Remedial Investigation / Feasibility Study Draft Work Plan

Volume 1

United States Environmental Protection Agency
Fulton Avenue Superfund Site Operable Unit 2
Garden City Park, Nassau County, New York

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RAC 2 PROGRAM

REMEDIAL INVESTIGATION/FEASIBILITY STUDY WORK PLAN

FULTON AVENUE OPERABLE UNIT 2

GARDEN CITY PARK, NASSAU COUNTY, NEW YORK

September 2013

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ACRONYMS

AOC	Area of Concern
AR	Authorized Representative
ARAR	Applicable or Relevant and Appropriate Requirement
ASCE	American Society of Civil Engineers
ASTM	American Society for Testing and Materials
bgs	below ground surface
BERA	Baseline Ecological Risk Assessment
BHHRA	Baseline Human Health Risk Assessment
CDI	Chronic Daily Intake
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CIC	Community Involvement Coordinator
CLASS	Contract Laboratory Analytical Support Services
CLP	Contract Laboratory Program
CO	Contracting Officer
COC	Chain of Custody
COPC	Chemical of Potential Concern
COPEC	Chemical of Potential Ecological Concern
CPI	Characters per Inch
CRP	Community Relations Plan
CSF	Cancer Slope Factor
CSIA	Compound Specific Isotope Analysis
CSM	Conceptual Site Model
DESA	Division of Environmental Science and Assessment
DMA	Demonstration of Method Applicability
DPT	Direct Push Technology
DQO	Data Quality Objective
GIS	Geographic Information System
EDR	Environmental Data Resources, Inc.
EFH	Exposure Factors Handbook
ELCR	Excess Lifetime Cancer Risks
EPA	United States Environmental Protection Agency
EPC	Exposure Point Concentration
EPIC	Environmental Photographic Interpretation Center
ERAGS	Ecological Risk Assessment Guidance for Superfund
ERM	Environmental Resources Management, Inc.
ESAT	Environmental Services Assistance Team
DER	Data Evaluation Report
FID	Flame Ionization Detector
FORMS	Field Operations and Records Management System
FS	Feasibility Study
GCPIA	Garden City Park Industrial Area
GCWD	Garden City Water District
GIS	Geographic Information System
GPS	Global Positioning System
HASP	Health and Safety Plan
HDR	Henningson, Durham and Richardson Architecture and Engineering, P.C. in association with HDR Engineering, Inc.

ACRONYMS (cont.)

HEAST	Health Effects Assessment Summary Table
HI	Hazard Index
HQ	Hazard Quotient
IDW	Investigation Derived Waste
IRIS	Integrated Risk Information System
IRM	Interim Remedial Measure
LDP	Locational Data Policy
LOE	Level of Effort
MDC	Maximum Detected Concentration
msl	mean sea level
NAD	North American Datum
NAVD	North American Vertical Datum
NCDH	Nassau County Department of Health
NCDPW	Nassau County Department of Public Works
NCEA	National Center for Environmental Assessment
NCP	National Contingency Plan
NYGS	New York Geological Survey
NYSDEC	New York State Department of Environmental Conservation
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAR	Pathways Analysis Report
PCE	Perchloroethylene
PID	Photoionization Detector
PO	Project Officer
PPE	Personal Protective Equipment
PRP	Potentially Responsible Party
PSA	Preliminary Site Assessment
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QMP	Quality Management Plan
RAGS	Risk Assessment Guidelines for Superfund
RAO	Remedial Action Objective
RAS	Routine Analytical Services
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
RSL	Regional Screening Level
SLERA	Screening Level Ecological Risk Assessment
SMDP	Scientific Management Decision Point
SOP	Standard Operating Procedure
SOW	Statement of Work
STR	Sampling Trip Report
STSC	Superfund Technical Support Center
TAL	Target Analyte List

ACRONYMS (cont.)

TBC	To Be Considered
TCE	Trichloroethylene
TCL	Target Compound List
TIP	Technology Innovation Program
TOC	Total Organic Carbon
UCL	Upper Confidence Limit
UFP	Uniform Federal Policy
USCS	Unified Soil Classification System
USDOT	Unites States Department of Transportation
USGS	United States Geological Survey
VOC	Volatile Organic Compound
WACR	Work Assignment Closeout Report
WAM	Work Assignment Manager

1. Introduction

This Revised Work Plan was prepared for the United States Environmental Protection Agency (EPA) by Henningson, Durham and Richardson Architecture and Engineering, P.C. in association with HDR Engineering, Inc. (HDR) to provide a scope of work for the Remedial Investigation/Feasibility Study (RI/FS) for the Fulton Avenue Superfund Site Operable Unit (OU) 2 (the Site), located in Garden City Park, Nassau County, New York (Figure 1). The RI/FS is being performed under Work Assignment Number 016-RICO-02JN, under the EPA RAC 2 Contract Number EP-W-09-009. The current Work Plan was prepared based upon the October 14, 2009 Statement of Work (SOW), the EPA-approved Tetra Tech EC, Inc. Final Work Plan, dated June 2006, discussions with EPA during the scoping meeting held on October 27, 2009, Amendment 02 dated August 26, 2010, the December 15, 2011 Work Plan and additional May 25, 2012 revisions.

The Work Plan has been revised as directed by Amendment 15 dated August 19, 2013 to include the deeper boring/well drilling contingency, expanded hydrogeological assessment and additional analytical parameters to complement forensic analyses and provide additional lines of evidence. These revisions were outlined in HDR's July 29, 2013 memo, *Recommendations for Additional Field Investigation Activities and other Associated Tasks* referenced in Amendment 15. The *Recommended Additional Field Investigation Activities* provide the basis to continue the field investigation, to fill identified data gaps and develop multiple lines of evidence, focusing on public water supply receptors and find the deeper, multiple component plume and its source(s).

A review of the results of sampling and other analyses performed by HDR, along with investigations completed by others since the original OU2 Work Plan was proposed has shifted both the lateral area and depths into the subsurface requiring further investigation to identify contaminant sources. Although the Work Assignment objectives are unchanged, the proposed technical approach for the field sampling program has been modified sufficiently to warrant this revision to the Work Plan.

There is evidence that a largely clean lens of shallow ground water exists beneath the Study Area, to the depth (80-120 feet bgs) that can be reached using direct push GeoProbe technology (DPT). Having completed 68 DPT holes and taken 132 ground water samples, *49 detects of chlorinated volatile organic compounds (CVOCs, i.e., PCE, TCE)* were noted, using field screening capable of detecting 3 ppb of CVOCs. Detected TCE concentrations varied from 0.82 to3300 ppb and PCE from 0.51 to 2800 ppb, with most CVOC detections in the double digit ppb range. These screening results were confirmed with laboratory analysis.

There are numerous factors contributing to this clean water lens that lend consistency and credibility to these findings, including natural and induced fresh water recharge via the large, irrigated open spaces (i.e., parks and golf courses) and recharge basins present in the area. The high volume, almost continuous pumpage at several public water supply wells from the deeper, highly productive zones of the Magothy formation also contribute to this effect.

There are indications there may be a localized ground water divide and extreme vertical gradient within the Study Area. Results of the CSIA analyses also indicate a complex hydrogeological environment,

having identified several separate and potentially overlapping TCE sources in multiple plumes, impacting public water supply wells at depths of 250-500 feet bgs. With this information, we have developed a clear path forward to identify potential sources.

The tasks presented here, including a hydrogeological assessment, refinement of the CSIA study and completion of deeper borings and monitoring wells are designed to complete the search for a contaminant source(s) and one or more potentially responsible parties.

- The hydrological assessment will help in understanding the potential receptors and water resources at risk; regional geology, stratigraphy and heterogeneity; vertical and lateral ground water flow gradients; and recharge and discharge areas. Transducers are to be installed in existing wells and, if necessary, in new wells to collect continuous water level measurements for a defined period, as detailed herein.
- Data collection has and will include measurements and/or modeling of VOC concentrations and CSIA and other forensic results; indicators of contaminant mass flux, potential preferential pathways; and contaminant distribution within both soil and groundwater.
- Based on the prior field investigation findings, the shallow depths (up to 120 ft) that can be achieved with DPT have proved insufficient to provide the data needed for this investigation. Installation of deeper borings and monitoring wells via Rotosonic, mud rotary drilling or similar methods within the Magothy aquifer are required to evaluate the potential source(s) of the TCE plume(s).

Triad Approach

This OU2 investigation presents many unknowns and uncertainties that could impact the ultimate remedial decision-making and is best implemented using proven Triad principles. This Revised Work Plan is based on the Triad approach to site investigation and remediation, which consists of three major components:

- Systematic Project Planning: includes use and ongoing refinement of a conceptual site model (CSM) to help define project goals and decisions, methods, as well as the type and quality of data to be collected. Systematic planning considers existing information to identify critical decisions and related data gaps to identify unit costs for activities included in the Work Plan. The scope, budget, and resources needed to conduct systematic project planning are reflected in this Revised Work Plan.
- Dynamic Work Strategies: a logical progression of activities to achieve project goals, including a flexible work plan to guide the project tasks, yet allowing them to be adapted in the field to react to the data being generated. Dynamic investigations using direct-push methods, common with Triad, often work best when detailed, optional tasks are built into a Work Plan, as is the case here. Unit costs, with minimum quantities and performance requirements based on the project scope or site knowledge have been developed, including those for sample collection, materials and standby time. The compensation schedule provided to subcontract bidders reflects these Triad-based components.

- Real-Time Measurement Technologies: sampling and analytical services that allow for immediate results, while the sampling team is still in the field. These technologies allow for fast turnaround to provide data on site geology and the extent of contamination. The level of QA/QC required and limitations of the technologies and contingency plans should they fail to produce required data need to be considered, as will be reflected in Standard Operating Procedures to be developed for the project. These will be incorporated in the QAPP and Determination of Method Applicability (DMA).

This Revised Work Plan provides a state-of-the-art framework needed to support groundwater contaminant source identification using advanced, real-time measurement technologies; state-of-the-art analytical methods; data visualization and 3-D mass flux modeling.

The task descriptions provided in the original SOW, as modified to allow for a dynamic work strategy are outlined and described in this Work Plan. Overall activities for the RI/FS remain largely the same and include project administration, review of background materials, community relations, RI/FS field activities including sample analysis, data validation and evaluation, risk assessment, RI and FS reports, remedial alternatives screening and evaluation.

The period of performance is extended until September 30, 2014. This extension is reflected in the associated revised cost estimate and has been approved. An anticipated RI/FS project schedule (see Figure 2) and deliverables schedule (see Table 1) are also being submitted with this Work Plan (Volume 1).

HDR has completed much of the background data review, field investigation technology method research, well inventory, well survey, Triad strategic and systematic planning tasks, tasks already included in the field investigation, groundwater sampling, real-time measurements and Compound-Specific Isotope Analysis (CSIA) as of September 1, 2013. Development of the CSM, refinement of the sampling and analytical strategy and other tasks is ongoing.

The previously submitted HASP and QAPP will be updated based upon the modifications to the Work Plan described herein. A Work Plan Cost Estimate is being submitted to EPA as Volume 2.

1.1 Purpose

The purpose of this Revised Work Plan is to set forth the requirements to successfully complete the RI/FS and to select and identify the viable remediation alternatives to eliminate, reduce, or control risks to human health and the environment associated with the regional trichloroethylene (TCE)-dominant groundwater contamination plume. The primary goal of the work assignment is to develop the minimum amount of data necessary to support source identification and ultimately, the selection of an approach for Site remediation and then to use the data in a well-supported Record of Decision (ROD). This Revised Work Plan outlines the scope of services to be provided.

Specific objectives of the Revised Work Plan include characterization of the extent of TCE contamination in the subsurface, identification of the currently unknown source(s) of groundwater contamination related to OU2 and development of an effective remedial strategy to protect public health and the environment.

Data, including information that has only recently become available from the Fulton Avenue OU1, NYSDEC and other investigations completed to date were considered in developing this Work Plan and

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will be incorporated in the site characterization. Additional data (e.g., water supply pumpage records) are needed to support the source identification goal of the RI, develop the site's ecological and human health risk assessments and complete the Feasibility Study.

The proposed field investigation is designed to evaluate the study area lithology, lateral and vertical hydraulic gradients, extent of contamination, preferential pathways, and other characteristics important in identifying potential sources. Information on both the horizontal and vertical contaminant distribution and horizontal and vertical hydraulic gradients is important to meet the objective of this OU2 investigation. The Work Plan includes depth-discrete sampling and analysis designed to obtain soil and groundwater quality data that reflects the hydrogeological heterogeneities and various recharge (e.g., stormwater basins) and withdrawal points (public supply wells) known to be present in the Study Area. Single-depth sampling would not capture these variations or the ramifications they present and therefore, provide an incomplete, if not erroneous picture of subsurface conditions. Having an accurate understanding of site conditions is critical to developing the CSM, identifying contaminant sources and ultimately, one or more responsible parties.

The depth-discrete data generated will be used to develop a vertical profile identifying contaminants, relative contaminant concentrations, and hydraulic conductivity as they vary in the subsurface. The vertical profile will then be used to support the visualization modeling, identify potential plume core and preferential pathways of contaminant transport, and the overall extent of the contamination, allowing for the tracking of contamination back to its source or sources. CSIA analysis has and will be used in an effort to connect discrete contaminant source(s) and receptors (i.e., water supply wells) – providing the direct evidence needed to distinguish and link potentially responsible parties to contamination in the subsurface.

Specific Objectives of the Revised Work Plan include:

- Review and assess historic investigatory work at the Site conducted by and on behalf of EPA (and other entities, as available), and finalize data needs for completing the RI/FS for the Site. This task has expanded since the time the August 2010 approved Work Plan was submitted, as additional investigations have been completed in the area and major new data sources have become available that required review in order to develop the CSM and sampling and analysis plan;
- Provide community relations support to EPA;
- Consider elements of Green Remediation and sustainable practices throughout the RI/FS process, and document efforts and observations to EPA; in doing so, HDR has incorporated methods that drastically reduce the amount of investigation-derived waste (IDW) to be generated during the RI; and
- Finalize RI/FS deliverables as prescribed in the EPA SOW as modified by Amendment 10.

No work beyond that described in EPA's SOW or this Revised Work Plan will be initiated prior to obtaining EPA approval.

1.2 Site Description

Operable Unit 1 (OU1) of this site is located at 150 Fulton Avenue, Garden City Park, NY and is the former location of a cutting mill and dry cleaning facility. The property consists of approximately 0.8 acre and houses a 20,000 square foot building. There have been numerous previous owners and/or occupants of the building, some of which utilized a dry cleaning process in their production line.

At the present time, the wider regional OU2 study area is bounded to the west by New Hyde Park Road, to the north by Hillside Avenue, to the east by Roslyn Road and to the south by Hempstead Turnpike in Nassau County, Long Island, New York (Figure 1). The August 2010 approved work plan anticipated that these boundaries may be adjusted by EPA depending on the results of the source area study conducted as part of OU2. Investigations completed in the interim indicated an area in need of further investigation located in the northeast quadrant of the original Study Area and extending somewhat further to the north and east than originally outlined, as shown in Figure 5. CSIA and other analytical results from public supply wells indicate there is TCE (and perchloroethylene - PCE) contamination at depths between 300-500 ft bgs, extending to the western edge of the Study Area, including wells operated by the Water Authority of Western Nassau County (wells 57/57A) and south past the extent of the plumes identified in OU1 studies.

1.3 Background

The New York State Department of Environmental Conservation (NYSDEC) conducted an environmental investigation to identify the source(s) of groundwater contamination within the Garden City Park Industrial Area and identified the major source to be a drywell in the parking lot of 150 Fulton Avenue. The present owner of the building entered into a Consent Decree with the NYSDEC to perform an Interim Remedial Measure (IRM) to remediate the drywell and to perform an RI/FS on the impacts on the local aquifer system. During the course of the RI, the data suggested that the contamination emanating from the 150 Fulton Avenue property created a PCE-dominant contaminant plume overlying a more regional TCE-dominant contamination problem, the source of which has not been identified to date. EPA had decided to continue the investigation for the source(s) of the TCE-dominant plume observed during the RI of OU1 for the Site. This designation allows for the remedial process to continue addressing the PCE-dominant portion of the study areas, as this separate OU2 remedial process continues to address the TCE contamination observed which is not thought to emanate from the former drywell at 150 Fulton Avenue.

Additional NYSDEC studies in the Denton Avenue Industrial Area completed in 2009 identified one potential contaminant source as worthy of additional study and several other sites where activities may have contributed to the aquifer contamination with VOCs. HDR had followed up with an in-depth review of available data, including a pending request to NYSDEC for the investigation reports and actual analytical data packages for state-identified sites upgradient of the TCE plume.

The groundwater quality data provided for within the OU2 study area indicates that approximately 17 public supply wells exhibit elevated concentrations of chlorinated volatile organic compounds (VOCs). The wells serve an estimated population of 170,000 persons and are owned or operated by five different water suppliers. Additional review of water supply data, particularly the USEPA Source Water Assessment Program database has provided additional insight to the water supply capture zones and

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potential contaminant sources within them. The impacted wells have either been removed from service or have been provided with treatment to achieve drinking water standards. CSIA results also indicate that there is likely more than one plume and more than one source of TCE within the Study Area.

1.4 Geology and Hydrogeology

1.4.1 Regional Geology

The Site is located in western Nassau County, Long Island. Long Island is situated within the Atlantic Coastal Plain physiographic province, which is underlain by a wedge of unconsolidated sediments that thickens and dips to the southeast toward the Atlantic Ocean. The unconsolidated deposits, which underlie the Site, range in age from late Cretaceous (65 million years ago) to recent.

The principal deposits at land surface in the vicinity of the Site are Pleistocene (glacial) in age. In the western region of Nassau County, where the Site is located, the thickness of the unconsolidated deposits ranges from approximately 400 feet on the north shore of Long Island to greater than 1,500 feet on the south shore. The approximate thickness of the unconsolidated deposits in the proximity of the Site is estimated to be 900 feet.

The unconsolidated deposits, from land surface downward, include glacial deposits of Pleistocene age (Pleistocene deposits); the Matawan Group-Magothy Formation (Magothy), undifferentiated, of late Cretaceous age; and the Lloyd sand and clay members of the Raritan Formation, also of late Cretaceous age. In this investigation, the two uppermost units (Pleistocene deposits and the Magothy Formation) are of primary interest because the Pleistocene deposits lie directly beneath the land surface, and directly above the Magothy Formation. Both the Upper Glacial and Magothy are principal aquifers in the Northern Atlantic Coastal Plain Aquifer System which has a sole source aquifer designation in this area.

The unconsolidated deposits rest unconformably on crystalline bedrock, consisting of Precambrian schist and gneiss, which is considered to be the bottom of the groundwater reservoir on Long Island. The age of the bedrock beneath Long Island has been established as Precambrian. The geologic history of this region exceeds 575 million years. However, long periods of non-deposition and/or periods of large scale erosion are responsible for limiting the rock record to the older Precambrian bedrock and younger Upper Cretaceous and Pleistocene sands, gravels, and clays, which are believed to have been deposited during the last 125 million years.

The Pleistocene deposits are approximately 100 to 130 feet thick in the area of the Site and consist mostly of glacial outwash consisting of fine to coarse sand and gravel with thin local lenses of clay. These Pleistocene deposits contain the water table aquifer in this region of Long Island, which is referred to as the Upper Glacial aquifer. The depth to the water table on OU2 varies, due to a number of factors, including topography, pumping withdrawals, precipitation trends, and local surface water features, including variations in recharge. The depth to the surface of the water table aquifer ranges between 38 and 75 feet below ground surface (bgs) in the vicinity of the Site, and is, in general, closer to the ground surface moving south in OU2.

There is no significant confining unit between the Upper Glacial and Magothy aquifers. However, data from the previous soil borings performed at or in the near vicinity of the Site indicate the presence of a low permeability unit consisting of clayey and silty sand. The low permeability unit marks the transitional interface between the Pleistocene deposits and Magothy Formation. Based upon limited data,

the low permeability unit ranges between 10 and 20 feet in thickness, and appears to be continuous beneath the Site.

The Magothy Formation ranges from 300 to 500 feet thick and occurs at approximately 110 to 140 feet bgs. The unit consists mostly of fine to medium sand to clayey sand interbedded with lenses and layers of coarse sand and sandy to solid clay. Gravel is common in the basal zone and discontinuous layers of gray lignitic clay are common in the upper zones.

The Raritan Formation underlies the Magothy Formation and directly overlies the crystalline bedrock. The Raritan Formation comprises the Lloyd sand member and the Raritan clay member. Although present beneath the Site, none of the borings or wells installed during the RI conducted by Environmental Resource Management (ERM) (ERM, 2004) encountered the Raritan Formation.

1.4.2 Site-specific Geology

The Site-specific geology in the area of the plume is based on data collected from drilling of soil borings and monitoring wells during the ERM RI, and was derived from information provided in the RI report (ERM, 2004). USEPA and HDR have supplemented this information with that from the US Geological Survey database for Long Island and are in the process of acquiring high-resolution data on lithology and other geological parameters on a site-specific basis. Through an interagency agreement, HDR has also secured the Nassau County GIS database and, in cooperation with EPA's technology Innovation Program Office, we are incorporating the geological information provided as appropriate.

The Upper Glacial aquifer consists of glacial till and glacial outwash deposited as a result of the Pleistocene ice advances. The flat areas along Long Island's south shore and between morainal areas are known as outwash plains and are composed of coalescing deltas deposited by glacial meltwaters. The sediments of the Upper Glacial aquifer consist of fine, medium and coarse sands with fine to coarse gravels, and locally thin clay lenses. The Pleistocene deposits tend to have high iron content and are oxidized exhibiting a reddish-orange staining in some areas. Soil samples collected from the borings drilled within the Site indicate the subsurface comprising the Upper Glacial aquifer generally consists of fine to medium quartz sand with trace fine to coarse quartz gravel and increasing amounts of silt that generally become finer with depth. The depth to the surface of the water table aquifer ranges between 38 and 75 feet bgs in the vicinity of the Site depending on local surface elevation.

The Magothy aquifer is encountered immediately beneath the Upper Glacial aquifer. The Magothy contacts the Upper Glacial as an erosional unconformity in a south dipping surface contact (approximately five to 40 feet mean seal level). There is no significant regional confining unit separating the Upper Glacial and Magothy aquifers.

There are distinctive differences between the Upper Glacial and Magothy aquifers with respect to depositional history, mineralogic content, configuration, and hydrogeology. The Magothy aquifer is a completely saturated groundwater system. The Magothy is composed of Cretaceous deltaic sediments deposited about 80 million years ago and represents near shore and alluvial depositional environments.

In the vicinity of the Site, the Magothy Formation is estimated to be approximately 300 to 500 feet in thickness (Suter, et. al., 1949). The Magothy consists of fine to medium sands and silts, clayey sands, sandy clays to solid clays and some coarse sand and gravel areas. In the upper to middle zones of the Magothy, discontinuous lenses of lignitic clays, consisting of brown to brownish-black coals, woody

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plant fragments and fragile pyrite crystallization are observed locally, embedded within silty sand matrices. These varieties of sediments are clearly representative of a depositional environment characterized by shifting stream deposits, marked by well sorted sands, silts and clays to poorly sorted sand, silt, and clay mixtures. Moving laterally as well as vertically through the Magothy these shifts, or "lenses" (geographically restricted members that terminate on all sides within the formation) of material occur readily and are locally correlative to distances approaching 500 to 1,000 feet. These discontinuous lenses of clays and silts of lower permeability create an inter-fingering or lattice pattern within the Magothy providing preferential flow pathways and cascading effects at depths within the aquifer system. Field investigations performed to date indicate the potential for a very complex subsurface environment to exist, necessitating revisions to the Work Plan as proposed.

Correlative large clay beds were not confirmed from analysis of the geologic and natural gamma logs within the Site. At the basal Magothy, gravelly sands become more prominent. Testing conducted during the 2004 RI (ERM, 2004) extended to a maximum depth of 517 feet at the southern most extent of the Site (basal-Magothy and the top of the Raritan Clay).

1.4.3 Regional Hydrogeology

The Upper Glacial, Magothy and Lloyd Sand Member aquifers are designated as Long Island's sole-source aquifer within NYSDEC Class GA designations for use and source(s) of potable water supply. For the purpose of this investigation, only the Upper Glacial and Magothy aquifers will be discussed because they are the primary sources of water supply within Nassau County. The information that follows is a summary of that provided in the OU1 2004 RI Report. As with the geological data, USEPA and HDR are supplementing this information with data from the US Geological Survey and Nassau County GIS databases and are incorporating the hydrogeological information from these sources as appropriate.

The Pleistocene deposits contain the water table aquifer in this region of Long Island, which is referred to as the Upper Glacial aquifer. In the vicinity of the Site, depth to water ranges between 38 and 75 feet below land surface. Consequently, the saturated thickness of the Upper Glacial aquifer can range anywhere between 35 and 102 feet in the vicinity of the Site. Hydraulic conductivity values for the Upper Glacial aquifer range between 150 to 300 ft/day and averages 270 ft/day. The average hydraulic gradient in the Upper Glacial aquifer provides groundwater recharge to the underlying Magothy aquifer.

The Magothy Formation is fully saturated and, therefore, its entire thickness makes up the Magothy aquifer. Hydraulic conductivities for the Magothy aquifer range 40 and 70 ft/day and may range as high as 190 ft/day in the basal zone. The average hydraulic gradient in the Magothy aquifer within this area of Nassau County is 0.0019 ft/ft. The Magothy aquifer receives groundwater recharge from the overlying Upper Glacial aquifer (ERM, 2004).

1.4.4 Site-specific Hydrogeology

Groundwater in the vicinity of the Site migrates through permeable sediments that comprise the Upper Glacial and Magothy aquifers. The direction of groundwater flow and hydraulic gradients and directions were characterized using water level measurements recorded in permanent monitoring wells that have been installed in the vicinity of the Site and surveyed to a common datum. These wells are screened in the Upper Glacial or Magothy aquifers. As noted above, USEPA and HDR are using data from the US Geological Survey and Nassau County databases to acquire high-resolution data on hydrogeology on a site-specific basis and SWAP data to more closely define transport pathways to impacted receptor wells.

The CSIA results have also provided valuable information, indicating where wells are receiving TCE contamination form the same source, at depths up to 500 ft bgs and in some cases, miles apart.

Regional groundwater flow patterns have been well documented in the literature and horizontal flow in the vicinity of the Site is generally in a south-southwesterly direction. Local flow gradients and directions were determined during the 2004 RI (ERM, 2004) using data recorded in monitoring wells. The public supply wells (e.g., Garden City Supply wells) and other pumpage in the area influence the lateral and vertical flow gradients and directions locally within the zone of influence of these wells. Available data from the US Geological Survey, Source Water Assessment Program and Nassau County databases will be incorporated as is appropriate. The hydrogeological assessment is designed to complement data available from these sources.

The saturated thickness of the Upper Glacial aquifer in the vicinity of the Site is approximately 55 to 75 feet. The groundwater flow patterns defined by the data are consistent with the regional flow direction.

As part of the 2004 RI, 30 monitoring wells were installed within the Magothy aquifer in the vicinity of the Site with screen zones set at various elevations in an effort to characterize groundwater quality. The average thickness of the Magothy at these wells is approximately 350 feet.

Compared to flow patterns in the Upper Glacial aquifer, a change in flow to a more southerly direction is evident in approaching public water supply wells -03881, -08339, and -07058 completed in the Magothy.

Consistent with flow patterns in the upper Magothy, flow in the deeper portion is also to a more southerly direction.

The change in flow direction observed in the Magothy monitoring wells located downgradient of the Site (to a more southerly direction) is attributed to hydraulic control imposed by the operation of three public supply wells located approximately 6,000 feet to the southwest of the Site.

Vertical flow potential was assessed using water level data recorded between December 11-13, 2001, January 21-22, 2002 and April 4-5, 2002 (ERM, 2004) at conventional monitoring well clusters (i.e. wells installed at the same location that screen different vertical intervals of the aquifer in the vicinity of the Site.

The average hydraulic gradient for all of the comparisons shown is 0.0014 ft/ft in a downward direction. The calculated gradients ranged from 0.070 ft/ft in an upward direction to 0.149 ft/ft in a downward direction.

The observed vertical hydraulic gradients vary by several orders of magnitude. We have also noted indications that there may be a severe vertical gradient in portions of the site, the need to investigate this further, as it may have a great impact on the source identification and any remedial action is a major reason why the groundwater elevation measurement task has been expanded. Likely causes of both spatial and temporal variation in vertical hydraulic gradients within the Site, noted by ERM include:

- Changes in the stratigraphic profile (aquifer heterogeneity) as groundwater moves along through the aquifers;
- Changes in ground surface cover restricting or allowing more recharge; and
- Localized effects of pumping public water supply wells and recharge basins.

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In summary, the OU1 data confirms that the overall direction of groundwater movement is downward as it moves south-southwest through the Site. The US Geological Survey and Nassau County databases are being used to identify and incorporate vertical flow conditions into the CSM and sampling design on a site-specific basis.

Similar horizontal groundwater flow gradients for the Upper Glacial aquifer (0.0017 ft/ft), upper Magothy aquifer (0.0011 ft/ft) and deeper Magothy aquifer (0.0012) ft/ft) were calculated in the 2004 OU1 RI Report.

1.4.5 Surface Water Hydrology

Runoff from the Site area drains to municipal storm drains. The municipal storm drain system conveys the storm water to recharge basins. Water collected in the basins is allowed to recharge to the Upper Glacial aquifer. Data from the US Geological Survey and Nassau County GIS database will be incorporated to provide more complete drainage and surface hydrology information.

1.4.6 Topography

Topographically, the land surface of the OU2 area is characterized as relatively flat, with a gradual southward slope, an elevation of 105 feet above msl in the northern potion of OU2 to approximately 50 feet msl in the southern portion of OU2. Data from the US Geological Survey and Nassau County GIS database will be incorporated to provide site-specific topographical contours.

1.5 Summary of Site Conditions

1.5.1 Site Contamination

The summary of Site contamination presented in the following subsections is based on data presented in the OU1 RI Report (ERM, 2004). The primary contaminants identified in soil and groundwater included TCE and PCE.

The Nassau County Health Department (NCDH) collected samples in 1985 and 1986 from monitoring and public supply wells in the Garden City Park Industrial Area (GCPIA). The GCPIA is located in Garden City Park, and is bounded by Park Avenue to the north, Herricks Road to the east, the Long Island Railroad corridor to the south, and Nassau Boulevard to the west. Results of sample analyses indicated the presence of VOCs exceeding the (previous) New York State standards and guidelines for drinking water in 9 of the 13 groundwater monitoring wells sampled. The primary contaminant detected was PCE.

In June 1991, the Nassau County Department of Public Works (NCDPW) and NCDH conducted a cooperative study. Results of the investigation confirmed the presence of high levels of VOCs in the groundwater. Industrial surveys were performed in the GCPIA as part of the study indicated there were several businesses within the industrial area that used the contaminants of concern, including PCE, TCE and 1,1,1-trichloroethane (TCA).

Dvirka & Bartilucci Consulting Engineers were contracted by the NYSDEC to conduct a Preliminary Site Assessment (PSA) for the GCPIA in April 1994. The results of the 1994 PSA investigation indicated that levels of PCE up to 1,900 micrograms per liter (ug/l) were found in the vicinity of the Site.

ERM was retained by Genesco (a potentially responsible party [PRP] for the Fulton Avenue OU1 Site) to conduct an RI of the Area of Concern (AOC) under NYSDEC oversight (ERM, 2004). The RI data

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identified VOC contamination other than PCE (predominantly TCE) in the Upper Glacial and Magothy aquifers whose origin is from other, unknown sources that are not related to 150 Fulton Avenue. ERM concluded that more than one VOC plume is evident from the data collected during the RI. This conclusion is based on a number of factors.

- Based on the observed groundwater flow patterns, the distribution of VOCs in the groundwater indicate that they could not have originated from a single source.
- The conditions within the aquifer material do not promote, to a great extent, the degradation of PCE to its daughter products (i.e., TCE, dichloroethene [DCE], etc.). Consequently, the distribution of PCE is a good indicator of the portion of the VOC plume that is attributable to 150 Fulton Avenue.
- The ratio of PCE to TCE in groundwater shows a distinct change, both parallel and perpendicular to the direction of groundwater flow. Hence, the different chemical fingerprint illustrated by the ratio of < 1.0 point to other potential VOC sources in the region.

Furthermore, ERM opined that there are just three public supply wells within the Garden City Water District (GCWD), -03881, -8339, and -07058, that lie directly within the trajectory of groundwater flow from the Site. Groundwater data from these three supply wells confirm that VOC impacts were apparent as early as 1979. The predominant VOC in the three wells was TCE, although the concentrations of PCE have been found to be increasing, and to become the predominant contaminant since 1999.

Baseline sampling was completed in July 2011. Analysis of groundwater samples from 19 existing well locations indicates TCE and PCE are present in groundwater at concentrations exceeding drinking water standards at the western, southern and northeastern edge of the plumes identified in OU1, at depths to 400 feet below ground surface (bgs). Elevated concentrations of both TCE and PCE are also present in groundwater to the northeast, upgradient of the identified plume and OU1 source area. Since the preparation of the December 2009 WP, NYSDEC has completed an investigation in the Denton Avenue area (previously identified as a possible source of the TCE/PCE groundwater contamination) but did not identify any shallow TCE/PCE contaminant sources. To truly understand the nature and extent of contamination in this area, that investigation needs to be supplemented with deeper sampling and analysis, as proposed. In addition, OU1 sampling results that should be available have been delayed. Data from the NYSDEC, OU2 baseline sampling completed by HDR, OU1 and other nearby site investigations were evaluated to determine optimal sample locations utilizing existing wells in an area upgradient and further to the north and/or east of the OU1 source and the Denton Avenue area (Figure 1). These revisions extend the investigation to the western edge of the Study Area and increase the depths of the subsurface sampling and analysis. The necessary modifications to the Work Plan are described in the sections that follow.

1.5.2 Preliminary Conceptual Site Model

VOC contamination, consisting predominantly of TCE, has been identified whose origin is from unknown sources not thought to be related to the 150 Fulton Avenue OU1 source area site. The CSM will be updated as the investigation continues to reflect data acquired from the OU1 RI (as appropriate), sampling events, Nassau County GIS database, and as other data are developed to mature the CSM and overall understanding of site conditions. The current, baseline CSM, including lithology, receptor water supply

wells and stormwater recharge basins is illustrated in Figures 3a, 3b and 3c. These figures provide a plan view of the known configuration of the TCE-dominant plume, plan view of relative hydraulic conductivity in the proposed sampling area and an isometric view, or "slice" showing relative hydraulic conductivity in the area of the initial proposed transect, roughly paralleling Herricks Road. These figures are based on the information gathered during the ERM OU1 RI (ERM, 2004), new information obtained through baseline groundwater sampling conducted by HDR in July 2011, United States Geological Survey (USGS) lithology data provided to Sundance Environment & Energy Specialists, Ltd., and from other sources. The model provides an initial basis from which to plan the proposed field activities. The horizontal extent of the plume is unknown; a better understanding of the extent of the plume including determining the location of potential source areas is needed to support a more complete understanding of potential exposure scenarios for both human and ecological receptors. We will continue to work with the EPA TIO Office to develop the 3-D model reflecting current understanding of the Site; however, funding for this effort has been delayed. Based on discussions with the TIO Program Manager in the past two weeks, we expect to have additional support form TIO to revise the CSM and perform 3-D mass flux modeling in FY 2014.

Groundwater, soil and soil gas (air) all may serve as transport media and are shown in the cross-sectional CSM in Figure 4. The migration of TCE from the source areas via the transport media results in soil, soil gas and groundwater having the potential to be exposure media. Ecological and human receptors may be exposed to Site-related contaminants from these media. The Field Investigation will provide the data for the evaluation of the potential for the environmental media at the Site to act as transport or exposure media.

The Preliminary CSM is a dynamic tool for understanding site conditions, and the model will evolve as the RI/FS process progresses. This model will serve as a guide for field activities and decisions and will be revised as the new data is gathered, functioning as a key element in the Triad approach to the Field Investigation. This approach is a dynamic process, which allows for a streamlined investigation and decision-making process through collection of field-screening data and the ability to make real-time decision in the field to respond to new information gathered as the Field Investigation progresses.

2. Task Descriptions and Assumptions

2.1 Task 1- Project Planning and Support

2.1.1 Subtask 1.1: Project Administration/Management

HDR will continue to provide project administration and management support to complete the work assignment. The HDR project team will consist of the Program Manager, Project Manager, Project Specialists, Hydrogeologists, Scientists, and other support staff, as appropriate. The Project Manager will be the primary interface between the EPA Work Assignment Manager (WAM) and technical staff. The Project Manager will manage day to day activities, interface with the EPA WAM on a regular basis, provide bi-weekly invoice inputs to HDR CONNECTS (HDR's automated financial management system), attend project meetings, oversee and coordinate the project, and manage project staff, budget, and task schedules. Project Administration/Management time has been estimated to direct and manage efforts including staffing plans, budget tracking, scheduling, and establishing internal quality management procedures. Additional management LOE will be required to implement the Triad investigation, as it

involves an increased need to communicate with the WAM and HDR field staff, coordinate with cooperating agencies, oversee subcontractors and interface with other entities involved in the project.

The Level of Effort (LOE) estimate assumes the activities will be delivered over the approximate 12 month period remaining in the revised Period of Performance (to October 2014). The activities included in Project Administration/Management include project initiation, financial and recordkeeping/filing, monthly coordination and preparation of monthly reports, weekly status calls with the WAM and associated follow-up calls.

Efforts will be made to minimize production of hardcopy documents, where appropriate, in favor of electronic deliverables and transmittals. Where hardcopies are produced HDR will utilize paper made from a minimum of 50% post-consumer recovered materials, in accordance with the contract requirements.

2.1.2 Subtask 1.2: Scoping Meeting

The HDR project team attended a scoping meeting at EPA's Region 2 office in New York City on October 27, 2009. Three HDR project team personnel participated in the scoping meeting. Draft minutes of the scoping meeting were prepared and distributed to EPA within five calendar days of the meeting's conclusion.

A formal scoping meeting was not conducted as part of this revised submittal. HDR has provided information to the WAM on an ongoing basis.

2.1.3 Subtask 1.3: Site Visit

The HDR project team conducted a one-day Site visit on November 12, 2009 with the WAM to develop an understanding of the Site layout and the RI/FS scope and requirements of the Site. The HDR Project Manager and Hydrogeologist attended the Site visit.

An additional site visit was not necessary for this revised submittal. HDR staff members have been to the Study Area numerous times since the initial site visit to perform various approved Work Plan tasks and meet with the WAM on-site.

2.1.4 Subtask 1.4: Develop Draft Work Plan and Associated Cost Estimate

The August 26, 2010 and December 15, 2011 approved Work Plans were prepared by HDR in accordance with the contract terms and conditions and with input from the project team based on information from the SOW and project schedule, as well as EPA guidance, background/existing documentation, scoping meeting, and technical direction provided by EPA. This revised Work Plan updates the detailed description of each project task including cost assumptions, deliverables/documentation and staffing plan to reflect the knowledge gained since the initial Work Plan was prepared, as well as the requirements of a Triad field investigation.

2.1.5 Subtask 1.5: Negotiate and Revise Draft Work Plan/Budget

Following submittal of the draft revised Work Plan, HDR will negotiate the Revised Work Plan with EPA as needed in person and/or by teleconference. A final Revised Work Plan that incorporates the negotiated agreements will be prepared and submitted to EPA. The document will include a summary of the negotiations with both electronic and hardcopies of the document submitted to EPA. The document will be

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submitted within 15 days after receipt of final EPA comments. LOE associated with this task include preparation for the revised draft Work Plan negotiations, participation in the negotiations with the WAM, contracting officer (CO) and project officer (PO), preparation of the meeting minutes, and finalizing the Work Plan and budget.

2.1.6 Subtask 1.6: Evaluate Existing Data and Documents

Existing Site background information available at the time the initial Work Plan was prepared has been reviewed by the HDR project team. The review of available background information originally provided by the EPA WAM includes:

1) Final RI/FS Work Plan – Fulton Ave. Superfund Site OU2 (June 2006)
2) Final RI/FS Work Plan – Fulton Ave. Superfund Site OU2 – Appendix A & B (June 2006)
3) Summary of Monitoring Wells – 150 Fulton Ave. – Garden City Park, NY
4) List of Monitoring Wells Sampled during 150 Fulton Ave. Remedial Investigation
5) Well Search Results and Well Specification – 150 Fulton Ave. – Garden City Park, NY
6) Well Location Sketches and Well Logs – GCP Wells
7) Environmental First Search Report Package for Somerset Ave. – Garden City, NY
8) Environmental First Search – Federal & State Wells List & Details – Somerset Ave. – Garden City, NY
9) Environmental First Search – Federal & State Wells List & Details – Somerset Ave. – Garden City, NY
10) Well Location Maps, Specs, Sampling Results – from Fulton Ave. OU2 RI/FS (Tetra Tech)
11) Tetra Tech Nassau County FOIL Request – Monitoring Well Locations and Specs
12) Nassau County DPW – Sampling Results – Inorganics and General Chemistry
13) Nassau County DPW – Sampling Results – VOCs
14) 150 Fulton Ave, Garden City Park, NY RI Report, prepared by ERM, October 2004

Based on a project meeting with NYSDEC held on December 2, 2009 additional data and reports relative to both existing and potential NYSDEC lead sites in the study area were being compiled and were to be electronically transferred to HDR and EPA. HDR set up a project file transfer protocol site to facilitate the transfer and organization of this data. In addition to the NYSDEC documents noted, the data review effort has expanded to include other relevant data and resources that, in the end, has allowed for the development of this Triad field investigation.

Examples of the documents provided and/or reviewed in addition to those originally provided include:

1) Records Search and Hydrogeologic Evaluation – WAWNC Well 57, Site No. 1-30-191, MACTEC for NYSDEC, September 2009
2) Expanded Site Inspection, Denton Avenue Landfill, USEPA, May 1995

3) NYSDEC site records, including Site Investigations, Records of Decision, spill records, etc. for numerous sites upgradient of Fulton Avenue that may serve as potential contaminant sources

4) Numerous documents related to utilization of Compound-Specific Isotope Analysis, including "A Guide for Assessing Biodegradation and Source Identification of Organic Groundwater Contaminants using Compound-Specific Isotope Analysis (CSIA)" USEPA, December 2008 and Forensic Investigations Using Compound Specific Isotope Analyses,

5) Real-Time Measurement Technology documentation related to development of DMA, including SOPs for Color-tec®, etc.

The project has and will continue to leverage available data and research. We have learned critical details regarding site conditions, potential contamination sources and methods to support a successful investigation, but more needs to be done. Important data sources have only recently become available. The LOE associated with this task includes the review of existing documents, identifying additional data needs for human health and ecological risk assessments, and providing technical support to EPA. As noted, the amount of data and documents to be reviewed has grown to encompass the results of EPA and NYSDEC investigations completed since the August 2010 approved Work Plan was conceived, advanced technology methods and applications for use in the Triad investigation and focus in localized portions of the Study Area, outside the scope of the OU1 investigation that have yet to be investigated. This includes, but is not limited to the appended list of references.

Setting up a project database, import of existing analytical and other data into a database, and management of existing data in a project database are not included in this task. Travel to acquire existing documents is also not included in this task.

2.1.7 Subtask 1.7: Quality Assurance Project Plan

HDR has revised the QAPP for the RI/FS to reflect modifications to the Work Plan in accordance with the current Uniform Federal Policy (UFP) for QAPP guidance and procedures and HDR's approved Quality Management Plan (QMP) and QAPP for the contract. The QAPP will be submitted 21 days after Work Plan approval. The QAPP will describe the project objectives and organization, functional activities, field activities and protocols, and quality assurance/quality control (QA/QC) protocols used to achieve the desired Data Quality Objectives (DQOs). Draft and Final QAPPs will be prepared. Information to be provided in the QAPP includes:

- Project sampling objectives;
- A project organizational chart;
- Standard Operating Procedures (SOPs) for the field investigation activities, including required sampling equipment;
- Quantitative and/or qualitative criteria to evaluate achievement of objectives;
- Sample documentation and chain-of-custody (COC) procedures;
- Sample handling, preservation, and shipment procedures;

- A table of sample numbers, matrices, locations, collection frequencies, and analytical methods;
- A breakout of samples to be analyzed via the EPA Contract Laboratory Program (CLP), the EPA Region 2 Division of Environmental Science and Assessment (DESA) Laboratory, and other Non-CLP providers;
- Calibration and maintenance procedures and requirements;
- QA/QC protocols and sample requirements;
- Requirements for project assessments/audits;
- Procedures for data reduction, validation, and reporting;
- Description of report deliverables; and
- Corrective action procedures.

2.1.8 Subtask 1.8: Health and Safety Plan

The Site-specific Health and Safety Plan (HASP) that specifies employee training, protective equipment, medical surveillance requirements, standard operating procedures and a contingency plan in accordance with 29 Code of Federal Regulations (CFR) 1910.120 (1)(1) and (1)(2), has been revised by the HDR project team to reflect modifications to the Work Plan. Task-specific health and safety risks, personnel protective equipment (PPE), employee training, and medical surveillance requirements will be addressed in the HASP in accordance with 40 CFR 300.150 of the National Contingency Plan (NCP) and 29 CFR 1910.120 1(1) and (1)(2). A task-specific HASP will also be prepared to address health and safety requirements for Site visits.

2.1.9 Subtask 1.9: Non-Routine Analytical Services (RAS) Analyses

As described in HDR's November 1, 2011 Proposed Modifications to the Approved Work Plan, vapor phase sampling in Region 2 was being performed by ERT-Edison. Discussion with EPA since that submission has resulted in HDR including vapor sampling as a contingency in the revised Work Plan, in order to retain the ability to respond to a need if, for some reason, ERT is unable to provide the necessary support.

In addition, direct push technology via dual tube borings will be conducted instead of hydropunch sampling. HDR proposes to collect additional samples for compound-specific isotope analysis (CSIA) and other forensic methods, in order to connect the dots between discrete contaminant source(s) and receptors (i.e., water supply wells). Additional depth-discrete groundwater and soil samples from potential contaminant sources, impacted water supply and existing monitoring wells are planned to determine the extent of chlorinated VOC contamination and provide CSIA "fingerprints". The FASTAC process will be followed for procurement of the laboratory services, unless other means become necessary, e.g., subcontracting services for CSIA analyses. In the event that DESA or CLP cannot accommodate the analysis of these samples, then the samples would be analyzed by a subcontracted laboratory. Unit costs have been obtained as a contingency and are included in the cost estimate.

2.1.10 Subtask 1.10: Meetings

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The HDR project team will continue to participate in progress meetings throughout the course of this work assignment. The level of communication required in planning the field investigation has necessitated almost daily calls with EPA staff, including the WAM, QA staff and subject experts at EPA labs and Headquarters. The costs, moving forward assume that such teleconferences will continue and that additional in person meetings will be held at the EPA's Region 2 offices in New York City. These meetings are assumed to be four hours in duration; teleconferences one hour in duration. Two personnel are presumed to attend each of the meetings. HDR will utilize public transportation to attend project meetings at EPA whenever possible. The anticipated meeting schedule is included in Figure 2.

Draft minutes will be prepared within five calendar days following each in person meeting and final minutes will be completed upon review and comment by EPA.

2.1.11 Subtask 1.11: Subcontract Procurement

In accordance with the SOW and as discussed during the scoping meeting, HDR has assumed subcontractors (bulleted below) will be procured to provide support during the RI/FS. The downhole geophysics that was to be performed by the USGS has been retained as a contingency task, to be completed if determined to be necessary in consultation with the WAM. Coordination of these activities will be included under Subtask 1.12 (Perform Subcontract Management). Any soil gas survey work deemed necessary and completed as part of a source area investigation will be conducted by HDR field personnel.

- Real-Time Color-Tec/CSIA and other Forensic Analytical
- Stenographer for Public Meeting Support;
- Field Mobilization/Demobilization (staging/support area set-up, fence installation);
- Utility Clearance/Geophysical;
- Drilling;
- Direct Push Probing (soil and groundwater);
- IDW Management, Transportation and Disposal

HDR will require subcontractors to submit their green policies and request options with the subcontractors to implement green remediation strategies to the proposed RI tasks. Any impacts on the costs for the subcontracting services will be presented as part of the cost analysis that will be completed during the procurement effort.

2.1.12 Subtask 1.12: Perform Subcontract Management

HDR will perform subcontract management, including:

- Implementing procedures for subcontractor management;
- Monitoring of subcontractor progress and performance;
- Maintaining subcontracting systems and records;
- Issuing subcontract modifications (if warranted);

- Reviewing and approving subcontractor invoices;
- Maintaining subcontract files;
- Coordinating subcontractor activities with EPA; and
- Closing each subcontract.

Any changes to a subcontractor's scope of work will be reported to the HDR Project Manager so that a proper determination can be made as to the need to modify the subcontractor's scope of work and/or compensation. Significant issues will be brought to the attention of EPA immediately. After an evaluation of the proposed change and receipt of the EPA CO's consent (if required) a subcontract modification may then be issued to effect the change. A change of any subcontractor's scope of work will not be made without a prior determination of appropriateness, and will be made only by modification of the subcontract.

All subcontractor invoices will be submitted to HDR for review and approval. After approval by the Project Manager or designee, the invoice will be submitted to the HDR Accounting Department for inclusion in the project invoice.

2.1.13 Subtask 1.13: Pathway Analysis Report (PAR)

HDR will prepare a Pathways Analysis Report (PAR) in accordance with Office of Solid Waste and Emergency Response (OSWER) Directive 9285.7-01D-1, dated December 2001 entitled "Risk Assessment Guidelines for Superfund, Part D" (RAGS Part D) and the Regional Risk Assessor for the Site. The PAR will be prepared in accordance with the aforementioned guidance; however, the focus of the PAR will be TCE, as per the objectives of the RI. Evaluation of chemicals of potential concern (COPCs) will be an important consideration if COPCs other than TCE are identified during the investigation. The PAR will precede preparation of a Draft Baseline Human Health Risk Assessment (BHHRA) (Task 7.01) for the Site. The PAR will present the methodologies used for the background review, data evaluation, exposure assessment, toxicity assessment, and associated RAGS Part D tables required for the Draft BHHRA. Preparation of the Draft BHHRA, which is contingent upon approval of the PAR by EPA Region 2, is discussed in detail in Section 2.7.1 of this Work Plan.

The background review will summarize the Site history, current and future land use scenarios, and present a BHHRA CSM for the Site.

A Site visit was conducted and included visual surveys to identify potential environmental migration pathways, potential human receptors, possible human exposure routes, and Site conditions. Information collected during the Site reconnaissance activities will be incorporated into the PAR.

RAGS Part D Table 1 in the PAR entitled "Selection of Exposure Pathways," will present the BHHRA CSM that will be developed based on the background review and Site reconnaissance work. Table 1 will identify the scenario time frame, exposure medium and exposure point, receptor populations and ages, and rationale for selecting or excluding an exposure pathway. Based on a preliminary review of available information, eight exposure areas and six possible source areas were to be evaluated, with exposures to be evaluated separately for each exposure area or source area. The exposure areas are indicated to be light industrial properties with occupied buildings. Exposures to commercial workers or residents will be evaluated at the eight exposure areas, in accordance with the PAR, as appropriate. Exposure to indoor air

was indicated to be the primary focus of assessment in these locations. At the six source areas, exposure to commercial workers, construction workers, utility workers and residents is proposed to be evaluated as appropriate, with exposures to surface soil, subsurface soil as the primary focus at these locations. These will be re-evaluated based on sampling and analysis results. For example, there are indications of a clean water lens in the Study Area that will greatly limit the potential for vapor intrusion concerns. If that proves to be the case, that pathway of exposure will not require evaluation. This re-evaluation will be provided to the EPA WAM and Risk Assessor for approval.

HDR will review available information on the contaminants present in all soil, groundwater, soil gas, indoor air and ambient air in each exposure area or source area as applicable and will identify the major COPCs, recognizing that OU2 is focused on TCE contamination. Information to be used in identifying COPCs will be derived from Site-specific findings made during the Site reconnaissance, available historic analytical data (i.e., from Tetra Tech, EPA, NYSDEC, NCDH, USGS, ATSDR, or other sources), and analytical results acquired during the RI.

Once the analytical data are compiled and tabulated, a multi-step screening process will be used to identify COPCs, beyond TCE that are to be retained for the BHHRA. The specific steps followed in this process are described in EPA RAGS Part A (EPA, 1989) and presented below. Validated data as defined in RAGS Part A (EPA, 1989) and the "Guidance for Data Usability in Risk Assessment (Part A)," (EPA, 1992) will be used in the BHHRA.

The COPC selection process is conducted as follows:

Comparison to Risk-Based Screening Criteria - The maximum concentration of each chemical in each exposure or source area will be compared to a risk-based screening value. Chemicals whose maximum detected concentrations (MDC) are below the screening value are eliminated from the COPC list. Screening toxicity values will be derived from the most up-to-date version of EPA's "Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites" for residential-use soil use (soil and sediment), tap water (for groundwater and surface water), and for residential air concentrations (if needed) (EPA 2009). The RSLs will correspond to the screening toxicity values associated with a 10^{-6} risk for carcinogenic effects or a noncarcinogenic hazard index of 0.1. (Note: Using 10 percent of the screening criteria for noncarcinogens (i.e., HI of 0.1) is recommended by EPA).

Frequency of Detection - Constituents occurring at a low frequency of detection (i.e., less than one detection in 20 samples) are eliminated from the COPC list in accordance with RAGS guidance (EPA, 1989). If a constituent is eliminated from the COPC list on this basis, the rationale will be documented in the RAGS Part D Table 2 as either infrequently detected but below the screening level (IFD-BSL) or infrequently detected but above the screening level (IFD-ASL).

Known Human Carcinogens - A chemical classified as a known human carcinogen (weight-of-evidence classification A) is retained as a COPC, regardless of concentration or frequency of detection. EPA's weight-of-evidence classification system will be discussed in greater detail in the BHHRA.

Essential Nutrients - Naturally occurring elements considered essential for human nutrition (calcium, magnesium, potassium, and sodium) are eliminated from the COPC list in accordance with RAGS Part A guidance (EPA, 1989).

Chemicals without Available Toxicological Data - If there is no screening toxicity value for a detected chemical, that chemical will be retained as a COPC.

The resulting COPCs will be summarized in tables titled, "Occurrence, Distribution, and Selection of Chemicals of Potential Concern." The following information will be included in the table as appropriate: minimum and maximum concentrations, data qualifiers, units, detection frequency, range of detection limits, concentration used for screening, background value, screening toxicity value, potential Applicable or Relevant and Appropriate Requirement (ARAR)/To Be Considered (TBC) value (s), whether or not that chemical was selected as a COPC for this risk assessment (COPC flag), and the rationale for the chemical's deletion or selection.

Exposure Pathway Analysis/Exposure Assessment

An exposure assessment will be performed to identify potential human receptors and exposure routes, and calculate magnitudes of actual or potential human exposures based on contaminant concentrations, frequency of occurrence, and duration of exposure. The exposure assessment addresses each potential current and future exposure pathway, focusing primarily on surface soil, subsurface soil, groundwater, and air at the exposure and source areas and shown in RAGS Part D Table 1. As noted above, the presumed pathways of exposure will be re-evaluated based on RI sampling and analysis results and any revisions provided to the EPA WAM and Risk Assessor for approval.

Exposure point concentrations (EPCs) will be calculated for each media, by Site and/or specific area of interest, as appropriate. The EPCs will be presented in RAGS tables titled, "Medium-Specific Exposure Point Concentration Summary." The EPCs will represent the lesser of the maximum detected concentration or the calculated upper confidence limits (UCL) for the arithmetic mean concentration. The UCL will be calculated using the statistical methods, as recommended or approved by EPA Region 2. The data distribution for each COPC will be determined and a UCL concentration will be selected.

The exposure parameters for the proposed scenarios will be presented in RAGS tables, "Values Used for Daily Intake Calculations." They will represent EPA's Reasonable Maximum Exposure (RME) scenario in order to facilitate risk management issues. Relevant equations for assessing intakes and exposure factors will be obtained from RAGS Part A (EPA, 1989), Methods for Derivation of Inhalation Reference Concentrations and Application of Inhalation Dosimetry (EPA, 1994), EPA's Exposure Factors Handbook: 2009 Update (EFH) (EPA, July 2009), and EPA's most recent guidance on assessing risks to dermal exposures presented in RAGS Part E (EPA, August 16, 2004). Central Tendency (CT) scenarios will be evaluated if the risk estimates exceed EPA's acceptable target risk criteria. The RME case will generally be based on default exposure factors and 95th percentile exposure values from the EFH (EPA, 2009). The CT case will generally be based on the standard default exposure factors (EPA, 1991) and, where appropriate, the 50th percentile exposure values from the EFH (EPA, 2009). Bioavailability of all constituents will conservatively be assumed to be 100 percent.

Fate and transport modeling (e.g., modeling particulate and volatile emissions from soil and modeling VOC release during showering) will be considered with EPA Region 2 as additional Site reconnaissance information and data are assessed and become available. The screening level indoor air vapor intrusion pathway assessment, if completed, will not involve Site-specific transport modeling of specific buildings using the Johnson and Ettinger Model and property-specific Site input parameters. The assessment will be conducted using the appropriately selected attenuation factors determined using EPA's semi-Site

specific approach in consideration of depth to the subsurface contamination and dominant soil type. Each fate and transport model used to support the BHHRA will be identified and described in the PAR.

Toxicological Evaluation

The COPCs will be evaluated based on their intrinsic toxicological properties as either non-carcinogens (i.e., systemic toxicants) or carcinogens. Quantitative toxicity indices that describe the relationship between exposure resulting in a calculated dose (chemical intake), and the likelihood of that exposure to result in adverse health effects (response), will be selected for use in the BHHRA. For non-carcinogens, the toxicity indices are reference doses (RfDs) or reference concentrations (RfCs). For carcinogens, the toxicity indices are cancer slope factors (CSFs). Toxicity data for the selected COPCs will be obtained from the EPA with the following hierarchy of sources: EPA RSL Table (most up-to-date version); the Integrated Risk Information System (IRIS) database (EPA, 2009), EPA's Provisional Peer Reviewed Toxicity Values (PPRTVs), other toxicity values, including the Health Effects Assessment Summary Tables (HEAST) (EPA, 1997). Chemicals without toxicity values will be forwarded to EPA risk assessors who may submit them to the Superfund Technical Support Center (STSC) of the National Center for Environmental Assessment (NCEA) for recommendations on possible provisional and surrogate values.

Oral RfDs and CSFs are typically based on administered dose (i.e., oral or inhalation exposure routes). The methodologies for evaluating dermal absorption are based on an estimation of absorbed dose. Therefore, for evaluating dermal exposures, oral toxicity factors will be adjusted to represent an absorbed rather than an administered dose. Consistent with the EPA guidance on dermal risk assessment (EPA, 2004) and in consultation with EPA Region 2, an adjustment will be made when the following conditions are met:

- The toxicity factor from the critical study is based on an administered dose; and
- A scientifically defensible database demonstrates that the gastrointestinal absorption of the chemical is significantly less than 100% (i.e., 50%).

If these conditions are not met, no adjustment will be made and a default value of complete (i.e., 100%) absorption will be conservatively assumed.

2.2 Task 2 - Community Relations

The HDR project team will provide community involvement support to EPA throughout the RI/FS in accordance with the EPA Superfund Community Involvement Handbook, April 2005 and direction from the EPA WAM.

2.2.1 Subtask 2.1: Community Interviews

In preparing for community interviews, the HDR project team will participate in a kick-off conference call with the EPA Community Involvement Coordinator (CIC), review background materials, and develop a list of potential interviewees representative of the community such as appropriate government officials (federal, state, county, city), environmental groups, local broadcast and print media, and any other relevant individuals or groups. It is assumed that these activities will be performed without travel to the Site. Draft interview questions will be prepared and submitted to EPA for review and comment. Final interview questions will incorporate EPA comments. HDR will assist EPA during the interviews and will summarize the information gathered for inclusion in the Community Relations Plan (CRP).

2.2.2 Subtask 2.2: Community Relations Plan

A draft and final CRP will be prepared as follows:

1. Draft CRP – a draft CRP will be developed which presents an overview of the community's concerns and includes the following:

   a) Site background including location, description and history;

   b) Community overview including a community profile, concerns and involvement;

   c) Community involvement objectives and planned activities with a schedule to accomplish those objectives;

   d) Mailing list of contacts and interested parties;

   e) Public meeting facility locations;

   f) List of acronyms; and

   g) A glossary

The HDR project team will participate in a conference call with the EPA CIC prior to the start of this task. The project team will also identify additional publication outreach measures (if any) for the area. The draft CRP shall be submitted within 30 days after Work Plan approval.

2. Final CRP – The HDR project team will review and discuss EPA comments and will submit the final CRP within 14 days after receipt of final comments from the EPA.

It is assumed that background information is publicly available, either online or from publications provided to the HDR project team, and that no travel will be needed to gather additional information. Further, it is assumed that the EPA will consolidate the comments provided by other agencies (state, city) on the CRP before providing its comments to the project team.

2.2.3 Subtask 2.3: Public Information Meeting Support

Community relations support will be provided for two public meetings/availability sessions/open houses (public meetings) to be held in a location to be specified in the vicinity of the Site. HDR will perform the following activities:

- Arrange the two public meetings, including the selection and reservation of a meeting space (at a local facility that will be no cost to the Government) as directed by the EPA;
- Provide recording and/or stenographic support, including reserving a court reporter, for the two public meetings. A full-page original and a "four on one" page copy (along with a CD) of the transcript will be provided to the EPA, with additional copies placed in the information repositories as required. The CD will be provided in the most recent EPA-approved word processing format;
- Prepare one power point presentation up to 15 draft overhead transparencies, 10 slides and 150 handouts and subsequent final versions of these materials that incorporate EPA comments for each of two public meetings;
- Three staff will attend two public meetings and prepare draft and final meeting summaries; and

- Prepare and maintain a sign-in sheet for each public meeting.

2.2.4 Subtask 2.4: Fact Sheet Preparation

Four draft fact sheets for the Site will be prepared at the direction of EPA's WAM. The HDR project team will research, write, edit, design, layout and reproduce the fact sheets including attaching mailing labels prior to delivery to EPA. The final fact sheets will be prepared incorporating all EPA comments. After EPA approval, the project team will attach mailing labels to 150 fact sheets, fold the fact sheets, and add postage before delivering them to EPA. EPA is responsible for mailing the fact sheets. The costs assume one four-page black and white fact sheet, with three illustrations to be distributed prior to each public meeting, for a total of 2 fact sheet distributions. The fact sheets with mailing labels will be provided to the EPA seven days prior to a public meeting/event. Per contract clause H.3, it is assumed that no more than 100 pages of color copying will be required for the public meeting fact sheets.

2.2.5 Subtask 2.5: Proposed Plan Support

HDR will assist EPA in technical preparation of the draft and final Proposed Plan. The plan will summarize: 1) environmental conditions at the Site; 2) alternatives analyzed in the FS; 3) the preferred remedy and rational for that preference; 4) any waivers to cleanup standards; and 5) any formal comments received from the support agency. HDR personnel will provide technical clarification for discussions of the selected remedy and/or remedial alternatives, as identified in the FS. HDR will also prepare graphic materials and/or maps that may be included in the Proposed Plan. The graphics will be based on graphics contained within the FS. The Proposed Plan will be published in 8.5 x 11 inch size format (comprised of 11 x 17 inch paper folded in half). It will consist of a card stock cover (EPA may choose from a number of available colors) and will contain approximately 24 double-sided pages including graphics. The plan will be bound in a book-type format using staples placed along the central spine. HDR will produce 275 copies of the final Proposed Plan for distribution by EPA.

2.2.6 Subtask 2.6: Public Notices

Three newspaper announcements/public notices will be prepared, two to announce each of the two public meetings/Site tours and a third to be prepared and published at the discretion of the EPA WAM. The draft notice text will be forwarded to EPA for review and comment and will be revised accordingly. The costs assume the HDR project team will coordinate publication of the announcement/public notice in two large circulation newspapers and one will appear in a local small newspaper.

- EPA will notify HDR at least 28 days prior to the date of each public meeting. HDR will: develop a draft notice (to be provided within 5 business days after receipt of the request for the notice); receive comments from EPA (to be provided within 2 business days of receipt of the draft notice); incorporate comments into a final notice (within 2 days of receipt of EPA's comments); and then reserve space in which the notice will appear one time in two newspapers (depends upon individual newspaper deadlines – generally requires 1 to 2 weeks advance reservation). Each notice will appear in the newspapers approximately one week prior to each respective meeting date.
- EPA will notify HDR at least 28 days prior to the date when EPA wishes the third notice to appear in the newspapers. HDR will develop a draft notice (to be provided within 5 business days after receipt of the request for the notice); receive comments from EPA (to be provided

within 2 business days of receipt of the draft notice); incorporate comments into a final notice (within 2 days of receipt of EPA's comments); and then reserve space in which the notice will appear one time in one small-distribution newspaper (depends upon individual newspaper deadlines – generally requires 1 to 2 weeks advance reservation. Small-distribution newspapers often publish weekly).

- HDR will provide three copies of each public notice to EPA within 14 days before public meetings/events.

2.2.7 Subtask 2.7: Information Repositories

HDR will provide information to the EPA CIC to update the information repositories. The CIC will ensure the repositories are updated. There will be two repository updates. EPA will maintain the Administrative Record. The two updates will occur following: 1) completion of the Final RI Report; and 2) completion of the Draft FS Report and Proposed Plan.

2.2.8 Subtask 2.8: Site Mailing List

The HDR project team will update the mailing list for community relation activities for the Site, including newly elected public officials, names of persons interviewed by EPA, and interested persons through the public meetings and through EPA points of contact. It is assumed that the initial mailing list will be provided by EPA in a Microsoft Excel or database format. The cost assumes that the mailing list will be updated twice and that each mailing list will consist of approximately 250 entries. The project team will provide an electronic version of the mailing list and will generate labels and provide postage for two mailings (for a total of 500 labels). Actual mailing of any information to the community will be performed by EPA. This will take place within 14 days of the approval of the final CRP.

2.2.9 Subtask 2.9: Responsiveness Summary Support

HDR will prepare a responsive summary that presents a concise and complete summary of significant oral and written comments that EPA receives from the public during the public comment period of the FS and Proposed Plan. HDR will compile, organize, and summarize all written and verbal comments received during the public comment period and assist EPA in developing responses to 75 technical comments. Policy-oriented comments will be addressed by EPA.

Following receipt of all public comments from EPA (generally the last day of the public comment period), HDR will submit a Draft Responsiveness Summary to EPA for review. The Final Responsiveness Summary will be submitted following receipt of EPA's comments on the Draft Responsiveness Summary.

2.3. Task 3 - Field Investigation

This Revised Work Plan incorporates the information generated from tasks completed to date. This includes information from the well inventory, well survey, baseline, DPT and public supply well sampling and the necessary components of the Triad approach and research into the state-of-the-art technologies and applicability to meeting the project goals. The results of this site-specific evaluation of sampling and testing tools, prepared in accordance with EPA guidance related to the DMA compares field- and lab-based methods and the effectiveness of particular technologies to determine what will work to reduce uncertainty and maximize usability of the field investigation data.

The field program will consist of a Site Reconnaissance, which has been completed and Field Investigation, which is ongoing. Based on the data obtained in the field effort to date and as described in this section, HDR will make a recommendation to EPA as to whether or not additional field work will be necessary.

2.3.1 Subtask 3.1: Site Reconnaissance

The purpose of the Site Reconnaissance is to obtain information to assist in the execution of the field investigation and will consist of two elements; a pre-field portion and a field portion. Prior to entering the field, the following tasks were performed:

- A base map, which will consist of an aerial photograph and an overlay of tax map information, will be prepared;
- Information regarding property ownership and utility right-of-ways will be obtained from the local municipalities and Nassau County;
- A desk-top well inventory, using information provided by Nassau County and results of prior field investigations; and
- Properties requiring access to initiate the field investigation were identified and tabulated; additional properties identified in the course of the investigation will be incorporated as this information becomes available.

Once property access was obtained by EPA (as needed), mobilization, a well inspection, the ecological resources reconnaissance, and utility mark-outs of the sampling locations were conducted. EPA has identified public property that may be used for IDW staging and storage; we are in the process of completing that agreement. EPA Regional Counsel has also clarified that under CERCLA/SARA, EPA does not need to acquire road opening permits for all Town, County and State roads; substantive requirements are to be met. The local government representatives have been advised. HDR has included costs for fencing and setting up the staging/storage area as a mobilization subcontractor item.

2.3.1.1 Subtask 3.1.1: Site Surveys

The base map will be expanded and revised as necessary. HDR staff will complete the survey utilizing industry standard methods (GPS, aerial photography, etc.). Because the Study Area is approximately eight square miles in area, multiple maps may be prepared.

The Nassau County GIS database, local tax assessor's records and other sources will be used to obtain property tax maps for the Site. The tax map information and utility right-of-way information will be overlain on an aerial photograph. The resulting figure will be the base map, which will be used to identify properties to which EPA will obtain access for the conduct of the field investigation and other purposes.

2.3.1.2 Subtask 3.1.2: Well Inventory

An assessment of existing monitoring wells and select commercial, monitoring and water supply wells will be conducted to evaluate their suitability, both conceptually and technically, for field investigation activities. The documentation (e.g., well construction diagrams) for the existing monitoring and water supply wells, as well as the locations of the wells has been and will be reviewed to determine their

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suitability for field investigation activities. An inventory of existing monitoring wells and water supply wells (public or private) that lie within the Site has been prepared. This inventory is based upon a review of documents obtained from EPA, discussions with officials and file reviews at the Nassau County Health Department, results of an Environmental Data Resources, Inc. (EDR) well search, the Nassau County GIS files and data obtained from the water purveyors. The availability of screened interval, depth information, well location, and accessibility is evaluated as part of this task.

2.3.1.3 Subtask 3.1.3: Property Access

Tax maps of the Site Area will be obtained, as described above. Locations for field activities will be identified, and ownership of those properties will be determined. HDR will provide to EPA a list of properties for which access is needed for the field investigation activities. EPA will obtain access to the properties as needed.

2.3.1.4 Subtask 3.1.4: Well Inspection

Each well that is determined potentially useful for inclusion in the field investigation will be inspected to determine its suitability for use in the field investigation following EPA Region 2-Superfund Well Assessment Checklist. The HDR inspection will consist of the following tasks:

- Determination of the condition of the well (e.g., damaged, removed, or intact);
- Determination if the well is accessible;
- Measurement of the depth of the well to determine if redevelopment is required; and
- Lowering of a bailer to the bottom of each well to evaluate the integrity (e.g., obstructions or shifted casing) of the casing.

If the wells are found to be in acceptable condition, they will be incorporated into the field investigation. If 50 percent of the length of the screened area of a selected well is occupied by silt, a decision will be made as to whether the well will be redeveloped for use during the field investigation. The results of the inspection will be documented on the Well Assessment Checklists and in a report summarizing well condition and usability. This Subtask is partially completed; a number of wells were not able to be located and are assumed to have been destroyed. Locations and data for these existing and former wells have been compiled and will be included in the RI report. If additional wells of value to the field investigation are identified, they too will be inspected.

2.3.1.5 Subtask 3.1.5: Ecological Resources Reconnaissance

An ecological resources reconnaissance of the Site was performed using the Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessment. The ecological resources reconnaissance effort included a compilation of existing information and a limited field effort. The following subtasks were performed:

- Desktop identification of the 100-year and 500-year floodplain adjacent to the Site:
- Consultation with federal and state resource agencies to identify the presence of any endangered, threatened, or species of special concern;

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- A qualitative description of vegetation cover types present within the site boundaries based on field inspection: and
- A qualitative wildlife survey based upon direct and indirect observations of wildlife within the site area.

The results of the ecological reconnaissance will be used in the screening level ecological risk assessment. This task has been completed and no additional effort will be required as part of Work Plan modifications.

2.3.1.6 Subtask 3.1.6: Geophysical Survey and Utility Markouts

A markout of underground utilities will be performed for DPT, boring and monitoring well locations within the Site. The markout will be obtained through Dig Safely New York. Intrusive activities will begin no sooner than three business days after the utility markout is requested. HDR will obtain a confirmation number through our subcontractor documenting the request and confirmation that the appropriate utilities have acknowledged and responded to the request. The markout is valid for 10 business days. A new markout request must be made prior to the expiration of the initial request when intrusive activities are planned that will continue beyond the 10 business day approval. Dig Safely New York notifies the appropriate utility companies to mark the locations of all their known utilities around boring and monitoring well locations.

A surface geophysical survey (utility clearance) will be conducted at all locations where intrusive activities (i.e., borings and monitoring well installation) will occur. The survey is necessary to ensure avoidance of the utilities during drilling and all locations will require the described additional efforts to clear the utilities. For each location, a 10-ft radius will be surveyed and any utilities detected will be marked out using ground penetrating radar and metal detecting equipment. The geophysical survey to identify subsurface utilities will be conducted in accordance with the State of New York and industry standards and guidelines such as the proposed American Society of Civil Engineers (ASCE) Standard for the Clearance and Depiction of Existing Subsurface Utilities. The locations of underground facilities and excavation sites will be identified utilizing stakes, spray paint or other appropriate means and the uniform color code identified in 16 NYCRR Part 753, Section 4.7.

Cultural features, debris, or the proximity of the drilling to utilities may result in complicated geophysical signatures for a number of locations, making interpretation difficult. Therefore, locations will also be cleared by soft-dig techniques to at least five feet by the drilling subcontractor.

2.3.2 Subtask 3.2 through 3.8: Field Investigation

The Field Investigation has been designed to identify sources of contamination in groundwater, determine fate and transport of Site contaminants, and support the ecological and human health risk assessments and Feasibility Study. The hydrogeological assessment consists of a direct push technology (DPT) investigation, the installation of borings, monitoring wells, and groundwater sampling. Soil borings will be installed at potential source areas and background locations to collect data to be used for the human health and ecological risk assessments and to identify source areas. In addition, a geophysical survey will be conducted as needed for clearance purposes.

DQOs will be developed during the preparation of revisions to the QAPP. The Triad approach will include the collection of field screening data (e.g., photoionization detector [PID], Color-Tec® real-time measurement technology) as well as quick turnaround for confirmatory, contract laboratory data, as

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needed. These data will be used to determine subsequent sampling locations, depth intervals, and for health and safety monitoring. Definitive laboratory analytical data generated during the field investigation will be used to support the project objectives listed below, ecological and human health risk assessments, and remedial alternative screening. In addition, CSIA and other forensic analyses of soil and groundwater samples and the resulting data interpretation will be performed by a laboratory specializing in forensic isotope analysis.

Specifically, the data will be used to:

- Identify sources of the OU2 TCE-dominant groundwater plume;
- Determine the current and potential future human health and ecological risk posed by the sources of contaminated groundwater, soil and soil gases;
- Obtain sufficient data to support the identification of source areas.
- Identify the most appropriate remedial alternative for the identified sources; and

2.3.2.1 Subtask 3.2: Mobilization and Demobilization

Mobilization

Mobilization will be required for both the Site Reconnaissance and the Field Investigation; this includes the effort already required to provide support for equipment delivery, sample and IDW management and communications during the well inspections performed to date. During mobilization, all the equipment and materials necessary for that portion of the field program will be procured and transferred to the Site. The necessary personnel, equipment and materials for conducting the field activities will be assembled during mobilization.

During mobilization, installation and setup of telephone service at the existing EPA field office space at the Genzale Plating Company site in Franklin Square has been included. We have included the cost for temporary fencing to contain the IDW at a storage area in Nassau County. EPA is in negotiation with Nassau County to allow use of county property for staging areas near the Site; the status of this agreement will need to be confirmed. In an effort to minimize the environmental impact from the mobilization and maximize sustainable practices, existing EPA field office space will be utilized during the field investigation. In order to further reduce energy and water usage, a specific IDW management and storage area maybe required to consolidate and treat IDW. The need and location of the staging area will be determined with the IDW contractor. Additional details on the mobilization area, including health and safety zones, the project field office, and IDW staging areas will be presented in the Site-specific QAPP and HASP. Mobilization will consist of the following:

- Prepare a list of required field equipment;
- Prepare requisitions to lease or purchase equipment, as necessary:
- Prepare requisitions to purchase expendable field supplies, as necessary;
- Set-up of Health and Safety Field Files;
- Arrange delivery, storage and setup of all equipment (as necessary);

- Coordinate and oversee mobilization/demobilization subcontractor (includes installation and setup of phone service, and temporary fencing at the IDW storage area, if required);
- Receive field activity and health & safety equipment;
- Perform general Site preparation/organization;
- Conduct initial Health & Safety briefing for Site personnel; and
- Set-up field computer equipment.

Demobilization

Upon completion of the field investigation, demobilization will occur. The following activities will be performed:

- Complete Site restoration activities, including temporary fence removal;
- Arrange for the transportation and disposal of wastes, including IDW, from the Site;
- Return rental equipment;
- Coordinate efforts of mobilization/demobilization subcontractor (includes removal of phone service and temporary fencing if utilized.);
- Demobilize field and computer equipment; and
- Perform Site restoration and cleanup activities.

2.3.2.2 Subtask 3.3 : Hydrogeological Assessment

Since the August 2010 approved Work Plan was developed, the NYSDEC has conducted an investigation of potential source locations in the Denton Avenue area, thought to be contributing to the groundwater plume. The NYSDEC investigation identified one facility deemed in need of further investigation (for which we are pursuing available data), but no specific shallow source areas. Similarly, the August 2010 approved Work Plan included soil gas sampling in the vicinity of 150 Fulton Avenue. Additional work done in the area of the OU1 source by others since that time provided no evidence that other shallow contaminant sources are present.

The NYSDEC investigation subsumed the groundwater sampling task within the Denton Avenue area that had been included in the August 2010 approved Work Plan. The data obtained from the NYSDEC sampling, recent OU2 baseline sampling events, OU1 sampling event, other nearby site investigations, modeling of area lithology and potential preferential pathways of contaminant migration will be used to determine sampling locations for this field investigation. The decision logic for choosing sample locations and depths is based on the decision tree provided in HDR's January 18, 2011 presentation to EPA. The decision logic will be finalized based on the accuracy of initial screening data, used during this subtask to maximize usability of the collected data and further in locating multi-level sampling locations in the next phase of sampling.

The actual locations of and need for sampling will be determined iteratively, through analysis of the results of previous investigations and use of the Technology Innovation Program (TIP) visualization tool

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that will allow for identification of preferential pathways of contaminant migration and presence of possible plume cores. Once a potential plume is identified, there may be a need to collect additional data, e.g., along a transect placed parallel to the groundwater flow path. Discrete groundwater samples from potential contaminant sources, impacted water supply and existing monitoring wells are also planned to determine the type and severity of VOC contamination and provide CSIA and other forensic analysis to link contaminant source(s) to receptor(s). If data gaps are noted, additional sampling may be necessary prior to initiating source area investigations.

HDR began the investigation using a DPT rig capable of reaching an approximate 100-120 foot depth in this localized area, advancing to the point of refusal. Results indicate deeper contamination and potential contamination sources in other parts f the Study Area. That is why we are exercising the contingency for other drilling methods (e.g., Rotasonic) capable of reaching greater depths and proposing sampling in other parts of the Study Area at this time.

Real-time, discrete-depth Total VOC concentration screening using Color-Tec® technology has been used and that is planned to continue. We have achieved a detection limit of 3 ppb with this screening method, which has been confirmed with laboratory analyses. The extent of the Color-Tec® screening will be governed by field conditions and VOC contamination detected. Groundwater and soil samples will continue to be collected to confirm the Color-Tec® findings and increase confidence in the data. Confirmatory sampling will be performed at locations where elevated VOCs are indicated.

Data collected will include measurements and/or modeling of:

- VOC concentrations and plume cores;
- Groundwater flow patterns, horizontal and lateral gradients and preferential pathways; and
- Contaminant distribution and partitioning between phases (i.e., NAPL, dissolved) and within soil and groundwater.

Groundwater samples will also be collected from groundwater monitoring wells for CSIA and other forensic analysis. The laboratory analysis needs to be subcontracted due to the limited capacity to perform such specialized forensic analyses, provide the appropriate QA/QC, and obtain expert interpretation of the results in accordance with EPA CSIA and other guidance.

These parameters are needed to meet the project objectives and support the visualization effort. Confirmatory laboratory analytical data generated during the field investigation will be used to support the DMA, ecological and human health risk assessments, and remedial alternative screening.

2.3.2.2.1 Subtask 3.3.1: Hydropunch Groundwater Sampling

Hydropunch (direct push) groundwater sampling is no longer being implemented. Please see Section 3.3.4 Direct Push Technology Transect Investigation for details of the revised sampling approach.

2.3.2.2.2 Subtask 3.3.2: Monitoring Well Installation

The baseline groundwater sampling and DPT results have been and will continue to be evaluated to determine where to install DPT sampling points to optimize lateral delineation of contamination and provide high-resolution vertical profiling. Borings/monitoring wells may be installed (e.g., at potential source areas) to evaluate groundwater quality, provide verification of source area contributions to

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subsurface contamination and assess contaminant mass flux. As part of the Triad approach, the final locations of the borings/monitoring wells and their sampling depth intervals will be determined based on the findings of the DPT and other (e.g., water supply well) groundwater sampling.

If needed, the drilled monitoring wells will be constructed with black steel riser and stainless steel screen. Upon completion of the borehole to the desired depth, the monitoring well will be installed using two-inch or four-inch inner diameter (ID), flush joint, stainless steel. Two inch diameter wells will be installed when the maximum depth is 250 feet or less and four-inch wells will be installed when the depth exceeds 250 feet. All of the monitoring wells will be installed with at least five feet of 0.010 inch (No. 10) slot stainless steel screen with a bottom cap at the base and two-inch black steel riser to the surface. The construction will be consistent with the existing monitoring well network. Centralizers will be placed on the riser so that the well is positioned properly in the boring. A slurry of graded sand will be tremied down the annulus of the borehole to an elevation of approximately two feet above the top of the screen interval to form a sand pack. A bentonite slurry will be tremied down the annular space to form a three-foot thick bentonite seal above the sand pack. The remaining annular space will then be tremied grouted with a cement-bentonite grout within three feet of the ground surface.

Monitoring wells will be completed with flush mount protective casings set into concrete. The top of the protective casing will be finished flush with the surrounding grade. All monitoring wells will be developed no sooner than 48 hours and no longer than two weeks after completion.

2.3.2.2.3 Subtask 3.3.3: Groundwater Elevation Measurements

Synoptic groundwater elevation measurements will no longer be collected. Data collected to date and other information indicates a very complex ground water flow regime in the Study Area, due to the presence of high volume, numerous artificial recharge (e.g., stormwater basins) and discharge (e.g., supply well pumpage) points. As the objective of measuring groundwater elevations remains to collect sufficient data to prepare groundwater elevation maps and evaluate flow direction a three-month ground water elevation monitoring program, with approximately 30 transducers being deployed is proposed. This is necessary to capture the changing pattern of what is occurring in the subsurface on what is thought to be an hourly, daily and seasonal basis.

All data will be recorded and presented in tabular form. Groundwater elevations will be measured from the inner casing measuring point using an electronic interface probe. Where no such point exists, (i.e., supply wells) elevations will be measured from a marked point which will be georeferenced using RTK-GPS.

2.3.2.2.4 Subtask 3.3.4: Direct Push Technology Transect Investigation

The DPT investigation indicates limited VOC contamination in the shallow ground water within the Study Area and potential for severe vertical flow gradients. While this necessitates the use of deeper drilling methods to reach contaminated zones in the underlying aquifer, HDR has and will continue use direct-push, groundwater grab sampling with field colorimetric testing for screening purposes within the Study Area.

Where the screening indicates elevated chlorinated VOC concentrations in groundwater, a DPT rig may be used to install depth-discrete monitoring points/wells to confirm the screening result through

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laboratory analyses, optimize the lateral delineation of contamination, provide high-resolution vertical profiling and identify source areas. In addition, HDR proposes to collect samples for CSIA and other forensic analyses at these depth-discrete monitoring points. These methods will be used to connect the dots between discrete contaminant source(s) and receptors (i.e., water supply wells).

Plume Extent and Vertical Profiling

Once the information on contaminant distribution is available, it will be evaluated to determine where to install sampling points to optimize delineation of the lateral extent of contamination and provide high-resolution vertical profiling. Depth-discrete sampling is recommended at sites with significant subsurface heterogeneity, as is the case here, and will also support development of an accurate visualization of site conditions. Parameters such as hydraulic flow and transport, influence of vertical gradients and preferential flow paths to support analysis of the extent of contamination, and the design of an effective remedial strategy can be determined through use of depth discrete technology.

Identified contaminant concentration trends, lower permeability zones, preferential pathways, drawdown from pumping wells, water infiltration from recharge basins and other factors will also be evaluated in choosing these well locations. In combination with CSIA and other forensic analyses and the TIP visualization tool, these data provide the best possibility to track contamination back to its source(s).

Data collected will include measurements or modeling of:

- Vertical and lateral hydraulic gradients,
- Subsurface lithology, geology,
- Geochemistry,
- CSIA and other forensic analysis, and
- Groundwater elevation measurements, to provide sufficient data to prepare groundwater elevation maps and evaluate flow direction.

The need for deeper borings and installation of permanent wells will be evaluated in consultation with the WAM, based on the data generated in the field investigation and considering the requirements to support long-term monitoring or other purposes.

2.3.2.3 Subtask 3.4: Soil Borings, Drilling and Testing

This phase of the field investigation consists of site- and/or source specific confirmatory sampling/vertical profiling at tentatively identified contaminant source areas. The purpose of this sampling is to determine specific source area contributions to the TCE-dominant plume, characterize subsurface conditions, and provide detailed information to support the identification of discrete sources and choice of remedial strategy.

The August 2010 approved Work Plan includes soil gas sampling that was to be completed in the vicinity of 150 Fulton Avenue. Similarly to the NYSDEC investigation in the Denton Avenue area, additional work done in the area of the OU1 source at 150 Fulton Avenue since that time provided no direct evidence that other shallow contaminant sources are present.

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The tasks included will support collection of more detailed, site-specific data needed for source area characterization. HDR plans to include appropriate sampling to help identify potential source areas and determine if chlorinated VOCs in the groundwater and/or soil are a potential health risk due to vapor intrusion or other mechanisms. The location and depth of the samples, technologies to be used and analyses to be completed (e.g. VOC, CSIA) will be determined based on results of earlier phases of this field investigation. The vapor intrusion investigations tasks are included as a contingency at this time; should they become necessary, labor and subcontractor cost estimates will be provided to EPA. This will include consideration of contaminant concentration trends, identification of lower permeability zones, preferential pathways, zones of influence from pumping wells, recharge basins and other factors.

This additional, property-specific investigation is anticipated to include a combination of soil, groundwater, and/or air sampling that will be used to "connect the last dot" – and confirm contaminant sources. The actual scope of the investigation will be tailored to characteristics of the potential source(s) identified.

Media samples will also be collected to support the ecological and human health risk assessments in accordance with Agency guidance. Samples will be taken in any identified potential source areas (and associated background locations), should soil be determined to be a media of concern. Subsurface soil boring data will also be used to support the HHRA where feasible.

The soil samples will be submitted for analysis of target compound list (TCL) organics/TAL inorganic/grain size and TOC, to address the investigation of TCE contamination associated with OU2 and provide additional data for completing the risk assessments and Feasibility Study.

2.3.2.4 Subtask 3.5: Environmental Sampling

Environmental sampling will be conducted to identify source areas and provide data for the human health and ecological risk assessments. Soil samples will be collected from within deeper borings, at potential source areas and at background locations to support source identification and the risk assessments.

2.3.2.4.1 Subtask 3.5.1: Surface and Subsurface Soil Sampling

A soil boring program will be conducted to assist in identifying potential source areas and support the risk assessments. A total of 36 surface soil samples were proposed to be collected from 0 to 0.5 foot bgs at six locations at each of six potential source areas. The actual number and location of these samples may change; however, any such data collected will also be used to aid in the ecological risk assessment.

Soil boring samples will also be collected from a depth of 0 to 2 feet bgs and from 2 to 10 feet bgs to aid in the human health risk assessment and identification of specific source areas. The exact locations will be determined in the field in consultation with the WAM.

Subsurface sample depths within the 2-10 bgs interval will be determined based on visual examination and headspace analysis of the soil collected as the boring is advanced. The headspace analysis is a field screening technique that consists of analyzing the headspace above an aliquot of a soil sample in a covered glass jar using a FID and/or PID.

When no surface cover is present, sampling will commence at the surface. In cases where a surface cover is present, samples will be obtained from the 0 to 2 feet interval immediately below the surface cover material and associated bedding (i.e. gravel road base). The soil samples will be submitted for analysis of

Target Compound List (TCL) organics, Target Analyte List (TAL) metals and Total Organic Carbon (TOC). Samples from the 2-10 ft interval will also be analyzed for grain size.

2.3.2.4.2 Subtask 3.5.2: Background Soil Sampling

Six surface (0 to 2 feet bgs) and six subsurface soil samples (2 to 10 feet bgs or above the water table) will be collected off-Site to determine background soil concentrations of various constituents for comparison to on-Site levels to be used in the human health risk assessment. When no surface cover is present, sampling will commence at the surface. In cases where a soil cover is present, samples will be obtained from the interval immediately below the surface cover material and associated bedding (i.e., gravel road base). Background soil samples will be submitted for analysis of TCL organics, TAL metals and TOC. The 2-10 ft interval will also be analyzed for grain size. These shallow borings will be completed using DPT sampling techniques.

Three background ecological soil samples will be collected if the Screening Level Risk Assessment (SLERA) indicates a Baseline Ecological Risk Assessment (BERA) is warranted (samples will be collected from a depth of 0 to 0.5 foot bgs).

2.3.2.4.3 Subtask 3.5.3: Groundwater Sampling

Baseline groundwater sampling was completed in July 2011. Groundwater samples were collected from 19 locations and analyzed for VOCs. VOCs were detected in several of the wells sampled. Analytical results from other investigations in the area (e.g., Fulton OU1 RI) indicate TCE and PCE are present in groundwater at concentrations exceeding drinking water standards in previously installed monitoring wells at the western, southern and northeastern extent of the plumes identified in OU1, to depths up to 400 feet bgs. There are also indications that elevated concentrations of both TCE and PCE are present in groundwater at the northeast, in an area considered to be upgradient of the identified OU1 source area.

The results of this sampling effort have been evaluated and will be incorporated into decisions regarding RI field activities. Prior to initiating the baseline sampling, HDR completed the well inspection for all wells to be included in the baseline sampling. The total number of additional groundwater samples to be collected will be determined based on the results of field investigation to date and in consultation with the WAM.

Prior to sampling, a water level measurement will be recorded using an electronic water level indicator. These measurements are taken cautiously to the extent practicable, in order to minimize turbulence to the static water level. After the water level is recorded, groundwater in each monitoring well will be purged. The groundwater purging will be accompanied by the periodic measurement of field indicator parameters, including pH, temperature, specific conductivity, dissolved oxygen, turbidity, and Eh using a flow-through cell attached to the Teflon tubing. Once the field parameters are considered to be stabilized within the limits specified in the EPA's Low Stress Method, groundwater samples will be collected directly from the Teflon tubing into sampling vials/jars. The purged groundwater and the well headspace will also be field-screened using a PID.

Groundwater purging operations and subsequent groundwater sample collection for third-party wells (to be identified during the field investigation) will be conducted by purging the well and pumping for at least 15 minutes prior to sample collection. If a treatment system is present, purging and sampling of the well will occur from a tap or spigot receiving water prior to any treatment system and/or storage tank, if

present. Purging will be conducted at a rate that does not produce turbulent or aerated flow from the tap or spigot. Prior to the sample being taken, the purged groundwater and well headspace will be field screened using a PID. The monitoring wells will be sampled and analyzed for TCL organics, TAL metals, water quality parameters, and CSIA, as described on Table 2.

The above task was partially completed by HDR in July 2011 with slight revisions and modifications and is considered baseline sampling for the site. Analysis of groundwater samples from 19 existing well locations indicates TCE and PCE are present in groundwater at the edge of the plumes identified in OU1. Elevated concentrations of both TCE and PCE are also present in groundwater to the northeast, upgradient of the identified plume and OU1 source area. Since the preparation of the December 2009 Work Plan, NYSDEC has completed an investigation in the Denton Avenue area (previously identified as a possible source of the TCE/PCE groundwater contamination) but did not identify any shallow TCE/PCE contaminant sources. In addition, OU1 sampling results that should be available has been delayed. Data from the NYSDEC, OU2 baseline sampling completed by HDR, OU1 and other nearby site investigations were evaluated to determine optimal sample locations utilizing existing wells in an area upgradient and further to the north and/or east of the OU1 source and the Denton Avenue area (Figure 1). Additional areas and depths require sampling to determine the nature, extent and source of the OU2 TCE plume.

2.3.2.4.4 Subtask 3.5.4: Sample Location Georeferencing

Sample locations will be georeferenced using appropriate GPS technology. Monitoring well locations will be located to the nearest 1.0 foot, and ground surface elevation, outer casing elevation and inner casing elevation will be georeferenced to the nearest 0.01 foot. Soil borings will be georeferenced to the nearest 1.0 foot, and the soil borings will also have their ground surface elevation georeferenced to the nearest 0.1 foot. No surveying will be performed. Where possible, USGS Light Detection and Ranging data will be utilized. GPS locations and elevations will be submitted electronically in Microsoft Excel format.

2.3.2.4.5 Subtask 3.5.5: Vapor Intrusion Sampling

The August 26, 2010 approved Work Plan included soil gas sampling under this task to be completed in the vicinity of 150 Fulton Avenue, with locations to be determined during the field investigation. Similar to the NYSDEC investigation in the Denton Avenue area, additional work done in the area of the OU1 source since that time provided no direct evidence that other shallow contaminant sources are present. Therefore, HDR plans to include sampling to identify potential source areas and assess if VOCs are a potential health risk where deemed appropriate. HDR is including vapor intrusion sampling as a contingency, with a scope of work and cost estimate to be provided to EPA should HDR assistance be required.

2.3.2.5 Subtask 3.6: Ecological Characterization

These subtasks are optional and are dependent on the results of the SLERA. These tasks will not be performed unless HDR is directed by EPA to do so.

Biota/Population Surveys

A biota survey of the cosmopolitan habitats and areas of open space within the Site will be performed if directed by EPA. The survey will consist of transect road surveys and discrete point survey techniques. A

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qualitative roadside survey will performed within the Site to identify ecological receptors (primarily birds and mammals) that inhabit the fragmented open space areas and urban settings present. The roadside surveys will encompass two north to south road survey transects within the Site. Direct visual observations and auditory identifications (for birds only) will be used to document the presence of wildlife within the study area. Tracks, roadside carcasses and middens will be used as indirect evidence to document any species present at the Site. In addition, discrete point surveys will be performed to document wildlife in areas of open space which may offer more significant opportunity for use by wildlife. At each point, an experienced ecologist will visually survey the open space area and record any evidence of wildlife presence or activity. Given that some of the open space appears to be private (i.e., golf courses), a point along the perimeter of the property will be surveyed. For each of the open space areas, four accessible points will be surveyed. The surveys of these areas will consist of visual and auditory observations for wildlife for a 10-minute period at each point. Open space areas to be surveyed could include golf courses, urban parkland, and water recharge basins within the Site. At each point, an experienced ecologist will survey the open space area and record any evidence of wildlife. All data recorded during the road transects and point surveys will be summarized in tabular format and integrated into the SLERA and the CSM for the Site.

Bioassays

Bioassays inclusive of toxicity tests may be proposed for soils at locations with potential exposure to terrestrial ecological receptors. Three surface soil samples from source areas and one background surface soil sample may be assessed for toxicity using the American Society for Testing and Materials (ASTM) methods for assessing toxicity in the earthworm, Eisenia foetida. Bulk surface soil samples collected from 0 to 0.5 ft. interval will be sampled for both TCL and TAL contaminants and TOC. Selection of the sampling locations will be based upon the problem formulation process for the BERA.

Bioaccumulation Studies

Bioaccumulation studies may be proposed for soils with the potential for exposure to terrestrial ecological receptors. Three surface (0 to 0.5 ft.) soil samples from the source areas of the Site and one background surface soil sample may be assessed for 28-day bioaccumulation potential using the ASTM methods for the manure worm, Eisenia foetida. Bulk surface soil samples collected from 0 to 6 inch interval will be sub-sampled for both TCL and TAL contaminants and TOC before being placed in the exposure chambers. Selection of the sampling locations will be based upon the problem formulation process for the BERA. Following the 28-day exposure period, the worms will be harvested and sampled for body burden concentrations for percent lipids and bioaccumulating COPCs identified from the results of the SLERA. Body burden data will used in conjunction with analytical data for the surface soils evaluated to assess bioaccumulation potential for the COPCs identified.

2.3.2.6 Subtask 3.7: Geophysical Survey

A markout of underground utilities will be performed for boring and monitoring well locations within the Site. The markout will be obtained through the New York State Dig Safe center. A markout is performed when intrusive activities will begin no sooner than three business days after the request is made and no later than ten business days after the request is made. HDR will obtain a confirmation number documenting the request. The markout is valid for 10 business days.

A new markout request must be made prior to the expiration of the initial request when intrusive activities are planned that will continue beyond the 10 business day approval. The Dig Safe center notifies the appropriate utility companies to mark the locations of all their known utilities around boring and monitoring well locations.

A surface geophysical survey (i.e., utility clearance) will be conducted at all DPT and newly installed groundwater monitoring well locations. The survey is necessary to insure avoidance of underground utilities during drilling activities. The number of locations assumed for cost estimating purposes is 232 locations that will require the described additional efforts to clear the utilities.

A 10-ft radius around each boring location will be surveyed and any utilities detected will be marked out using ground penetrating radar and metal detecting equipment. The geophysical survey to identify subsurface utilities will be conducted in accordance with the State of New York and industry standards and guidelines such as the proposed American Society of Civil Engineers (ASCE) Standard for the Clearance and Depiction of Existing Subsurface Utilities. The locations of underground facilities and excavation sites will be identified utilizing stakes and the uniform color code identified in 16 NYCRR Part 753, Section 4.7.

Cultural features, debris, or the proximity of the drilling to utilities may result in complicated geophysical signatures for a number of locations, making interpretation difficult. Therefore, in those situations, soil boring and monitoring well locations will be cleared by soft-dig techniques to at least five feet.

2.3.2.7 Subtask 3.8: Investigation Derived Waste (IDW) Characterization and Disposal

HDR will assist the EPA in arranging for and establishing a secure location to stage the IDW. The Waste Management Plan contained in the HASP will describe how the IDW generated during the field investigation will be managed (staging pad, fencing, tarping, marking, inspection requirements, etc.). IDW may include the following waste streams, if generated during the field investigation:

- Monitoring well development and purge water;
- Soil cuttings;
- Residual drilling fluids and mud;
- Decontamination fluids containing wash/rinse water and decontamination chemicals; and
- Contaminated debris including but not limited to personal protective clothing, plastic sheeting, and consumable sampling equipment.

IDW determined to be hazardous will be transported by an approved, licensed transporter to an approved treatment, storage, and disposal facility for disposal. It is anticipated that some of the soil cuttings and monitoring well development and purge water may be hazardous. If field screening indicates that the IDW from a certain location is likely highly contaminated, this material will be segregated from the other IDW in order to minimize the volume of IDW that will require management as hazardous. HDR will

verify whether facilities to be used are currently approved by EPA Region 2. Only an approved disposal facility will be used for disposal of hazardous IDW. HDR will review the profiles and manifests from the IDW contractor and will recommend a classification. This recommendation will then be forwarded to EPA for concurrence and approval.

HDR is exploring green options for reducing and managing the IDW including local disposal and recycling options to dispose of the IDW. Large quantities of wastewater may be generated during the deeper boring and monitoring well installation and sampling; it may be possible to use methods that reduce or manage the volume of soil cutting and residual drilling mud to reduce the impact of their generation and disposal.

2.4 Task 4 - Sample Analysis

2.4.1 Subtask 4.1: Innovative Methods/Field Screening Sample Analysis

HDR will perform on-Site field screening (e.g., PID, Color-Tec) associated with the direct push and drilling of borings/installation of monitoring wells and collection of samples under Task 3. In addition, measurement of field screening parameters will be performed using a water quality meter (e.g., Horiba U-22 or equivalent) during the groundwater sampling.

In addition, as part of the modifications to this revised Work Plan, the following innovative methods/field screening sample analysis will be implemented:

- Direct Push borings instead of Hydropunch;
- Color-Tec® in-field analysis to provide a qualitative picture of total chlorinated VOC contamination in groundwater;
- CSIA and other forensic parameter sampling (to be subcontracted due to limited capacity to perform these specialized analyses).

2.4.2 Subtask 4.2: Analytical Services Provided via CLP, DESA or EPA-ERT

HDR will secure RAS for the sample analyses available through either the EPA CLP and/or the EPA Region 2 DESA Laboratory in Edison, New Jersey in accordance with Region 2 SOP "Policy for Implementing the National Strategy for Procuring Analytical Services for all OSWER Programs (Superfund, RCRA and Brownfields) (EPA 2006). These analyses will include TCL organics TAL metals, water quality and geochemical parameters, TOC and grain size.

2.4.3 Subtask 4.3: Non-Routine Analytical Services

HDR proposes to collect groundwater samples for compound-specific isotope analysis (CSIA) and other forensic analyses from newly installed DPT and deeper monitoring wells to connect the dots between discrete contaminant source(s) and receptors (i.e., water supply wells). The CSIA and other analyses will be provided by a subcontractor laboratory as necessary.

These services will be performed in accordance with the approved HDR RAC 2 Program Quality Management Plan and the Site-specific QAPP prepared under Subtask 1.7.

2.5 Task 5 - Analytical Support and Data Validation

HDR will arrange with EPA sample management personnel for the analysis and validation of RAS and Non-RAS (if required) environmental samples collected during the field investigation program in accordance with the EPA SOP "Policy for Implementing the National Strategy for Procuring Analytical Services for all OSWER Programs (Superfund, RCRA and Brownfields) (EPA 2006). Analytical services will be produced utilizing the sequential decision tree provided in the SOP. Sample slots for the CLP, the EPA Region 2 DESA Laboratory and/or EPA National Non-RAS contracts will be scheduled with the EPA Regional Sample Control Center (RSCC) in Edison New Jersey. If applicable, HDR will arrange for the analysis, and perform the validation of any Non-RAS samples analyzed via subcontract laboratories during the field investigation program. The following subsections describe the activities HDR will perform.

2.5.1 Subtask 5.1: Collect, Prepare and Ship Samples

During the field program, HDR will prepare and ship all samples collected for laboratory analysis under Task 3 in accordance with the procedures outlined in the Site-specific QAPP (Appendix A) and the EPA Contract Laboratory Program Guidance for Field Samplers (EPA, 2007). A summary of the field samples and associated QA/QC samples to be collected will be provided in the QAPP.

Arrangements will be made for sample shipment and delivery schedules with the RSCC for samples to be analyzed by CLP laboratories, the DESA Laboratory and/or the EPA National Non-RAS contract laboratory. HDR will procure and provide the containers for these samples. EPA's Field Operations and Records Management System (Scribe) will be used in the field for shipping documentation preparation.

2.5.2 Subtask 5.2: Sample Management

HDR will provide sample management functions, including COC procedures, information management, and data storage/retention, in accordance with the procedures outlined in the Site-specific QAPP. Communication will be maintained with the RSCC office regarding the scheduling, tracking, and oversight of the sample analyses and validation. Sampling Trip Reports (STRs), which provide information on completed analytical shipments, will be prepared and sent to the RSCC office in Edison, New Jersey.

HDR will make split sampling available to other governmental agencies and municipalities during the field investigation. HDR will not supply bottleware, provide packing and shipping, or arrange for shipment or analysis of these samples.

Sample management associated with the optional ecological characterization (Subtask 3.6) will also be performed in this subtask, if directed.

2.5.3 Subtask 5.3: Data Validation

CLP RAS data will be validated by EPA Region 2 Hazardous Waste Support Section (HWSS) personnel, with contractor support as required. Hard copy CLP data packages will be sent to the EPA WAM, who will forward a copy of the validated results to HDR.

Data validation associated with the optional ecological characterization (Subtask 3.6) will also be performed in this subtask, if directed.

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All data validation reports will be summarized according to EPA Region 2 Data Validation SOPs. HDR will submit copies of these reports to the EPA upon receipt by the HDR Project Manager from the HDR data validator.

2.6 Task 6 - Data Evaluation

This task includes the compilation and evaluation of field sampling data from the OU2 investigation and an evaluation of the usability of the data. A Data Evaluation Report (DER) will be prepared that summarizes the results of the RI investigation at the Site. The report will include a discussion of the investigation activities, the analytical results, and any apparent trends and/or discrepancies within the data. The evaluation of CSIA analytical results will be included with the laboratory's analytical package and summarized in the DER. The DER will also identify additional data requirements, if warranted.

2.6.1 Subtask 6.1: Data Usability Evaluation

HDR will evaluate (quantitatively and/or qualitatively) the usability of data obtained during this Work Assignment's investigatory phase by:

- Examining data validation summary reports and field logbooks, and verifying that the sampling procedures and analytical results were obtained following the applicable protocols; and
- Verifying that the data is of sufficient quality to satisfy DQOs, and can he relied upon for performing the Risk Assessments, the FS, and subsequent remedial design activities.
- The usability evaluation of data acquired during the RI field effort will include review of the data validation summary reports; confirmation that sampling procedures were performed following applicable protocols; and confirmation that the analytical results were obtained following applicable protocols, are of sufficient quality to satisfy DQOs, and can be relied upon for performance of the Risk Assessments, the FS, and subsequent remedial design activities.
- Data usability particularly as it relates to the collection and interpretation of screening and confirmatory sampling completed and used in decision-making during the Triad investigation and as part of the RI and Risk Assessment evaluations will also be discussed. Verification, comparability and other analyses of the various types of data generated will be included.
- Evaluation of data associated with the optional ecological characterization will also be performed in this subtask, if directed.

The results of the data usability evaluations will be presented in the DER.

2.6.2 Subtask 6.2: Data Reduction, Tabulation, and Evaluation

Validated data assessed to be usable and relevant to the project will be compiled and summarized in tabular format with an independent quality control criterion at each step in the process to prevent transcription/typographical errors. The data will be entered into an Electronic Data Processor (EDP) using EQuIS software, the data management/storage platform selected by HDR for the project. Electronic data deliverables (EDD) will be provided and managed according to the Electronic Data Deliverable (EDD) Comprehensive Specification Manual 2.0 USEPA Region 2 (EPA May 2012). Screening level data generated during the Field Investigation will be summarized and provided in an Excel format, to allow for a complete evaluation of project-related data. Additional information provided through the

EPA-HQ visualization efforts supporting the RI will be summarized and outputs provided for completeness.

For reporting purposes, tables of analytical results will be organized by analytical fraction (e.g., VOCs), matrix (e.g., soil, groundwater, etc.), and/or segregated according to specific contaminant source area and/or other unique areas, if warranted. Analytical tables will identify individual samples by a unique sample location/identification number that corresponds to the sample location maps. The tables will also include the sample collection dates, detection limits for parameters not detected, and laboratory and/or data validation qualifiers. Standard units for results reporting (e.g., ug/L for groundwater, etc.) will be used in all tables, texts and figures which summarize the analytical results. CSIA analytical results will be provided in the format in which they are received from the laboratory, which will include interpretation of the results.

Within the DER, the EPA protocol for eliminating field sampling analytical results based on laboratory/field blank contamination results will be clearly explained. The discussions of the sampling results will not be qualified by suggesting that a particular chemical is a common laboratory contaminant or was detected in a laboratory blank. If the reported result has passed QC procedures during validation, it will be considered valid and usable. Field rinsate blank analyses will be discussed in detail in the DER if decontamination solvents are believed to have contaminated field samples.

Graphical soil boring logs/well construction diagrams will be prepared during the data reduction phase to describe the subsurface conditions encountered during intrusive operations. Soil interval information will be entered into the Site database for use in generating cross-section figures.

Data reduction, tabulation and evaluation associated with the optional ecological characterization (Subtask 3.6) will be performed in this subtask, if directed.

2.6.3 Subtask 6.3: Modeling Support

The original modeling effort, like other components of the initial work plan, has been overcome by time and events. The EPA WAM has approved a work plan, funded and being managed by the EPA-HQ Technology Innovation Program for their contractor to perform a Mass Flux 3-D Visualization modeling effort of the groundwater contaminant distribution within the Fulton Avenue OU2 Study Area. HDR proposes to support the effort to advance the much larger and more sophisticated TIP modeling effort through specific sampling and analytical tasks during the field investigation, considerations related to the CSIA analyses, and other tasks to be finalized in consultation with the WAM and TIP. The scope of this effort is to evolve as the data gathering and analysis progress.

In cooperation with TIP, HDR will prepare a CSM that depicts the most important behaviors of the system, object, or process relevant to the problem of interest, based on the output from the TIP modeling and other information. HDR will clearly describe (in words, functional expressions, diagrams, and/or graphs) each element of the CSM and will document the science behind each element (e.g., laboratory experiments, mechanistic evidence, empirical data supporting the hypothesis, peer-reviewed literature), as information becomes available.

2.6.4 Subtask 6.4: Technical Memorandum (Data Evaluation Report)

A DER, in the form of a Technical Memorandum, will be prepared and submitted to the EPA for review and approval within 30 days of completion of Subtask 6.2. This report will include:

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- A discussion of the investigation activities conducted at the Site, including any approved deviations from this Work Plan and/or the Site-specific QAPP;
- A summary of the results of the field effort, including any associated tables and/or figures;
- A determination of the usability of the data obtained during the RI;
- An assessment of the ability of the data to satisfy DQOs;
- A discussion of any apparent trends in the data, including any associated tables and/or figures;
- Additional data requirements, if warranted, recommended to be addressed (i.e., potential subsequent field investigation work);
- Graphical soil boring logs/monitoring well diagrams;
- Tables of analytical data acquired during the field program; and
- A discussion of the information associated with the optional ecological characterization will also be performed in the subtask, if directed.

After submission of the DER, EPA and HDR will meet to discuss the report contents. A revised DER will not be prepared; however, a response to comments and minutes of discussion letter will be developed. Any changes to the information provided in the DER based on the comments/discussion will be incorporated into the Draft RI Report. If additional field data are required to fill data gaps before proceeding with the RI Report following EPA's direction to do so, these data will be collected and an addendum to the DER will be submitted following the collection of the additional field data.

2.7 Task 7 - Assessment of Risk

2.7.1 Subtask 7.1: Baseline Risk Assessment (Human Health)

HDR will evaluate and assess the current and potential future risk to human health posed by exposure to soil (surface and subsurface), groundwater and air contaminants identified at the Site. The focus of OU2, and therefore, the BHHRA is TCE contamination. The BHHRA will incorporate the information presented in the Draft PAR (Section 2.1.13) and information added or modified in response to EPA comments. Development of the BHHRA report is contingent on the approval of the PAR by EPA Region 2.

The BHHRA report will be prepared in accordance with the following EPA guidance documents: RAGS Parts A, D, and E (EPA, 1989, 2001, and 2004, respectively) and the Exposure Factors Handbook (EPA, 2009) and guidance provided by EPA Region 2. The following subsections present the principal elements to be addressed in the Draft and Final BHHRA reports.

2.7.1.1 Subtask 7.1.1: Draft Baseline Human Health Risk Assessment Report

The BHHRA will address the following as described in the PAR:

- BHHRA CSM – The cumulative analyses and results are synthesized to develop an overall model of the potential exposures and risks to the contaminated Site media.

- Hazard Identification – Identifying which hazardous substances are present in the Site media and which constitute the major COPCs due to potential exposures. This OU2 RI/FS and BHHRA are focused on TCE contamination.
- Characterization of Site Potential Receptors – Identifying and characterizing the human populations and exposure pathways (part of the Conceptual Site Model).
- Exposure Assessment – Identifying the magnitude of actual or potential human exposures, the frequency and duration of these exposures, and the routes by which these receptors are exposed. The exposure assessment will include an evaluation of the likelihood of such exposure occurring and will provide the basis fro the development of acceptable exposure levels. Reasonable Maximum Exposure (RME) and CT estimates of exposure for both current and potential future use of the Site will be developed.
- Toxicity Assessment – Evaluating and characterizing the intrinsic toxicological properties of these COPCs, i.e., TCE.

Further, the BHHRA report will address the following aspects not previously described in the PAR, including:

- Risk Characterization – Combining contaminant-specific toxicity information with quantitative and qualitative information from the exposure assessment to develop estimates of risk that can be compared to EPA target levels established to indicate when Site chemicals may potentially affect human health. The risk projections will be presented and interpreted with respect to naturally occurring compounds and which indicated risk drivers may justify remediation. The results will allow a separate evaluation of each exposure area to facilitate Site management decision-making.
- Identification of Limitations/Uncertainties – Critically evaluating the principal assumptions and uncertainties in the BHHRA or in the interpretation of the results.

These two elements of the BHHRA (not addressed in the PAR) are described in greater detail, as follows. In the Risk Characterization, chemical-specific toxicity information presented in the PAR in Tables 5.1 and 5.2 ("Non-Cancer Toxicity Data") and in Tables 6.1 and 6.2 ("Cancer Toxicity Data") will be combined with quantitative and qualitative data from the exposure assessment presented in PAR Tables 3 ("Medium-Specific EPC Summary") and 4 ("Values Used for Daily Intake Calculations"). Collectively, this information will be used to calculate non-carcinogenic and carcinogenic risks for individual receptors and exposure routes identified in the BHHRA CSM, PAR Table 1.

The operative EPA model for dose-response of non-carcinogenic COPCs assumes that a minimum threshold dose or intake exists; below which adverse effects are not associated with exposure. Therefore, the potential for non-carcinogenic effects is calculated by dividing the chemical-specific chronic daily intake (CDI) by the reference dose (RfD) for each COPC. The resulting quotient or ratio is the hazard quotient (HQ) and is calculated for individual COPCs. HQs will be summed over all chemicals and all complete exposure pathways to estimate a cumulative hazard index (HI) for each receptor and will be presented in RAGS Part D Table 7 ("Calculation of Chemical Cancer Risks and Non-Cancer Hazards"). Since the units of the RID are mg/kg-day and the units of the CDI are mg/kg-day, the HQ and HI are dimensionless. HI ratios less than or equal to 1.0 indicate that adverse non-carcinogenic health effects are unlikely. Ratios greater than 1.0 indicate the potential for adverse non-carcinogenic health effects to

occur and that exposure level and additional evaluation may be warranted. However, a ratio greater than 1.0 does not mean that adverse effects will definitely be observed, since the RfDs used in the calculation of these ratios incorporate safety and modifying factors to reduce the potential that the likelihood of occurrence of adverse health effects will be underestimated. This procedure assumes that the risks from exposure to multiple chemicals are additive, an assumption that is probably valid for compounds that have the same target organ or cause the same toxic effect. HIs estimated to be in exceedance of 1.0 will be segregated and summed by target organ for further consideration.

Carcinogenic effects are expressed as excess lifetime cancer risks (ELCRs). Quantitative risk calculations for potentially carcinogenic COPCs estimate the potential ELCR for an individual in a specified population. This unit of risk refers to a potential caner risk that is above the background cancer risk in unexposed individuals. For example, an ELCR of 1×10^{-6} indicates that an exposed individual has an increased probability of one in a million of developing cancer as a result of the projected exposure, over the course of their lifetime. ELCRs will be estimated as the product of the CDI and the cancer slope factor (CSF). Since the units of the CDI and CSF are mg/kg-day and kg-day/mg, respectively, the resulting ELCR is dimensionless. For quantitative estimation of risk, it is assumed that cancer risks from various exposure routes are additive. Estimated ELCR values will also be presented in RAGS Part D Table 7 (Calculation of Chemical Cancer Risks and Non-Cancer Hazards) and will be discussed relative to the 1×10^{-6} to 1×10^{-4} target risk range of ELCR values considered by the EPA to represent an acceptable (i.e., de minimus) risk.

As stated previously, the non-carcinogenic and carcinogenic health risks will be presented in RAGS Part D Table 7. The purposes of this table are summarized in the following items:

- To present the EPCs and CDIs used in the risk calculations;
- To present non-carcinogenic and carcinogenic risks calculated for each exposure route for each COPC; and
- To provide the total HIs and total ELCRs for all current and future exposure routes,

  environmental media of concern, and receptors.

All non-carcinogenic and carcinogenic risks presented in RAGS Part D Table 7 will be summarized in RAGS Part D Table 9 ("Summary of Receptor Risks and Hazards for COPCs") for each receptor, by environmental medium, exposure route, and exposure point. RAGS Part D Table 10 ("Risk Summary") will summarize only those non-carcinogenic and carcinogenic risks for each receptor, by environmental medium, exposure route, and exposure point that exceed the 1×10^{-6} ELCR level or the 1.0 HI level. RAGS Part D Tables 7, 9, and 10 will be presented for the CT exposure scenario only when the RME exposure scenario indicates potentially unacceptable risk. The Site does not have known radiological contamination, therefore RAGS Part D, Table 8 will not be presented.

The Identification of Limitations/Uncertainties Includes a description of those uncertainties encountered throughout the process of performing a risk assessment. This component will address the sources of uncertainty inherent in the main components of the BHRRA to be performed for the Site. The following paragraphs briefly describe potential areas of uncertainties associated with each component of the BHHRA.

- Sampling and Analysis

  The development of a risk assessment depends on the reliability of, and uncertainties associated with, the analytical data available to the risk assessor. These, in turn, are dependent on the operating procedures and techniques applied to the collection of environmental samples in the field and their subsequent analyses in the laboratory. Any issues problems identified during the sampling and analysis and highlighted during data evaluation and reduction will be discussed in this section. Key to the quality and usability of data will be discussions regarding precision and accuracy of the methods of analysis. Finally, considerations will be given to the sufficiency of data to represent temporal and spatial characteristics of contamination at the Site with respect to exposure. Data uncertainty as it relates to screening and confirmatory data generated in the field investigation will be evaluated.

- Selection of COPCs

  The COPC screening criteria to be used in the PAR is described in Section 2.1.13. Uncertainties associated with the application of these criteria and their impacts on conducting the BHHRA will be discussed in this section. As the focus of this OU2 RI/FS is TCE contamination, the BHRRA will focus on the potential health risks from TCE as well.

- Exposure Assessment

  In performing exposure assessments, uncertainties arise from two main sources. First, uncertainties arise in estimating the fate of a compound in the environment, including estimating release and transport in a particular environmental medium. Second, uncertainties arise in the estimation of chemical intakes resulting from contact by a receptor with a particular medium. The latter uncertainties usually result from assumptions made regarding exposure events, exposure durations, and the corresponding assimilation of chemicals by the receptor. Both Site-specific and EPA-default exposure factors will be used for calculating CDIs for each receptor at the Site. Default factors representing RME scenarios will be used that generally represent upper-bound exposure conditions in order to bias uncertainties toward health conservatism. These are factors that have been generated by the scientific community and have undergone review and approval by the EPA. Additionally, uncertainties with use of the RME and CT approach in deriving EPCs based on statistical distributions of data will be discussed.

- Toxicological Assessment

  In making quantitative estimates of the toxicity of varying dosages of compounds to human receptors, uncertainties arise from three sources. First, research data on human exposure and the subsequent effects are usually insufficient, if they are available at all. Human exposure data usually lack adequate concentration estimations and suffer from inherent temporal variability. Therefore, animal studies are often used and new uncertainties arise from the process of extrapolating animal results to humans.

  Second, to obtain observable effects with a manageable number of experimental subjects, high doses of a compound are often used. In this situation, a high dose means that high exposures are used in the experiment with respect to most environmental exposures. Therefore, when applying the results of the animal experiment to the human condition, the effects at the high doses must be

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extrapolated to approximate effects at lower doses. The effects of these considerations on the risk assessment, along with those resulting from applications of modifying and safety factors for COPCs believed to cause threshold effects (i.e., non-carcinogens), will be discussed as appropriate. Third, the use of surrogate chemicals, if any, will be discussed. In addition, recent evaluations of the toxicity of certain chemicals (i.e., TCE) will be addressed in the uncertainty section.

- Risk Characterization

  Uncertainties to be discussed regarding the characterizations of risks may include assumption of chemical additivity and the inability to predict synergistic or antagonistic interactions between COPCs. These uncertainties are inherent in any inferential risk assessment. Additionally, those constituents identified as COPCs due to a lack of toxicological data, and their impacts on uncertainties in estimating overall non-carcinogenic risks, will be discussed in this section.

2.7.1.2 Subtask 7.1.2: Final Baseline Human Health Risk Assessment Report

Following a review of the comments provided by EPA Region 2 on the Draft BHHRA report, any clarifications required will be discussed with the EPA Region 2 Risk Assessment staff. Following resolution of these comments, a Final BHHRA incorporating final EPA comments on the Draft BHHRA, will be submitted to EPA. The Final BHHRA will be submitted to EPA 14 days after the receipt of the final EPA comments.

2.7.2 Subtask 7.2: Baseline Risk Assessment - Ecological Risk Assessment

HDR will evaluate and assess the risk to the environment posed by Site-related contaminants in surface soils (defined as 0-1 foot bgs), and consider impacts from groundwater to any surface water and sediments, if applicable and associated with the Site. This evaluation and assessment will be performed in accordance with the Ecological Risk Assessment Guidance for Superfund (ERAGS) (EPA, 1997) and Guidelines for Performing Ecological Risk Assessments (EPA, 1998). Consistent with the above guidance documents; a screening level ecological risk assessment (SLERA) will be performed to assist in focusing the investigation and to determine if risks warrant performance of a baseline ecological risk assessment.

2.7.2.1 Subtask 7.2.1: Screening Level Ecological Risk Assessment Report

Consistent with the ERAGS guidance, HDR will prepare a Draft SLERA technical memorandum report which will be submitted 45 days following submission of the DER for the Site. The SLERA will address Steps 1 and 2 of the ERAGS process. This report will form the basis for documenting the initial evaluation of ecological risks for the Site sampled as part of the field investigation.

The SLERA will describe the environmental setting and preliminarily determine if ecological receptors are exposed to and potentially at risk as a result of exposure to contaminants in the environmental media associated with the Site. Screening criterion to be used to conduct the SLERA will be the following, in order of preference.

- Soils: EPA Ecological Soil Screening Levels (Eco-SSLs) (EPA, 2005 – updated as of June 14, 2013) for which screening values are available for the contaminants of potential ecological

concern; and ORNL's Preliminary Remediation Goals for Ecological Endpoints (Efroymson et. al. 1997) soil values.

- Surface Water: NYSDEC Ambient Water Quality Criteria; EPA Ambient Water Quality Criteria; and ORNL's Preliminary Remediation Goals for Ecological Endpoints (Efroymson et. al. 1997) surface water values.
- Sediments: NYSDEC Technical Guidance for Screening Contaminated Sediments (NYSDEC, 1999); and, ORNL's Preliminary Remediation Goals for Ecological Endpoints (Efroymson et. al. 1997) sediment values.

The SLERA will provide a preliminary estimate of risk for consideration at the first Scientific Management Decision Point (SMDP #1), provide the basis to determine the need for continuing the risk process through the performance of a BERA (i.e., ERAGS Steps 3 through 7) and assist in identifying the assessment and measurement endpoints for the BERA. The draft SLERA memorandum will be submitted to EPA for review. If the determination is made by the Biological Technical Assistance Group (BTAG) and EPA to accept the screening level analysis without further need for the BERA, a response to comments will be prepared. Following EPA concurrence with the HDR responses, the draft SLERA will be finalized. EPA will review and approve the SLERA and determine whether a full Baseline Ecological Assessment is required.

2.7.2.2 Subtask 7.2.2: Baseline Ecological Risk Assessment (BERA)

If EPA directs that a BERA be prepared, HDR will prepare a Work Plan amendment for any additional field work. Upon completion of additional field work, if needed, a Draft BERA Report will be prepared for the Site that addresses the following:

- Refined Problem Formulation and Hazard Identification – HDR will review the results of the SLERA and other available information on the hazardous substances present and identify the Contaminants of Potential Ecological Concern (COPECs) as part of the problem formulation for the Site.
- Refined BERA CSM - A refined BERA conceptual model of the Site will be developed and presented based on the contaminants identified, the exposure and toxicity assessments, and the risk characterization.
- Refined Toxicity Evaluation and Dose-Response Assessment - The COPECs will be selected based on their intrinsic toxicological properties as evaluated from the available toxicological literature.
- Characterization of Potential Receptors - Environmental exposure pathways end receptor populations potentially affected will be characterized and verified.
- Refined Assessment and Measurement End Points - COPECs, ecological receptor species (i.e., species especially sensitive to environmental contaminants), and assessment and measurement end points will be developed and identified for application in the BERA.
- Toxicity Assessment/Ecological Effects Assessment - A toxicity and ecological effects assessment will be performed to identify the potential adverse environmental effects associated

with chemical exposures to COPECs, the relationships between the magnitude of exposures and adverse effects, and the related uncertainties for contaminant toxicity (e.g., weight of evidence for a chemical's toxicity).

- Exposure Assessment - An exposure assessment will be performed to identify the magnitude of actual or potential environmental exposures, their frequency of occurrence and duration, and the routes of exposure for the environmental receptors. This assessment will include the likelihood of occurrence, which will provide the basis for developing acceptable exposure levels, and reasonable maximum exposure estimates for current land use conditions at the Site.
- Risk Characterization - Chemical-specific toxicity information, combined with quantitative and qualitative data from the exposure assessment, will be compared to measured contaminant exposure levels and the levels predicted through environmental fate and transport modeling. These comparisons will be utilized to determine if concentrations of contaminants at or near the Site are affecting or could potentially affect ecological receptors.
- Identification of Limitations/Uncertainties – Critical assumptions (e.g., background concentrations and conditions) and uncertainties stated in the report will be discussed with respect to their impact on the risk characterization.

Focus and preparation of the BERA will rely upon results of the SLERA, the ecological characterization performed as part of the Reconnaissance Phase and Site-specific studies required and scoped as part of the BERA development under a separate Work Plan amendment.

2.7.2.3 Subtask 7.2.3: Final Baseline Ecological Risk Assessment Report

After the Draft BERA Report has been reviewed and commented on by EPA, HDR will submit a written response to each comment to the EPA for review. Any further resolution/clarification of specific comments of HDR's responses will be rectified with the EPA prior to revising the draft report.

Once required revisions are finalized and agreed to by EPA, HDR will revise the Draft BERA Report as warranted and submit a Final BERA as part of the RI Report to EPA.

2.8 Task 8 - Treatability Study and Pilot Testing - Not Applicable

2.9 Task 9 - Remedial Investigation Report

HDR will collect environmental data required to accurately establish the media contaminated, and to determine the horizontal and vertical extent of the contamination, focused on TCE. Contaminant persistence and mobility in the environment and the degree of hazard to human and/or environmental receptors will be considered. These key contaminant(s) will be evaluated for receptor exposure and an estimate of the contaminant levels reaching human or environmental receptors will be made. Existing standards and guidelines (e.g., drinking-water standards, water-quality criteria, and other criteria accepted by the EPA as appropriate for the situation) will be used for comparison with Site data to evaluate potential effects to human receptors.

The RI Report will be written in accordance with "Guidance for Conducting Remedial Investigation/Feasibility Studies under the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)," OSWER Directive 9355.3-01, October 1988, Interim Final (or latest version) and "Guidance for Data Usability in Risk Assessment," (EPAI540/G-90/008), April 1992.

2.9.1 Subtask 9.1: Draft Remedial Investigation Report

HDR will submit a Draft RI Report pursuant to the RI/FS schedule presented in this Work Plan. The Draft RI Report will include, but will not be limited to, the following major categories:

- Site Background;
- Investigation;
- Site Characteristics;
- Nature and Extent of Contamination;
- Fate and Transport;
- Summary and Conclusions.

Additional detail regarding the content and presentation requirements for each category is presented in the following sections.

Site Background

Summaries will be provided of available regional and Site-specific information, including physical features, demographic information, current and historical land uses, cultural resources, and current or historic environmental investigations. These summaries may include the following:

- An index map showing where the Site is located within the State of New York;
- A regional map showing the location of the Site relative to nearby cultural or ecological features such as: residential, commercial and industrial areas; public water supply wells; schools; parks: wetlands; surface water bodies; other hazardous waste sites; etc.;
- A Site map (or maps) showing the locations of all present and historic structures and other pertinent features. Labels or a key will be used to explain the nature of each Site feature. More than one map may be necessary to adequately represent operational changes over time;
- A topographic contour map presented at a sufficiently large scale (e.g., 1" = 20') and details to allow sample locations to be plotted accurately in relation to Site features. This may require that the Site be divided into a number of maps to provide a sufficient level of detail. A smaller-scale index map will be provided to show the locations of the large scale maps relative to the entire Site;
- A discussion of the federal, state, and local regulatory history of the Site. This discussion will include references to pertinent correspondence, court orders, and or other relevant documents relating to regulatory actions pertaining to the Site. A table may be used to summarize the regulatory history;
- The findings, if available, of EPA's aerial photograph analysis provided in the Environmental Photographic Interpretation Center (EPIC). The EPIC findings may be summarized in the RI Report text and/or included as an appendix; and
- Ecological concerns such as sensitive habits, wetlands, or threatened or endangered species.

Investigation

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This portion of the RI report will provide the scope for or otherwise address the following major investigative topics:

- Field Investigation and Technical Approach;
- Chemical Analysis and Analytical Methods;
- Field Methodologies;
- Ecological Assessment;
- Soil Boring;
- Soil Sampling;
- Groundwater Sampling;
- Vapor Intrusion Sampling Program (if deemed necessary).

Soil Boring Logs: Graphical soil boring logs will be prepared to describe the subsurface conditions encountered during intrusive operations. In developing final logs from rough field logs, there will be no attempt to simplify the logs by eliminating data or observations obtained in the field. If necessary, additional pages will be included to explain any drilling problems, unusual observations, detailed stratigraphic descriptions or any other information that would help to convey how the boring was installed and the nature of the subsurface conditions that were encountered, but will not fit into the standard boring log format.

Monitoring Well Completion, Development and Sampling Logs: Graphical monitoring well completion logs will be prepared to describe the construction of the monitoring well points and any wells that may be completed. In developing final logs from rough field logs, there will be no attempt to simplify the logs by eliminating data or observations obtained in the field. If necessary, additional pages will be included to explain any construction and development problems, unusual observations. Development and sampling logs will be tabular format documenting the actually development and sampling process to serve as a record of that activity at each location.

All raw, uninterpreted data used to support document conclusions will be provided in the appendices, along with a complete explanation of how the data was manipulated and/or corrected in developing the geophysical conclusions. GPS methods and results will be reported.

Conditions Warranting Immediate Removal Action: During the course of the field investigation conditions warranting an immediate removal action to protect human health and/or the environment may be discovered. Examples of this type of situation include leaking drums, leaking underground or aboveground storage tanks, potentially explosive conditions, evidence of indoor air contamination or of contaminated drinking water wells. As much detail as possible will be provided in the report, so that the feasibility of conducting an immediate removal action can be evaluated.

Site Characteristics

The RI Report will include discussion of the following:

- Geology;

- Hydrogeology;
- Demographics and Land Use; and
- Ecological Assessment.

A discussion of the geology and hydrogeology will be accompanied by relevant cross sections as well as piezometric figures.

Nature and Extent of Contamination

This section of the RI Report will be divided into two major subsections: contaminant sources, and contaminant distribution and trends.

- Contaminant Sources - A full description of all potential contaminant source areas within the Site Study Area will be provided, utilizing all current and available pre-existing information. These discussions will include the following points: dimensions, depth below grade, depth to water table, waste volume, type of wastes/products, construction/demolition/closure dates, regulatory history, past/existing permits, historical changes in use or configuration, and available environmental sampling results.
- Contaminant Distribution and Trends - A full discussion of the horizontal and vertical extent of contamination in groundwater and soil will be presented.

Discussions of the nature and extent of contamination will focus on those contaminants that pose the most significant risk to human health and the environment and exceed state or federal ARARs, not necessarily those that are present at the highest concentrations.

Recent and historic sampling results will be quantitatively compared to sampling results from the RI investigation, only when the same or equivalent sample collection methods, analytical methods, QA/QC protocols, etc. were employed. If different methods, protocols, etc. were used, only qualitative comparisons will be made.

Physical and chemical properties of contaminants (e.g., density, solubility and mobility) exert significant effect on their distribution in the environment and their patterns of transport. Therefore, pertinent physical and chemical properties of Site-related contaminant(s) will be summarized in a table.

Site-specific background levels will be provided for soil using information that relates directly to the Site. This information will include the results of sampling and analyses conducted in the vicinity of the site. Soil collected in background locations will be of the same type as the contaminated soil in the areas under investigation. Additional background information may potentially include location-specific data from sources such as the USGS, United States Department of Agriculture (USDA) and New York Geological Survey (NYGS). A table will be used to summarize the background levels for the Site.

Isoconcentration maps, cross-sections, 3D visualization of OU2-investiagtion results or other appropriate means to relay the information will be used to summarize the RI sampling results, and will illustrate the level and current extent of OU2-related contamination and potential migration pathways and sources supported by the data. All applicable sampling information will be used in the development of these visual representations of the investigation results. Factors such as sampling and analytical protocols will be considered when comparing RI sampling results to sampling results from other sources.

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The public water supply wells within the OU2 study area will be indicated on the figures.

The number and types of figures, e.g., maps and/or cross sections, required will depend on the nature of the Site contamination. Development of figures will be considered for any Site-related contaminant (e.g., TCE) or contaminant class (e.g., total VOCs) that exceeds ARARs and/or poses a relatively high risk to human health or the environment. Mass flux information will also be evaluated for inclusion as it is available.

Fate and Transport

This section of the RI Report will address:

- Contaminant Characteristics;
- Transport Processes; and
- Contaminant Migration Trends.

A qualitative assessment of the environmental fate and transport of Site-related contaminants will be conducted on the basis of individual constituents, with the discussions grouped by contaminant class. In addition to consideration of the physical-chemical transport properties for individual constituents, this assessment will consider the potential for co-solvent effects on mobility. Site-specific properties of the environmental media will also be considered, including factors such as soil porosity, organic carbon fraction, and dry bulk density. The results of the TIP visualization and modeling will be presented and described including applicable figures to be determined in consultation with TIP and the WAM.

Summary and Conclusions

This section will focus upon integration of all available information to develop a comprehensive understanding and mature CSM. The intent will be to describe the current state of understanding of the link between the nature and magnitude of source contamination, the applicable contaminant transport mechanisms, and the current nature and extent of OU2-related contamination. The summary will include an assessment of the limits of understanding, so that recommendations for additional sampling may be made to eliminate any critical data gaps. This can then be used to predict future contaminant migration and to support decisions regarding remedial actions.

General Report Preparation Guidelines

The following guidelines will be used in preparing the Draft Remedial Investigation Report:

Figure Guidelines

- The original source of each figure will be referenced. If a pre-existing figure is modified, the new figure will reference both the pre-existing figure and its original source.
- The area of interest will be enlarged to fill as much of the available space on the page/plate as possible.
- All units, symbols, patterns, and scales used on figures will be fully explained in a key provided on the figure.
- All text and symbols used on maps, tables, and figures will be legible. To avoid data loss during

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reproduction nothing in an original will be smaller than 17 characters per inch (CPI).

- Page numbers will be assigned to figures so that they can be easily located or replaced in the text.

Map Format

- All maps will include an accurate north arrow, scale, a title explaining the purpose of the map, and an explanation of all symbols/notations. A reference will be provided to the source of the map if it is based on a pre-existing map. Any maps incorporated that are generated by others (e.g., EPA-HQ contractor) will be referenced to include the source of the map.
- The scale will include both a written scale and a graphical scale. The inclusion of a graphical scale is essential because its accuracy will be retained even if the map is enlarged or reduced through reproduction processes.
- At least one base map with an appropriate map scale (e.g., 1 inch equals 50 feet, 1 inch equals 100 feet) will be utilized to accurately show the location of environmental sampling locations relative to known source areas, topographic contours, Site boundary, and other important features.
- The surveyor's reference point/benchmark will be identified on the map (if survey is completed). Otherwise, GPS data, using a single reference station to allow for real-time corrections will be provided.
- Text and numbers will be oriented on the map so that the north arrow is pointing in an upward direction as one reads the map. The orientation of text and numbers relative to north will be consistent from map to map throughout the report.
- All units, symbols, and patterns used on the map will be fully described in an explanation included on the map. In addition, as applicable, the date that the data was collected will be indicated.
- The map title and figure/plate number will be shown in large bold type.
- Maps will be presented in an EPA-compatible format of Arc-GIS. The resulting maps will be AutoCAD or GIS-based, rectified maps. Figures generated by EPA-TIP may be presented in an alternate format.

Presenting Analytical Results

- Tables of analytical results will be organized in a logical manner (e.g., by sample location number, sampling zone, etc.). For example, surface and subsurface soil analyses may be separated according to Site location or specific contaminant source areas.
- The sample location identification number will always be used as the primary reference for the analytical results. Analytical results will not be ordered by laboratory identification numbers.
- Analytical tables will indicate the sample collection dates.
- The detection limit will be indicated in instances where a parameter was not detected.
- Analytical results will be reported in the next tables, and figures using a consistent convention, such as ug/L for groundwater analyses, and ug/kg for organic soil analyses.

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- The applicable federal state criteria for each constituent will be specified on the analytical tables, and exceedances of criteria will be highlighted. Any samples where the detection limit is greater than the applicable criteria will be identified, and an explanation will be provided.

Discussion of Laboratory/Field Blank Contamination

- The lead agency's protocol for eliminating field sample analytical results based on laboratory/field blank contamination will be clearly explained.
- Discussion of approved sampling results will not be qualified by suggesting that a particular chemical is a common laboratory contaminant or was detected in a laboratory blank. If the reported result was validated, it will be considered valid and usable.
- Results from field equipment rinsate blank analyses will be discussed, as necessary, if decontamination solvents are believed to have contaminated field samples.

2.9.2 Subtask 9.2: Final Remedial Investigation Report

After EPA review of the Draft RI Report, HDR will incorporate final EPA comments and submit a Final RI Report.

2.10 Task 10 - Remedial Alternatives Screening

This task includes work efforts to develop appropriate remedial alternatives to undergo full evaluation. The alternatives will encompass a range including innovative treatment technologies consistent with the regulations outlined in the NCP, 40 CFR Part 300, and the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA (OSWER Directive 9355.3-01) and other OSWER Directives, including 9355.4-03, October 18, 1989, and 9283.1-06, May 27, 1992, "Considerations in Groundwater Remediation at Superfund Sites", or more recent guidance, policies or procedures.

HDR will investigate only those hazardous waste management alternatives that will remediate or control contaminated media (soils, groundwater and air) remaining at the Site, as deemed necessary in the RI, to provide adequate protection of human health and the environment. The potential alternatives will encompass, as appropriate, 1) a range of alternatives in which treatment is used to reduce the toxicity, mobility and/or volume of wastes but vary in the degree to which long-term management of residuals or untreated waste is required, 2) one or more alternatives involving containment with little or no treatment, and 3) a no-action alternative. Four different alternatives for each contaminated media will be analyzed during the screening process. The screening will note the degree to which alternatives may offer opportunities for green or sustainable remediation, consistent with EPA's August 2009 policy and EPA's current guidance.

2.10.1 Subtask 10.1: Draft Technical Memorandum

HDR will prepare a draft Technical Memorandum presenting the potential remedial alternatives and including the following:

- Establish Remedial Action Objectives (RAOs). Based on existing information, HDR will identify Site-specific RAOs which will be developed to protect human health and the environment. The objectives will specify the contaminant(s) and media of concern, the exposure route(s) and receptor(s), and n acceptable contaminant level or range of levels for each exposure route (i.e.,

preliminary remediation goals).

- Establish General Response Actions (GRAs). HDR will develop GRAs for each medium of interest by defining contaminant, treatment, excavation, pumping, or other actions, singly or in combination to satisfy remedial action objectives. The response actions will take into account requirements for protectiveness as identified in the RAOs and the chemical and physical characteristics of the Site.
- Identify & Screen Applicable Remedial Technologies. HDR will identify and screen technologies based on the developed GRAs. Hazardous waste treatment technologies will be identified and screened to ensure that only those technologies applicable to the contaminants present, their physical matrix, and other Site characteristics will be considered. This screening will be based primarily on a technology's ability to effectively address the contaminants at the Site, but will also take into account a technology's implementability and cost. HDR will select representative process options, as appropriate, to carry forward into alternative development. HDR will identify the need for treatability testing for those technologies that are probable candidates for consideration during the detailed analysis.
- Develop Remedial Alternatives. HDR will develop media-specific or Site-wide remedial alternatives, as appropriate, in accordance with the NCP. The developed alternatives will be defined with respect to size and configuration of the representative process options; time for remediation; rates of flow or treatment; spatial requirements; distances for disposal; required permits; imposed limitations; and other factors necessary to evaluate the alternatives.
- Screen Remedial Alternatives for Effectiveness, Implementability, and Cost. If many distinct, viable alternatives are developed, HDR will screen the alternatives on a general basis with respect to their effectiveness, implementability and cost, to reduce the number of alternatives that will undergo detailed evaluation.

2.10.2 Subtask 10.2: Final Technical Memorandum

After the EPA's review of the Draft Technical Memorandum, HDR will incorporate EPA's comments and will submit the Final Technical Memorandum.

2.11 Task 11 - Remedial Alternatives Evaluation

This task includes efforts associated with the assessment of individual alternatives against each of the nine current evaluation criteria and a comparative analysis of all options against the criteria. The analysis will be consistent with the NCP and will consider the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA and other pertinent OSWER guidance. EPA will make the determination regarding the final selection of remedial alternatives.

The nine evaluation criteria are:

- Overall protection of human health and the environment;
- Compliance with ARARs;
- Long-term effectiveness and permanence;
- Reduction in toxicity, mobility or volume through treatment;

- Short-term effectiveness;
- Implementability – technical and administrative;
- Cost;
- State acceptance; and
- Community acceptance.

2.11.1 Subtask 11.1: Draft Technical Memorandum

HDR will prepare a Draft Technical Memorandum which addresses the following: 1) a technical description of each alternative that outlines waste management strategy involved and identifies the key ARARs associated with each alternative, and 2) a discussion that profiles the performance of each alternative with respect to the first seven evaluation criteria listed above. Once the individual analysis is complete, the alternatives will be compared and contrasted to one another with respect to the first seven evaluation criteria listed above. The evaluation of alternatives with respect to the last two criteria - State Acceptance and Community Acceptance -will be performed later in the FS process (i.e., these evaluations are typically performed during preparation of the Proposed Plan and ROD).

2.11.2 Subtask 11.2: Final Technical Memorandum

After the EPA's review of the Draft Technical Memorandum, HDR will incorporate EPA's comments and will submit the Final Technical Memorandum.

2.12 Task 12 - Feasibility Study Report

HDR will develop an FS Report consisting of a detailed analysis of alternatives and cost-effectiveness analysis in accordance with NCP 300.430(e). The report will contain, in accordance with Chapters 3-7: 1) a summary of alternative remedial actions, 2) cost analysis, 3) institutional analysis, 4) public health analysis, 5) environmental analysis or the most recent applicable, or relevant and appropriate, requirements.

2.12.1 Subtask 12.1: Draft Feasibility Study Report

HDR will prepare a Draft FS that will contain the following:

- Summary of FS objectives;
- Summary of RAOs;
- Identification of GRAs;
- Identification and screening of remedial action technologies, including innovative technologies;
- Description of remedial alternatives;
- Screening of remedial alternatives (if necessary);
- Detailed analysis of remedial alternatives; and
- Overall summary and conclusions.

HDR's technical feasibility will include the careful study of any problems that may prevent a remedial alternative from mitigating Site problems. Therefore, the characteristics from the RI will be kept in mind as technical feasibility of an alternative is studied. Specific items that will be addressed will include the reliability (operation over time), safety, operations and maintenance, ease with which the alternative can be implemented and time needed for implementation.

HDR will include a floodplain assessment as part of the FS Report if remedial alternatives will be necessary within the 100-year or 500-year floodplain. The floodplain assessment will reference the RI's delineation of the floodplains in the project area, and include a description of the effects of potential remedial actions on both floodplains (including a brief description of the alternatives to the proposed action and their effects on the floodplains), and a description of measures that are proposed or necessary to minimize potential adverse impacts on both floodplains.

2.12.2 Subtask 12.2: Final Feasibility Study Report

After EPA's review of the Draft FS Report, HDR will incorporate EPA's comments and will submit the Final FS Report.

2.13 Task 13 - Post RI/FS Support

HDR will provide technical support required for the preparation of the ROD for the Site, excluding those activities already addressed under Task 2 of this SOW.

2.13.1 Subtask 13.1: Feasibility Study Addendum

HDR will prepare a draft addendum to the FS, and finalize the addendum based on the EPA's comments on the draft addendum.

2.14 Task 14 - Negotiation Support - Not Applicable

2.15 Task 15 - Administrative Record - Not Applicable

2.16 Task 16 - Work Assignment Closeout

Please note that Work Assignment Closeout tasks have been revised to comport with current practices. Upon direction from EPA, that the technical work under the work assignment is complete, HDR will perform the necessary activities to close out this work assignment in accordance with contract requirements. After work assignment close out activities have been completed, HDR will retain the work assignment files in accordance with contract clause *H.36-Retention and Availability of Contractor Files*.

2.16.1 Subtask 16.1: Revised Work Plan Budget

As part of work assignment close out, HDR will provide a revised work plan budget with the actual costs incurred and an estimate to complete close out activities. The revised work plan budget will be submitted to EPA within 30 days of close-out direction.

2.16.2 Subtask 16.2: Document Indexing

At the conclusion of this work assignment, HDR will organize the work assignment files in our possession and will provide the index to the Project Officer. The index will be submitted with the long-term storage submittal required under Task 16.3. The index will contain at a minimum the following information:

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- Project Name and Work Assignment Number (in a heading on top of the list)
- Document Date (The documents indexed will be sorted chronologically by date, beginning to end), description /subject of document, who sent the document and who received the document.

The documents to: be indexed include, but are not limited to, all final deliverables, work assignment amendments, and working files that may need to be accessed to provide information on why certain technical decisions were made.

2.16.3 Subtask 16.3: Document Retention/Conversion

HDR will convert all relevant paper files into long-term storage electronic format, CDs or DVDs. The media will then be delivered to the Project Officer within 45 days of approval of the revised work plan budget.

3. Project Management Approach

3.1 Project Organization

The project organizational structure is provided in Figure 6.

3.2 Key Personnel

Bradley Williams is the Program Manager for the EPA Region 2 RAC under which the Fulton Avenue Superfund Site RI/FS will be conducted. The Project Manager is Lisa Voyce. The Project Manager is responsible for the development of the Work Plan; acquisition of scientific, engineering, or additional specialized technical support; and other aspects of the day-to-day activities associated with the project. The Project Manager identifies staff requirements, directs and monitors progress, ensures implementation of quality procedures and adherence to applicable codes and regulations, and is responsible for performance within the established budget and schedule.

Project team members include project task leads and key technical personnel from various technical disciplines. They are: Sean Quarry for field activities; Vincent Carbone for modeling/hydrogeology; Carol Zurlo for environmental chemistry; Lisa Voyce/Michael Musso, P.E. for human health and ecological risk assessment, Demetrios Klerides, P.E. for the feasibility study; Melissa LaMacchia for community relations and cultural resources; James Woolcott, CIH for health and safety; Richard McCollum, P.E. for quality assurance and project quality control. Technical discipline leads will oversee activities related to their expertise and provide their input, as needed, to the Project Manager.

3.3 Project Schedule

This Work Plan has been updated to reflect current dates for the project schedule. We anticipate mobilization to initiate the additional CSIA analysis tasks included in the Field Investigation in October of 2013. Deeper drilling tasks will begin once subcontractor procurement has been completed and weather permits; the hydrogeological in Spring 0f 2014 to capture the seasonal change in pumpage and flow regime know to exist in the Study Area.

The RI Report and Baseline Human Health Risk Assessment (HHRA) preparation can be completed once those data are received. There is the potential for data gaps to emerge as the data are reviewed, with additional sampling being necessary. That can be accomplished concurrent with preparation of the RI

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Report and performance of the Human Health Risk Assessment, incorporating the data as it becomes available. At this time, HDR anticipates completion of the both the HHRA and RI reports by September of 2014.

If successful in identifying either discrete contaminant sources or a treatable contaminant mass presenting risks to human health or the environment requiring remedial action, the Remedial Alternatives Evaluation can be completed by August 10, with a draft FS/FFS to address the remediation of site contamination related to OU2 completed by mid-July 2014.

Table 1 lists the major project deliverables. Figure 2 is the overall baseline project schedule, originally based on Work Plan and budget, and revised to reflect the updates presented in this Work Plan.

3.4 Cost Estimate

The estimated cost and LOE hours for completing the scope of work described in this revised Work Plan are included in the Work Plan Cost Estimate, which has been submitted under a separate cover as Volume 2. This includes the previously approved Work Plan LOE hours and costs, as well as ODCs, LOE and ODCs incurred to date, revised Work Plan hours and ODCs, and LOE and ODC estimates to complete all Sub-tasks, with cost totals.

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4. References

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TABLE 1 - DELIVERABLES

WORK PLAN
EPA REGION 2 AES CONTRACT NO. EP-W-09-009
SCHEDULE / DELIVERABLES

WORK ASSIGNMENT NO: 016-RICO-02JN | **WORK ASSIGNMENT TITLE: FULTON AVENUE RI/FS**
WORK PLAN NO: 1 | **WORK ASSIGNMENT TYPE: RI/FS**

Task No.	Task Name	Due Date
Task 1	**Project Planning and Support**	
1.4	Draft RI/FS Work Plan	45 Days After Scoping Meeting
1.5	Final RI/FS Work Plan	15 Days After Receipt of EPA's Final Comments
1.7	Draft Quality Assurance Project Plan	21 Days After Work Plan Approval
1.13	Pathway Analysis Report (PAR)	45 Days After Receipt of Validated Laboratory Data
Task 2	**Community Relations**	
2.1	Community Interview Summaries	30 Days After Completion of Interviews
2.2	Draft Community Relations Plan (CRP)	30 Days After Work Plan Approval
2.2	Final CRP	14 Days After Final Comments on Draft CRP
2.4	Fact Sheets	7 Days Prior to Public Meeting/Event
2.6	Public Notices	14 Days Prior to Public Meeting/Event
2.8	Site Mailing List	14 Days After Approval of Final CRP
Task 5	**Analytical Support and Data Validation**	
5.3	Data Validation Reports	30 Days After Receipt of All Analytical Results from Laboratory
Task 6	**Data Evaluation**	
6.4	Data Evaluation Report	30 Days After Completion of Task 6.2 (Data Reduction)
Task 7	**Assessment of Risk**	
7.1.1	Draft Baseline Human Health Risk Assessment Report	45 Days After Approval of Pathways Analysis Report, under Task 1.13
7.1.2	Final Baseline Human Health Risk Assessment Report	15 Days After Receipt of EPA Final Comments
7.2.1	Screening Level Ecological Risk Assessment (SLERA)	The Screening Level Ecological Risk Assessment Shall be Submitted Within 45 Days After Submission of the DER, Under Task 6.4

TABLE 1 - DELIVERABLES

WORK PLAN
EPA REGION 2 AES CONTRACT NO. EP-W-09-009
SCHEDULE / DELIVERABLES

WORK ASSIGNMENT NO: 016-RICO-02JN **WORK ASSIGNMENT TITLE: FULTON AVENUE RI/FS**
WORK PLAN NO: 1 **WORK ASSIGNMENT TYPE: RI/FS**

Task No.	Task Name	Due Date
7.2.2	Draft Baseline Ecological Risk Assessment (BERA)	The Draft Ecological Risk Assessment Shall be Submitted Within 30 Days After Receipt of EPA Comments on the SLERA
7.2.3	Final Ecological Risk Assessment	15 Days After Receipt of EPA Final Comments
Task 9	**Remedial Investigation Report**	
9.1	Draft Remedial Investigation (RI) Report	90 Days After Submittal of Data Evaluation Report, Under Task 6.4
9.2	Final RI Report	30 Days After Receipt of EPA Final Comments
Task 10	**Remedial Alternatives Screening**	
10.1	Draft Remedial Alternatives Technical Memorandum (RATM)	60 Days After Submission After Final RI Report Submission
10.2	Final RATM	14 Days After Receipt of EPA Final Comments on Draft RATM, under Task 10.1
Task 11	**Remedial Alternatives Evaluation**	
11.1	Draft Remedial Alternatives Evaluation Memorandum (RAEM)	30 Days After Final RATM, under Task 10.2
11.2	Final RAEM	14 Days After Receipt of EPA Final Comments on Draft RAEM, Under Task 11.1
Task 12		
12.1	Draft Feasibility Study (FS) Report	45 Days After Approval of Final RAEM, under Task 11.2
12.2	Final FS Report	30 Days After Receipt of EPA Final Comments on FS

Table 2
FIELD INVESTIGATION FIELD SCREENING AND SAMPLING PROGRAM
RATIONALE AND ANALYSIS
FULTON AVENUE SUPERFUND SITE OU2 RI/FS

Sample Type	Location	Number	Rationale for Sampling	End Use of Data	Analysis*
Ground Water Screening - DPT and boring locations	Up to 150 locations, within assumed ground water flow paths, and as directed by sampling results and visualization modeling. Number of samples as needed for depth-discrete analysis, based on screening/modeling, estimated 5-10 samples per location.	Up to 750	To confirm the absence or presence of groundwater contamination, identify potential TCE source areas, determine locations of DPT/drilled borings and wells.	NE, GEO, HH, FS	Real-time Color-tec field measurement for VOC screening. Confirmatory TCL VOC analysis for all Color-Tec VOC detections.
Ground Water - Monitoring Wells	Up to 28 existing and 12 newly installed wells, as indicated to be impacted based on screening/modeling, with potential 20 additional samples as needed for depth-discrete analysis.	Up to 50	To confirm the absence or presence of groundwater contamination and to evaluate groundwater as an exposure media.	NE, GEO, HH, FS	TCL Organics, TAL Metals, Water Quality Parameters, Compound-specific isotope analysis (CSIA) and other forensic analytes, field indicator parameters
	Total Groundwater Samples	**800**			
Soil - Deeper Borings/Monitoring Wells	Up to 24 newly installed borings, as indicated to be impacted based on screening, with borings to be screened at 10 ft intervals.	Up to 600	To confirm the absence or presence of subsurface contamination.	NE, GEO, HH, FS	TCL Organics, TAL Metals, Compound-specific isotope analysis (CSIA) and other forensic analyses
Surface Soil (0-0.5 foot bgs)	Sampling within potential source areas (at potential source areas - # TBD, 6 samples at each).	36	To determine source areas, evaluate surface soil as an exposure media for potential human and ecological receptors.	NE, ECO, HH, FS	TCL Organics, TAL Metals, TOC

Table 2
FIELD INVESTIGATION FIELD SCREENING AND SAMPLING PROGRAM
RATIONALE AND ANALYSIS
FULTON AVENUE SUPERFUND SITE OU2 RI/FS

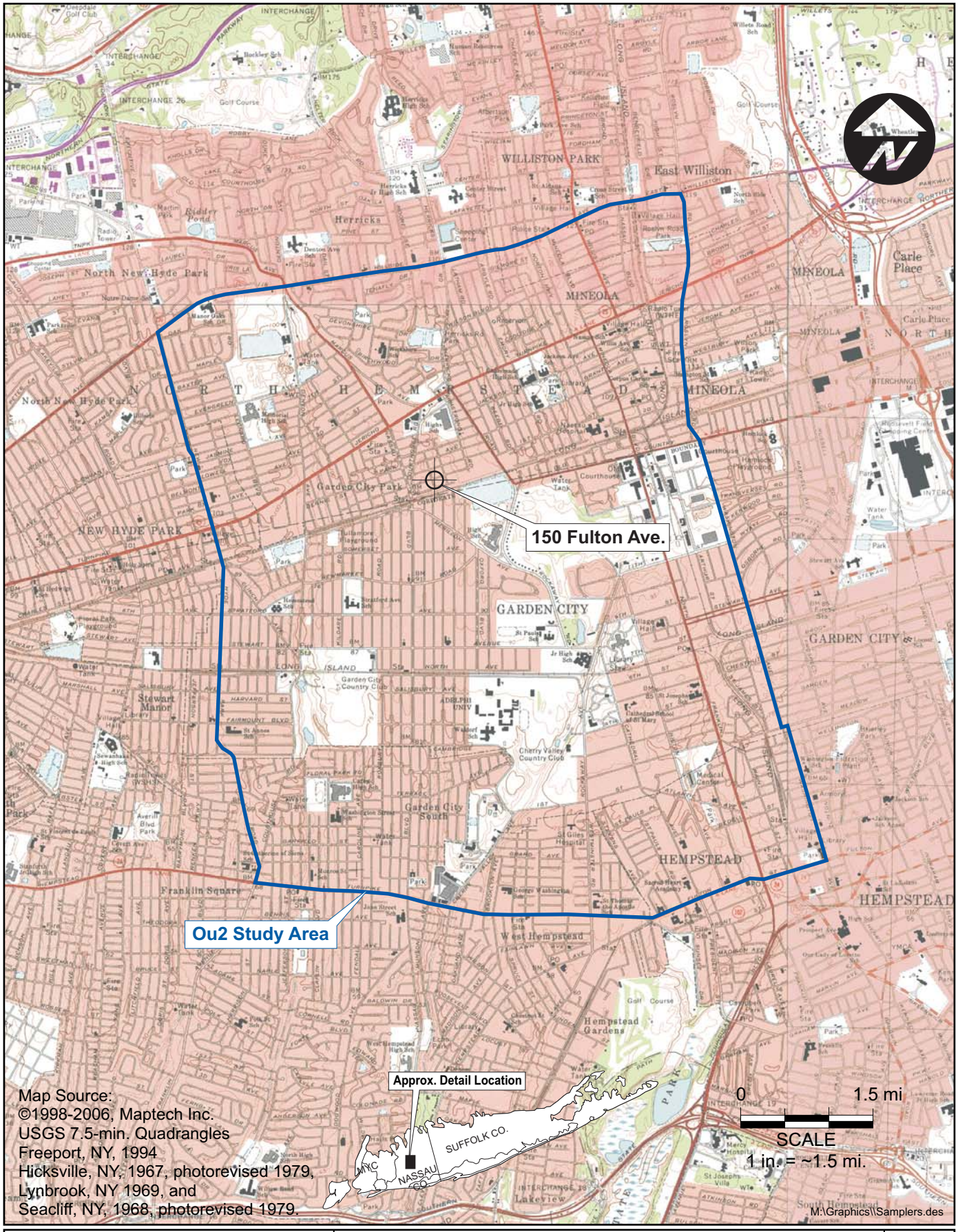
Sample Type	Location	Number	Rationale for Sampling	End Use of Data	Analysis*
Surface Soil (0-2 foot bgs)	High potential exposure areas at potential source areas (at potential source areas # TBD, 6 samples at each).	36	To determine source areas, evaluate surface soil as an exposure media for potential human and ecological receptors.	NE, ECO, HH, FS	TCL Organics, TAL Metals, TOC
Surface Soil (0-2 foot bgs)	Off-site (Background) 6 locations, 1 sample each location.	6	To determine background surface soil VOC concentrations.	HH, NE	TCL Organics, TAL Metals, TOC
Surface Soil (0-0.5 foot bgs)	Off-site (Background) 3 locations, 1 sample each location.	3	Will be collected only if needed for BERA, to determine background surface soil concentrations of various constituents.	ECO, NE	TCL Organics, TAL Metals, TOC
Subsurface Soil (2-10 feet bgs or above water table)	High potential exposure areas (at potential source areas # TBD, 6 samples at each).	36	To determine presence and extent of impacted soil in source areas, evaluate subsurface soil as an exposure media for potential human receptors.	NE, HH, FS	TCL Organics, TAL Metals, TOC, grain size
Subsurface Soil (2-10 feet bgs or above water table)	Off-site (Background) locations 6 locations, 1 sample each location.	6	To determine background surface soil concentrations of various constituents.	NE, HH, FS	TCL Organics, TAL Metals, TOC, grain size
	Total Soil Samples	**431**			
Soil Gas (Contingency)	Up to 8 locations. Soil gas samples to be collected at approximately 5 and 10 feet bgs. In addition, one indoor air sample to be collected at each location.	Up to 16	Characterize exposure risks to residents and workers in community and to evaluate air as an exposure media and transport media.	HH	VOCs, Non-RAS Laboratory
	Total Soil Gas Samples	**16**			

Table 2
FIELD INVESTIGATION FIELD SCREENING AND SAMPLING PROGRAM
RATIONALE AND ANALYSIS
FULTON AVENUE SUPERFUND SITE OU2 RI/FS

NOTES:
* The table does not include QA/QC samples. These will be identified in the QAPP.

Acronyms/abbreviations include:

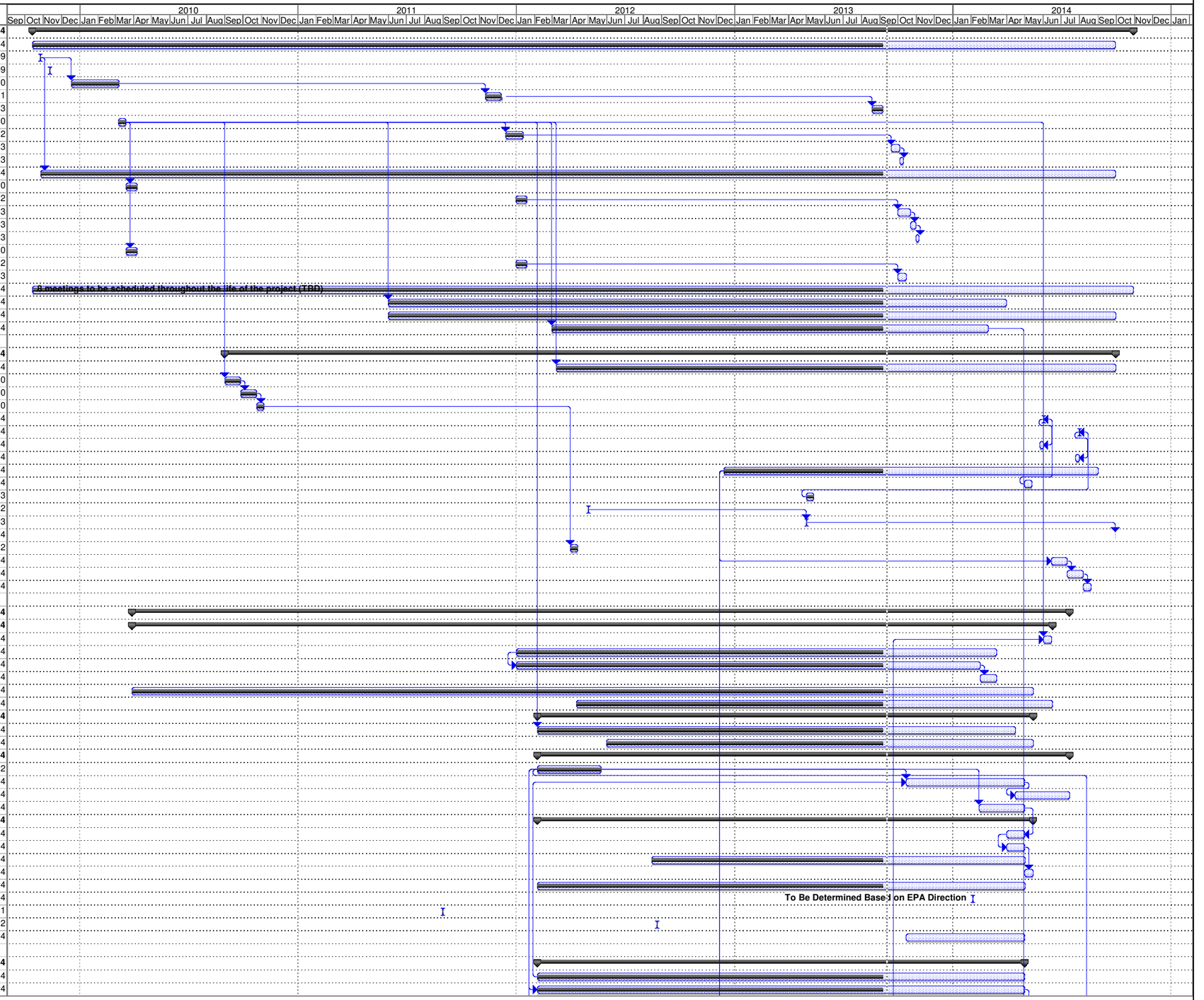
NE =	Nature and Extent	HH =	Human Health Risk Assessment
ECO =	Ecological Risk Assessment	FS =	Feasibility Study
GEO =	Geology / Hydrogeology	VOC =	Volatile Organic Compounds



HDR Henningson, Durham & Richardson Architecture and Engineering, P.C. One Blue Hill Plaza Pearl River, NY 10965	**Site Location - Fulton Avenue OU2 RI/FS**	**Figure 1**

FIGURE 2
EPA Region 2 RAC2 - Contract # EP-W-09-009
Fulton Avenue RI/FS - Work Assignment # 016-RICO-02JN
Garden City Park, Nassau County, NY

ID	Task Name	Duration	Start	Finish
1	**Task 1: Project Planning and Support**	**2067 days**	**Wed 10/14/09**	**Thu 10/30/14**
2	Task 1.1 Project Administration/Management	2033 days	Wed 10/14/09	Tue 9/30/14
3	Task 1.2 Attend Scoping Meeting	1 day	Tue 10/27/09	Tue 10/27/09
4	Task 1.3 Conduct Site Visit	1 day	Thu 11/12/09	Thu 11/12/09
5	Task 1.4 Develop / Revise Draft Work Plan and Associated Cost Estimate	90 days	Fri 12/18/09	Sun 3/7/10
6	Task 1.4 Develop / Revise Draft Work Plan and Associated Cost Estimate	30 days	Fri 11/11/11	Thu 12/15/11
7	Task 1.4 Develop / Revise Draft Work Plan and Associated Cost Estimate	21 days	Mon 8/19/13	Fri 9/6/13
8	Task 1.5 Negotiate and Revise Draft Work Plan/Budget	14 days	Sun 3/7/10	Fri 3/19/10
9	Task 1.5 Negotiate and Revise Draft Work Plan/Budget	33 days	Thu 12/15/11	Fri 1/13/12
10	Task 1.5 Negotiate and Revise Draft Work Plan/Budget	16 days	Fri 9/20/13	Fri 10/4/13
11	Task 1.5 Final Work Plan	7 days	Fri 10/4/13	Thu 10/10/13
12	Task 1.6 Evaluate Existing Data and Documents	2018 days	Wed 10/28/09	Tue 9/30/14
13	Task 1.7 Quality Assurance Project Plan (Draft)	21 days	Fri 3/19/10	Wed 4/7/10
14	Task 1.7 Quality Assurance Project Plan (Draft)	21 days	Sun 1/1/12	Thu 1/19/12
15	Task 1.7 Quality Assurance Project Plan (Draft)	24 days	Tue 10/1/13	Tue 10/22/13
16	Task 1.7 QAPP Review by EPA	10 days	Tue 10/22/13	Thu 10/31/13
17	Task 1.7 Final QAPP	6 days	Thu 10/31/13	Tue 11/5/13
18	Task 1.8 Health and Safety Plan	21 days	Fri 3/19/10	Wed 4/7/10
19	Task 1.8 Health and Safety Plan	21 days	Sun 1/1/12	Thu 1/19/12
20	Task 1.8 Health and Safety Plan	16 days	Tue 10/1/13	Tue 10/15/13
21	Task 1.10 Meetings	2067 days	Wed 10/14/09	Thu 10/30/14
22	Task 1.11 Subcontract Procurement	1164 days	Wed 6/1/11	Mon 3/31/14
23	Task 1.12 Perform Subcontract Management	1370 days	Wed 6/1/11	Tue 9/30/14
24	Task 1.13 Pathway Analysis Report	822 days	Thu 3/1/12	Sat 3/1/14
25				
26	**Task 2: Community Relations**	**1677.38 days**	**Wed 9/1/10**	**Tue 9/30/14**
27	Task 2.1 Community Interviews	1054 days	Thu 3/8/12	Tue 9/30/14
28	Task 2.2 Community Relations Plan (Draft)	30 days	Wed 9/1/10	Mon 9/27/10
29	Task 2.2 CRP Review by EPA	30 days	Mon 9/27/10	Sun 10/24/10
30	Task 2.2 Final CRP	14 days	Sun 10/24/10	Fri 11/5/10
31	Task 2.3 Public Meeting Support (1st Meeting)	1 day	Mon 6/2/14	Mon 6/2/14
32	Task 2.3 Public Meeting Support (2nd Meeting)	1 day	Fri 8/1/14	Fri 8/1/14
33	Task 2.4 Fact Sheet Preparation (1st Meeting)	7 days	Mon 5/26/14	Mon 6/2/14
34	Task 2.4 Fact Sheet Preparation (2nd Meeting)	7 days	Fri 7/25/14	Fri 8/1/14
35	Task 2.5 Proposed Plan Support	705 days	Fri 12/14/12	Mon 9/1/14
36	Task 2.6 Public Notices (1st Meeting)	14 days	Thu 5/1/14	Tue 5/13/14
37	Task 2.6 Public Notices (2nd Meeting)	14 days	Wed 5/1/13	Mon 5/13/13
38	Task 2.7 Information Repositories	1 day	Tue 5/1/12	Tue 5/1/12
39	Task 2.7 Information Repositories	1 day	Wed 5/1/13	Wed 5/1/13
40	Task 2.7 Information Repositories	1 day	Tue 9/30/14	Tue 9/30/14
41	Task 2.8 Site Mailing List	14 days	Sun 4/1/12	Fri 4/13/12
42	Task 2.9 Responsiveness Summary Report (Draft)	30 days	Sun 6/15/14	Fri 7/11/14
43	Task 2.9 EPA Review of Responsiveness Summary	30 days	Fri 7/11/14	Thu 8/7/14
44	Task 2.9 Final Responsiveness Summary	15 days	Thu 8/7/14	Wed 8/20/14
45				
46	**Task 3: Field Investigation**	**1765.38 days**	**Mon 3/29/10**	**Tue 7/15/14**
47	**Task 3.1 Site Reconnaissance**	**1733 days**	**Mon 3/29/10**	**Mon 6/16/14**
48	Task 3.1.1 Site Surveys	15 days	Mon 6/2/14	Sun 6/15/14
49	Task 3.1.2 Well Inventory	904 days	Mon 1/2/12	Sat 3/15/14
50	Task 3.1.3 Property Access	873 days	Mon 1/2/12	Sat 2/15/14
51	Task 3.1.4 Well Inspection	31 days	Sun 2/16/14	Sat 3/15/14
52	Task 3.1.5 Ecological Resources Reconnaissance	1697 days	Mon 3/29/10	Thu 5/15/14
53	Task 3.1.6 Geophysical Survey and Utility Markouts	896 days	Wed 4/11/12	Mon 6/16/14
54	**Task 3.2 Mobilization and Demobilization**	**933.75 days**	**Mon 2/6/12**	**Thu 5/15/14**
55	Task 3.2.1 Mobilization	900 days	Mon 2/6/12	Tue 4/15/14
56	Task 3.2.2 Demobilization	804 days	Thu 5/31/12	Thu 5/15/14
57	**Task 3.3 Hydrogeological Assessment**	**1002.13 days**	**Mon 2/6/12**	**Tue 7/15/14**
58	Task 3.3.2 Hydropunch (DPT) Groundwater Sampling	120 days	Mon 2/6/12	Tue 5/22/12
59	Task 3.3.3 Monitoring Well Installation	223 days	Tue 10/15/13	Thu 5/1/14
60	Task 3.3.4 Groundwater Elevation Measurements (1st Round)	103 days	Tue 4/15/14	Tue 7/15/14
61	Task 3.4 Soil Borings, Drilling and Testing	86 days	Fri 2/14/14	Thu 5/1/14
62	**Task 3.5 Environmental Sampling**	**933.38 days**	**Mon 2/6/12**	**Thu 5/15/14**
63	Task 3.5.1 Surface Soil Sampling	34 days	Tue 4/1/14	Thu 5/1/14
64	Task 3.5.2 Background Soil Sampling	34 days	Tue 4/1/14	Thu 5/1/14
65	Task 3.5.3 Groundwater Sampling	703 days	Wed 8/15/12	Thu 5/1/14
66	Task 3.5.4 Sample Location Survey	16 days	Thu 5/1/14	Thu 5/15/14
67	Task 3.5.5 Vapor Intrusion Sampling	918 days	Mon 2/6/12	Thu 5/1/14
68	Task 3.6 Ecological Characterization	1 day	Mon 2/3/14	Mon 2/3/14
69	Task 3.8 IDW Characterization and Disposal	1 day	Wed 8/31/11	Wed 8/31/11
70	Task 3.8 IDW Characterization and Disposal	1 day	Fri 8/24/12	Fri 8/24/12
71	Task 3.8 IDW Characterization and Disposal	223 days	Tue 10/15/13	Thu 5/1/14
72				
73	**Task 4: Sample Analysis**	**917 days**	**Mon 2/6/12**	**Thu 5/1/14**
74	Task 4.1 Innovative Methods/Field Screening Analysis	917 days	Mon 2/6/12	Thu 5/1/14
75	Task 4.2 Analytical Services Provided via CLP, DESA, EPA-ERT	917 days	Mon 2/6/12	Thu 5/1/14

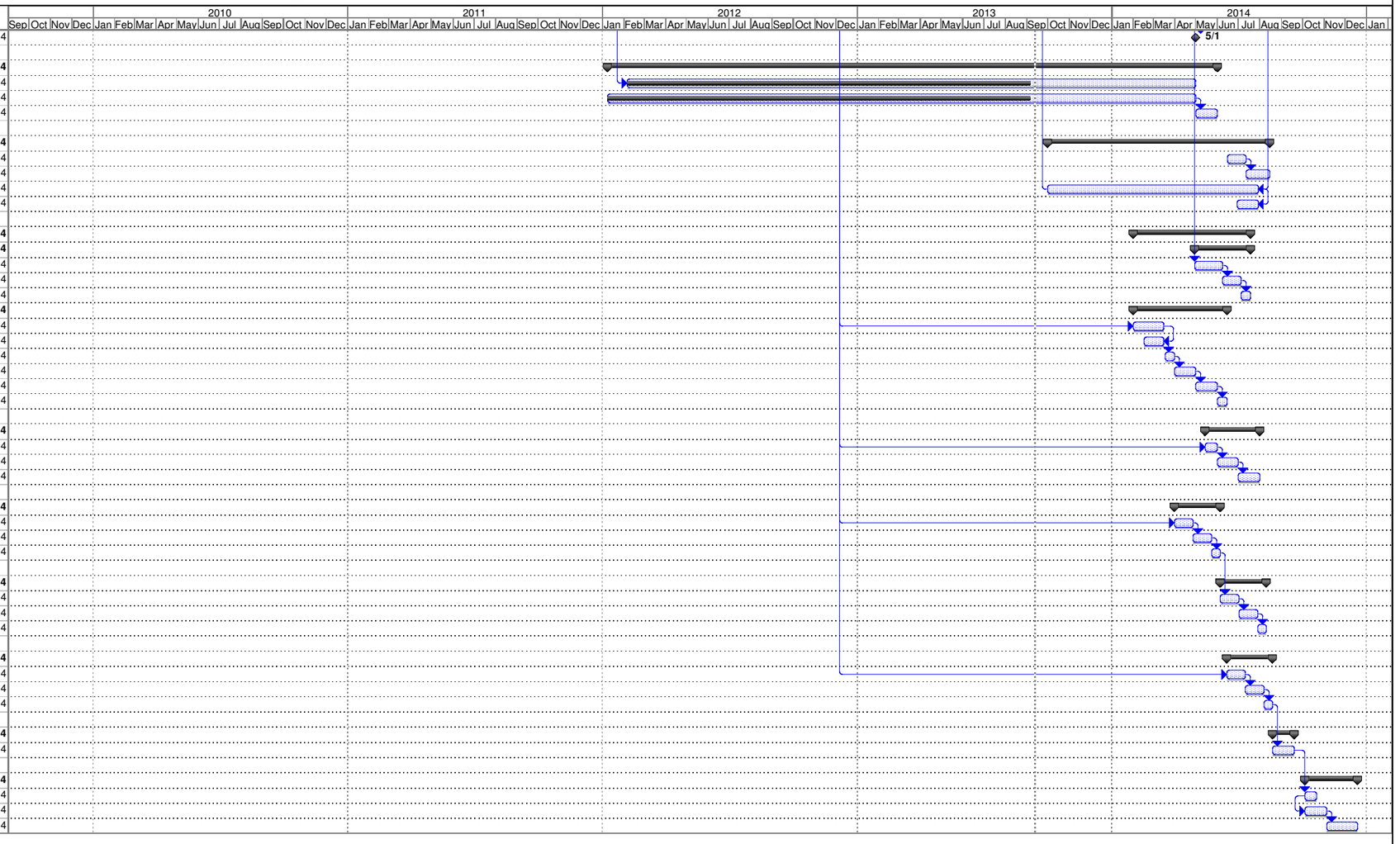


Fulton OU2 091213
Thu 9/12/13

Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Progress | Deadline

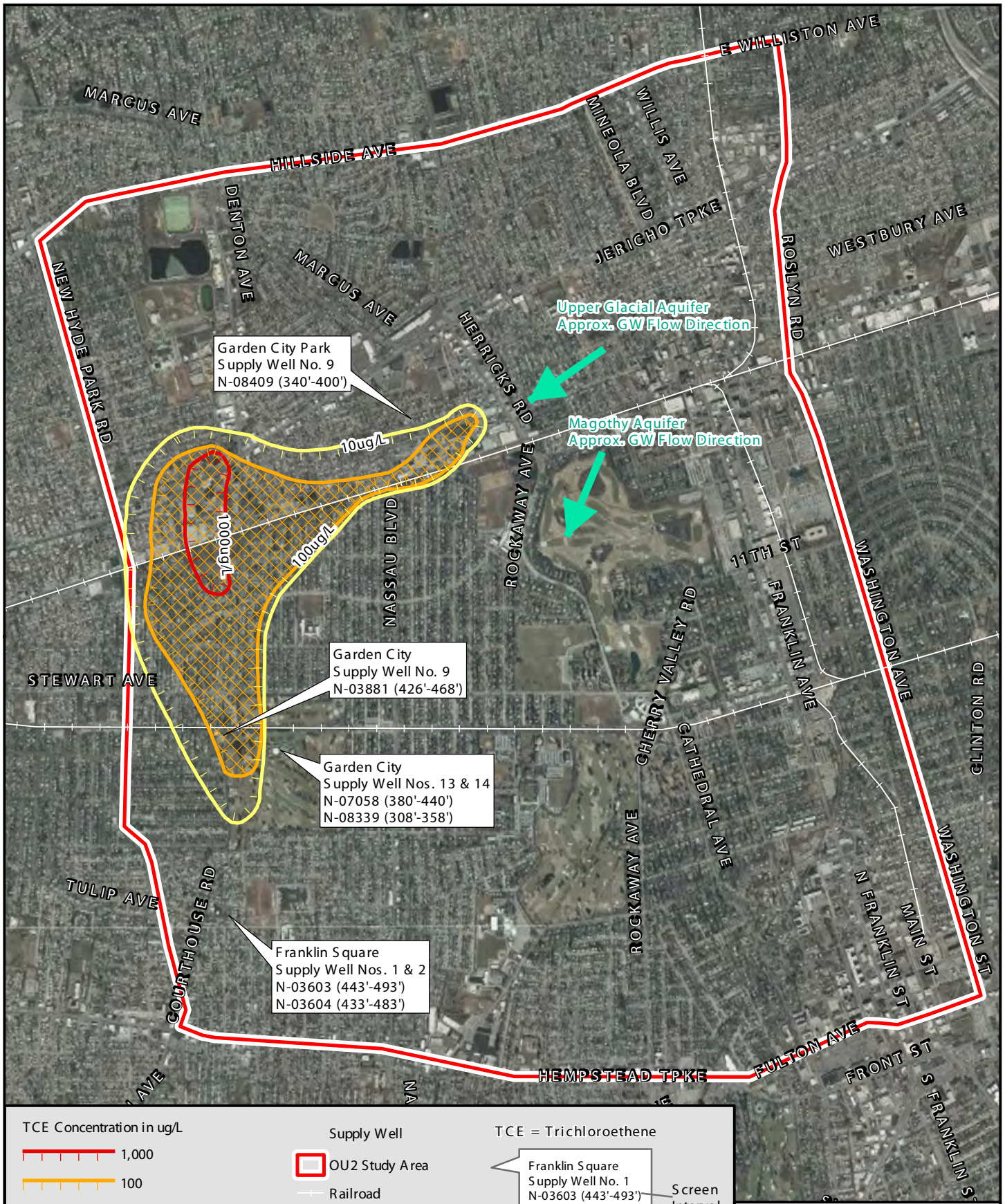
FIGURE 2
EPA Region 2 RAC2 - Contract # EP-W-09-009
Fulton Avenue RI/FS - Work Assignment # 016-RICO-02JN
Garden City Park, Nassau County, NY

ID	Task Name	Duration	Start	Finish
76	Task 4.3 Non-Routine Analytical Services	0 days	Thu 5/1/14	Thu 5/1/14
77				
78	**Task 5: Analytical Support and Data Validation**	**984 days**	**Mon 1/9/12**	**Sun 6/1/14**
79	Task 5.1 Collect, Prepare and Ship Sample	917 days	Mon 2/6/12	Thu 5/1/14
80	Task 5.2 Sample Management	949 days	Mon 1/9/12	Thu 5/1/14
81	Task 5.3 Data Validation	35 days	Thu 5/1/14	Sun 6/1/14
82				
83	**Task 6: Data Evaluation**	**358.25 days**	**Tue 10/1/13**	**Fri 8/15/14**
84	Task 6.1 Data Usability Evaluation	30 days	Mon 6/16/14	Sat 7/12/14
85	Task 6.2 Data Reduction, Tabulation and Evaluation	38 days	Sat 7/12/14	Fri 8/15/14
86	Task 6.3 Modeling	340 days	Tue 10/1/13	Wed 7/30/14
87	Task 6.4 Technical Memorandum (Data Evaluation Report)	34 days	Mon 6/30/14	Wed 7/30/14
88				
89	**Task 7: Assessment of Risk**	**189 days**	**Sat 2/1/14**	**Fri 7/18/14**
90	**Task 7.1 Baseline Risk Assessment (Human Health)**	**90 days**	**Wed 4/30/14**	**Fri 7/18/14**
91	Draft BHHRA Report	45 days	Wed 4/30/14	Sun 6/8/14
92	EPA Review of BHHRA	30 days	Mon 6/9/14	Sat 7/5/14
93	Final BHHRA Report	15 days	Sat 7/5/14	Fri 7/18/14
94	**Task 7.2 Baseline Risk Assessment Ecological Risk Assessment**	**151.38 days**	**Sat 2/1/14**	**Sun 6/15/14**
95	SLERA	49 days	Sat 2/1/14	Sun 3/16/14
96	EPA Review of SLERA	32 days	Sun 2/16/14	Sun 3/16/14
97	Final SLERA	15 days	Tue 3/18/14	Mon 3/31/14
98	BERA	34 days	Tue 4/1/14	Thu 5/1/14
99	EPA Review of BERA	35 days	Thu 5/1/14	Sun 6/1/14
100	Final Baseline Ecological Risk Assessment Report	16 days	Sun 6/1/14	Sun 6/15/14
101				
102	**Task 9: Remedial Investigation Report**	**88 days**	**Thu 5/15/14**	**Fri 8/1/14**
103	Task 9.1 Draft RI Report	20 days	Thu 5/15/14	Sun 6/1/14
104	EPA Review of RI Report	33 days	Sun 6/1/14	Tue 7/1/14
105	Task 9.2 Final RI Report	35 days	Tue 7/1/14	Fri 8/1/14
106				
107	**Task 10: Remedial Alternatives Screening**	**74 days**	**Tue 4/1/14**	**Thu 6/5/14**
108	Task 10.1 Draft Technical Memorandum	30 days	Tue 4/1/14	Sun 4/27/14
109	EPA Review of RATM	30 days	Sun 4/27/14	Sat 5/24/14
110	Task 10.2 Final Technical Memorandum	14 days	Sat 5/24/14	Thu 6/5/14
111				
112	**Task 11: Remedial Alternatives Evaluation**	**74 days**	**Thu 6/5/14**	**Sun 8/10/14**
113	Task 11.1 Draft Technical Memorandum	30 days	Thu 6/5/14	Wed 7/2/14
114	EPA Review of RAEM	30 days	Wed 7/2/14	Tue 7/29/14
115	Task 11.2 Final Technical Memorandum	14 days	Tue 7/29/14	Sun 8/10/14
116				
117	**Task 12: Feasibility Study Report**	**74 days**	**Sun 6/15/14**	**Tue 8/19/14**
118	Task 12.1 Draft FS Report	30 days	Sun 6/15/14	Fri 7/11/14
119	EPA Review of FS	30 days	Fri 7/11/14	Thu 8/7/14
120	Task 12.2 Final FS Report	14 days	Thu 8/7/14	Tue 8/19/14
121				
122	**Task 13: Post RI/FS Activities**	**35 days**	**Tue 8/19/14**	**Fri 9/19/14**
123	Task 13.1 FS Addendum	35 days	Tue 8/19/14	Fri 9/19/14
124				
125	**Task 16: Work Assignment Closeout**	**85 days**	**Sun 10/5/14**	**Fri 12/19/14**
126	Task 16.1 Revised Work Plan Budget	19 days	Sun 10/5/14	Tue 10/21/14
127	Task 16.2 Document Indexing	35 days	Sun 10/5/14	Wed 11/5/14
128	Task 16.3 Document Retention/Conversion	50 days	Wed 11/5/14	Fri 12/19/14



Fulton OU2 091213
Thu 9/12/13

Task | Split | Milestone | Summary | Project Summary | External Tasks | External Milestone | Progress | Deadline

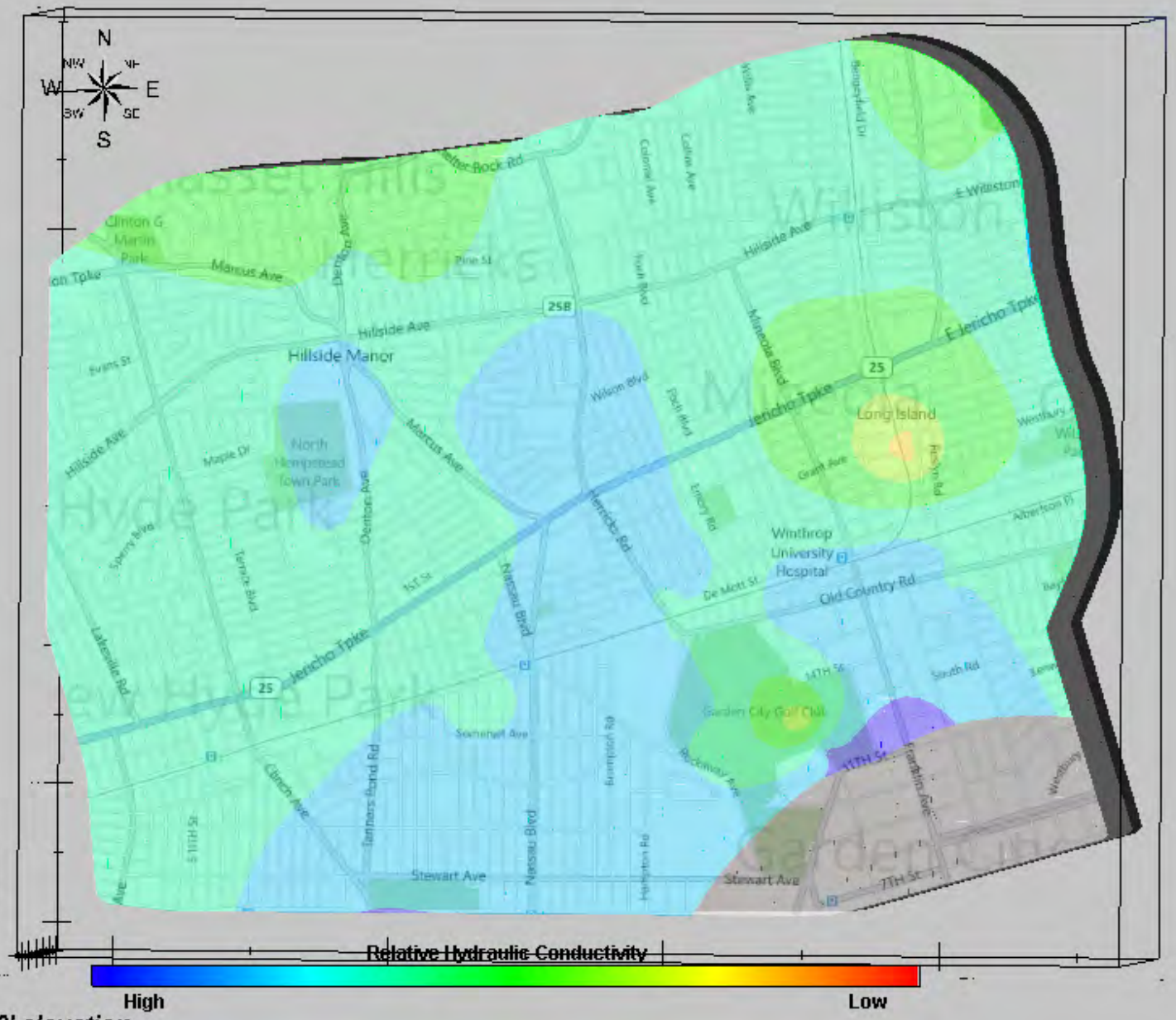


HDR

EPA RAC 2 WA 016-RICO-2LN
Fulton Avenue RI/FS, Garden City Park, NY
Preliminary Site Conceptual Model (Aerial Plan View)

Job No.	Date	Figure
123589	12/09/11	3a

NE Area of Interest

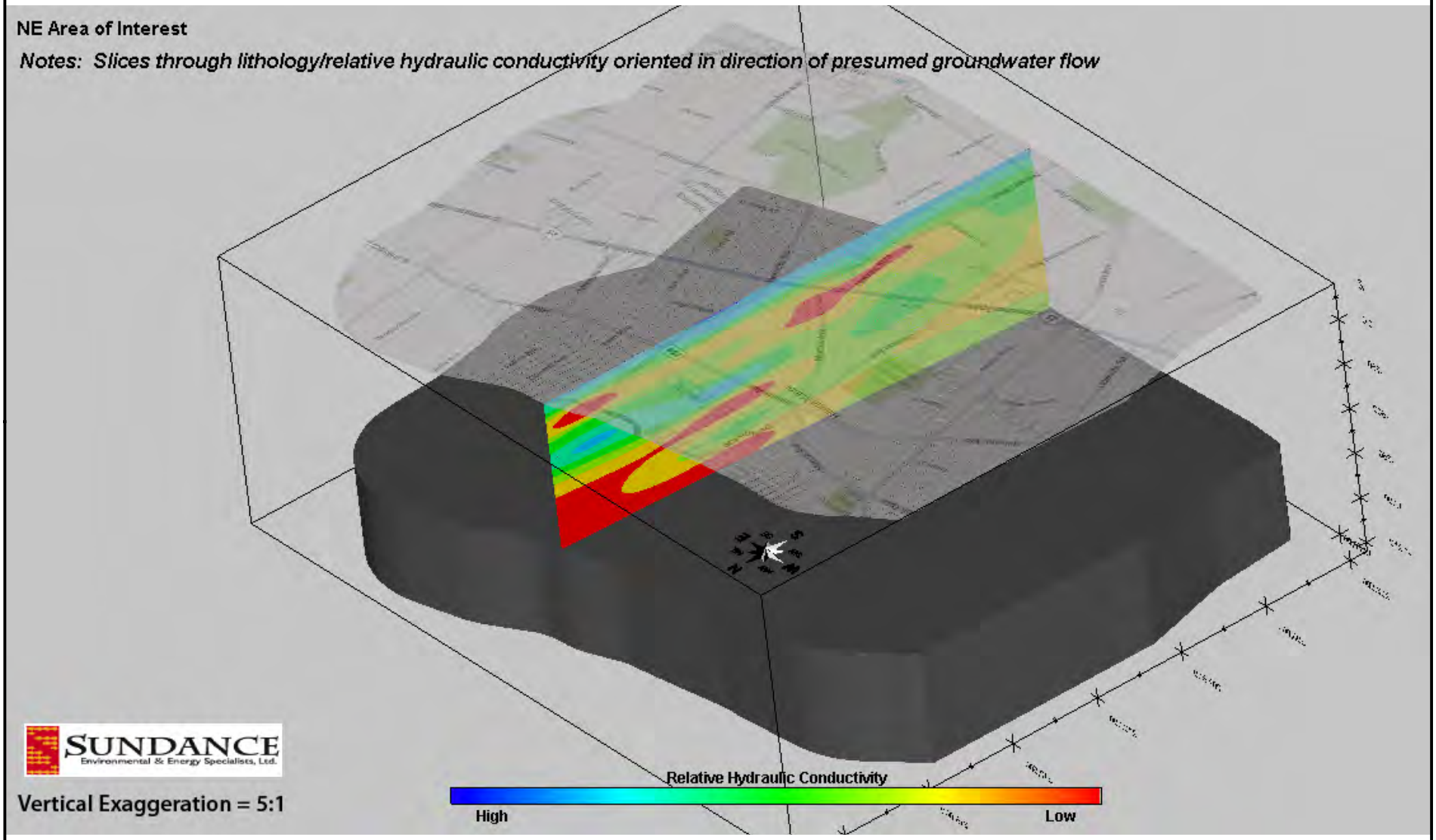


SUNDANCE
Environmental & Energy Specialists, Ltd.

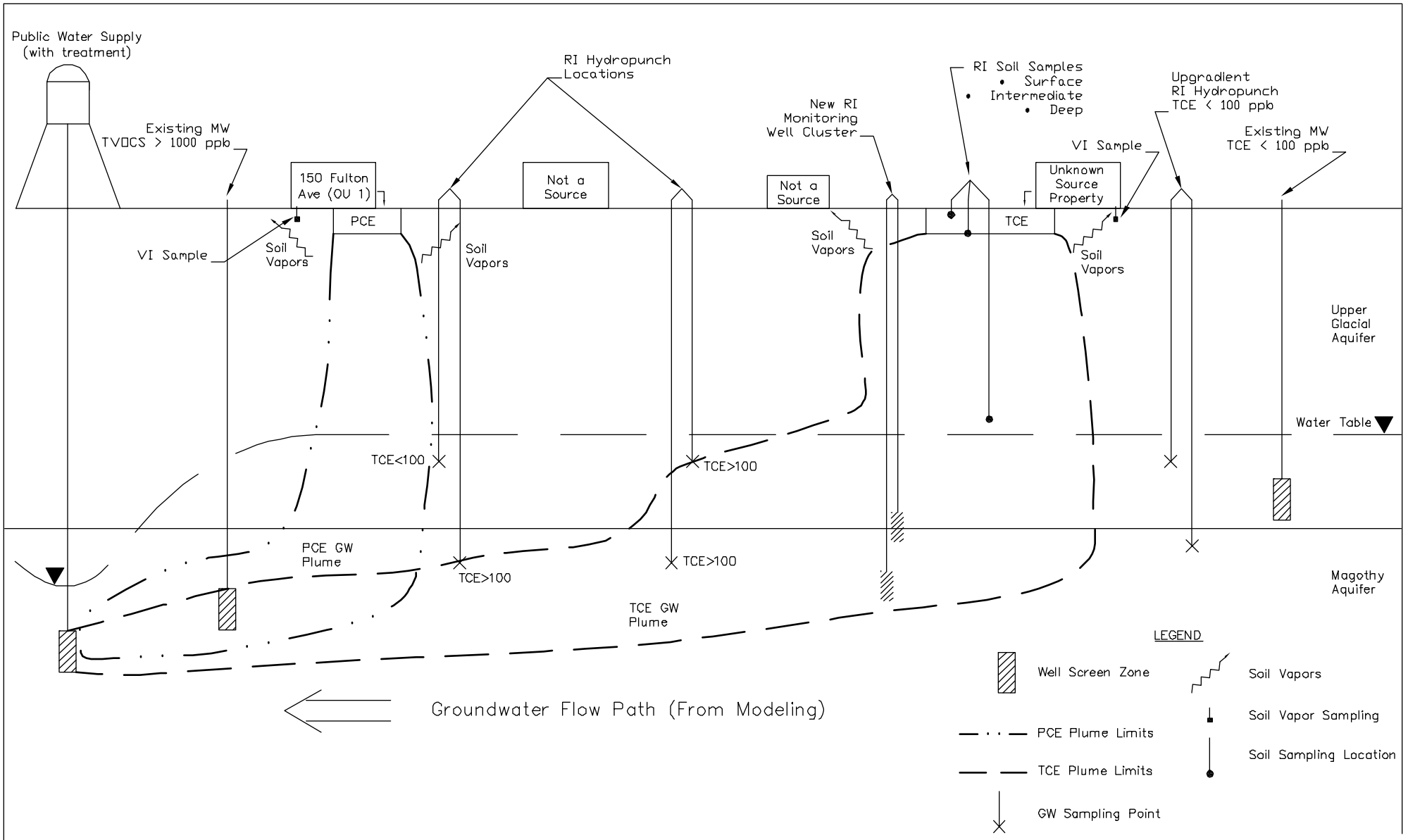
Vertical exaggeration = 5:1

Notes: Horizontal slice at 70' elevation

HDR	EPA RAC 2 WA 016-RICO-2LN Fulton Avenue RI/FS, Garden City Park, NY Preliminary Site Conceptual Model (Model Plan View)	Job No.	Date	Figure
		123589	12/09/11	3b



HDR	EPA RAC 2 WA 016-RICO-2LN Fulton Avenue RI/FS, Garden City Park, NY Preliminary Site Conceptual Model (Isometric View)	Job No.	Date	Figure
		123589	12/09/11	3c



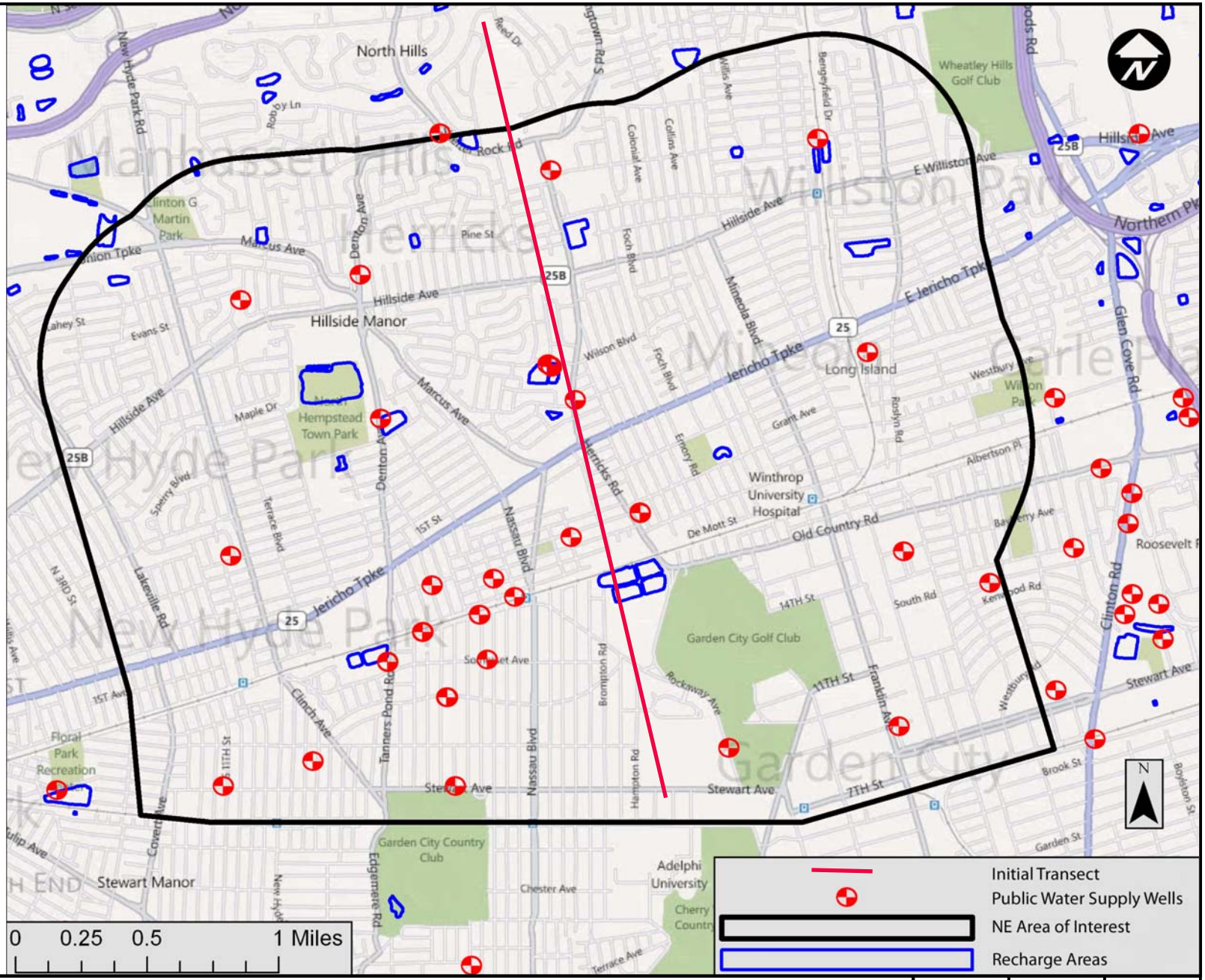
NOT TO SCALE

HDR

Cross Sectional Site Conceptual Model

DATE
12-14-09

FIGURE
4



Data provided by:
Nassau County,
Sundance Environmental &
Energy Specialists, Ltd.

HDR

EPA RAC 2 WA 016-RICO-2LN
Fulton Avenue RI/FS, Garden City Park, NY
Proposed Sampling Area

Job No.	Date	Figure
123589	12/09/11	5

December 2011
(rev'd September 2013)

Figure 6 - Project Organization Structure

Fulton Avenue RI/FS
USEPA Region 2
Contract # EP-W-09-009