FINAL
REMEDIAL INVESTIGATION SAMPLING AND ANALYSIS PLAN

For

FORMERLY USED DEFENSE SITE
CHARLESTON AIR FORCE STATION
CHARLESTON, MAINE
D01ME011201

Contract No.: W912WJ-19-D-0002
TASK ORDER F0182

Prepared for:

New England District
U.S. Army Corps of Engineers
696 Virginia Road
Concord MA 01742-2751

29 September 2020

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This is to certify that Wood has performed a peer technical review of this deliverable under USACE NAE Contract No. W912WJ-19-D-0002 *consistent with Wood Quality Management Program Procedure-PJM-PRO-002, Technical Review.*

Peter S. Baker, CG	**Scott F. Calkin, PG**
Project Manager	**RI Technical Lead**

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ACRONYMS AND ABBREVIATIONS

2,3,7,8-TCDD	2,3,7,8-Tetrachlorodibenzodioxin
AC&W	Aircraft Control and Warning Station
ADR	Applied Data Research
AFB	Air Force Base
AFS	Air Force Station
ARAR	Applicable or Relevant and Appropriate Requirements
BERA	Baseline Ecological Risk Assessment
BHHRA	Baseline Human Health Risk Assessment
bgs	Below Ground Surface
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CG	Certified Geologist
CFR	Code of Federal Regulations
COC	Chemicals of Concern
COPC	Chemical of Potential Concern
COPEC	chemical of potential ecological concern
COR	Contracting Officer Representative
CSM	Conceptual Site Model
DCE	cis-1, 2 Dichloroethene
DERP	Defense Environmental Restoration Program
DL	Detection Limit
DoD	Department of Defense
DQO	Data Quality Objective
EDD	Electronic Data Deliverable
EGAD	Environmental and Geographic Analysis Database
ELCR	Excess Lifetime Cancer Risk
EPH	Extractable Petroleum Hydrocarbons
ERA	Ecological Risk Assessment
FAA	Federal Aviation Administration
FDR	Field Data Record
FOL	Field Operations Leader
FS	Feasibility Study
ft	Feet/Foot
FUDS	Formerly Utilized Defense Site
FUDSChem	Formerly Utilized Defense Site Chemistry Database
GPR	Ground-Penetrating Radar
GPS	Global Positioning System
HHRA	Human Health Risk Assessment

HTRW	Hazardous, Toxic, and Radioactive Waste
HQ	Hazard Quotient
ID	Identification Numbers
INPR	Inventory Project Report
µg/L	micrograms per liter
MCL	Maximum Contaminant Level
MEDEP	Maine Department of Environmental Protection
NAE	New England District
NCO	Non-Commissioned Officer
NCP	National Contingency Plan
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resource Conversation Service
PA	Preliminary Assessment
PAL	Project Action Level
PAVE	Precision Avionics Vectoring Equipment
PAWS	Phased Array Warning System
PCB	Poly-Chlorinated Bi-phenyl
PG	Professional Geologist
PRG	Preliminary Remediation Goal
QAPP	Quality Assurance Project Plan
RAG	Remedial Action Guideline
RCRA	Resource Conservation and Recovery Act
RI	Remedial Investigation
RSL	Regional Screening Level
SAGE	Semi-automatic Ground Environment
SAP	Sampling Analysis Plan
SEDD	Staged Electronic Data Deliverable
SLERA	Screening Level Ecological Risk Assessment
Site	The former Charleston Air Force Station located in Charleston, Maine
SOP	Standard Operating Procedure
SVOC	Semi-Volatile Organic Compound
TBC	“to-be-considered”
TCE	Trichloroethene
TEF	toxicity equivalence factor
TEQ	toxicity equivalence quotient
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
UST	Underground Storage Tank
VI	Vapor Intrusion

VOC	Volatile Organic Compound
VPH	Volatile Petroleum Hydrocarbons
Wood	Wood Environment & Infrastructure Solutions, Inc.
XRF	X-Ray Fluorescence

1.0 Introduction

Wood Environment & Infrastructure Solutions, Inc. (Wood) has prepared this Remedial Investigation (RI) Sampling and Analysis Plan in support of the RI at the former Charleston Air Force Station (AFS or Site) located in Charleston, Maine (**Figure 1-1**). This work plan has been prepared for the United States Army Corps of Engineers New England District (USACE-NAE) under contract number W912WJ-19-D-0002 Task Order F0182. This work plan describes the investigation activities to be conducted at the Site.

RI work will be conducted under the Defense Environmental Restoration Program (DERP) Formerly Used Defense Site (FUDS) program for Hazardous, Toxic, and Radioactive Waste (HTRW) and lead from small arms use. The RI will be completed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) and the National Contingency Plan (NCP) 40 Code of Federal Regulations (CFR) Part 300 and EM 200-1-2 (USACE, 2016). Under the FUDS program Charleston AFS is designated as Property Number D01ME0112. USACE-NAE is the lead agency and the Maine Department of Environmental Protection (MEDEP) is the lead regulatory agency.

1.1 Site Description

The former Charleston AFS consisted of 82.3 acres in Charleston, Maine, located in Penobscot County (**Figure 1-1**). The property is on State Highway 15, approximately 25 miles northwest of Bangor, ME and 2.5 miles east of Charleston, ME. The approximate center of the property is at Latitude N45° 05’ 29” (45.091389) Longitude W69°05’ 43” (-69.095278). The property is located within United States Environmental Protection Agency (USEPA) Region 1, Maine Congressional District 2, and postal zip code 04422.

The Air Force built Charleston AFS as an Aircraft Control and Warning Station (AC&W) and became fully operational on 01 June 1952. Its radars scanned the offshore airspace of the Bangor Defense Area, searching for incoming enemy aircraft. In May 1959, the station converted to a semi-automatic ground environment (SAGE) system, and it began backup interceptor operations in March 1963. The Air Force declared Charleston AFS surplus on 29 September 1979.

Figure 1-2 shows current Site features at the former Charleston AFS.

Charleston AFS is currently owned by the State of Maine and is occupied by the Mountain View Youth Development Center and the Charleston Correctional Facility. The Youth Development Center provides treatment and services for juvenile offenders in a safe, secure environment. The program develops pro-social skills and develops competencies to reduce the likelihood of re-offending. The correctional facility runs programs for adults nearing the end of their period of incarceration in order to prepare them to re-enter society. Services provided by the facility include work-release programs, vocational training, academics, and counseling.

The public has limited access to portions of the former Charleston AFS. The developed portions of the corrections facility have security personnel and fencing with secured entries. However, the area east of Highway 15 (former radio receiver and Non-Commissioned Officers [NCO] club) and the abandoned' radar facilities at the top of the Bull Hill can be entered on foot from adjacent properties. This property is currently owned by the Central Maine & Quebec Railway.

It is anticipated the former Charleston AFS will continue to be used by the Corrections Facility and the Central Maine & Quebec Railway for the foreseeable future.

1.2 Site History

The following subsections describe the Charleston AFS history of operations. Most of the information in this section is summarized from the Preliminary Assessment (USACE, 2018).

1.2.1 1949-1958

The U.S. Air Force began acquiring the land that would become the Charleston AFS in 1949-1951 by lease; originally known as AC&W #2, Charleston AFS was also known as P-65 and Z-65 in historical documentation. The 765th AC&W Squadron began its move from Dow Air Force Base (AFB) to Charleston AFS in late 1951.

Initially, the squadron continued its mission at Dow AFB while initiating operations at the new station, which became fully operational on 01 June 1952. Charleston AFS operated as an air defense direction center with a manual capability. The radar system detected incoming aircraft, and airmen determined the plane's speed, direction and altitude. Once an aircraft's track was determined, airmen compared it to known flight plans. If an aircraft's track was "unknown," interceptor aircraft scrambled. The crew at the radar station guided the interceptors to the target aircraft.

In January 1951, construction at Charleston AFS included improvements to the central heating plant, water distribution system, the sewerage system, and the steam heat distribution system. A 32-man Bachelor Quarters, a supply and maintenance building, a modified Motor Repair Shop, and improvements to the water distribution system and the sewage treatment system were authorized.

In February 1951, the New England Division Engineer requested additional funding for the construction of a regular radar tower. A special height finding tower was requested by the Office of the Chief of Engineers in May 1951. In September 1951, an increase in diesel fuel storage capacity from 8,500 gallons to 24,000 gallons was authorized. Other construction from the early 1950's included four airmen dormitories, various administrative and support buildings, and the operational complex on Bull Hill Range. Nine family housing units were added in 1957.

1.2.2 1959-1969

Construction of two new radar towers commenced in 1961 and was completed the following year. A Data Monitor and Control Center was built in the SAGE Annex. In 1963, a Fall-Out Shelter to encase the Operations Building and SAGE Annex was built and included living quarters for assigned personnel. Other improvements included a new sewer treatment system, repainting the radar domes, new steam lines and boilers, an extension of the Recreation Hall to house a two-lane bowling alley, and repairs to the cooling tower. A new diesel power plant was built in 1963 capable of providing power to the entire station, but in 1969, Charleston AFS acquired commercial power for the Cantonment Area and the housing area. Beginning in 1969, the primary power plant was dedicated to the requirements of the operational area. Twenty-eight housing units were added in 1964 and 1965. In 1965, the Recreation Hall was rebuilt after a fire destroyed the original structure.

Exhibit 1 Presents a historical aerial photograph (unknown date) of the Site.

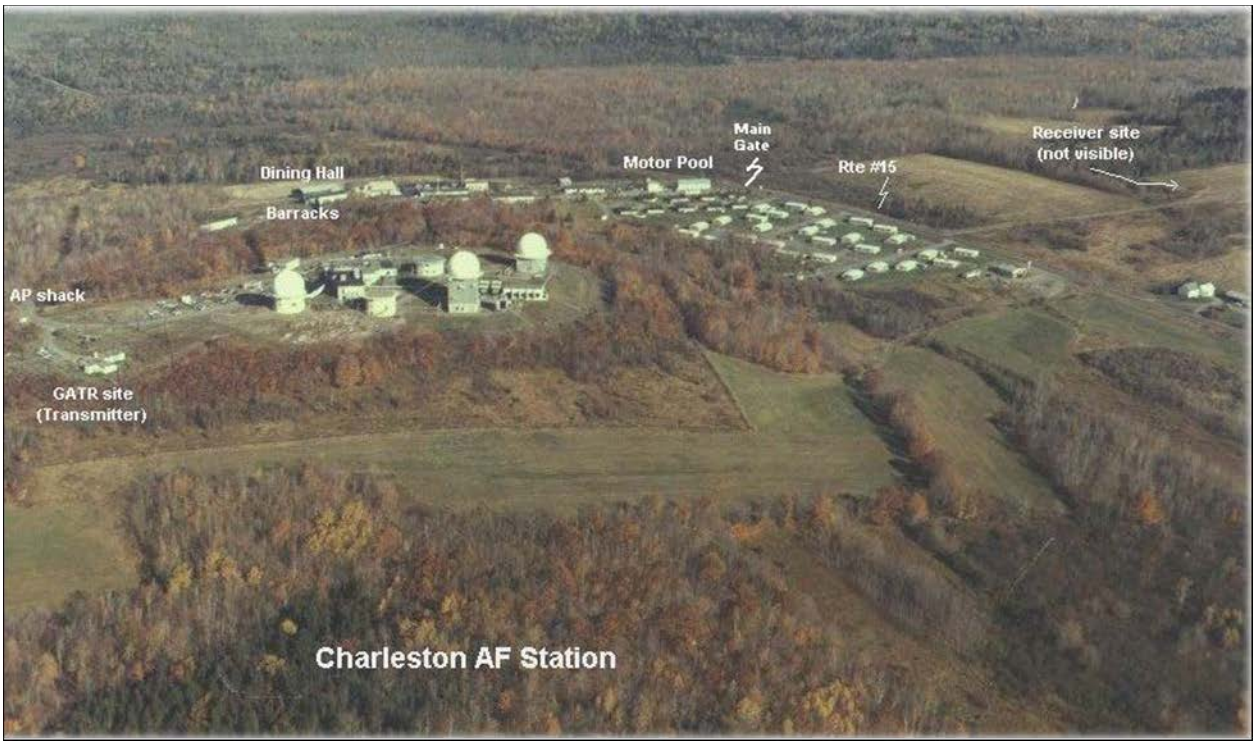

Exhibit 1 Charleston Air Force Station (date unknown)

1.2.3 1970-1979

Following several reconfigurations in the late 1960's, the 765th became the 765th Air Defense Group under the command of the 21st Air Division and the 21st North American Air Defense Region. The Air Defense Group designation was short-lived, and reverted to the 765th Radar Squadron on 01 January 1974.

A 1972 Installation Survey Report detailed the condition of the AFS at that time period. The Operations Area contained the equipment and facilities supporting the long-range radar, the sea-launched ballistic missile radar, and the semi-active backup interceptor control missions. Building 211, an AN/FSS-7 radar tower, housed the equipment supporting the sea-launched ballistic missile warning system. The long- range radar, an AN/FPS-27 radar tower was in Building 212.

Building 209 had the height radar (AN/FPS-90) for the long-range radar system. The power plant for the operations area was Building 213, which contained four 500 Kilowatt White-Superior diesel engines. The telecommunications building was Building 210 and was owned by New England Telephone and Telegraph Company. It supported the communications needs of the air station. The water pump system station (Building 207) distributed the water from the 86,500-gallon water reservoir (Building 9120) for the entire installation. Although not necessarily part of the radar operation, building 203 was the supply office and storage warehouse. By 1973, the Radome base (Building 206) had been converted to storage. The other two structures on the hilltop were Building 200, security police gatehouse, and the ground to air transmitter facility. **Exhibit 2** shows some of these buildings circa 1975.

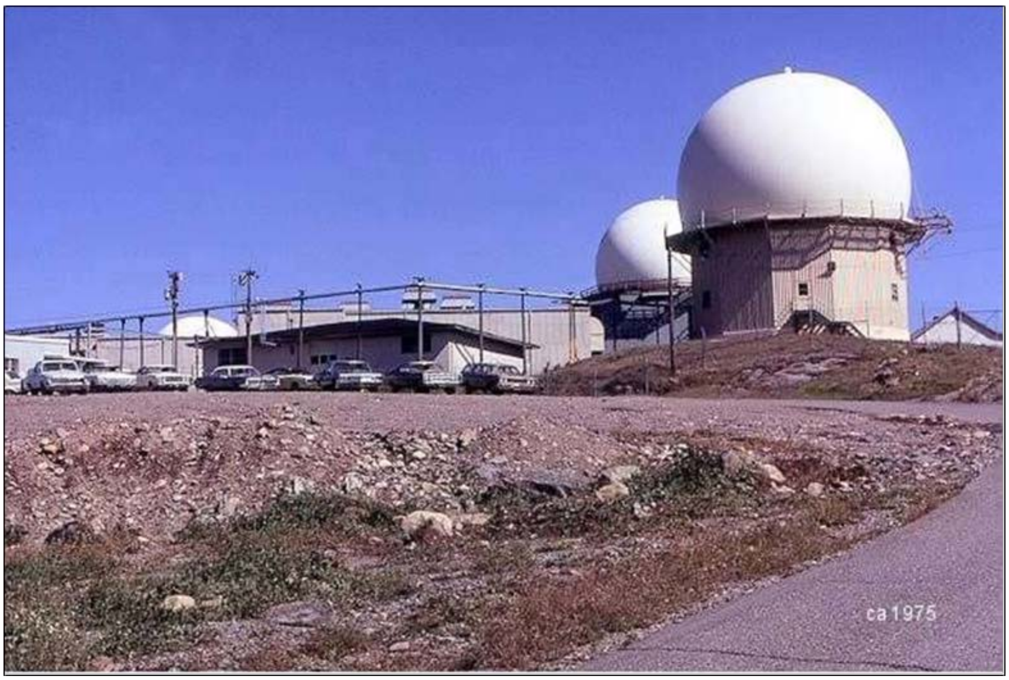

Exhibit 2 Charleston Air Force Station - Radomes (circa 1975)

The Installation Survey Report also provides information on the non-operational areas of Charleston AFS as well (see **Exhibit 3**). The Support and Cantonment Area (Area B) contained the equipment and personnel facilities to support the mission. These buildings included the station headquarters and administration building, housing for four single officers and 124 single airmen, a dining hall, a 11,600,000 BTU steam heating plant, a 20,000 gallon per day sewage treatment/disposal plant, the Civil Engineering building, vehicle maintenance shops, and a multi-purpose recreational building. The Air Force converted the boilers in the central heating plant from coal-fired to oil-fired in 1972. Another section of the station (Area C) had 37 single family housing units. Nine were constructed in 1957, and 28 more homes were added in 1964-65. The Air Force drilled two drinking water wells in this area. The former ground to air transmitter/receiver building (Area D) on the east side of Highway 15 had been converted to a NCO Club by the time of the 1972 Installation Survey. Area E was the recreational areas at the station.

Area E-1 was an outdoor picnic and playground for the residents of family housing, and Area E-2 was adjacent to the multi-purpose recreational building which was planned to be developed by self-help into a softball field and skeet range for base personnel. In winter months, it was to be a snowmobiling track and ice-skating rink.

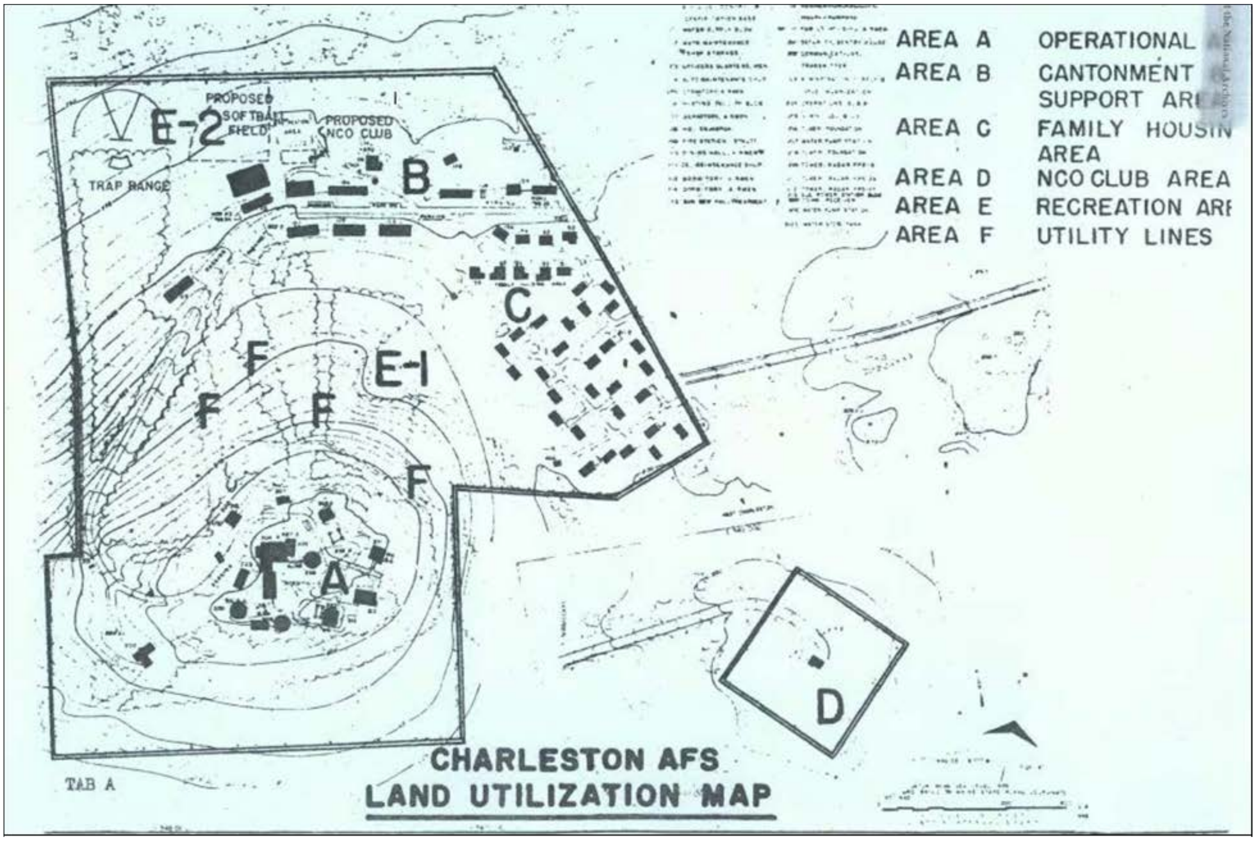

Exhibit 3 Charleston Air Force Station – Utilization Map

1.2.4 Station Closure

In the late 1970's, the Federal Aviation Administration (FAA) and the Air Force combined their respective civil air control and military detection and reporting mission into the Joint Surveillance System run by the FAA. Five Region Operation Control Centers processed data received from FAA/United States Air Force radar installations, with an annual savings of over $100 million. At the same time, the Precision Avionics Vectoring Equipment (PAVE) Phased Array Warning System (PAWS) was developed to detect submarine launch ballistic missiles from five regionally located radar stations. The Joint Surveillance System and the PAVE PAWS system eliminated the need for Charleston Air Force Station. On 29 September 1979, the Air Force declared the station excess to its needs in Disposal Report No. 490. The Disposal Report covered 112 acres of the property including 202 family housing units and 165 housing units adjacent to Bangor International Airport.

1.3 Summary of Previous Work

There have been no Department of Defense (DoD) soil and groundwater investigations completed at the former Charleston AFS. An inventory and removal action of transformers and some USTs was completed.

1.3.1 Inventory Project Report Charleston Air Force Station, 1988

The New England District of the U.S. Army Corps of Engineers prepared an Inventory Project Report (INPR) for the Charleston AFS (D01ME011200) on 07 November 1988. The report which was approved on 20 January 1989, identified one DERP-FUDS project on the property. The project consisted of the testing and removal of twenty-two transformers and twenty-seven 275-gallon underground heating fuel storage tanks as well as sampling the soil surrounding the tanks. The transformers and tanks were potential sources of environmental contaminants. **Figure 1-3** shows the approximate location of these tanks and transformers.

<u>Environmental Assessment and Finding of No Significant, Project No. D01ME011200. June 1989</u>

The New England District produced this Environmental Assessment to evaluate the environmental consequences of the removal action of three 10,000-gallon underground fuel storage tanks, twenty-one 275-gallon heating fuel underground storage tanks (USTs), two well house gasoline tanks, and twenty-two transformers from the Charleston AFS. A “Finding of No Significant Impact” was signed on 03 July 1989 for the proposed activity. The report determined the UST and transformer removal would have no impact on federally listed, threatened or endangered species; any cultural resources present would have been heavily disturbed or destroyed during the construction of the UST, so no adverse effects were anticipated; and only temporary minimal impacts during the construction needed for the UST and transformer removal were expected. Based on information on Formerly Utilized Defense Site Management Information System, this project was completed in 1990, and in addition to the tank and transformer removal, the contractor removed 18 tons of petroleum-contaminated soil, 25 cubic yards of Poly-Chlorinated Biphenyl (PCB)- contaminated soil, and 340 tons of waste oil-contaminated soil. This removal action was conducted by the MEDEP. The project was declared to be a No Further DoD Action Indicated on 30 September 1992.

1.3.2 Preliminary Assessment Report (USACE, 2018)

A Preliminary Assessment (PA) Report was prepared for the Site by the USACE in January 2018. The location of potential source areas identified in the PA are shown in **Figure 1-4**. The summary of the PA findings are as follows:

- A small arms firing range was present.
- Three 10,000-gallon USTs were present on the Hilltop Area where radars were located. MEDEP testing indicated the presence of PCBs, petroleum and waste oil in the tanks and surrounding soils. Waste manifests were not found during review of MEDEP records. Note: additional research showed that one of these USTs was 8,500 gallons.

- In 1989 the two 10,000-gallon USTs, the 8,500 gallon UST and the twenty-one 275-gallon heating fuel USTs, two well house gasoline tasks and 22 transformers were removed and disposed by MEDEP.
- During the 1989 removal action approximately 18 tons of petroleum contaminated soil, 25 cubic yards of PCB contaminated soil and 340 tons of waste oil contaminated soil was removed. Little to no documentation of the removal action and no confirmation sampling data is available. No investigation of groundwater was undertaken or reported.
- An UST is suspected to be present at the radio transmitter building/NCO club on the adjacent property to the east.
- A bedrock water supply well was drilled by the State of Maine and groundwater sampled was found to contain trichloroethene (TCE) and cis-1,2 dichloroethene (DCE) at concentrations just below the Maximum Contaminant Level of 5 micrograms per lite (µg/L) and 10 µg/L, respectively. This well is located outside the former property boundary of the Charleston AFS and currently owned by the Correctional Facility. The well is currently being used by the Maine State Correctional Facility for potable water use. It is one of three wells where water is pumped to a storage tank in the Hilltop Area where water mixes before being gravity fed to the Correctional Facility. Correctional Facility personnel have indicated that Volatile Organic Compounds (VOCs) have not been detected in the other two wells.
- The PA identified several other possible source areas in the former industrial support area.

1.3.3 Technical Memorandum Historic and Aerial Photography Analysis/Research (Wood 2020a)

Wood identified additional potential source areas following a review of historical air photography, existing site drawings and microfiche as-built drawings. This information and a summary of the findings are documented in Final Technical Memorandum Historic and Aerial Photography Research/Analysis (Wood, 2020a). The Technical Memorandum is provided in **Appendix A**. These areas are also identified in **Figure 1-4** and include:

- Former coal storage pile runoff pond
- Dry well associated with a wash rack
- Former Fire Station
- Discharge drain associated with the former Auto Storage Building
- UST (2,000-gallon fuel oil) associated with the Motor Pool
- 2,000 gallon tank in the industrial area
- Septic systems serving the former Operations Building, Building 211, Building 212, and Building 213
- 275-gallon waste oil storage tank near the former Operations Building
- Discharge lines serving Buildings 212 and 213
- Two 40,000-gallon diesel fuel oil USTs serving Building 213; abandoned in place
- Lube oil tank serving Building 213
- Waste oil and possibly PCBs observed in the excavation during a water line repair on the Hilltop, 200 feet (ft) downslope of the former three USTs (two 10,000 gallon and

one 8,500 gallon) on the Hilltop. This event triggered the investigation, sampling, and removal of the USTs.

- Transformer locations in the industrial area

1.4 Contaminant Distribution

There is little relevant data available to determine or describe contaminant presence or distribution at the Site as it relates to former operations of Charleston AFS, the sites identified in the PA or the sites listed in the Technical Memorandum (**Appendix A**).

1.4.1 Environmental, Biological, and Cultural Resource Survey Findings

Wood conducted environmental, biological, and cultural resource surveys to identify protected natural and cultural resources at or near the Site that could be potentially impacted by RI field activities (Wood, 2020b). The report concluded the following:

- Impacts to freshwater wetlands and protected resources are likely negligible as drilling and sampling work can be accomplished without harm to these resources.
- The Site may provide habitat for the Northern Long-eared Bat, however RI activities are not likely to affect mature trees or building structures providing bat habitat.
- The Site does not support cold water fishery or salmon habitat therefore impacts are highly unlikely.
- The Site does not have habitat to support the auricled twayblade, a rare and endangered orchid located in bogs.
- Portions of the Site appear suitable for American ginseng and Clinton's bulrush, however neither of these species were observed during reconnaissance.
- No known archaeological or historical resources were identified for the Site and the site is not located in proximity to navigable waters.

American ginseng is typically located in upland wood environments. RI direct push investigations are slated to be conducted in open, developed areas of the Site. American ginseng may exist in the Small Arms Range and potential seep areas that will be defined in the field. Sampling activities in these areas will cause very low to no impact on vegetation. Clinton's bulrush is typically found in drainage ditches adjacent to roads. RI activities are not planned in ditches at the Site. Based on these findings (Wood, 2020b), work at the Site as described in this Sampling and Analysis Plan, will not require further biological or archaeological assessment or clearance.

1.4.2 Soils

There is no data available to evaluate potential contaminants in soil that are attributable to former Charleston AFS operation. However, the INPR discusses the removal of PCB contaminated soils at the former location of the three Hilltop USTs (two 10,000 gallon and one 8,500 gallon), no analytical data exists from that time period or the removal action. MEDEP sampled the UST tank contents prior to removal and confirmed the presence of PCBs.

1.4.3 Groundwater

There are no groundwater monitoring wells at the Site. The Correctional Facility maintains three bedrock water supply wells. Water from these wells is pumped to the Hilltop Area to a 10,000 gallon storage tank for potable water use by the Correctional Facility. Drinking water is periodically tested for contaminants by the State of Maine. Contaminants have not been detected at concentrations in excess of USEPA Maximum Contaminant Levels (MCLs). The most recently drilled bedrock water supply well (October 2016) located in the southern portion of the facility (**Figure 1-2**), contained TCE at 3.4 µg/L and cis 1,2 DCE at 4 µg/L.

1.5 Conceptual Site Model

This section describes an initial Conceptual Site Model (CSM) for the Charleston AFS. Although no soil and groundwater investigations have been conducted previously at the Site, there are basic physical and chemical processes that relate to potential migration of potential contaminants.

The CSM defines potential sources, migration and the exposure pathways and receptors, it evaluates whether exposure pathways are complete and informs human health and ecological risk assessments. Preparation of a CSM leads to identification of data gaps that may need to be filled to address uncertainty in risk assessments nature and extent of contamination needed to support a feasibility study.

Limited records are available relative to maintenance and waste practices conducted at the Charleston AFS. Solvent related compounds such as TCE were most likely used as a degreaser in automotive maintenance and painting. TCE and other solvents may have been used to clean electrical components and radar antennas. Various fuel products were also stored and used at various locations across the Site. Waste solvents and fuels may have been released directly to the ground surface or to subsurface soils though septic systems and floor drains or other discharge locations. Transformers containing PCBs used in the Hilltop Area were mounted on both concrete pads and poles and PCB may have been released to the ground surface and/or the concrete pads. During the site visit in 2019, Wood observed a thick, black, oily substance at one of the transformer pads. It is unknown if these substances are currently sorbed to soils or concrete and have migrated to groundwater. Lead likely exists in shallow soils at the Small Arms Range, as lead bullet fragments have been found in this area.

The key components of the initial CSM are summarized below.

Overburden Soils

- Chlorinated solvents may have been used to clean tools and Radome equipment, waste solvents may have been released to soils following or during use.
- Fuels and oils were stored in USTs, improper use/disposal and leaks from these tanks may have released these substances to soils.
- Operations at the Small Arms Range most likely introduced lead to shallow soils.
- Contaminants may remain sorbed to fine grained soils and may partition to groundwater and air.

- Soils likely consist of weathered/reworked glacial till and local fill materials.
- Soils overlying bedrock are expected to be thin. Facility well construction near Route 15 (**Figure 1-2**) suggest soils may be approximately 12 ft thick.
- Overburden soils in the Hilltop Area are thin to non-existent.
- Fill materials were placed in low areas between bedrock highs in the Hilltop Area to accommodate building structures and underground structures such as fuel tanks and septic fields.

Bedrock

- Due to thin soils, the volume of chlorinated solvents, fuels, and oils released to the ground surface and subsurface soils may have been sufficient to migrate to the bedrock surface and bedrock groundwater. Bedrock exposures are prevalent in the Hilltop Area.
- Bedrock consists of Devonian-Silurian Madrid Formation (MGS, 1985a) described as calcareous sandstone and interbedded limestone
- Bedrock also described locally as thickly bedded metasandstones (Westerman, 1983)
- Bedrock has high angle joints (dip angle > 75 degrees), which trend NW to SE, minor joints sets trend NE to SW (Westerman, 1983), bedrock is likely discretely fractured.
- Several bedrock exposures on the Hilltop appear well scoured by glacial action.

Overburden Groundwater

- Overburden groundwater occurs in response to areal recharge from precipitation, run-off, topographic controls, and to some degree by lateral or upward discharge from bedrock groundwater.
- Perched groundwater may exist locally in shallow till soils.
- Recharge water percolating through contaminated soils may leach, dissolve, contaminants to the water table.
- Water table is most likely shallow (<10 ft below ground surface [bgs]) if soils are of sufficient thickness to support an overburden system.
- There are no known overburden wells in the Northern Industrial area, however, it is assumed that groundwater may be shallow based on the presence of wetland environments bordering the northern area of the property.
- Soils are not continuous in the Hilltop Area due to the presence of bedrock exposures, overburden groundwater may be present seasonally in thin overburden.
- If present, groundwater flow from the Hilltop area is expected to be radial
- Potentiometric surface most likely mimics topography.
- It is unknown if overburden groundwater is impacted by former Charleston AFS operations.

Bedrock Groundwater

- Bedrock groundwater occurs in response to areal recharge from precipitation, run-off, and topographic controls.

- Recharge water percolating through contaminated overburden and shallow bedrock materials may dissolve contaminants and migrate through the underlying fractured bedrock.
- Bedrock groundwater is most likely shallow (~10 to 15 ft bgs) in the Northern Industrial Area and beneath the Correctional Facility.
- Bedrock potentiometric surface most likely fluctuates widely in the Hilltop Area due to seasonal variations in recharge.
- Bedrock groundwater potentiometric surface is expected to mimic topography resulting in radial flow from the Hilltop Area.
- Due to bedrock structure, anisotropy may develop in a northwest to southeast orientation (Westerman, 1983) under a pumping stress
- It is currently unknown if low level VOC contamination in the Facility Well is attributable to former Charleston AFS operations.

Surface Water

- Contaminants sorbed to surface soils may migrate overland with soil particles during heavy rain and snow melt events.
- Surface water runoff via overland flow is expected to occur during heavy rain events and thick snowpack melt.
- Three seep locations were mapped in October 2019, additional locations may occur during the Spring months (Wood, 2020b).
- USFWS National Wetland Inventory (Wood, 2020b) indicates no mapped wetlands on the Site.
- A palustrine scrub/shrub wetland exists along the northwestern portion of the Site (Wood, 2020b).
- Two vernal pools were observed in the area of the former NCO club (Wood, 2020b).
- There are no perennial streams known on Site.
- Two storm water detention ponds currently exist on the Site and were constructed post Charleston AFS.
- Nearby streams include Rollins Brook ~½ mile to the southeast and Black Stream approximately 1 mile north and west of the Site.

Sediment

- Sediment likely collects in storm water detention structures that were constructed post closure of the Charleston AFS
- Rollins Brook and Black Stream are not anticipated to have been affected by past Charleston AFS operations.
- Discharge of contaminated bedrock groundwater through overburden to Rollins Brook and Black Stream is unlikely to have impacted sediments if such discharge occurred.

1.6 Definition of Problem

The Site lacks data needed to draw conclusions regarding the presence or absence of chemical impacts to soil, rock, seeps, and groundwater from past disposal, maintenance, and material handling practices at the former Charleston AFS. Uncertainty exists with each potential source area, with the exception of the 3 USTs and soil that were removed from the Hilltop Area in 1989. There is a confirmed presence of TCE and DCE below MCLs in bedrock groundwater at the Site, but the source is unknown. No other analytical chemical data exists for the Site. **Table 1-1** provides a list of potential source areas and summarizes the potentially affected media that will be evaluated during this phase of investigation.

2.0 Project Organization and Responsibilities

Work at the Site is conducted by the USACE-NAE as the lead agency and coordinated with the MEDEP. Wood is the USACE-NAE's environmental engineering subcontractor.

Wood has responsibility for execution of the project including management, work plan development, field activities, reporting, and quality control. The following presents the roles and responsibilities of Wood project staff support this RI work plan.

- Project Manager – Peter Baker, Certified Geologist (CG), will be responsible for the overall execution of the RI work, scheduling, invoicing, and finances. Mr. Baker will serve as the primary point of contact with the USACE Project Manager and Contracting Officer Representative (COR).
- Principal Scientist – Jeff Pickett, CG will serve as the senior technical reviewer of the RI.
- Quality Assurance Manager – Julie Ricardi will provide review and oversight laboratory reports, data reports, and records
- RI Technical Lead – Scott Calkin, PG, will be responsible for execution of the RI field work and preparation of the RI report
- Field Operations Leader – Brian Havens, PG, will be responsible for coordinating and implementation of field work activities
- Health and Safety Manager – Cindy Sundquist, CHMM, CIH, will be responsible for oversight of the project health and safety
- Site Health and Safety Officer – Maddy Bruno will be responsible for on-site field work adherence to the health and safety plan
- Human Health Risk Assessor – Amy Quintin will be the Human Health Risk Assessment lead
- Ecological Risk Assessor – Tony Rodolakis will be the Ecological Risk Assessment lead
- Project Chemist – Brad LaForest, CEAC, will be the Chemistry lead responsible for laboratory coordination, data validation, and analytical data management
- Project Administrator – Diane Harmon will provide administrative support

Project roles and responsibilities are further defined in the Quality Assurance Project Plan (QAPP) worksheets 3 through 8 (Wood, 2020c).

3.0 Project Scope and Objectives

3.1 Task Description and Sampling Objectives

The primary objective of this phase of the RI will involve sampling of soil and overburden groundwater to determine the presence/absence of contamination at potential source areas. Another objective will be to determine the presence/absence of contamination in the Mountain View Correctional Facility and residential water supply wells in the area. During this phase another objective will be to determine on-Site background concentrations of anthropogenic Semi-Volatile Organic Compounds (SVOCs) or poly aromatic hydrocarbons and metals in soil to allow comparison to soils data collected in impacted areas of the Site.

The data collected from these sampling activities will be screened against human health and ecological screening levels as well as site-specific background levels to evaluate the presence/absence of contaminants and update the CSM (see **Section 11**). Data will be organized by medium, and if relevant may be organized into exposure areas. Summary statistics including minimum, maximum, average and Frequency of Detect will be provided, where relevant. The results of the presence/absence data collection and risk screening during this phase of the RI will determine if more samples and analyses are needed for areas with detections above screening levels. The additional samples would be collected to support quantitative risk assessments.

3.2 Applicable Regulations and Standards

RI work will be conducted under the DoD DERP FUDS program for HTRW and lead from small arms. The DERP was established by Congress for cleanup of DoD hazardous waste sites consistent with the CERCLA, the NCP, and Executive Order 12580- Superfund Implementation. Applicable or Relevant and Appropriate Requirements (ARARs) relevant to conducting a site investigation will be identified in the RI, with further refinement of ARARs in a Feasibility Study (FS), if necessary based on the need for remedial action.

CERCLA and the NCP require that remedial actions must attain federal standards, requirements, limitations, or more stringent state standards determined to be legally applicable or relevant and appropriate to the circumstances at a given site. ARARs are federal and state environmental requirements used in combination with other assessment methods to: (1) evaluate the appropriate extent of site cleanup; (2) define and formulate remedial action alternatives; and (3) govern implementation and operation of the selected remedy.

One of the purposes in considering ARARs early in the RI planning process is to evaluate analytical methods, reporting limits and method detection limits (DLs) such that resulting RI data, to the extent possible, can be used to initially evaluate detected analytes as potential contaminants of concern based on human health and ecological screening levels and benchmarks. As discussed later in Section 11, potential human health and ecological screening levels have been evaluated and proposed.

The MDLs have been evaluated in comparison to the risk-based screening levels to ensure they are sufficiently low. All MDLs are below ecological benchmarks. The majority of MDLs are also below the RSLs for human health. Exceptions are generally within an acceptable margin that avoids masking potential risk drivers, with the exception of 1,2-Dibromo-3-chloropropane. The results for all parameters listed below will be reviewed in the context of detected soil concentrations and related parameters to ensure that there are no significant data gaps for expected site-related concentrations. Details related to MDLs exceeding PALs are as follows:

- Eight MDLs for VOCs in water are not sufficiently low. In general data collection in aqueous media for potential VOCs is sufficient to capture potential risk drivers and avoid masking low detected results that may impact future actions. Further details are provided below for specific VOCs:
- Five VOC PALs are within one order of magnitude of the MDL (1,1,2,2-Tetrachloroethane, 1,1,2-Trichloroethane1,2-dichloroethane, bromodichloromethane, and chloroform). Therefore, all potential risk drivers will be detected, as the typical remediation decision threshold is one order of magnitude above the RSL for non-cancer endpoints and two orders of magnitude above the RSL based on a cancer endpoint. Any concentrations present below the detection limit are below potential risk thresholds that would impact future action.
- Two VOC PALs are between 1 and 2 orders of magnitude lower than the MDL (1,2-Dibromoethane (EDB) and vinyl chloride). The PALs are based on RSLs, which are based on a cancer endpoint at a target excess lifetime cancer risk (ELCR) of 1x10-6. The non-cancer based RSL is more than two orders of magnitude higher than the cancer based RSL for these two parameters. Therefore, as the cancer-based RSL is based on an ELCR of 1x10-6 and the typical remediation decision threshold for carcinogens is two orders of magnitude above the RSL based on a cancer endpoint, all potential risk drivers will be captured for these two parameters. Any concentrations present below the MDL are below potential risk thresholds that would impact future action.
- One VOC PAL is over 2 orders of magnitude lower than the MDL (1,2-Dibromo-3-chloropropane). This PAL is also based on an RSL, which is based on a cancer endpoint at an ELCR of 1x10-6. The non-cancer based RSL is more than two orders of magnitude higher than the cancer based RSL for this parameter. This MDL has the potential to miss a risk driver, however this parameter is not specifically anticipated to be site-related (i.e., associated with agricultural use), and therefore is unlikely to be a risk-driver for the site. When results are obtained, any related detected compounds including whether this parameter is detected in soil will be evaluated to identify whether this chemical is likely to be present, and therefore would be expected to be a significant data gap.
- MDLs for PCBs in water are not sufficiently low for several Aroclors, however this difference is less than one order of magnitude (Aroclor 1221, Aroclor 1232, Aroclor 1242, Aroclor 1248, Aroclor 1254, and Aroclor 1260). As PCBs in soil are a primary target analyte class for the RI, there will be sufficient data available to evaluate whether potential non-detects could be masking low detected results in specific areas. Additionally, the Tapwater RSLs are a conservative estimate to evaluate groundwater seeps, which are not expected to be a source of drinking water.
- Two MDLs for PCBs congeners in soil are not sufficiently low (3,3',4,4',5,5'-Hexachlorobiphenyl and 3,3',4,4',5-Pentachlorobiphenyl). The difference is less than an order of magnitude, and the PAL is based on the RSL, suggesting the likelihood that low

concentrations below the detection limit could mask a risk driver is minimal. Additionally, the MDLs for aroclors in soil are sufficiently low, and PCB congeners are primarily collected for comparison to ecological benchmarks based on 2,3,7,8-TCDD. Therefore, the impact is considered negligible.

PALs for EPH and VPH analyses are based on Remediation Guidelines for Petroleum Contaminated Sites in Maine (MEDEP, 2014) and are for the purpose of comparison only as EPH and VPH are non CERCLA compounds

The following subsections describe the overarching definitions and purpose of ARARs. Location Specific, Action Specific and Chemical Specific ARARs will be developed in a FS, if the results of the RI indicate that a remedial action is necessary.

3.2.1 Definition of ARAR Categories

To properly consider ARARs and to clarify their function in the remedy selection process, the NCP defines two ARAR components: (1) applicable requirements; and (2) relevant and appropriate requirements. These definitions are discussed in the following paragraphs:

Applicable Requirements. Applicable requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site (40 CFR 300.400(g)). Basically, to be applicable, a requirement must directly and fully address a CERCLA activity. For example, Resource Conservation and Recovery Act (RCRA) regulations governing the operation and design of a hazardous waste incinerator (40 CFR Part 264, Subpart O) apply to hazardous waste incinerators used at Superfund sites. To be considered applicable, state standards must be of general applicability and legally enforceable (i.e., promulgated), identified by the state in a timely manner, and more stringent than federal requirements (40 CFR 300.400(g)(4)).

Relevant and Appropriate Requirements. Relevant and appropriate requirements are those cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limitations that, while not applicable to a hazardous substance, pollutant, contaminant, remedial action, location or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the site that their use is well-suited to the particular site (40 CFR 300.400(g)(2)). For example, RCRA landfill design standards could be relevant and appropriate to a landfill at a CERCLA site, if the wastes being disposed of were sufficiently similar to RCRA hazardous wastes.

Requirements under federal or state law may be either applicable or relevant and appropriate to CERCLA cleanup actions, but not both. However, requirements must be both relevant and appropriate for compliance to be necessary. In the case where both a federal and a state ARAR are available, or where two potential ARARs address the same issue, the more stringent regulation must be selected. The final NCP states that a state standard must be legally enforceable and more stringent than a corresponding federal standard to be relevant and appropriate (40 CFR 300.400(g)(4)).

The NCP at 40 CFR 300.430(f)(1)(ii)(C) provides several ARAR waiver options that may be invoked, providing that the basic premise of protection of human health and the environment is not ignored:

1. The alternative is an interim measure and will become part of a total remedial action that will attain the applicable or relevant and appropriate federal or state requirement.
2. Compliance with the requirement will result in greater risk to human health and the environment than other alternatives.
3. Compliance with the requirement is technically impracticable from an engineering perspective.
4. The alternative will attain a standard of performance that is equivalent to that required under the otherwise applicable standard, requirements, or limitation through use of another method or approach.
5. With respect to a state requirement, the state has not consistently applied, or demonstrated the intention to consistently apply, the promulgated requirement in similar circumstances at other remedial actions within the state.
6. For financed response actions only, an alternative that attains the ARAR will not provide a balance between the need for protection of human health and the environment at the site and the availability of monies to respond to other sites that may present a threat to human health and the environment.

Substantive requirements pertain directly to the actions or conditions at a site, while administrative requirements facilitate their implementation. CERCLA on-site remedial response actions must only comply with substantive requirements that are “applicable” or “relevant and appropriate,” but not the administrative requirements, such as any requirement to obtain federal, state, or local permits (CERCLA §121(e)). The NCP defines on-site as “the aerial extent of contamination and suitable areas in very close proximity to the contamination necessary for implementation of the response action.” Off-site response actions must comply with both the substantive and administrative requirements of an applicable (but not a relevant and appropriate) regulation, but such regulations pertaining to off-site actions are not classified as ARARs (OSWER 9347.1-0; USEPA, 1988b).

As noted in the ARARs guidance (USEPA, 1988a):

> “The CERCLA program has its own set of administrative procedures, which assure proper implementation of CERCLA. The application of additional or conflicting administrative requirements could result in delay or confusion.”

To ensure that CERCLA response actions proceed as rapidly as possible, USEPA has reaffirmed this position in the final NCP. The USEPA recognizes that certain administrative requirements, such as consultation with state agencies and reporting, are accomplished through the state involvement and public participation requirements of the NCP.

In the absence of federal- or state-promulgated regulations, there are many criteria, advisories, and guidance values that are not legally binding, but may serve as useful guidance for response actions. These are "to-be-considered" (TBC) guidance (USEPA, 1988a). These guidelines or advisory criteria should be identified if used to develop clean-up goals or if they provide important information needed to properly design or perform a remedial action. Three categories of TBC information are: (1) health effects information with a high degree of certainty (e.g., RfDs); (2) technical information on how to perform or evaluate site investigations or response actions; and (3) regulatory policy or proposed regulations (53 Federal Register 51436).

3.3 Project Schedule

The bulk of the field work which includes soil and groundwater grab sampling is anticipated to be performed in the fall of 2020. The scope of work includes quarterly sampling (4 rounds) of seeps, Correctional Facility and residential water supply wells; therefore, field work will not be completed until June 2021. The Draft RI report is anticipated to be issued in the fall of 2022. A detailed field activities schedule will be provided in Final Sampling Analysis Plan (SAP). The general overall schedule is shown below.

- Draft SAP and QAPP: March 31, 2020
- Draft Final SAP and QAPP: July 30, 2020
- Final SAP and QAPP: September 15, 2020
- Mobilization Activities: September 16 – Oct. 2, 2020
- Field Work: Oct. 5, 2020 – June 2021
- Draft RI Report: November 2021
- Draft Final RI Report: January 2022
- Final RI Report: March 2022

4.0 Non-Measurement Data Acquisition

Non-measurement data acquisition describes data collected from non-sampling sources and includes pertinent site data, documents, reports and plans. Information of this type can support risk assessment by identifying habitats, endangered species, future land uses, and well surveys. Non-measurement data acquisition also includes geological data, hydrogeological data, meteorological data, and data supporting modeling activities. This information is used to refine the CSM and assess the potential for contaminant transport and exposure. Wood has reviewed available information on the physical setting, geology and hydrology of the Site as provided below.

4.1 Physical Setting

The following sections present the physical setting of the Site. This information is summarized from the Preliminary Assessment (USACE, 2018) in includes general geology, hydrogeology, terrain features, and historic climatic data.

4.1.1 Site Setting

The topography of the former Charleston AFS is generally hilly due to its location on the Bull Hill Range. Elevation at the Site ranges from approximately 740 to 926 ft above mean sea level. (**Exhibit 4)** The primary vegetation types are low grasses and shrubs around the former military buildings and developed areas. Upland woodlands dominate in the non-developed areas of the Site.

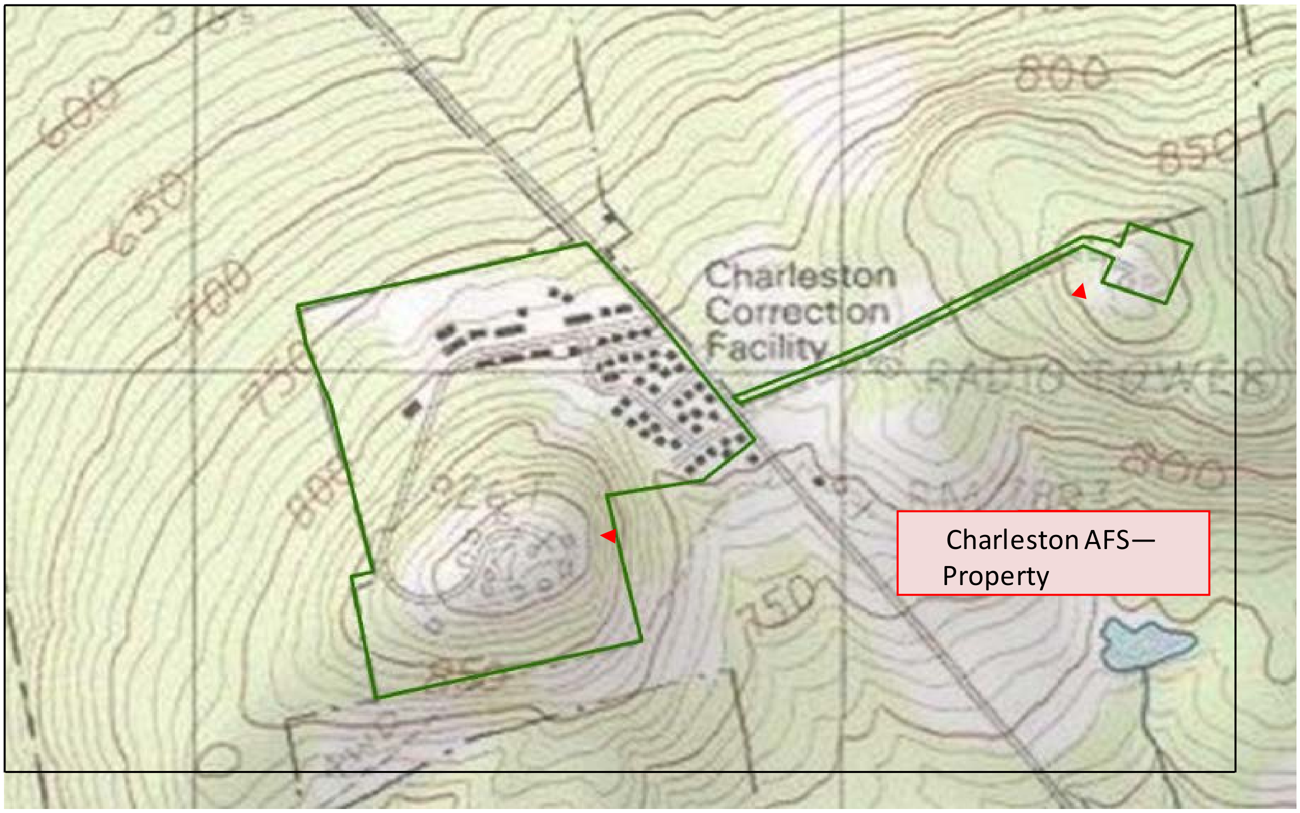

Exhibit 4 Charleston Air Force Station – from USGS Topographic Quadrangle, Charleston, Maine vicinity- 1983

4.1.2 Climate

Climatological data from the National Oceanic and Atmospheric Administration (NOAA) weather station located in Dover-Foxcroft, Maine, approximately 11 miles northwest of the former Charleston AFS property provides representative temperature and precipitation data (see **Exhibit 5** table below).

National Oceanic and Atmospheric Administration (NOAA) 1981-2010													
	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Annual
Maximum Temperature (degrees F)	23.5	28.2	36.8	49.6	63.8	72.8	78.0	76.5	68.1	55.1	42.1	29.7	52.1
Minimum Temperature (degrees F)	2.3	5.9	15.8	28.4	39.0	49.1	54.3	52.5	43.7	33.6	24.7	12.0	30.4
Average Temperature (degrees F)	12.6	17.2	26.2	39.0	51.4	60.9	66.1	64.5	55.8	44.2	33.3	21.0	41.6
Precipitation (inches)	3.33	2.63	3.20	3.56	3.66	4.08	3.37	3.16	3.75	4.25	4.34	3.54	43.50
Snowfall (inches)	21.8	19.8	17.5	6.1	0.1	0.0	0.0	0.0	0.0	0.7	6.1	19.0	95.4

Exhibit 5 Climatological Data NDAA Dover Foxcroft Station

The average maximum temperature for Dover-Foxcroft, Maine, from 1981-2010 was 52.1°F; the average minimum temperature was 30.4°F. The average total precipitation is documented as 43.50 inches. In the summer, the average maximum temperature was 75.8°F with an extreme high of 98°F. In the winter, the average minimum temperature was 6.7° F with a recorded extreme low of -31° F.

4.1.3 Surface Water Hydrology

The Site is located within the Penobscot River watershed. This watershed is within the overall Gulf of Maine watershed. The Site area contains no active steams and is located on a ridge that acts as a drainage divide between the Piscataquis River and its tributaries, to the north, and a myriad of first and second order streams that eventually feed into the Penobscot River, to the south. The closest streams are to the south of Bull Hill Range and appear to drain from the hills side. These unnamed headwaters eventually join to create Rollins Brook.

There are no well-defined streams located on the former Charleston AFS. Locally the Site rests on a ridgeline where surface water drainage and groundwater from the Site is generally to the north and south, depending on proximity to the local watershed divide. Surface topography generally causes runoff at the property to drain northwest, southwest, or southeast along the topographic relief of Bull Hill Range. Nearby water features include Rollins Brook approximately ½ mile to the southeast of the property and Black Stream approximately one mile to the north and west.

Seeps occur in areas where infiltrating groundwater follows the bedrock surface and discharges along the top of bedrock exposures.

4.1.4 Geology

The former Charleston AFS lies within the New England Upland physiographic province. The underlying bedrock is part of the Devonian-Silurian Madrid Formation, which consists of calcareous sandstone and interbedded sandstone and impure limestone (Maine Geological Survey, 1985a). Westerman (1983) further describes the area as composed of thickly bedded metasandstones that are weakly calcareous. Outcrops of thinly bedded, phyllitic, metasiltones are present in the area. These formations follow the regional strike trending southwest to northeast through the area.

Surficial soils are characterized primarily by thin glacial drift deposits (Maine Geological Survey, 1985b). Surficial deposits are glacial till composed of sand, silt, clay, stones and thin drift over bedrock outcrops (Wood, 2019b).

The United States Department of Agriculture (USDA) Natural Resource Conversation Service (NRCS) Web Soil Survey was utilized to obtain data on soils within the Site area. The Web Soil Survey defines soil types and their characteristics, based on decades of soil data collection by the USDA (USDA-NRCS, 2019).

Soils within the Site area have slopes of three to fifteen percent. These soils began forming directly after the glacial retreat. Most of the Site area is mapped as man-made urban land. Up to four soil series representing multiple soil map units, can be found within, or near, the Site area (USDA-NRCS 2019). Each of these four-soil series are spodosols, a soil type found typically in environments dominated by acidic soils caused by millennia of pine tree growth. As such, these soils are generally stable and likely been forming relatively undisturbed since the retreat of the last glaciers.

Elliotsville and Monson soils are best characterized as thin glacial till formed over, and possibly from, the local bedrock. Soil profile description indicate that the bedrock can be found within 0.40 to 0.6 m (1.3 to 2.0 ft) of the ground surface. Chesuncook and Telos soils are characterized as thicker till that is very dense. Given the formation time of spodic soils like these, this could be evidence that this soil has been forming since the retreat of the glacial ice, in the late Pleistocene to early Holocene, and is likely to have received little sedimentation since that time. These soil series are listed below.

Map Unit Soil Series	Soil Order	Soil Texture	Drainage Description	Landscape Setting	Sediment Origins
Chesuncook	Spodosol	Silt loam	Well drained	Till plains, hills, ridges, and mountains	Glacial till
Elliottsville	Spodosol	Silt loam	Well drained	Till plains, hills, ridges, and mountains	Glacial till
Monson	Spodosol	Silt loam	Somewhat excessively drained	Knolls of till plains, and on hills, ridges and mountains	Glacial till
Telos	Spodosol	Silt loam	Somewhat poorly drained	Till plains, hills, and ridges	Glacial till

4.1.5 Hydrogeology

The former Charleston AFS is not located on a mapped sand and gravel or major aquifer. The nearest aquifers are approximately one and a half miles west and two miles southwest of the Site (Maine Geological Survey, 2001).

There are three groundwater wells in current use on the property. The Charleston Correction Facility obtains its potable water from these wells. Two original wells were drilled to depths of 225 ft and 250 ft. These wells were installed by the Air Force. The Corrections Facility drilled a third well in October 2016 to depth of 550 ft. to supplement their water supply. The Corrections Facility owns an additional bedrock well that served a former restaurant, this well currently does not serve as a potable water source. The depth of the former restaurant well is unknown. The well is equipped with a pump that is operational and the surface casing consists of 6-inch diameter steel.

5.0 Field Activities

This section presents the proposed field investigation program. The program is summarized in **Table 5-1**. Investigation work will be completed in accordance with the methods described in this Sampling and Analysis Plan and the Quality Assurance Project Plan (Wood, 2020c). Work will be executed under the requirements set forth in the Site Health and Safety Plan (Wood, 2020d).

Figures 5-1 through **5-12** show the location of proposed investigation explorations to determine the presence or absence of contaminants. **Table 5-2** provides a listing of proposed exploration locations, rationale, and analytical program summary. **Table 5-3** lists the analytical parameters and numbers of samples to be analyzed. Details of proposed investigations are described below.

5.1 Soils Investigation

Surface soil sampling (0-6 inches bgs) will be completed using hand augering or direct push sampling methods. Direct push soil profiling techniques are an integral component of the proposed soils investigation. Up to 67 direct push soil borings will be advanced during the program (**Table 5-2**). Each direct push location will be screened for subsurface utilities and other obstructions using a GSSI Subsurface Interface Radar Model 3000 system equipped with a 400-megaHertz transducer (or equivalent). Each direct push location will be staked in the field prior to calling DigSafe (811 or www.digsafe.com). Direct push profiling will be completed with a GeoProbe® 7822DT drill rig (or equivalent). Direct push profiling will be completed in the Northern Industrial Area, the Hilltop Area and the Radio Receiver Area. At each direct push location a groundwater grab sample will be collected, at the water table, if encountered.

Location and Sample Identifications have been pre-established in Formerly Utilized Defense Site Chemistry Database (FUDSChem) (Wood, 2020c). Sample labels and containers will be prepared prior to sampling activities.

The QAPP (Wood, 2020c) contains field data forms/records to be used during characterization activities and standard operating procedures for sampling activities proposed at the Site.

Direct push soil cuttings will be containerized and characterized for off-site disposal. Soil sampling locations will be surveyed using sub-meter, handheld Global Positioning System (GPS).

5.1.1 Background Soils

Soil samples will be collected to establish background concentrations of metals and SVOCs in surface (0-6 inches bgs) and subsurface soils (0.5-10 ft) within the former facility boundary. Additional depth intervals will be selected to support human health and ecological risk assessment and evaluate the potential for leaching to groundwater. Depths will be consistent with risk assessment exposure scenarios. Background surface soil samples will only be collected at off Site locations approved by the USACE COR. Forty (40) background soil samples will be collected at 20 locations. Locations to be determined during the planning phase, background locations will be discussed with the USACE COR prior to selection. Samples will be analyzed for parameters shown on **Table 5-2**. **Figure 5-1** shows the approximate location of proposed background sample locations.

Step 1. Identify background locations and come to agreement with USACE COR and MEDEP representatives.

Step 2. Acquire property access for off-Site background locations on an as needed basis.

Step 3. Wood will review subsurface utility drawings/maps prior to staking direct push locations in the field. Wood assumes that the Correctional Facility or the Town of Charleston will make drawings available.

Step 4. Up to 20 direct push soil borings will be staked in the field. Each stake will be marked with white flagging and or white paint.

Step 5. Each location will be profiled with ground-penetrating radar (GPR) to screen for the presence of subsurface utilities or other possible obstructions. Positioning of each direct push location are subject to change based on ground-penetrating radar screening results.

Step 6. Wood will inform the drilling subcontractor to notify DigSafe (811 or www.digsafe.com). Drilling will commence no earlier than 3 days of being issued a DigSafe ticket.

Step 7. Collect up to 20 surface soil and 20 shallow (>2 ft) background soil samples using direct push methods. Log soils, complete field data records, and chain of custody.

Step 8. Survey each sampling location using sub-meter GPS methods.

Step 9. Preserve and ship samples to subcontract laboratory for analysis.

Step 10. Update FUDSChem to rectify deviations, if needed.

5.1.2 Hilltop Area, Northern Industrial Area, and the Former Radio Receiver Building - Direct Push Investigation

Seven potential source areas will be the subject direct push soil investigation in the Hilltop Area (**Figure 5-2**). The Hilltop Area is where the former radar operations buildings are located. This area also contained three USTs (removed in 1989) and numerous transformers and switch gear equipment for mission support (USACE, 2018). The primary contaminants of concern in this area are PCBs, VOCs, and fuel-related compounds. Potential source areas include:

- 275-gallon Waste Oil Tank
- Former 8,500/10,000 Fuel Oil USTs
- Lube Oil UST
- Two 40,000 gallon fuel oil USTs
- Radar Buildings 206, 208, 209, 211, and 212
- Septic Systems serving Buildings 204, 211, 212, and 213
- Location of PCB Contaminated Oil (1989 Water Line Repair)

Figures 5-3 through 5-5 show the exploration locations associated with each of these areas.

Eight potential source areas in the Northern Industrial Area will also be investigated with direct push methods. The Northern Industrial Area of the Site served as a coal storage yard, contained fuel storage tanks, an auto maintenance shop, sanitary sewer, and septic field structures and other facilities. The primary contaminants of concern in the Northern Industrial Area are VOCs, SVOCs, PCBs, fuel-related compounds, and metals. Potential source areas include:

- Fuel Tanks/Coal Yard/Coal Yard Runoff
- Water Treatment Plant/Septic Tank/Weld Shop Area

- Water Treatment Plant Septic Sand Filter Area
- Auto Storage Building
- Auto Maintenance Shop/Motor Pool and Former 2,000-gallon UST
- Fire Station Building
- Maintenance Shop
- Location of a 2,000-gallon tank; use unknown.

Figure 5-6 shows the location of direct push locations associated with each of these areas.

Direct push investigation of soils at the Former Radio Receiver Building will also be conducted (**Figure 5-7**). An above ground tank cradle was reported in the Preliminary Assessment (USACE, 2018) and there may be evidence for a UST.

See **Table 5-2** for a summary of the sampling and analysis program for each potential source area.

The direct push investigation at each potential source area will be conducted in the following steps.

Step 1. Wood will review subsurface utility drawings/maps prior to staking direct push locations in the field. Wood assumes that the Correctional Facility or the Town of Charleston will make drawings available.

Step 2. Up to 67 direct push soil borings will be staked in the field. Each stake will be marked with white flagging and or white paint in advance of investigation activities. In areas of asphalt, the drill location will be marked with white paint.

Step 3. Each location will be profiled with GPR to screen for the presence of subsurface utilities or other possible obstructions. Positioning of each direct push location is subject to change based on GPR radar screening results.

Step 4. Wood will inform the drilling subcontractor to notify DigSafe (811 or www.digsafe.com). Drilling will commence no earlier than 3 days of being issued a DigSafe ticket.

Step 5A. Advance up to 2 locations at the 275 Gallon Waste Oil Tank (**Figure 5-3**). Collect 1 surface soil sample and up to 4 subsurface soil samples at each location (0.5-20 ft bgs). From one of the locations, collect 1 groundwater grab sample, if the water table is encountered.

Step 5B. Advance up to 5 locations at the Former 8,500/10,000-gallon Fuel Oil UST graves (**Figure 5-3**). Collect to 2 subsurface soil samples at each location (0.5-20 ft bgs). One of the subsurface soil samples will be collected at the interface with the top of the weathered bedrock. If the water table in encountered above the bedrock surface a sample will be collected. From two of the locations, collect 1 groundwater grab sample, if the water table is encountered.

Step 5C. Conduct GPR survey to map footprint of two 40,000-gallon Fuel Oil USTs which were abandoned in place (**Figure 5-3**). Advance up to 4 boring locations. Collect 1 surface soil sample and up to 2 subsurface soil samples at each location (0.5-20 ft bgs). One of the subsurface soil samples will collected at the interface with the top of the bedrock. If the water table in encountered above the bedrock surface a sample will be collected. From two of the locations, collect 1 groundwater grab sample, if the water table is encountered.

Step 5D. Conduct GPR survey to map footprint of Lube Oil UST **(Figure 5-3**). Advance 1 direct push location. Collect 1 surface soil sample and up to 4 subsurface soil samples (0.5-20 ft bgs). One of the subsurface soil samples will be collected from the interface above the top of the bedrock. If the water table in encountered above the bedrock surface a sample will be collected Collect 1 groundwater grab sample, if the water table is encountered.

Step 5E. Advance 1 direct push location near access door at Radome Buildings 206, 208, 209, 211, and 212 (**Figure 5-4**), 5 total locations. At each location collect 1 surface soil sample and 1 subsurface soil sample at the soil/bedrock interface. If the water table in encountered above the bedrock surface a sample will be collected. Collect 1 groundwater grab sample at each location, if the water table is encountered.

Step 5F. Advance 2 direct push locations at septic systems associated with Buildings 204, 211, 212, and 213. (**Figure 5-5**), 8 total locations. At each location collect 1 surface soil sample and up to 2 subsurface soil samples (2-15 ft bgs). At each septic tank collect 1 groundwater grab sample, if the water table is encountered. Locate septic tank and collect 1 sludge sample.

Step 5G. Advance 1 direct push location at the approximate location of PCB contaminated oil observed during a water line repair in 1989 (**Figure 5-5**). Collect 1 surface soil sample and up to 4 subsurface soil samples (0.5-20 ft bgs). One of the subsurface soil samples will be collected from the interface above the top of the bedrock. If the water table in encountered above the bedrock surface a sample will be collected. Collect 1 groundwater grab sample if the water table is encountered.

Step 5H. Advance up to 3 locations at the Fuel Tanks/Coal Yard/Coal Yard Runoff Area (**Figure 5-6**). Collect 1 surface soil sample and up to 4 subsurface soil samples at each location (0.5-20 ft bgs). Samples will be collected at interpreted areas of impact based on visual observations and photo-ionization detector screening. At each drill location, collect 1 groundwater grab sample, if the water table is encountered.

Step 5I. Advance up to 3 locations at the Water Treatment Plant/Septic Tank/Weld Shop Area (**Figure 5-6**). Collect 1 surface soil sample and up to 4 subsurface soil samples at each location (0.5-20 ft bgs). Samples will be collected at interpreted areas of impact based on visual observations and photo-ionization detector screening. At each drill location, collect 1 groundwater grab sample, if the water table is encountered.

Step 5J. Advance up to 3 locations at the Water Treatment Plant/Septic Sand Filter Area (**Figure 5-6**). Collect 1 surface soil sample and up to 4 subsurface soil samples at each location (0.5-20 ft bgs). Samples will be collected at interpreted areas of impact based on visual observations and photo-ionization detector screening. At each drill location, collect 1 groundwater grab sample, if the water table is encountered.

Step 5K. Advance 1 location at the Former Auto Storage Building in an area of a drain discharge point (**Figure 5-6**). Collect 1 surface soil sample and up to 4 subsurface soil samples (0.5-20 ft bgs). Samples will be collected at interpreted areas of impact based on visual observations and photo-ionization detector screening. Collect 1 groundwater grab sample, if the water table is encountered.

Step 5L. Advance up to 3 locations at the Former Auto Maintenance/Motor Pool/2,000-gallon UST (**Figure 5-6**). Locations target a former dry well, downgradient location of the building, and near the tank grave. Collect 1 surface soil sample and up to 4 subsurface soil samples at each location (0.5-20 ft bgs). Samples will be collected at interpreted areas of impact based on visual observations and photo-ionization detector screening. At each drill location, collect 1 groundwater grab sample, if the water table is encountered.

Step 5M. Advance 1 boring location at the Former Fire Station Building (**Figure 5-6**). Collect 1 surface soil sample and up to 4 subsurface soil samples (0.5-20 ft bgs). Samples will be collected at interpreted areas of impact based on visual observations and photo-ionization detector screening. Collect 1 groundwater grab sample, if the water table is encountered.

Step 5N. Advance up to 2 boring locations at the Former Maintenance Shop (**Figure 5-6**). Collect 1 surface soil sample and up to 4 subsurface soil samples at each location (0.5-20 ft bgs). Samples will be collected at interpreted areas of impact based on visual observations and photo-ionization detector screening. At each drill location, collect 1 groundwater grab sample, if the water table is encountered.

Step 5O. Advance 1 boring location at the Site of a 2,000-gallon tank (use unknown) (**Figure 5-6**). Collect 1 surface soil sample and up to 4 subsurface soil samples (0.5-20 ft bgs). Samples will be collected at interpreted areas of impact based on visual observations and photo-ionization detector screening. Collect 1 groundwater grab sample, if the water table is encountered.

Step 5P. Advance up to 4 boring locations at the Former Radio Receiver Building around a former AST cradle (**Figure 5-7**). Samples will be collected at interpreted areas of impact based on visual observations and photo-ionization detector screening. Collect 1 surface soil sample and up to 3 subsurface soil samples at each location (0.5-20 ft bgs).

Step 6. For each direct push boring location log soils, fill out field data records and chain of custody.

Step 7. Preserve and ship samples to subcontract laboratory for analysis.

Step 8. Survey each sampling location using sub-meter GPS methods.

Step 9. Update FUDSChem to rectify deviations as needed.

5.1.3 Hilltop Area, Northern Industrial Area, and Former Small Arms Range - Surface Soil Investigation

Surface soil sampling for PCBs will be completed at former transformer pad and transformer pole locations in the Hilltop Area and Northern Industrial Area (see **Figures 5-8 and 5-9, respectively**). Ten transformer pads and four transformer pole locations will be investigated as potential source areas in the Hilltop Area. Additionally, two transformer pole locations will be investigated in the Northern Industrial Area.

Surface soil sampling and concrete pad sampling for PCBs, will be conducted in the following steps.

Step 1. Survey (visually inspect) concrete pad, pad area, and pole areas for indications of surface or soil staining.

Step 2A. Collect up to 4 surface soil samples around each of 10 transformer pad (**Figure 5-8 and 5-9**). Log soils, complete field data records, and chain of custody.

Step 2B. Scrabble or chip concrete pad surface in areas of staining and collect one concrete sample at each of 10 transformer pads. If no staining noted, sample will be collected from center of pad. Complete field data records, and chain of custody.

Step 2C. Collect one surface soil sample at each of 6 transformer pole location (**Figure 5-8 and 5-9**). Log soils, complete field data records, and chain of custody.

Step 2D. Collect one surface soil sample at each possible discharge pipe associated with Building 212 and 213 (**Figure 5-2**). Locate outfall, logs soils complete field data records and chain of custody. Evaluate easterly trending aboveground pipe trench associated with Building 212. Collect one surface soil sample at discharge location if found.

Step 2E. Collect up to 10 surface soil samples at 5 mapped drum locations (**Figure 5-2**) and at 5 optional drum locations. Screen Hilltop Area for additional drums. Log soils, complete field data records, and chain of custody.

Step 3. Preserve and ship samples to subcontract laboratory for analysis.

Step 4. Stake each surface soil location and survey with sub-meter GPS methods.

Step 5. Update FUDSChem to rectify deviations as needed.

Figure 5-10 shows the location of the Former Small Arms Range. Surface soil screening for the presence or absence of lead will be completed at the proposed locations depicted on **Figure 5-4**. Screening for lead will be completed with an InnovX Systems Alpha-4000 Metal Analyzer (or equivalent) in the field. Screening of surface soils will be completed in the following steps.

Step 1. Survey the area depicted in **Figure 5-10**. Document the location of berm.

Step 2. Establish survey grid with sub-meter GPS. Stake each location.

Step 3A. Collect up to 48 surface soils and screen for lead with a Metal Analyzer (**Figure 5-10**). Record values. Log soils and fill out field data records. Transcribe results to a spreadsheet file. Screen surface samples with X-Ray Fluorescence (XRF) for presence or absence of lead.

Step 3B. Collect up to 10 surface soil samples for off-site laboratory analysis of metals. Samples for off-site laboratory analysis were selected using https://www.calculator.net/random-number-generator.html (comprehensive version generator). Locations are shown on **Figure 5-10.**

Step 4. Preserve and ship samples to subcontract laboratory for analysis.

Step 5. Update FUDSChem to rectify deviations as needed.

5.2 Groundwater Investigation

Groundwater investigations will be conducted at both on-Site and at six off-Site residential properties. Residential groundwater sampling will be contingent on obtaining rights of entry by the USACE COR. Samples will be analyzed for the parameters listed in **Table 5-2**. Groundwater sampling is described in the following subsections.

5.2.1 Correctional Facility Supply Well Sampling

Groundwater samples will be collected from three Correctional Facility bedrock supply wells and one well that served a former restaurant. The former restaurant is currently owned by the Correctional Facility. **Figure 5-11** shows the location of each well. Sampling will be conducted in the following steps.

Step 1. Obtain rights of entry from the Correctional Facility.

Step 2. Inspect the condition of each well. Survey the well location with sub-meter GPS.

Step 3. Document the water system layout. Note water treatment systems if present.

Step 4. Identify a spigot, faucet, or sampling port before treatment to use as the sampling point.

Step 5. Purge system and record parameters.

Step 6. Collect a groundwater sample for analysis of VOCs, SVOCs, PCBs, and metals.

Step 7. Preserve and ship samples to subcontract laboratory for analysis.

Step 8. Complete field data records and chain of custody.

Step 9. Update FUDSChem to rectify deviations as needed.

A bedrock well is located within the footprint of the Former Radio Receiver Building. Little is known about the former well. The building was used after the DoD disposed of the property and is not eligible for investigation under the FUDS program. However, if contaminants related to the former AST cradle are present in soils the COR will work consult with the owner of the property to potentially sample the well should it be in keeping with project data quality objectives.

5.2.2 Residential Water Supply Well Sampling

Six residential wells were identified for sampling. The estimated location of these wells and are shown in **Figure 5-11**. Four rounds of groundwater sampling will be completed on a quarterly basis beginning in the Fall of 2020 and ending in the Summer of 2021.

Sampling of the residential water supply wells will be completed in the following steps.

Step 1. Obtain rights of entry from homeowners.

Step 2. Schedule a convenient time to sample each homeowner well.

Step 3. Inspect the condition of each well. Survey the well location using sub-meter GPS.

Step 4. Document the water system layout. Note water treatment systems if present.

Step 5. Identify a spigot or faucet before treatment. If available, use as the sampling point by retreatment.

Step 6. Purge system and record parameters as per Standard Operating Procedure (SOP) 23 in the QAPP (Wood 2020c).

Step 7. Collect a groundwater sample for analysis of VOCs.

Step 8. Preserve and ship samples to subcontract laboratory for analysis.

Step 9. Complete field data records and chain of custody

Step 10. Update FUDSChem to rectify deviations as needed.

5.3 Seep Investigation

Seeps were identified near the base of the Hilltop Area and in the former transmitter area (see **Figure 5-12**) during a Site visit in October 2019. These areas of seep drainage were out of rock outcrop faces and exhibited low flowing seepage conditions. The purpose of seep sampling is to determine if bedrock groundwater discharging to the ground surface has been impacted by former Site operations in the Hilltop Area.

For the purposes of sampling, the Hilltop Area has been divided into four quadrants. Wood will survey each quadrant for the presence of seeps and sample up to eight seeps. Four rounds of seep sampling will be completed on a quarterly basis beginning in the Fall of 2020 and ending in the summer of 2021. Seep samples will be analyzed for VOCs and Extractable Petroleum Hydrocarbons (EPH)/ Volatile Petroleum Hydrocarbons (VPH).

The seep investigation will be completed in the following steps.

Step 1. Conduct seep location survey during the Spring of 2020.

Step 2. Map, mark, and conduct sub-meter GPS survey of identified seeps in each quadrant.

Step 3. Select up to 4 seeps per quadrant for sampling, base selection on highest observed flows and spatial distribution within each quadrant.

Step 4. Collect up to 16 seep samples per sample rounds for VOCs and EPH/VPH.

Step 5. Preserve and ship samples to subcontract laboratory for analysis.

Step 6. Complete field data records and chain of custody

Step 7. Update FUDSChem to rectify deviations as needed.

5.4 Rock Matrix Investigation

Rock coring will be completed at three locations within the footprint of the excavation of three former USTs (two 10,000 and one 8,000-gallon UST) in the Hilltop Area (**Figure 5-2**). Three of the five direct push locations will be re-established for collection of shallow rock core. Locations will be chosen based on direct push observations and sample results. Wood assumes up to 10 feet of overburden (using drive and wash casing method) and 10 feet of bedrock (using NX rock coring method) will be drilled at each location. One rock matrix sample will be collected from each rock core boring for analysis of VOCs and PCBs. Each boring will be abandoned and grouted up to the ground surface.

The rock matrix investigation will be completed in the following steps.

Step 1. Review direct push results and confer with USACE COR on location selection, base selection highest VOC/PCB concentrations near the bedrock surface. Note that each direct push location will have been established within the former tank grave using ground-penetrating radar.

Step 2. Excavate to top of bedrock and install each casing.

Step 3. Advance 10 feet of NX rock core at each location, collect one rock matrix sample from each location, total of 3.

Step 4. For each rock core location log rock, note fractures, fill out field data records and chain of custody.

Step 5. Preserve and ship samples to subcontract laboratory for analysis of VOCs and PCBs.

Step 6. Survey each sampling location using sub-meter GPS methods.

Step 7. Update FUDSChem to rectify deviations as needed.

6.0 Field Operations Documentation

6.1 Logbooks

A Site Logbook and Field Logbook will be used for daily record of events, observations, and measurements during field investigations. The Site logbook is the master log for recording activities during an investigation. Field logbooks provide data and observations which will enable field personnel to reconstruct field project events. Sufficient data and observations should be logged in the field logbook to enable reconstruction of field events and to provide sufficient evidence in the event of legal proceedings.

It is the responsibility of the Field Operations Leader (FOL) to maintain centralized daily logbook records of field events, milestones, observations, and measurements during field investigations. Members of the field team are responsible for maintaining complete records of their actions, observations, etc. in their logbooks and providing this information to the FOL at the end of each day. If observations and measurements are taken in an area where the field logbook may become contaminated or if the field personnel are spread over a large area, separate waterproof bound and numbered field logbooks may be maintained. Logbook entries should be signed and dated at the completion of each task or at the end of each day. Individual field logbooks are retained by the field team members until the logbook is filled or the completion of the project, at which time, possession of the logbooks is transferred to the FOL or project manager.

The title page of each logbook may contain the following:

- The logbook number
- Project name and project number
- Site name (Charleston AFS)
- Site address (1202 Dover Rd, Charleston, ME 04422)
- Logbook start date

The site logbook and field logbooks provide a daily hand-written account of field activities. Entries will be made in permanent black or blue ink. Errant field entries shall have a single line drawn through them and the correct data entered above or below the strikeout. Corrections shall be initialled and dated by the appropriate field personnel. Individual pages should never be removed from bound logbooks.

Each page of the logbook will be dated and signed by the person completing the log. Partially completed pages will have a line drawn through the unused portion at the end of each day. Pages left unintentionally or intentionally blank will also have a line drawn through page.

6.2 Site Logbook

The site logbook is a record of major tasks completed for each day or operation. Entries are made each day. The FOL responsible for on-site field operations will complete the site logbook. At a minimum the site logbook will contain the following information:

- A list of field logbooks created for the project;
- Names and titles of project related personnel present at the site during each day of operation;
- A brief summary of activities completed for each day of operation;
- A listing of changes made to established RI program procedures; and,
- A summary of problems encountered during the day including a description of corrective actions and impacts on the project.

6.3 Field Logbook

Field logbooks are daily records of field task activities that are entered in real time by the on-site field personnel. The following information is entered into the field logbooks:

- The date and time of each entry. The daily log should begin with weather conditions and the names and organizations of personnel performing the documented task;
- A summary of important tasks or subtasks completed during the day;
- A description of field tests completed in association with the daily task;
- A description of samples collected including documentation of any quality control samples that were prepared (rinse blanks, duplicates, matrix spikes, split samples);
- Documentation of equipment maintenance and decontamination activities; and,
- A summary of problems encountered during the day including a description of corrective actions and impacts on the daily task.

6.4 Field Data Records

Field Data Records (FDRs) will be completed during sampling activities to document conditions of the sample location, observations made during sampling activities at the specific location, start and end time of the specific location sample activity, samples collected and analytical parameters, and location specific drawing. The FDRs will be provided in the RI report. FDRs are located in the QAPP.

6.5 Sample Documentation

Sample documentation activities include assignment of sample identification numbers (IDs), sample labels, and completion of chains of custody.

6.5.1 Sample Numbering System

A unique sample identification will be assigned to each sample. Refer to Worksheet 18 in the QAPP (Wood 2020c).

Table 5-2 lists each sample identification. These designations were created in FUDSChem.

An example sample numbering nomenclature follows for a surface soil sample location in the Hilltop Area.

Example: CASF-02-SL001 where,

CAFS = Charleston Air Force Station

02 = Hilltop Transformer Pad

SL = surface soil location

001 = location 001

Other source area location designations include:

01 = Background Soils

02 = Hilltop Transformer Pads 1 through 10

03 = Hilltop Transformer Poles 1 through 4

04 = Hilltop 275 Gallon Waste Oil Tank

05 = Hilltop Former 8,500/10,000 Gallon Fuel Oil UST

06 = Hilltop Approximate Location of PCB Contaminated Oil (Water Line Repair 1989

07 = Hilltop Two 40,000 Gallon Fuel Oil USTs

08 = Hilltop Lube Oil UST

09 = Hilltop Former Radome Buildings

10 = Hilltop Septic Systems Buildings 204, 211, 212 and 213

11 = Hilltop Possible Discharge Pipes 212 and 213

12 = Hilltop Drum Location 1 through 10

13 = Small Arm Range

14 = Industrial Area Fuel Tanks/Coal Yard/Coal Yard Runoff Area

15 = Industrial Area Water Treatment Plant/Septic Plant/Weld Shop Area

16 = Industrial Area Water Treatment Plant/Septic Sand Filter Area

17 = Industrial Area Auto Storage Building

18 = Industrial Area Auto Maintenance Shop/Motor Pool and Former 2,000 Gallon UST

19 = Industrial Area Fire Station Building

20 = Industrial Area Maintenance Shop

21 = Industrial Area Location of 2,000 Gallon Tank

22 = Industrial Area Transformer Poles 5 and 6

23 = Former Radio Receiver Building

24 through 27 = Seep Sampling Location Quadrants

28 = Correctional Facility Supply Wells and Old Restaurant Well

29 = Residential Wells

Other location type designations include:

CC = concrete chip

GW = groundwater grab

PH = direct push

PW = private well

RC = rock chip

RE = residential well

SE = seep

SL = surface location

TK = tank

TB = trip blank

EB = equipment blank

6.5.2 Sample Labels

Each sample container will be labelled. Each label will include the location identification, sample ID, analytical parameters requested, preservative, a unique sample tracking number, date and time collected. Sample labels will be created in FUDSChem.

6.5.3 Chain of Custody

Chain of custody procedures will be followed in accordance with ASTM D4840-95: Guide for Sampling Chain-of-Custody Procedures and USEPA Region 4 "Environmental Investigations SOPs and Quality Assurance Manual," May 1996 Including 1997 Revisions.

Procedures used for completion of chain of custody are outlined in SOP S-8 "Sample Chain of Custody Procedure" (Wood, 2020c).

Sample labels and Chain of Custody forms will be generated from FUDSChem. Chain of Custody information will be uploaded to FUDSChem within 5 business days of sample collection.

6.6 Data Management

Location IDs and field sample IDs will be pre-loaded in FUDSChem prior to sampling and label sheets and COCs will be produced from FUDSChem. Collected samples will have COC details uploaded into FUDSChem within 5 days of collection. Wood has prepared an eQAPP in FUDSChem with the validation DQO criteria for the analytical data. The laboratory will upload the analytical EDDs to FUDSChem in SEDD format. Following error free submission of chemistry data by contract laboratories that is consistent with the hardcopy data packages, this analytical data will be independently and automatically evaluated for data usability using the Automated Data Review (ADR) module in FUDSChem. After ADR evaluation, the Wood chemist will review the FUDSChem qualifiers and certify the EDD as complete and ready for approval by the Army Corp chemist.

To the extent possible, FUDSChem will be the permanent repository of site data. Tabular data will be uploaded to the appropriate tables in FUDSChem and scanned hardcopy data (as PDF files) will be stored in the library. Examples of site data to be loaded include field sheets, water levels, boring logs, GIS figures and survey data. Timing and data required for loading into FUDSChem are outlined in the NAE FUDSChem Data Management Plan (2016).

Wood will also prepare and upload data from FUDSChem to the MEDEP's EGAD system. Submittals to the MEDEP will include location coordinates, sample IDs will match EDD sample IDs. Lab reports will be submitted with the EDD.

7.0 Sample Packaging and Shipping Requirements

SOP have been established for shipping samples collected during environmental field investigation/remediation activities. This SOP applies to environmental samples including drinking water, groundwater, surface water samples, soil, and sediment samples, and treatment plant samples. Procedures used for completion of chain of custody are outlined in SOP S-7 "Sample Packaging and Shipment" which is included in the QAPP.

Wood may also use courier service provided by the contracted analytical laboratory for shipment of samples to the laboratory.

8.0 Investigation Derived Wastes

Soil investigation derived wastes will be tested and disposed of according to existing requirements by USACE, State, and Federal requirements. Analytical testing methods are outlined in the QAPP. Wood and its subcontractors will containerize waste, label and prepare manifest for shipping. Manifests will be signed by a USACE representative or approved Wood designee, if needed, so that originals and comeback copies can be filed appropriately with the State of Maine.

9.0 Field Assessment and Inspection Procedures

Field assessments and inspections include field sampling procedural audits, field sampling, health and safety audits, and field sampling equipment calibration.

9.1 Contractor Quality Control

Field assessments and inspections will follow the schedule outlined in Worksheet 31, 32, and 33 “Planned Project Assessments Table” in the QAPP.

9.2 Field Instrumentation Calibration

Instrumentation used to record in-situ parameters during sampling activities will be calibrated as described in SOP S-3, “Calibration of Field Instrumentation for Water Quality Parameters”, SOP S-16, “Calibration Procedure for Photo-Ionization Detector” and SOP S-19 “ XRF Analysis” in the QAPP.

10.0 Non-Conformance and Corrective Actions

Assessment findings and corrective actions will be performed as described in Worksheet 32, Assessment Findings and Corrective Action Responses” in the QAPP.

11.0 Risk Assessment

This section describes the initial human health risk assessment (HHRA) and ecological risk assessment (ERA) activities to be conducted at the Site.

As discussed on January 7th, 2020, the scope of the risk assessments at this stage of the project is limited to identifying the presence or absence of contamination above risk-based thresholds, and to help identify migration pathways. The risk assessments will compare site data to screening levels and benchmarks. This initial risk screening step consists of comparing exposure concentrations to human health screening levels and ecological benchmarks, and to background levels. The results of the risk screening will identify areas and chemical classes where more samples and analyses are needed (results above screening levels, and background if applicable). The additional samples would be collected to support quantitative risk assessments. This risk assessment work plan provides the preliminary CSM, which is based on the current understanding of site history and will be updated as the RI progresses, and the initial methodology necessary to complete the risk screening. The risk assessment CSM and methodology will be refined in a further work plan if chemicals are identified greater than screening levels and the site progresses to a quantitative risk assessment. **Figure 11-1** presents a flowchart of how the data will be used and evaluated as part of each risk assessment.

At this time, the risk assessment portion of the Work Plan consists only of the preliminary CSM and a discussion of appropriate screening levels and is based on the current understanding of site history.

11.1 Preliminary Conceptual Site Model

The potential human and ecological exposure pathways and receptors are discussed below in the context of the physical CSM. The human health CSM (**Figure 11-2**) and ecological CSM (**Figure 11-3**) identify source areas, potential migration and exposure pathways, and potential receptors that may be exposed to chemicals in environmental media.

The preliminary CSMs are based on the current understanding of the site history and current and potential future land use. There have been no investigations at this site for which analytical data is available. The only analytical data obtained is from one of the three bedrock correctional facility water supply wells, in which TCE and cis-1,2-DCE were detected (below the MCL). The correctional facility and wells are located inside the former property boundary. Sources, potential migration pathways, exposure routes, and receptors are considered preliminary and will be updated as additional information becomes available throughout the investigation process.

Sources

- Waste solvents (including TCE and cis-1,2-DCE) and fuels including PCBs are anticipated. The investigation will largely focus on collection of soil data, water from seeps, and groundwater at several residences off-site.

Migration pathways

- Leaching, wind dispersion, and volatilization may be relevant. The presence or absence of contamination and migration pathways will be evaluated and presented in the updated CSM

Human Health Exposure Scenarios (potential receptors and exposure pathways)

- Current Correctional Facility Resident - ingestion and dermal contact with surface soil, and inhalation of fugitive dusts on-site, potable use of supply well groundwater (ingestion of groundwater as tap water, and dermal contact and inhalation while showering).
- Current on-site trespasser/recreator - ingestion and dermal contact with surface soil, and inhalation of fugitive dusts, through walking/hiking, and ingestion and dermal contact with surface water from seeps, and inhalation of volatiles from surface water if applicable.

- Current and future on-site commercial/industrial worker - ingestion and dermal contact with surface soil, and inhalation of fugitive dusts,
- Current off-site resident – potable use of groundwater (ingestion of groundwater as tap water, and dermal contact and inhalation while showering).
- Future on-site construction/excavation worker - ingestion and dermal contact with surface and subsurface soil, groundwater, seeps, and inhalation of fugitive dusts,
- Hypothetical future on-site resident – ingestion and dermal contact with surface and subsurface soil (assuming potential regrading) and inhalation of fugitive dusts and potable use of groundwater (ingestion of groundwater as tap water, and dermal contact and inhalation while showering).

Inhalation of volatiles may be considered if relevant based on the results of the investigation. Site-specific evaluation of receptors at the on-site correctional facility will be further evaluated for relevance based on the nature and extent of contamination identified during the investigation.

Ecological Exposure Scenarios (potential receptors and exposure pathways)

Chemicals may move from surface soil to ecological receptors through several major biological exposure mechanisms:

- Root uptake from chemicals in soil (upland plants)
- Direct contact with chemicals in soil (soil invertebrates)
- Incidental ingestion of chemicals in soil (birds, mammals)
- Ingestion of chemicals in soil via the food chain (birds, mammals)

Although inhalation and dermal absorption pathways are possibly complete for some receptors, these pathways are considered to be minor compared to uptake and dietary ingestion (Sutter, 1993) and will not be evaluated.

Chemicals may move from seep water to ecological receptors through several major biological exposure mechanisms:

- Uptake from chemicals in seeps via leaf or shallow roots (seep plants)
- Direct contact with chemicals in seeps (aquatic invertebrates)
- Incidental ingestion of chemicals in seeps (birds, mammals)
- Ingestion of chemicals in seeps via the food chain (birds, mammals)

It is noted that there are no significant water features and that the only features are manmade storm water retention ponds and infrastructure and a not considered habitat.

11.2 Human Health Risk Assessment

The HHRA will be completed under USEPA guidance documents published pursuant to the CERCLA, including the below. A full list of guidance used will be provided in the report:

- Risk Assessment Guidance for Superfund (RAGS). Volume 1: Human Health Evaluation Manual (Parts A, D, E and F) (USEPA, 1989; 2001; 2004; 2009a)

Site data will be compared to the federal and risk-based screening values. Screening values will be selected from published literature and guidance developed based on generic human health exposure scenarios. They are based on conservative exposure assumptions, which are intended to provide a level below which no further evaluation would be necessary. Concentrations above the screening levels do not necessarily constitute unacceptable risk but indicate that further evaluation is necessary. USEPA screening values are not intended for use as clean-up criteria.

Selected human health screening values are the lower concentration per media and chemical from the following sources:

1) USEPA RSL for residential and commercial/industrial exposure, based on a target (ELCR) of 1×10^{-6}. May 2020 (USEPA, 2020).
2) Preliminary Remediation Goals (PRGs) for Radionuclides (USEPA, 2020).

The current phase of work does not include a vapor intrusion (VI) study goal, however the VI pathway will be qualitatively considered to identify if it is a potentially complete pathway. If VOCs are detected in groundwater or soil and the vapor migration and exposure pathway is potentially complete, then VI may be pursued quantitatively. Therefore, vapor intrusion screening levels are not required for this phase of work, but may be applied if a subsequent field effort includes evaluation of VI as a study goal.

No exposure assessment will be completed during RI work, although data may be evaluated within “exposure areas” if deemed appropriate (e.g. industrial area vs hilltop). The exposure areas will be identified based on the results obtained during the investigation.

It is noted that the PALs have been developed using the USEPA RSL, based on a target Hazard Quotient (HQ) of 0.1 and a target ELCR of 1×10^{-6}. Reporting limits selected using the lower target HQ provide sufficient data quality for selection of Chemicals of Potential Concern (COPCs), should the risk assessment progress to a CERCLA-compliant Baseline Human Health Risk Assessment (BHHRA). **Table 11-1** provides the human health and ecological screening values that were used in development of PALs to identify appropriate reporting limits.

11.3 Ecological Risk Assessment

The ERA is being completed under USEPA guidance documents published pursuant to the CERCLA, including:

- Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (USEPA, 1997)
- Framework for Ecological Risk Assessment (USEPA, 1992)
- Guidelines for Ecological Risk Assessment (USEPA, 1998)
- The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments (BERA), ECO Update (USEPA, 2001)
- ECO Updates published between 1991 and 2008 (USEPA 1991-2008)
- RAGS, Volume II: Environmental Evaluation Manual (USEPA, 1989)
- Wildlife Exposure Factor Handbook Volumes I and II (USEPA, 1993)

Under the current ERA scope, site soil data will be compared to risk-based screening values selected from the sources listed below in the order of preference **(Table 11-1)**:

1) USEPA Ecological Soil Screening Levels (USEPA, 2003b-2007)
2) Los Alamos National Laboratory (LANL) No Effects Levels (LANL, 2017)
3) USEPA Region 5 Ecological Screening Levels (USEPA, 2003a)
4) USEPA Region 4 Ecological Soil Screening Values for Soil (USEPA, 2018).

Only data from surface soil samples collected from within the zone of biological activity (i.e. the top 2 feet) will be evaluated (USEPA, 2015).

Site seep data will be compared to risk-based screening values for surface water selected from the sources listed below in the order of preference **(Table 11-1)**:

1) USEPA freshwater chronic Ambient Water Quality Criteria (USEPA, 2020)
2) *Characterizing Risks Posed by Petroleum Contaminated Sites* (MassDEP, 2002) for EPH/VPH only.
3) USEPA Region 4 Freshwater Screening Values (USEPA, 2018)\

PCBs will be assessed as outlined in *Framework for Application of the Toxicity Equivalence Methodology for Polychlorinated Dioxins, Furans, and Biphenyls in Ecological Risk Assessment* (USEPA, 2008). In this approach, congeners will be the principal line of evidence, as these are individual chemicals, whereas Aroclors are mixtures of chemicals which would have degraded over time. The congener analysis is performed by multiplying each congener concentration by a toxicity equivalence factor (TEF) so that toxicity of each congener is expressed in terms of 2,3,7,8 -TCDD. 2,3,7,8 -TCDD is most toxic of the dioxin/PCB congeners. Most of the congeners of interest are approximately three orders of magnitude less toxic than TCDD (i.e., a TEF of 0.0001 or 0.0003). The TEF-adjusted congener concentrations are then summed to calculate a toxicity equivalence quotient (TEQ) which expresses all the congener concentrations as a single soil concentration in terms of 2,3,7,8 -TCDD. This TEQ concentration is then compared to an ecological soil screening benchmark for 2,3,7,8 -TCDD. Where a given congener is not detected, the 1/2 reporting limit will be used in the calculation. As part of the uncertainty discussion in the risk assessment report, a brief quantitative sensitivity analysis can be performed by using the full detection limits instead. However, because the TEFs are so low, congeners would need to be detected at tens to hundreds of times above the PAL in order to contribute any meaningful level of toxicity. In other words, congener DLs above PALs are not anticipated to be a significant issue.

Ecological exposure areas will be identified based on the results obtained during the investigation. Field investigations will also determine the size and location of seeps and whether they provide standing water for sufficient amounts of time for significant aquatic communities to develop, or attract birds and mammals, i.e. whether seep exposure pathways are complete. Concentrations above the screening levels do not necessarily constitute unacceptable risk but indicate that further evaluation is necessary. Screening values are not intended for use as clean-up criteria.

12.0 Reporting

Wood will complete an RI report in accordance with CERCLA and USACE-NAE guidance. A Draft document will be produced for USACE-NAE review, following analysis of the last quarterly round of groundwater sampling. Draft Final and Final documents will be produced for USACE-NAE and stakeholder review.

The objectives of the RI report are the following:

- Evaluate the presence/absence of contaminants released during former Charleston AFS practices and maintenance
- Evaluate potential human health and ecological exposure pathways to site-related contaminants by comparing chemical results to human health RSLs and ecological benchmarks
- Identify areas where further data collection is needed if characterization is not complete (data gaps).

The RI report will follow the standard CERCLA format. The report will summarize investigations and provide details on the execution of the SAP. Physical characteristics of the Site, the presence or absence of contamination, migration pathways and receptors will be evaluated and presented in an updated CSM.

The results of the human health and ecological screening level comparison will be presented in the RI report. Depending on the findings of the RI field investigation and the screening level comparisons, the risk assessment may advise that additional data collection is needed to address data gaps, to support further risk activities, to complete the RI, or inform a potential FS. The potential outcomes of the screening level evaluation will be:

1) Identification of areas where no further investigation or risk evaluation is necessary
2) Identification of areas where additional data collection is necessary to support a BHHRA and/or Screening Level Ecological Risk Assessment (SLERA) or BERA.

Outcomes may differ per area, if for example sufficient data is collected in one area to move ahead with a BHHRA, but more data collection is needed in another area. If the screening comparisons described herein indicate that additional sampling or risk assessment steps are required, a detailed risk assessment work plan will be developed upon authorization from the USACE.

If additional human health risk evaluation is required, the next step in developing a more robust human health risk assessment following additional data collection, will be a CERCLA compliant work plan, to support a BHHRA. A BHHRA would select COPCs, calculate Exposure Point Concentrations, evaluate potential risks for potentially complete exposure pathways for current and future land use, and if relevant select Chemicals of Concern (COCs) and calculate risk-based PRGs to support risk management decisions.

If additional ecological risk evaluation is required, the next step in the ecological risk assessment process is to complete a SLERA. The SLERA is necessary to meet the RI requirements for ecological risk assessment. The SLERA would identify complete exposure pathways, conduct a conservative assessment of chemicals of potential ecological concern (COPECs), eliminate from further consideration pathways and chemicals that represent minimal ecological risk, and document which exposure pathways and COPECs can be eliminated from additional consideration and which should be evaluated further as part of a BERA, if necessary. The SLERA may also provide sufficient information of which to base risk management decisions. The SLERA could be prepared with existing information if the screening comparison finds that no additional sampling is required.

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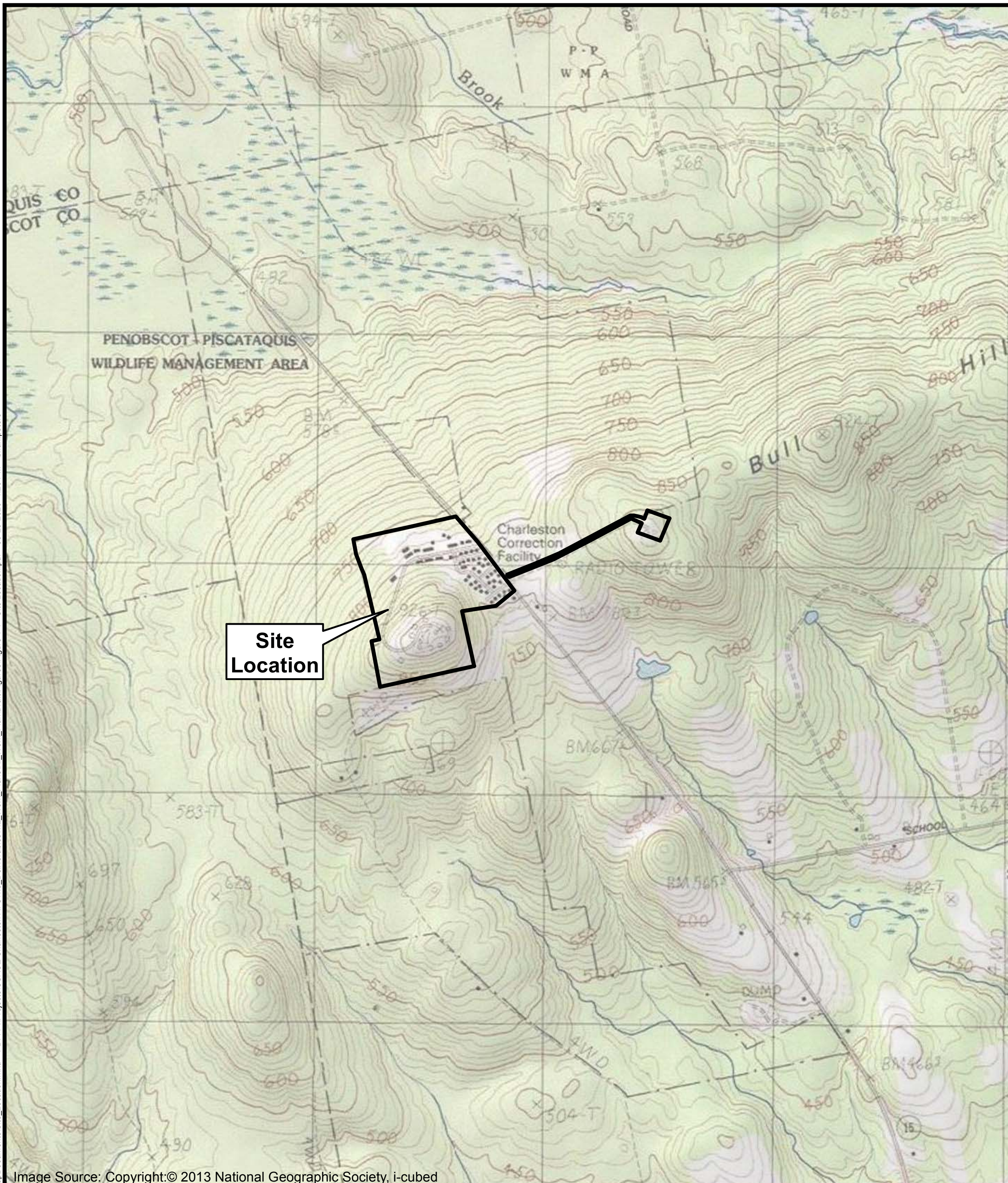
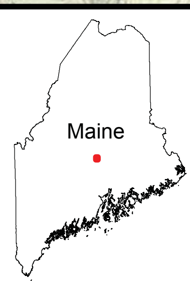
FIGURES





N

0 1,000 2,000
Feet

Figure 1-1
Site Location

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

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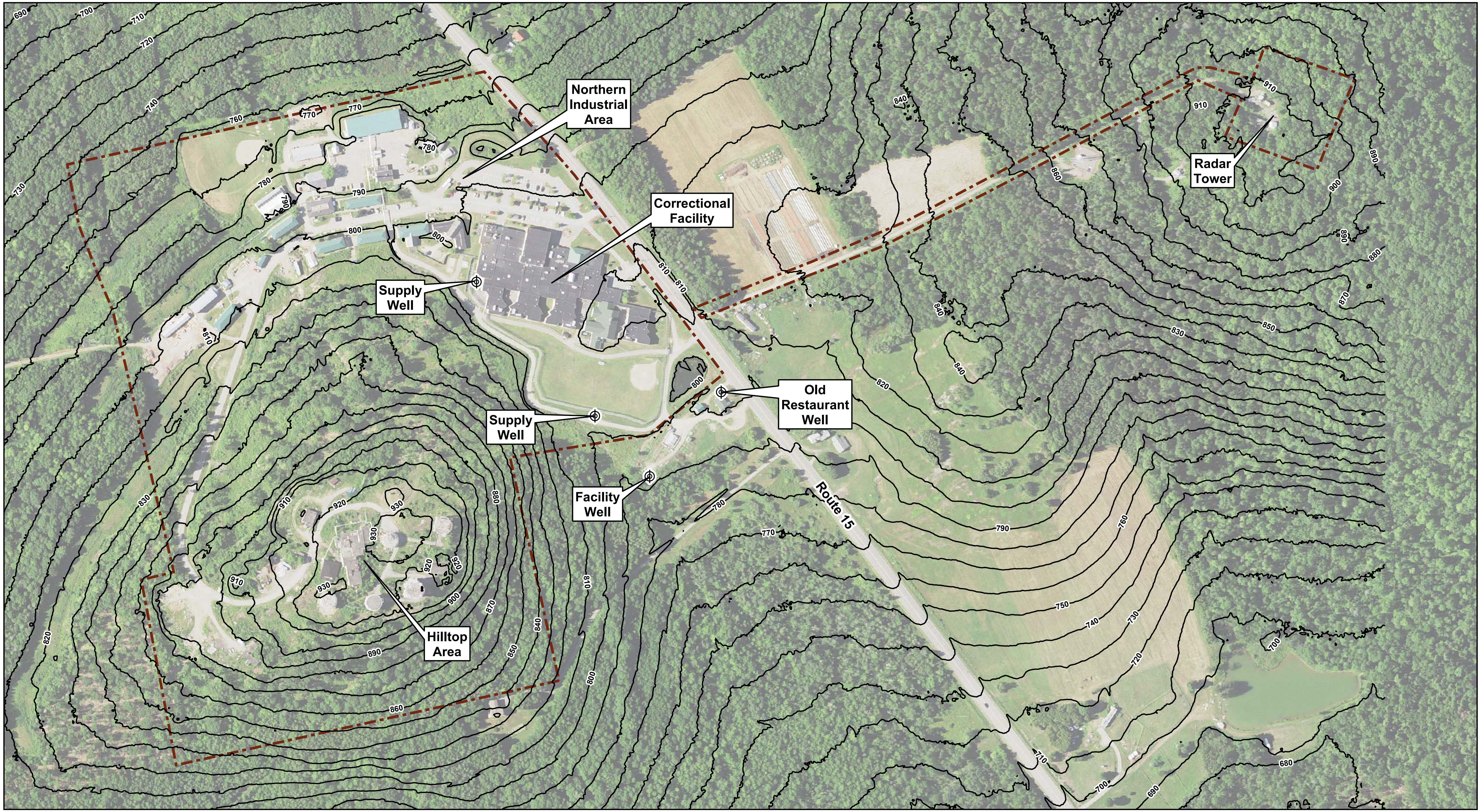

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wood.

Legend

- Approximate Supply Well Location
- 10 foot contour
- Approximate Property Boundary

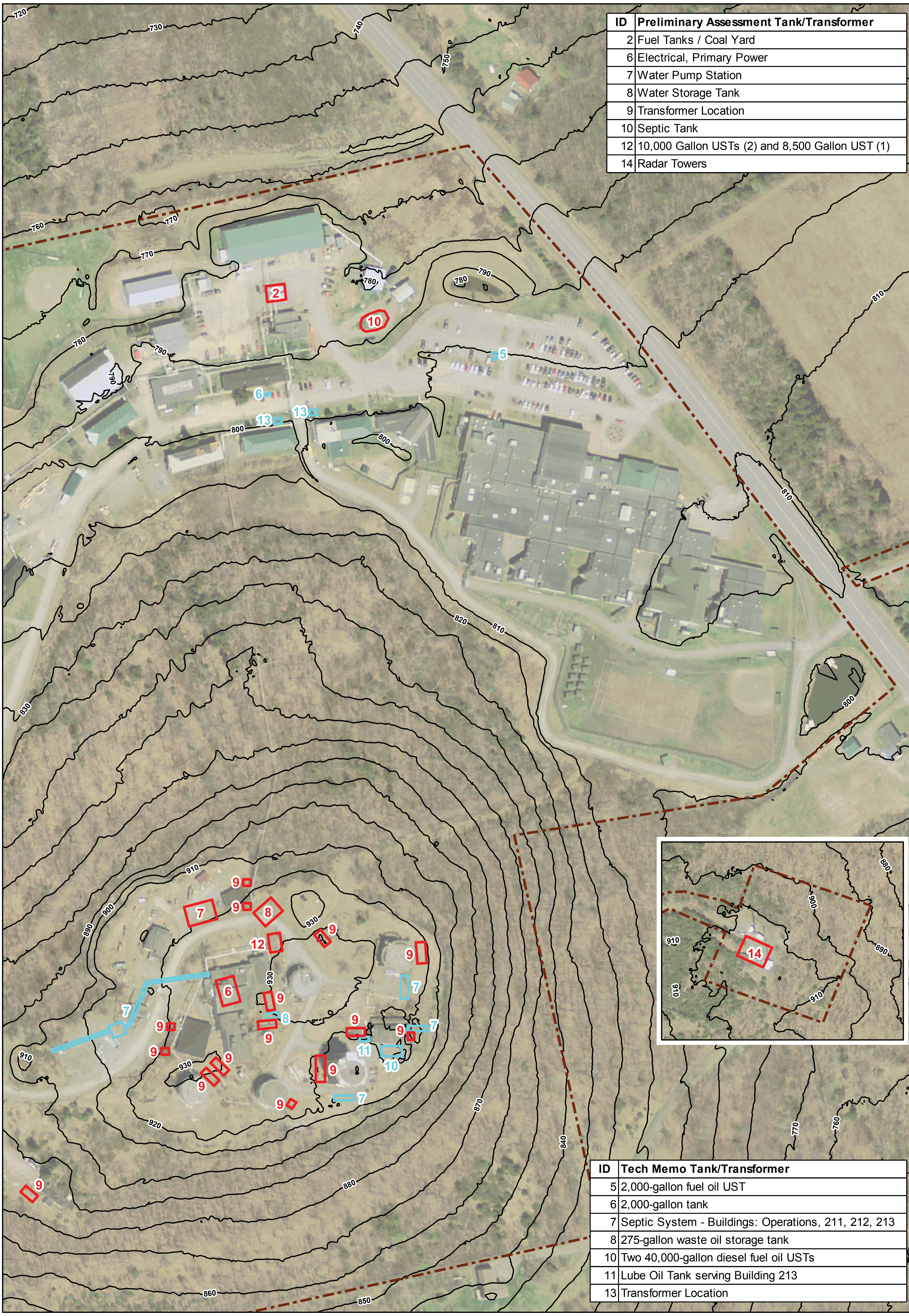
N

0 165 330 Feet

Prepared/Date: BRP 03-23-20	Checked/Date: SFC 03-23-20

Figure 1-2
Site Features

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine



ID	Preliminary Assessment Tank/Transformer
2	Fuel Tanks / Coal Yard
6	Electrical, Primary Power
7	Water Pump Station
8	Water Storage Tank
9	Transformer Location
10	Septic Tank
12	10,000 Gallon USTs (2) and 8,500 Gallon UST (1)
14	Radar Towers

ID	Tech Memo Tank/Transformer
5	2,000-gallon fuel oil UST
6	2,000-gallon tank
7	Septic System - Buildings: Operations, 211, 212, 213
8	275-gallon waste oil storage tank
10	Two 40,000-gallon diesel fuel oil USTs
11	Lube Oil Tank serving Building 213
13	Transformer Location

wood.

N

0 90 180 Feet

Legend

- Tank/Transformer (Preliminary Assessment)
- Tank/Transformer (Tech Memo)
- 10 foot contour
- Approximate Property Boundary

Figure 1-3
Location of Former
Tanks and Transformers

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

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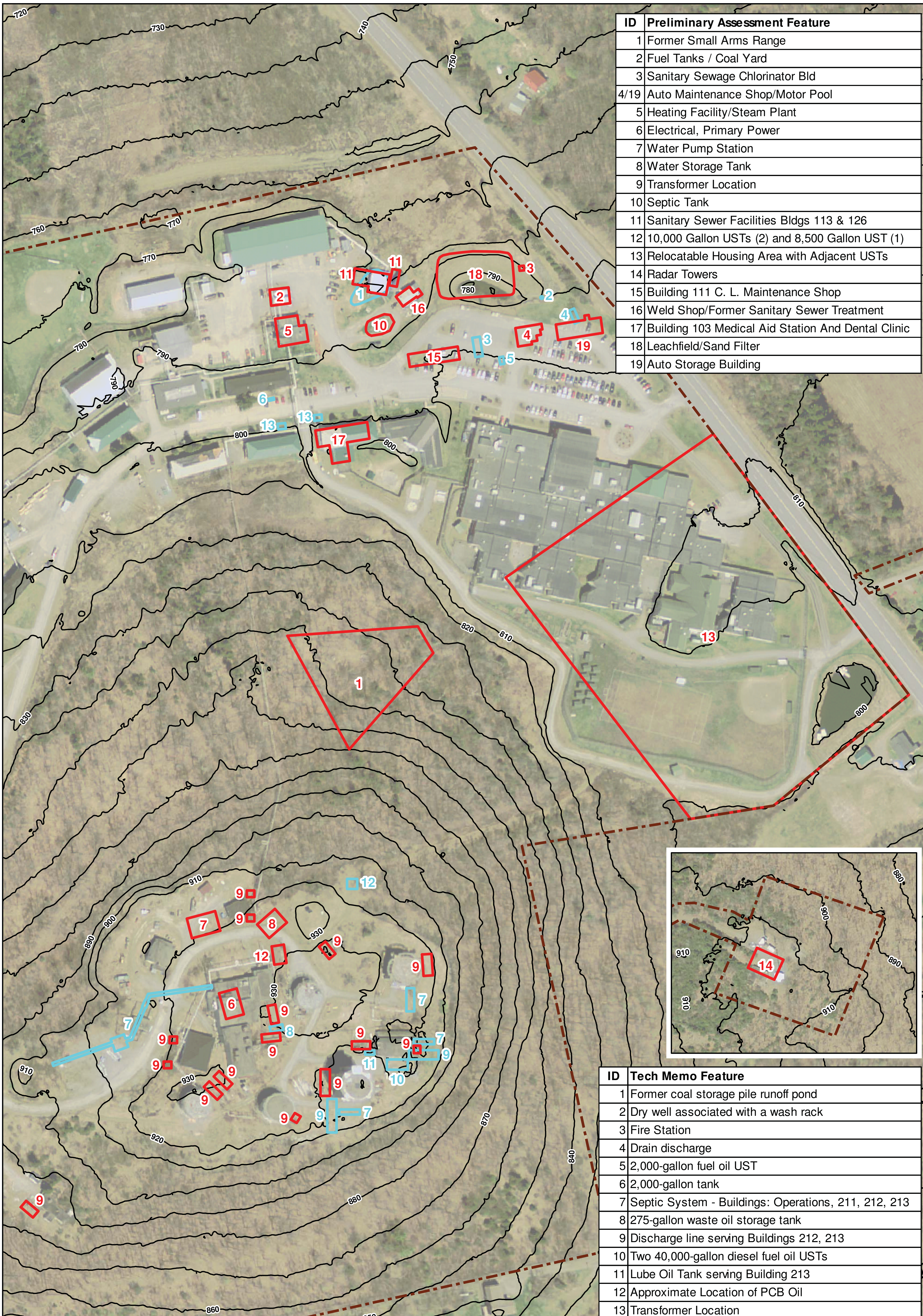

ID	Preliminary Assessment Feature
1	Former Small Arms Range
2	Fuel Tanks / Coal Yard
3	Sanitary Sewage Chlorinator Bld
4/19	Auto Maintenance Shop/Motor Pool
5	Heating Facility/Steam Plant
6	Electrical, Primary Power
7	Water Pump Station
8	Water Storage Tank
9	Transformer Location
10	Septic Tank
11	Sanitary Sewer Facilities Bldgs 113 & 126
12	10,000 Gallon USTs (2) and 8,500 Gallon UST (1)
13	Relocatable Housing Area with Adjacent USTs
14	Radar Towers
15	Building 111 C. L. Maintenance Shop
16	Weld Shop/Former Sanitary Sewer Treatment
17	Building 103 Medical Aid Station And Dental Clinic
18	Leachfield/Sand Filter
19	Auto Storage Building

ID	Tech Memo Feature
1	Former coal storage pile runoff pond
2	Dry well associated with a wash rack
3	Fire Station
4	Drain discharge
5	2,000-gallon fuel oil UST
6	2,000-gallon tank
7	Septic System - Buildings: Operations, 211, 212, 213
8	275-gallon waste oil storage tank
9	Discharge line serving Buildings 212, 213
10	Two 40,000-gallon diesel fuel oil USTs
11	Lube Oil Tank serving Building 213
12	Approximate Location of PCB Oil
13	Transformer Location

wood.

N

0 90 180 Feet

Legend

- Feature of Interest (Preliminary Assessment)
- Feature of Interest (Tech Memo)
- 10 foot contour
- Approximate Property Boundary

Figure 1-4
Location of Potential Source Areas

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

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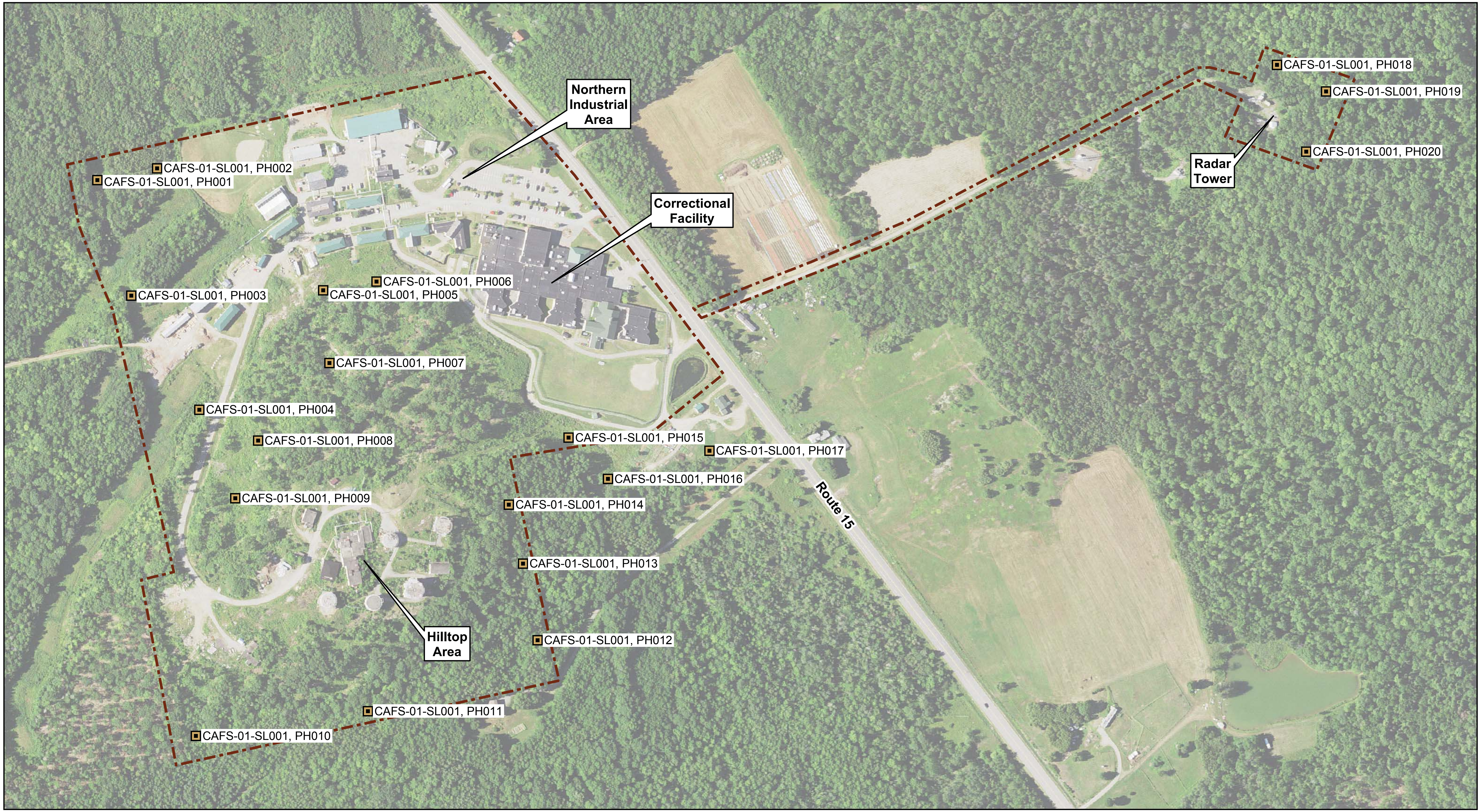

wood.

N

0 165 330 Feet

Legend

Proposed Background Soil Location

Approximate Property Boundary

Figure 5-1
Background Soil
Sample Locations

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

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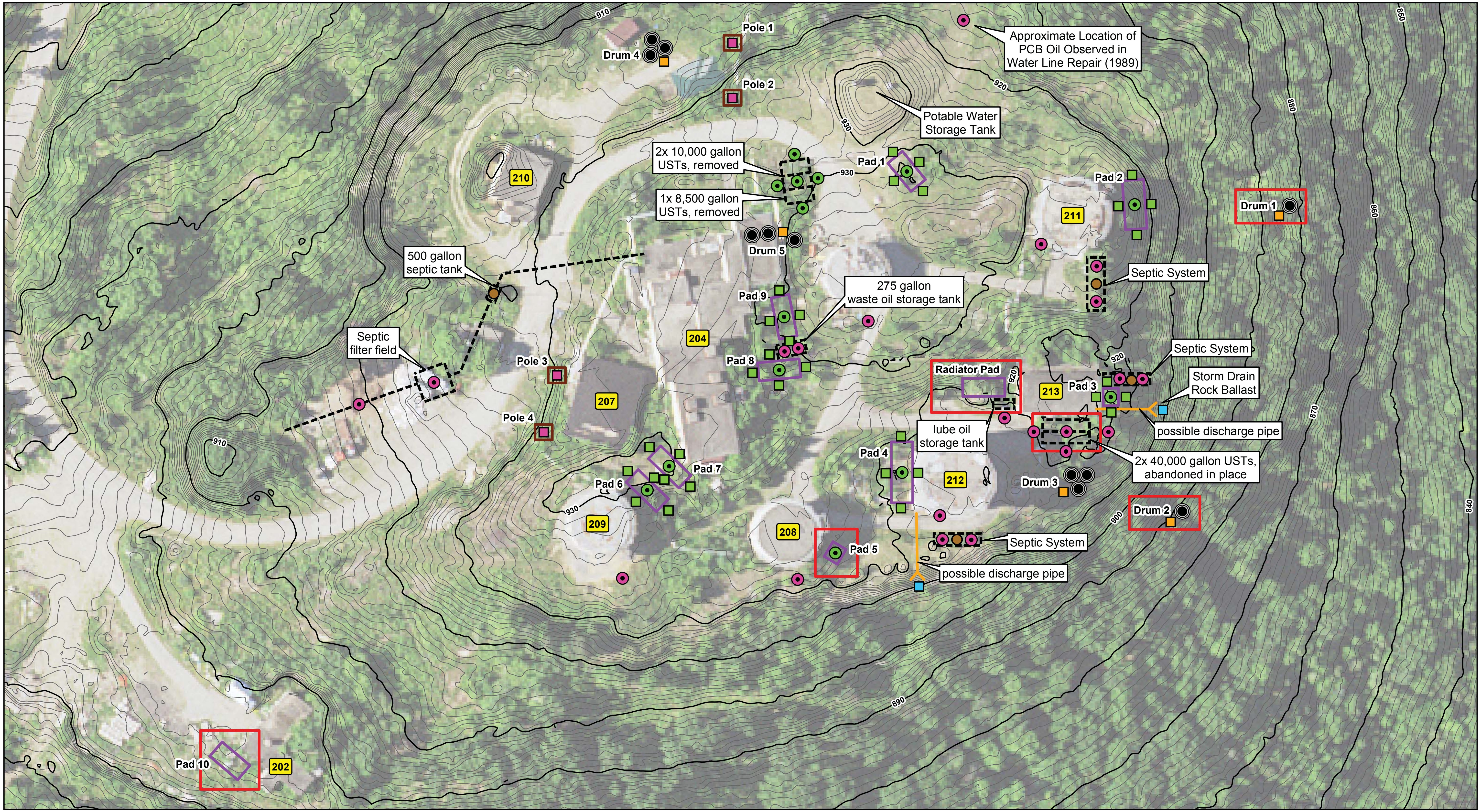

Legend

- SS - Transformer Side (32)
- SS - Transformer Pole (4)
- SS - Drum Composite (5)
- SS - Discharge Pipe (2)
- Sludge (4)
- DP - Transformer Center/ UST Side & Center (14)
- DP (21)
- Approximate Drum Location
- Approximate Transformer Pad Location
- Approximate Pole-mounted Transformer Location
- Approximate UST/Septic Location
- Additional Site Identified During Site Visit
- 10 foot contour
- 1 foot contour
- 209 Structure ID

wood.

N

0 40 80 Feet

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Figure 5-2
Hilltop Area
Soil Sample Locations

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

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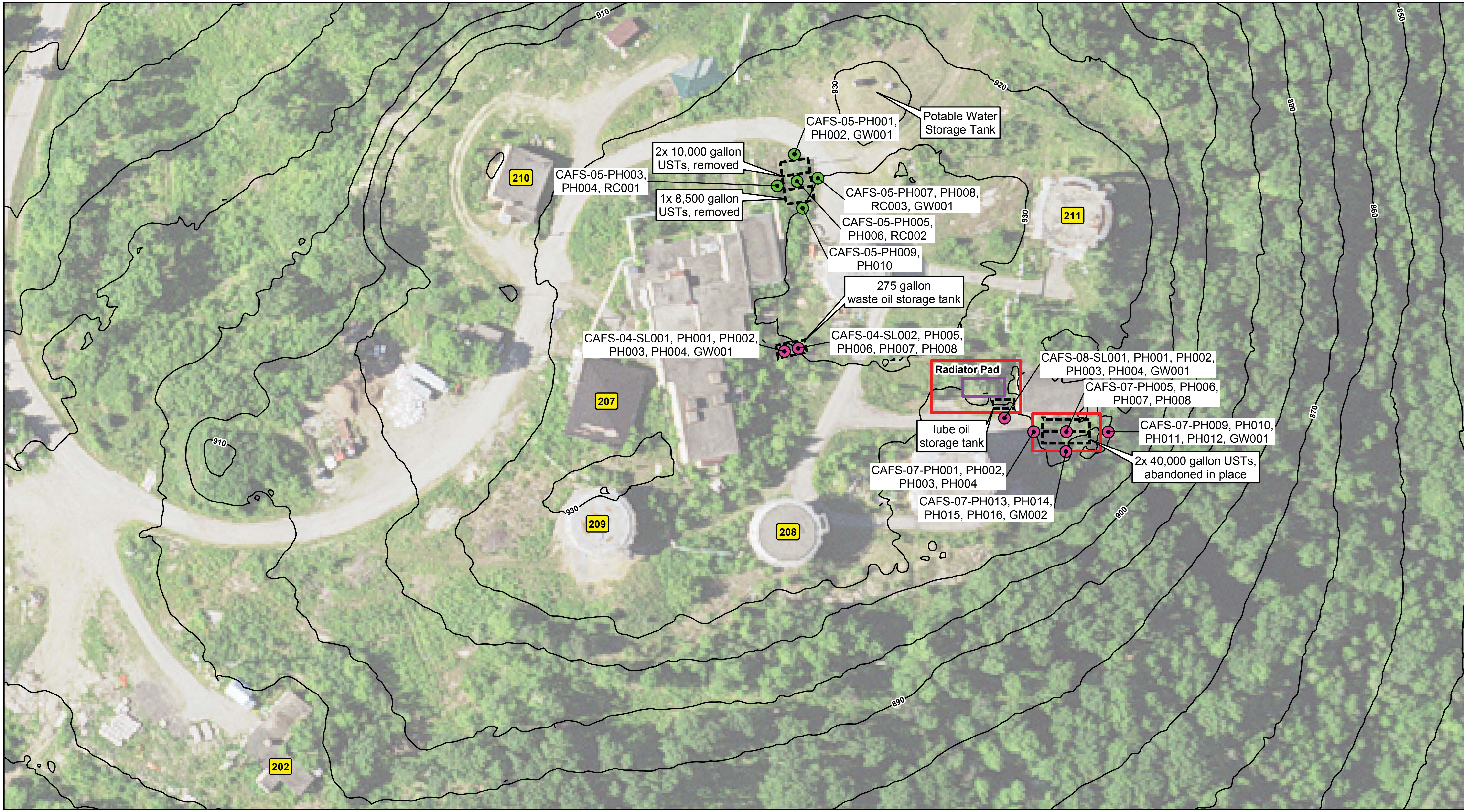

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wood.

N

0 40 80 Feet

Legend

- DP - UST Side & Center (5)
- DP (7)
- Approximate Transformer Pad Location
- Approximate UST Location
- Additional Site Identified During Site Visit
- 10 foot contour
- 209 Structure ID

Figure 5-3
Hilltop Area
Underground Storage Tank
Direct Push Locations
Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

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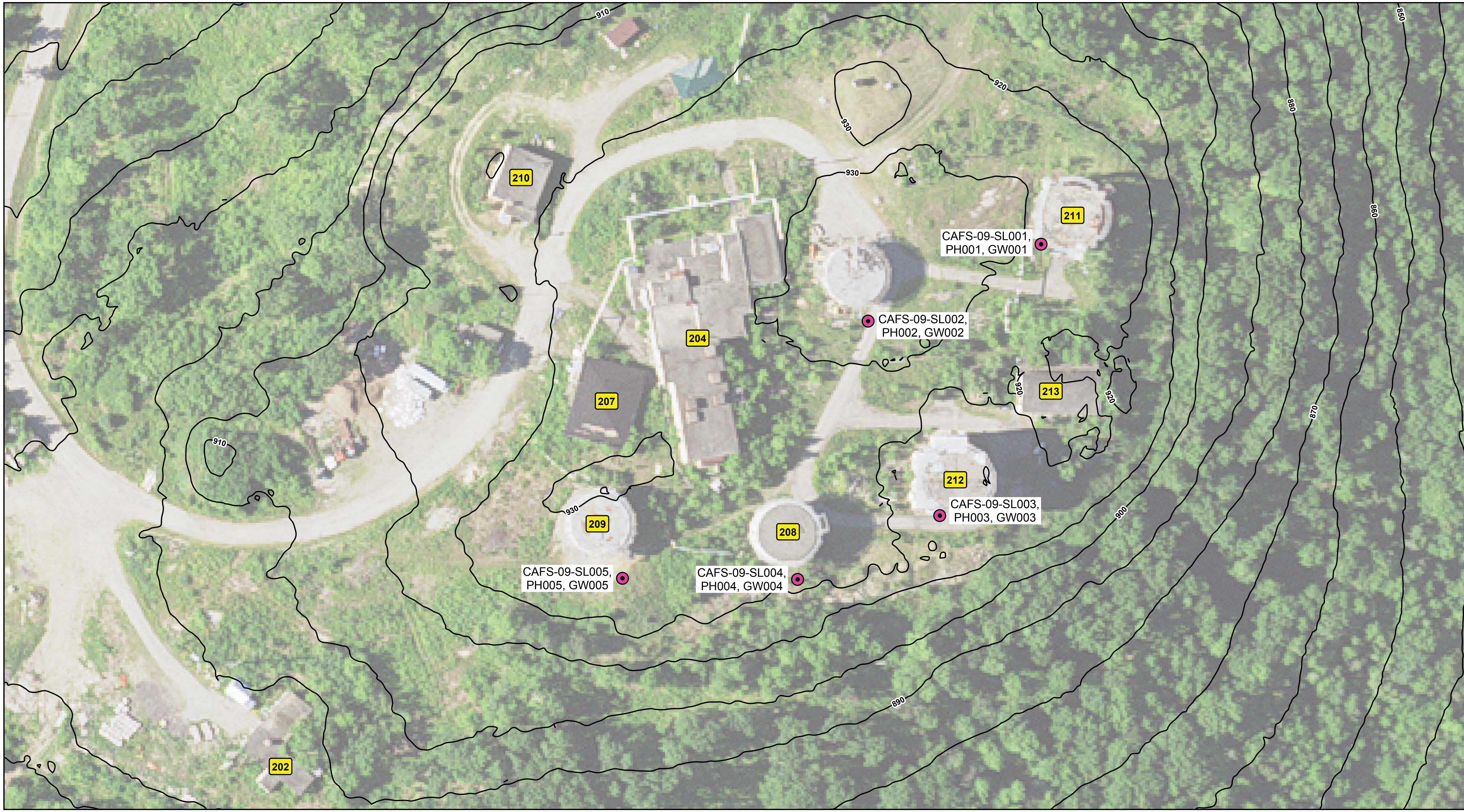

wood.

N

0 40 80 Feet

Legend

DP (5)

10 foot contour

209 Structure ID

Figure 5-4
Hilltop Area
Radome Direct Push Locations

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

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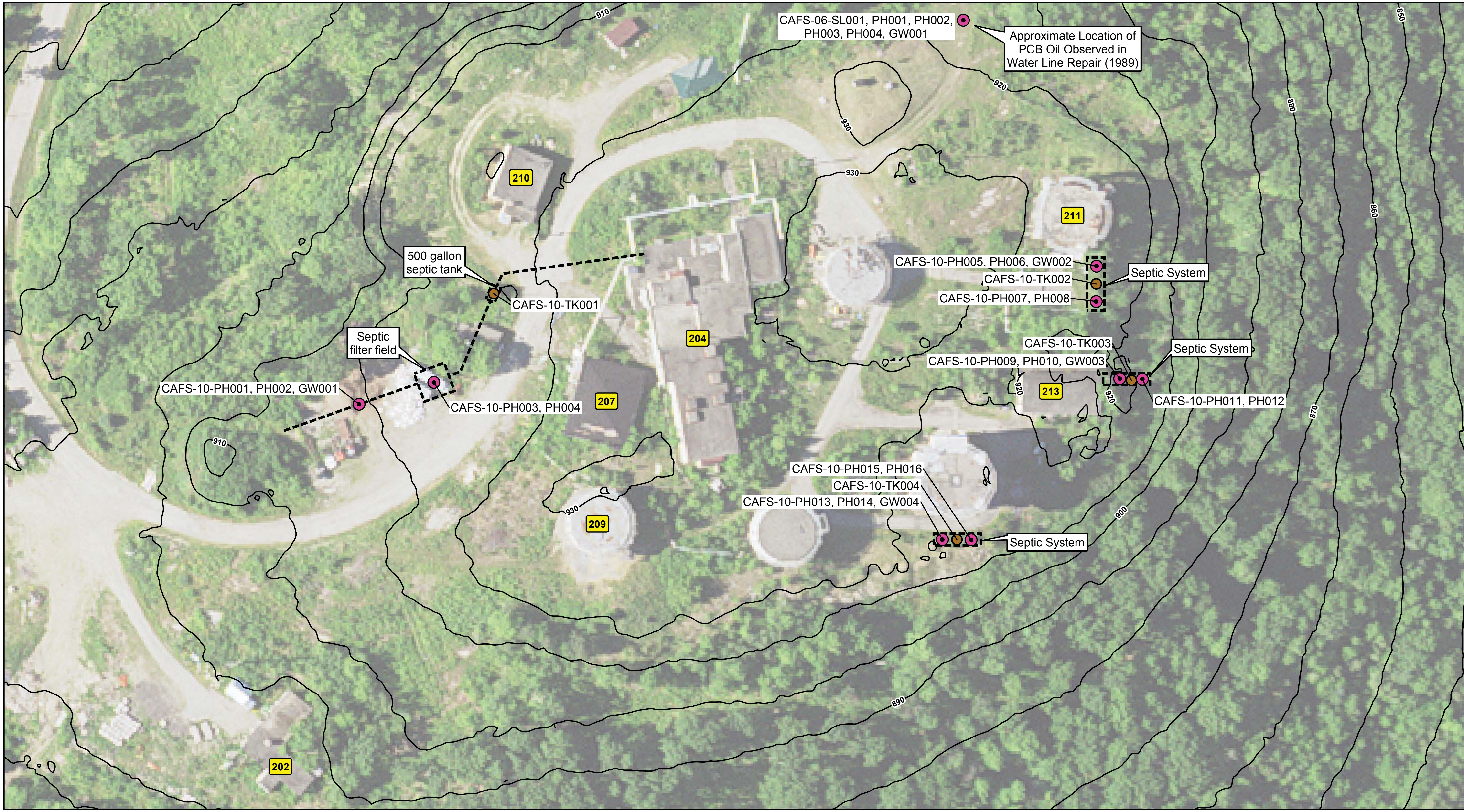

wood.

N

0 40 80 Feet

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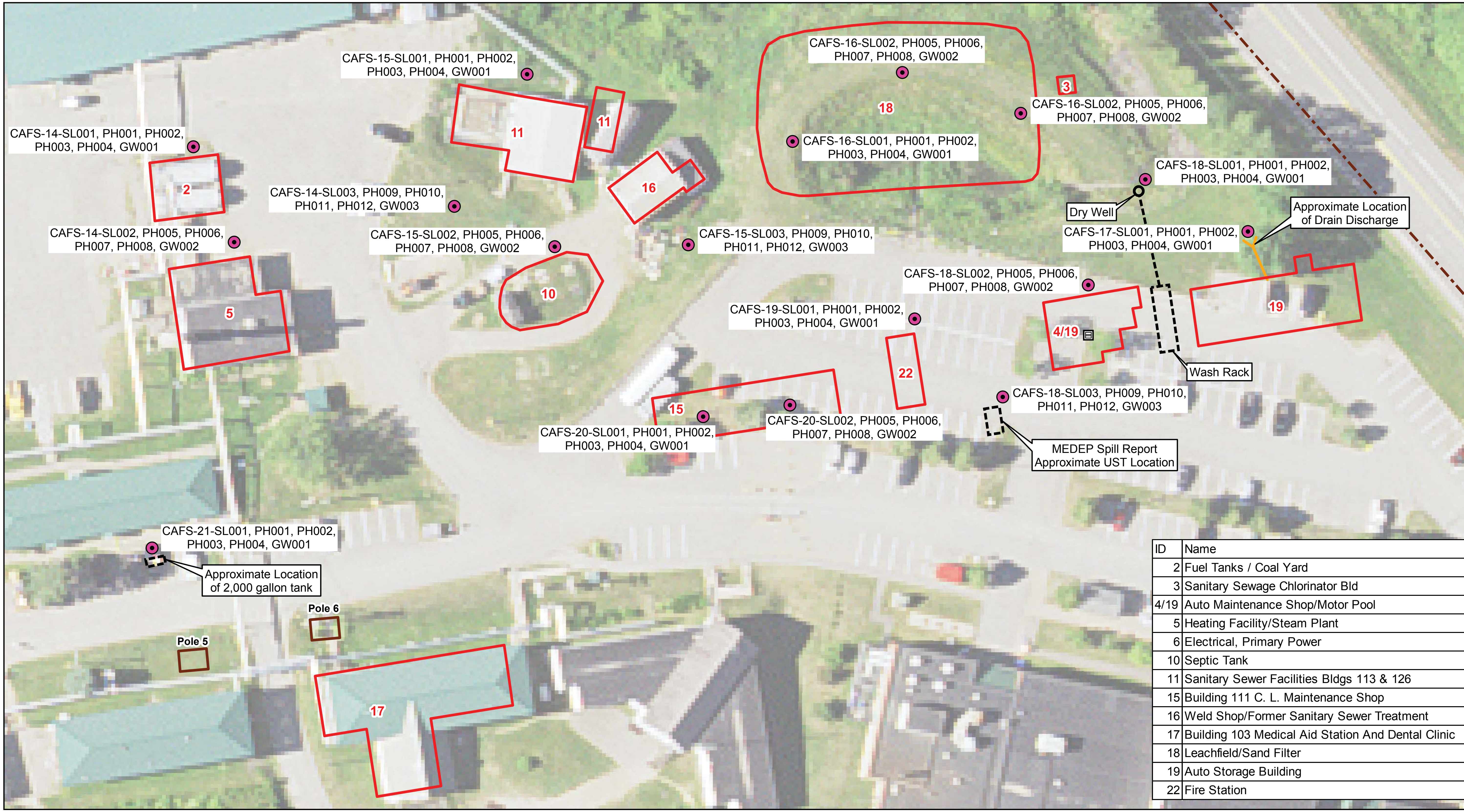
Legend

- DP (9)
- Sludge (4)
- Approximate Septic Location
- 10 foot contour
- 209 Structure ID

Figure 5-5
Hilltop Area
Septic Field and Water Line Repair
Direct Push Locations
Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine



ID	Name
2	Fuel Tanks / Coal Yard
3	Sanitary Sewage Chlorinator Bld
4/19	Auto Maintenance Shop/Motor Pool
5	Heating Facility/Steam Plant
6	Electrical, Primary Power
10	Septic Tank
11	Sanitary Sewer Facilities Bldgs 113 & 126
15	Building 111 C. L. Maintenance Shop
16	Weld Shop/Former Sanitary Sewer Treatment
17	Building 103 Medical Aid Station And Dental Clinic
18	Leachfield/Sand Filter
19	Auto Storage Building
22	Fire Station

wood.

N

0 25 50 Feet

Legend

- DP (17)
- Catch Basin
- Approximate Pole-mounted Transformer Location
- Features of Interest
- Approximate Property Boundary

Figure 5-6
Northern Industrial Area
Direct Push Locations

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

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Legend

- Direct Push Sample Location VOCs/SVOCs/DRO-GRO Metals
- Approximate Area of Ground Penetrating Radar Screening
- Approximate AST Cradle Location
- 10 foot contour
- 1 foot contour
- Approximate Receiver Building
- Approximate Property Boundary

N

0 25 50 Feet

Figure 5-7
Former Radio Receiver Building
Sample Locations

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

Prepared/Date: BRP 03-25-20	Checked/Date: SFC 03-25-20

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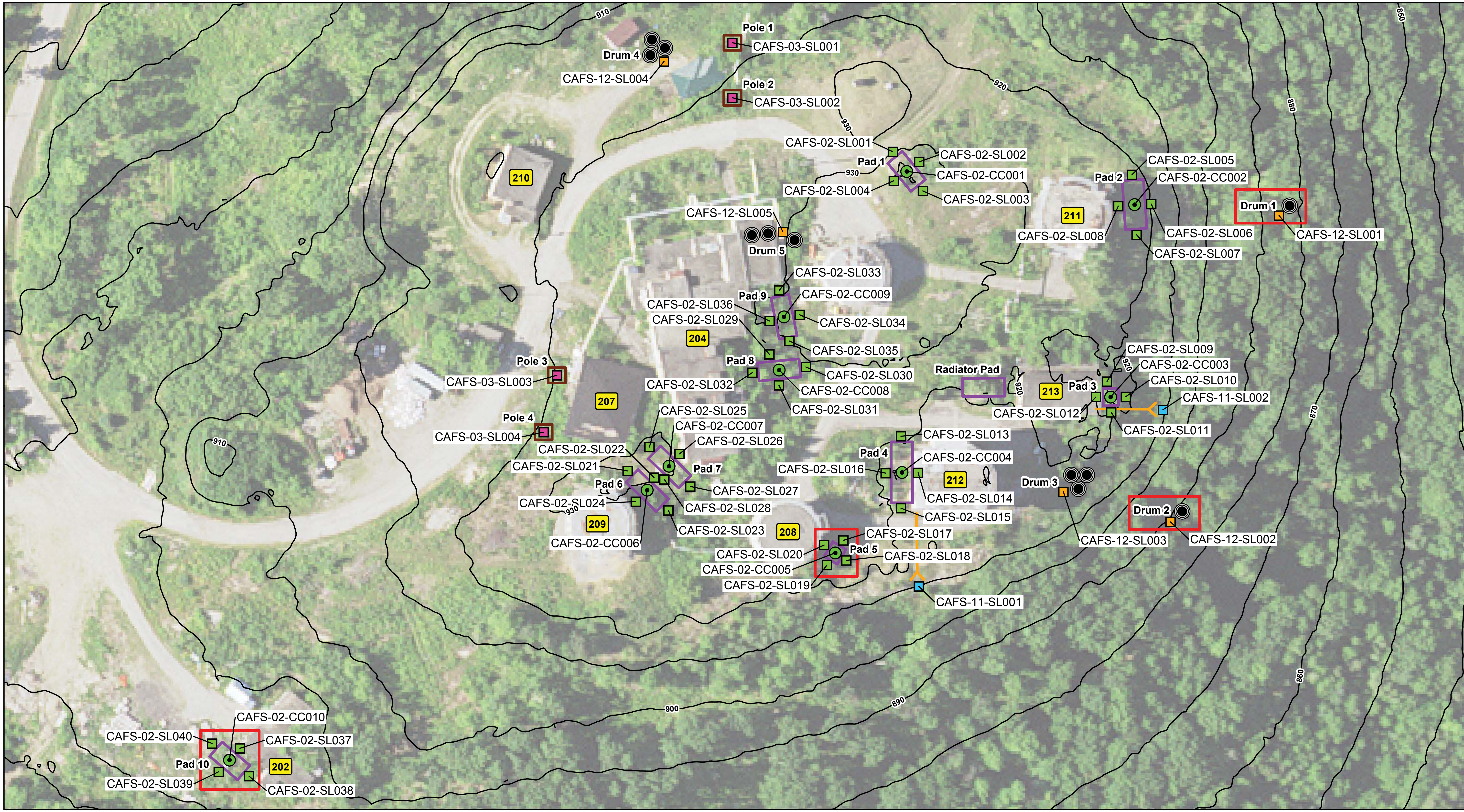


wood.

N

0 40 80 Feet

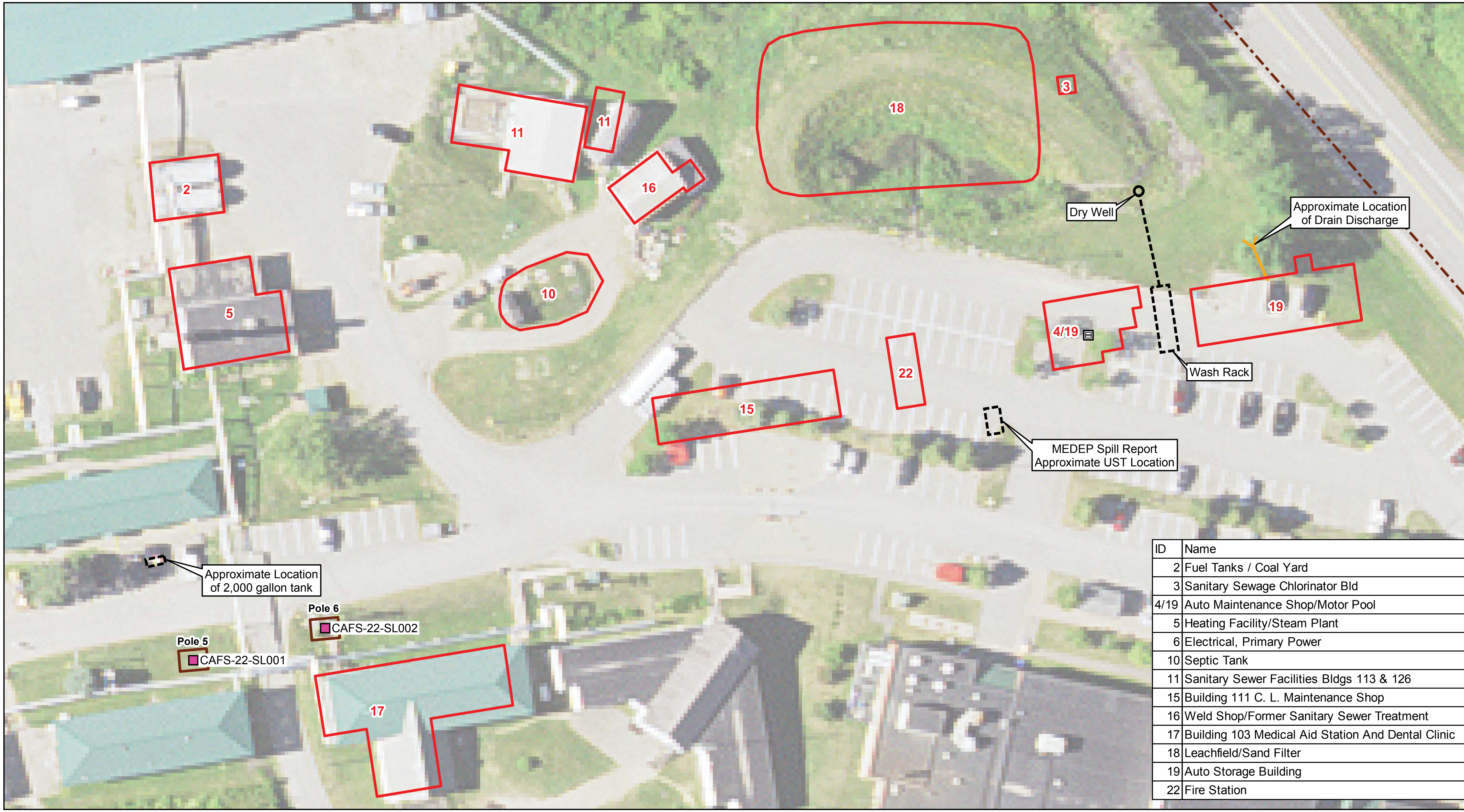
Prepared/Date: BRP 03-23-20 | Checked/Date: SFC 03-23-20

Note:
5 additional drum composite sample locations TDB:
CAFS-12-SL006
CAFS-12-SL007
CAFS-12-SL008
CAFS-12-SL009
CAFS-12-SL010

Legend

- SS - Transformer Side (40)
- SS - Transformer Pole (4)
- SS - Drum Composite (5)
- SS - Discharge Pipe (2)
- DP - Transformer Center (10)
- Approximate Drum Location
- Approximate Transformer Pad Location
- Approximate Pole-mounted Transformer Location
- Additional Site
- 10 foot contour
- 209 Structure ID

Figure 5-8
Hilltop Area
Transformer Pads, Poles, Discharge and Drum Sample Locations
Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine



ID	Name
2	Fuel Tanks / Coal Yard
3	Sanitary Sewage Chlorinator Bld
4/19	Auto Maintenance Shop/Motor Pool
5	Heating Facility/Steam Plant
6	Electrical, Primary Power
10	Septic Tank
11	Sanitary Sewer Facilities Bldgs 113 & 126
15	Building 111 C. L. Maintenance Shop
16	Weld Shop/Former Sanitary Sewer Treatment
17	Building 103 Medical Aid Station And Dental Clinic
18	Leachfield/Sand Filter
19	Auto Storage Building
22	Fire Station

wood.

N

0 25 50 Feet

Legend

SS - Transformer Pole (2)

Catch Basin

Approximate Pole-mounted Transformer Location

Features of Interest

Approximate Property Boundary

Figure 5-9
Northern Industrial Area
Transformer Pole Locations

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

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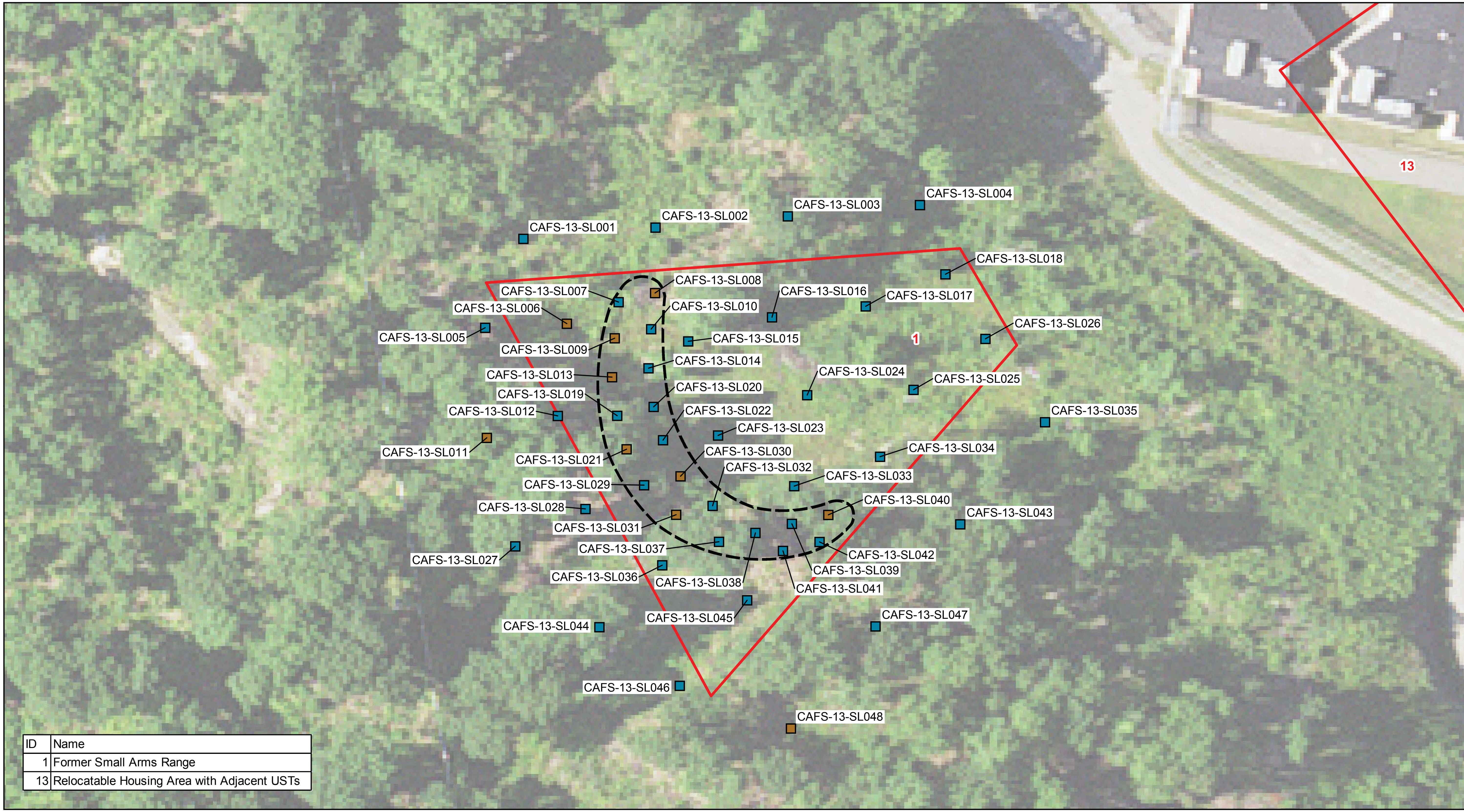

ID	Name
1	Former Small Arms Range
13	Relocatable Housing Area with Adjacent USTs

wood.

N

0 25 50 Feet

Prepared/Date: BRP 03-23-20 | Checked/Date: SFC 03-23-20

Note:
Offsite selected using
https://www.calculator.net/random-number-generator.html

Legend

- SS DP XRF and OFFSITE (10)
- SS DP XRF (38)
- Approximate Location of Berm
- Features of Interest

Figure 5-10
Former Small Arms Range
Sample Locations

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

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wood.

Legend

- Approximate Residential Well Location
- Residential Property
- Approximate Property Boundary

N

0 300 600 Feet

Figure 5-11
Bedrock Groundwater and
Residential Well Sample Locations

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

Prepared/Date: BRP 07-07-20 | Checked/Date: SFC 07-07-20

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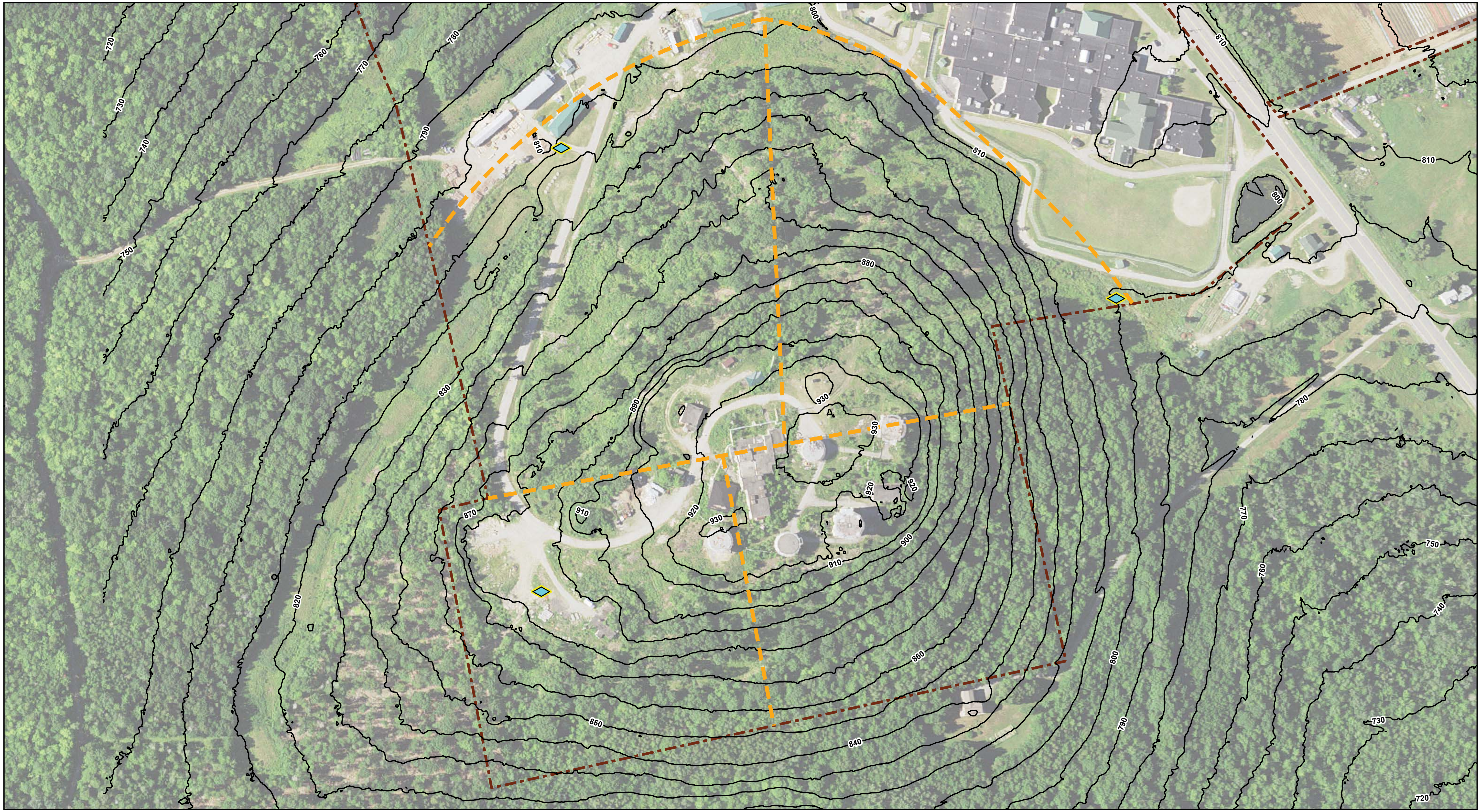


Legend

Hilltop Area Quadrant for Seep Sampling (4 Samples Per Quadrant TBD)

Seep Location (Identified October 2019)

10 foot contour

Approximate Property Boundary

N

0 110 220 Feet

Prepared/Date: BRP 03-23-20 | Checked/Date: SFC 03-23-20

Figure 5-12
Seep Sample Locations

Remedial Investigation Sampling and Analysis Plan
Charleston Air Force Station
Charleston, Maine

Document: P:\Projects\USACE Charleston AFS\7.0_GIS\MapDocuments\RI Work Plan\RI_WP_11x17LS.mxd PDF: P:\Projects\USACE Charleston AFS\4.0_Deliverables\4.2_Work_Plans\RI_Work_Plan\Draft\Figures\Figure 5-12 - Seep Sample Locations.pdf 03-23-2020 4:05 PM brian.peters

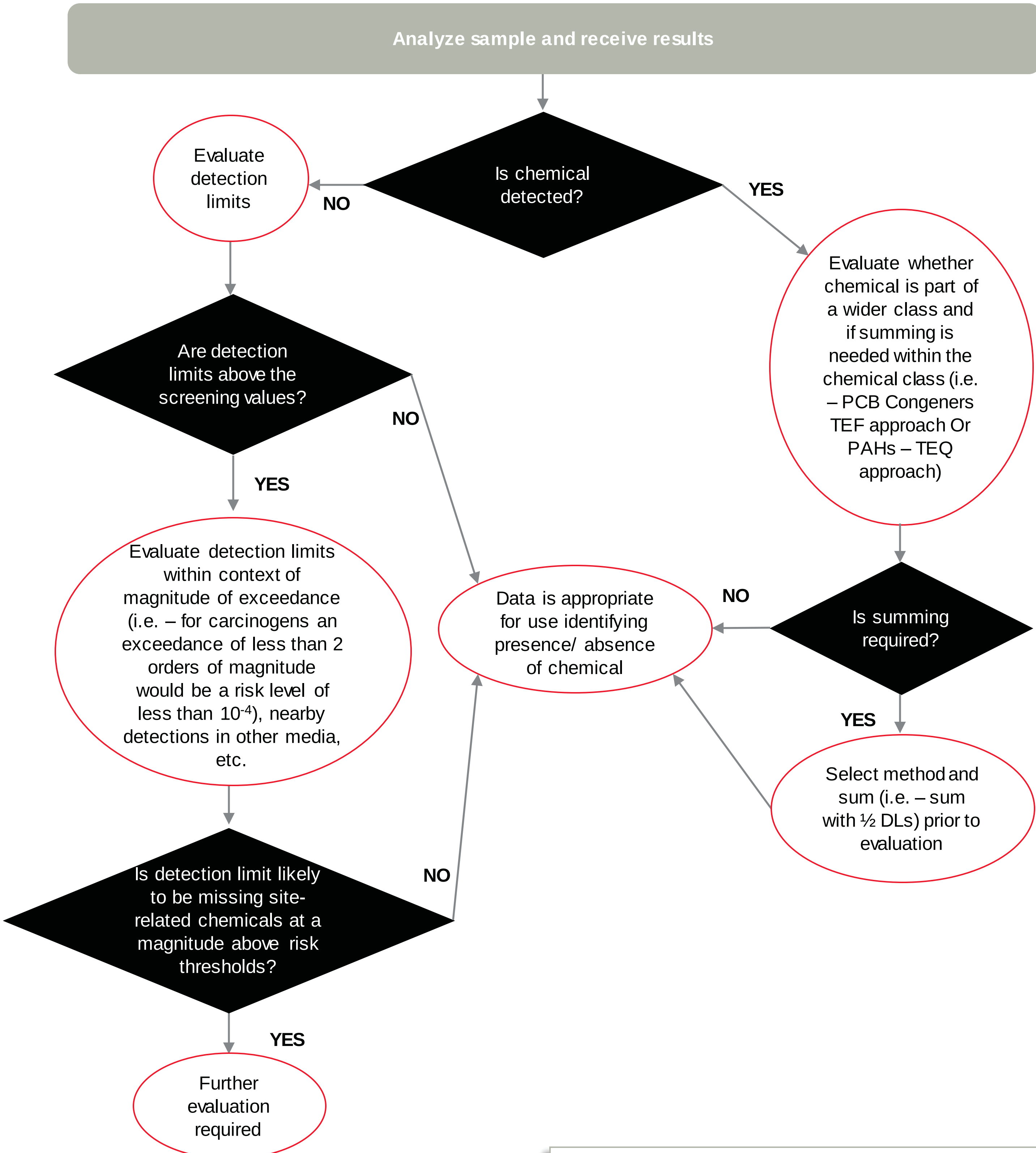
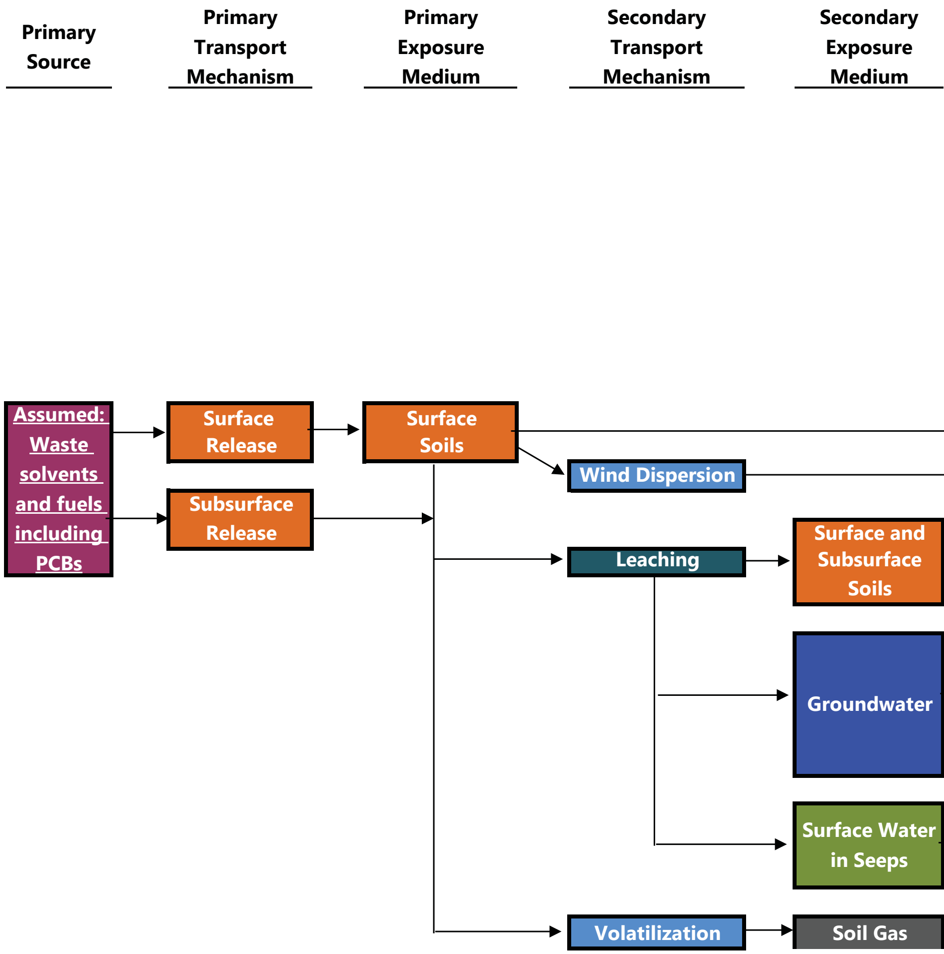


Figure 11-1 Data Use and Evaluation Flowchart

Data considered appropriate for use identifying presence/ absence will be compared to risk-based screening levels.

- Concentrations above screening levels will identify that further action (sampling) is required.
- Concentrations below screening levels will identify that No Further Action is required.

Figure 11-2
Human Health Risk Assessment Preliminary Conceptual Site Model Chart



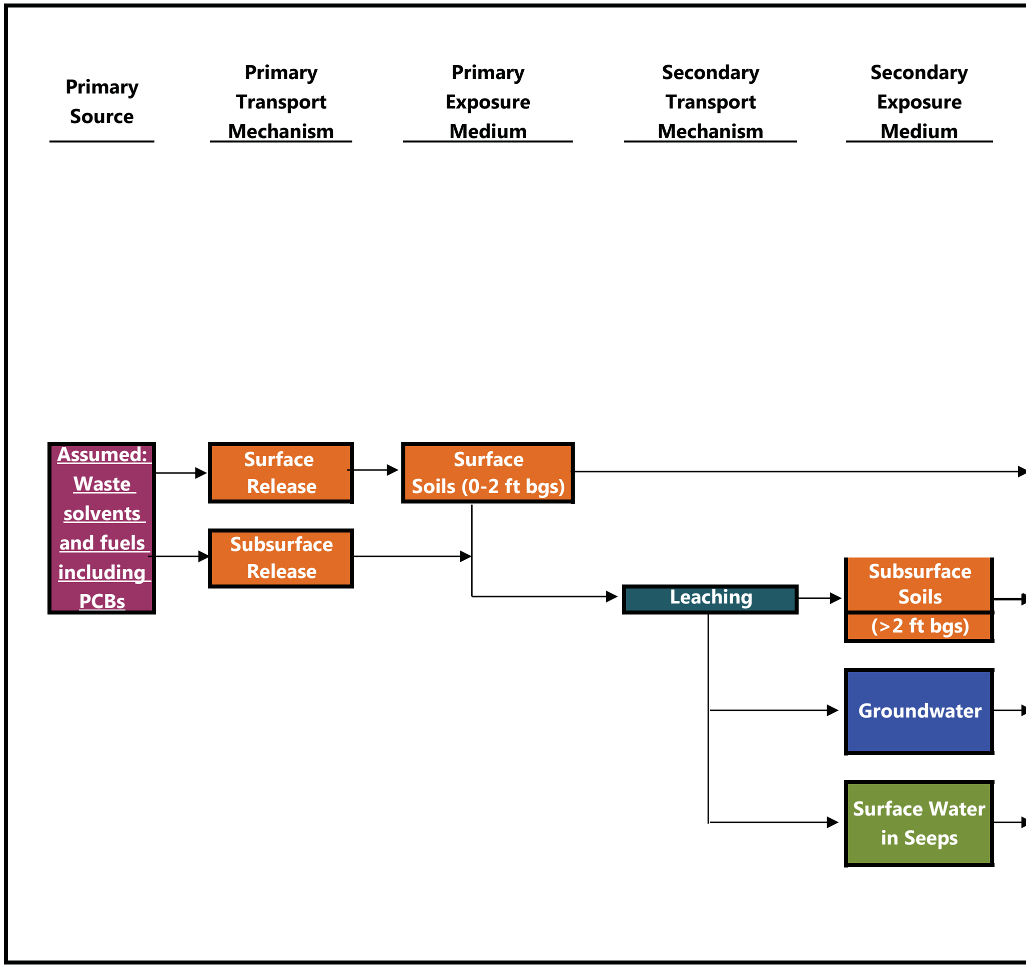
Exposure Medium	Exposure Route	Current Correctional Facility Resident (on-site soil exposure, groundwater from supply wells)	Current On-Site Commercial/Industrial Worker	Current On-Site Trespasser/Recreator	Current Off-Site Resident	Future Construction Worker	Hypothetical Future On-Site Commercial/Industrial Worker	Hypothetical Future On-Site Resident
		Potential Receptors [a]						
		Current and Future Receptors					Hypothetical Future Receptors	
Surface Soils	Ingestion	X	X	X				
	Dermal contact	X	X	X				
Wind Dispersion	Inhalation of airborne particles	X	X	X				
Surface and Subsurface Soils	Ingestion					X	X	X
	Dermal contact					X	X	X
	Inhalation of airborne particles					X	X	X
Groundwater	Ingestion	X			X	X		X
	Dermal contact	X			X	X		X
	Inhalation of whole house air or while showering	X			X			X
	Inhalation of vapors[b]	X			X	X		X
Surface Water in Seeps	Ingestion			X		X		
	Dermal contact			X		X		
	Inhalation of volatiles			X		X		
Soil Gas	Inhalation of vapors[b]					X	X	X

Notes:

Prepared by: ARQ 4/14/2020

X: Indicates a potentially complete exposure pathway.
Blank cells indicate an incomplete or negligible exposure pathway.
Sources will be confirmed based on the investigation.
(a) Other potential receptors will be evaluated for relevance following the site investigation, including residents at the correctional facility on-site. Current workers and trespassers/recreators will be evaluated for surface soil exposure only. Surface and subsurface soil will be used to evaluate future and hypothetical future scenarios.

Figure 11-3
Ecological Risk Assessment Preliminary Conceptual Site Model Chart



Exposure Route	Ecological Receptors – Terrestrial: Upland Plants	Terrestrial: Soil Invertebrates	Terrestrial: Birds	Terrestrial: Mammals	Seeps (a): Plants	Seeps (a): Invertebrates	Seeps (a): Birds	Seeps (a): Mammals
Root Uptake	X							
Direct contact	X	X						
Incidental Ingestion			X	X				
Ingestion via Food Chain			X	X				
Incomplete								
Incomplete								
Leaf/Shallow Root Uptake					X			
Direct Contact						X		
Incidental Ingestion							X	X
Ingestion via Food Chain							X	X

Notes:
X: Indicates a potentially complete exposure pathway.
Blank cells indicate an incomplete or negligible exposure pathway.
Sources will be confirmed based on the investigation.
(a) Seep exposures are shown to be potentially complete. Field investigations will determine the size and location of seeps and whether they provide standing water for sufficient amounts of time for significant aquatic communities to develop or attract birds and mammals.

Prepared by: AMR 4/15/2020
Checked by SFC 6/1/2020

TABLES

Table 1-1
List of Potential Source Area Identified in the Preliminary Assessment and Historical Review
Remedial Investigation Sampling and Analysis Plan'
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

			Potentially Affected Media					
Potential Source Area or Area of Study (refer to Figure 1-4)	**Preliminary Assessment (USACE, 2018)**	**Historical Review (Wood, 2020a and Appendix A)**	**Surface Soil**	**Soil**	**Rock Matrix**	**Overburden Groundwater**	**Bedrock Groundwater**	**Surface Water**
Background Soils	NA	NA	NA	NA				
Hill Top Transformer Pads 1 thru 10	X		X					
Hill Top Transformer Poles 1 thru 4		X	X					
Hill Top 275 Gallon Waste Oil Tank		X	X	X		X		
Hill Top Former 8,500/10,000 Gallon Fuel Oil USTs	X			X	X	X		
Hill Top Two 40,000 Gallon Fuel Oil USTs		X	X	X		X		
Hill Top Lube Oil UST		X	X	X		X		
Hill Top Former Radar Buildings	X		X	X		X		
Hill Top Septic Systems Buildings 204, 211, 212, and 213		X		X		X		
Hill Top Drum Locations 1 thru 5 (5 optional)		X	X					
Hill Top Possible Discharge Pipes Buildings 212 and 213		X	X					
Hill Top Approximate Location of PCB Contaminated Oil (Water Line Repair 1989)		X		X		X		
Small Arms Range	X		X					
Industrial Area - Fuel Tanks/Coal Yard/Coal Yard Runoff Area (2 and 5)	X		X	X		X		
Industrial Area - Water Treatment Plant/Septic Tank/Weld Shop Area (10, 11, and 16)		X	X	X		X		

Table 1-1
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Charleston, Maine

Potential Source Area or Area of Study (refer to Figure 1-4)	Preliminary Assessment (USACE, 2018)	Historical Review (Wood, 2020a and Appendix A)	Potentially Affected Media: Surface Soil	Soil	Rock Matrix	Overburden Groundwater	Bedrock Groundwater	Surface Water
Industrial Area - Water Treatment Plant/Septic Sand Filter Area (18)		X	X	X		X		
Industrial Area - Chlorinator Building (3)		X						
Industrial Area - Auto Storage Building (19)		X	X	X		X		
Industrial Area - Auto Maintenance Shop/Motor Pool (4) and Former 2,000 Gallon UST	X	X	X	X		X		
Industrial Area - Fire Station Building (22)		X	X	X		X		
Industrial Area - Maintenance Shop (15)	X		X	X		X		
Industrial Area - Location of 2,000 Gallon tank, use unknown		X	X	X		X		
Industrial Area Transformer Poles 5 and 6		X	X					
Former Radio Reciever Building	X		X	X		X		
Seep Sampling (4 quads, 4 rounds)		X						X
Correctional Facility Supply Wells and Old Restaurant Well (four rounds)	X						X	
Residential Well Sampling (four rounds, 6 wells)		X					X	

Table 5-1 Summary of Remedial Investigation
Remedial Investifation Sampling and Analysis Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

Potential Source Areas, Sampling and Well Installation	Visual Screening Survey	Ground-Penetrating Radar	Hand Auger Soil Samples	Direct Push Soil Borings	Direct Push Groundwater Grab Samples	Concrete Chip Samples	Bedrock Matrix Samples	Tank Sludge Samples	Groundwater Samples	Seep Samples	X-Ray Fluoresence Samples
Background Soils	X			20							
Hilltop Transformer Pads 1 thru 10			40			10					
Hilltop Transformer Poles 1 thru 4			4								
Hilltop 275 Gallon Waste Oil Tank (GeoProbe)		X		2	1						
Hilltop Former 8,500/10,000 Gallon Fuel Oil USTs (GeoProbe)		X		5	2		3				
Hilltop Two 40,000 Gallon Fuel Oil USTs (GeoProbe)		X		4	2						
Hilltop Lube Oil UST (GeoProbe)		X		1	1						
Hilltop Former Radar Buildings (GeoProbe near doors)		X		5	5						
Hilltop Septic Systems Buildings 204, 211, 212, and 213 (GeoProbe)		X		8	4			4			
Hilltop Drum Locations 1 thru 5 (5 optional)	X		10								
Hilltop Possible Discharge Pipes Buildings 212 and 213	X	X	2								
Hilltop Approximate Location of PCB Contaminated Oil (Water Line Repair 1989)		X		1	1						
Small Arms Range	X		48								48
Industrial Area - Fuel Tanks/Coal Yard/Coal Yard Runoff Area (2 and 5)		X		3	3						
Industrial Area - Water Treatment Plant/Septic Tank/Weld Shop Area (10, 11, and 16)		X		3	3						
Industrial Area - Water Treatment Plant/Septic Sand Filter Area (18)		X		3	3						
Industrial Area - Auto Storage Building (19)		X		1	1						
Industrial Area - Auto Maintenance Shop/Motor Pool (4) and Former 2,000 Gallon UST		X		3	3						
Industrial Area - Fire Station Building (22)		X		1	1						

Table 5-1 Summary of Remedial Investigation
Remedial Investifation Sampling and Analysis Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

Potential Source Areas, Sampling and Well Installation	Visual Screening Survey	Ground-Penetrating Radar	Hand Auger Soil Samples	Direct Push Soil Borings	Direct Push Groundwater Grab Samples	Concrete Chip Samples	Bedrock Matrix Samples	Tank Sludge Samples	Groundwater Samples	Seep Samples	X-Ray Fluoresence Samples
Industrial Area - Maintenance Shop (15)		X		2	2						
Industrial Area - Location of 2,000 Gallon tank, use unknown		X		1	1						
Industrial Area Transformer Poles 5 and 6			2								
Former Radio Reciever Building		X		4							
Optional Overburden Bedrock Groundwater		X									
Seep Sampling (4 quads, 4 rounds)	X									32	
Correctional Facility Supply Wells and Old Restaurant Well (four rounds)									16		
Residential Well Sampling (four rounds, 6 wells)	X								24		
Totals			106	67	33	10	3	4	40	32	48

Table 5-2 Summary of Sampling and Analysis
Remedial Investifation Sampling and Analysis Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

RI Work Plan Sample Location Figure Designations	Location ID	Sample ID	Matrix Type	VOC 8260	Select SVOC 8270 SIM	Metals 6020	Metals 7471	PCBs 8082	PCB Congeners 8082	EPH MAEPH	VPH MAVPH	Radionuclides Gamma Spec GA-01-R	Radionuclides Gross Alpha/Beta 9130	Grain Size ASTM D422	FOC ASTM D2974-00	pH 9045	XRF XRF
01 - Background Soils - Step 7																	
	CAFS-01-SL001	CAFS-01-SL001_1R2020	SL		1	1	1							1	1	1	
	CAFS-01-SL002	CAFS-01-SL002_1R2020	SL		1	1	1							1	1	1	
20 locations - each location 1 surface soil and 1 subsurface soil	CAFS-01-SL003	CAFS-01-SL003_1R2020	SL		1	1	1							1	1	1	
CAFS-01-SL001, PH001	CAFS-01-SL004	CAFS-01-SL004_1R2020	SL		1	1	1							1	1	1	
CAFS-01-SL002, PH002	CAFS-01-SL005	CAFS-01-SL005_1R2020	SL		1	1	1							1	1	1	
CAFS-01-SL003, PH003	CAFS-01-SL006	CAFS-01-SL006_1R2020	SL		1	1	1										
CAFS-01-SL004, PH004	CAFS-01-SL007	CAFS-01-SL007_1R2020	SL		1	1	1										
CAFS-01-SL005, PH005	CAFS-01-SL008	CAFS-01-SL008_1R2020	SL		1	1	1										
CAFS-01-SL006, PH006	CAFS-01-SL009	CAFS-01-SL009_1R2020	SL		1	1	1										
CAFS-01-SL007, PH007	CAFS-01-SL010	CAFS-01-SL010_1R2020	SL		1	1	1										
CAFS-01-SL008, PH008	CAFS-01-SL011	CAFS-01-SL011_1R2020	SL		1	1	1										
CAFS-01-SL009, PH009	CAFS-01-SL012	CAFS-01-SL012_1R2020	SL		1	1	1										
CAFS-01-SL010, PH010	CAFS-01-SL013	CAFS-01-SL013_1R2020	SL		1	1	1										
CAFS-01-SL011, PH011	CAFS-01-SL014	CAFS-01-SL014_1R2020	SL		1	1	1										
CAFS-01-SL012, PH012	CAFS-01-SL015	CAFS-01-SL015_1R2020	SL		1	1	1										
CAFS-01-SL013, PH013	CAFS-01-SL016	CAFS-01-SL016_1R2020	SL		1	1	1										
CAFS-01-SL014, PH014	CAFS-01-SL017	CAFS-01-SL017_1R2020	SL		1	1	1										
CAFS-01-SL015, PH015	CAFS-01-SL018	CAFS-01-SL018_1R2020	SL		1	1	1										
CAFS-01-SL016, PH016	CAFS-01-SL019	CAFS-01-SL019_1R2020	SL		1	1	1										
CAFS-01-SL017, PH017	CAFS-01-SL020	CAFS-01-SL020_1R2020	SL		1	1	1										
CAFS-01-SL018, PH018	CAFS-EB-1	CAFS-EB-1_1R2020	EB		1	1	1										
CAFS-01-SL019, PH019	CAFS-01-PH001	CAFS-01-PH001_1R2020	PH		1	1	1							1	1	1	
CAFS-01-SL020, PH020	CAFS-01-PH002	CAFS-01-PH002_1R2020	PH		1	1	1							1	1	1	
	CAFS-01-PH003	CAFS-01-PH003_1R2020	PH		1	1	1							1	1	1	
	CAFS-01-PH004	CAFS-01-PH004_1R2020	PH		1	1	1							1	1	1	
	CAFS-01-PH005	CAFS-01-PH005_1R2020	PH		1	1	1							1	1	1	
	CAFS-01-PH006	CAFS-01-PH006_1R2020	PH		1	1	1										
	CAFS-01-PH007	CAFS-01-PH007_1R2020	PH		1	1	1										
	CAFS-01-PH008	CAFS-01-PH008_1R2020	PH		1	1	1										
	CAFS-01-PH009	CAFS-01-PH009_1R2020	PH		1	1	1										
	CAFS-01-PH010	CAFS-01-PH010_1R2020	PH		1	1	1										
	CAFS-01-PH011	CAFS-01-PH011_1R2020	PH		1	1	1										
	CAFS-01-PH012	CAFS-01-PH012_1R2020	PH		1	1	1										
	CAFS-01-PH013	CAFS-01-PH013_1R2020	PH		1	1	1										
	CAFS-01-PH014	CAFS-01-PH014_1R2020	PH		1	1	1										
	CAFS-01-PH015	CAFS-01-PH015_1R2020	PH		1	1	1										
	CAFS-01-PH016	CAFS-01-PH016_1R2020	PH		1	1	1										
	CAFS-01-PH017	CAFS-01-PH017_1R2020	PH		1	1	1										
	CAFS-01-PH018	CAFS-01-PH018_1R2020	PH		1	1	1										
	CAFS-01-PH019	CAFS-01-PH019_1R2020	PH		1	1	1										
	CAFS-01-PH020	CAFS-01-PH020_1R2020	PH		1	1	1										

RI Work Plan Sample Location Figure Designations	Location ID	Sample ID	Matrix Type	VOC 8260	Select SVOC 8270 SIM	Metals 6020	Metals 7471	PCBs 8082	PCB Congeners 8082	EPH MAEPH	VPH MAVPH	Radionuclides Gamma Spec GA-01-R	Radionuclides Gross Alpha/Beta 9130	Grain Size ASTM D422	FOC ASTM D2974-00	pH 9045	XRF XRF
02 - Hilltop Transformer Pads 1 through 10 - Step 2A & 2B																	
	CAFS-02-SL001	CAFS-02-SL001_1R2020	SL					1	1								
10 Locations - each location 4 surface soils and 1 concrete chip	CAFS-02-SL002	CAFS-02-SL002_1R2020	SL					1	1								
sample	CAFS-02-SL003	CAFS-02-SL003_1R2020	SL					1	1								
CAFS-02-SL001, SL002, SL003, SL004, CC001	CAFS-02-SL004	CAFS-02-SL004_1R2020	SL					1	1								
CAFS-02-SL005, SL006, SL007, SL008, CC002	CAFS-02-SL005	CAFS-02-SL005_1R2020	SL					1	1								
CAFS-02-SL009, SL010, SL011, SL012, CC003	CAFS-02-SL006	CAFS-02-SL006_1R2020	SL					1	1								
CAFS-02-SL013, SL014, SL015, SL016, CC004	CAFS-02-SL007	CAFS-02-SL007_1R2020	SL					1	1								
CAFS-02-SL017, SL018, SL019, SL020, CC005	CAFS-02-SL008	CAFS-02-SL008_1R2020	SL					1	1								
CAFS-02-SL021, SL022, SL023, SL024, CC006	CAFS-02-SL009	CAFS-02-SL009_1R2020	SL					1	1								
CAFS-02-SL025, SL026, SL027, SL028, CC007	CAFS-02-SL010	CAFS-02-SL010_1R2020	SL					1	1								
CAFS-02-SL029, SL030, SL031, SL032, CC008	CAFS-02-SL011	CAFS-02-SL011_1R2020	SL					1									
CAFS-02-SL033, SL034, SL035, SL036, CC009	CAFS-02-SL012	CAFS-02-SL012_1R2020	SL					1									
CAFS-02-SL037, SL038, SL039, SL040, CC010	CAFS-02-SL013	CAFS-02-SL013_1R2020	SL					1									
	CAFS-02-SL014	CAFS-02-SL014_1R2020	SL					1									
	CAFS-02-SL015	CAFS-02-SL015_1R2020	SL					1									
	CAFS-02-SL016	CAFS-02-SL016_1R2020	SL					1									
	CAFS-02-SL017	CAFS-02-SL017_1R2020	SL					1									
	CAFS-02-SL018	CAFS-02-SL018_1R2020	SL					1									
	CAFS-02-SL019	CAFS-02-SL019_1R2020	SL					1									
	CAFS-02-SL020	CAFS-02-SL020_1R2020	SL					1									
	CAFS-02-SL021	CAFS-02-SL021_1R2020	SL					1									
	CAFS-02-SL022	CAFS-02-SL022_1R2020	SL					1									
	CAFS-02-SL023	CAFS-02-SL023_1R2020	SL					1									
	CAFS-02-SL024	CAFS-02-SL024_1R2020	SL					1									
	CAFS-02-SL025	CAFS-02-SL025_1R2020	SL					1									
	CAFS-02-SL026	CAFS-02-SL026_1R2020	SL					1									
	CAFS-02-SL027	CAFS-02-SL027_1R2020	SL					1									
	CAFS-02-SL028	CAFS-02-SL028_1R2020	SL					1									
	CAFS-02-SL029	CAFS-02-SL029_1R2020	SL					1									
	CAFS-02-SL030	CAFS-02-SL030_1R2020	SL					1									
	CAFS-02-SL031	CAFS-02-SL031_1R2020	SL					1									
	CAFS-02-SL032	CAFS-02-SL032_1R2020	SL					1									
	CAFS-02-SL033	CAFS-02-SL033_1R2020	SL					1									
	CAFS-02-SL034	CAFS-02-SL034_1R2020	SL					1									
	CAFS-02-SL035	CAFS-02-SL035_1R2020	SL					1									
	CAFS-02-SL036	CAFS-02-SL036_1R2020	SL					1									
	CAFS-02-SL037	CAFS-02-SL037_1R2020	SL					1									
	CAFS-02-SL038	CAFS-02-SL038_1R2020	SL					1									
	CAFS-02-SL039	CAFS-02-SL039_1R2020	SL					1									
	CAFS-02-SL040	CAFS-02-SL040_1R2020	SL					1									
	CAFS-EB-2	CAFS-EB-2_1R2020	EB					1	1								
	CAFS-EB-3	CAFS-EB-3_1R2020	EB					1									
	CAFS-02-CC001	CAFS-02-CC001_1R2020	CC					1									
	CAFS-02-CC002	CAFS-02-CC002_1R2020	CC					1									
	CAFS-02-CC003	CAFS-02-CC003_1R2020	CC					1									
	CAFS-02-CC004	CAFS-02-CC004_1R2020	CC					1									
	CAFS-02-CC005	CAFS-02-CC005_1R2020	CC					1									
	CAFS-02-CC006	CAFS-02-CC006_1R2020	CC					1									
	CAFS-02-CC007	CAFS-02-CC007_1R2020	CC					1									
	CAFS-02-CC008	CAFS-02-CC008_1R2020	CC					1									
	CAFS-02-CC009	CAFS-02-CC009_1R2020	CC					1									
	CAFS-02-CC010	CAFS-02-CC010_1R2020	CC					1									

RI Work Plan Sample Location Figure Designations	Location ID	Sample ID	Matrix Type	VOC	Select SVOC	Metals	Metals	PCBs	PCB Congeners	EPH	VPH	Radionuclides Gamma Spec	Radionuclides Gross Alpha/Beta	Grain Size	FOC	pH	XRF
				8260	8270 SIM	6020	7471	8082	8082	MAEPH	MAVPH	GA-01-R	9130	ASTM D422	ASTM D2974-00	9045	XRF
03 - Hilltop Transformer Poles 1 through 4 - Step 2C																	
4 locations- each location 1 surface soil																	
CAFS-03-SL001	CAFS-03-SL001	CAFS-03-SL001_1R2020	SL					1	1								
CAFS-03-SL002	CAFS-03-SL002	CAFS-03-SL002_1R2020	SL					1	1								
CAFS-03-SL003	CAFS-03-SL003	CAFS-03-SL003_1R2020	SL					1	1								
CAFS-03-SL004	CAFS-03-SL004	CAFS-03-SL004_1R2020	SL					1	1								
04 - Hilltop 275 Gallon Waste Oil Tank - Step 5A																	
2 locations - each location 1 surface soil and 4 subsurface soils. 1	CAFS-04-SL001	CAFS-04-SL001_1R2020	SL		1	1	1	1	1	1	1			1	1	1	
location groundwater grab	CAFS-04-SL002	CAFS-04-SL002_1R2020	SL		1	1	1	1	1	1	1			1	1	1	
CAFS-04-SL001, PH001, PH002, PH003, PH004, GW001	CAFS-04-PH001	CAFS-04-PH001_1R2020	PH	1	1	1	1	1	1	1	1						
CAFS-04-SL002, PH005, PH006, PH007, PH008	CAFS-04-PH002	CAFS-04-PH002_1R2020	PH	1	1	1	1	1	1	1	1						
	CAFS-04-PH003	CAFS-04-PH003_1R2020	PH	1	1			1		1	1						
	CAFS-04-PH004	CAFS-04-PH004_1R2020	PH	1	1			1		1	1						
	CAFS-04-PH005	CAFS-04-PH005_1R2020	PH	1				1									
	CAFS-04-PH006	CAFS-04-PH006_1R2020	PH	1				1									
	CAFS-04-PH007	CAFS-04-PH007_1R2020	PH	1				1									
	CAFS-04-PH008	CAFS-04-PH008_1R2020	PH	1				1									
	CAFS-04-GW001	CAFS-04-GW001_1R2020	GW	1													
	CAFS-TB-1	CAFS-TB-1_1R2020	TB	1							1						
	CAFS-TB-2	CAFS-TB-2_1R2020	TB	1													
05 - Hilltop Former 8,500/10,000 Gallon Fuel Oil UST - Step 5B																	
	CAFS-05-PH001	CAFS-05-PH001_1R2020	PH	1	1	1	1	1	1	1	1			1		1	
	CAFS-05-PH002	CAFS-05-PH002_1R2020	PH	1	1	1	1	1	1	1	1			1		1	
5 locations - each location 2 subsurface samples. 3 locations rock	CAFS-05-PH003	CAFS-05-PH003_1R2020	PH	1	1	1	1	1	1	1	1			1		1	
chip samples. 2 locations groundwater grab samples.	CAFS-05-PH004	CAFS-05-PH004_1R2020	PH	1	1	1	1	1	1	1	1			1		1	
*3 locations running east west get rock chip	CAFS-05-PH005	CAFS-05-PH005_1R2020	PH	1	1	1	1	1	1	1	1			1		1	
CAFS-05-PH001, PH002, GW001	CAFS-05-PH006	CAFS-05-PH006_1R2020	PH	1	1	1	1	1		1	1						
CAFS-05-PH003, PH004, RC001	CAFS-05-PH007	CAFS-05-PH007_1R2020	PH	1	1	1	1	1		1	1						
CAFS-05-PH005, PH006, RC002	CAFS-05-PH008	CAFS-05-PH008_1R2020	PH	1	1	1	1	1		1	1						
CAFS-05-PH007, PH008, RC003, GW001	CAFS-05-PH009	CAFS-05-PH009_1R2020	PH	1	1	1	1	1		1	1						
CAFS-05-PH009, PH010	CAFS-05-PH010	CAFS-05-PH010_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-05-RC001	CAFS-05-RC001_1R2020	RC	1				1									
	CAFS-05-RC002	CAFS-05-RC002_1R2020	RC	1				1									
	CAFS-05-RC003	CAFS-05-RC003_1R2020	RC	1				1									
	CAFS-05-GW001	CAFS-05-GW001_1R2020	GW	1				1		1	1						
	CAFS-05-GW002	CAFS-05-GW002_1R2020	GW	1				1		1	1						
	CAFS-TB-3	CAFS-TB-3_1R2020	TB	1							1						
	CAFS-TB-4	CAFS-TB-4_1R2020	TB	1							1						
06 - Hilltop Approximate Location of PCB Contaminated Oil (Water Line Repair 1989) - Step 5G																	
	CAFS-06-SL001	CAFS-06-SL001_1R2020	SL		1	1	1	1	1	1	1						
1 location - 1 surface soil sample, 4 subsurface samples, 1	CAFS-06-PH001	CAFS-06-PH001_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
groundwater grab sample.	CAFS-06-PH002	CAFS-06-PH002_1R2020	PH	1	1	1	1	1	1	1	1						
CAFS-06-SL001, PH001, PH002, PH003, PH004, GW001	CAFS-06-PH003	CAFS-06-PH003_1R2020	PH	1				1									
	CAFS-06-PH004	CAFS-06-PH004_1R2020	PH	1				1									
	CAFS-06-GW001	CAFS-06-GW001_1R2020	GW	1				1		1	1						
	CAFS-TB-5	CAFS-TB-5_1R2020	TB	1							1						
	CAFS-TB-6	CAFS-TB-6_1R2020	TB	1							1						

Table 5-2 Summary of Sampling and Analysis
Remedial Investifation Sampling and Analysis Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

RI Work Plan Sample Location Figure Designations	Location ID	Sample ID	Matrix Type	VOC 8260	Select SVOC 8270 SIM	Metals 6020	Metals 7471	PCBs 8082	PCB Congeners 8082	EPH MAEPH	VPH MAVPH	Radionuclides Gamma Spec GA-01-R	Radionuclides Gross Alpha/Beta 9130	Grain Size ASTM D422	FOC ASTM D2974-00	pH 9045	XRF XRF
07 - Hilltop Two 40,000 Gallon Fuel Oil UST - Step 5C																	
	CAFS-07-PH001	CAFS-07-PH001_1R2020	PH	1	1	1	1	1		1	1			1	1	1	
4 locations - each location 4 subsurface samples. 2 locations	CAFS-07-PH002	CAFS-07-PH002_1R2020	PH	1	1	1	1	1		1	1			1	1	1	
groundwater grab samples.	CAFS-07-PH003	CAFS-07-PH003_1R2020	PH	1	1	1	1	1		1	1			1	1		
CAFS-07-PH001, PH002, PH003, PH004	CAFS-07-PH004	CAFS-07-PH004_1R2020	PH	1	1	1	1	1		1	1			1	1		
CAFS-07-PH005, PH006, PH007, PH008	CAFS-07-PH005	CAFS-07-PH005_1R2020	PH	1	1	1	1	1		1	1						
CAFS-07-PH009, PH010, PH011, PH012, GW001	CAFS-07-PH006	CAFS-07-PH006_1R2020	PH	1	1	1	1	1		1	1						
CAFS-07-PH013, PH014, PH015, PH016, GM002	CAFS-07-PH007	CAFS-07-PH007_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-07-PH008	CAFS-07-PH008_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-07-PH009	CAFS-07-PH009_1R2020	PH	1													
	CAFS-07-PH010	CAFS-07-PH010_1R2020	PH	1													
	CAFS-07-PH011	CAFS-07-PH011_1R2020	PH	1													
	CAFS-07-PH012	CAFS-07-PH012_1R2020	PH	1													
	CAFS-07-PH013	CAFS-07-PH013_1R2020	PH	1													
	CAFS-07-PH014	CAFS-07-PH014_1R2020	PH	1													
	CAFS-07-PH015	CAFS-07-PH015_1R2020	PH	1													
	CAFS-07-PH016	CAFS-07-PH016_1R2020	PH	1													
	CAFS-07-GW001	CAFS-07-GW001_1R2020	GW	1													
	CAFS-07-GW002	CAFS-07-GW002_1R2020	GW	1													
08 - Hilltop Lube Oil UST - Step 5D																	
	CAFS-08-SL001	CAFS-08-SL001_1R2020	SL		1	1	1	1		1	1						
1 location - 1 surface soil sample, 4 subsurface samples, 1	CAFS-08-PH001	CAFS-08-PH001_1R2020	PH	1	1	1	1	1		1	1			1	1	1	
groundwater grab sample.	CAFS-08-PH002	CAFS-08-PH002_1R2020	PH	1	1	1	1	1		1	1						
CAFS-08-SL001, PH001, PH002, PH003, PH004, GW001	CAFS-08-PH003	CAFS-08-PH003_1R2020	PH	1													
	CAFS-08-PH004	CAFS-08-PH004_1R2020	PH	1													
	CAFS-08-GW001	CAFS-08-GW001_1R2020	GW	1													
09 - Hilltop Former Radar Buildings - Step 5E																	
	CAFS-09-SL001	CAFS-09-SL001_1R2020	SL		1	1	1	1	1	1	1					1	
5 locations - each location 1 surface soil sampl, 1 subsurface sample,	CAFS-09-SL002	CAFS-09-SL002_1R2020	SL		1	1	1	1	1	1	1					1	
1 groundwater grab sample.	CAFS-09-SL003	CAFS-09-SL003_1R2020	SL		1	1	1	1	1	1	1						
CAFS-09-SL001, PH001, GW001	CAFS-09-SL004	CAFS-09-SL004_1R2020	SL		1	1	1	1	1	1	1						
CAFS-09-SL002, PH002, GW002	CAFS-09-SL005	CAFS-09-SL005_1R2020	SL		1	1	1	1	1	1	1						
CAFS-09-SL003, PH003, GW003	CAFS-09-PH001	CAFS-09-PH001_1R2020	PH	1	1	1	1	1	1	1	1			1		1	
CAFS-09-SL004, PH004, GW004	CAFS-09-PH002	CAFS-09-PH002_1R2020	PH	1	1	1	1	1	1	1	1			1		1	
CAFS-09-SL005, PH005, GW005	CAFS-09-PH003	CAFS-09-PH003_1R2020	PH	1	1	1	1	1	1	1	1			1			
	CAFS-09-PH004	CAFS-09-PH004_1R2020	PH	1	1	1	1	1	1	1	1			1			
	CAFS-09-PH005	CAFS-09-PH005_1R2020	PH	1	1	1	1	1	1	1	1			1			
	CAFS-09-GW001	CAFS-09-GW001_1R2020	GW	1													
	CAFS-09-GW002	CAFS-09-GW002_1R2020	GW	1													
	CAFS-09-GW003	CAFS-09-GW003_1R2020	GW	1													
	CAFS-09-GW004	CAFS-09-GW004_1R2020	GW	1													
	CAFS-09-GW005	CAFS-09-GW005_1R2020	GW	1													
	CAFS-TB-7	CAFS-TB-7_1R2020	TB	1							1						
	CAFS-TB-8	CAFS-TB-8_1R2020	TB	1													

			Matrix	VOC	Select SVOC	Metals	Metals	PCBs	PCB Congeners	EPH	VPH	Radionuclides Gamma Spec	Radionuclides Gross Alpha/Beta	Grain Size	FOC	pH	XRF
RI Work Plan Sample Location Figure Designations	Location ID	Sample ID	Type	8260	8270 SIM	6020	7471	8082	8082	MAEPH	MAVPH	GA-01-R	9130	ASTM D422	ASTM D2974-00	9045	XRF
10 - Hilltop Septic Systems Buildings 204, 211, 212 and 213 - Step F																	
	CAFS-10-PH001	CAFS-10-PH001_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
8 locations - each location 2 subsurface samples. 4 locations 1	CAFS-10-PH002	CAFS-10-PH002_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
groundwater grab sample. each tank 1 sludge sample.	CAFS-10-PH003	CAFS-10-PH003_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
CAFS-10-PH001, PH002, GW001	CAFS-10-PH004	CAFS-10-PH004_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
CAFS-10-PH003, PH004	CAFS-10-PH005	CAFS-10-PH005_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
CAFS-10-PH005, PH006, GW002	CAFS-10-PH006	CAFS-10-PH006_1R2020	PH	1	1	1	1	1		1	1			1	1		
CAFS-10-PH007, PH008	CAFS-10-PH007	CAFS-10-PH007_1R2020	PH	1	1	1	1	1		1	1			1	1		
CAFS-10-PH009, PH010, GW003	CAFS-10-PH008	CAFS-10-PH008_1R2020	PH	1	1	1	1	1		1	1			1	1		
CAFS-10-PH011, PH012	CAFS-10-PH009	CAFS-10-PH009_1R2020	PH	1	1	1	1	1		1	1			1	1		
CAFS-10-PH013, PH014, GW004	CAFS-10-PH010	CAFS-10-PH010_1R2020	PH	1	1	1	1	1		1	1			1	1		
CAFS-10-PH015, PH016	CAFS-10-PH011	CAFS-10-PH011_1R2020	PH	1	1	1	1	1		1	1						
CAFS-10-TK001	CAFS-10-PH012	CAFS-10-PH012_1R2020	PH	1	1	1	1	1		1	1						
CAFS-10-TK002	CAFS-10-PH013	CAFS-10-PH013_1R2020	PH	1	1	1	1	1		1	1						
CAFS-10-TK003	CAFS-10-PH014	CAFS-10-PH014_1R2020	PH	1	1	1	1	1		1	1						
CAFS-10-TK004	CAFS-10-PH015	CAFS-10-PH015_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-10-PH016	CAFS-10-PH016_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-10-GW001	CAFS-10-GW001_1R2020	GW	1													
	CAFS-10-GW002	CAFS-10-GW002_1R2020	GW	1													
	CAFS-10-GW003	CAFS-10-GW003_1R2020	GW	1													
	CAFS-10-GW004	CAFS-10-GW004_1R2020	GW	1													
	CAFS-10-TK001	CAFS-10-TK001_1R2020	TK	1	1	1	1	1	1	1	1						
	CAFS-10-TK002	CAFS-10-TK002_1R2020	TK	1	1	1	1	1	1	1	1						
	CAFS-10-TK003	CAFS-10-TK003_1R2020	TK	1	1	1	1	1		1	1						
	CAFS-10-TK004	CAFS-10-TK004_1R2020	TK	1	1	1	1	1		1	1						
11 - Hilltop Possible Discharge Pipes Buildings 212 and 213 - Step 2D																	
2 locations - each location 1 surface soil sample	CAFS-11-SL001	CAFS-11-SL001_1R2020	SL		1	1	1	1	1	1	1			1	1	1	
CAFS-11-SL001	CAFS-11-SL002	CAFS-11-SL002_1R2020	SL		1	1	1	1	1	1	1						
CAFS-11-SL002	CAFS-EB-4	CAFS-EB-4_1R2020	EB		1	1	1	1	1	1	1						
12 - Hilltop Drum Locations 1 through 5 - Step 2E																	
10 locations - each location 1 surface soil sample	CAFS-12-SL001	CAFS-12-SL001_1R2020	SL	1	1	1	1	1	1	1	1			1	1	1	
CAFS-12-SL001	CAFS-12-SL002	CAFS-12-SL002_1R2020	SL	1	1	1	1	1	1	1	1			1	1	1	
CAFS-12-SL002	CAFS-12-SL003	CAFS-12-SL003_1R2020	SL	1	1	1	1	1	1	1	1			1	1	1	
CAFS-12-SL003	CAFS-12-SL004	CAFS-12-SL004_1R2020	SL	1	1	1	1	1	1	1	1			1	1	1	
CAFS-12-SL004	CAFS-12-SL005	CAFS-12-SL005_1R2020	SL	1	1	1	1	1	1	1	1			1	1	1	
CAFS-12-SL005	CAFS-12-SL006	CAFS-12-SL006_1R2020	SL	1	1	1	1	1		1	1						
CAFS-12-SL006	CAFS-12-SL007	CAFS-12-SL007_1R2020	SL	1	1	1	1	1		1	1						
CAFS-12-SL007	CAFS-12-SL008	CAFS-12-SL008_1R2020	SL	1	1	1	1	1		1	1						
CAFS-12-SL008	CAFS-12-SL009	CAFS-12-SL009_1R2020	SL	1	1	1	1	1		1	1						
CAFS-12-SL009	CAFS-12-SL010	CAFS-12-SL010_1R2020	SL	1	1	1	1	1		1	1						
CAFS-12-SL010	CAFS-EB-5	CAFS-EB-5_1R2020	EB	1	1	1	1	1	1	1	1						
	CAFS-TB-9	CAFS-TB-9_1R2020	TB	1							1						

RI Work Plan Sample Location Figure Designations	Location ID	Sample ID	Matrix Type	VOC 8260	Select SVOC 8270 SIM	Metals 6020	Metals 7471	PCBs 8082	PCB Congeners 8082	EPH MAEPH	VPH MAVPH	Radionuclides Gamma Spec GA-01-R	Radionuclides Gross Alpha/Beta 9130	Grain Size ASTM D422	FOC ASTM D2974-00	pH 9045	XRF XRF
13 - Small Arms Range - Steps 3A & 3B																	
48 locations - each location 1 surface soil sample	CAFS-13-SL001	CAFS-13-SL001_1R2020	SL			1	1							1			1
CAFS-13-SL001	CAFS-13-SL002	CAFS-13-SL002_1R2020	SL			1	1							1			1
CAFS-13-SL002	CAFS-13-SL003	CAFS-13-SL003_1R2020	SL			1	1							1			1
CAFS-13-SL003	CAFS-13-SL004	CAFS-13-SL004_1R2020	SL			1	1							1			1
CAFS-13-SL004	CAFS-13-SL005	CAFS-13-SL005_1R2020	SL			1	1							1			1
CAFS-13-SL005	CAFS-13-SL006	CAFS-13-SL006_1R2020	SL			1	1										1
CAFS-13-SL006	CAFS-13-SL007	CAFS-13-SL007_1R2020	SL			1	1										1
CAFS-13-SL007	CAFS-13-SL008	CAFS-13-SL008_1R2020	SL			1	1										1
CAFS-13-SL008	CAFS-13-SL009	CAFS-13-SL009_1R2020	SL			1	1										1
CAFS-13-SL009	CAFS-13-SL010	CAFS-13-SL010_1R2020	SL			1	1										1
CAFS-13-SL010	CAFS-13-SL011	CAFS-13-SL011_1R2020	SL														1
CAFS-13-SL011	CAFS-13-SL012	CAFS-13-SL012_1R2020	SL														1
CAFS-13-SL012	CAFS-13-SL013	CAFS-13-SL013_1R2020	SL														1
CAFS-13-SL013	CAFS-13-SL014	CAFS-13-SL014_1R2020	SL														1
CAFS-13-SL014	CAFS-13-SL015	CAFS-13-SL015_1R2020	SL														1
CAFS-13-SL015	CAFS-13-SL016	CAFS-13-SL016_1R2020	SL														1
CAFS-13-SL016	CAFS-13-SL017	CAFS-13-SL017_1R2020	SL														1
CAFS-13-SL017	CAFS-13-SL018	CAFS-13-SL018_1R2020	SL														1
CAFS-13-SL018	CAFS-13-SL019	CAFS-13-SL019_1R2020	SL														1
CAFS-13-SL019	CAFS-13-SL020	CAFS-13-SL020_1R2020	SL														1
CAFS-13-SL020	CAFS-13-SL021	CAFS-13-SL021_1R2020	SL														1
CAFS-13-SL021	CAFS-13-SL022	CAFS-13-SL022_1R2020	SL														1
CAFS-13-SL022	CAFS-13-SL023	CAFS-13-SL023_1R2020	SL														1
CAFS-13-SL023	CAFS-13-SL024	CAFS-13-SL024_1R2020	SL														1
CAFS-13-SL024	CAFS-13-SL025	CAFS-13-SL025_1R2020	SL														1
CAFS-13-SL025	CAFS-13-SL026	CAFS-13-SL026_1R2020	SL														1
CAFS-13-SL026	CAFS-13-SL027	CAFS-13-SL027_1R2020	SL														1
CAFS-13-SL027	CAFS-13-SL028	CAFS-13-SL028_1R2020	SL														1
CAFS-13-SL028	CAFS-13-SL029	CAFS-13-SL029_1R2020	SL														1
CAFS-13-SL029	CAFS-13-SL030	CAFS-13-SL030_1R2020	SL														1
CAFS-13-SL030	CAFS-13-SL031	CAFS-13-SL031_1R2020	SL														1
CAFS-13-SL031	CAFS-13-SL032	CAFS-13-SL032_1R2020	SL														1
CAFS-13-SL032	CAFS-13-SL033	CAFS-13-SL033_1R2020	SL														1
CAFS-13-SL033	CAFS-13-SL034	CAFS-13-SL034_1R2020	SL														1
CAFS-13-SL034	CAFS-13-SL035	CAFS-13-SL035_1R2020	SL														1
CAFS-13-SL035	CAFS-13-SL036	CAFS-13-SL036_1R2020	SL														1
CAFS-13-SL036	CAFS-13-SL037	CAFS-13-SL037_1R2020	SL														1
CAFS-13-SL037	CAFS-13-SL038	CAFS-13-SL038_1R2020	SL														1
CAFS-13-SL038	CAFS-13-SL039	CAFS-13-SL039_1R2020	SL														1
CAFS-13-SL039	CAFS-13-SL040	CAFS-13-SL040_1R2020	SL														1
CAFS-13-SL040	CAFS-13-SL041	CAFS-13-SL041_1R2020	SL														1
CAFS-13-SL041	CAFS-13-SL042	CAFS-13-SL042_1R2020	SL														1
CAFS-13-SL042	CAFS-13-SL043	CAFS-13-SL043_1R2020	SL														1
CAFS-13-SL043	CAFS-13-SL044	CAFS-13-SL044_1R2020	SL														1
CAFS-13-SL044	CAFS-13-SL045	CAFS-13-SL045_1R2020	SL														1
CAFS-13-SL045	CAFS-13-SL046	CAFS-13-SL046_1R2020	SL														1
CAFS-13-SL046	CAFS-13-SL047	CAFS-13-SL047_1R2020	SL														1
CAFS-13-SL047	CAFS-13-SL048	CAFS-13-SL048_1R2020	SL														1
CAFS-13-SL048	CAFS-EB-6	CAFS-EB-6_1R2020	EB			1	1										

Table 5-2 Summary of Sampling and Analysis
Remedial Investifation Sampling and Analysis Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

				VOC	Select SVOC	Metals	Metals	PCBs	PCB Congeners	EPH	VPH	Radionuclides Gamma Spec	Radionuclides Gross Alpha/Beta	Grain Size	FOC	pH	XRF
RI Work Plan Sample Location Figure Designations	Location ID	Sample ID	Matrix Type	8260	8270 SIM	6020	7471	8082	8082	MAEPH	MAVPH	GA-01-R	9130	ASTM D422	ASTM D2974-00	9045	XRF
14 - Industrial Area - Fuel Tanks/Coal yard/Coal Yard Runnoff Area (2 and 5) - Step 5H																	
	CAFS-14-SL001	CAFS-14-SL001_1R2020	SL		1	1	1	1	1	1	1			1	1	1	
3 locations - each location 1 surface soil sample, 4 subsurface	CAFS-14-SL002	CAFS-14-SL002_1R2020	SL		1	1	1	1	1	1	1						
samples, 1 groundwater grab sample.	CAFS-14-SL003	CAFS-14-SL003_1R2020	SL		1	1	1	1		1	1						
CAFS-14-SL001, PH001, PH002, PH003, PH004, GW001	CAFS-14-PH001	CAFS-14-PH001_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
CAFS-14-SL002, PH005, PH006, PH007, PH008, GW002	CAFS-14-PH002	CAFS-14-PH002_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
CAFS-14-SL003, PH009, PH010, PH011, PH012, GW003	CAFS-14-PH003	CAFS-14-PH003_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
	CAFS-14-PH004	CAFS-14-PH004_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-14-PH005	CAFS-14-PH005_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-14-PH006	CAFS-14-PH006_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-14-PH007	CAFS-14-PH007_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-14-PH008	CAFS-14-PH008_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-14-PH009	CAFS-14-PH009_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-14-PH010	CAFS-14-PH010_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-14-PH011	CAFS-14-PH011_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-14-PH012	CAFS-14-PH012_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-14-GW001	CAFS-14-GW001_1R2020	GW	1													
	CAFS-14-GW002	CAFS-14-GW002_1R2020	GW	1													
	CAFS-14-GW003	CAFS-14-GW003_1R2020	GW	1													
15 - Industrial Area - Water Treatment Plant/Septic Plant/Weld Shop Area (10, 11 and 16) - Step 5I																	
	CAFS-15-SL001	CAFS-15-SL001_1R2020	SL		1	1	1	1	1	1	1			1	1	1	
3 locations - each location 1 surface soil sample, 4 subsurface	CAFS-15-SL002	CAFS-15-SL002_1R2020	SL		1	1	1	1	1	1	1						
samples, 1 groundwater grab sample.	CAFS-15-SL003	CAFS-15-SL003_1R2020	SL		1	1	1	1		1	1						
CAFS-15-SL001, PH001, PH002, PH003, PH004, GW001	CAFS-15-PH001	CAFS-15-PH001_1R2020	PH	1	1	1	1	1	1	1	1	1	1	1	1	1	
CAFS-15-SL002, PH005, PH006, PH007, PH008, GW002	CAFS-15-PH002	CAFS-15-PH002_1R2020	PH	1	1	1	1	1	1	1	1	1	1	1	1	1	
CAFS-15-SL003, PH009, PH010, PH011, PH012, GW003	CAFS-15-PH003	CAFS-15-PH003_1R2020	PH	1	1	1	1	1	1	1	1	1	1	1	1	1	
	CAFS-15-PH004	CAFS-15-PH004_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-15-PH005	CAFS-15-PH005_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-15-PH006	CAFS-15-PH006_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-15-PH007	CAFS-15-PH007_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-15-PH008	CAFS-15-PH008_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-15-PH009	CAFS-15-PH009_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-15-PH010	CAFS-15-PH010_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-15-PH011	CAFS-15-PH011_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-15-PH012	CAFS-15-PH012_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-15-GW001	CAFS-15-GW001_1R2020	GW	1													
	CAFS-15-GW002	CAFS-15-GW002_1R2020	GW	1													
	CAFS-15-GW003	CAFS-15-GW003_1R2020	GW	1													
	CAFS-TB-10	CAFS-TB-10_1R2020	TB	1							1						
	CAFS-TB-11	CAFS-TB-11_1R2020	TB	1													
16 - Industrial Area - Water Treatment Plant/Septic Sand Filter Area (18) - Step 5J																	
	CAFS-16-SL001	CAFS-16-SL001_1R2020	SL		1	1	1	1	1	1	1			1	1	1	
3 locations - each location 1 surface soil sample, 4 subsurface	CAFS-16-SL002	CAFS-16-SL002_1R2020	SL		1	1	1	1	1	1	1						
samples, 1 groundwater grab sample.	CAFS-16-SL003	CAFS-16-SL003_1R2020	SL		1	1	1	1		1	1						
CAFS-16-SL001, PH001, PH002, PH003, PH004, GW001	CAFS-16-PH001	CAFS-16-PH001_1R2020	PH	1	1	1	1	1	1	1	1	1	1	1	1	1	
CAFS-16-SL002, PH005, PH006, PH007, PH008, GW002	CAFS-16-PH002	CAFS-16-PH002_1R2020	PH	1	1	1	1	1	1	1	1	1	1	1	1	1	
CAFS-16-SL003, PH009, PH010, PH011, PH012, GW003	CAFS-16-PH003	CAFS-16-PH003_1R2020	PH	1	1	1	1	1	1	1	1	1	1	1	1	1	
	CAFS-16-PH004	CAFS-16-PH004_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-16-PH005	CAFS-16-PH005_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-16-PH006	CAFS-16-PH006_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-16-PH007	CAFS-16-PH007_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-16-PH008	CAFS-16-PH008_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-16-PH009	CAFS-16-PH009_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-16-PH010	CAFS-16-PH010_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-16-PH011	CAFS-16-PH011_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-16-PH012	CAFS-16-PH012_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-16-GW001	CAFS-16-GW001_1R2020	GW	1													
	CAFS-16-GW002	CAFS-16-GW002_1R2020	GW	1													
	CAFS-16-GW003	CAFS-16-GW003_1R2020	GW	1													

RI Work Plan Sample Location Figure Designations	Location ID	Sample ID	Matrix Type	VOC 8260	Select SVOC 8270 SIM	Metals 6020	Metals 7471	PCBs 8082	PCB Congeners 8082	EPH MAEPH	VPH MAVPH	Radionuclides Gamma Spec GA-01-R	Radionuclides Gross Alpha/Beta 9130	Grain Size ASTM D422	FOC ASTM D2974-00	pH 9045	XRF XRF
17 - Industrial Area - Auto Storage building (19) - Step 5K																	
	CAFS-17-SL001	CAFS-17-SL001_1R2020	SL		1	1	1			1	1						
1 location - 1 surface soil sample, 4 subsurface samples, 1	CAFS-17-PH001	CAFS-17-PH001_1R2020	PH	1	1	1	1			1	1			1	1	1	
groundwater grab sample.	CAFS-17-PH002	CAFS-17-PH002_1R2020	PH	1	1	1	1			1	1			1	1	1	
CAFS-17-SL001, PH001, PH002, PH003, PH004, GW001	CAFS-17-PH003	CAFS-17-PH003_1R2020	PH	1	1	1	1			1	1						
	CAFS-17-PH004	CAFS-17-PH004_1R2020	PH	1	1	1	1			1	1						
	CAFS-17-GW001	CAFS-17-GW001_1R2020	GW	1													
18 - Industrial Area - Auto maintenance Shop/Motor pool (4) and Former 2,000 Gallon UST - Step 5L																	
	CAFS-18-SL001	CAFS-18-SL001_1R2020	SL		1	1	1	1	1	1	1			1	1	1	
3 locations - each location 1 surface soil sample, 4 subsurface	CAFS-18-SL002	CAFS-18-SL002_1R2020	SL		1	1	1	1	1	1	1						
samples, 1 groundwater grab sample.	CAFS-18-SL003	CAFS-18-SL003_1R2020	SL		1	1	1	1		1	1						
CAFS-18-SL001, PH001, PH002, PH003, PH004, GW001	CAFS-18-PH001	CAFS-18-PH001_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
CAFS-18-SL002, PH005, PH006, PH007, PH008, GW002	CAFS-18-PH002	CAFS-18-PH002_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
CAFS-18-SL003, PH009, PH010, PH011, PH012, GW003	CAFS-18-PH003	CAFS-18-PH003_1R2020	PH	1	1	1	1	1	1	1	1			1	1	1	
	CAFS-18-PH004	CAFS-18-PH004_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-18-PH005	CAFS-18-PH005_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-18-PH006	CAFS-18-PH006_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-18-PH007	CAFS-18-PH007_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-18-PH008	CAFS-18-PH008_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-18-PH009	CAFS-18-PH009_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-18-PH010	CAFS-18-PH010_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-18-PH011	CAFS-18-PH011_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-18-PH012	CAFS-18-PH012_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-18-GW001	CAFS-18-GW001_1R2020	GW	1													
	CAFS-18-GW002	CAFS-18-GW002_1R2020	GW	1													
	CAFS-18-GW003	CAFS-18-GW003_1R2020	GW	1													
	CAFS-EB-7	CAFS-EB-7_1R2020	EB		1	1	1	1	1	1	1						
	CAFS-TB-12	CAFS-TB-12_1R2020	TB	1							1						
	CAFS-TB-13	CAFS-TB-13_1R2020	TB	1													
19 - Industrial Area - Fire Station Building (22) - Step 5M																	
	CAFS-19-SL001	CAFS-19-SL001_1R2020	SL		1	1	1			1	1						
1 location - 1 surface soil sample, 4 subsurface samples, 1	CAFS-19-PH001	CAFS-19-PH001_1R2020	PH	1	1	1	1			1	1						
groundwater grab sample.	CAFS-19-PH002	CAFS-19-PH002_1R2020	PH	1	1	1	1			1	1						
CAFS-19-SL001, PH001, PH002, PH003, PH004, GW001	CAFS-19-PH003	CAFS-19-PH003_1R2020	PH	1	1	1	1			1	1						
	CAFS-19-PH004	CAFS-19-PH004_1R2020	PH	1	1	1	1			1	1						
	CAFS-19-GW001	CAFS-19-GW001_1R2020	GW	1													
20 - Industrial Area - Maintenance Shop (15) - Step 5N																	
	CAFS-20-SL001	CAFS-20-SL001_1R2020	SL		1	1	1	1		1	1						
2 locations - each location 1 surface soil sample, 1 subsurface	CAFS-20-SL002	CAFS-20-SL002_1R2020	SL		1	1	1	1		1	1						
sample, 1 groundwater grab sample.	CAFS-20-PH001	CAFS-20-PH001_1R2020	PH	1	1	1	1	1		1	1			1	1		
CAFS-20-SL001, PH001, PH002, PH003, PH004, GW001	CAFS-20-PH002	CAFS-20-PH002_1R2020	PH	1	1	1	1	1		1	1			1	1		
CAFS-20-SL002, PH005, PH006, PH007, PH008, GW002	CAFS-20-PH003	CAFS-20-PH003_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-20-PH004	CAFS-20-PH004_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-20-PH005	CAFS-20-PH005_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-20-PH006	CAFS-20-PH006_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-20-PH007	CAFS-20-PH007_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-20-PH008	CAFS-20-PH008_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-20-GW001	CAFS-20-GW001_1R2020	GW	1													
	CAFS-20-GW002	CAFS-20-GW002_1R2020	GW	1													
21 - Industrial Area - Location of 2,000 Gallon Tank, Use Unknown - Step 5O																	
	CAFS-21-SL001	CAFS-21-SL001_1R2020	SL		1	1	1	1	1	1	1						
1 location - 1 surface soil sample, 4 subsurface samples, 1	CAFS-21-PH001	CAFS-21-PH001_1R2020	PH	1	1	1	1	1	1	1	1						
groundwater grab sample.	CAFS-21-PH002	CAFS-21-PH002_1R2020	PH	1	1	1	1	1		1	1						
CAFS-21-SL001, PH001, PH002, PH003, PH004, GW001	CAFS-21-PH003	CAFS-21-PH003_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-21-PH004	CAFS-21-PH004_1R2020	PH	1	1	1	1	1		1	1						
	CAFS-21-GW001	CAFS-21-GW001_1R2020	GW	1													
	CAFS-TB-14	CAFS-TB-14_1R2020	TB	1							1						
	CAFS-TB-15	CAFS-TB-15_1R2020	TB	1													

			Matrix	VOC	Select SVOC	Metals	Metals	PCBs	PCB Congeners	EPH	VPH	Radionuclides Gamma Spec	Radionuclides Gross Alpha/Beta	Grain Size	FOC	pH	XRF
RI Work Plan Sample Location Figure Designations	Location ID	Sample ID	Type	8260	8270 SIM	6020	7471	8082	8082	MAEPH	MAVPH	GA-01-R	9130	ASTM D422	ASTM D2974-00	9045	XRF
22 - Industrial Area Transformer Poles 5 and 6 - Step 2A																	
2 locations- each location 1 surface soil																	
CAFS-22-SL001	CAFS-22-SL001	CAFS-22-SL001_1R2020	SL					1	1								
CAFS-22-SL002	CAFS-22-SL002	CAFS-22-SL002_1R2020	SL					1									
23 - Former Radio Receiver Building - Step 5P																	
	CAFS-23-SL001	CAFS-23-SL001_1R2020	SL		1	1	1			1	1			1	1		
4 locations - each location 4 surface soil samples, 3 subsurface	CAFS-23-SL002	CAFS-23-SL002_1R2020	SL		1	1	1			1	1			1	1		
samples.	CAFS-23-SL003	CAFS-23-SL003_1R2020	SL		1	1	1			1	1						
CAFS-23-SL001, PH001, PH002, PH003	CAFS-23-SL004	CAFS-23-SL004_1R2020	SL		1	1	1			1	1						
CAFS-23-SL002, PH004, PH005, PH006	CAFS-23-PH001	CAFS-23-PH001_1R2020	PH	1	1	1	1			1	1			1	1		
CAFS-23-SL003, PH007, PH008, PH009	CAFS-23-PH002	CAFS-23-PH002_1R2020	PH	1	1	1	1			1	1			1	1		
CAFS-23-SL004, PH010, PH011, PH012	CAFS-23-PH003	CAFS-23-PH003_1R2020	PH	1	1	1	1			1	1			1	1		
	CAFS-23-PH004	CAFS-23-PH004_1R2020	PH	1	1	1	1			1	1						
	CAFS-23-PH005	CAFS-23-PH005_1R2020	PH	1	1	1	1			1	1						
	CAFS-23-PH006	CAFS-23-PH006_1R2020	PH	1	1	1	1			1	1						
	CAFS-23-PH007	CAFS-23-PH007_1R2020	PH	1						1	1						
	CAFS-23-PH008	CAFS-23-PH008_1R2020	PH	1						1	1						
	CAFS-23-PH009	CAFS-23-PH009_1R2020	PH	1						1	1						
	CAFS-23-PH010	CAFS-23-PH010_1R2020	PH	1						1	1						
	CAFS-23-PH011	CAFS-23-PH011_1R2020	PH	1						1	1						
	CAFS-23-PH012	CAFS-23-PH012_1R2020	PH	1						1	1						
	CAFS-TB-16	CAFS-TB-16_1R2020	TB	1							1						
24 through 27 - Seep Sampling (8 Seep Locations, 4 Rounds) - Step 4																	
	CAFS-24-SE001	CAFS-24-SE001_1R2020	SE	1						1	1						
8 locations - each location sampled quarterly	CAFS-24-SE002	CAFS-24-SE002_1R2020	SE	1						1	1						
CAFS-24-SE001, 25-SE001, 26-SE001, 27-SE001	CAFS-24-SE003	CAFS-24-SE003_1R2020	SE	1						1	1						
CAFS-24-SE002, 25-SE002, 26-SE002, 27-SE002	CAFS-24-SE004	CAFS-24-SE004_1R2020	SE	1						1	1						
CAFS-24-SE003, 25-SE003, 26-SE003, 27-SE003	CAFS-24-SE005	CAFS-24-SE005_1R2020	SE	1						1	1						
CAFS-24-SE004, 25-SE004, 26-SE004, 27-SE004	CAFS-24-SE006	CAFS-24-SE006_1R2020	SE	1						1	1						
CAFS-24-SE005, 25-SE005, 26-SE005, 27-SE005	CAFS-24-SE007	CAFS-24-SE007_1R2020	SE	1						1	1						
CAFS-24-SE006, 25-SE006, 26-SE006, 27-SE006	CAFS-24-SE008	CAFS-24-SE008_1R2020	SE	1						1	1						
CAFS-24-SE007, 25-SE007, 26-SE007, 27-SE007																	
CAFS-24-SE008, 25-SE008, 26-SE008, 27-SE008																	
	CAFS-25-SE001	CAFS-25-SE001_2R2020	SE	1						1	1						
	CAFS-25-SE002	CAFS-25-SE002_2R2020	SE	1						1	1						
	CAFS-25-SE003	CAFS-25-SE003_2R2020	SE	1						1	1						
	CAFS-25-SE004	CAFS-25-SE004_2R2020	SE	1						1	1						
	CAFS-25-SE005	CAFS-25-SE005_2R2020	SE	1						1	1						
	CAFS-25-SE006	CAFS-25-SE006_2R2020	SE	1						1	1						
	CAFS-25-SE007	CAFS-25-SE007_2R2020	SE	1						1	1						
	CAFS-25-SE008	CAFS-25-SE008_2R2020	SE	1						1	1						
	CAFS-26-SE001	CAFS-26-SE001_3R2021	SE	1						1	1						
	CAFS-26-SE002	CAFS-26-SE002_3R2021	SE	1						1	1						
	CAFS-26-SE003	CAFS-26-SE003_3R2021	SE	1						1	1						

RI Work Plan Sample Location Figure Designations	Location ID	Sample ID	Matrix Type	VOC	Select SVOC	Metals	Metals	PCBs	PCB Congeners	EPH	VPH	Radionuclides Gamma Spec	Radionuclides Gross Alpha/Beta	Grain Size	FOC	pH	XRF
				8260	8270 SIM	6020	7471	8082	8082	MAEPH	MAVPH	GA-01-R	9130	ASTM D422	ASTM D2974-00	9045	XRF
	CAFS-26-SE004	CAFS-26-SE004_3R2021	SE	1						1	1						
	CAFS-26-SE005	CAFS-26-SE005_3R2021	SE	1						1	1						
	CAFS-26-SE006	CAFS-26-SE006_3R2021	SE	1						1	1						
	CAFS-26-SE007	CAFS-26-SE007_3R2021	SE	1						1	1						
	CAFS-26-SE008	CAFS-26-SE008_3R2021	SE	1						1	1						
	CAFS-27-SE001	CAFS-27-SE001_4R2021	SE	1						1	1						
	CAFS-27-SE002	CAFS-27-SE002_4R2021	SE	1						1	1						
	CAFS-27-SE003	CAFS-27-SE003_4R2021	SE	1						1	1						
	CAFS-27-SE004	CAFS-27-SE004_4R2021	SE	1						1	1						
	CAFS-27-SE005	CAFS-27-SE005_4R2021	SE	1						1	1						
	CAFS-27-SE006	CAFS-27-SE006_4R2021	SE	1						1	1						
	CAFS-27-SE007	CAFS-27-SE007_4R2021	SE	1						1	1						
	CAFS-27-SE008	CAFS-27-SE008_4R2021	SE	1						1	1						
	CAFS-TB-17	CAFS-TB-17_1R2020	TB	1							1						
	CAFS-TB-18	CAFS-TB-18_2R2020	TB	1							1						
	CAFS-TB-19	CAFS-TB-19_3R2021	TB	1							1						
	CAFS-TB-20	CAFS-TB-20_4R2021	TB	1							1						
28 - Correctional Facility Supply Wells and Old Restaurant Well (4 Wells, 4 Rounds) - Step 6																	
	CAFS-28-PW001	CAFS-28-PW001_1R2020	PW	1													
4 locations - each location sampled quarterly	CAFS-28-PW002	CAFS-28-PW002_1R2020	PW	1													
CAFS-28-PW001	CAFS-28-PW003	CAFS-28-PW003_1R2020	PW	1													
CAFS-28-PW002	CAFS-28-PW004	CAFS-28-PW004_1R2020	PW	1													
CAFS-28-PW003	CAFS-28-PW001	CAFS-28-PW001_2R2020	PW	1													
CAFS-28-PW004	CAFS-28-PW002	CAFS-28-PW002_2R2020	PW	1													
	CAFS-28-PW003	CAFS-28-PW003_2R2020	PW	1													
	CAFS-28-PW004	CAFS-28-PW004_2R2020	PW	1													
	CAFS-28-PW001	CAFS-28-PW001_3R2021	PW	1													
	CAFS-28-PW002	CAFS-28-PW002_3R2021	PW	1													
	CAFS-28-PW003	CAFS-28-PW003_3R2021	PW	1													
	CAFS-28-PW004	CAFS-28-PW004_3R2021	PW	1													
	CAFS-28-PW001	CAFS-28-PW001_4R2021	PW	1													
	CAFS-28-PW002	CAFS-28-PW002_4R2021	PW	1													
	CAFS-28-PW003	CAFS-28-PW003_4R2021	PW	1													
	CAFS-28-PW004	CAFS-28-PW004_4R2021	PW	1													

RI Work Plan Sample Location Figure Designations	Location ID	Sample ID	Matrix Type	VOC 8260	Select SVOC 8270 SIM	Metals 6020	Metals 7471	PCBs 8082	PCB Congeners 8082	EPH MAEPH	VPH MAVPH	Radionuclides Gamma Spec GA-01-R	Radionuclides Gross Alpha/Beta 9130	Grain Size ASTM D422	FOC ASTM D2974-00	pH 9045	XRF XRF
29 - Residential Wells (4 Rounds - 6 Wells) - Steps 6 & 7																	
	CAFS-29-RE001	CAFS-29-RE001_1R2020	RE	1													
6 locations - each location sampled quarterly	CAFS-29-RE002	CAFS-29-RE002_1R2020	RE	1													
CAFS-29-RE001	CAFS-29-RE003	CAFS-29-RE003_1R2020	RE	1													
CAFS-29-RE002	CAFS-29-RE004	CAFS-29-RE004_1R2020	RE	1													
CAFS-29-RE003	CAFS-29-RE005	CAFS-29-RE005_1R2020	RE	1													
CAFS-29-RE004	CAFS-29-RE006	CAFS-29-RE006_1R2020	RE	1													
CAFS-29-RE005	CAFS-29-RE001	CAFS-29-RE001_2R2020	RE	1													
CAFS-29-RE006	CAFS-29-RE002	CAFS-29-RE002_2R2020	RE	1													
	CAFS-29-RE003	CAFS-29-RE003_2R2020	RE	1													
	CAFS-29-RE004	CAFS-29-RE004_2R2020	RE	1													
	CAFS-29-RE005	CAFS-29-RE005_2R2020	RE	1													
	CAFS-29-RE006	CAFS-29-RE006_2R2020	RE	1													
	CAFS-29-RE001	CAFS-29-RE001_3R2021	RE	1													
	CAFS-29-RE002	CAFS-29-RE002_3R2021	RE	1													
	CAFS-29-RE003	CAFS-29-RE003_3R2021	RE	1													
	CAFS-29-RE004	CAFS-29-RE004_3R2021	RE	1													
	CAFS-29-RE005	CAFS-29-RE005_3R2021	RE	1													
	CAFS-29-RE006	CAFS-29-RE006_3R2021	RE	1													
	CAFS-29-RE001	CAFS-29-RE001_4R2021	RE	1													
	CAFS-29-RE002	CAFS-29-RE002_4R2021	RE	1													
	CAFS-29-RE003	CAFS-29-RE003_4R2021	RE	1													
	CAFS-29-RE004	CAFS-29-RE004_4R2021	RE	1													
	CAFS-29-RE005	CAFS-29-RE005_4R2021	RE	1													
	CAFS-29-RE006	CAFS-29-RE006_4R2021	RE	1													

			VOC	**Select SVOC**	**Metals**	**Metals**	**PCBs**	**PCB Congeners**	**EPH**	**VPH**	**Radionuclides - Gamma Spec**	**Radionuclides - Gross Alpha/Beta**	**Grain Size**	**FOC**	**pH**	**XRF**
		Totals	**286**	**211**	**220**	**220**	**220**	**77**	**211**	**226**	**6**	**6**	**74**	**59**	**54**	**48**
Total Samples		**468**														
Total Analyses		**1918**														
Concrete Chip	CC	10					10									
Groundwater Grab	GW	33	33				3		3	3						
Direct Push	PH	163	143	141	139	139	113	32	127	127	6	6	50	40	35	
Private Well	PW	16	16													
Rock Chip	RC	3	3				3									
Residence	RE	24	24													
Seep	SE	32	32						32	32						
Surface Location	SL	156	10	62	72	72	82	39	42	42			24	19	19	48
Tank	TK	4	4	4	4	4	4	2	4	4						
Trip Blank	TB	20	20							15						
Equipment Blank	EB	7	1	4	5	5	5	4	3	3						

Notes:
CAFS = Charleston Air Force Station
Example Sample ID: CASF-02-SL001 where,
CAFS = Charleston Air Force Station
02 = Hilltop Transformer Pad
SL = surface soil location
001 = location 001
Other source area location designations include:
CC = concrete chip
GW = groundwater grab
PH = direct push
PW = private well
RC = rock chip
RE = residential well
SE = seep
SL = surface location
TK = tank
TB = trip blank
EB = equipment blank

Prepared by B.LaForest 3/9/2020
Checked by S.Calkin 3/10/2020

Table 5-3 Summary of Analytical Program
Remedial Investigation Sampling and Analysis Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

Matrix	Parameter	TAT	Deliverable	Prep Method	Analtytical Method	Alternate Method	Field Samples	Trip Blanks	Equipment Blanks	Field Duplicates	MS	MSD	Total Samples
Soil	CERCLA Target Compound List VOCs	10 business days	FULL/ADR	5035	8260		160	9	1	8	8	8	194
Soil	Project Select SVOC List	10 business days	FULL/ADR	3510C	8270 SIM		207		4	11	11	11	244
Soil	Target Compound List PCBs	10 business days	FULL/ADR	3540C	8082		212		5	11	11	11	250
Soil	PCB Congeners	10 business days	FULL/ADR	3540C	8082		73		4	4	4	4	89
Soil	Target Analyte List Metals	10 business days	FULL/ADR	3050C	6020/7471		215		5	11	11	11	253
Soil	VPH	10 business days	FULL/ADR	5035	MA DEP VPH 04-1.1		173	9	3	9	9	9	212
Soil	EPH	10 business days	FULL/ADR	3546	MA DEP EPH 04-1.1		173		3	9	9	9	203
Soil	Radionuclides Gross Alpha/Beta	10 business days	FULL/ADR	NONE	9130		6						6
Soil	Radionuclides Gamm Spec (Ra-226, Ra-228, Th-232, Th-234, U-235)	10 business days	FULL/ADR	NONE	GA-01-R		6						6
Soil	pH	10 business days	FULL/ADR	NONE	9045		54			4			58
Soil	Grain Size	10 business days	FULL/ADR	NONE	ASTM D422		74			4			78
Soil	FOC	10 business days	FULL/ADR	NONE	9060A		59			3			62
Water	CERCLA Target Compound List VOCs	10 business days	FULL/ADR	5030B	8260		137	11		7	7	7	169
Water	VPH	10 business days	FULL/ADR	5030B	MA DEP VPH 04-1.1		67	6		4	4	4	85
Water	EPH	10 business days	FULL/ADR	3510C	MA DEP EPH 04-1.1		67			4	4	4	79
Water	PCBs	10 business days	FULL/ADR	3510C	8082		3			1	1	1	6
Solid	Waste Characterization TCLP VOCs	10 business days	Results only	1311/5030B	8260		2						2
Solid	Waste Characterization TCLP SVOCs	10 business days	Results only	1311/3510C	8270		2						2
Solid	Waste Characterization TCLP Pesticides	10 business days	Results only	1311/3510C	8081		2						2
Solid	Waste Characterization TCLP Herbicides	10 business days	Results only	1311/3510C	8151		2						2
Solid	PCBs	10 business days	Results only	3510C	8082		2						2
Solid	Waste Characterization TCLP RCRA 8 Metals	10 business days	Results only	1311/3010A	6010/7470		2						2
Solid	Cyanide	10 business days	Results only	NONE	9012		2						2
Solid	Sulfide	10 business days	Results only	NONE	9034		2						2
Solid	pH-Corrosivity	10 business days	Results only	NONE	9045		2						2
Solid	Ignitability	10 business days	Results only	NONE	1010MOD		2						2

Prepared by B.Laforest 3/9/2020
Checked by S.Calkin 3/10/2020

Table 11-1 List of Human Health and Ecological Screening Levels
Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

		AQUEOUS	
Media	CAS	ECO RISK RSL (ug/L)	HUMAN HEALTH Tapwater RSL (ug/L)
VOCs			
1,1,1-Trichloroethane (1,1,1-TCA)	71-55-6	76	800
1,1,2,2-Tetrachloroethane	79-34-5	610	0.076
1,1,2-Trichloroethane	79-00-5	730	0.041
1,1-Dichloroethane (1,1-DCA)	75-34-3	410	2.8
1,1-Dichloroethene (1,1-DCE)	75-35-4	130	28
1,2-Dibromoethane (EDB)	106-93-4	-	0.0075
1,2-Dichlorobenzene	95-50-1	23	30
1,2-Dichloroethane (1,2-DCA)	107-06-2	2000	0.17
1,2-Dichloropropane	78-87-5	520	0.82
1,3-Dichlorobenzene	541-73-1	22	-
1,4-Dichlorobenzene	106-46-7	9.4	0.48
2-Butanone (MEK)	78-93-3	22000	560
4-Methyl-2-pentanone (MIBK)	108-10-1	170	630
Acetone	67-64-1	1700	1400
Benzene	71-43-2	160	0.46
Bromoform	75-25-2	320	3.3
Carbon tetrachloride	56-23-5	77	0.46
Chlorobenzene	108-90-7	25	7.8
Chloroform	67-66-3	140	0.22
Cis-1,2-DCE	156-59-2	620	3.6
Cis-1,3-Dichloropropene	10061-01-5	-	-
Dibromochloromethane	124-48-1	320	0.87
Ethylbenzene	100-41-4	61	1.5
Methylene chloride	75-09-2	1500	11
Methyl-tert-butyl-ether (MTBE)	1634-04-4	730	14
Styrene	100-42-5	32	120
Tetrachloroethene (PCE)	127-18-4	53	4.1
Toluene	108-88-3	62	110
Trans-1,2-DCE	156-60-5	558	36
Trans-1,3-Dichloropropene	10061-02-6	-	-
Trichloroethene (TCE)	79-01-6	220	0.28
Vinyl chloride	75-01-4	930	0.019
o-Xylene	95-47-6	-	19
m-Xyene	108-38-3	-	19
p-Xylene	106-42-3	-	19
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	-	1000
1,2,3-Trichlorobenzene	87-61-6	8	0.7
1,2,4-Trichlorobenzene (1,2,4-TCB)	120-82-1	24	0.4
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	-	0.00033
2-Hexanone	591-78-6	99	3.8
Bromochloromethane	74-97-5	-	8.3
Bromodichloromethane	75-27-4	-	0.13
Bromomethane (Methyl bromide)	74-83-9	16	0.75
Carbon disulfide	75-15-0	0.92	81
Chloroethane	75-00-3	-	2100
Chloromethane (Methyl chloride)	74-87-3	-	19
Cyclohexane	110-82-7	-	1300
Dichlorodifluoromethane	75-71-8	-	20
Isopropylbenzene (Cumene)	98-82-8	2.6	45
Methyl acetate	79-20-9	-	2000
Methylcyclohexane	108-87-2	-	-
Trichlorofluoromethane	75-69-4	-	520

Notes:
"-" Not available.
RSL - USEPA Regional Screening Level (USEPA, 2020).

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020
Updated by: ARQ 06/22/2020

References:

Maine Department of Environmental Protection (MEDEP). 2005. Maine Ambient Water Quality Criteria. Maine Law Chapter 584. Adopted October 9.

USPEA. 2018. Region 4 Ecological Risk Assessment supplemental Guidance - March 2018 Update.

USEPA. 2020. National Recommended Water Quality Criteria - Aquatic Life. Available at: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table. Accessed March 3.

USEPA. 2020. US Environmental Protection Agency Regional Screening Levels for residential tapwater at a target hazard quotient of 0.1 or an excess lifetime cancer risk of $1x10^{-6}$. May 2020.

Table 11-1 List of Human Health and Ecological Screening Levels
Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

Media	CAS	SOLIDS ECO RISK RSL (mg/kg)	SOLIDS HUMAN HEALTH Residential Soil RSL (mg/kg)
VOCs			
1,1,1-Trichloroethane (1,1,1-TCA)	71-55-6	260	810
1,1,2,2-Tetrachloroethane	79-34-5	0.127	0.6
1,1,2-Trichloroethane	79-00-5	28.6	0.15
1,1-Dichloroethane (1,1-DCA)	75-34-3	20.1	3.6
1,1-Dichloroethene (1,1-DCE)	75-35-4	11	23
1,2-Dibromoethane (EDB)	106-93-4	1.23	0.036
1,2-Dichlorobenzene	95-50-1	0.92	180
1,2-Dichloroethane (1,2-DCA)	107-06-2	0.85	0.46
1,2-Dichloropropane	78-87-5	32.7	1.6
1,3-Dichlorobenzene	541-73-1	0.74	-
1,4-Dichlorobenzene	106-46-7	0.89	2.6
2-Butanone (MEK)	78-93-3	350	2700
4-Methyl-2-pentanone (MIBK)	108-10-1	9.7	3300
Acetone	67-64-1	1.2	6100
Benzene	71-43-2	24	1.2
Bromoform	75-25-2	15.9	19
Carbon tetrachloride	56-23-5	2.98	0.65
Chlorobenzene	108-90-7	2.4	28
Chloroform	67-66-3	8	0.32
Cis-1,2-DCE	156-59-2	0.04	16
Cis-1,3-Dichloropropene	10061-01-5	0.398	-
Dibromochloromethane	124-48-1	2.05	8.3
Ethylbenzene	100-41-4	5.16	5.8
Methylene chloride	75-09-2	2.6	35
Methyl-tert-butyl-ether (MTBE)	1634-04-4	-	47
Styrene	100-42-5	1.2	600
Tetrachloroethene (PCE)	127-18-4	0.18	8.1
Toluene	108-88-3	23	490
Trans-1,2-DCE	156-60-5	0.784	160
Trans-1,3-Dichloropropene	10061-02-6	0.398	-
Trichloroethene (TCE)	79-01-6	42	0.41
Vinyl chloride	75-01-4	0.12	0.059
o-Xylene	95-47-6	-	65
m-Xyene	108-38-3	-	55
p-Xylene	106-42-3	-	56
1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	-	670
1,2,3-Trichlorobenzene	87-61-6	20	6.3
1,2,4-Trichlorobenzene (1,2,4-TCB)	120-82-1	0.27	5.8
1,2-Dibromo-3-chloropropane (DBCP)	96-12-8	0.0352	0.0053
2-Hexanone	591-78-6	0.36	20
Bromochloromethane	74-97-5	-	15
Bromodichloromethane	75-27-4	0.54	0.29
Bromomethane (Methyl bromide)	74-83-9	0.235	0.68
Carbon disulfide	75-15-0	0.81	77
Chloroethane	75-00-3	-	1400
Chloromethane (Methyl chloride)	74-87-3	10.4	11
Cyclohexane	110-82-7	-	650
Dichlorodifluoromethane	75-71-8	39.5	8.7
Isopropylbenzene (Cumene)	98-82-8	0.04	190
Methyl acetate	79-20-9	-	7800
Methylcyclohexane	108-87-2	-	-
Trichlorofluoromethane	75-69-4	52	2300

Notes:
"-" Not available.
RSL - USEPA Regional Screening Level (USEPA, 2020).

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020
Updated by: ARQ 06/22/2020

References:

LANL (Los Alamos National Laboratory). 2017. Ecorisk Database Release 4.1. Engineering and Technology Division. September.
USEPA 2020. US Environmental Protection Agency Regional Screening Levels for residential soil at a target hazard quotient of 0.1 or an excess lifetime cancer risk of $1x10^{-6}$. May 2020.
USEPA. 2018. Region 4 Ecological Risk Assessment Supplemental Guidance, Scientific Support Section, Superfund Division, March 2018 Update.
USEPA. 2003b-2007. Ecological Soil Screening Levels for Various Chemicals - Interim Final. Office of Solid Waste and Emergency Response.
USEPA. 2003a. USEPA Region 5, RCRA Ecological Screening Levels. August 22, 2003.

Table 11-1 List of Human Health and Ecological Screening Levels
Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

		AQUEOUS
Media	CAS	HUMAN HEALTH Tapwater RSL (ug/L)
SVOCs		
1-Methylnaphthalene	90-12-0	1.1
2-Methylnaphthalene	91-57-6	3.6
Acenaphthene	83-32-9	53
Acenaphthylene	208-96-8	-
Anthracene	120-12-7	180
Fluoranthene	206-44-0	80
Fluorene	86-73-7	29
Naphthalene	91-20-3	0.12
Phenanthrene	85-01-8	-
Benzo(a)anthracene	56-55-3	0.03
Benzo(a)pyrene	50-32-8	0.025
Benzo(b)fluoranthene	205-99-2	0.25
Benzo(k)fluoranthene	207-08-9	2.5
Benzo(g,h,i)perylene	191-24-2	-
Chrysene	218-01-9	25
Dibenz(a,h)anthracene	53-70-3	0.025
Indeno(1,2,3-cd)pyrene	193-39-5	0.25
Pyrene	129-00-0	12
Carbozole	86-74-8	-
Dibenzofuran	132-64-9	0.79
2,4-Dichlorophenol	120-83-2	4.6
2-Chlorophenol	95-57-8	9.1
Pentachlorophenol	87-86-5	0.041
Phenol	108-95-2	580
2,3,4,6-Tetrachlorophenol	58-90-2	24
2,4,5-Trichlorophenol	95-95-4	120
2,4,6-Trichlorophenol	88-06-2	1.2
2,4-Dimethylphenol	105-67-9	36
2,4-Dinitrophenol	51-28-5	3.9
2-Methylphenol (o-cresol)	95-48-7	93
2-Nitrophenol	88-75-5	-
4,6-Dinitro-2-methylphenol	534-52-1	0.15
4-Chloro-3-methylphenol	59-50-7	140
4-Methylphenol (p-cresol)	106-44-5	190
4-Nitrophenol	100-02-7	-
Benzoic acid	65-85-0	7500

Notes:
"-" Not available.
RSL - USEPA Regional Screening Level (USEPA, 2020).

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020
Updated by: ARQ 06/22/2020

References:

USEPA 2020. US Environmental Protection Agency Regional Screening Levels for residential tapwater at a target hazard quotient of 0.1 or an excess lifetime cancer risk of $1x10^{-6}$. May 2020.

Table 11-1 List of Human Health and Ecological Screening Levels
Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

Media	CAS	SOLIDS ECO RISK RSL (mg/kg)	SOLIDS HUMAN HEALTH Residential Soil RSL (mg/kg)
SVOCs			
1-Methylnaphthalene	90-12-0	0.14	18
2-Methylnaphthalene	91-57-6	16	24
Acenaphthene	83-32-9	29	360
Acenaphthylene	208-96-8	29	-
Anthracene	120-12-7	29	1800
Fluoranthene	206-44-0	29	240
Fluorene	86-73-7	29	240
Naphthalene	91-20-3	29	2
Phenanthrene	85-01-8	29	-
Benzo(a)anthracene	56-55-3	1.1	1.1
Benzo(a)pyrene	50-32-8	1.1	0.11
Benzo(b)fluoranthene	205-99-2	1.1	1.1
Benzo(k)fluoranthene	207-08-9	1.1	11
Benzo(g,h,i)perylene	191-24-2	1.1	-
Chrysene	218-01-9	1.1	110
Dibenz(a,h)anthracene	53-70-3	1.1	0.11
Indeno(1,2,3-cd)pyrene	193-39-5	1.1	1.1
Pyrene	129-00-0	1.1	180
Carbozole	86-74-8	79	-
Dibenzofuran	132-64-9	6.1	7.8
2,4-Dichlorophenol	120-83-2	87.5	19
2-Chlorophenol	95-57-8	0.39	39
Pentachlorophenol	87-86-5	2.1	1
Phenol	108-95-2	0.79	1900
2,3,4,6-Tetrachlorophenol	58-90-2	0.199	190
2,4,5-Trichlorophenol	95-95-4	14.1	630
2,4,6-Trichlorophenol	88-06-2	9.94	6.3
2,4-Dimethylphenol	105-67-9	0.01	130
2,4-Dinitrophenol	51-28-5	0.0609	13
2-Methylphenol (o-cresol)	95-48-7	0.67	320
2-Nitrophenol	88-75-5	1.6	-
4,6-Dinitro-2-methylphenol	534-52-1	0.144	0.51
4-Chloro-3-methylphenol	59-50-7	7.95	630
4-Methylphenol (p-cresol)	106-44-5	163	630
4-Nitrophenol	100-02-7	5.12	-
Benzoic acid	65-85-0	1	25000

Notes:
"-" Not available.
RSL - USEPA Regional Screening Level (USEPA, 2020).
For ecological risk assessment, concentrations will be summed and assessed as Low Molecular Weight PAHs.
For ecological risk assessment, concentrations will be summed and assessed as High Molecular Weight PAHs.
Ecological value for 1-methylnpahthalene is 0.14 mg/kg (from USEPA Reg 4).
Ecological value Benzoic acid is 1 mg/kg (from LANL).

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020
Updated by: ARQ 06/22/2020

References:

LANL (Los Alamos National Laboratory). 2017. Ecorisk Database Release 4.1. Engineering and Technology Division. September.
USEPA 2020. US Environmental Protection Agency Regional Screening Levels for residential soil at a target hazard quotient of 0.1 or an excess lifetime cancer risk of $1x10^{-6}$. May 2020.
USEPA. 2018. Region 4 Ecological Risk Assessment Supplemental Guidance, Scientific Support Section, Superfund Division, March 2018 Update.
USEPA. 2003b-2007. Ecological Soil Screening Levels for Various Chemicals - Interim Final. Office of Solid Waste and Emergency Response.
USEPA. 2003a. USEPA Region 5, RCRA Ecological Screening Levels. August 22, 2003.

Table 11-1 List of Human Health and Ecological Screening Levels
Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

		AQUEOUS
Parameter	CAS	Maine Petroleum Guidance (µg/L)
EPH_VPH		
VPH - Aliphatic Hydrocarbons C5-C8		200
VPH - Aliphatic Hydrocarbons C9-C12		500
VPH - Aromatic Hydrocarbons C9-C10		200
EPH - Aliphatic Hydrocarbons C9-C18		500
EPH - Aliphatic Hydrocarbons C19-C36		8000
EPH - Aromatic Hydrocarbons C11-C22		200

Notes:
"-" Not available.

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020
Updated by: ARQ 06/22/2020

References:
MassDEP (Massachusetts Department of Environmental Protection). 2002. Characterizing Risks Posed by Petroleum Contaminated Sites: Implementation of the MADEP VPH/EPH Approach. Policy #WSC-02-411. October 31.

MEDEP (Maine Departemt of Environmental Protection). 2014. Remediation Guidelines for Petroleum Contaminated Sites in Maine. Bureau of Remediation & Waste Management, May 23, 2014.

Table 11-1 List of Human Health and Ecological Screening Levels
Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

Parameter	CAS	**SOLID** Maine Petroleum Guidance (mg/kg)
EPH_VPH		
VPH - Aliphatic Hydrocarbons C5-C8		1400
VPH - Aliphatic Hydrocarbons C9-C12		2700
VPH - Aromatic Hydrocarbons C9-C10		75
EPH - Aliphatic Hydrocarbons C9-C18		2700
EPH - Aliphatic Hydrocarbons C19-C36		10000
EPH - Aromatic Hydrocarbons C11-C22		460

Notes:
"-" Not available.

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020
Updated by: ARQ 06/22/2020

References:

MassDEP (Massachusetts Department of Environmental Protection). 2002. Characterizing Risks Posed by Petroleum Contaminated Sites: Implementation of the MADEP VPH/EPH Approach. Policy #WSC-02-411. October 31.

MEDEP (Maine Departemt of Environmental Protection). 2014. Remediation Guidelines for Petroleum Contaminated Sites in Maine. Bureau of Remediation & Waste Management, May 23, 2014.

Table 11-1 List of Human Health and Ecological Screening Levels
Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

		AQUEOUS
Media	CAS	HUMAN HEALTH Tapwater RSL (ug/L)
PCBs		
Aroclor-1016	12674-11-2	0.14
Aroclor-1221	11104-28-2	0.0047
Aroclor-1232	11141-16-5	0.0047
Aroclor-1242	53469-21-9	0.0078
Aroclor-1248	12672-29-6	0.0078
Aroclor-1254	11097-69-1	0.0078
Aroclor-1260	11096-82-5	0.0078
Aroclor-1262*	37324-23-5	0.044
Aroclor-1268*	11100-14-4	0.044

Notes:
* Polychlorinated Biphenyls (low risk) used for
aroclors not on RSL table (aroclor 1262 and 1268).
RSL - USEPA Regional Screening Level (USEPA, 2020).

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020
Updated by: ARQ 06/22/2020

References:

USEPA 2020. US Environmental Protection Agency Regional Screening Levels for residential tapwater at a target hazard quotient of 0.1 or an excess lifetime cancer risk of $1x10^{-6}$. May 2020.

Table 11-1 List of Human Health and Ecological Screening Levels
Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

		SOLIDS	
Media	CAS	ECO RISK RSL (mg/kg)	HUMAN HEALTH Residential Soil RSL (mg/kg)
PCBs			
Aroclor-1016	12674-11-2	1.1	0.41
Aroclor-1221	11104-28-2	--	0.2
Aroclor-1232	11141-16-5	--	0.17
Aroclor-1242	53469-21-9	0.041	0.23
Aroclor-1248	12672-29-6	0.0073	0.23
Aroclor-1254	11097-69-1	0.041	0.12
Aroclor-1260	11096-82-5	0.88	0.24
Aroclor-1262*	37324-23-5	--	0.23
Aroclor-1268*	11100-14-4	--	0.23

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020
Updated by: ARQ 06/22/2020

Notes:
* Polychlorinated Biphenyls (high risk) used for aroclors not on RSL table (aroclor 1262 and 1268).
"-" Not available.
RSL - USEPA Regional Screening Level (USEPA, 2020).

References:

LANL (Los Alamos National Laboratory). 2017. Ecorisk Database Release 4.1. Engineering and Technology Division. September.
USEPA 2020. US Environmental Protection Agency Regional Screening Levels for residential soil at a target hazard quotient of 0.1 or an excess lifetime cancer risk of $1x10^{-6}$. May 2020.
USEPA. 2018. Region 4 Ecological Risk Assessment Supplemental Guidance, Scientific Support Section, Superfund Division, March 2018 Update.
USEPA. 2003b-2007. Ecological Soil Screening Levels for Various Chemicals - Interim Final. Office of Solid Waste and Emergency Response.
USEPA. 2003a. USEPA Region 5, RCRA Ecological Screening Levels. August 22, 2003.

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Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

			SOLIDS	
Media	Congener #	CAS	ECO RISK RSL * (mg/kg)	HUMAN HEALTH Residential Soil RSL (mg/kg)
PCB Congeners				
3,3',4,4'-Tetrachlorobiphenyl	77	32598-13-3	-	0.038
3,4,4',5-Tetrachlorobiphenyl	81	70362-50-4	-	0.012
2,3,3',4,4'-Pentachlorobiphenyl	105	32598-14-4	-	0.12
2,3,4,4',5-Pentachlorobiphenyl	114	74472-37-0	-	0.12
2,3',4,4',5-Pentachlorobiphenyl	118	31508-00-6	-	0.12
2,3',4,4',5'-Pentachlorobiphenyl	123	65510-44-3	-	0.12
3,3',4,4',5-Pentachlorobiphenyl	126	57465-28-8	-	0.000036
2,3,3',4,4',5-Hexachlorobiphenyl	156	38380-08-4	-	0.12
2,3,3',4,4',5'-Hexachlorobiphenyl	157	69782-90-7	-	0.12
2,3',4,4',5,5'-Hexachlorobiphenyl	167	52663-72-6	-	0.12
3,3',4,4',5,5'-Hexachlorobiphenyl	169	32774-16-6	-	0.00012
2,3,3',4,4',5,5'-Heptachlorobiphenyl	189	39635-31-9	-	0.13
2,3,7,8-TCDD		1746-01-6	0.00000029	0.0000048

Notes:
* PCB Congeners will be assessed as 2,3,7,8-TCDD using the Toxicity Equivalency (TEQ) Method (USEPA, 2008).
"-" Not available.
RSL - USEPA Regional Screening Level (USEPA, 2020).

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020
Updated by: ARQ 06/22/2020

References:
LANL (Los Alamos National Laboratory). 2017. Ecorisk Database Release 4.1. Engineering and Technology Division. September.
USEPA 2020. US Environmental Protection Agency Regional Screening Levels for residential soil at a target hazard quotient of 0.1 or an excess lifetime cancer risk of $1x10^{-6}$. May 2020.

Table 11-1 List of Human Health and Ecological Screening Levels
Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

		AQUEOUS
Media	CAS	HUMAN HEALTH Tapwater RSL (ug/L)
METALS		
Aluminum	7429-90-5	2000
Antimony	7440-36-0	0.78
Arsenic	7440-38-2	0.052
Barium	7440-39-3	380
Beryllium	7440-41-7	2.5
Cadmium	7440-43-9	0.92
Calcium	7440-70-2	NA
Chromium*	7440-47-3	2200
Cobalt	7440-48-4	0.6
Copper	7440-50-8	80
Iron	7439-89-6	1400
Lead	7439-92-1	15
Magnesium	7439-95-4	NA
Managanese	7439-96-5	43
Mercury **	4739-97-6	0.57
Nickel	7440-02-0	39
Potassium	7440-09-7	NA
Selenium	7782-49-2	10
Silver	7440-22-4	9.4
Sodium	7440-23-5	NA
Thallium	7440-28-0	0.02
Vanadium	7440-62-2	8.6
Zinc	7440-66-6	600

Notes:
*Trivalent chromium is used to represent chromium.
** Mercuric Chloride (and other Mercury salts) used to represent mercury.
NA - Not applicable. Ca, Mg, K and Na are considered essential nutrients that are rarely toxic at detected levels.
RSL - USEPA Regional Screening Level (USEPA, 2020).

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020
Updated by: ARQ 06/22/2020

References:

USEPA 2020. US Environmental Protection Agency Regional Screening Levels for residential tapwater at a target hazard quotient of 0.1 or an excess lifetime cancer risk of $1x10^{-6}$. May 2020.

Table 11-1 List of Human Health and Ecological Screening Levels
Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

Media	CAS	SOLIDS	
		ECO RISK RSL (mg/kg)	HUMAN HEALTH Residential Soil RSL (mg/kg)
METALS			
Aluminum	7429-90-5	pH <5.5	7700
Antimony	7440-36-0	0.27	3.1
Arsenic	7440-38-2	18	0.68
Barium	7440-39-3	330	1500
Beryllium	7440-41-7	21	16
Cadmium	7440-43-9	0.36	7.1
Calcium	7440-70-2	NA	NA
Chromium*	7440-47-3	26	12000
Cobalt	7440-48-4	13	2.3
Copper	7440-50-8	28	310
Iron	7439-89-6	pH<5, pH>8	5500
Lead	7439-92-1	11	400
Magnesium	7439-95-4	NA	NA
Managanese	7439-96-5	220	180
Mercury**	4739-97-6	0.013	2.3
Nickel	7440-02-0	38	150
Potassium	7440-09-7	NA	NA
Selenium	7782-49-2	0.52	39
Silver	7440-22-4	4.2	39
Sodium	7440-23-5	NA	NA
Thallium	7440-28-0	0.05	0.078
Vanadium	7440-62-2	7.8	39
Zinc	7440-66-6	46	2300

Notes:
*Trivalent chromium is used to represent chromium.
** Mercuric Chloride (and other Mercury salts) used to represent mercury.
NA - Not applicable. Ca, Mg, K and Na are considered essential nutrients that are rarely toxic at detected levels.
RSL - USEPA Regional Screening Level (USEPA, 2020).

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020
Updated by: ARQ 06/22/2020

References:

LANL (Los Alamos National Laboratory). 2017. Ecorisk Database Release 4.1. Engineering and Technology Division. September.
USEPA 2020. US Environmental Protection Agency Regional Screening Levels for residential soil at a target hazard quotient of 0.1 or an excess lifetime cancer risk of $1x10^{-6}$. May 2020.
USEPA. 2018. Region 4 Ecological Risk Assessment Supplemental Guidance, Scientific Support Section, Superfund Division, March 2018 Update.
USEPA. 2003b-2007. Ecological Soil Screening Levels for Various Chemicals - Interim Final. Office of Solid Waste and Emergency Response.
USEPA. 2003a. USEPA Region 5, RCRA Ecological Screening Levels. August 22, 2003.

Table 11-1 List of Human Health and Ecological Screening Levels
Remedial Investigation Sampling and Analysis Work Plan
Formerly Used Defense Site
Charleston Air Force Station
Charleston, Maine

Media	CAS	SOLIDS Residential TOTAL PRG (pCi/g)
Radionuclides		
Gross Alpha	12587-46-1	-
Gross Beta	12587-47-2	-
Gamma Spec		-
Ra-226	13982-63-3	0.00182
Ra-228	15262-20-1	0.00174
Th-232	7440-29-1	0.00174
Th-234	15065-10-8	0.00178
U-235	15117-96-1	0.00623

Prepared by: SL Feb 3, 2020
Checked by: ARQ 02/03/2020

Notes:
"-" Not available.
PRG - USEPA Preliminary Remediation Goals for Radionuclides (USEPA, 2020)

References:
USEPA, 2020. Preliminary Remediation Goals for Radionuclides (PRG) Calculator: https://epa-prgs.ornl.gov/cgi-bin/radionuclides/rprg_search.

APPENDIX A

TECHNICAL MEMORANDUM HISTORIC AND AERIAL PHOTOGRAPHY ANALYSIS/RESEARCH

ON CD