REMEDIAL INVESTIGATION WORKPLAN

Dutchess County Fire Training Center
392 Creek Road
Poughkeepsie, Dutchess County, New York 12601
NYSDEC SITE NO. 314128

Prepared for:

NEW YORK STATE OF OPPORTUNITY. Department of Environmental Conservation

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Acronyms and Abbreviations

AFFF	Aqueous Film Forming Foam
ASP	Analytical Services Protocol
bgs	Below Ground Surface
CAMP	Community Air Monitoring Plan
CCR	Construction Completion Report
COCs	constituents of concern
DCDPW	Dutchess County Department of Public Works
DCER	Dutchess County Emergency Response
DCFTC	Dutchess County Fire Training Center
DER	Division of Environmental Remediation
DER-10	NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation
DOT	Department of Transportation
DUSRs	Data Usability Summary Reports
EDDs	Electronic Data Deliverables
FAP	Field Activities Plan
FWIA	Fish and Wildlife Impact Analysis
FWRIA	Wildlife Resource Impact Assessment
gpm	Gallons Per Minute
HASP	Health and Safety Plan
HDPE	High Density Poly-Ethylene
IDW	Investigation Derived Waste
IRM	Interim Remedial Measure
MS/MSD	Matrix Spike/Matrix Spike Duplicate
ng/L	Nanograms Per Liter
NTP	Notice to Proceed
NTUs	Nephelometric Turbidity Units
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OD	Outer Diameter
PCBs	Polychlorinated Biphenyls
PFAS	Per- and Polyfluoroalkyl Substances
PID	Photoionization Detector
PFOA	Perfluorooctanoic Acid
PFOS	Perfluorooctanesulfonic Acid
PLS	Professional Land Surveyor
ppb	Parts Per Billion

Acronyms and Abbreviations (cont.)

PPE	Personal Protective Equipment
PVC	Poly-Vinyl Chloride
QAPP	Quality Assurance Project Plan
RI	Remedial Investigation
SC	Site Characterization
the Site	392 Creek Road, Hyde Park, Dutchess County, New York
SOW	Scope of Work
SPLP	Synthetic Precipitation Leaching Procedure
SVOCs	Semivolatile Organic Compounds
TAL	Target Analyte List
TCL	Target Compound List
TICs	Tentatively Identified Compounds
TSOW	Technical Scope of Work
µg/kg	Micrograms Per Kilogram
USCS	Unified Soil Classification System
USEPA	United States Environmental Protection Agency
USGS	United States Geological Survey
UUSCO	Unrestricted Use Soil Cleanup Objective
VOCs	Volatile Organic Compounds
WA	Work Assignment

1.0 Introduction

This workplan presents the Remedial Investigation (RI) activities to be performed at the Dutchess County Fire Training Center (DCFTC) located at 392 Creek Road, Hyde Park, Dutchess County, New York (the Site). The RI activities will be completed in accordance with the July 2021 New York State Department of Environmental Conservation (NYSDEC) Division of Environmental Remediation (DER) Work Assignment (WA) No. D009812-22 Notice to Proceed (NTP), the November 2021 NYSDEC-approved Scope of Work (SOW), and NYSDEC DER-10, Technical Guidance for Site Investigation and Remediation (DER-10).

The Site has been assigned NYSDEC Site No. 314128 and encompasses the active training area of the Dutchess County Emergency Response (DCER) property. The RI objective is to investigate multiple media (surface water, sediment, surface soil, subsurface soil, and groundwater) to determine the nature and extent of contamination caused by the historical use of aqueous film forming foam (AFFF) during training operations. AFFF is known to contain per- and polyfluoroalkyl substances (PFAS), specifically perfluorooctanesulfonic acid (PFOS).

2.0 Site Description and History

2.1 Site Location and Setting

The DCFTC is located in a southern area of Hyde Park, approximately three miles north of the city of Poughkeepsie. The Site is bordered to the north by East Dorsey Lane and residential properties; to the east by the Fall Kill stream and residential properties; to the south by the offices of DCER, undeveloped land, and the Fall Kill stream; and to the west by Creek Road and public recreational sporting fields. The Hudson River is approximately two miles west of the Site. A United States Geological Survey (USGS) 7.5-minute topographic map showing the Site location and surrounding land features is provided on **Figure 1**.

The entire property contains one irregularly shaped land parcel identified on Dutchess County tax maps as parcel number 133200-6163-02-876717-0000 (9.7 acres). Per the online Dutchess County Real Property Tax Service Agency ParcelAccess, land use for the parcel is classified as police/fire (land use code number 662). The parcel immediately east of the DCFTC, which encompasses both the Fall Kill and southern unnamed water body, is identified as parcel number 133200-6163-04-900472-0000 (100 acres), land use classified as a County park (land use code number 962) and is owned by the County of Dutchess.

The Site is currently owned by the County of Dutchess and accessed from Creek Road via a parking lot and secured chain link fence gates. The DCFTC is identified as the active training grounds and is the focus of these RI activities.

2.2 Regional Geology and Hydrogeology

According to the Cadwell, D.H., and others, 1986 Surficial Geological Map of New York, New York State Museum – Geological Survey Map and Chart Series #40, Lower Hudson Sheet (1989), general area surficial geology is identified outwash sand and gravel (og) consisting of coarse to fine gravel with sand, proglacial fluvial deposition, well rounded and stratified, generally finer texture away from the ice border, thickness variable (2-20 meters).

According to the Bedrock Geology Map of New York State – Lower Hudson Sheet (1970), bedrock underlying the general area is the Austin Glen Formation (Oag) of the Upper-Middle Ordovician Age, consisting of graywacke, shale. Bedrock was not cored during the Site Characterization (SC) activities; however nearby shale bedrock outcrops were noted.

According to Edward F. Bugliosi, Ruth A. Trudell, and George D. Casey's Potential Yields of Wells in Unconsolidated Aquifers in Upstate New York – Lower Hudson Sheet Map, the Site is located within an unconfined aquifer, composed of sand and gravel, with a saturated zone generally less

than 10-feet thick, or thicker but with less permeable silty sand and gravel. Well yields in these areas range from 10 to 100 gallons per minute (gpm). Yields in areas adjacent to streams may exceed 100 gpm through pumping induced infiltration.

2.3 Site Features and Use

The Site is an active emergency response and fire training center, operated by the County of Dutchess. Approximately half of the Site's eastern edge is wooded and borders the Fall Kill. The DCFTC is largely paved with grassed areas found on the northern, western, and southeastern perimeters, in addition to two small square shaped areas at the northeastern end which are reportedly utilized for Jaws of Life training exercises. A concrete water impoundment (approximately 50 feet long by 7 feet wide) is located on the Site's eastern perimeter and utilized as a standing water source for fire training exercises. Two culverts were found in this structure (one inlet and one outlet), with both ends connecting to the Fall Kill.

DCFTC-specific structures include several classrooms, various multi-story fire training buildings, and confined space training areas. The perimeter of the property is secured by chain link fencing with the only access gates located on the western perimeter. Fire hydrants, supplied with municipal water, are located throughout the Site. One on-Site groundwater supply well is located west and adjacent to the southern DCER office/call center building. During 2019 SC activities, TRC and the NYSDEC were informed by the DCER Commissioner that the supply well was no longer in service.

A map showing the DCFTC and above referenced features can be found on **Figure 2**.

2.4 Site History / Past Use

According to historical Site aerial imagery accessed via the online Dutchess County ParcelAccess, DCFTC structures, as they appear today, were constructed sometime between 1970 and 1980. From 1936 (the earliest available aerial image) to 1970, the northern property appears have been agricultural. The southern DCER building can be seen in all available historical aerial imagery. Historical fire training exercises at the DCFTC may have used open burn methods and as well as fire-fighting agents such as AFFF, known to contain PFAS.

2.5 Topography and Site Drainage

The Site is relatively flat, with the eastern perimeter topography sloping gradually downward toward the Fall Kill. During an August 2019 Site visit between TRC, NYSDEC, and the DCER Commissioner, two stormwater discharge points were identified discharging to the Fall Kill: one on the central eastern perimeter; and one downgradient of a southern outfall, located east of a

southern garage. In addition, one concrete water impoundment located on the Site's eastern perimeter was identified. This impoundment is connected to the Fall Kill via inlet and outlet culverts, as stated above in **Section 2.3**.

2.6 Previous Investigation and Sampling

Per a December 27, 2018 letter from the NYSDEC to the DCER, PFAS compounds were detected in a nearby groundwater supply well and were considered potentially attributable to current or historical DCFTC operations. In response, on April 4, 2019, the Dutchess County Department of Public Works (DCDPW) commissioned the sampling of the on-Site supply well and upstream/downstream Fall Kill surface water for PFAS and 1,4-dioxane. Analytical results from the three sample locations indicated the presence of PFAS at each location, and the total concentrations ranged from 3.54 nanograms per liter (ng/L) (on-Site DCER groundwater supply well) to 11.777 ng/L (upstream Fall Kill surface water sample). 1,4-dioxane was not detected in any sample collected for analysis. The full results of this sampling effort can be found in the *April 12, 2019 Emerging Contaminants Sampling Report*, authored by C.T. Male Associates of Poughkeepsie, New York.

From November 2019 to January 2020, TRC completed SC activities at the Site to investigate multiple media for evidence of potential PFAS contamination caused by historical use of AFFF. The NYSDEC-approved SC SOW activities included surface water and sediment sampling, surface and subsurface soil sampling, monitoring well installations, groundwater sampling, surveying, and investigation derived waste (IDW) disposal. As a result of the SC activities, elevated concentrations of PFAS were detected in surface water and sediment of the on-Site water impoundment, on-Site subsurface soil, and on-Site groundwater. The full results of these activities can be found in the *June 8, 2020 Site Characterization Report*.

3.0 Interim Remedial Measure

Based on the findings of the SC activities completed at the Site in 2019, an Interim Remedial Measure (IRM) is necessary to prevent further discharge of PFAS-contaminated surface water and sediment from the on-Site surface water impoundment to the Fall Kill. It is anticipated that the IRM will initially consist sealing the inlet and outlet culverts running from the impoundment to the Fall Kill. Secondary IRM tasks including Site pavement improvements will be determined following a review of the Phase I RI activities and analytical data (see **Section 4.1**). The scope of the IRM is not anticipated to include remediation of potential PFAS contamination in soil both within and surrounding the impoundment. Investigation to determine the nature and extent of potential contamination to soil will be performed under **Section 4.0** below.

3.1 IRM Technical Scope of Work

TRC will inspect the surface water impoundment, including available construction/as-built documents, and prepare a Technical Scope of Work (TSOW) for use by the NYSDEC to procure a construction contractor to complete the IRM. The TSOW will include technical requirements, drawings, and relevant Site data and information as attachments. The TSOW will include requirements for submittals, products, execution, testing, materials management, health and safety, environmental protection, documentation, and other sections, as necessary, to describe the work.

3.2 IRM Oversight

TRC will direct and oversee the IRM activities. A summary of activities associated with IRM oversight is presented below:

- Review of NYSDEC call-out contractor submittals.
- Periodic monitoring and recording progress, including photographic documentation.
- Recording removal of waste (if any) from the Site and obtaining copies of waste shipping documents (e.g., manifests and bills of lading).
- Inspecting materials imported to the Site.
- Preparing and submitting inspection reports.
- Identifying and promptly notifying the NYSDEC and New York State Department of Health (NYSDOH) of any deviations from the approved project documents and/or schedule.
- Immediately notifying the NYSDEC and NYSDOH in the event of a release to the environment or of any health and safety related incident.

- Closely monitoring implementation of the Community Air Monitoring Plan (CAMP) (expected to be implemented by the NYSDEC construction call-out contractor) and promptly notifying the NYSDEC of any issues.
- Promptly notifying the NYSDEC and NYSDOH regarding any complaints from the community and of visits to the Site by representatives of the public or other agencies.
- Attendance at project meetings.
- Maintaining files documenting the above.

3.3 Construction Completion Report

TRC will prepare a Construction Completion Report (CCR) in accordance with the applicable provisions of NYSDEC DER-10 following the completion of the IRM. The CCR will:

- Document the remedial work completed.
- Provide a tabular summary of material characterization results and other sampling and chemical analyses performed as part of the remedial action (if any).
- Provide a comprehensive account of the locations and characteristics of waste removed (if any) from the Site.
- Include signed and sealed record drawings, manifests, and bill of ladings, as applicable.
- Provide a description of changes/deviations from the TSOW, if any.

4.0 Proposed Remedial Investigation

The RI field activities are comprised of two phases. The objective of Phase I is to evaluate the impact of PFAS containing AFFF usage on the ground surface and surrounding water bodies. Phase I sampling includes an evaluation PFAS in surface soil on the Site, shallow soil directly below the pavement in the fire training area and surface water and sediment adjacent to the Site. Phase I activities are summarized in the following subsections. The objective of the Phase II RI field activities will be to evaluate the horizontal and vertical extent of PFAS containing AFFF in subsurface soil and groundwater. The number of soil borings, the total depths of the borings and the targeted intervals of the groundwater sampling will be based on the findings and conclusions Phase I.

Prior to outlining the proposed work, general item applicable to the activities are listed below:

- A site-specific Health and Safety Plan (HASP) will be prepared for the investigation activities based on the generic HASP and site-specific HASP template.
- A CAMP will be implemented (as necessary) during ground intrusive activities in accordance with the NYSDOH generic CAMP. The CAMP will include real-time monitoring for volatile organic compounds (VOCs) and particulates (i.e., dust) at one upwind and one downwind perimeter location during ground intrusive activities. The CAMP will be implemented by the TRC scientist/engineer overseeing investigation activities.
- Investigation activities, including sample collection and analysis, will be completed in accordance with the Standby Engineering Services Contract, NYSDEC DER-10, Guidelines for Sampling and Analysis of PFAS under NYSDEC's Part 375 Programs, the HASP, CAMP, Field Activities Plan (FAP), and Quality Assurance Project Plan (QAPP).
- Unless noted otherwise, environmental samples collected will be submitted for laboratory for analysis of PFAS (21 compound list) by United States Environmental Protection Agency (USEPA) Method 537 Modified.
- In addition to the sampling described below, quality control samples consisting of one field duplicate and one matrix spike/matrix spike duplicate (MS/MSD) sample will be collected in accordance with the QAPP (i.e., at a frequency of one per 20 sample matrix). Additionally, equipment blanks will be collected for analysis of PFAS in accordance with the QAPP (i.e., at a frequency of one per piece of non-dedicated sampling equipment per day). The laboratory will provide NYSDEC Analytical Services Protocol (ASP) Category B data deliverable packages for PFAS analyses and Category A data deliverable packages for waste characterization parameters. Data Usability Summary Reports (DUSRs) for the analytical results, except for any waste characterization analyses, will be prepared. The DUSR will provide an evaluation of analytical data with the primary objective of determining whether or not the data, as presented, satisfies the project specific criteria for

data quality and use. Electronic Data Deliverables (EDDs) in EQuIS format will be submitted to NYSDEC and the results will be presented in the RI Reports.

- The detection limits for PFAS compounds will be accordance with the *June 2021 Sampling, Analysis, and Assessment of PFAS Under NYSDEC's Part 375 Remedial Programs* (Aqueous – 2 ng/L; Solids – 0.5 micrograms per kilogram (µg/kg)).
- For ease of refence, an estimated sample count per each RI Phase is provided in **Table 1**.

4.1 Phase I Remedial Investigation

As part of the Phase I RI, TRC will perform/oversee the following site activities: Fall Kill surface water and sediment sampling, storm water sampling, onsite surface soil and water sampling, Fish and Wildlife Resource Impact Assessment (FWRIA), and IDW management. Each of the aforementioned activities are described further below.

4.1.1 Fall Kill Surface Water and Sediment Sampling (Completed Fall 2021)

In order to co-locate surface water and sediment samples with fish sample locations, collected by NYSDEC Division of Fish and Wildlife, and to ensure samples were collected prior to freezing winter temperatures, TRC completed this subtask in October 2021.

To determine if PFAS contamination has impacted the Fall Kill, TRC collected co-located surface water and sediment samples from the 11 locations identified below and shown on **Figure 3**.

- 2 locations in the Fall Kill directly adjacent to the on-site surface water impoundment culverts.
- 7 locations downgradient of the Site and upgradient of the southern dam.
- 2 locations downgradient of the southern dam.

Due to the width, depth and configuration of the Fall Kill near the Site, it was necessary to use a small boat to access several of the surface water and sediment sample locations. TRC coordinated its activities with the NYSDEC Division of Fish and Wildlife so that surface water/sediment samples were collected in concert with biota sampling by the Division of Fish and Wildlife.

Surface water samples were collected at a depth of 1 foot beneath the water surface. Sediment samples were collected from the boat via a ponar dredge sampling device. Where sediment sampling locations are accessible by foot, sediment samples were collected using a slide hammer sludge sampler.

At each surface water/sediment sampling location, water column thickness, velocity, and water quality (dissolved oxygen, pH, turbidity, oxidation-reduction potential, etc.) wasw measured. Sediment samples were screened for evidence of contamination and characterized using the Unified Soil Classification System (USCS).

4.1.2 Upgradient Fall Kill Sediment Sampling

To reassess the presence of PFAS contamination in sediment upgradient of the Site, TRC will recollect sediment sample DCFTC-SE-01, shown on **Figure 3**. The sediment sample will be collected via a ponar dredge sampling device. Sampling of this location will be performed concurrent with shallow soil sampling – below pavement (see **Section 4.1.4**) and surface soil sampling (see **Section 4.1.5**) activities.

4.1.3 Storm Water Sampling

To assess the potential for PFAS migration at the Site via storm water infiltration and runoff, TRC will complete one storm water sampling event during a precipitation event that includes 0.1 or more inches of rain. Up to 10 storm water grab samples will be collected from various areas of the Site and submitted for PFAS analysis. Storm water samples will be biased toward areas of ponded water (on paved and unpaved surfaces), unpaved areas receiving sheet flow/runoff from paved areas, swales, ditches, and culverts.

4.1.4 Shallow Soil Sampling – Below Pavement

To further investigate elevated PFAS concentrations previously detected in soil beneath paved areas of the Site, 10 shallow soil borings will be advanced in 5 paved investigation areas. Proposed paved investigation areas are shown as red symbols on **Figure 4**. At each investigation area, a shallow soil boring will be advanced through a cracked, weathered, or degraded section of asphalt via a slide hammer sampler or hand auger. Following advancement of each boring, a second shallow boring will be advanced approximately 5 feet away in competent asphalt, free of cracks, weathering or visible degradation via the same method. Soil samples collected from each shallow soil boring at 3 depth intervals will be submitted for laboratory analysis of PFAS, as follows: immediately below the pavement to 1 foot below ground surface (bgs), 1 to 2 feet bgs, and 2 to 3 feet bgs (30 samples total).

Soil will be screened for indications of contamination (visual, olfactory, and photoionization detector (PID)) and characterized using the USCS. Observations will be recorded in a field log book. Soil samples will be submitted for analysis of PFAS. The following sampling methodology will be utilized:

- At each location, samples from the upper interval will be analyzed initially. If preliminary analytical results from the upper interval exceed the Unrestricted Use Soil Cleanup Objective (UUSCO) for either perfluorooctanoic acid (PFOA) (0.66 parts per billion (ppb)) or PFOS (0.88 ppb), both lower intervals will be analyzed.
- Soil samples collected from the shallowest and deepest intervals may additionally be analyzed for synthetic precipitation leaching procedure (SPLP) PFAS. Initially the samples will be held for analysis, pending the PFAS results for the upper depth interval. If preliminary analytical results from the upper interval exceed UUSCOs for either PFOA or PFOS, both SPLP samples will be analyzed.

Following completion of sampling at each location, the boreholes will be backfilled with a cement/bentonite grout.

4.1.5 Surface Soil Sampling

To further delineate the limits of elevated PFAS concentrations in surface soil detected during the 2019 SC and assess surface soil in the pathway of storm water sheet flow, TRC will sample accessible surface soil surrounding paved areas of the Site. The surface soil sampling will include the collection of 84 samples from up to 28 surface soil sample locations. Included are 22 primary and 6 secondary ("step out" contingency) locations. Proposed surface soil sample locations are shown as yellow (primary) and orange (secondary) symbols on **Figure 4**.

Surface soil samples will be collected via a slide hammer sampler or hand auger to a depth of 2.5 feet bgs, refusal, or the water table, whichever is encountered first. Surface soil samples will be collected from 3 intervals (0 to 0.5 feet bgs, 0.5 to 1.5 feet bgs, and 1.5 to 2.5 feet bgs) for possible laboratory analysis.

Surface soil samples will be submitted for analysis of PFAS. The following sampling methodology will be utilized:

- At all primary locations, samples from the upper interval will be analyzed initially. If preliminary analytical results from the upper interval exceed the UUSCO for either PFOA (0.66 ppb) or PFOS (0.88 ppb), both lower intervals will be analyzed.
- If a PFAS concentration above a UUSCO is detected in a sample collected at a primary surface soil sampling location, samples from the corresponding secondary location will be analyzed for PFAS. The same procedure with respect to authorizing analysis of the lower depth intervals will be implemented.
- Up to 8 surface soil samples, biased at the 0 to 0.5 foot bgs depth interval, will additionally be analyzed for SPLP PFAS. These samples will be selected based on preliminary results.

- Due to the "hold and analyze" methodology described above, primary samples will be analyzed on a 5-day turn-around-time to minimize the potential for exceeding laboratory hold times (28 days) for secondary samples.

Surface soil samples will be screened for indications of contamination (visual, olfactory, and PID) and characterized using the USCS. In addition, approximately 25% of surface soil samples will be submitted for the following additional analyses:

- Target Compound List (TCL) VOCs plus 10 tentatively identified compounds (TICs) by USEPA Method 8260; and
- TCL Semivolatile Organic Compounds (SVOCs) plus 20 TICs by USEPA Method 8270.

4.1.6 Surface Water Sampling

At up to 15 locations, TRC will sample ponded surface water in the wooded area between the eastern Site fence and Fall Kill as shown on **Figure 4**. Surface water samples will be submitted for analysis of PFAS.

4.1.7 Fish and Wildlife Resources Impact Assessment

A FWRIA will be conducted in accordance with NYSDEC DER-10 and the NYSDEC Guidance Document "Fish and Wildlife Impact Analysis for Inactive Hazardous Waste Sites". The scope of work for the Fish and Wildlife Impact Analysis (FWIA) includes components associated with Step I of the FWIA process, including wetland and waterbody delineations, ecological cover-type classification and mapping, evaluation of habitat quality and determination of complete ecological pathways and receptors (in coordination with the NYSDEC) through the comparison of site soils, sediments, surface water and groundwater to ecological screening criteria. The results of this analysis will determine whether or not further evaluation is required for specific pathways and/or receptors in order to establish whether constituents of concern (COCs) at the Site may affect fish and wildlife resources.

If it is determined that further analysis is required based on this analysis and consultation with the NYSDEC and NYSDOH, additional scope and costs can be provided to complete criteria-specific and toxic analyses (Step II of the FWIA Process), evaluate ecological effects of remedial alternatives (Step III), further delineate and determine fish and wildlife requirements for implementation of remedial actions (Step IV), and develop a monitoring program for the Site (Step V).

4.1.8 Land Survey

The land survey will include the above referenced sampling locations and significant Site physical features. The surveyor will collect the following:

- Locations and elevations of existing monitoring wells including elevations of adjacent ground surface, top of protective casing elevations, and top of polyvinyl chloride (PVC) riser elevations;
- Locations and elevations of storm water, below pavement soil, surface soil, surface water and sediment samples;
- Topography showing ground surface at 1-foot intervals;
- Parcel boundaries; and
- Significant Site physical features (i.e., buildings, utilities, fencing, limits of ground surface coverings, drainage features, edges of wetlands, limits of vegetated areas, etc.)

A land survey drawing, showing the surveyed points and Site features, signed and sealed by a Professional Land Surveyor (PLS) licensed to practice in the State of New York, will be included in the Phase I RI Report.

4.1.9 Investigation Derived Waste

- Wash and rinse water used for equipment decontamination will be containerized in Department of Transportation (DOT)-approved 55-gallon drums for off-site disposal.
- Concrete, asphalt and soil cuttings will be containerized in DOT-approved 55-gallon drums for off-site disposal.
- Used personal protective equipment (PPE) and disposable sampling equipment will be bagged as regular refuse and disposed as solid waste, unless grossly contaminated.
- Containerized materials will be clearly marked to indicate the contents of the containers, the date of collection, and the source of the material.
- Materials containerized for off-site disposal will be staged at a predetermined location agreed on with the NYSDEC and Site property owner(s).
- IDW pickup of all materials will be scheduled following completion of all Phase II RI activities.

4.1.10 Phase I Remedial Investigation Report

The Phase I RI Report will present the results of the initial remedial investigation and will be prepared in accordance with the applicable provisions of NYSDEC DER-10. The report will include text, tables, and figures. The figures will show the aerial and vertical extent of contaminants identified. The Phase I RI Report will describe the characteristics of the areas investigated, geology and hydrogeology and will also present the results of the FWRIA, if completed. Recommendations for Phase II RI activities (if any) will also be presented in the Phase I RI Report.

4.2 Phase II Remedial Investigation

Based on the findings and conclusions presented in the Phase I RI Report, additional remedial investigation activities may be required to define the horizontal and vertical extent of PFAS contamination at the Site, in order to assess associated risk to human health and the environment. The Phase II RI activities will likely include advancement of soil borings, installation and development of groundwater monitoring wells, and the collection and analysis of additional soil and groundwater samples. Although the exact number, location and depths of the additional soil borings and wells may be modified based on the results of the Phase I investigation, it is anticipated that up to 15 soil borings and 8 new monitoring wells will be completed at the Site.

4.2.1 Utility Locating Survey

Prior to intrusive activities, a private utility locating survey will be conducted, in addition to the public utility mark outs. To support future remedial actions, the entire training portion of the Site will be scanned for utilities. Any subsurface utilities/structures/anomalies will be identified on the ground surface with spray paint and/or pin flags. A utility survey report, including a map showing the locations and types of subsurface features identified, will be prepared and included in the Phase II RI Report.

TRC will discuss any required soil boring repositioning, due to identified subsurface utilities/structures/anomalies, with the NYSDEC and NYSDOH prior to installation. It is anticipated that minor offsets (10 feet or less) will not require prior notification/approval.

4.2.2 Direct Push Soil Borings

Continuous soil sampling will be completed at up to 15 boring locations to a depth of 5 feet below the encountered water table (expected to be within 5 to 10 feet bgs) or refusal, whichever is encountered first. Subsurface soil samples will be collected via a dual-tube sampling system and small diameter poly-vinyl chloride (PVC) sleeves.

One soil sample from each soil boring, collected from directly above the apparent groundwater table, will be submitted for laboratory analysis of PFAS.

Following sample collection, a blind center rod will be placed inside the dual-tube rods, and the drill string will be advanced to the top of bedrock (expected to be within 40 feet bgs) for purposes of contouring the bedrock surface. Each borehole will be tremie grouted using a cement/bentonite grout from the refusal depth to ground surface upon completion.

4.2.3 Monitoring Well Installation and Development

Up to 8 overburden monitoring wells, co-located with soil borings, will be installed. Soil borings selected for monitoring well installations will be offset from the soil boring locations by a distance of approximately 5 feet. The upper 3 feet of soil at each well location will be removed by hand and a length of 6-inch diameter PVC will be set to prevent potential soil fall-in during drilling activities. Following installation of the upper temporary PVC casing, the monitoring wells will be installed via direct-push technology with 3.25-inch outer diameter (OD) rods and expendable points. Construction details for the monitoring wells is anticipated to consist of the following:

- Wells at 6 locations will be constructed with 7 feet of 1-inch diameter 0.01 slot screen set 5 feet below and 2 feet above the encountered water table.
- Wells at 2 locations will be completed directly above the refusal (estimated bedrock surface) depth as determined by the soil boring subtask above. One upgradient and one downgradient location will be selected for well installations. Each well location will be constructed with 5 feet of 1-inch diameter 0.01 slot screen.
- The annulus between the well and borehole wall will be backfilled with a No. 0 filter sand to 1 foot above the screen followed by a minimum 1-foot thick hydrated bentonite seal. The remaining annulus will be filled with a cement/bentonite grout to approximately 1 foot bgs, as conditions allow.

Where completed on-site in asphalt pavement or landscaped areas, monitoring wells will be completed with flush mount manholes within a concrete pad. Where completed off-site in vegetated areas, monitoring wells will be completed above ground surface within a steel standpipe set in a concrete pad.

Following installation, the monitoring wells will be developed via an inertial lift pump, high density poly-ethylene (HDPE) tubing and equipment compatible with the recommendations for PFAS purging protocols. Development will be considered complete when either turbidity is below 50 nephelometric turbidity units (NTUs), the well purges dry, or 10 well volumes have been removed, whichever occurs first.

4.2.4 Groundwater Sampling

A minimum of two weeks after well development activities have been completed, groundwater samples will be collected from the 5 existing and 8 newly installed monitoring wells utilizing low-flow sampling techniques and analyzed for PFAS. Similar to the well development subtask, HDPE tubing and equipment compatible with the recommendations for PFAS purging protocols will be used. Prior to sampling, the monitoring wells will be screened with a PID and gauged for total well depth and depth to water. Field data will be recorded in a field log book. Depth to water measurements will be used to prepare groundwater surface elevation contour maps, to be provided in the Phase II RI Report.

4.2.5 Site Survey

The surveyor selected to perform activities under the Phase I RI will revisit the Site to survey locations and elevations (ground surface, top of protective casing elevation and top of PVC well casing) of the new monitoring wells and direct-push borings, and coordinates of identified subsurface utilities and geophysical anomalies.

The survey drawing will be updated and signed/sealed by the PLS and included in the Phase II RI Report. The survey data will be used to generate groundwater/bedrock surface elevation contour figures for the project investigation area.

4.2.6 Investigation Derived Waste

- Wash and rinse water from equipment decontamination, development water, purge water, and soil cuttings will be containerized in DOT-approved 55-gallon drums for off-site disposal.
- Concrete, asphalt and soil cuttings will be containerized in DOT-approved 55-gallon drums for off-site disposal.
- Used PPE and disposable sampling equipment will be bagged as regular refuse and disposed as solid waste, unless grossly contaminated.
- Containerized materials will be clearly marked to indicate the contents of the containers, the date of collection, and the source of the material.
- Materials containerized for off-site disposal will be staged at a predetermined location agreed on with the NYSDEC and Site property owner(s).

4.2.7 Phase II Remedial Investigation Report

The Phase I RI Report will be updated with the results of the Phase II RI activities, additional FWRIA activities (if any), and/or additional IRMs (if any) completed at the Site.

Groundwater surface elevation contour maps showing inferred predominant groundwater flow direction will be provided. In accordance with NYSDEC DER-10, if determined, the RI Report will identify the sources of contamination, migration pathways, and known actual or potential receptors of contaminants.

TABLES

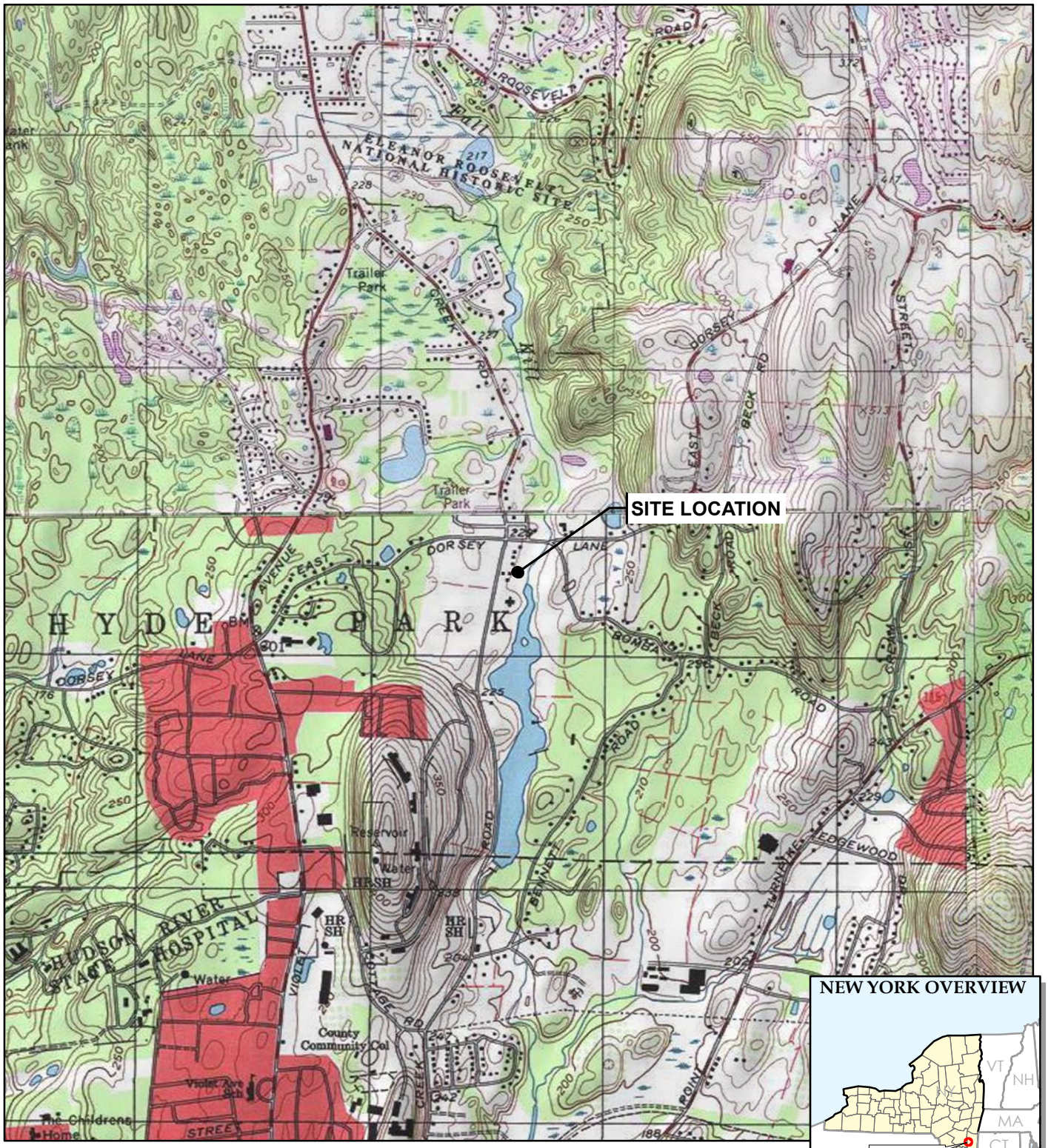
Table 1
New York State Department of Environmental Conservation
Dutchess County Fire Training Center (Site No. 314128)
Hyde Park, New York
Remedial Investigation/Feasibility Study with Interim Remedial Measure
Sample Analysis Summary

Task and Subtask Name	Sample Type	Sample Matrix	Number of Samples for Analysis	Analytical Parameters
PHASE I REMEDIAL INVESTIGATION				
Storm Water Sampling	Storm Water	Water	10	PFAS (21 Compound List)
	Blind Duplicate	Water	1	
	MS/MSD	Water	2	
Shallow Surface Soil Sampling - Below Pavement	Environmental	Soil	30	PFAS (21 Compound List) - Hold and Analyze Methodology
			20	SPLP PFAS (21 Compound List) - Hold and Analyze Methodology
	Equip. Blank	Water	2	PFAS (21 Compound List)
	Blind Duplicate	Soil	2	
	MS/MSD	Soil	4	
Surface Soil Sampling	Environmental	Soil	84	PFAS (21 Compound List) - Hold and Analyze Methodology
			8	SPLP PFAS (21 Compound List) - Hold and Analyze Methodology
			21	TCL VOCs and TCL SVOCs
	Equip. Blank	Water	2	PFAS (21 Compound List), TCL VOCs, and TCL SVOCs
	Blind Duplicate	Soil	5	
	MS/MSD	Soil	10	
Surface Water Sampling	Surface Water	Surface Water	15	PFAS (21 Compound List)
	Blind Duplicate	Surface Water	1	
	MS/MSD	Surface Water	2	
Fall Kill Surface Water Sampling	Surface Water	Surface Water	11	PFAS (21 Compound List)
	Blind Duplicate	Surface Water	1	
	MS/MSD	Surface Water	2	
Fall Kill Sediment Sampling	Sediment	Sediment	12	PFAS (21 Compound List)
	Equip. Blank	Water	1	
	Blind Duplicate	Sediment	1	
	MS/MSD	Sediment	2	
		Total	**249**	
PHASE II REMEDIAL INVESTIGATION				
Direct Push Soil Borings and Monitoring Wells	Environmental	Soil	15	PFAS (21 Compound List)
	Equip. Blank	Water	3	
	Blind Duplicate	Soil	1	
	MS/MSD	Soil	2	
Groundwater Sampling	Groundwater	Groundwater	13	PFAS (21 Compound List)
	Equip. Blank	Water	1	
	Blind Duplicate	Groundwater	1	
	MS/MSD	Groundwater	2	
Investigation Derived Waste	IDW	Liquid Waste	1	PFAS, TCL VOCs, TCL SVOCs, TCL Pesticides/Herbicides, PCBs, TAL Metals plus CN, pH, Total Organic Halides, Ignitability, Corrosivity, and Reactivity
	IDW	Solid Waste	1	PFAS, Full List TCLP (TCL VOCs, TCL SVOCs, TCL Pesticides/Herbicides, TAL Metals plus CN), PCBs, pH, Paint Filter, Total Organic Halides, Ignitability, Corrosivity, and Reactivity
		Total	**40**	

Notes:

CN	: Cyanide	SVOCs	: Semi-volatile Organic Compounds
IDW	: Investigation Derived Waste	TAL	: Target Analyte List
MS/MSD	: Matrix Spike/Matrix Spike Duplicate	TCL	: Target Compound List
PCBs	: Polychlorinated Biphenyls (7 Aroclor List)	TCLP	: Toxicity Characteristic Leaching Procedure
PFAS	: Per- and Polyfluoroalkyl Substances	VOCs	: Volatile Organic Compounds

FIGURES



BASE MAP FROM USGS 7.5 MINUTE TOPOGRAPHIC QUADRANGLE SERIES - POUGHKEEPSIE QUAD

1 " = 2,000 '
1:24,000

0 2,000 4,000 FEET

TRC
10 Maxwell Drive, Suite 200
Clifton Park, NY 12065
Phone: 518.348.1190
www.trccompanies.com

PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DUTCHESS COUNTY FIRE TRAINING CENTER - SITE NO. 314128
392 CREEK ROAD
HYDE PARK, DUTCHESS COUNTY, NEW YORK

TITLE:

SITE LOCATION MAP

DRAWN BY:	M. OPEL
CHECKED BY:	J. KING
APPROVED BY:	J. MAGDA
DATE:	FEBRUARY 2020
PROJ. NO.:	353945
FILE:	Fig01_SiteLoc.mxd

FIGURE 1

S:\1-PROJECTS\NYSDEC\353945_HydePark\HydePark\HydePark\Fig01_SiteLoc.mxd -- Saved By: MOPEL on 2/3/2020, 16:13:43 PM

LEGEND

- TAX PARCEL BOUNDARY
- ONSITE WATER IMPOUNDMENT
- SURFACE WATER FLOW DIRECTION
- CULVERT
- MONITORING WELL (2019)
- SOIL BORING (2019)
- SUPPLY WELL

PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DUTCHESS COUNTY FIRE TRAINING CENTER - SITE NO. 314128
392 CREEK ROAD
HYDE PARK, DUTCHESS COUNTY, NEW YORK

TITLE:

SITE LAYOUT MAP

DRAWN BY:	L. LILL	PROJ. NO.:	453208.0000.0000
CHECKED BY:	J. KING		
APPROVED BY:	J. MAGDA		**FIGURE 2**
DATE:	FEBRUARY 2022		

BASE MAP: GOOGLE EARTH IMAGERY
DATA SOURCES: TRC
SHEET SIZE: 11X17P

NOTE: LOCATIONS AND DIMENSIONS OF BOUNDARIES AND PHYSICAL FEATURES ARE APPROXIMATE.

0 100 200 FEET
1:1,200 1" = 100'

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Clifton Park, NY 12065
Phone: 518-348-1190
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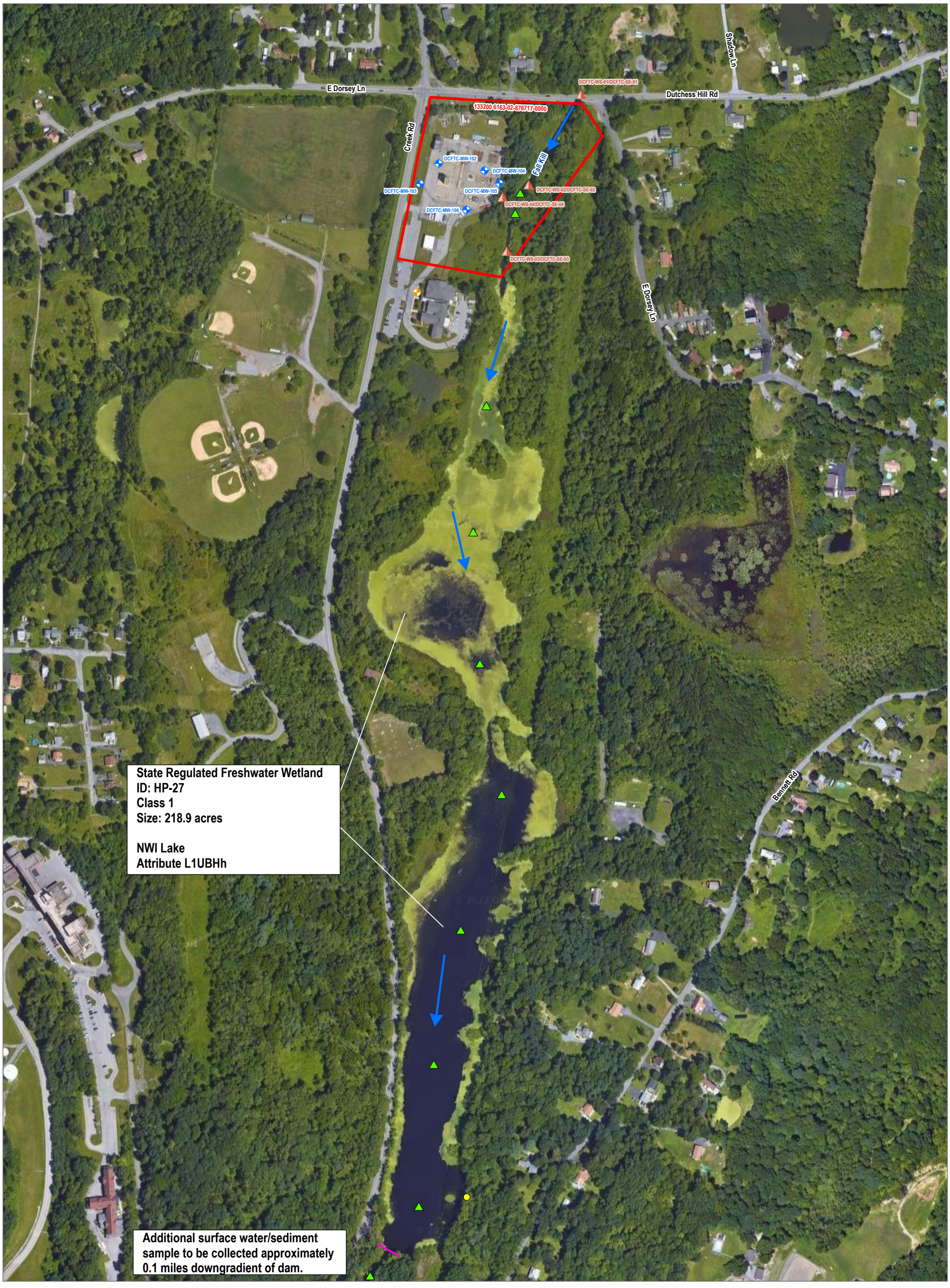
FILE: SITELAYOUT



LEGEND

- TAX PARCEL BOUNDARY
- DAM
- SURFACE WATER FLOW DIRECTION
- MONITORING WELL (2019)
- SURFACE WATER/SEDIMENT SAMPLE (2019)
- SUPPLY WELL
- BOAT LAUNCH
- PROPOSED SURFACE WATER/SEDIMENT SAMPLE LOCATION

BASE MAP: GOOGLE EARTH IMAGERY
DATA SOURCES: TRC
SHEET SIZE: 11X17P

NOTE: LOCATIONS AND DIMENSIONS OF BOUNDARIES AND PHYSICAL FEATURES ARE APPROXIMATE.

0 375 750 FEET

1:4,500 1" = 375'

PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DUTCHESS COUNTY FIRE TRAINING CENTER - SITE NO. 314128
392 CREEK ROAD
HYDE PARK, DUTCHESS COUNTY, NEW YORK

TITLE:
PROPOSED SURFACE WATER/SEDIMENT SAMPLE LOCATIONS

DRAWN BY:	L. LILL	PROJ. NO.:	453208.0000.0000
CHECKED BY:	J. KING		
APPROVED BY:	J. MAGDA		**FIGURE 3**
DATE:	FEBRUARY 2022		

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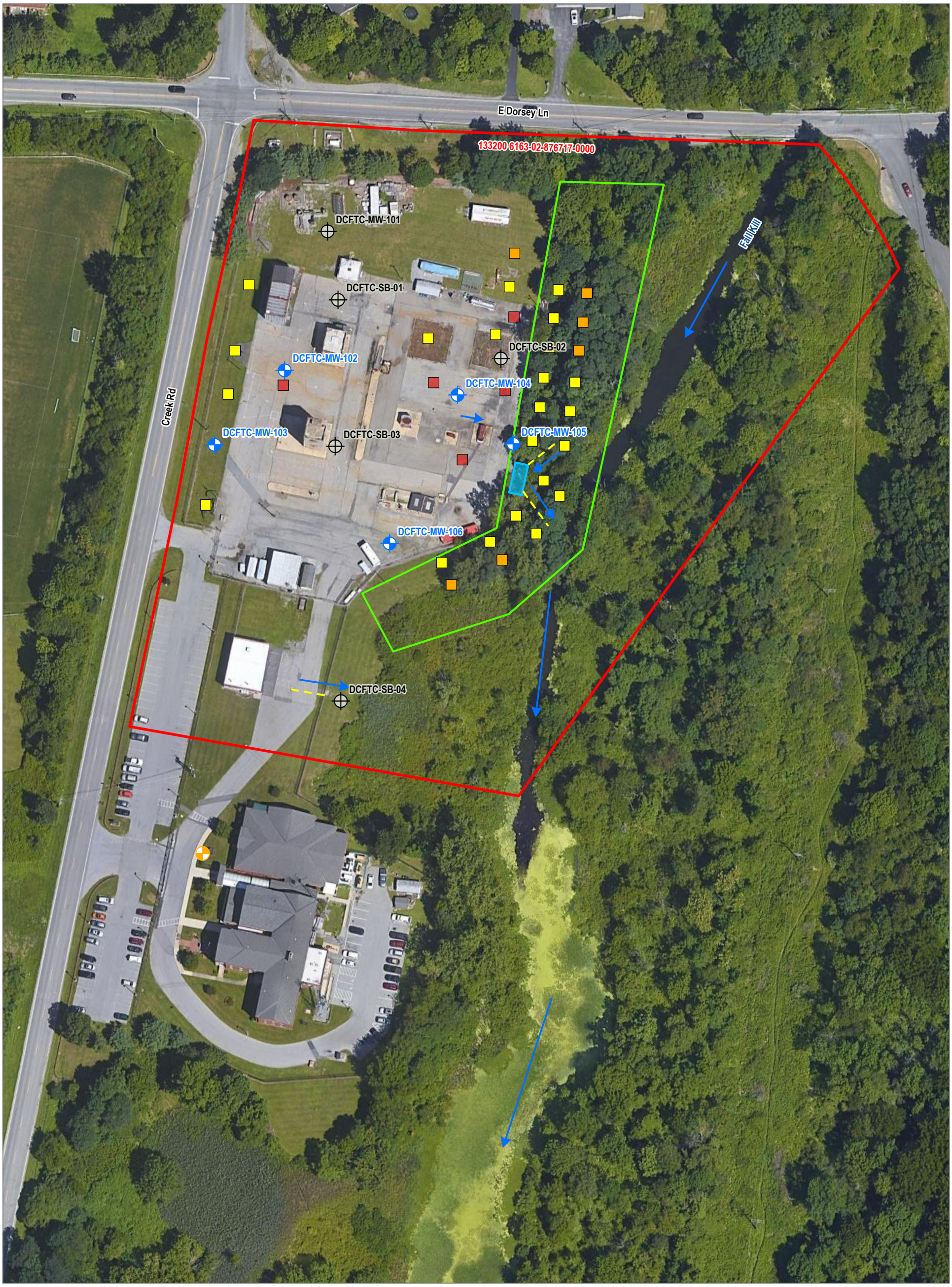
FILE: SITELAYOUT



LEGEND

- TAX PARCEL BOUNDARY
- ONSITE WATER IMPOUNDMENT
- AREA TARGETED FOR SURFACE WATER SAMPLING
- SURFACE WATER FLOW DIRECTION
- CULVERT
- MONITORING WELL (2019)
- SOIL BORING (2019)
- SUPPLY WELL
- PROPOSED SURFACE SOIL SAMPLE - PRIMARY LOCATIONS
- PROPOSED SURFACE SOIL SAMPLE - SECONDARY LOCATIONS
- PROPOSED SURFACE SOIL SAMPLE - BELOW PAVEMENT LOCATIONS

PROJECT:
NEW YORK STATE DEPARTMENT OF ENVIRONMENTAL CONSERVATION
DUTCHESS COUNTY FIRE TRAINING CENTER - SITE NO. 314128
392 CREEK ROAD
HYDE PARK, DUTCHESS COUNTY, NEW YORK

TITLE:
PROPOSED SOIL SAMPLE LOCATION MAP

DRAWN BY:	L. LILL	PROJ. NO.:	453208.0000.0000
CHECKED BY:	J. KING		
APPROVED BY:	J. MAGDA		**FIGURE 4**
DATE:	FEBRUARY 2022		

BASE MAP: GOOGLE EARTH IMAGERY
DATA SOURCES: TRC
SHEET SIZE: 11X17P

NOTE: LOCATIONS AND DIMENSIONS OF BOUNDARIES AND PHYSICAL FEATURES ARE APPROXIMATE.

0 100 200 FEET
1:1,200 1" = 100'

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FILE: SITELAYOUT