Final Remedial Investigation/ Feasibility Study Work Plan

Volume 1

United States Environmental Protection Agency
New Cassel/Hicksville Groundwater Contamination
Superfund Site
Nassau County, New York

Contract No. EP-W-09-009
Work Assignment No. 034-RICO-A245

December 2015

EPA WORK ASSIGNMENT NUMBER: 034-RICO-A245

EPA CONTRACT NUMBER: EP-W-09-009

HDR

RAC 2 PROGRAM

FINAL
REMEDIAL INVESTIGATION/FEASIBILITY STUDY
WORK PLAN
NEW CASSEL/HICKSVILLE GROUNDWATER CONTAMINATION
SUPERFUND SITE
NASSAU COUNTY, NEW YORK

DECEMBER 2015

Prepared by:

Demetrios Klerides, P.E., BCEE
Project Manager
HDR

Reviewed by:

Bradley Williams, Ph.D.
RAC 2 Program Manager
HDR

Approved by:

Melissa LaMacchia
RAC 2 Quality Assurance Manager
HDR

TABLE OF CONTENTS

Tables

Figures

ACRONYMS

AALA	American Association for Laboratory Accreditation
ANSETS	Analytical Services Tracking System
ARAR	Applicable or Relevant and Appropriate Requirement
ASTM	ASTM International
ATV	Acoustic Televiewer
bgs	below ground surface
BERA	Baseline Ecological Risk Assessment
BHHRA	Baseline Human Health Risk Assessment
BTEX	Benzene, Toluene, Ethylbenzene, Xylene
CAL	Caliper
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
CLP	Contract Laboratory Program
cm/s	centimeter per second
CO	Contracting Officer
COC	Chain of Custody
COPC	Chemical of Potential Concern
CRP	Community Relations Plan
CRS	Cultural Resource Survey
CSIA	Compound Specific Isotope Analysis
CSM	Conceptual Site Model
CVOC	Chlorinated Volatile Organic Compound
DESA	Division of Environmental Science and Assessment
DESR	Data Evaluation Summary Report
DNAPL	Dense Non-Aqueous Phase Liquid
DO	Dissolved Oxygen
DQO	Data Quality Objective
EDD	Electronic Data Deliverable
EDP	Electronic Data Processor
EPA	United States Environmental Protection Agency
ERAGS	Ecological Risk Assessment Guidance for Superfund
ESAT	Environmental Services Assistance Team
FASTAC	Field and Analytical Services Teaming Advisory Committee
FID	Flame Ionization Detector
FLC	Fluid Conductivity
FLUTe®	Flexible Liner Underground Technology®
FS	Feasibility Study
FUSRAP	Formerly Utilized Site Remedial Program
gpm	gallons per minute
GPR	Ground Penetrating Radar
GPS	Global Positioning System
GRA	General Response Action
HASP	Health and Safety Plan
HDR	Henningson, Durham and Richardson Architecture and Engineering, P.C. in association with HDR Engineering, Inc.

HHRA	Human Health Risk Assessment
HPFM	Heat Pulse Flowmeter
HRS	Hazard Ranking System
IAG	Interagency Agreement
IDW	Investigation Derived Waste
LNR	Long Normal Resistivity
LOE	Level of Effort
MASW	Multi-channel Analysis of Surface Waves
µg/L	micrograms per liter
mgd	million gallons a day
MHz	Megahertz
msl	mean sea level
NCP	National Contingency Plan
NELAP	National Environmental Laboratory Accreditation Program
NG	Natural Gamma
NHPA	National Historic Preservation Act
NCHGW	New Cassel/Hicksville Groundwater
NCIA	New Cassel Industrial Area
Non-RAS	Non-Routine Analytical Services
NPL	National Priorities List
NR	Single-Point Resistivity
NTU	Nephelometric Turbidity Units
OSWER	Office of Solid Waste and Emergency Response
OU	Operable Unit
PAR	Pathways Analysis Report
PCE	Tetrachloroethylene
PID	Photo-Ionization Detector
PO	Project Officer
PP	Proposed Plan
ppb	parts per billion
psi	pounds per square inch
PVC	Polyvinyl Chloride
QAPP	Quality Assurance Project Plan
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
QMP	Quality Management Plan
RAC	Remedial Action Contract
RAGS	Risk Assessment Guidelines for Superfund
RAO	Remedial Action Objective
RAS	Routine Analytical Services
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RIR	Remedial Investigation Report
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
RSCC	Regional Sample Control Center

SCSR	Site Characterization Summary Report
SDWA	Safe Drinking Water Act
SLERA	Screening Level Ecological Risk Assessment
SNR	Short Normal Resistivity
SOP	Standard Operating Procedure
SOW	Statement of Work
SAS	Specific Analytical Services
SSA	Sole Source Aquifer
STR	Sampling Trip Report
SVOC	Semi Volatile Organic Compound
TAL	Target Analyte List
TCL	Target Compound List
TDS	Total Dissolved Solids
TES	Threatened and Endangered Species
TMP	Fluid Temperature
TOC	Total Organic Carbon
TSS	Total Suspended Solids
UFP	Uniform Federal Policy
USACE	U.S. Army Corps of Engineers
VOC	Volatile Organic Compound
VID	Video/Optical Televiewer
Vs	Shear-wave velocity
WAM	Work Assignment Manager

SECTION 1 - INTRODUCTION

1.1 General Information

This 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), for the Remedial Investigation/Feasibility Study (RI/FS) of the New Cassel/Hicksville Groundwater (NCHGW) Contamination Superfund Site (the site), located in Nassau County, New York (Figure 1). The NCHGW site comprises a widespread area of groundwater contamination within the towns of North Hempstead, Hempstead, and Oyster Bay, New York.

The RI/FS is being performed under Work Assignment Number 034-RICO-A245, under the EPA Remedial Action Contract (RAC) 2 Contract Number EP-W-09-009. This Work Plan was prepared based upon the Statement of Work (SOW) and discussions with the EPA during the scoping meeting held at the EPA Region 2 office in New York City on July 30, 2015.

As outlined in the SOW, the purpose of the RI/FS is to investigate the overall nature and extent of contamination and develop remedial alternatives at Operable Unit 3 (OU3) of the NCHGW site (Figure 1) that will eliminate, reduce, or control risks to human health and the environment.

Based on the limited sampling and location of OU3, a phased approach is required, to target and evaluate attribution of potential sources, and aid in the development of concise and achievable remedial actions. This Interim Work Plan presents the RI/FS planning process and is based on information that is available at the present time. EPA will review the information collected from the initial phase of work and provide comments that will guide the remaining work and may modify the currently proposed work. Based on EPA's comments, a subsequent, more thorough project planning effort will be completed to develop the final work plan.

Tasks that will be conducted during the RI/FS of the project include:

- Information gathering and background research, including review of existing files from EPA records;
- Site surveys and reconnaissance;
- Down hole geophysics;
- Vertical profile groundwater sampling;
- Monitoring well installation;
- Groundwater sampling;
- Groundwater elevation measurements;
- Evaluation of well hydraulic testing; and
- Completion of reports.

The technical approach and schedule to complete the site characterization work and RI/FS are included in this work plan. This effort includes evaluating existing data and on-going site remedial practices, identifying data gaps, performing a limited amount of field work, and aiding in defining the overall Conceptual Site Model (CSM)/evaluation strategy.

This Work Plan uses generic place holders for many of the RI/FS activities to allow for the preparation of an initial cost estimate. To this end, EPA provided some preliminary qualitative and quantitative details in the SOW that were followed to prepare the cost estimate (submitted as Volume 2).

The proposed task list presented above reflects the tasks identified in the SOW. Additional activities for the RI/FS will include project administration, data reduction and evaluation, risk assessment, the generation of RI and FS reports, and remedial alternatives screening and evaluation. A Work Plan Cost Estimate is submitted to EPA as Volume 2. No work beyond that described in EPA's SOW or this Work Plan will be initiated prior to obtaining EPA approval.

1.2 Purpose

The purpose of this Work Plan is to set forth the requirements to successfully complete the RI/FS activities to determine the overall nature and extent of contamination and to develop viable remediation alternatives to eliminate, reduce, or control risks to human health and the environment at the NCHGW Site.

A primary goal is to develop the minimum amount of data necessary to support the selection of an approach for site remediation, and then to use this data in a well-supported Proposed Plan (PP) and Record of Decision (ROD). The RI and FS are interactive and may be conducted concurrently so that the data collected in the RI influences the development of the remedial alternatives in the FS. This in turn may affect the data needs and the scope of treatability studies, if needed.

SECTION 2 - SITE BACKGROUND INFORMATION

2.1 Site Description

The NCHGW site comprises a widespread area of groundwater contamination within the Towns of North Hempstead, Hempstead, and Oyster Bay, Nassau County, New York. The site is estimated to include approximately 6.5 square miles that has been characterized by Volatile Organic Compound (VOC) contaminated groundwater that has impacted several water supply wells, including four Town of Hempstead wells (Bowling Green 1 and 2, Roosevelt Field 10, and Levittown 2A), six Hicksville water supply wells (4-2, 5-2, 5-3, 8-1, 8-3, and 9-3), and one Village of Westbury water supply well (11).

To date, EPA has designated three OUs for the Site. OU1 is a discrete portion of contaminated groundwater downgradient of the New Cassel Industrial Area (NCIA). OU1 is located primarily in Salisbury, an unincorporated area of the Town of Hempstead; however the portion of OU1 north of Grand Boulevard is located within the Hamlet of New Cassel in the Town of North Hempstead. A Site location map, which highlights the area encompassing OU1, is provided as Figure 1. The area comprising OU1 includes approximately 211 acres and consists of residential properties, as well as some commercial areas. The Town of Hempstead's Bowling Green Water District operates Wells 1 and 2 on the property located within OU1. In September 2013, EPA signed a ROD for OU1, selecting a remedy which included a combination of in-situ treatment of groundwater via in-well vapor stripping and extraction of groundwater via pumping and ex-situ treatment of groundwater prior to discharge to a publicly owned treatment works or reinjection to groundwater with the purpose of establishing contaminant and effectuate removal of contaminant mass where concentrations of total VOCs concentrations are greater than 100 micrograms per liter. The ROD also included in-situ chemical treatment to target high concentration contamination areas, as appropriate.

EPA's ROD for OU1 discussed anticipation of a separate investigation of one or more additional OUs to address groundwater contamination at the site, including the far-field area farther downgradient of the portion of the plume addressed in the OU1 ROD. OU2 of the site includes an investigation of groundwater at and emanating from the Sylvania property in Hicksville, NY. The U.S. Army Corps of Engineers (USACE) Formerly Utilized Site Remedial Program (FUSRAP) is conducting an RI/FS of OU2. Additional planned OUs for the Site include, but may not be limited to, areas of groundwater contamination impacting the Hicksville water supply wells 5-2, 5-3, 4-2, 8-1, 8-3, 9-3, and Hempstead-Levittown water supply well 2A. The referenced far-field area of groundwater contamination is OU3 and the subject of this work plan.

2.2 OU3 History, Background

Based on the limited sampling and location of OU3 (downgradient of OU1), a phased approach will be required to improve the understanding of OU3, to target and evaluate attribution of potential sources, and aid in the development of concise and achievable remedial actions. This section will be updated when more information is available and submitted in the Final Work Plan.

SECTION 3 - TASK DESCRIPTIONS AND ASSUMPTIONS

3.1 Task 1- Project Planning and Support

3.1.1 Subtask 1.1: Project Administration

HDR will provide project administration and management support during the investigation to complete the work assignment. The period of performance is assumed to be 36 months.

3.1.2 Subtask 1.2: Scoping Meetings

The HDR project team attended a scoping meeting at EPA's Region 2 office in New York City on July 30, 2015. Minutes of the scoping meetings were prepared and distributed to EPA on August 3, 2015. Due to the phased approach, it is assumed that there will be a total of two scoping meetings.

3.1.3 Subtask 1.3: Conduct Site Visit

The HDR project team will schedule a one-day site visit during the project planning phase, to develop a conceptual understanding of the Site and the RI/FS scope and requirements. Due to the potential expansive contaminant extent, additional site visits will likely be warranted. It is assumed that two (2) site visits will be performed.

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

HDR will prepare and submit a RI/FS Work Plan in accordance with the contract terms and conditions. HDR will use information from the appropriate EPA guidance as the basis for preparing the RI/FS Work Plan.

Due to site complexities, a two-phased RI/FS Work Plan is necessary. This Interim RI/FS Work Plan has been prepared until more is learned about the site (through site characterization and investigation). After a second scoping meeting, a subsequent, more thorough project planning effort will be completed to develop the final RI/FS Work Plan. This interim plan has generic place holders for many of the back end RI/FS activities to allow for the preparation of an initial cost estimate. EPA has provided some preliminary qualitative and quantitative scoping details in subsequent tasks/sections of this work statement. A detailed schedule for task/project completion has been provided in this work plan based on the qualitative and quantitative scoping details provided by EPA.

To support the completion of the final RI/FS Work Plan, a site characterization summary report (SCSR) will be required. The technical approach, level of effort, estimated budget and schedule to complete the site characterization work and report has been included under Subtask 1.6 *Evaluate Existing Data and Documents* of this interim RI/FS Work Plan. This effort includes evaluating existing data, identifying data gaps, and aiding in defining the overall Conceptual Site Model (CSM)/evaluation strategy. The final RI/FS Work Plan shall be modified based on the findings and conclusions of the site characterization step. EPA will review the site characterization information

and provide additional statement of work elements to HDR, to complete the final RI/FS Work Plan.

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

HDR will participate in a work plan negotiation meeting with EPA via teleconference. HDR will submit a work plan and budget incorporating the agreements made in the negotiation meeting. The interim work plan will include a summary of the negotiations. HDR will submit a revised interim work plan and budget in both hardcopy and electronic formats (e.g., Word .doc files and Excel spreadsheets). Due to the phased approach, HDR will assume there will be two negotiation meetings.

3.1.6 Subtask 1.6: Evaluate Existing Data and Documents

HDR will review and evaluate existing site background information, including all information pertaining to the Site and OU3 provided or identified by the EPA WAM. This information will be used/presented in the SCSR as well as the Remedial Investigation Report (RIR). The format for data presentation and review in the SCSR and RIR will be submitted to EPA for review and approval. The data and documents to be reviewed and evaluated include, but are not limited to the following:

- EPA files and records
- Files and records from the U.S.G.S, Corps of Engineers, and other Federal sources
- NYSDEC files and records
- Municipal files including public utility/well field information as it pertains to the site
- Available private or local water company information as it pertains to the site

Site Characterization Summary Report (SCSR)

HDR will prepare a SCSR. An outline and schedule for this effort will be submitted to EPA for review and approval. The SCSR will include a preliminary conceptual site model (CSM) and will identify any data gaps which need to be filled in order to complete the OU3 RI/FS. The overall objective of site characterization is to describe areas of OU3 that may pose a threat to human health or the environment. This will be accomplished by determining the OU3's physiography, geology, and hydrology, along with identifying potential surface and subsurface pathways of migration. The SCSR shall identify (if possible) the sources of contamination and characterize the nature, extent, and volume of the sources of contamination, including their physical and chemical constituents, as well as their concentrations at incremental locations relative to background concentrations in the affected media. Using this information, contaminant fate and transport will be estimated.

The SCSR information/findings/conclusions shall form the basis for future RI/FS activities scoping and final work plan preparation. At a minimum, the SCSR shall include a compilation and summary of all pertinent existing data for OU3 of the site including:

- the results of investigations of the site
- historical information about the site

- site-related geography, physiography, geology, and hydrology
- chemicals of potential concern
- environmental pathways of concern
    - migration pathways
    - potential exposure pathways
- background analytical levels
    - evaluation of background groundwater chemical constituent levels
- aerial photographs
- narrative summary and compiled spreadsheets, maps, graphs, and figures, including electronic database of sampling data with coordinates and sampling dates.

HDR will submit the SCSR to EPA, as well as present the information at a meeting with the WAM and EPA technical staff. A revised final document will be prepared based on EPA comments. Information from the revised and approved SCSR will be utilized for the preparation of additional RI work plan elements that will be incorporated into the RIR.

The SCSR will most likely identify the need for field investigations to more fully delineate the extent of contamination and likely source areas, which will subsequently require additional investigation. It is assumed that the estimated costs for these subsequent source area site-specific activities will be provided in an update to the RI cost estimate. In addition, if sufficient information is not available (data gaps still exist) to identify sources which might be contributing to OU3 contamination, a groundwater modeling activity may be warranted to assist in formulating the CSM. The scope and estimated cost for these activities will be submitted for EPA approval. Additional scoping details for groundwater modeling are provided under Section 6.3.

3.1.7 Subtask 1.7: Quality Assurance Project Plan

HDR will prepare a Quality Assurance Project Plan (QAPP) for the RI/FS in accordance with the current Uniform Federal Policy (UFP) for QAPP guidance and procedures and HDR's EPA-approved Quality Management Plan (QMP) and QAPP for the contract. The UFP-QAPP will be submitted under separate cover following the submittal of the Work Plan.

The QAPP will provide for collection of data sufficient to delineate site-related contamination in potentially affected media, to the extent necessary to select an appropriate remedy; to evaluate cross-media contaminant transport as necessary to support the assessment of risks associated with potential or actual exposures to site-related contamination under current and reasonably likely future conditions; and to evaluate remedial alternatives that address site-related contamination.

Additional requirements may be required by EPA and will be included as activities in the cost estimate including a Cultural Resources Survey (CRS) Work Plan to address the requirements of the National Historic Preservation Act.

3.1.8 Subtask 1.8: Health and Safety Plan

HDR will prepare a 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 40 Code of Federal Regulations (CFR) 300.150 of the National Contingency Plan (NCP), and 29 CFR 1910.120 (l)(1) and (l)(2). The HASP will be submitted under separate cover following the submittal of the Work Plan.. The HASP will cover the initial site characterization activities, as well as any future field work efforts. As new information becomes available regarding potential source area investigations, the HASP shall be updated to include site-specific elements related to those sites.

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

HDR will follow EPA Region 2's FASTAC procedures. For all non-time critical data collection projects, the FASTAC approach requires that a sequential decision tree for procuring Superfund analytical services be followed, which includes:

- Tier 1: EPA Region 2 DESA laboratory (with Environmental Services Assistance Team [ESAT] support);
- Tier 2: National Analytical Services Contract laboratories (CLP and Non-RAS);
- Tier 3: Region Specific Analytical Services (SAS) Contract laboratories; and
- Tier 4: Contractor, interagency agreement (IAG), and Field Contractor Subcontract laboratories.

HDR will follow the FASTAC strategy unless written direction is provided by the EPA to deviate from it. This letter will be submitted to the RSCC along with the sample.

In the event that analytical services cannot be provided through Tiers 1 through 3, HDR will subcontract these services. HDR will provide oversight of subcontract laboratories through periodic performance evaluation sample analyses and/or on-site audits of operations. HDR will be prepared to implement corrective actions in any cases in which the subcontract laboratory's performance does not meet the standards called for in this work assignment. The following activities are included:

- HDR will prepare Laboratory Services Requests (e.g., statements of work) for all non-RAS parameters. The Laboratory Services Request(s) will include the following elements:
    - digestion/analytical methods
    - data deliverable requirements
    - quality control (QC) requirements
    - estimated number of samples
    - method restrictions and penalties for non-compliance
    - turn-around times

- HDR will develop QC criteria for each parameter provided in the approved QAPP that will be incorporated in the Laboratory Service Request.

- At EPA's request, HDR will provide copies of Laboratory Services Requests for review by the EPA WAM. Prior to acquiring analytical services by subcontract, HDR shall make use of Tier 1, 2, and 3 alternatives for these services under the Field and Analytical Services Teaming Advisory Committee (FASTAC) approach, which is described below:

Validation of data generated using Tier 1 and Tier 2 of the FASTAC strategy will be performed by EPA Region 2 and the EPA contractor (discussed under Task 5). All contractor procured data validation through Tier 4 of the FASTAC strategy will be validated by personnel not connected to the laboratory performing the analysis.

3.1.10 Subtask 1.10: Meetings

Both initial technical review and progress meetings will be required during the course of this work assignment. HDR assumes participation will be needed in one SCSR review meeting, one technical meeting to discuss groundwater modeling and a sequence of six progress meetings (a total of eight meetings). HDR estimates that each meeting will be attended by three (3) people, and that each meeting will last five (5) hours. All meetings are assumed to be held at the EPA Region 2 New York City office.

3.1.11 Subtask 1.11: Subcontract Procurement

All anticipated subcontract procurement activities will be completed under this subtask. It is assumed that nine subcontractors would be procured to complete field work or technical support activities related to completion of the SOW. These subcontracts are:

- Driller for Vertical Profile Boring (VPB) and Monitoring Well Installation
- Surveyor
- IDW
- Laboratory for Compound Specific Isotope Analysis (CSIA) and Evaluation
- Laboratory for Screening Samples (quick turn-around)
- Borehole Geophysics
- Cultural Resources Survey
- Stenographer
- Equipment supplier

3.1.12 Subtask 1.12: Perform Subcontract Management

HDR will perform the necessary management and oversight of any subcontractor(s) required for OU3 RI/FS activities. HDR will ensure that the work proceeds according to contract requirements, review and approve subcontractors' invoices, and issue any necessary contract modifications.

3.1.13 Subtask 1.13: Pathway Analysis Report (PAR)

HDR will prepare a Pathway Analysis Report (PAR) in accordance with OSWER Directive 9285.7-01D-1 dated December 2001 entitled, "*Risk Assessment Guidelines for Superfund Part D*" (RAGS Part D) (EPA 2001) and input from the EPA Regional Risk Assessor assigned to the Site. The PAR will be submitted after work plan approval; the specific schedule for submission of the PAR will be established as part of the work plan approval action.

The PAR will describe the risk characterization process and how the risk assessment will be prepared, in order to allow the risk assessors to ensure that the proper guidance and methodologies are followed. The PAR will contain information necessary for a reviewer to understand how the risks at OU3 will be addressed, including the statistical treatment of the data, the methods to select the contaminants of concern, the exposure pathways, receptors, parameters to be used and current toxicological values. It will include RAGS, Part D Tables 1 through 6, as well as the necessary explanatory text. Because the PAR includes RAGS, Part D tables 1 through 6, it cannot be completed until all analytical data are available. If HDR recommends modeling, a description of the model and an explanation of the inputs and assumptions will be included in the PAR so that their appropriateness can be determined. Outputs/results will be provided in the Draft HHRA.

3.2 Task 2 - Community Relations

The HDR project team will provide community relations support to EPA throughout the RI/FS in accordance with the Superfund Community Involvement Handbook, EPA, Office of Emergency and Remedial Response, EPA 540-K-05-003, April 2005.

3.2.1 Subtask 2.1: Community Interviews

Not Applicable

3.2.2 Subtask 2.2: Community Relations Plan (CRP)

Not Applicable

3.2.3 Subtask 2.3: Public Meeting Support

HDR will perform the following activities:

- Arrange two public meetings, availability sessions, or open houses including the reservation of a meeting space, as identified by EPA.

- Attend public meetings or availability sessions, provide recording and/or stenographic support, prepare draft and final meeting summaries, and prepare presentation materials/handouts.

- Prepare Draft and Final Public Meeting Visual Aids. HDR will develop draft visual aids (i.e., slides and handouts). HDR has assumed preparation of 25 PowerPoint slides, one poster board size display and three handouts for each public meeting.

- Final Public Meeting Visual Aids. HDR will develop final visual aids incorporating all EPA comments.

- HDR shall reserve a court reporter for the two public meetings. A full-page original and a "four on one" page copy of the transcripts (along with an electronic copy of the transcripts) will be provided to the EPA, and one copy placed in the information repository.

3.2.4 Subtask 2.4: Fact Sheet Preparation

HDR will perform the following fact sheet preparation support activities:

- Draft Fact Sheets – EPA's WAM will prepare the draft Fact Sheet; HDR will perform a technical review and edit, lay-out, and photocopy the Fact Sheets.

- Final Information Letters/Updates/Fact Sheets - EPA will prepare final Fact Sheets incorporating all comments. After EPA approval, HDR will attach mailing labels to the Fact Sheets before delivering them to EPA from where they will be mailed. HDR has assumed that two Fact Sheets, six to eight pages in length, with two illustrations per Fact Sheet and 200 copies will be prepared.

3.2.5 Subtask 2.5: Proposed Plan Support

EPA will prepare the Proposed Plan. HDR will provide administrative and technical support for the preparation of the draft and final Proposed Plan describing the preferred alternative and other alternatives evaluated in the Feasibility Study (FS).

3.2.6 Subtask 2.6: Public Notices

EPA will prepare newspaper announcements/public notices in support of each public meeting. HDR will place the ads in the newspapers and assume the development of two newspaper advertisements (ads placed in newspapers) in the most widely read local newspaper. HDR assumes that half the ads will be placed in a large newspaper and the other half will be placed in a small town newspaper.

3.2.7 Subtask 2.7: Information Repositories

HDR will establish and maintain a local repository. Only documents designated by EPA for inclusion will be placed in the repository.

3.2.8 Subtask 2.8: Site Mailing List

HDR will update the site mailing list two times. It is estimated that each mailing list will have about 200 entries. HDR will provide EPA a copy of the mailing list in an EPA acceptable format on compact disk as requested by EPA.

3.2.9 Subtask 2.9: Responsiveness Summary Support

HDR will provide administrative and technical support for the Site Responsiveness Summary. HDR will provide assistance in compiling and summarizing comments received during the public comment period on the Proposed Plan and the FS. It is estimated that 100 separate comments (including duplicate comments) will have to be compiled and summarized.

3.3 Task 3: Field Investigation

HDR will complete the following field activities or combination of activities for data acquisition in accordance with the EPA-approved QAPP developed in Task 1.

After the SCS, the hydrogeological assessment will be completed with drilling of VPBs followed by the drilling and installation of monitoring wells to delineate the nature and extent of groundwater contamination and to confirm the CSM. Borehole geophysics will be completed to define the site-specific geologic conditions and stratigraphy. Water levels will be measured to define the potentiometric surface of the aquifer and determine the direction of groundwater flow. Groundwater samples will be collected from the newly installed monitoring wells and existing wells to delineate the nature and extent of groundwater contamination. Groundwater samples will be analyzed for volatile organic compounds (VOCs), CSIA, and monitored natural attenuation (MNA) parameters. Aquifer testing is included in the SOW, but considering the extensive aquifer testing that has been completed in this portion of Nassau County it has been re-scheduled to occur during a future pre-design investigation. Based on existing knowledge of site conditions, contamination is limited to deep groundwater, therefore, investigation of surface water, sediment, indoor air and ecological characterization are not necessary .

The following activities will be completed in the sequence listed below. VPBs and monitoring wells will be completed concurrently with some lag time between the completion of a VPB and a monitoring well at the same location to allow for analytical results to be evaluated and decisions to be made for the well depth.

- Site Reconnaissance, Section 3.3.1
- Mobilization, Section 3.3.2
- Vertical Profile Borings, Section 3.3.3
- Monitoring Well Installation, section 3.3.4
- Downhole Geophysics, Section 3.3.5
- Surveying, Section 3.3.1
- Groundwater Elevation Measurements, Section 3.3.5

- Groundwater Sampling, Section 3.3.5
- Investigative Derived Waste Management, Section 3.3.8
- Demobilization, Section 3.3.2

3.3.1 Subtask 3.1: Site Reconnaissance

HDR will conduct site surveys when needed, including property, boundary, utility rights-of-way, and topography. This information will become part of the SCSR for geographic areas considered in the initial OU3 area. Additional site surveys will be completed as progress is made in defining the nature and extent of off-site groundwater contamination, and additional areas (drilling locations) are investigated. HDR will complete the following activities as part of the site reconnaissance:

- Topography, property boundaries, utility rights-of-way surveys, site ownership (tax map) information for all properties proposed for monitoring well installation
  - To be updated on an as-needed basis as areas or sites of concern are discovered or new monitoring well locations are proposed.
- Establishment of sampling points
  - Groundwater well inventory including residential and monitoring wells;
  - Establish locations for VPBs utilizing existing data including WPBs collected pursuant to OU1 Remedial Design activities, if available.
- Ecological resources reconnaissance (for future work, if needed)
- Cultural resources survey
- Photographic Documentation: HDR will take photographs to document the RI field activities (including the SCS) and significant events or observations made during the RI/FS. These activities will include mobilization, collection of samples, ecological studies, treatability studies (if required) and demobilization. HDR will photograph these activities so that the photographs will serve as a clear record of the procedures required to carry out each activity. HDR will also store and maintain these photographs in electronic form and submit them to EPA on disk. For each photograph, HDR will provide the time, date, location, and a brief explanation of what is being photographed.

3.3.2 Subtask 3.2: Mobilization and Demobilization

HDR will provide the necessary personnel, equipment, and materials for mobilization and demobilization to and from the Site. It is anticipated that mobilization will be for field activities, such as well installation and sampling, to support the discussion presented in the SCSR and the field efforts associated with RI/assessment work plan activities. Due to the phased approach for this project, multiple mobilizations may be required.

Details on the mobilization area, including health and safety zones, the project field office, and investigation derived waste (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 rent equipment, as necessary;
- Identify field office space and arrange for staging area for contractor equipment;
- Arrange for field office utilities, 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;
- Receive field activity and health and safety equipment;
- Perform general site preparation/organization;
- Conduct initial health and safety briefing for site personnel; and
- Set-up field computer equipment, office equipment, furniture and field office supplies.

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

- Complete site restoration activities and cleanup;
- Arrange for the transportation and disposal of wastes, including IDW, from the Site;
- Return rental equipment;
- Terminate field office lease and disconnect utilities; and
- Demobilize field, office and computer equipment.

3.3.3 Subtask 3.3: Soil Boring, Drilling, and Testing

The primary objective of the RI is to horizontally and vertically delineate the nature and extent of groundwater contamination in the underlying aquifers (OU3). This will be completed by initially drilling VPBs to document the stratigraphy and to collected groundwater samples from discrete aquifer intervals to document the vertical extent of CVOCs. After the completion of the VPBs, one or more monitoring wells will be installed at each location. These wells will be used to collect groundwater samples and to measure the elevation of the potentiometric surface of the aquifer discussed in Section 3.3.4, Subtask 3.4 Hydrogeological Assessment.

As shown on Figure 2, HDR is proposing drilling six VPBs at locations OU3-B1 through OU3-B6. VPBs OU3-B1 through OU3-B3 will be drilled first and each will be drilled down-gradient of the three main plumes emanating from OU1 to assess the vertical and horizontal extent of groundwater contamination. These locations were selected based on regional groundwater flow direction in the Magothy Aquifer as defined by the USGS (Monti, et al, 2010). The maximum depth of each VPB was estimated based on the slope of plumes in nearby portions of Nassau County and the mapped depth of the Raritan Clay (Perlmutter and Geraghty, 1963).

The location and depth of subsequent VPBs will be discussed following the evaluation of the results from three initial VPBs. The locations of VPBs OU3-B4 through OU3-B6 are shown on Figure 2 as place holders until HDR evaluates and presents the information from the initial VPBs to EPA. Information provided in the SCSR will also be used to identify additional drilling locations in subsequent phases of work.

The actual depth of each VPB will be dependent on the concentration of VOCs in laboratory results and site stratigraphy as well as discussion with EPA. For planning purposes, the estimated maximum depth of each VPB is 600 feet below ground surface (bgs). To minimize the possibility of cross-contamination, sonic drilling methods or similar methods (to be determined) will be used to drill all boreholes.

The VPB and testing phase on the aquifer will proceed through the following sequence of steps so that the groundwater contamination in the aquifer is delineated with reasonable certainty. Depths provided below are again for planning purposes and will be dependent on the results and recommendations in the SCSR and discussion with EPA.

1. Boreholes for VPBs OU3-B1 through OU3-B3 will be drilled using Sonic drilling techniques to 140 feet below ground surface where groundwater sampling will begin. Boreholes for VPBs OU3-B4 through OU3-B6, located further down-gradient, will be drilled to 200 feet bgs where groundwater sampling will begin.

2. Upon reaching the 140 or 200 foot depth respectively, the core barrel will be removed from the sonic drive head and a 2-7/8 inch inner diameter drill rod with a carbide tipped drive point with flanges and sampling ports will be advanced in the borehole. The sampler will be sonically driven beyond the bottom of the boring to the desired groundwater sampling interval, which should be 5 to 10 feet into the undisturbed formation. To ensure the seal is intact and no drill fluids have entered the borehole, a water level meter will then be lowered into the drill rods. If no water is encountered, the water level meter will be removed from the drill rods and the sampling ports will be opened. The water level meter will then be lowered back down the drill rods to confirm water has entered to rods.

3. After groundwater sample is collected, the groundwater collection system will be advanced further to another depth for additional sampling. Sampling will continue until refusal or a termination depth is reached. If refusal is encountered, the groundwater collection system will be removed from the borehole and the borehole will be drilled to a depth approximately 10 feet above the next desired sample interval. The groundwater

collection system will be advanced in the borehole and the process will be repeated until the final depth is reached.

4. Two consecutive samples with low VOC concentrations (<20 microgram per liter (ug/l)) or encountering the Raritan Clay will be used to define the final depth after discussions with EPA.

3.3.4 Subtask 3.4: Hydrogeological Assessment

Based on evaluation of the current contamination of the contamination plume, HDR will install nine groundwater monitoring wells to define the nature and extent of groundwater contamination.

- Six deep wells at Locations OU3-B1 through OU3-B6. The depth of these wells will be up to 600 feet or as defined "termination" depth during VPB;

- Three shallower wells at Locations OU3-B1 through OU3-B3. The depth of these wells will be up to 400 feet;

- Two wells will be installed at VPB OU3-B1 through OU3-B3, with one interval being at the highest detected vertical profile concentration and the second will be selected after discussions with EPA;

- For VPB OU3-B4 through OU3-B6, one well will be installed with the screen interval being at the highest detected vertical profile concentration; and,

Monitoring wells will be installed using following sequence of steps:

1. A 6-inch diameter borehole will be drilled to the final using Sonic drilling methods.

2. A 2.5-inch inside diameter well will be constructed in the borehole. Each well will be constructed with 10-feet of Schedule 80 PVC well screen (20-slot) and sufficient Schedule 80 PVC riser to reach ground surface. The screen will be surrounded by an appropriately sized sand pack from the bottom of the borehole to about 5 feet above the top of the screen. Bentonite pellets (2-feet) will be placed on top of the sand pack to create a seal and to prevent the grout from penetrating the sand pack. The remainder of the borehole annulus will be filled with neat cement grout using the tremie method. Figure 3 shows a typical monitoring well construction layout.

3. It is anticipated that flush-mount curb boxes will be used on most of the wells as they will limit above surface obstructions. If the well is in a secured area, a stick-up protective casing may be installed with a 2x2 foot cement pad.

A drilling subcontractor, licensed for drilling in the State of New York, will obtain any necessary permits for each borehole prior mobilization to the Site. A HDR geologist will log the drilling and geology to note any changes in stratigraphy and other observations within the subsurface. Once the well is installed, it will be developed until turbidity measurements for the discharged

groundwater are recorded at less than 50 Nephelometric Turbidity Units (NTU) for three consecutive measurements taken at 10 minute intervals.

3.3.4.1 Borehole Geophysics

Borehole geophysics, mainly gamma logging, will be completed in the deep wells installed at boring locations OU3-B1 through OU3-B6 to document the lithology of the geologic formation and to locate potential confining layers. The borehole geophysics will be limited to gamma logging because it will be completed in PVC wells.

Gamma logging provides measurements of naturally occurring gamma radiation. This method is effective at detecting clay layers as they emit more gamma radiation than sand and gravel due to the potassium, thorium and uranium content that is common in the clay.

A geophysical firm will be subcontracted to log the wells. Data will be recorded in digital form in the field in a portable computer and will be processed in the office using commercially licensed software. The borehole equipment will be decontaminated after logging each borehole.

3.3.5 Subtask 3.5: Environmental Sampling

HDR will complete the following activities:

- Sampling of VPB intervals; and
- Sampling of existing and newly installed groundwater monitoring wells.

HDR will collect synoptic round of groundwater elevations to establish groundwater flow direction. Groundwater samples will be collected following EPA low-flow procedures. Before sampling is initiated, the depth to water of the monitoring well will be measured. During the sampling procedure, field parameters including specific conductivity, ORP, temperature, pH, dissolved oxygen and turbidity will be measured and recorded on data sheets to document the stabilization of parameters prior to sampling. Upon stabilization, the samples will be collected in certified-clean glassware and placed on ice for preservation. Chain of custodies will be prepared to track the shipment of the samples to the laboratory.

3.3.5.1 Vertical Profile Boring Screening Samples

Groundwater samples will be collected from the six VPBs and will be analyzed for TCL VOCs with 24 hour turn-around time.

3.3.5.2 Monitoring Well Groundwater Samples

HDR will collect samples from ten existing groundwater wells and nine new monitoring wells installed under Task 3.3. The wells will be sampled during two events separated by three months using the low flow procedures described above. For the first sampling event, groundwater samples will be analyzed for Target Compound List (TCL) VOCs, SVOCs, pesticides and Target Analyte List (TAL) metals for all new wells and VOCs only for the existing wells. Samples for MNA parameters will also be collected from the six, new, deep monitoring wells during the

initial round. For the second sampling event, the parameter list for all wells will be TCL VOCs only.

3.3.5.3 Compound Specific Isotope Analysis Samples

HDR proposes the collection of CSIA samples from a subset of monitoring wells. HDR estimates that 15 CSIA samples (six of the new wells within OU-3 and nine additional wells) will be collected. CSIA is a forensic tool that can be used to establish a link between groundwater contamination detected in monitoring wells and one or more contaminant sources. It can be described as a type of contaminant 'finger-printing'. The results of CSIA groundwater samples will provide chemical fingerprints for chlorinated solvents detected in groundwater samples collected from monitoring wells. The CSIA results will be reviewed to establish a link between the impacted monitoring wells and one or more potential source areas, and thus, assist in the determination of one or more potentially responsible parties. HDR proposes to conduct CSIA using three isotope ratios ($^{13}C/^{12}C$, $^{37}Cl/^{35}Cl$, and $^{2}H/^{1}H$, referred to as 3D-CSIA) to allow for potential source identification and determination of degradation for both tetrachloroethylene (PCE) and trichloroethylene (TCE) in groundwater collected from selected monitoring wells in OU3 and suspected source areas. CSIA samples have to be collected in conjunction with VOC samples because the analyzing laboratory requires VOC results prior to their analysis. This data will be evaluated to determine if there are any correlations between VOCs detected in groundwater samples collected from monitoring wells in OU3 and groundwater samples collected at suspected source areas.

CSIA sampling and analysis will follow EPA's 'Guide for Assessing Biodegradation and Source Identification of Organic Ground Water Contaminants using Compound-Specific Isotope Analysis (CSIA)' (EPA 2008) and procedures and requirements specified by the analytical laboratory. A SOP for the CSIA analytical method that documents the identification of the three isotope pairs and their ratios (($^{13}C/^{12}C$, $^{37}Cl/^{35}Cl$, and $^{2}H/^{1}H$) was previously developed by HDR and submitted to EPA-QA staff for review and approval for another Superfund site. As the SOP has been finalized and approved, it will be included in the QAPP. Subtask 3.6: Ecological Characterization

Based on current knowledge of the Site and Site conditions, HDR is not anticipating any work will be required under this activity. Based on the SOW, if deemed necessary, HDR will complete the following activities:

- Wetland and habitat delineation/function and value assessment
- Wildlife observations
- Benthic reconnaissance/community characterization
- Identification of endangered species and others of special concern
- Biota sampling/population studies
- Bioassays
- Bioaccumulation studies

3.3.6 Subtask 3.7: Geotechnical/Geophysical Survey

Based on current knowledge of the Site and Site conditions, HDR is not anticipating any work will be required under this activity. Based on the SOW if deemed necessary, HDR will initiate this task at the direction of EPA and will perform the following activities:

- Magnetometer
- Electromagnetic
- Ground-Penetrating Radar
- Resistivity
- Site Meteorology
- Remote Sensor Survey/Aerial photographic analysis

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

HDR will manage and dispose of all IDW in accordance with local and Federal regulations as specified in the QAPP.

A subcontractor will be procured to sample, characterize, and dispose of the waste. Characterization determination will be completed in coordination with HDR and EPA. Parameters required for characterization will be dependent on disposal facility requirements. The subcontractor will identify a primary and an alternate disposal facility at the beginning of the work and these facilities will have to be approved by EPA for being in compliance with all Federal and Local requirements.

3.4 Task 4: Sample Analysis

HDR will arrange for the analysis of environmental samples collected during the previous tasks. This task includes only the cost of the sample analysis. Efforts associated with sample collection are included in Task 3, efforts associated with shipment and data validation are included in Task 5, and efforts associated with data evaluation are included in Task 6. All sample analysis will be conducted in accordance with the approved QAPP for this work assignment.

3.4.1 Subtask 4.1: Innovative Methods/Field Screening Sample Analysis

The use of innovative methods or field screening techniques have been described throughout this scope of work including use during the drilling and sampling of VPBs and the use of CSIA. HDR will request analytical laboratory capacity under the FASTAC process for the analysis of groundwater samples collected from the VPBs; however, these screening samples will require an overnight turn-around time. Due to the distance to many of the EPA or CLP laboratories, the FASTAC process may not be able to fulfill this need. Therefore, HDR will make provisions to subcontract this analytical service to a laboratory that is local to the site. Also, the CSIA analysis is completed by specialty laboratories that are not part of the FASTAC program. Therefore, provisions will be made to subcontract these services to a specialty laboratory capable of completing CSIA analysis.

Note: Based on the current knowledge of the Site conditions, surface water, soil, air and sediment samples will not be required.

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

HDR will secure Routine Analytical Services (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 the FASTAC approach described in the EPA Region 2 SOP "Policy for Implementing the National Strategy for Procuring Analytical Services for all OSWER Programs (Superfund, RCRA and Brownfields) (EPA 2009). These analyses include TCL VOCs. Other analyses may be required once the scope of work for the characterization of identified potential source areas has been developed. For the investigation, the analysis of TCL VOCs, TCL SVOCs, TCL pesticides, TAL metals and MNA parameters in groundwater is proposed.

3.4.3 Subtask 4.3: Non-Routine Analytical Services

HDR will arrange for the analysis of the Non-Routine samples collected under Task 3 in accordance with Task 1.9 of the SOW.

3.5 Task 5: Analytical Support and Data Validation

HDR will generate three types of samples during the field investigation for this project. These samples are:

- Screening samples from the VPBs: These samples are for screening purposes and are typically not validated.
- Groundwater samples from monitoring wells: These samples will be analyzed by DESA or CLP and validated by EPA prior to returning the results to HDR
- CSIA samples: These samples are analyzed by specialty laboratories.

DESA or CLP samples analyzed under Task 4 will be validated by EPA. HDR will arrange for all other data validation of environmental data as necessary. Sample validation under this task will begin with the completion of the field sampling program and reservation of sample slots in the CLP, and will end with validation of the analytical data received from the laboratory. HDR will ensure that all subcontracted laboratory analyses are performed in accordance with generally-accepted EPA methods, and will submit all analytical data from subcontracted laboratories to EPA in a CLP-deliverable format.

3.5.1 Subtask 5.1: Collect, Prepare and Ship Samples

HDR will collect, prepare and ship all samples collected under Task 3 in accordance with the approved QAPP.

3.5.2 Subtask 5.2: Sample Management

HDR will provide a sample management function which includes:

- Coordinate with appropriate Region 2 sample management personnel and HWSS and DESA laboratory sample management offices regarding analytical, data validation, and quality assurance issues.

- Coordinate with the Regional Sample Control Coordinator (RSCC), and/or the Division of Environmental Science and Assessment (DESA) regarding analytical, data validation, and quality assurance issues.

- Implement EPA-approved laboratory QA program to provide oversight of in-house and/or subcontract laboratories.

- Prepare trip report(s) for all samples that will be analyzed by the CLP.

- Provide Chain of Custody, Sample Retention, and Data Storage functions in accordance with the approved contract-wide QAPP, QMP, and contract. HDR will ensure accurate chain-of custody procedures for sample tracking, protective sample packing techniques, and proper sample-preservation techniques.

3.5.3 Subtask 5.3: Data Validation

Based on the types of projected samples, HDR is not anticipating the need for data validation. It is anticipated that samples that will require validation will be analyzed any DESA or CLP and will be validated by EPA. HDR will perform and overall data usability to ensure that the data and chain of custody are accurate and defensible. Should validation of data be required by HDR (e.g., for subcontracted analyses), HDR will perform the following activities as part of this subtask:

- Review analysis results against validation criteria

- Review the data and make a data usability determination

- Develop a Data Usability Report to the WAM after all the data has been validated

3.6 Task 6: Data Evaluation

Under this task, HDR will organize and evaluate existing data and data gathered during the RI field effort tasks. Data evaluation begins with the receipt of analytical data from the data acquisition task and ends with the submittal of the Data Evaluation Summary Report (DESR).

3.6.1 Subtask 6.1: Data Usability Evaluation

HDR will evaluate the usability of data obtained during the field investigation, including any uncertainties associated with the data. If statistical methods are used to evaluate the usability of the data, the guidance used will be "Data Quality Assessment: A Reviewer's Guide" EPA QA/G-

9R EPA/240/B-06/002, February 2006. Section 5 of the UFP-QAPP Manual also provides information on what will be presented in the Data Evaluation Report.

3.6.2 Subtask 6.2: Data Reduction, Tabulation, and Evaluation

HDR will evaluate, interpret, and tabulate data in an appropriate presentation format for final data tables. Historic or soil data are not anticipated to be part of this tabulation. Current data collected as part of this Work Assignment will be entered into an environmental database, created as part of this task. The data formatting will be consistent with the EDD requirements. The following shall be used as general guidelines in the preparation of the environmental database and the data for the RI report:

- Tables of analytical results will be organized in a logical manner such as by sample location number, sampling zone, or some other logical format. Well identification numbers within each set will be assigned in accordance with the alphanumeric system used for the well identification numbers. HDR will coordinate the table organization with the EPA WAM.

- The sample location/well identification number will always be used as the primary reference for the analytical results. The sample location number will also be indicated if the laboratory sample identification number is used.

- Analytical tables will indicate the sample collection dates.

- The detection limit will be indicated in instances where a parameter was not detected.

- Detection limits will be required which meet the risk evaluation minimum criteria unless otherwise approved by EPA.

- Analytical results will be reported in the text, tables and figures using a consistent convention such as µg/l for groundwater analyses and mg/kg for soil analyses.

- EPA's protocol for eliminating field sample analytical results based on laboratory/field blank contamination results will be clearly explained.

- Discussion of approved sampling results will not be qualified by suggesting that a particular chemical is a common lab contaminant or was detected in the lab blank. If the reported result has passed QA/QC it shall be considered valid. In cases where the chemical in question was known to have been used and/or disposed of on site, positively identified at high levels in other environmental media, and passes QA/QC protocols, the sampling results shall not be questioned as being due to laboratory contaminants.

- Field equipment rinsate blank analyses results will be discussed in detail if decontamination solvents are believed to have contaminated field samples.

3.6.3 Subtask 6.3: Modeling

Modeling of groundwater for both the initial SCSR and RI stages will be completed after receipt of written direction from EPA. During the SCS, a preliminary model using simplified boundary conditions and aquifer parameters may be necessary to aid in the determination of the natural or pumping scenario groundwater divide boundaries/capture areas and establish general flow regimes. The outcome of the initial modeling effort will be used to guide future field efforts including additional studies (potentially including more modeling) to support delineating the extent of contamination and/or identification of potential source areas.

In the event that EPA determines that performance of either modeling effort is necessary, HDR will be notified. A work assignment amendment will be issued to formally implement the requirements for the second phase or full RI modeling effort into this work assignment.

3.6.4 Subtask 6.4: Data Evaluation Report

Per the SOW, HDR will evaluate and present results in a DESR, to be submitted to EPA for review and approval. The report will include:

- An evaluation of the historical data and identification of gaps that may be addressed as part of the RI;
- A summary of data gathered as part of the field investigation and identification of data gaps for future investigations; and,
- A presentation of findings and conclusions as to the acceptance of the data validity, areas where data exceed acceptable regulatory or guidance values, and any concerns regarding the data.

3.7 Task 7: Assessment of Risk

The Risk Assessment will determine whether site contaminants pose a current or potential risk to human health and the environment in the absence of any remedial action. HDR will address the contaminant identification, exposure assessment, toxicity assessment, and risk characterization. The Risk Assessment will be used to determine whether remediation is necessary at the Site, provide justification for performing remedial action, and determine what exposure pathways need to be remediated.

3.7.1 Subtask 7.1: Baseline Risk Assessment (Human Health)

HDR will perform a Baseline Human Health Risk Assessment (HHRA) in accordance with the approach and parameters described in the approved PAR. The requirements for the PAR are described in Subtask 1.13 above. The draft HHRA report will not be initiated before receipt of EPA's comments on the PAR submitted under Subtask 1.3. Comments on the PAR will be incorporated into the draft HHRA.

Draft Baseline Human Health Risk Assessment Report

HDR will prepare a Draft Baseline HHRA Report covering the flowing requirements:

- Hazard Identification. HDR will identify and describe the contaminants of potential concern (COPCs) based on their intrinsic toxicological properties.

- Characterization of Site and Potential Exposure Pathways. HDR will identify and characterize human receptor populations in the exposure pathways.

- Exposure Assessment. The exposure assessment will identify the magnitude of actual or potential human exposures, the frequency and duration of these exposures and routes by which receptors are exposed. In preparing the exposure assessment, HDR will develop reasonable maximum and central tendency (when appropriate) estimates of exposure for both current and potential land use conditions at the Site. The rationale for use of any site-specific over default exposure factors will be clearly explained and justified.

- Toxicity Assessment. HDR will list all toxicity values (e.g., slope factors and reference doses) for the COPCs and the sources of toxicity values, according to EPA's current toxicity hierarchy (OSWER Directive 9285.7-53). Those chemicals without toxicity values in Tiers 1 and 2 will be submitted to EPA to determine the appropriate value.

- Risk Characterization. During risk characterization, chemical-specific toxicity information, combined with quantitative and qualitative information from the exposure assessment, will be compared to measured levels of contaminant exposure and levels predicted through environmental fate and transport modeling. These comparisons will be used to determine whether concentrations of contaminants at or near the Site are affecting or could potentially affect human health.

- Identification of Limitations/Uncertainties. HDR will identify critical assumptions and uncertainties in the report (examples of uncertainties and limitations such as background concentrations, modeling inputs, toxicity data, environmental data, etc. will be provided).

- CSM. Based on contaminant identification, exposure assessment, toxicity assessment, and risk characterization, HDR will develop a conceptual model of the site.

Final Baseline Human Health Risk Assessment Report

HDR will submit the final Baseline HHRA Report incorporating EPA comments.

The current remedial practices being conducted by the municipal water utility will be addressed in the HHRA.

3.7.2 Subtask 7.2: Baseline Risk Assessment - Ecological Risk Assessment

Based on the current knowledge of the Site and discussion during the scoping meeting, HDR is not anticipating completion of a Screening-Level Ecological Risk Assessment (SLERA). If the

need arises, HDR will perform a SLERA in accordance with current Superfund ecological risk assessment guidance (*Ecological Risk Assessment Guidance for Superfund, Process for Designing and Conducting Ecological Risk Assessments [ERAGS],* USEPA 1997 [EPA/540-R-97-006]). HDR will compare the maximum contaminant concentrations in each medium of concern to appropriate conservative ecotoxicity screening values, and will use conservative exposure estimates.

HDR will evaluate and assess the risk to the environment posed by site contaminants. As part of this effort, HDR will perform the following activities:

- Draft Ecological Risk Assessment Report. Prepare a draft Ecological Risk Assessment Report that addresses the following:

    - Hazard Identification (sources). HDR will review available information on the hazardous substances present at the site and identify the major contaminants of concern.

    - Dose-Response Assessment. Contaminants of concern will be selected based on their intrinsic toxicological properties.

    - Characterization of Site and Potential Receptors. HDR will identify and characterize environmental exposure pathways.

    - Select Chemicals, Indicator Species, and End Points. In preparing the assessment, HDR shall select representative chemicals, indicator species (species that are especially sensitive to environmental contaminants), and end points on which to concentrate.

    - Exposure Assessment. The exposure assessment will identify the magnitude of actual or environmental exposures, the frequency and duration of these exposures, and the routes by which receptors are exposed. The exposure assessment will include and evaluation of the likelihood of such exposures occurring and will provide the basis for the development of acceptable exposure levels. In developing the exposure assessment, HDR shall develop reasonable maximum estimates of exposure for both current land use conditions and potential land use conditions at the site.

    - Toxicity Assessment/Ecological Effects Assessment. The toxicity and ecological effects assessment will address the types of adverse environmental effects associated with chemical exposures, the relationships between magnitude of exposures and adverse effects, and the related uncertainties for contaminant toxicity (e.g., weight of evidence for a chemical's carcinogenicity).

    - Risk Characterization. During risk characterization, chemical-specific toxicity information, combined with quantitative and qualitative information from the exposure assessment, will be compared to measured levels of contaminant exposure levels and the levels predicted through environmental fate and transport

modeling. These comparisons shall determine whether concentrations of contaminants at or near the site are affective or could potentially affect the environment.

- Identification of Limitations/Uncertainties. HDR shall identify critical assumptions (e.g., background concentrations and conditions) and uncertainties in this report.

- Site Conceptual Model. Based on contaminant identification, exposure assessment, toxicity assessment, and risk characterization, HDR shall develop a conceptual model of the site.

- Final Screening Level Ecological Risk Assessment Report

After the draft Ecological Risk Assessment Report has been reviewed and commented on by EPA, HDR will incorporate EPA comments and submit the final Ecological Risk Assessment Report.

3.8 Task 8: Treatability Study and Pilot Testing

Treatability studies and/or pilot testing will be at the discretion of the EPA. The need for additional studies has not been determined at this time. Once additional data has been collected, the need for new treatability study or pilot testing will be identified.

In the event that EPA determines that performance of additional studies will be necessary, HDR will be notified. A work assignment amendment will be issued to formally implement the requirements for this effort.

3.9 Task 9: Remedial Investigation Report

HDR will develop and deliver an RI report that accurately establishes the Site characteristics such as media contaminated, extent of contamination, and the physical boundaries of the contamination. Pursuant to this objective, HDR will obtain only the minimally essential amount of detailed data necessary to determine the key contaminant(s) movement and extent of contamination. The key contaminant(s) must be selected based on persistence and mobility in the environment and the degree of hazard. The key contaminant(s) identified in the RI will be evaluated for receptor exposure and an estimate of the key contaminant(s) level reaching human or environmental receptors will be made. HDR will use existing standards and guidelines such as drinking-water standards, water-quality criteria, and other criteria accepted by the EPA as appropriate to determine nature and extent. The BHHRA is an integral part of the RI and these two documents will be consistent.

3.9.1 Subtask 9.1: Draft RI Report

In accordance with the schedule developed in the RI/FS work plan, HDR will submit a Draft RI Report which includes the following:

1) Executive Summary

2) Introduction
   a. Purpose of the Report
   b. Site Background - HDR will summarize all available information regarding the following:
      i. Site Description
      ii. Site History
      iii. Previous Investigations
      iv. Report Organization

3) Study Area Investigation
   a. HDR will incorporate all field activities associated with site characterization, including as appropriate physical and chemical monitoring of the following:
      i. Surface Features (e.g.; topographic mapping, natural and manmade features)
      ii. Contaminant Source Investigations
      iii. Meteorological Investigations (if applicable)
      iv. Surface water and Sediment Investigations (if applicable)
      v. Geological Investigations
      vi. Soil and Vadose Zone Investigations (if applicable)
      vii. Groundwater Investigations
      viii. Human Populations Surveys
      ix. Ecological Investigations
   b. Any technical memoranda documenting field activities will be included in an appendix and summarized in this report chapter.

4) Physical Characteristics of the Study Area
   a. HDR will include results of field activities conducted to determine physical characteristics, including as appropriate the following:
      i. Surface Features
      ii. Meteorology
      iii. Surface water hydrology (if applicable)
      iv. Geology
      v. Soils
      vi. Hydrogeology

vii. Demography and Land use

viii. Ecology

5) Nature and Extent of Contamination – Screening values used to determine nature and extent of contamination will be agreed to by HDR and EPA before issuing a draft RI.

   a. HDR will present the results of site characterization, both natural and chemical components and contaminants as appropriate in the following media:

      i. Sources

      ii. Soils and Vadose Zone (if applicable)

      iii. Groundwater

      iv. Surface Water and Sediments (if applicable)

      v. Air

6) Contaminant Fate and Transport

   a. Potential Routes of Migration (e.g., air , groundwater, soils)

   b. Contaminant Persistence

      i. As applicable, HDR will describe the estimated persistence in the study area environment and physical, chemical, and/or biological factors of importance for the media of interest

   c. Contaminant Migration

      i. HDR will discuss factors affecting contaminant migration for the media of interest (e.g., sorption onto soils, solubility in water, movement of groundwater, etc.)

      ii. HDR will discuss modeling methods and results if applicable.

7) Baseline Risk Assessment

   a. Human Health Risk Assessment

      i. Hazard Identification

      ii. Exposure Assessment

      iii. Toxicity Assessment

      iv. Risk Characterization/Uncertainty Discussion

   b. Screening Level Ecological Risk Assessment

8) Summary and Conclusions

   a. Summary

      i. Nature and Extent of Contamination

ii. Fate and Transport

iii. Risk Assessment

9) Conclusions

   a. Data Limitations and Recommendations for Future Work

   b. Recommended Remedial Action Objectives

10) References

11) Tables and Figures

12) Appendices (i.e., log books, soil boring logs, test pit/trenching logs, monitoring well construction diagrams, private and public well records, analytical data, and QA/QC evaluation results).

3.9.2 Subtask 9.2: Final RI Report

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

3.10 Task 10: Remedial Alternatives Screening

This task includes work efforts to develop appropriate remedial alternatives to undergo full evaluation.

HDR will investigate only those hazardous waste management alternatives that will remediate or control contaminated media (soil, surface water, groundwater, sediments) remaining at the Site, to provide adequate protection of human health and the environment. The potential alternatives will encompass 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, one or more alternatives involving containment with little or no treatment, and a no-action alternative. The current remedial technology utilized by the municipal water utility will be included in any evaluation of remedial alternatives for the Site.

3.10.1 Subtask 10.1: Draft Technical Memorandum

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

- 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 an 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 containment, treatment, excavation, pumping, or other actions, singly or in combination, to satisfy RAOs. The response actions will take into account requirements for protectiveness as identified in the RAOs as well as 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 in accordance with National Contingency Plan (found at www.epa.gov/emergencies/content/lawsregs/ncpover.htm).

- Screen Remedial Alternatives for Effectiveness, Implementability, and Cost. HDR will screen alternatives to identify the potential technologies or process options that will be combined into media-specific or site-wide alternatives. 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; and required permits, imposed limitations, and other factors necessary to evaluate the alternatives. If many distinct, viable options are available and developed, HDR will screen the alternatives that undergo the detailed analysis to provide the most promising process options. The alternatives will be screened on a general basis with respect to their effectiveness, implementability and cost.

3.10.2 Subtask 10.2: Final Technical Memorandum

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

3.11 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 evaluation criteria. EPA will make the determination regarding final selection of remedial alternatives.

The nine evaluation criteria HDR will employ in the evaluation of the remedial alternatives are:

- Overall protection of human health and the environment;
- Compliance with Applicable or Relevant and Appropriate Requirements (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.

3.11.1 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 the 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 each of the evaluation criteria.

HDR will provide a table summarizing the results of this analysis. Once the individual analysis is complete, the alternatives will be compared and contrasted to one another with respect to each of the evaluation criteria.

3.11.2 Subtask 11.2: Final Technical Memorandum

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

3.12 Task 12: FS Report

HDR will develop an FS Report consisting of a detailed analysis of alternatives and cost-effectiveness analysis in accordance with the most recent guidance.

3.12.1 Subtask 12.1: Draft FS Report

HDR will prepare a Draft FS report and submit it for EPA review according to the schedule in the RI/FS work plan. To expedite the development of the FS report, HDR will provide draft chapters of the FS report to the WAM for review as they are developed.

The FS Report will contain the following:

- Feasibility Study Objectives
- Remedial Objectives
- General Response Actions

- Identification and Screening of Remedial Technologies
- Remedial Alternatives Description
- Detailed Analysis of Remedial Alternatives.
  - HDR's technical feasibility considerations will include the careful study of any problems that may prevent a remedial alternative from mitigating site problems. Therefore, the Site characteristics from the RI will be kept in mind as technical feasibility of an alternative is studied. Specific items to be addressed will include the reliability (operation over time), safety, operation and maintenance, ease with which the alternative can be implemented, and time needed for implementation.
- Summary and Conclusions

3.12.2 Subtask 12.2: Final FS Report

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

3.13 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 the SOW.

Subtask 13.1: HDR will prepare a draft and final addendum to the FS (based upon EPA comments) covering issues arising after the finalization of the basic FS document.

3.14 Task 14: Negotiation Support

Not applicable.

3.15 Task 15: Administrative Record

Not applicable.

3.16 Task 16: Work Assignment Closeout

Upon notification from EPA that the technical work performed under this 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.

3.16.1 Subtask 16.1: Revised Work Plan Budget

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

3.16.2 Subtask 16.2: Document Indexing

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

- 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 will not be 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.

3.16.3 Subtask 16.3: Document Retention/Conversion

HDR will convert all relevant paper files and major deliverables into an appropriate electronic long-term storage format (Word, Excel, and/or PDF, as applicable), and submit one copy to the EPA WAM and one copy to the EPA Records Manager, pursuant to the requirements of Clause D.1, "Electronic Submission of Deliverables."

SECTION 4 - PROJECT MANAGEMENT APPROACH

4.1 Project Organization

The project organizational structure is provided in Figure 4.

4.2 Key Personnel

Bradley Williams is the Program Manager for the EPA Region 2 RAC under which the NCHGW Superfund Site RI/FS will be conducted.

The Project Manager is Demetrios Klerides. 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: Edward Schwetz, Remedial Investigation Task Leader, Brian Montroy for field activities; Vincent Carbone and Mike Lehtinen for geology and modeling/hydrogeology; Carol Zurlo for environmental chemistry; Michael Musso, P.E., for human health risk assessment; Shannon Kling, P.E., for the feasibility study; Melissa LaMacchia for community relations, quality assurance and project quality control; and Jeff Kleinfelter, for health and safety. Technical discipline leads will oversee activities related to their expertise and provide their input, as needed, to the Project Manager.

4.3 Project Schedule

A project scoping meeting was held on July 30, 2015. Table 1 lists the major project deliverables. Figure 5 is the overall baseline project schedule.

4.4 Cost Estimate

The estimated cost and LOE hours and assumptions for completing the scope of work described in this Work Plan are included in the Work Plan Cost Estimate, which has been submitted under a separate cover as Volume 2.

SECTION 5 - REFERENCES

EPA, 1988. Interim Final Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA. October 1988, OSWER Directive 9335.3-01.

EPA, 1989. Risk Assessment Guidance for Superfund: Volume I - Human Health Evaluation Manual (Part A). EPA/540/1-89/002. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. December 1989.

EPA, 1991a. Risk Assessment Guidance for Superfund, Volume 1 - Human Health Evaluation Manual, Supplemental Guidance. "Standard Default Exposure Factors." OSWER Directive 9285.6-03. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response.

EPA, 1991b. Information Resources Management Policy Manual, Chapter 13 – Locational Data. April 8, 1991.

EPA, 1992. Guidance for Data Usability in Risk Assessment (Part A), Final. Publication 9285.7-09A. PB92-963356. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. April 1992.

EPA, 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. Interim Final. EPA Office of Solid Waste and Emergency Response. EPA 540-R-97-006. June 1997.

EPA, 1998. Guidelines for Ecological Risk Assessment. EPA/630/R-95/002F. April 1998.

EPA, 2000. Business Rules for Latitude/Longitude Data Standard. November 21, 2000.

EPA, 2001. Risk Assessment Guidance for Superfund (RAGS): Volume I – Human Health Evaluation Manual (Part D, Standardized Planning, Reporting and Review of Superfund Risk Assessments) Final December 2001.

EPA, 2002a. Ground-Water Sampling Guidelines for Superfund and RCRA Project Managers, Groundwater Forum Issue Paper, OSWER, EPA/542-S-02-001, May 2002.

EPA, 2002b. OSWER Draft Guidance for Evaluating the Vapor Intrusion to Indoor Air Pathway from Groundwater and Soils (Subsurface Vapor Intrusion Guidance). EPA 530-D-02-004. November 2002.

EPA, 2004. Risk Assessment Guidance for Superfund: Volume I – Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment), Final, EPA/540/R/99/005, OSWER 9285.7-02EP, July 2004.

EPA, 2005a. Ecological Soil Screening Level (Eco-SSLs). March 2005.

EPA, 2005b. Superfund Community Involvement Handbook. EPA/540/K-05/003. U.S. Environmental Protection Agency, Office of Emergency and Remedial Response. April 2005.

EPA, 2006. Data Quality Assessment: A Reviewer's Guide" EPA QA/G-9R EPA/240/B-06/002, February 2006.

EPA, 2007, Guidance for Preparing Standard Operating Procedures (SOPs). USEPA, Office of Environmental Information, EPA/600-B-07-001, April 2007.

EPA 2008a. Contract Laboratory Program Guidance for Field Samplers. USEPA, Office of Superfund Remediation and Technology Innovation. EPA/540-R-07-06. July 2008.

EPA, 2008b. A Guide for Assessing Biodegradation and Source Identification of Organic Groundwater Contaminants using Compound Specific Isotope Analysis (CSIA). Office of Research and development, National Risk Management Laboratory, EPA/600-R-08/148, December 2008.

EPA, 2009a. Region 2 Policy for Implementing the National Strategy for Procuring Analytical Services for all OSWER Programs (Superfund, RCRA, and Brownfields), Standard Operating Procedure. SOP HW-32, Revision 7. August 2009.

EPA, 2009b. Electronic Data Deliverable (EDD) Comprehensive Specifications Manual 1.4, USEPA Region 2. July 2009.

EPA, 2009c. Exposure Factors Handbook: 2009 Update. EPA600/R-09/052a. U.S. Environmental Protection Agency, Office of Research and Development, National Center for Environmental Assessment, July 2009.

EPA, 2009d. User's Guide and Background Technical Document for USEPA Region 9's Preliminary Remediation Goals (PRG) Table.

EPA, 2009e. Integrated Risk Information System, Online.

EPA, 2009f. Regional Screening Levels (RSL) for Chemical Contaminants at Superfund Sites. April 2009.

Monti, Jack, Jr., Como, Michael, and Busciolano, Ronald, 2013, Water-table and Potentiometric-surface altitudes in the Upper Glacial, Magothy, and Lloyd aquifers beneath Long Island, New York, April-May 2010: U.S. Geological Survey, Scientific Investigations Map 3270

N.M. Perlmutter and J.J. Geraghty , 1963, Geology and ground-water conditions in southern Nassau and southeastern Queens Counties, Long Island, New York, U.S. Geological Survey, Water Supply Paper 1613-A

TABLES

Table 1: Summary of Major Submittals
OU3 RI/FS
New Cassel/Hicksville Groundwater Contamination Superfund Site

TASK	NUMBER OF COPIES*	DUE DATE
1.2 Scoping Meeting Minutes	3**	5 days after scoping meeting
1.4 Draft RI/FS Work Plan and Draft Budget -Interim	3**	45 days after receipt of Work Assignment
1.5 Final RI/FS Work Plan and Budget -Interim	3**	15 days after negotiation
1.6 Evaluate Existing Data	2***	60 days after Work Plan approval
1.6 SCSR	2*	90 days after completion of associated field investigation under task 3
1.7 QAPP	1	21 days after Work Plan approval
1.8 HASP	1	21 days after Work Plan approval
1.10 Meeting Minutes	1	5 days after meeting
3.7 Pathways Analysis Report	2	21 days after submission of Data Evaluation Report, under task 6.4
2.1 Community Interview Summaries	1	30 days after receipt of direction from EPA
2.4 Fact Sheets	2	3 days prior to public meeting/event
2.6 Public Notices	1	14 days prior to public meeting/event
2.8 Site Mailing List	1	14 days after approval of Final CRP
2.9 Responsiveness Summary Support	2	21 days after public meeting
5.3 Data Validation Report	1	30 days after receipt of all analytical results from laboratory
6.4 Data Evaluation Report	2	30 days after completion of subtask 6.2
7.1 Draft Baseline Risk Assessment (HH)	2	45 days after approval of PAR, under task 1.13
7.1 Final Baseline Risk Assessment (HH)	2	14 days after receipt of EPA final comments
7.2 Draft Ecological Risk Assessment	2	The Screening Level Ecological Risk Assessment shall be submitted within 45 days after submission of the DER, under task 6.4.
7.2 Final Ecological Risk Assessment	2	If applicable, 14 days after receipt of EPA final comments

Table 1: Summary of Major Submittals
OU3 RI/FS
New Cassel/Hicksville Groundwater Contamination Superfund Site

TASK	NUMBER OF COPIES*	DUE DATE
9.1 Draft RI Report	3	90 days after submittal of Data Evaluation Report, under task 6.4
9.2 Final RI Report	3	30 days after receipt of EPA comments
10.1 Draft Remedial Alternatives Technical Memorandum	3	60 days after submission of Final RI Report
10.2 Final Remedial Alternatives Technical Memorandum	3	14 days after receipt of EPA final comments on Draft Remedial Alternatives Technical Memorandum, under task 10.1
11.1 Draft Remedial Alternatives Evaluation Memorandum	3	30 days after Final Remedial Alternatives Technical Memorandum, under task 10.2
11.2 Final Remedial Alternatives Evaluation Memorandum	3	14 days after receipt of EPA final comments on Draft Remedial Alternatives Evaluation Memorandum, under task 11.1
12.1 Draft Feasibility Study Report	3	45 days after approval of Final Remedial Alternatives Evaluation Memorandum, under task 11.2
12.2 Final Feasibility Study Report	3	30 days after receipt of EPA final comments
13.1 Final addendum to the Feasibility Study	3	21 days after receipt of EPA final comments
16.1 Revised Work Plan Budget	3**	30 days after receipt of EPA closeout direction
16.2 Document Index	2****	45 days after receipt of EPA approval on Revised Work Plan Budget, to be submitted with 16.3
16.3 Document Retention/Conversion	2****	45 days after receipt of EPA approval on Revised Work Plan Budget, to be submitted with 16.2

*All deliverable copies will be submitted to the WAM unless otherwise directed by EPA. An electronic copy of all documents will be submitted to EPA**.**
** One copy of the deliverable will be submitted to the PO and CO; the remainder will be submitted to the WAM.
*** Dependent on work scope. If modeling is required to identify capture zone and sources, time line will be extended by EPA accordingly.
****One copy of the deliverable will be submitted to the EPA Records Manager; the remainder will be submitted to the WAM.

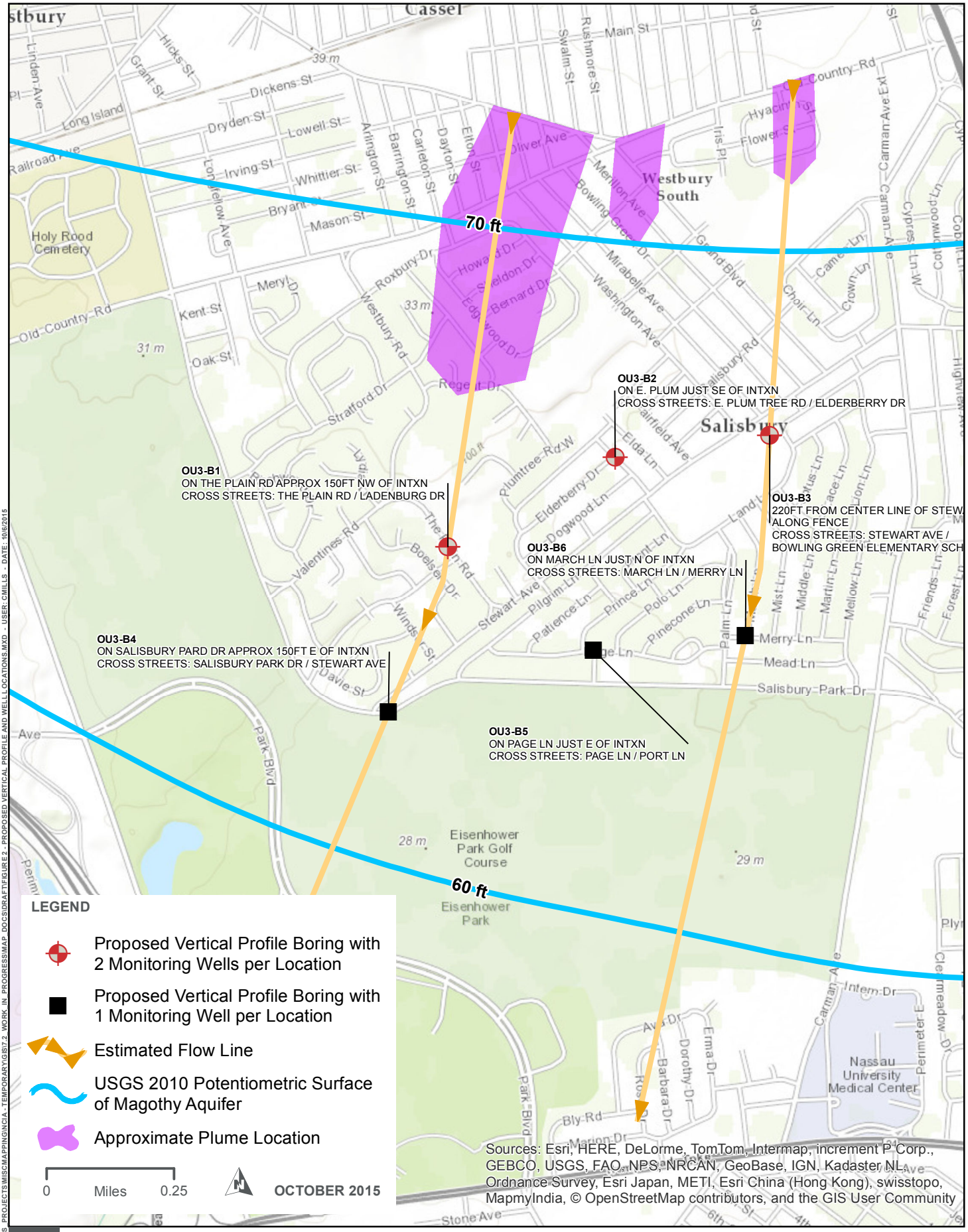
Note: EPA WAM should receive 2 hardcopies of the following documents developed pursuant to Tasks 1.4, 1.5, 1.6, 2.9, 6.4, 7.1, 7.2, 9.1, 10.1, 10.2, 11.1, 12.1, 12.2, and 13.1.

FIGURES

\\MAHPI-FILE01\Graphics\Projects\259775_NewCassel\MWlocationMap-fromEPA.ai

New Cassel/Hicksville Groundwater Contamination Superfund Site
Nassau County, NY

Figure 1
Site Location Map
October 2015



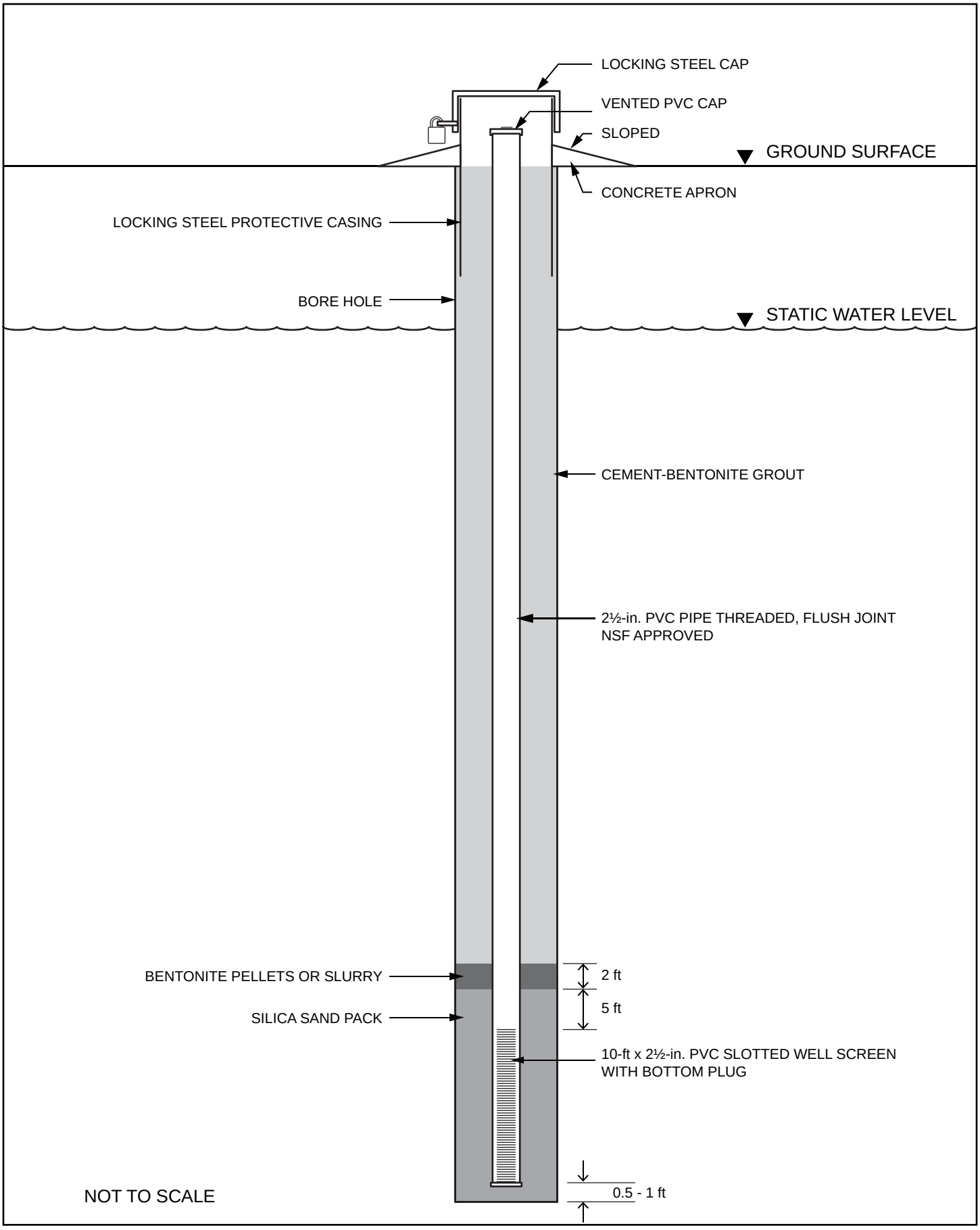
PATH: \\MAHPI-FILE01\GIS_PROJECTS\MISC\MAPPINGINCIA - TEMPORARY\GIS\7.2 WORK IN PROGRESS\MAP DOCS\DRAFT\FIGURE 2 - PROPOSED VERTICAL PROFILE AND WELL LOCATIONS.MXD - USER: CMILLS - DATE: 10/6/2015

PROPOSED VERTICAL PROFILE BORINGS AND MONITORING WELL LOCATIONS

NEW CASSEL/HICKSVILLE GROUNDWATER CONTAMINATION SUPERFUND SITE

NASSAU COUNTY, NEW YORK

FIGURE 2



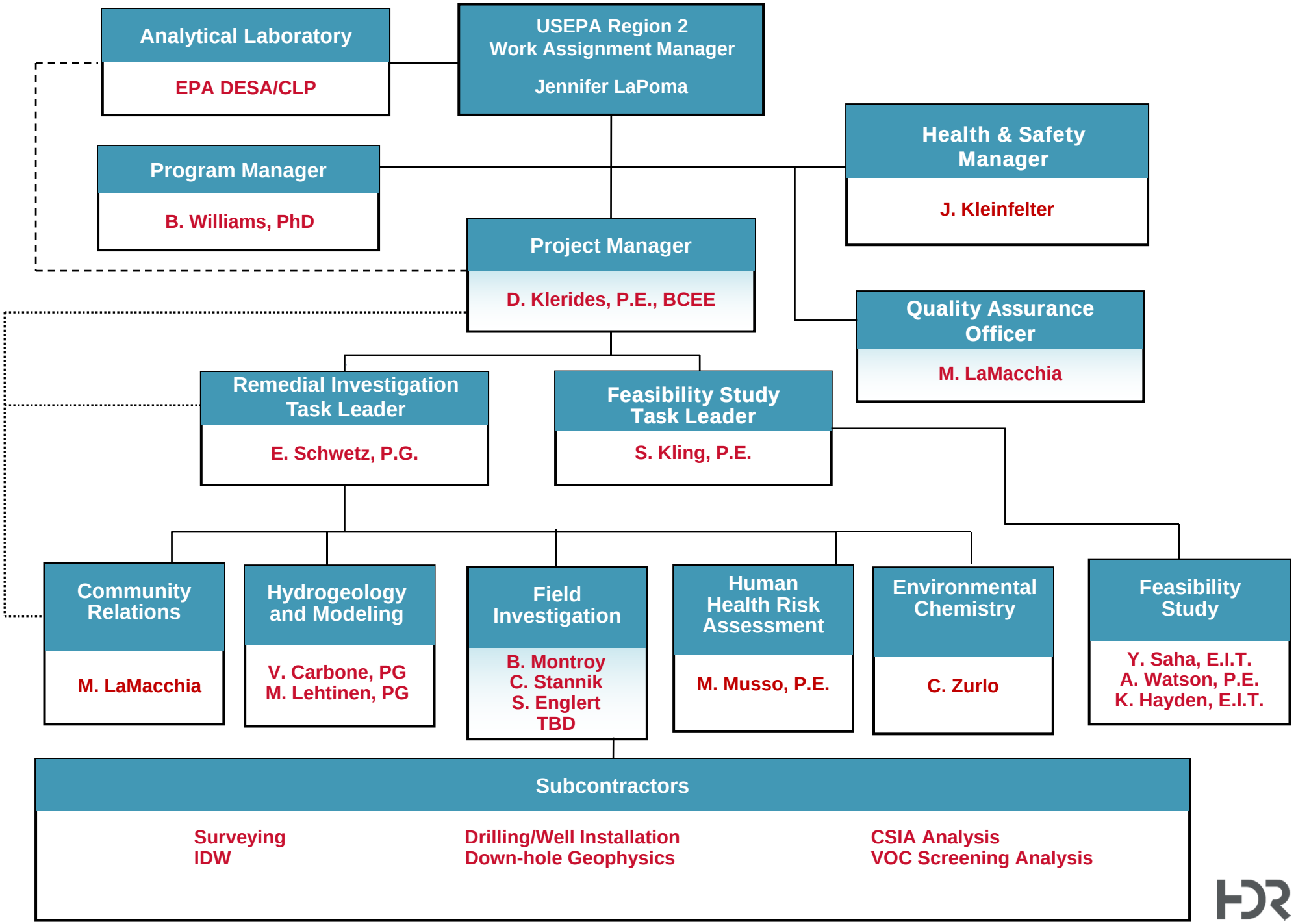
New Cassel/Hicksville Groundwater Contamination Superfund Site
Nassau County, NY

Figure 3
Typical Monitoring Well Construction Detail
October 2015

October 2015

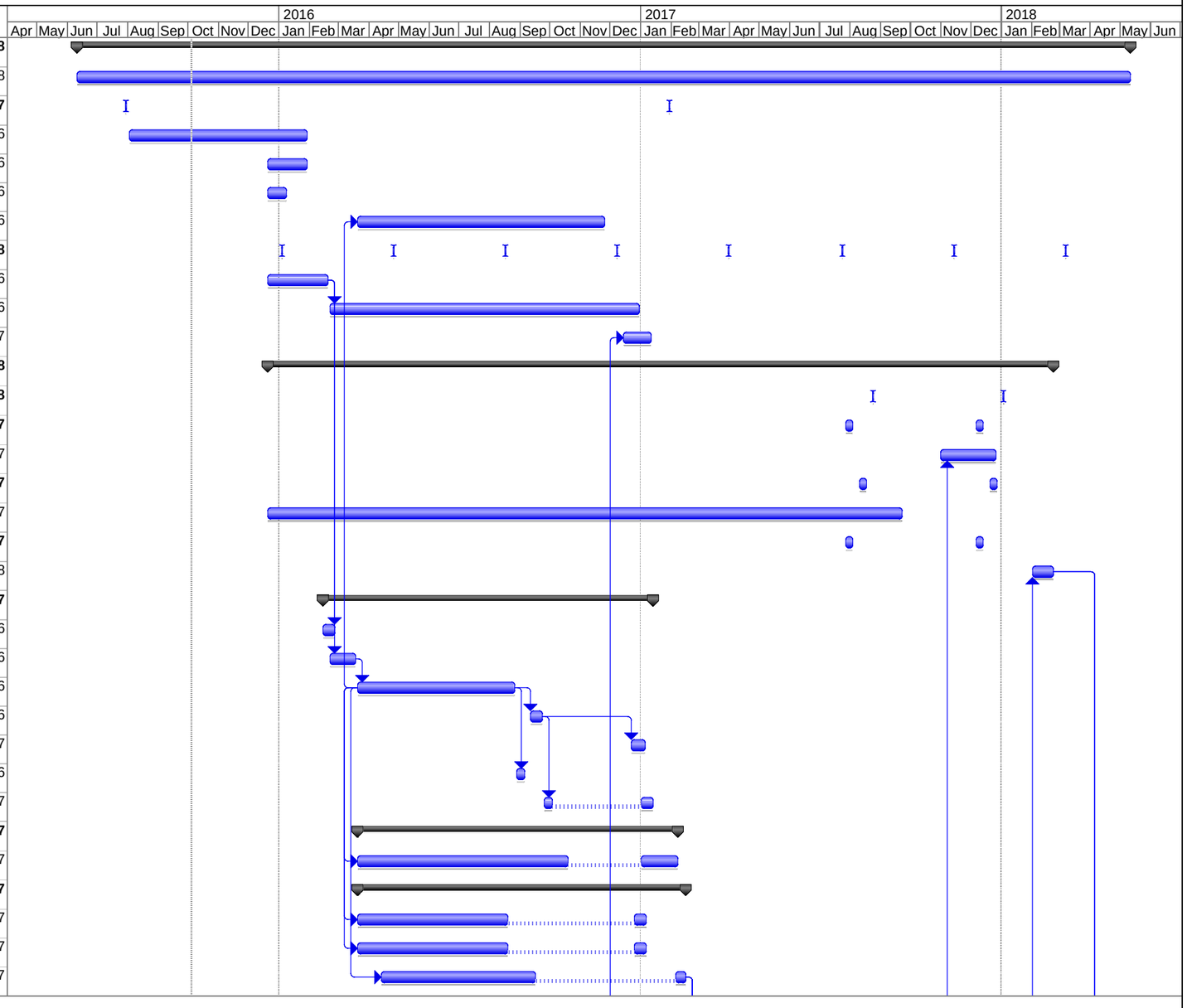
Figure 4 - Project Organizational Chart

New Cassel/Hicksville GW RI/FS
USEPA Region 2
Contract # 034-RICO-A245



WA # 034-RICO-A245
New Cassel/Hicksville GW RI/FS
Nassau County, NY
Project Schedule

ID	Task Name	Duration	Start	Finish
1	**Task 1 Project Planning And Support**	**762 days**	**Thu 6/11/15**	**Fri 5/11/18**
2	Project Administration	762 days	Thu 6/11/15	Fri 5/11/18
3	Scoping Meetings	**470 days**	**Thu 7/30/15**	**Wed 5/17/17**
15	Evaluate Existing Data and Documents	130 days	Mon 8/3/15	Fri 1/29/16
16	Quality Assurance Project Plan	30 days	Mon 12/21/15	Fri 1/29/16
17	Health and Safety Plan	15 days	Mon 12/21/15	Fri 1/8/16
18	Non-RAS Analysis	180 days	Mon 3/21/16	Fri 11/25/16
19	Project Meetings	**568 days**	**Mon 1/4/16**	**Wed 3/7/18**
28	Subcontract Procurement	45 days	Mon 12/21/15	Fri 2/19/16
29	Perform Subcontract Management	225 days	Mon 2/22/16	Fri 12/30/16
30	Pathway Analysis Report (PAR)	20 days	Thu 12/15/16	Wed 1/11/17
31	**Task 2 - Community Relations**	**569 days**	**Mon 12/21/15**	**Thu 2/22/18**
32	Public Meeting Support	**95 days**	**Thu 8/24/17**	**Wed 1/3/18**
35	Fact Sheet Preparation	**99 days**	**Fri 7/28/17**	**Wed 12/13/17**
38	Proposed Plan Support	40 days	Wed 11/1/17	Tue 12/26/17
39	Public Notices	**99 days**	**Fri 8/11/17**	**Wed 12/27/17**
42	Information Repositories	460 days	Mon 12/21/15	Fri 9/22/17
43	Site Mailing List	**99 days**	**Fri 7/28/17**	**Wed 12/13/17**
46	Responsiveness Summary Support	15 days	Fri 2/2/18	Thu 2/22/18
47	**Task 3 -Field Investigation**	**240 days**	**Mon 2/15/16**	**Fri 1/13/17**
48	Site Reconnassance	10 days	Mon 2/15/16	Fri 2/26/16
49	Mobilization and Demobilization	20 days	Mon 2/22/16	Fri 3/18/16
50	Soil Boring, Drilling and Testing/Hydrogeological Assessment	115 days	Mon 3/21/16	Fri 8/26/16
51	Groundwater Sampling Round 1	10 days	Mon 9/12/16	Fri 9/23/16
52	Groundwater Sampling Round 2	10 days	Fri 12/23/16	Thu 1/5/17
53	Geotechnical/ Geophysical Survey	6 days	Mon 8/29/16	Mon 9/5/16
54	Investigation Derived Waste Characterization and Disposal	16 days	Mon 9/26/16	Fri 1/13/17
55	**Task 4 Sample Analysis**	**232 days**	**Mon 3/21/16**	**Tue 2/7/17**
56	Field Screening and Sample Analysis	180 days	Mon 3/21/16	Tue 2/7/17
57	**Task 5 - Analytical Support and Data Validation**	**238 days**	**Mon 3/21/16**	**Wed 2/15/17**
58	Collect, Prepare and Ship Samples	120 days	Mon 3/21/16	Fri 1/6/17
59	Sample Management	120 days	Mon 3/21/16	Fri 1/6/17
60	Data Validation	120 days	Thu 4/14/16	Wed 2/15/17



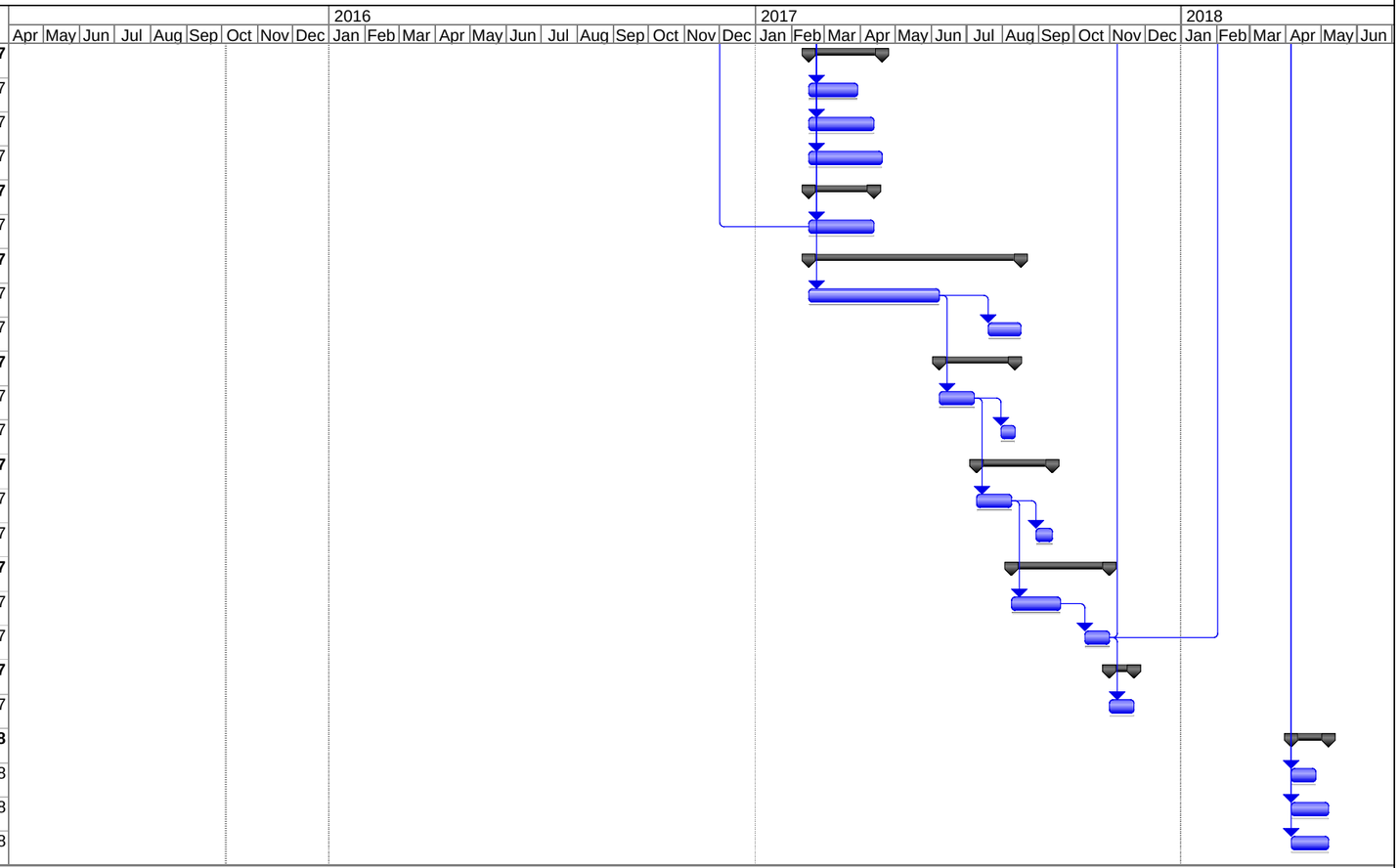
New Cassel-Hicksville Initial Project S
Date: Sun 10/4/15

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

Figure 5

WA # 034-RICO-A245
New Cassel/Hicksville GW RI/FS
Nassau County, NY
Project Schedule

ID	Task Name	Duration	Start	Finish
61	**Task 6 - Data Evaluation**	**45 days**	**Thu 2/16/17**	**Wed 4/19/17**
62	Data Usability Evaluation	30 days	Thu 2/16/17	Wed 3/29/17
63	Data Reduction, Tabulation, and Evaluation	40 days	Thu 2/16/17	Wed 4/12/17
64	Data Evaluation Reports	45 days	Thu 2/16/17	Wed 4/19/17
65	**Task 7 Assessment of Risk**	**40 days**	**Thu 2/16/17**	**Wed 4/12/17**
66	Baseline Risk Assessment - Human Health	40 days	Thu 2/16/17	Wed 4/12/17
67	**Task 9 - Remedial Investigation Report**	**130 days**	**Thu 2/16/17**	**Wed 8/16/17**
68	Draft RI Report	80 days	Thu 2/16/17	Wed 6/7/17
69	Final RI Report	20 days	Thu 7/20/17	Wed 8/16/17
70	**Task 10 - Remedial Alternatives Screening**	**47 days**	**Thu 6/8/17**	**Fri 8/11/17**
71	Draft Technical Memorandum	22 days	Thu 6/8/17	Fri 7/7/17
72	Final Technical Memorandum	10 days	Mon 7/31/17	Fri 8/11/17
73	**Task 11 - Remedial Alternatives Evaluation**	**47 days**	**Mon 7/10/17**	**Tue 9/12/17**
74	Draft Technical Memorandum	22 days	Mon 7/10/17	Tue 8/8/17
75	Final Technical Memorandum	10 days	Wed 8/30/17	Tue 9/12/17
76	**Task 12 - Feasibility Study Report**	**60 days**	**Wed 8/9/17**	**Tue 10/31/17**
77	Draft FS Report	30 days	Wed 8/9/17	Tue 9/19/17
78	Final FS Report	15 days	Wed 10/11/17	Tue 10/31/17
79	**Task 13 - Post RI/FS Support**	**15 days**	**Wed 11/1/17**	**Tue 11/21/17**
80	Draft and Final Addendum Report	15 days	Wed 11/1/17	Tue 11/21/17
81	**Task 16 - Work Assignment Closeout**	**22 days**	**Fri 4/6/18**	**Mon 5/7/18**
82	Revised Work Plan Budget	15 days	Fri 4/6/18	Thu 4/26/18
83	Document Indexing	22 days	Fri 4/6/18	Mon 5/7/18
84	Document Retention/Conversion	22 days	Fri 4/6/18	Mon 5/7/18



New Cassel-Hicksville Initial Project S
Date: Sun 10/4/15

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

Figure 5