insertion of peristaltic tubing with the pump operating in reverse (blowing bubbles during insertion through the NAPL). Upon placement of the tubing below the product layer, the peristaltic pump can be run to obtain groundwater samples. To address the potential for entrainment of NAPL, bulk (total) and filtered (dissolved) samples will be collected. Filtering will be performed using glass fiber filters. Bulk and filtered groundwater samples will be analyzed as indicated in **Table 4-3**.

4.4.2 Shoreline Assessment and Opportunistic Seep Sampling

CDM Smith will perform reconnaissance of the shorelines adjacent to the monitoring well network to identify seepage locations that would be feasible to sample. Collection of seep samples will be attempted where active seepage is observed. It is anticipated that most seepage will be aqueous, and efforts will be made to collect seepage before it reaches the surface water.

Seep samples will be collected from the shorelines in conjunction with one of the groundwater sampling rounds. It is assumed that 14 aqueous environmental samples will be obtained. Seepage will be collected in general conformance with the SOP for Opportunistic Seep Sampling (#39) from the Feasibility Study FSAP dated October 18, 2017. Final sampling methods will be determined following reconnaissance and detailed in the QAPP, or a QAPP addendum, as necessary. Samples will be analyzed as indicated in **Table 4-3**. If the quantity of seepage that can be obtained is too small, a more limited analytical suite will be conducted based on the hierarchy presented in Table B5-2B of the Feasibility Study FSAP.

NAPL

The sampling teams will note observations or evidence of the presence of NAPL seeping from the shorelines during the shoreline reconnaissance and seep sampling. If/when NAPL is discovered, a stepwise process will be used to assess its significance, and samples of the NAPL or highly contaminated media will be collected. If sufficient NAPL is obtained, chemical analysis will be performed on the NAPL and will include PAHs/alkyl PAHs, PCBs, EPH, TPH-DRO, and TOC as indicated in **Table 4-3**.

For locations where there is visible evidence that the seep includes both aqueous and non-aqueous phases, bulk (total) and filtered (dissolved) samples will be collected. Filtering will be performed at the laboratory using glass fiber filters. Bulk and filtered samples will be analyzed for the suite of site constituents specified in **Table 4-3**.

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Section 5

Approach to Data Reporting

5.1 Laboratory Coordination

Regarding the samples collected during this field program, CDM Smith will request that analytical services be in compliance with the procedure specified by EPA's Field and Analytical Services Teaming Advisory Committee. Analyses of these samples will be performed by EPA's Laboratory Services and Applied Sciences Division (LSASD) or Contract Laboratory Program (CLP) laboratories. Samples for nonroutine analyses will be analyzed by a CDM Smith subcontract laboratory.

CDM Smith will perform the following:

- Coordinate with EPA Sample Management Office, Region 2 regional sample control coordinator (RSCC), LSASD, and/or other applicable sample management offices regarding analytical, data validation, and QA questions or issues.
- Implement an EPA-approved laboratory QA program to provide oversight of subcontract laboratories, as directed by the EPA Task Order Contracting Officer's Representative.
- Book the analytical laboratories through the RSCC. CDM Smith will coordinate sample tracking prior to and after sampling events, coordinate CLP samples numbers, and resolve laboratory questions and issues.
- Submit a trip report for each CLP case.
- Provide chain-of-custody, sample retention, information management, data storage, and 10-year storage functions per the approved DES QMP, Region 2, and the contract requirements.

Upon receiving the electronic data deliverables (EDDs), CDM Smith will review each sample delivery group and each data submittal for completeness, update the sample tracking, and check EDDs and upload them to the EQuIS database and CDM Smith's file management system—ProjectWise—for data storage purposes.

5.2 Data Management

Data will be stored in EQuIS and can be exported as required to support the analysis and presentation of data using various software. Database management activities include implementing the DMP and uploading field sample information, field measurements, boring locations, and validated analytical data from the laboratories. The DMP will be implemented, and all manual data entry will be QC checked. CDM Smith will prepare and submit a final EDD consistent with the EPA Region 2 EDD requirements for the analytical data generated during the groundwater study.

5.3 Data Validation and Data Usability Assessment

For chemical analyses performed by a subcontract laboratory, CDM Smith will oversee a data validation subcontractor to validate 100 percent of the data—per the most recent EPA validation protocols—to verify the data meet the quality objectives for the study. The data validation subcontractor will evaluate and qualify the laboratory analytical data against predefined requirements to be outlined in the QAPP. CDM Smith will provide a data validation report.

Following receipt of all validated data, CDM Smith will evaluate the usability of the data, including any uncertainties associated with the data. When evaluating the usability of the data, the following factors are considered: field sampling techniques, results of self or independent assessments, laboratory analytical methods and techniques, data validation reports, and QAPP-listed data quality objectives and criteria. Any rejected data will be discussed in the data usability evaluation report, to be provided with the data summary report.

5.4 Data Summary Report

CDM Smith will prepare a draft and final data summary report to summarize the information gathered during the field investigation and subsequent data processing. The data summary report will include a data usability evaluation report, boring logs, well installation records, development logs, sampling logs, and compilations of all water level data, hydraulic characterization data (i.e., data from slug and specific-capacity tests), groundwater velocity data, and analytical chemistry data.

Specific data reduction activities to be performed include the following:

- **Water Level Data Compilation** – Compilation and reduction of synoptic and continuous water level monitoring data, including salinity, conductivity, and temperature measurements.
- **Hydraulic Characterization Data Processing** – Estimation of the water table unit transmissivity at each monitoring well location based on the results of slug and specific-capacity testing. Transmissivity values will be used to estimate shallow lateral groundwater discharge rates based on the application of Darcy's Law and the appropriate equations for water table unit conditions with discharge to surface waters.
- **Groundwater Velocity Data Processing** – Data from HPFMs and PFMs will be reduced and compiled.

Section 6

Schedule

The proposed field schedule is as follows:

Task	Start Date	End Date	Duration
Draft Technical Approach Plan for Respondent Review	12/9/2021	1/10/2022	4 weeks
Technical Approach Workshop	2/3/2022	2/9/2022	2 x 1 day
Final Technical Approach Plan	2/10/2022	4/1/2022	7 weeks
Other Planning Documents (QAPP, HASP, WMP, DMP)	1/13/2022	4/14/2022	66 days
Field Work			
Access Support	--		Ongoing
Mobilization	5/2/2022	5/27/2022	4 weeks
Well Installation and Development	5/30/2022	9/30/2022	18 weeks
MW Sampling Event 1	10/3/2022	10/14/2022	2 weeks
Hydrogeological Testing (completed between MW sampling events)	10/17/2022	12/16/2022	10 weeks
MW Sampling Event 2	2/27/2023	3/10/2023	2 weeks
Demobilization	–	4/1/2023	--
Post-Field Work Activities			
Data Management	--	1/8/2024	Ongoing as data is received
Data Validation and Usability Evaluation	--	10/6/2023	Ongoing as data is received
Data Compilation and Reduction	--	1/8/2024	Ongoing as data is received
Data Summary Report	7/17/2023	1/8/2024	126 days

Note:
Days refer to business days.
*Indicates a proposed date that is subject to change.

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Section 7

References

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Figures

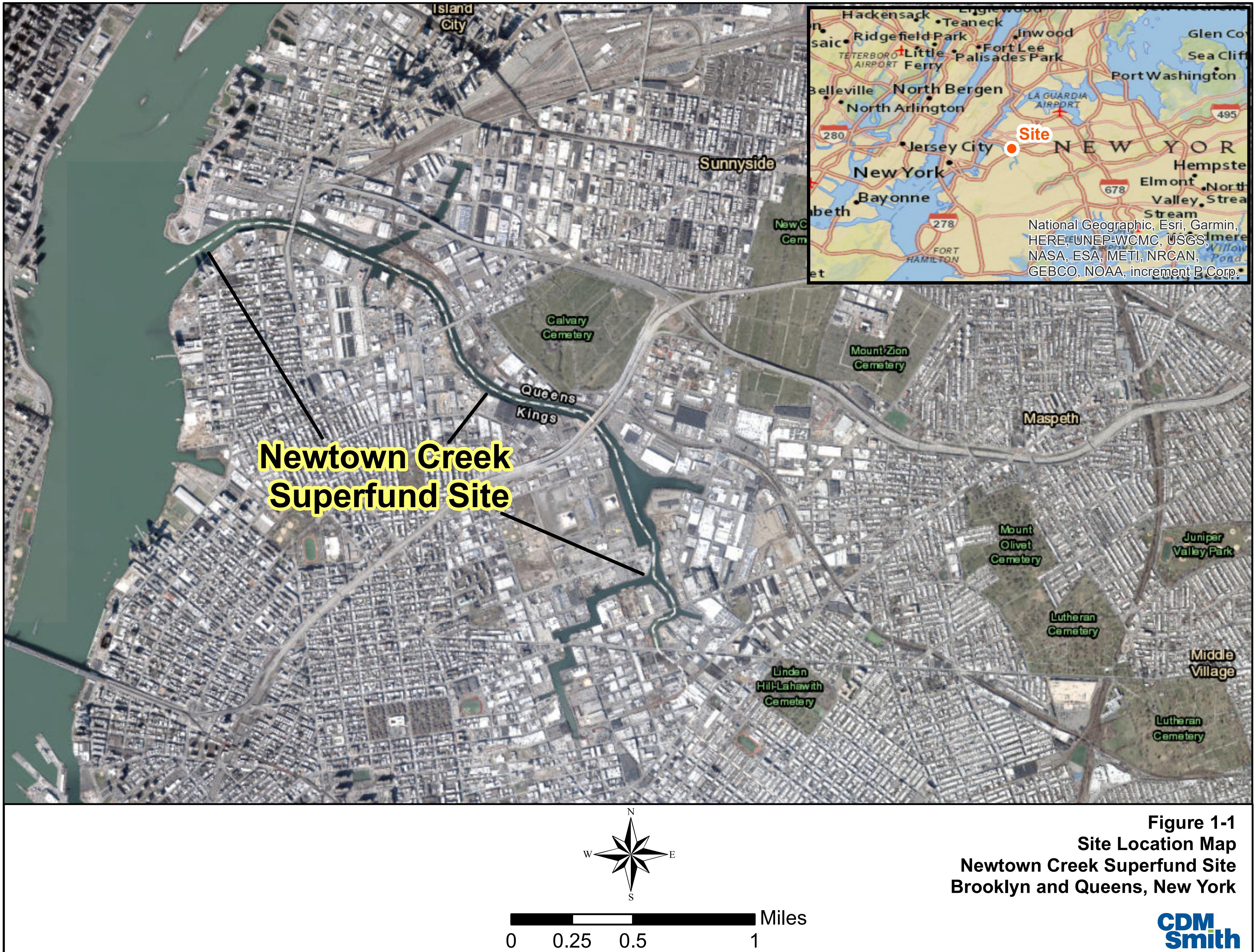

Figure 1-1
Site Location Map
Newtown Creek Superfund Site
Brooklyn and Queens, New York

CDM Smith

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Proposed Study Locations

Existing Wells

RI Monitoring Wells

Upland GW Investigation Wells

AQ MW Database

Seepage Monitoring Location

Combined Sewer Outfall

Storm Sewer Outfall

Bulkhead Classification

Pile-supported concrete; Precast concrete; Vertical concrete; Vertical concrete with wood facing

Riprap

Steel sheetpile

Vertical Wood; Vertical wood

GW Remediation Wall

NOAA Navigable Channel

Notes:

1. Proposed study locations are preliminary subject to field verification and coordination with property owners.
2. Data layers provided by Anchor QEA and NYCDEP

Acronyms:

GW - Groundwater

NOAA - National Oceanic and Atmospheric Administration

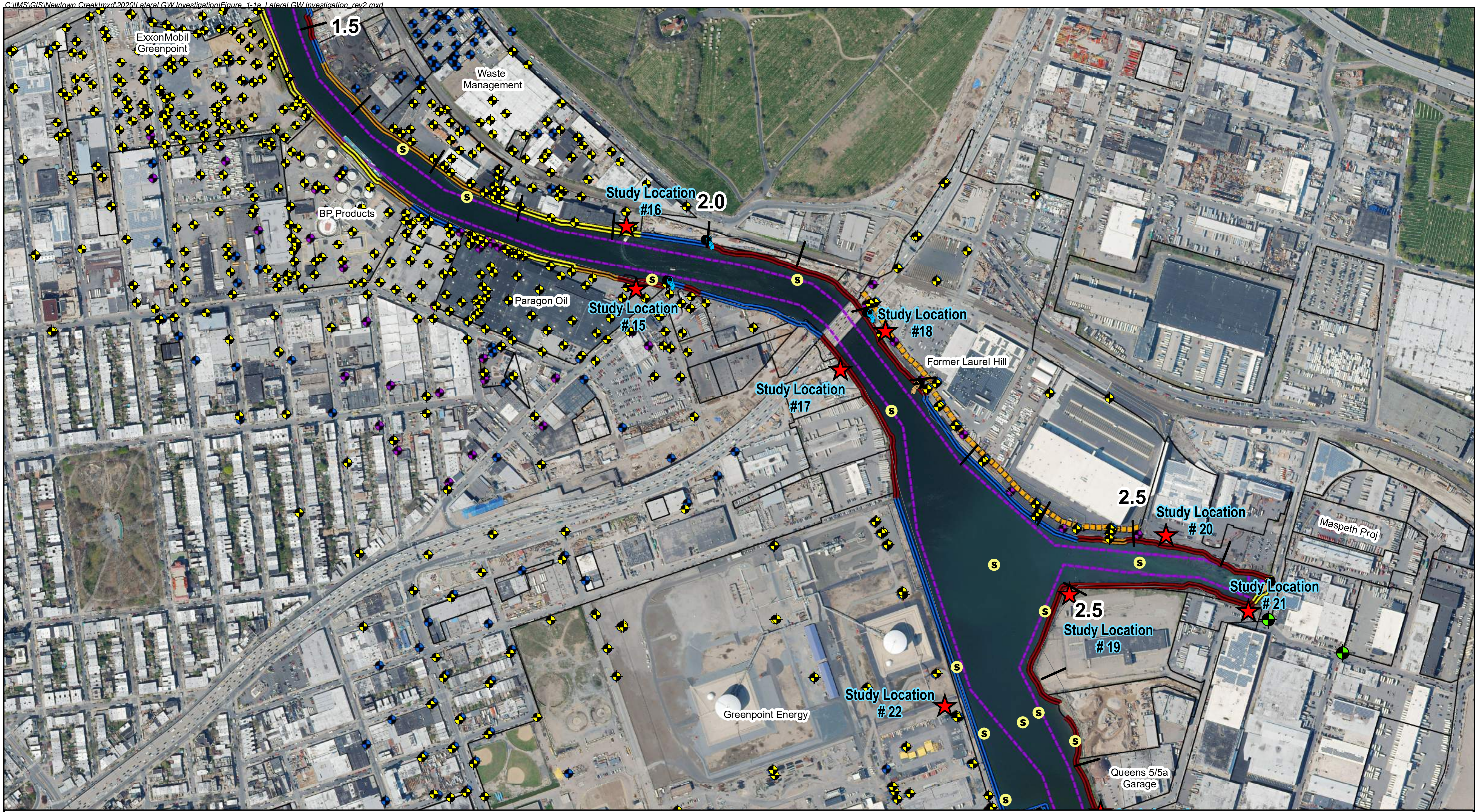
NYCDEP - New York City Department of Environmental Protection

N

0 250 500 1,000 Feet

Figure 4-1a
Proposed Shallow Lateral Groundwater Discharge Investigation Locations - View A
Newtown Creek Superfund Site
Brooklyn and Queens, New York

CDM Smith



Proposed Study Locations

Existing Wells

- RI Monitoring Wells
- Upland GW Investigation Wells
- AQ MW Datbase
- Seepage Monitoring Location
- Combined Sewer Outfall
- Storm Sewer Outfall

Bulkhead Classification

- Pile-supported concrete; Precast concrete; Vertical concrete; Vertical concrete with wood facing
- Riprap
- Steel sheetpile
- Vertical Wood; Vertical wood
- GW Remediation Wall
- NOAA Navigable Channel

Notes:

1. Proposed study locations are preliminary subject to field verification and coordination with property owners.
2. Data layers provided by Anchor QEA and NYCDEP

Acronyms:

GW - Groundwater
NOAA - National Oceanic and Atmospheric Administration
NYCDEP - New York City Department of Environmental Protection

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Figure 4-1b
Proposed Shallow Lateral Groundwater Discharge Investigation Locations - View B
Newtown Creek Superfund Site
Brooklyn and Queens, New York

CDM Smith

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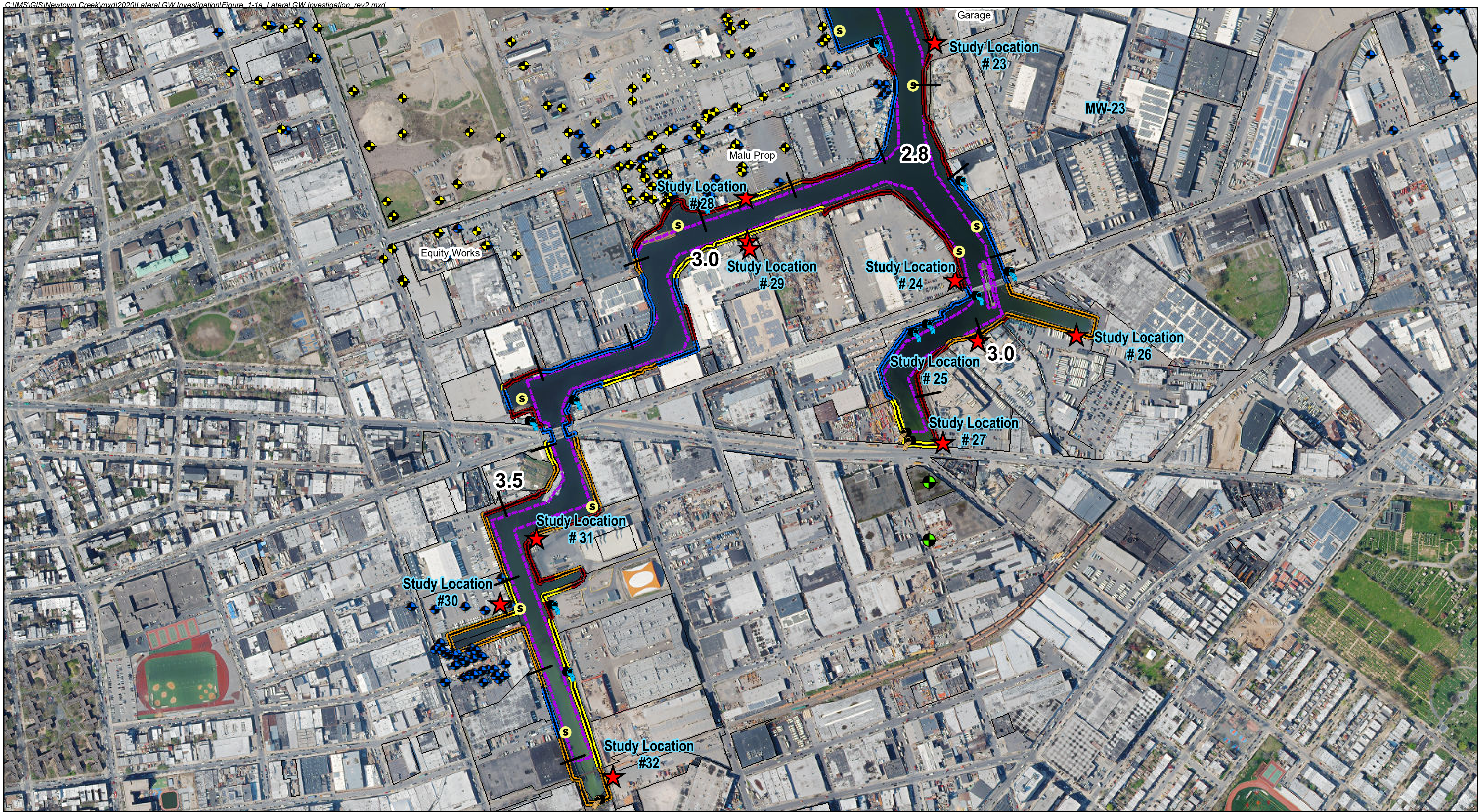

Proposed Study Locations

Existing Wells

- RI Monitoring Wells
- Upland GW Investigation Wells
- AQ MW Databse
- Seepage Monitoring Location
- Combined Sewer Outfall
- Storm Sewer Outfall

Bulkhead Classification

- Pile-supported concrete; Precast concrete; Vertical concrete; Vertical concrete with wood facing
- Riprap
- Steel sheetpile
- Vertical Wood; Vertical wood
- GW Remediation Wall
- NOAA Navigable Channel

Notes:

1. Proposed study locations are preliminary subject to field verification and coordination with property owners.
2. Data layers provided by Anchor QEA and NYCDEP

Acronyms:

GW - Groundwater
NOAA - National Oceanic and Atmospheric Administration
NYCDEP - New York City Department of Environmental Protection

N

Feet
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Figure 4-1c
Proposed Shallow Lateral Groundwater Discharge Investigation Locations - View C
Newtown Creek Superfund Site
Brooklyn and Queens, New York

CDM Smith

Tables

CDM Smith

Table 4-1
Summary of Field Activities
Newtown Creek Superfind Site, OU1 Supplemental Characterization of Shallow Groundwater Discharge
Brooklyn and Queens, New York

Activity	Area/Sample Locations	Data Usability Objective	Sampling Activities					Total Environmental Samples
			Locations*	Frequency (rounds)	Analytical Parameters		Field Parameters	
					LSASD or CLP	Subcontract Laboratory		
Installation of Monitoring Well Network								
Monitoring Well Installation	Monitoring Well - Shallow (shoreline and paired inland)	See below. These wells will be paired monitoring wells - one shoreline location and one inland location.	64	--	--	Grain size/ Shelby Tube	--	64
	New Monitoring Well - Deep (paired deep)	See below. Wells will be paired with a shallow inland location monitoring well (see above).	8	--	--	Grain size/ Shelby Tube	--	8
Monitoring Well Development/ Redevelopment	New Monitoring Well - Shallow (shoreline and paired inland)	New and existing wells must be developed to remove fines from the well screen and provide a good connection to the aquifer to provide representative samples.	64	--	--	--	Well development parameters	None.
	New Monitoring Well - Deep (paired deep)		8					
Monitoring Well and Staff Guage Survey	All wells (72) and staff guages (2) to be used in the study	Information used to calculate water level elevations which are essential for defining and estimating shallow groundwater flow directions and rates.	74	1	--	--	--	None.
Hydraulic Characterization**								
Continuous Water Levels	All wells (72) and staff gauges (2)	Analyze the effects of tidal variations, seasonal changes, and impacts of remediation systems; will form the basis for adjusting the monthly readings at MWs without continuous recorders to account for the tidal/seasonal variations and remediation system impacts. BaroTroll to be mobilized as well to log barometric pressure.	74	Deployed for 12 months Checked every two months	--	--	Water elevations, temperature, pressure, salinity	None.
Hydraulic characterization	Slug tests	Collect data that along with other evidence will be utilized to estimate horizontal hydraulic conductivity at all wells	72	1	--	--	--	None.
	Specific Capacity Tests	Specific capacity testing on all shallow and deep shoreline wells to provide complimentary information on horizontal hydraulic conductivity.	40	1	--	--	--	None.
Groundwater Velocity	Heat pulse flow meter or Kerfoot flowmeters	Complementary information to the other groundwater hydraulic data; use in the assessment of estimated groundwater flow rates and directions.	30	1	--	--	--	None.
	Passive flux meter		9	1	--	--	--	None.

Table 4-1
Summary of Field Activities
Newtown Creek Superfind Site, OU1 Supplemental Characterization of Shallow Groundwater Discharge
Brooklyn and Queens, New York

Activity	Area/Sample Locations	Data Usability Objective	Sampling Activities					Total Environmental Samples
			Locations*	Frequency (rounds)	Analytical Parameters		Field Parameters	
					LSASD or CLP	Subcontract Laboratory		
Water Quality Characterization								
Monitoring Well Sampling (2 Rounds - 6 months apart)	Groundwater samples*** (shoreline wells only)	Shallow groundwater quality data for estimating the discharge of COPC mass to the Study Area sediments and surface water.	32	2	TCL SVOCs; TAL Metals (total and dissolved); TDS, TSS, TOC, DOC, Fluoride, Chloride	PAHs; Alkylated PAHs; PCB Congeners; Dioxins/furans; EPH, VPH	Temperature, pH, specific conductance, dissolved oxygen, ORP, turbidity, salinity	64
	NAPL (if encountered)	Shallow groundwater quality data for estimating the discharge of COPC mass to the Study Area sediments and surface water.	TBD	2	--	PAHs; Alkylated PAHs; PCB Congeners; EPH, VPH, DRO. TOC. Physical parameters (viscosity, density, and interfacial tension)	--	TBD
Shallow Lateral Seepage Sampling	Opportunistic Seep Sampling ***	Use the shallow seepage water quality data to complement the shallow groundwater quality data from sampling the shoreline monitoring wells. Focus of the data is to use for the estimation of COPC mass discharge to the Study Area surface water column.	14	1	TCL SVOCs; TAL Metals (total and dissolved); TDS, TSS, TOC, DOC, Fluoride, Chloride	PAHs; Alkylated PAHs; PCB Congeners; Dioxins/furans; EPH, VPH	Temperature, pH, specific conductance, dissolved oxygen, ORP, turbidity, salinity	14
	NAPL (if encountered)	Shallow groundwater quality data for estimating the discharge of COPC mass to the Study Area sediments and surface water.	TBD	1	--	PAHs; Alkylated PAHs; PCB Congeners; EPH, VPH, DRO. TOC. Physical parameters (viscosity, density, and interfacial tension)	--	TBD

Notes:
* The exact number of wells to be installed and monitored is subject to change based on ongoing assessment of existing well locations, site access, shoreline structures, and logistical constraints.
** Hydraulic characterization and water level monitoring activities will commence following performance of Round 1 monitoring well sampling.
*** If NAPL encountered in a monitoring well or seep sample, a groundwater/ seep water sample will be collected for filtered and bulk samples. The filtered samples will be submitted for the tpical suite of groundwater/ seep water analyses; the bulk sample will be analyzed for PAHs, alkylated PAHs and PCB congeners.
CLP - Contract Laboratory Program
COPC - contaminant of potential concern
DOC - dissolved organic carbon
DRO - diesel range organics
EPH - extractible petroleum hydrocarbon
LSASD - Laboratory Services and Applied Sciences Division
MW - monitoring well
ORP - oxidation-reduction potential
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
SVOCs - semi-volatile organic compounds
TAL - target analyte list
TCL - target compound list
TDS - total dissolved solids
TOC - total organic carbon
TSS - total suspended solids
VPH - volatile petroleum hydrocarbon

Table 4-2
Monitoring Well Network Progress
Newtown Creek Superfind Site, OU1 Supplemental Characterization of Shallow Groundwater Discharge
Brooklyn and Queens, New York

Study Location ID	Owner Name	Property Name	Address	Block and Lot	Site Visit	Requesting Use of Existing Wells	New Well Installations
Study Location #1	TF Cornerstone	Former Newtown Creek Bud Site	55-01 2nd Street Queens, NY	Queens: 11/4	Completed initial visit on 10/14/21	No known existing wells (all wells likely being abandoned)	2 shallow wells would likely need to be installed.
Study Location #2	Brookfield Property Group	BOP Greenpoint H-3 LLC Brookfield Property Group	Commercial Street Brooklyn, NY	Brooklyn: 2472/475	Completed initial visit on 10/14/21	No known existing wells (all wells likely being abandoned)	2 shallow wells would likely need to be installed.
Study Location #2a	NYC Transit Authority	65 Commercial Street X-Town Yard/Paratransit	65 Commercial Street Brookly, NY	Brooklyn: 2472/425	No	No	Yes. 2 shallow wells would need to be installed.
Study Location 3	Fresh Direct	Fresh Direct Property	53-01 11th Street Long Island City, NY 11101	Queens: 65/56	Completed initial visit on 10/12/21	No known existing wells	2 shallow wells would likely need to be installed.
Study Location 4	Zenith Energy Terminals	Zenith/Motiva Brooklyn	Zenith Energy Terminals Brooklyn 25 Paidge Avenue Brooklyn, NY 11222	Brooklyn: 2491/1	Completed initial visit on 11/17/21	Yes. 3 existing MWs in northwestern parking lot are useable for a shoreline and inland MW pair. MW-13, MW-21R, and MW-22R.	Not anticipated.
Study Location 5	TBD	Simsmetal/HugoNeu	SIMSMETAL East LLC - Queens Plant 30-27 Greenpoint Ave Long Island City, NY 11101	Queens 294/360	Completed initial visit on 3/28/22	No	2 shallow wells would likely need to be installed.
Study Location 6	King's Land Realty Associates, LLC	Exxon-Mobil – Former Allocca Recycling (520 Kingsland Avenue, Brooklyn, NY 11222)	520 Kingsland Avenue, Brooklyn, NY 11222	Brooklyn: 2517/27	Completed on 10/14/21	Yes. 2 existing wells appear useable. Existing wells S-96 (10-20 feet bgs); D-96 (29-44 feet bgs). NAPL in wells.	Yes. 1 paired shallow will need to be installed
Study Location 7	Unknown (Tec-Crete NYC will be operator)	Harsco Corp.	50-09 27th street Long Island City, NY 11101	Queens: 113/1	Reconned site. Appears unoccupied.	No known existing wells	2 shallow wells would likely need to be installed.
Study Location 8	Robert F. Corroon Jr. Presdient Richard Zirinsky Associates	29-01 Borden Ave/ ELM Eng./FEDEX Ground	29-01 Borden Ave Long Island City 11101	Queens 292/1	Completed initial visit on 10/12/21. May need to revisit.	No existing wells	2 shallow wells would likely need to be installed.
Study Location 9	George Reis/ Chaves Development	47-17 27th Street Long Island City, NY 11101	47-17 27th STREET Long Island City, NY 11101	Queens: 115/56	NA	None	Yes. 2 shallow wells will need to be installed.
Study Location 10 (trailer staging area)	NYCDEP	NYCDEP – Newtown Creek Wastewater Treatment Plant	327 GREENPOINT AVENUE Brooklyn, NY 11222	Brooklyn: 2525/1	Completed on 10/13/21	None	Yes. 2 shallow wells would need to be installed.
Study Location 12	NYC Department of Sanitation	NYC Department of Sanitation – Greenpoint Marine Transfer Station and Incinerator	1 KINGSLAND AVENUE Brooklyn, NY 11222	Brooklyn: 2508/1	Completed on 10/13/21	None	Yes. 2 shallow wells would need to be installed.
Study Location 13	NYC	NYC/ End of Dead End Road	NA	NA	Completed on 10/12 and 10/13/21	None	2 shallow wells would need to be installed.
Study Location 14	New York Paving, Inc. Anthony Bartone CEO	New York Paving	37-18 RAILROAD AVENUE Long Island City, NY 11101	Queens: 312/2	Reconned site. Got phone number for contact. Would like to visit site if possible	No known existing wells	2 shallow wells would likely need to be installed.
Study Location 15	Empire Merchants	Texaco – Former Paragon Oil (50 Bridgewater St. Brooklyn, NY)	50 Bridgewater St. Brooklyn, NY 11222	Brooklyn: 2666/125	Completed on 10/13/21	Yes. 2 wells appear usable. Existing wells CMW-15 and MW-63.	Yes. Install a deeper well paired with existing shorelione MW.
Study Location 16	Steel Equities	Exxon-Mobil –Former Pratt Oil Works (Parcel B of 38-42 and 39-14 Review Avenue, Queens, NY 11101)	38-42 and 39-14 Review Avenue Queens, NY 11101	Queens: 312/309	Completed on 10/14/21	Yes. 2 existing wells appear potentially usable. Existing wells MW-10 (3-13 feet bgs); MW-13 (1-8 feet bgs)	Yes. 1 deep well along shoreline
Study Location 17	Fred Carillo	Empire Transit Mix/ Brooklyn Ready Mix	462 Scott Avenue Brooklyn, NY 11222	Brooklyn: 2809/50	NA	No known existing wells	2 shallow wells would likely need to be installed.
Study Location 18	LHD Ventures, LLC	PDRC – PDRC (44-02 57th avenue, Queens, NY 11378 (Lot 1))	44-02 57th Avenue Queens, NY 11378	Queens: 2529/1	Completed on 10/13/21	Several wells usable if desirable	Not anticipated.
Study Location 19	Federal Express	Former RPS (Current Fedex Ground Maspeth redevelopment project) - 55-90 48th Street, Maspeth, NY	55-90 48th Street Queens, NY 11378	Queens: 2600/92	Completed initial visit on 10/12/21	No known existing wells	2 shallow wells would likely need to be installed.
Study Location 20	Ferguson Enterprises	57-22 49th St. LLC/ 57-22 57th St	57-22 57th AVENUE Queens, NY 11378	Queens: 2554/55	Reconned site. Got email and phone for contact.	No known existing wells	2 shallow wells would likely need to be installed.
Study Location 21	Fred Carillo	55-70 48th Street property	55-70 48th Street Queens, NY 11378	Queens 2600/ 70	To Be Determined	No known existing wells	2 shallow wells would likely need to be installed.

Table 4-2
Monitoring Well Network Progress
Newtown Creek Superfind Site, OU1 Supplemental Characterization of Shallow Groundwater Discharge
Brooklyn and Queens, New York

Study Location ID	Owner Name	Property Name	Address	Block and Lot	Site Visit	Requesting Use of Existing Wells	New Well Installations
Study Location 22	National Grid	National Grid – Greenpoint Energy Center (287 Maspeth Avenue Brooklyn, NY 11211)	287 Maspeth Avenue Brooklyn, NY 11211	Brooklyn: 2837/1	Completed on 10/14/21	Yes.2 existing wells appear useable. Existing wells GPECMW03 (25-40 feet bgs); GPECMW03WT (3-13 feet bgs) Additional GPECMW03D monitoring well is also available.	1 inland well will need to be installed (National Grid/ GEI has agreed to install well)
Study Location 23	NYC Sanitation or if on street NYC	NYC Sanitation. Queens West 5/5A Garage 47-01 48th Street Queens, NY 11378	47-01 48th Street Queens, NY 11378	Queens: 2600/1	Visit dead end road to see if viable.	No known existing wells	2 shallow wells would likely need to be installed.
Study Location 24	1313 Grand Street Realty LLC	1313 Grand Street/ Natmi Truck – Currently YRC Truck Terminal	1313 GRAND STREET Brooklyn, NY 11222	Brooklyn: 2930/90	Completed initial visit on 10/12/21	No known existing wells	2 shallow wells would likely need to be installed.
Study Location 25	Tec-Crete Transit-Mix Corp.(operator)	Maspeth Concrete Corp	Maspeth Concrete Loading Corp. 46-73 Metropolitan Avenue Ridgewood, NY 11385	Queens: 2611/35	Completed on 11/16/2021 10 AM	None	Yes. 2 shallow wells will need to be installed.
Study Location 26	Western Beef	One Stop Metro/Western Beef (Location of TS Wells)	46-81 Metropolitan Avenue Ridgewood, NY 11385	Queens: 2611/71	Completed initial visit on 3/28/22	Yes. 2 existing wells that are usable	Yes 1 deep well.
Study Location 27	MTA	NYC MTA NYC Transit 46-25 Metropolitan Avenue Queens, NY 11385 (2611/1)	46-25 Metropolitan Avenue Queens, NY 11385 (2611/1)	Queens: 2611/1	Visited on 2/3	No	Yes. 2 shallow wells would need to be installed.
Study Location 28	Malu Properties, Inc. 275 Madison Ave, 37th Floor New York, NY 10016	362/364/394 Maspeth Avenue Property (Former Ditmas Oil)	362/364/394 Maspeth Avenue Brooklyn, NY 11211	Brooklyn: 2927/110, 123	Visited. Met consultant.	None	Yes. 2 shallow wells will need to be installed.
Study Location 29	Cinelease	1245 Grand Street/ English Kills Realty	1245 GRAND STREET Brooklyn, NY 11211	Brooklyn: 2929/1	To Be Determined	None	Yes. 2 shallow wells will need to be installed.
Study Location 30	Frito-Lay/ Pepsico	Frito-Lay/ Pepsico	202-218 Morgan Avenue Brooklyn, NY 11237	Broooklyn: 2942/105	Completed on 10/12/21	Yes. 1 existing Well – MW-05 in good condition	Yes. 1 inland well will need to be installed.
Study Location 31	Waste Management	Waste Management Varick Ave prop	Numerous Varick Ave properties. MW-31 at 221 Varick Ave Brooklyn, NY 11237	Brooklyn: 2950/1 and 44	Recon visit completed. Able to look at locations	No known existing wells	2 shallow wells would likely need to be installed.
Study Location 32	Waste Management	Waste Management Varick Ave prop	469 Johnson Ave Brooklyn, NY11237	Brooklyn: 2974/112	Recon visit completed. Able to look at locations	No known existing wells	2 shallow wells would likely need to be installed.

Table 4-3
Summary of Sample Analysis
Newtown Creek Superfind Site, OU1 Supplemental Characterization of Shallow Groundwater Discharge
Brooklyn and Queens, New York

Activity	Matrix	Analyte/Analytical Group	Method/SOP	Environmental Sample Count	Duplicates	Equipment Blanks	MS/MSD	Total
MW Installation	Soil	Grain size	ASTM D6913	64	--	--	--	64
		Vertical Wall Permeameter	ASTM D2434 or ASTM D5084	32	--	--	--	32
MW Sampling (2 Rounds x 32 wells)	Groundwater	TCL SVOCs	SFAM01.1	64	4	4	4	76
		PAHs	8270D SIM	64	4	4	4	76
		Alkylated PAHs	8270D SIM	64	4	4	4	76
		TAL Metals (total)	SFAM01.1	64	4	4	4	76
		TAL Metals (dissolved)	SFAM01.1	64	4	4	4	76
		PCB Congeners	EPA 1668	64	4	4	4	76
		Dioxins/furans	EPA 1613	64	4	4	4	76
		EPH	MADEP-EPH-04-Rev 1.1	64	4	4	4	76
		VPH	MADEP-EPH-04-Rev 1.1	64	4	4	4	76
		TDS	SM2540C	64	4	--	--	68
		TSS	SM2540D	64	4	--	--	68
		TOC	SFAM01.1	64	4	--	--	68
		DOC	EPA 415.3	64	4	--	--	68
		Fluoride	SM4500	64	4	--	--	68
		Chloride	SM4500	64	4	--	--	68
	NAPL (if encountered and recoverable). Assumed 8 locations	PAHs	8270D SIM	16	2	2	2	22
		Alkylated PAHs	8270D SIM	16	2	2	2	22
		PCB Congeners	EPA 1668	16	2	2	2	22
		EPH	MADEP-EPH-04-Rev 1.1	16	2	2	2	22
		VPH	MADEP-EPH-04-Rev 1.1	16	2	2	2	22
		DRO	8015D	16	2	2	2	22
		Physical Paramters (viscosity, density, interfacial tension)	TBD	16	--	--	--	16

Table 4-3
Summary of Sample Analysis
Newtown Creek Superfind Site, OU1 Supplemental Characterization of Shallow Groundwater Discharge
Brooklyn and Queens, New York

Activity	Matrix	Analyte/Analytical Group	Method/SOP	Environmental Sample Count	Duplicates	Equipment Blanks	MS/MSD	Total
Opportunistic seep sampling (assumed 14 samples)	Aqueous	TCL SVOCs	SFAM01.1	14	2	1	1	18
		PAHs	8270D SIM	14	2	1	1	18
		Alkylated PAHs	8270D SIM	14	2	1	1	18
		TAL Metals (total)	SFAM01.1	14	2	1	1	18
		TAL Metals (dissolved)	SFAM01.1	14	2	1	1	18
		PCB Congeners	EPA 1668	14	2	1	1	18
		Dioxins/furans	EPA 1613	14	2	1	1	18
		EPH	MADEP-EPH-04-Rev 1.1	14	2	1	1	18
		VPH	MADEP-EPH-04-Rev 1.1	14	2	1	1	18
		TDS	SM2540C	14	2	--	--	16
		TSS	SM2540D	14	2	--	--	16
		TOC	SFAM01.1	14	2	--	--	16
		DOC	EPA 415.3	14	2	--	--	16
		Fluoride	SM4500	14	2	--	--	16
		Chloride	SM4500	14	2	--	--	16
	NAPL (if encountered and recoverable). Assumed 4 locations	PAHs	8270D SIM	4	1	1	1	7
		Alkylated PAHs	8270D SIM	4	1	1	1	7
		PCB Congeners	EPA 1668	4	1	1	1	7
		EPH	MADEP-EPH-04-Rev 1.1	4	1	1	1	7
		VPH	MADEP-EPH-04-Rev 1.1	4	1	1	1	7
		DRO	8015D	4	1	1	1	7
		Physical Paramters (viscosity, density, interfacial tension)	TBD	4	--	--	--	4

Notes:
DOC - dissolved organic carbon
DRO - diesel range organics
EPH - extractible petroleum hydrocarbon
MS/MSD - matrix spike/ matrix spike duplicate
PAH - polycyclic aromatic hydrocarbon
PCB - polychlorinated biphenyl
SOP - standard operating procedure
SVOC - semi-volatile organic compound
TCL - target compound list
TDS - total dissolved solids
TOC - total organic carbon
TSS - total suspended solids
VPH - volatile petroleum hydrocarbon

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