United States Environmental Protection Agency
Region 1

Decision Document

Training Areas Operable Unit

Camp Edwards
Joint Base Cape Cod
Cape Cod, Massachusetts

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PART I: DECLARATION FOR THE SAFE DRINKING WATER ACT DECISION DOCUMENT

A. SITE NAME

The Training Areas Operable Unit (also referred to as "the Site"), which is located at Camp Edwards at the Joint Base Cape Cod (JBCC). The Site is composed of 36 sites or locations whose names are the following: A-4, A-5, A-6, B-7, B-8, C-12, C-14, C-15, Land Nav II, 1949 Engineer Training Site, Trenches Pits and Excavations, Bunkers, Former Buildings, Cleared Areas, Ground Scars, Demolition Area 3, Demolition Area 4, Inactive Demolition Sites, Bailey's Pond, Donnely Pond, Deep Bottom Pond, Opening Pond, Gibbs Pond, BA-1, GN1/GN2 Grenade Courts, Mock Village, Former Ammunition Supply Points, 1940s Era Latrines, Stables, Bayonet Area, Waste Oil Dump Sites, Air to Air Target Darts, Former E Range, Infantry Battle Course (IBC) Range, Known Distance (KD) Range (West) and U Range.

B. STATEMENT OF BASIS AND PURPOSE

This Decision Document presents the selected decisions for the Training Areas (as listed in Section A). The selected decisions were chosen in accordance with Section 1431(a) of the Safe Drinking Water Act (SDWA), 42 USC § 300i(a), as amended, and the Administrative Order (AO) concerning response actions issued thereunder, U.S. Environmental Protection Agency Region 1 (EPA) Administrative Order No. SDWA-1-2000-0014 (AO3). The authority to select the necessary response action(s) has been delegated to EPA Region 1's Regional Administrator pursuant to EPA Delegation No. 9-17 (1200-TN-350) dated May 11, 1994, and further delegated to EPA Region 1's Director, Office of Site Remediation and Restoration, pursuant to a redelegation of authorities dated April 6, 2010.

This decision is based on the Administrative Record, which has been developed in accordance with AO3 and with a previous EPA Administrative Order, SDWA 1-97-1019 (AO1), including consideration of the substantive cleanup standards of the Massachusetts Contingency Plan (MCP) 310 CMR 40.0000. The Administrative Record is available for review by appointment at the Impact Area Groundwater Study Program (office, 1807 West Outer Road, Camp Edwards, MA).

C. ASSESSMENT OF THE SITE

On July 13, 1982, EPA determined that the Cape Cod Aquifer is the sole or principal source of drinking water for Cape Cod, Massachusetts, and that the Cape Cod Aquifer, if contaminated, would create a significant hazard to public health (47 Fed. Reg.30282).

Contaminants from the Training Ranges and Impact Area at JBCC are present in and may enter and migrate in the aquifer. The decisions selected for the Training Areas in this Decision Document are necessary to protect the Cape Cod Aquifer, an underground source of drinking water on which the public relies. The Training Areas are also located within the Upper Cape Water Supply Reserve established pursuant to Chapter 47 of the Massachusetts Acts of 2002 and designated as conservation land under the care and control of the Massachusetts Division of Fisheries and Wildlife.

D. DESCRIPTION OF THE ACTIONS

This Decision Document sets forth the selected decisions for the Training Areas which are comprised of 36 sites. Most of the Training Areas and other site features are located on Figure 1-1 and in figures provided in Appendices D-G.

Extensive groundwater monitoring has been conducted at over 100 wells proximate to the Training Areas. Evaluation of representative monitoring well data indicates that groundwater beneath the Training Areas has not been significantly impacted by past training activities. The overall results of the groundwater sampling evaluations conducted to date indicate that the Training Areas are not currently a source of any significant groundwater contamination above action levels.

Certain explosive related compounds have been detected in soils at a few sites within the Training Areas. Explosives related detections were primarily associated with certain locations in the Central Impact Area as well as at IBC Range and KD Range (West) but were not detected in soil samples from the majority of the Training Areas where no records indicate that training with explosives has taken place. Perchlorate was also detected in only a few soil samples from certain areas including U Range. The propellant 2,4-Dinitrotoluene (2,4-DNT) has been detected in some soil samples from Training Area BA-1. However, this area has previously been evaluated in conjunction with Former F Range and is considered in the Final Gun and Mortar Position Investigation Report (Tetra Tech 2011b). Certain metals (including copper and lead) potentially associated with past training activities (including small arms use) have been detected in a few soil samples from those Training Areas where small arms training took place. In almost all cases, lead concentrations are below the MCP S1/GW-1 standard of 200 milligram/kilogram (mg/Kg). Copper concentrations in most soil samples are below 25 mg/Kg and generally comparable to background.

Based upon the absence of any groundwater contamination beneath any of the Training Areas and previous response actions, no further remedial actions have been selected for the following Training Areas: A-4, A-5, A-6, B-8, C-12, C-14, Land Nav II, Trenches Pits and Excavations, Bunkers, Former Buildings, Cleared Areas, Ground Scars, Demolition

Area 3, Demolition Area 4, Inactive Demolition Sites, Bailey's Pond, Donnely Pond, Deep Bottom Pond, Opening Pond, Gibbs Pond, BA-1, GN1/GN2 Grenade Courts, Mock Village, Former Ammunition Supply Points, 1940s Era Latrines, Stables, Bayonet Area, Waste Oil Dump Sites, Air to Air Target Darts, and U Range. Certain future actions related to limited additional data review and/or confirmatory sampling are recommended at three Training Areas (B-7, C-15 and IBC Range). A limited geophysical screening at the 1949 Engineer Training Site is recommended to confirm that munitions were not used at the site. Soil sampling and munitions surveys will be required at the Former E Range to document site conditions. Finally, munitions debris and targets will be removed from the KD Range (West) and confirmatory soil samples will be collected from beneath the primary target APC at the middle of the range. Follow-on response actions may be needed based on the results of the investigations.

Plans for confirmatory investigations and tasks are described in project notes which are located in Appendices D through G. These project notes have been reviewed and approved by EPA and Mass DEP.

The selected decision is protective of human health and the environment. Table 2 provides a summary of the Training Areas sites.

E. DETERMINATIONS

The selected action of no further action for the following Training Areas is consistent with the SDWA §1431(a), 42 USC §300i(a), as amended, and with AO3:

> A-4, A-5, A-6, B-8, C-12, C-14, Land Nav II, Trenches Pits and Excavations, Bunkers, Former Buildings, Cleared Areas, Ground Scars, Demolition Area 3, Demolition Area 4, Inactive Demolition Sites, Bailey's Pond, Donnely Pond, Deep Bottom Pond, Opening Pond, Gibbs Pond, BA-1, GN1/GN2 Grenade Court, Mock Village, Former Ammunition Supply Points, 1940s Era Latrines, Stables, Bayonet Area, Waste Oil Dump Sites, Air to Air Target Darts, and U Range.

The selected action of data review and/or confirmatory sampling, and geophysical screening for six Training Areas as follows is consistent with the SDWA §1431(a), 42 USC §300i(a), as amended, and with AO3:

> B-7, C-15, 1949 Engineer Training Site, Former E Range, KD Range (West) and IBC Range.

This decision is protective of human health. EPA's determination is related to unacceptable threats to the groundwater aquifer from the Site; however, by this Decision Document EPA is making no determination regarding public safety risk, ecological risk,

dermal contact risk, and/or soil ingestion risk posed by remaining contamination or unexploded ordnance at any of the individual Training Area Sites.

F. SUPPORTING DATA

Detailed information on the Site is included in the Final *Training Areas Investigation Report* dated April 2018. An overview of the Site is included in the Decision Summary section of this document. Additional information can be found by reviewing the documents listed in the Index of Key Supporting Documents, which is Appendix C to the Decision Document.

G. AUTHORIZING SIGNATURE

This Decision Document documents EPA's selected decisions, under the authority of the SDWA, of no further action at many of the Training Areas (as listed in Part I, Section A) with limited work at six ranges, as described in Section F of the Decision Summary, and in Project Notes contained in Appendices D-G. The determination was made by the U.S. Environmental Protection Agency under the authority of the Safe Drinking Water Act. The Massachusetts Department of Environmental Protection concurs with this decision.

U.S. Environmental Protection Agency

By: _____ Date: 2/22/19

Bryan Olson
Director, Office of Site Remediation and Restoration
Region 1

PART II: THE DECISION SUMMARY

A. SITE DESCRIPTION

The Training Areas at Camp Edwards is an operable unit and contains a group of 36 locations where various types of military training-related activities have been conducted (Figure 1-1). These 36 locations have been sub-divided into the following categories; 1) Field Maneuver, Pyrotechnic and Chemical Warfare Simulation Training Areas; 2) Disturbed Soil Areas; 3) Demolition Areas; 4) Surface Waterbodies; and 5) Additional Ranges, Sites and Structures.

Field Maneuver Pyrotechnic & Chemical Warfare Simulation Training	Disturbed Soil Areas	Demolition Areas	Surface Waterbodies	Additional Ranges, Sites and Structures
A-4	Trenches Pits and Excavations	Demolition Area 3	Bailey's Pond	BA-1
A-5	Former Buildings	Demolition Area 4	Donnely Pond	GN1/GN2 Grenade Courts
A-6	Bunkers	Inactive Demolition Areas	Deep Bottom Pond	Mock Village
B-7	Cleared Areas		Opening Pond	Former Ammunition Supply Points
B-8	Ground Scars		Gibbs Pond	1940s Era Latrines
C-13				Stables
C-14				Bayonet Areas
C-15				Waste Oil Dump Sites
Land Nav II				Air-to-Air Target Darts
1949 Engineer Training Site				Former E Range
				IBC Range
				KD Range (West)
				U Range

The areas have been used for a variety of activities including small unit maneuvers, bivouacs, combat assault training, pyrotechnics training, chemical warfare training, grenade and demolition use, and rocket use. A number of additional areas associated with training activities have also been evaluated. These include former ammunition supply points and bayonet practice areas. Generally, the individual study areas are located in a circumference to the south, west and north of the Impact Area. Certain additional areas are located toward the southern end of JBCC. The maneuver areas are typically several hundred acres in size. Although the terrain varies, much of it is relatively wooded and

hilly. A number of formerly disturbed areas are now overgrown. Some of the sites also encompass the locations of other military use sites including small arms ranges and gun positions which have been evaluated under separate operable units.

Areas at Camp Edwards have been historically used for troop training exercises, including small unit maneuvers and bivouacs. The maneuver areas included in this investigation are: A-4, A-5, A-6, B-7, B-8, C-13, C-14, C-15 and BA-1. The majority of these areas have been included for evaluation based upon historical information suggesting possible past training activities involving small unit maneuvers, pyrotechnics and/or chemical warfare training. Also evaluated were the Land Nav II and 1949 Engineer Training Site, which lie within the boundaries of one or more of the maneuver areas noted above. Historically, training with explosives and small arms firing have been prohibited from these areas.

In addition to the bivouac and maneuver areas noted above, several ranges and areas wherein multiple types of munitions and weaponry were used were also evaluated. These include IBC Range, KD Range (West), U Range, and the Former E Range. The U Range and IBC Range are located to the north of the Central Impact Area. KD Range (West) and Former E Range are located to the southeast and south of the Central Impact Area, respectively. Munitions used at one or more of these ranges included small arms ammunition, rifle grenades, 90mm recoilless rifles, Dragon missiles and/or TOW anti-tank missiles including training with high explosives. Evaluations have also been included for several demolition areas and grenade use areas. Demolition Area 3 was located to the west of the Central Impact Area; Demolition Area 4 was believed to have been located along the southern boundary of the Central Impact Area; and two Inactive Demolition Sites were located to the immediate west of Training Area BA-1. Grenade courts GN1 and GN2 were located to the immediate north of Training Area BA-1.

B. SITE HISTORY AND ENFORCEMENT ACTIVITIES

1. History of Site Activities

The history of the individual sites within the Training Areas Operable Unit varies considerably depending upon its past use. The *Archives Search Report* (USACE 1999) represents the most comprehensive summary of historical training area use at JBCC. This report includes numerous interviews with persons knowledgeable of JBCC range use history and past activities. In general, the *Archives Search Report* and associated range use historical documents indicate that training area activities occurred as early as the late 1930s in conjunction with the outbreak of World War II and continued into the 1990s. Certain types of training at many of these areas continues today). For several Training Areas, no specific historical interview reference or documented activity was discovered for dates after 1984.

Available historical documentation does not provide a complete picture of activities at each individual training area from the 1930s through the 1950s. *Archives Search Report* interviews with one former National Guard personnel indicated that from 1959 to 1975, Training Areas C-14, C-15 and C-16 were frequently used for bivouacs. Historical information suggests that during this time frame, 20 to 40 battalions (approximately 300-500 soldiers in each) may have trained at JBCC each summer. Each battalion would typically bivouac within a specific area, with some units returning to the same area each summer. Many battalions may have maintained a field kitchen and a field maintenance area wherein small equipment repairs may have occurred. Another interviewee indicated that from 1987 to 1989 his engineering company frequently trained in areas BA-1, BA-3, C-13, C-14, C-15 and C-16. Training activities included rifle qualification, bivouacs, war games, road repairs and demolition training and operations. Demolition training activities included use of the explosive C-4 and detonation cord for cutting steel, creating craters and/or clearing fire breaks.

Available historical information indicates that, over their operational lifetimes, the large maneuver areas have been used for small unit bivouacs and field maneuvers including limited small arms firing primarily with blanks. At several sites chemical warfare simulation training (using tear gas) and/or the use of pyrotechnic smokes may also have occurred. In addition, at a few of the sites included in this document, multiple types of ordnance and/or demolition related explosives were likely used. In particular, multiple types of ordnance including both small arms ammunition and certain types of rockets and artillery were used at the live fire ranges including IBC Range, KD Range (West) and/or U Range.

Archives Search Report findings indicate that pyrotechnic use during troop training exercises in the bivouac and maneuver areas likely consisted of flares, star clusters, parachute flares, trip flares, grenade and artillery simulators, and smoke grenades (USACE 1999b, 1999c, 1999d). Pyrotechnic use varied depending upon the specific area. Tear gas grenades were rarely referred to by interviewees. No documentation has been discovered that identifies any specific open area where tear gas was used in training exercises. However, one interviewee suggested that tear gas training was conducted at the following locations: Training Areas A-5, A-6 near Gun Position 24 (GP-24), B-8, Wheelock Road across from Range Control, and Land Nav II (Ogden 1997a). Another interviewee provided some details of tear gas pellet use inside enclosed buildings at the Nuclear, Biological, and Chemical (NBC) Training Area (USACE 1999a). During a field inspection conducted for the *Archives Search Report*, a single tear gas grenade was found in area C-16. Reports of ordnance discoveries at JBCC were summarized by the U.S. Army Corps of Engineers (USACE) for the period of 1980 to 1998 (USACE 1999).

2. History of Investigations and Response Actions

History of Investigations

In 1998, the Phase IIa investigation program was initiated to evaluate a number of ranges and sites at JBCC. Under this program, investigations were implemented for a variety of locations, including several maneuver areas and related sites. These included the following:

- Characterization of Multiple Training Areas (C-15, B-12, Deep Bottom Pond, Pew Road Quonset Huts)
- Characterization of KD Range (West) and U Range
- Characterization of Trenches, Excavations, Bunkers and Buildings

The proposed approaches for investigating these and other JBCC areas were detailed in the *Final Workplan for Phase IIa Activities* (Ogden 1999). As indicated in the *Draft Phase IIa Training Areas Field Sampling Plan* (Ogden 2000), characterizations of the Training Areas were to include specific plans for the investigations of possible past use of chemical warfare simulants, pyrotechnic smokes and herbicides.

Investigations at KD Range (West) and U Range were intended to focus on evaluation of the nature and extent of any contaminants potentially associated with target practice for multiple types of ordnance, including past use for rocket training. Investigations at these ranges focused on firing locations where propellants may have been present and target locations where explosives may have been deposited.

The study areas included in the *Draft Final TM 02-6 Phase IIb Report* (AMEC 2003) were among several Training Areas, ranges, and other sites selected by the EPA to be investigated under the Phase IIb Program. As specified in the *Final Phase IIb Work Plan* (Ogden 2000a) and its supplement (Ogden 2000b), initial investigation activities included field reconnaissance inspections at each of the Phase IIb sites. Based on the inspection findings, sampling plans were developed for 12 selected sites to evaluate current and future potential groundwater impacts. Field sampling plans were developed for these sites specifically to characterize the nature and extent of possible soil and/or groundwater contamination resulting from historical releases. Investigation plans for the remaining Phase IIb study areas not included among the original 12 (e.g., the Mock Village, Former E Range, and Training Area BA-1) were postponed pending the acquisition of additional historical information and physical evidence of past training practices. Where data gaps were identified, a second round of investigations was performed at these, and other, newly listed Phase IIb sites. These investigations were performed under the *Final Supplemental Phase IIb Work Plan* (AMEC 2002a).

The Training Areas investigated under Phase IIb included the following:

- Former Ammunition Supply Points (ASP)
- 1949 Engineer Training Site
- Demolition Areas 3 and 4
- Inactive Demolition Sites
- Former E Range
- Cleared Areas
- GN-2 Grenade Court
- Training Area BA-1
- Mock Village
- Waste Oil Release Sites
- Latrines
- IBC Range
- U Range (Former S Range)

The investigation results (i.e., groundwater and soil data from both the initial and supplemental sampling rounds) for non-small arms range Phase IIb sites were initially presented in the Draft Final TM 02-6 Report (AMEC 2003) along with a discussion of findings and general recommendations.

Certain elements of the site investigations relating to the Training Areas and associated sites pre-date the implementation of the Phase IIa and Phase IIb programs. Specifically, certain initial groundwater sampling programs and the majority of the surface water and sediment sampling programs were conducted prior to 1999. The results of these initial investigations were summarized in the *Draft Completion of Work Report for the Impact Area Groundwater Quality Study* (Ogden 1998). Included in the 1998 report are the results of surface water and sediment sampling efforts conducted at 19 ponds located within and/or around JBCC.

Geophysical Investigations

With a few exceptions, historical information gathered in the Impact Area Groundwater Study Program (IAGWSP) investigations indicated that inert training munitions were primarily used at the maneuver and bivouac areas. Small arms ammunition was primarily confined to the use of blanks. Live ammunition was typically only used at Small Arms Ranges and were not allowed on the maneuver areas. Site field reconnaissance investigations were conducted at many Training Areas including both non live-fire and live-fire sites. During these site visits, explosives ordnance disposal (EOD)/unexploded ordnance (UXO) staff typically accompanied the field investigation team and conducted

limited geophysical (Schonstedt or similar handheld metal detector) monitoring in the immediate reconnaissance area. Subsequent decisions regarding the need for additional site-specific geophysics and/or UXO investigations were considered in conjunction with the preparation of related field sampling plans and based upon the review of historical information, ordnance and explosives discoveries, and field/UXO information associated with the site in question.

Small arms ammunition, rockets, and/or artillery projectiles were used at a few live fire ranges including Former E Range, IBC Range, KD Range (West) and U Range. As such, more extensive geophysical work was conducted at these training areas to evaluate for the presence of UXO. Inert, training munitions were found at IBC Range, KD Range (West) and U Range. UXO were found at Former E Range and additional investigations are required and underway.

Response Actions

Response actions to address localized contaminated soil have been conducted at a few Training Areas and/or associated sites. These remedial actions have typically involved soil excavations. Most of these remedial actions have been focused on localized soil contamination at the multiuse ranges (KD Range (West) and U Range) wherein multiple types of ammunition and/or ordnance were historically used. Soil removal actions were conducted at the Training Area BA-4 Disposal Area as a separate operable unit. At Training Area BA-1, soil excavations were implemented in 2001 to remove bromoform contaminated soils and again in 2009 to remove soils where propellant bags from historical artillery use had been deposited. At the Grenade Courts, propellant contaminated soil was removed in conjunction with remedial measures implemented at gun position GP-11 which is co-located with the Grenade Courts. At KD Range (West) over 500 yards of soil were excavated in 2000 to reduce elevated concentrations of several explosives including hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX), octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX) and trinitrotoluene (TNT). At U Range, 1,665 cubic yards of perchlorate contaminated soil was removed in 2017.

To date, no response actions have been needed to address groundwater due to contamination from any of the Training Areas identified in this document. A Human Health Risk Screening was conducted for the 36 Training Areas to identify any analytes that warranted further evaluation, and no analytes were found that exceeded screening criteria.

3. History of Relevant Federal and State Enforcement Activities

Federal Enforcement Activities

In February 1997, EPA Region 1 issued SDWA Administrative Order 1-97-1019 (AO1) requiring the investigation of the impact of contamination at or emanating from the Training Ranges and Impact Area upon the Sole Source Aquifer.

In May 1997, EPA issued SDWA Administrative Order 1-97-1030 (AO2), which prohibited all live firing of mortars and artillery, firing of lead from small arms, planned detonation of ordnance or explosives at or near the Training Ranges and Impact Area except for Unexploded Ordnance (UXO) activities, and certain other training-related activities.

In January 2000, EPA issued SDWA Administrative Order 1-2000-0014 (AO3), which required implementation of Rapid Response Actions (RRAs) and Remedial Actions (RAs) to address contamination from past and present activities and sources at and emanating from the training ranges and impact area. The RRAs specifically required by AO3 addressed elevated concentrations of contaminants in soil and have been completed. The comprehensive response action component of AO3 required that a feasibility study, remedial design and response action be completed for several areas of concern. This work has also been completed.

Several sites were transferred to the Air Force Civil Engineer Center for management under a Military Munitions Response Program. The sites are: Bayonet Areas, Former Ammunition Supply Point; and Mock Village.

C. COMMUNITY PARTICIPATION

Throughout the Site's history, the Impact Area Groundwater Study Program (IAGWSP), EPA and the Massachusetts Department of Environmental Protection (MassDEP) have kept the community and other interested parties informed and involved with response activities at the Training Areas through informational meetings, fact sheets, press releases, public comment periods and public meetings.

The Impact Area Review Team (IART) was a citizen advisory committee established in 1997 under AO1. The IART served as a technical advisory resource, allowing the EPA, the National Guard Bureau, the Army, and MassDEP to hear the concerns and questions the public had related to the ongoing investigations and cleanup efforts at Camp Edwards. In 2007, the IART team merged with the Plume Cleanup Team, the citizens' advisory team for the Air Force Civil Engineer Center Installation Restoration Program, and was renamed the MMR Cleanup Team (MMR CT, now the JBCC CT). The JBCC CT meets regularly throughout the year for program updates and to provide public input.

Notices for all meetings related to the Training Areas investigation and response activities were published in the *Cape Cod Times* and the local edition of *The Enterprise*

newspapers.

In October 2001, the IAGWSP, EPA and MassDEP released a Public Involvement Plan outlining activities to address community concerns and to keep citizens informed about and involved in response activities.

With respect to this Training Areas Decision Document, important updates include:

- On April 11, 2018, an informational meeting was held at Camp Edwards, MA, to present the Remedy Selection Plan for the Training Areas to the JBCC CT and the public. A fact sheet was developed for JBCC CT members and the public. At the meeting, the IAGWSP gave a presentation on the results of the investigations and the EPA provided a presentation on the proposed decision for the Site. The JBCC CT, local residents and officials, news media representatives, and members of the public were invited to attend the meeting. Representatives from EPA, MassDEP and IAGWSP were available to answer questions. The IAGWSP notified the public of the informational meeting and associated public comment period in a display ad placed in the *Cape Cod Times* and *The Enterprise* newspapers on April 6, 2018. A news release regarding the meeting and the public comment period was issued to the local media on April 10, 2018.

- From April 11, through May 10, 2018, a 30 day public comment period was held on the Remedy Selection Plan and no comments were received. Copies of the Remedy Selection Plan Fact Sheet and other IAGWSP fact sheets and documents were placed in the IAGWSP's information repositories at the Bourne, MA public library; on the IAGWSP Web site: www.jbcc-iagwsp.org; and were available by appointment at the Administrative Record Office located at 1807 West Outer Road, Camp Edwards, MA. This information was also placed on the EPA web site at www.epa.gov/superfund/otis, along with the Remedy Selection Plan.

The IAGWSP, EPA, and MassDEP participated in general information sessions, such as open houses, information sessions, community meetings and annual updates to the local Town Managers, Boards of Selectmen, and Boards of Health on JBCC investigations and response activities.

D. SITE CHARACTERISTICS

Site Geology

The geology of Upper Cape Cod is comprised of glacial sediments deposited during the retreat of the Wisconsin stage of Holocene glaciations, approximately 15,000 years ago. Four sedimentary units characterize the regional geology: the Buzzards Bay and

Sandwich Moraines, the Buzzards Bay Outwash, and the Mashpee Pitted Plain. The sedimentary units are underlain by crystalline bedrock. Many of the Training Areas are located in the Buzzards Bay Moraine. The Buzzards Bay and Sandwich Moraines lie along the western and northern edges of Camp Edwards, converging in the vicinity of the Northwest Corner area of JBCC. Masterson et al. (1997) report that the Buzzards Bay Moraine resulted from the meltwater deposition of sorted sediments within a stagnant ice margin overlying a basal till. The Mashpee Pitted Plain consists of fine- to coarse-grained sands with gravel forming a broad outwash plain lying to the east and south of the moraines and interior to JBCC. The lower part of the Mashpee Pitted Plain consists of fine-grained, glaciolacustrine sediments comprised of fine sand, silt, and clay. This laterally persistent facies can be encountered underlying the moraines. The Buzzards Bay Outwash can be found along the west JBCC boundary to the Cape Cod Canal and Buzzards Bay. Like the Mashpee Pitted Plain, the Buzzards Bay Outwash consists of coarse sand and gravel of deltaic origin with locally interbedded fine sand and silt.

It should be noted that overlying all of these glacial deposits is a thin veneer of fine eolian silt, in some places two feet in thickness. This silt layer is normally located directly below topsoil at the Training Areas.

Site Hydrogeology

Surface water resources on JBCC are scarce. Surface water is not usually retained due to the well-drained, sandy soils of JBCC. As a result, approximately 60 percent of the annual rainfall on JBCC infiltrates the soil and contributes to the groundwater aquifer. The 31 wetlands located on the training sites of JBCC comprise 55 acres of land. No large lakes, rivers, or streams exist on the property, only small marshy wetlands and ponds. Most of the wetlands and surface waters in the Sandwich and Buzzards Bay Moraines on JBCC are considered to be perched. However some, such as Succonsette Pond which lies immediately southwest of the Central Impact Area, intercepts the water table.

The groundwater beneath JBCC is known as the Sagamore Lens, which is a part of the larger Cape Cod Aquifer. The Sagamore Lens is underlain by low permeability crystalline bedrock, which is not a productive source of water. The source of fresh water recharge to this groundwater system is rainfall and snowmelt only. Approximately 27 inches of the average annual rainfall infiltrates the soil and recharges groundwater on an annual basis. The top of the groundwater mound of the Sagamore Lens is located within the area of the J-1, J-2, and J-3 Ranges, which are southeast of the Impact Area located in the central portion of JBCC.

The height of the water table in and around JBCC can fluctuate up to seven feet annually due to seasonal variations in groundwater recharge. Groundwater levels are highest in the

spring when recharge rates are high; levels are lowest in the late summer/early autumn when rainfall is minimal.

The Training Areas are situated over a portion of the Sagamore Lens. The groundwater flow direction beneath most Training Areas in western and central portions of the site is predominantly to the west and northwest, and the hydraulic gradient steepens with increasing distance from the top of the regional potentiometric groundwater mound. Within the central portions of JBCC, groundwater elevations typically range between 65 and 70 feet National Geodetic Vertical Datum, and depth to groundwater ranges from approximately 100 to 140 feet below ground surface (bgs). For Training Areas located to the south of the groundwater mound, such as BA-1 Range, groundwater flow is to the southwest. Based on the observed response of the water table relative to recharge events, the hydraulic travel time through the vadose zone is expected to be three to six months. The thickness of the saturated zone varies between 180 and 280 feet.

E. SUMMARY OF SITE RISKS

A Human Health Risk Screening was conducted for the 36 locations within the Training Areas Operable Unit. The objective of the risk screening was to identify any analytes that warranted further evaluation. Risk screening evaluations were based on sampling data collected for four environmental media; groundwater, soil, surface water and sediment. However, sampling data were not available for all four media for each location within the site. It should also be noted that this area-wide risk screening has utilized all validated analytical data available. Details of the risk screening can be found in the *Final Training Areas Investigation Report* (April 2018).

The screening criteria for soil included the MCP Method 1 S-1/GW-1 Standards, the JBCC Soil Screening Levels (SSLs), and the EPA Risk-Based SSLs. The screening criteria for sediment included the MCP Method 2 S-1 Standards, the JBCC Soil Screening Levels (SSLs), and the EPA Risk-Based SSLs. MassDEP Leaching-Based Soil Concentrations and the JBCC-specific background soil concentration for each detected analyte were evaluated in the Investigation Report.

The screening criteria for groundwater and surface water included federal and Massachusetts (where available) Maximum Contaminant Levels (MCL and MMCL), USEPA Drinking Water Life-Time Health Advisories (HAs), EPA Regional Screening Levels (RSL) for Tapwater, and MCP Method 1 GW-1 Standards. Background regional water quality data was obtained from the three supply wells operated by the Upper Cape Regional Water Supply Cooperative.

Other factors that were considered in determining whether to further evaluate the detected analyte included whether the analyte was an essential human nutrient, its frequency of

detection across all of the sampled Training Areas and within individual Training Areas, specific characteristics of the analyte (such as munitions related constituents), and if the compound had a documented history of false positive analytical results.

Groundwater sampling data from 124 monitoring and water supply wells associated with the Training Areas were available for explosives, perchlorate, metals and inorganics, pesticides and herbicides, semi-volatile organic compounds (SVOCs), volatile organic compound (VOCs), and polychlorinated biphenyls (PCBs). Of the 234 widely reported analytes for groundwater, 16 were detected at maximum concentrations that exceeded one or more risk-based groundwater screening criteria: 2,6-DNT, RDX, perchlorate, arsenic, cadmium, chromium, lead, manganese, molybdenum, thallium, zinc, bis(2-ethylhexyl)phthalate, chloroform, cis-1,3-dichloropropene, MCPP, and pentachlorophenol. In addition to these typical analytes, dioxins/furans data was available for one well (MW-79S), radionuclide data was available for one well (MW-174S), and two wells were sampled for 4,4'-dichlorobiphenyl and pentachloronitrobenzene (ASP well and Rangecon). Of these analytes, 1,2,3,4,6,7,8-heptachlorodibenzo-p-dioxin and pentachloronitrobenzene were detected at maximum concentrations that exceeded risk-based screening criteria. Arsenic and chloroform have been previously associated with other naturally occurring sources, and their presence is not presumed to be related to Training Area activities. In summary, sixteen analytes were selected for further risk screening evaluation on an area-by-area basis.

Soil data were available for explosives, perchlorate, polychlorinated naphthalene (PCNs), metals and inorganics, pesticides and herbicides, SVOCs, VOCs, and PCBs. PCNs were not detected. Perchlorate was the most frequently detected munitions constituent identified at the Training Areas. Of the 228 soil analytes, 10 were detected at concentrations that exceeded both soil and groundwater screening criteria: RDX, perchlorate, arsenic, cadmium, lead, manganese, molybdenum, thallium, bis(2-ethylhexyl)phthalate, and pentachlorophenol. The maximum detected concentrations of RDX, perchlorate, chromium, lead, phenol, dieldrin and gamma-BHC exceeded their respective MCP Method 1 S-1/GW-1 Standards. The concentration of arsenic in Training Areas soil is consistent with background levels and its presence in groundwater is likely due to natural occurrence and does not warrant further evaluation. Therefore, RDX, perchlorate, cadmium, chromium, lead, manganese, thallium, bis(2-ethylhexyl)phthalate, phenol, dieldrin, gamma-BHC, and pentachlorophenol were selected for further risk screening on an area-by-area basis.

Of the 203 surface water analytes, only chromium, manganese, thallium, chloroform, heptachlor, and Arochlor 1260 exceeded at least one screening criteria. For each of these analytes, the maximum detected concentration was observed at Deep Bottom Pond. These surface water exceedances were further evaluated in a Stage I Environmental Risk

Characterization for the affected individual Training Areas.

Of the 210 sediment analytes, the following 28 analytes exceeded either the JBCC SSL or the EPA Risk-Based SSL or both but none exceeded the MCP Method 2 S-1 Standard: TNT, RDX, antimony, arsenic, boron, chromium, cobalt, copper, iron, lead, manganese, mercury, molybdenum, selenium, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, carbazole, dibenz(a,h)anthracene, acetone, chloroform, methylene chloride, 2-methyl-4-chlorophenoxyacetic acid (MCPA), alpha-chlordane, dieldrin, gamma-chlordane, and heptachlor epoxide. The reported detections of TNT and RDX were based on chemical screening methods that have been shown to be prone to false positive results and the results are considered unreliable for decision-making purposes. Subsequent analysis of these same samples by Method 8330 for RDX and TNT were non-detect. With the exception of barium, copper and lead, all of the metals were detected in sediment at levels consistent with JBCC background soil concentrations and/or were below screening criteria. Although the maximum detected concentrations of copper and lead were inconsistent with background soil levels, the concentrations observed in sediments were less than MCP Method 2 S-1 Standards. The detected concentrations of the six PAHs were comparable to JBCC background levels for soil. The maximum detected concentrations of acetone, chloroform, and methylene chloride in sediment exceeded either their JBCC SSL or their EPA Risk-Based SSL or both, but all were less than their respective MCP Method 2 S-1 Standard. All five pesticides were less than their respective MCP Method 2 S-1 Standard except for MCPA which does not have a MCP Method 2 S-1 Standard. The MCPA detections have been associated with false positives obtained using an older analytical method (AMEC 2002a). Because the observed concentrations were inconsistent with background levels and exceeded at least one sediment screening criteria, copper, lead, acetone, chloroform, methylene chloride and pesticides were further evaluated in the Stage I Environmental Risk Characterization for the affected individual Training Areas.

The Stage I Environmental Risk Characterization was performed on six freshwater ponds (Opening Pond, Donnely Pond, Cranberry Bog, Bailey's Pond, Deep Bottom Pond, and Gibbs Pond) that are located on Camp Edwards to determine whether there is current or potential future exposure of environmental receptors to contaminants in the existing pond environments. These six ponds are located in close proximity to historic former Training Areas as well as access roads, parking areas, vehicle paths and down-range locations. Given their locations, sediment and surface water were sampled at the start of the program for a wide range of analytes. These data were used to conduct the Stage I Environmental Screening for the *Training Areas Investigation Report*.

The Stage I Environmental Screening identified no current or future exposure of environmental receptors to site contaminants and concluded that a condition of no

significant risk of harm to the pond biota and habitats exists.

A risk screening evaluation for groundwater and soil was conducted on an area-by-area basis. Evaluation of representative monitoring well data indicates that groundwater beneath the Training Areas has not been significantly impacted by past training activities. Explosives have only been detected in a few monitoring wells associated with certain Training Areas. Perchlorate has been detected in some groundwater samples from certain areas. However, the majority of these detections are believed to be associated with the groundwater plume from the Central Impact Area. Trace levels of a few semivolatile compounds were sporadically reported in some samples from a few wells. However, most SVOC detections were below risk screening criteria and some detections may be laboratory artifacts. A few pesticides have been reported in a small number of samples from certain areas. These detections were likely the result of pesticide use in accordance with product labeling. All reported pesticide concentrations were below their groundwater screening values except for MCPP which has been determined to be a false positive based on an older analytical method and pentachlorophenol which was only detected once with subsequent results non-detect. Low levels of certain metals [including barium, chromium, copper, molybdenum and zinc] were detected in some monitoring well samples. In all but a few cases, these detections were below MCLs. Concentrations were generally consistent with JBCC background concentrations although the maximum reported concentrations for certain metals in certain representative wells exceeded background levels. However, in most cases, contaminant concentrations were below MCP GW-1/S-1 standards. In those cases where one or more screening criteria may have been exceeded by a given contaminant, the risk screening evaluation further considered the available data including the magnitude of the exceedance, the frequency of detection and the specific screening criteria being exceeded. The overall results of the groundwater sampling evaluations conducted to date indicate that the Training Areas are not currently a source of any significant groundwater contamination above action levels.

Results of investigations at the Training Areas indicate that certain explosive related compounds have been detected in soils at a few areas. Explosives related detections were primarily associated with certain locations in the Central Impact Area as well as at IBC Range and KD Range (West) but were not detected in soil samples from the majority of the Training Areas. Perchlorate was also detected in only a few soil samples from certain areas including U Range. The propellant 2,4-DNT has been detected in some soil samples from Training Area BA-1. However, this area has previously been evaluated in conjunction with Former F Range and is considered in the *Final Gun and Mortar Position Investigation Report* (Tetra Tech 2011b). Certain metals (including copper and lead) potentially associated with past training activities (including small arms use) have been detected in a few soil samples from some training areas. In almost all cases, lead concentrations are below the MCP S1/GW-1 standard of 200 mg/Kg. Copper concentrations in most soil

samples are below 25 mg/Kg and generally comparable to background.

F. THE SELECTED SITE DECISIONS

Based on the investigations, risk evaluations, and past actions, EPA selects no further action to address drinking water under the AO at Training Area sites A-4, A-5, A-6, B-8, C-12, C-14, Land Nav II, Trenches Pits and Excavations, Bunkers, Former Buildings, Cleared Areas, Ground Scars, Demolition Area 3, Demolition Area 4, Inactive Demolition Sites, Bailey's Pond, Donnely Pond, Deep Bottom Pond, Opening Pond, Gibbs Pond, BA-1, GN1/GN2 Grenade Courts, Mock Village, Former Ammunition Supply Points, 1940s Era Latrines, Stables, Bayonet Area, Waste Oil Dump Sites, Air to Air Target Darts, and U Range. The decisions reflect the results of the soil, groundwater, surface water and sediment data collected and analyzed for the specific area in question and the associated risk screening evaluations. At most Training Areas, environmental analyses indicated that military training related contaminants were absent or present at low concentrations comparable to background. At certain Training Areas, risk screening results indicate that one or more contaminants (e.g. RDX, perchlorate, lead and dieldrin) may have exceeded certain screening criteria in a few samples. However, in most cases, contaminant concentrations were below MCP S-1/GW-1 standards. In those cases where one or more screening criteria may have been exceeded by a given contaminant, the risk screening evaluation further considered the available data including the magnitude of the exceedance, the frequency of detection and the specific screening criteria being exceeded. The recommendation for NFA is subsequently based on an overall assessment of the available information for that Training Area including work performed in conjunction with another operable unit.

For example, elevated perchlorate levels were reported in groundwater at several Training Areas including A-5, A-6, Opening Pond and Former E Range. However, in each case, the elevated groundwater perchlorate concentrations are believed to be associated with contamination being addressed under another operable unit. In the case of Training Areas A-5 and A-6, the groundwater perchlorate contamination is believed to be associated with the Western Boundary Operable Unit and was addressed under that operable unit. Groundwater perchlorate contamination at Opening Pond and Former E Range is being addressed under the Demolition Area 1 Operable Unit. Similarly, at the Mock Village, Former Ammunition Supply Points, Stables, and Bayonet Area, the No Further Action recommendation reflects the fact these Training Areas are being evaluated by the Air Force Civil Engineer Center Installation Restoration Program as a Military Munitions Response Program (MMRP) site (Table 2).

EPA selects further action of limited additional data review and/or confirmatory sampling at two Training Areas (B-7 and IBC Range). Continued groundwater sampling for perchlorate will be conducted at B-7 under the Central Impact Area (CIA) groundwater monitoring program. Additional evaluation of lead detections at IBC Range will be required

if range use changes. EPA selects further action at the 1949 Engineer Training Site, the Former E Range, KD Range (West) and C-15. Appendix D describes a limited geophysical screening at the 1949 Engineer Training Site to confirm that munitions were not used at the site Appendix E describes the soil sampling and munitions surveys required at the Former E Range to document site conditions. Appendix F describes the target and munitions debris removal and soil sampling to be conducted at KD Range (West). Finally, Appendix G describes the confirmatory sampling for Smokes and Pyrotechnics required at C-15. Follow-on response actions may be needed based on the results of the investigations.

Land Use Controls and Five Year Reviews

Land Use Controls and Five Year Reviews are not required for the Training Areas with a No Further Action decision. For the sites where limited additional data review and/or confirmatory sampling is recommended, the need for Land Use Controls and/or Five Year Reviews will be determined after completion of the investigations as described in the project notes attached to this Decision Document.

Modifications

Any significant changes to the selected decision described in this Decision Document will be documented in a technical memorandum in the Administrative Record. If the EPA, in consultation with MassDEP, believes that fundamental changes to the selected decisions are necessary, the EPA will issue a proposed revised Decision Document and accept public comment on it before issuing a final, Decision Document Addendum.

G. DETERMINATIONS

The selected action, which consists of No Further Action for drinking water under the AO for the following Training Areas: A-4, A-5, A-6, B-8, C-13, C-14, Land Nav II, Trenches Pits and Excavations, Bunkers, Former Buildings, Cleared Areas, Ground Scars, Demolition Area 3, Demolition Area 4, Inactive Demolition Sites, Bailey's Pond, Donnely Pond, Deep Bottom Pond, Opening Pond, Gibbs Pond, BA-1, GN1/GN2 Grenade Courts, Mock Village, Former Ammunition Supply Points, 1940s Era Latrines, Stables, Bayonet Area, Waste Oil Dump Sites, Air to Air Target Darts, and U Range and data review and/or confirmatory sampling soil sampling and geophysical screening at six Training Areas (B-7, C-15, 1949 Engineer Training Site, Former E Range, KD Range (West) and IBC Range) is consistent with the SDWA §1431(a), 42 USC §300i(a), as amended and with AO3.

This decision is protective of human health. EPA's determination is related to unacceptable threats to the groundwater aquifer from the Site; however, by this Decision Document EPA is making no determination regarding public safety risk, ecological risk,

dermal contact risk, and/or soil ingestion risk posed by remaining contamination or unexploded ordnance at any of the individual Training Area Sites.

H. DOCUMENTATION OF NO SIGNIFICANT CHANGES

EPA presented the Remedy Selection Plan for the Training Areas on Wednesday, April 11, 2018. The proposed remedy was No Further Action for the following Training Areas: A-4, A-5, A-6, B-8, C-13, C-14, Land Nav II, Trenches Pits and Excavations, Bunkers, Former Buildings, Cleared Areas, Ground Scars, Demolition Area 3, Demolition Area 4, Inactive Demolition Sites, Bailey's Pond, Donnely Pond, Deep Bottom Pond, Opening Pond, Gibbs Pond, BA-1, GN1/GN2 Grenade Court, Mock Village, Former Ammunition Supply Points, 1940s Era Latrines, Stables, Bayonet Area, Waste Oil Dump Sites, Air to Air Target Darts, and U Range Additional follow-up work is required at six Training Areas (B-7, C-15, 1949 Engineer Training Site, Former E Range, KD Range (West) and IBC Range). No written or verbal comments were submitted during the public comment period. Based on that, EPA determined that no significant changes to the actions, as originally identified in the Remedy Selection Plan, were necessary.

I. STATE ROLE

The MassDEP has reviewed the various alternatives in the Remedy Selection Plan for the Training Areas and has concurred with the selected decisions (Appendix A).

PART III: THE RESPONSIVENESS SUMMARY

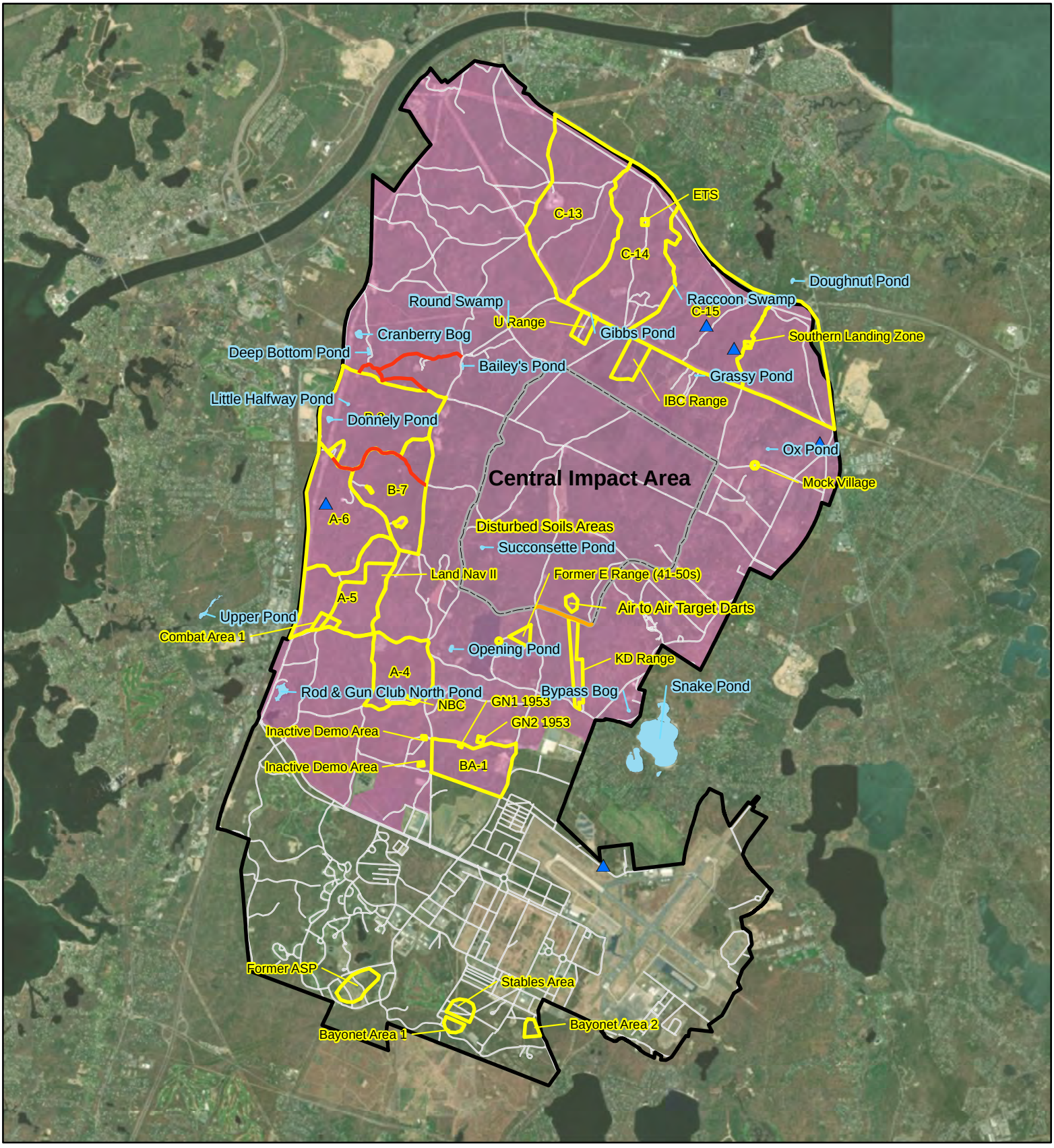
On April 11, 2018 EPA published the Training Areas Remedy Selection Plan for a 30-day public comment period.

The IAGWSP notified the public of the April 11, 2018 public meeting and announced the public comment period in display advertisements placed in the April 6 editions of the *Cape Cod Times* and *Enterprise* newspapers.

The IAGWSP placed copies of the Remedy Selection Plan for the Training Areas in the IAGWSP's information repositories at the Bourne, MA public library. The repository contains documents on the investigations and findings supporting selection of the response actions including the investigation report for the site and other relevant documents upon which EPA relied in selecting the proposed decision. The fact sheet also was made available on the IAGWSP web site, which also contains the supporting documents and which offered a means of submitting public comments on the decision document fact sheet.

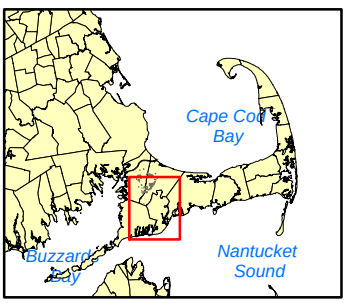
At the April 11, 2018 public meeting of the JBCC CT, held at Camp Edwards, MA, the IAGWSP and EPA gave a presentation on the Remedy Selection Plan and answered questions from the team. Local residents, officials, and news media representatives interested in site activities and cleanup decisions were invited to attend the meeting. At the conclusion of the 30-day public comment period, no comments were received.

FIGURES



- Municipal Water Supply Well
- Demo Area 3
- Demo Area 4
- Training Area
- Impact Area Boundary
- MMR Boundary
- Pond/Swamp
- Roads
- Upper Cape Water Supply Reserve

Figure 1-1
Location of Training Areas



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TABLES

TABLE 1
Training Areas
Summary of Regulatory Considerations*

AUTHORITY/TYPE	PROVISION	SYNOPSIS
Federal/Chemical Specific	SDWA MCLs, 40 CFR 141.61 – 141.63	The EPA has promulgated SDWA MCLs (40 CFR 141-143) that are enforceable standards for public drinking water supplies. The standards protect drinking water quality by limiting the levels of specific contaminants that can adversely affect public health.
State/Chemical Specific	MA Drinking Water Regulations, 310 CMR 22.00	These standards establish Massachusetts MCLs (MMCLs) for public drinking water systems (310 CMR 22.00 et seq.).
Federal/Action Specific	SDWA 47 FR 30282 Sole Source Aquifer	Pursuant to Section 1424(e) of the Safe Drinking Water Act, the EPA has determined that the Cape Cod aquifer is the sole or principal source of drinking water for Cape Cod, Massachusetts, and that the Cape Cod aquifer, if contaminated, would create a significant hazard to public health.
Federal/Chemical Specific	Drinking Water Health Advisories, published at http://www.epa.gov/ waterscience/criteria/drinking/	These are exposure concentrations protective of adverse non-cancer effects for a given exposure period. The 1-day and 10-day HA are designed to protect a child; the lifetime HA is designed to protect an adult.
Federal/Chemical Specific	Drinking Water Equivalent Levels (DWELs), published at http://www.epa.gov/ waterscience/criteria/drinking/	DWELs set forth lifetime exposure concentration values protective of adverse, non-cancer health effects, assuming that all of the exposure to a contaminant is from drinking water.
Federal/Chemical Specific	Human Health Reference Doses (RfDs), Reference Concentrations (RfCs), Cancer Slope Factors (CSFs), and 10^{-6} excess lifetime cancer risk level	These risk-based concentrations are considered together with site-specific exposure information to develop concentrations of residual contamination that will not endanger human health.

TABLE 1
Training Areas
Summary of Regulatory Considerations*

AUTHORITY/TYPE	PROVISION	SYNOPSIS
State/Chemical Specific	Massachusetts Contingency Plan, Method 1, GW-1 Groundwater Standards, 310 CMR 40.0974(2) Table 1	These cleanup standards were developed by MassDEP considering a defined set of exposures considered to be a conservative estimate of the potential exposures at most sites. Groundwater at MMR is classified as GW-1.
State/Chemical Specific	Massachusetts Drinking Water Guidelines, in Standards and Guidelines for Chemicals in Massachusetts Drinking Waters (Spring 2009), available at http://www.mass.gov/dep/water/dwstand.pdf.	This document lists both promulgated Massachusetts MCLs and also MassDEP Office of Research and Standards guidelines for chemicals that do not have Massachusetts MCLs. Standards promulgated by EPA but not yet effective may be included on the Guidelines list. These values are derived based on a review and evaluation of all available data for the chemical of interest.
State/Action Specific	Massachusetts Surface Water Quality Standards, 314 CMR 4.00	These MassDEP standards prescribe the minimum water quality criteria required to sustain the designated uses of Massachusetts waters. The levels are designed to prevent all adverse health effects from ingestion, inhalation or dermal contact.
Federal/Action Specific	Subtitle C Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities, 40 CFR Part 264	These requirements establish minimum national standards that define the acceptable management of hazardous waste.

TABLE 1
Training Areas
Summary of Regulatory Considerations*

AUTHORITY/TYPE	PROVISION	SYNOPSIS
State/Action Specific	MA Hazardous Waste Management Regulations (310 CMR 30.0000)	These requirements specify how a generator of solid waste must determine whether that waste is hazardous. If waste is determined to be hazardous, it must be managed in accordance with these requirements.
Federal/Action Specific	EPA Guidance on "Use of Monitored Natural Attenuation at Superfund, RCRA Corrective Action, and Underground Storage Tank Sites" (9200.4-17P) (Apr. 21, 1999)	This guidance describes EPA's policy regarding the use of monitored natural attenuation (MNA) for the cleanup of contaminated soil and groundwater. It provides guidance regarding necessary site-specific characterization data and analysis, a methodology for determining a reasonable timeframe for remediation, a preference for remediation of sources, appropriate performance monitoring and evaluation, and a preference for contingency remedies.
Federal/Action Specific	Resource Conservation and Recovery Act (RCRA) [40 CFR 261-262]	These regulations govern the identification and listing of hazardous waste under RCRA, and the requirements on generators of hazardous waste.
Federal/Action Specific	RCRA Land Disposal Restrictions [40 CFR 268]	These regulations restrict the disposal of any treatment wastes classified as hazardous waste.
State/Action Specific	Solid Waste Management Regulations (RCRA Subtitle D), 310 CMR 19.000 et seq.	If a waste is determined to be a solid waste, it must be managed in accordance with the state regulations at 310 CMR 19.000 et seq.
Federal/Action Specific	Hazardous Waste Operations and Emergency Response, 29 CFR 1910.120	These regulations describe training, monitoring, planning, and other activities to protect the health of workers performing hazardous waste operations.

TABLE 1
Training Areas
Summary of Regulatory Considerations*

AUTHORITY/TYPE	PROVISION	SYNOPSIS
Federal/Action Specific	Underground Injection Control Program [40 CFR 114, 144, 146, 147, 148, 1000]	Underground Injection Control Program regulations outline minimum program and performance standards for underground injection wells and prohibit any injection that may cause a violation of any primary drinking water regulation in the aquifer. Infiltration galleries and wells fall within the broad definition of Class V wells. These regulations are administered by the State.
State/Action Specific	MassDEP Stormwater Management Program Policy (Nov. 18, 1996)	Provides policies and guidance on complying with the state's stormwater discharge requirements.
Federal/Action Specific	National Environmental Policy Act, 42 U.S.C. 4321-4370f	"EPA believes that NGB is not required to follow NEPA procedures, as long as the NGB's actions are conducted in accordance with the administrative order, because of the provision in the CEQ regulations exempting enforcement actions from NEPA." (USEPA, 1 March 01)
Federal/Action Specific	CWA NDPES Stormwater Discharge Requirements, 40 CFR 122.26	Establishes requirements for stormwater discharges associated with construction activities that result in a land disturbance of equal to or greater than one acre of land. The requirements include good construction management techniques; phasing of construction projects; minimal clearing; and sediment, erosion, structural, and vegetative controls to mitigate stormwater run-on and runoff.
State/Action Specific	Stormwater Discharge Requirements, 314 CMR 3.04 and 314 CMR 3.19	Requires that stormwater discharges associated with construction activities be managed in accordance with the general permit conditions of 314 CMR 3.19 so as not to cause a violation of Massachusetts surface water quality standards in the receiving surface water body (including wetlands).

TABLE 1
Training Areas
Summary of Regulatory Considerations*

AUTHORITY/TYPE	PROVISION	SYNOPSIS
State/Chemical Specific	Massachusetts Air Pollution Control Regulations [310 CMR 6.00 – 7.00]	Construction activities could trigger Massachusetts Air Pollution Control Regulations (310 CMR 6.00 – 7.00). These regulations set emission limits necessary to attain ambient air quality standards for fugitive emissions, dust and particulates.
State/Action Specific, Chemical Specific	310 CMR 40.0040 Construction and operation of a groundwater treatment plant	Regulations establish management procedures for remedial wastewater as well as the construction, installation, change, operation and maintenance of treatment works for Remedial Wastewater. Treatment works shall be inspected and the inspections documented. Treatment works shall be protected from vandalism and measures shall be taken to prevent system failure, contaminant pass through, interference, by-pass, upset, and other events likely to result in a discharge of oil and/or hazardous material to the environment.
State/Action Specific, Chemical Specific	Discharge of Groundwater 310 CMR 40.0045	Regulations restrict remedial wastewater discharge to the ground surface or subsurface and/or groundwater. Such a discharge should not erode or impair the functioning of the surficial and subsurface soils, infiltrate underground utilities, building interiors or subsurface structures, result in groundwater mounding within two feet of the ground surface, or result in flooding or breakout to the ground surface. The concentrations of all pollutants discharged must be below the Massachusetts Groundwater Quality Standards established by 314 CMR 6.0. The concentrations must also be below the applicable Reportable Concentrations established by 310 CMR 40.0300 and 40.1600.
State/Action Specific	Discharge of Groundwater 310 CMR 40.0300 and 310 CMR 40.1600	The MCP contains special provisions for the discharge of groundwater containing very low levels of oil or hazardous material. Groundwater containing oil and/or hazardous material in concentrations less than the applicable release notification threshold established by 310 CMR 40.0300 and 40.1600, can be discharged to the ground subsurface and/or groundwater only when following appropriate guidelines.

TABLE 1
Training Areas
Summary of Regulatory Considerations*

AUTHORITY/TYPE	PROVISION	SYNOPSIS
State/Action Specific	Groundwater Discharge Regulations [314 CMR 5.00]	Recharge of effluent from some treatment works requires a permit under Groundwater Discharge Regulations at 314 CMR 5.00 unless the exemption allowing for actions taken in compliance with MGL C. 21E and regulations at 40 CMR 40.00 applies. The effluent discharged must not exceed any Massachusetts Groundwater Quality Standards and effluent limitations in 314 CMR 5.10(3). For previous projects on MMR, the MassDEP has determined that effluent from any constructed treatment system is "conditionally exempt" from obtaining the permit provided that the applicable or relevant provisions of the MCP 310 CMR 40.0000 are complied with.
State/Action Specific	MassDEP Drinking Water Program, Private Well Guidelines (2008), available at http://www.mass.gov/dep/water/laws/prwellgd.pdf	These are guidelines concerning private well location, design, construction, development, water quality testing, operation, maintenance, and decommissioning.
State/Action Specific	Underground Injection Control [310 CMR 27.00]	These regulations prohibit injection of fluid containing any pollutant into underground sources of drinking water where such pollutant will, or is likely to, cause a violation of any state drinking water standard or adversely affect the health of persons.
State/Action Specific	STATE - MA Erosion and Sediment Control Guidelines for Urban and Suburban Areas (May 2003), available at http://www.mass.gov/dep/water/essec1.pdf	Provides guidance and best management practices regarding erosion and sediment control.

TABLE 1
Training Areas
Summary of Regulatory Considerations*

AUTHORITY/TYPE	PROVISION	SYNOPSIS
Federal/Action Specific	Archaeological Resources Protection Act, 16 U.S.C. §§ 470aa-ll, 43 CFR Part 7; Native American Graves Protection and Repatriation Act, 25 U.S.C. §§ 3001-3013, 43 CFR Part 10, National Historic Preservation Act, 16 U.S.C. §§ 470 et seq., 36 CFR Part 800; Massachusetts Historic Preservation Act, MGL ch. 9 §§ 26-27C; MGL ch. 7, § 38A; MGL ch. 38, §§ 6B-6C; 950 CMR 70-71.	These statutes and regulations provide for the protection of historical, archaeological, and Native American burial sites, artifacts, and objects that might be lost as a result of a federal construction project.
State/Action Specific	Massachusetts Endangered Species Act.	The Massachusetts Endangered Species Act provides that impacts to state-listed endangered or threatened species, or species of special concern or their habitats from actions are to be avoided, minimized, and/or mitigated.

*Regulations that EPA will either consider or require, as appropriate, in selecting and defining the remedial action as specified in the final decision document.

Table 2
JBCC Training Areas Summary

Range/Site	Past Use	Focus of Investigation (Area of Concern)	Representative Wells	Groundwater Analyses	Groundwater Detections	Soil Sampling	Soil Analyses	Soil Detections	Removal Actions	Findings/Recommendations
A-4	Training Area - Maneuvers and Bivouacs - CBR Training Area	Simulated Chemical Warfare Training and use of Pyrotechnics (1)	MW-210 MW-231 ASPWELL	Full Groundwater Suite (2)	Perchlorate in a few wells - Metals in ASPWELL	2 Composite soil samples - 4 multiple increment samples	Full Soil Suite (3) for composite samples	No explosives detects - a few perchlorate, PAH and metals detects	No soil removal actions	No further action
A-5	Training Area - Maneuvers and Bivouacs	Simulated Chemical Warfare Training and possible use of Pyrotechnics	MW-226 MW-80 MW-82 MW-84	Full Groundwater Suite	Perchlorate in a few downgradient wells	One multiple increment sample - Western Boundary	Explosives and Perchlorate	Explosives and perchlorate were non-detect	No soil removal actions	No further action
A-6	Training Area - Maneuvers and Bivouacs	Simulated Chemical Warfare Training (Possible tear gas use at GP-24)	MW-213 MW-233 MW-280 MW-81	Full Groundwater Suite	Perchlorate detected in some wells	No soil samples collected	NA	NA	No soil removal actions	No further action
B-7	Training Area - Maneuvers and Bivouacs	Simulated Chemical Warfare Training	MW-174 MW-267 MW-282	Full Groundwater Suite	Perchlorate detected in some wells	Samples collected for Former C and D Ranges only	NA	NA	No soil removal actions	Continue CIA plume monitoring for perchlorate at representative wells in B-7.
B-8	Training Area - Maneuvers and Bivouacs	Simulated Chemical Warfare Training	MW-475 MW-476 58MW0021	TAL Metals	Copper detected in a few wells	Samples collected for Former A and B Ranges only	NA	NA	No soil removal actions	No further action
C-13	Training Area - Maneuvers and Bivouacs	Simulated Chemical Warfare Training and use of Pyrotechnics	PPAWSPW-1 PPAWSPW-2	Explosives and Perchlorate	No explosives or perchlorate detects	2 5-Point composite soil samples	Full Soil Suite	Explosives/SVOCs were non-detect - some low metals detects below screening levels	No soil removal actions	No further action
C-14	Training Area - Maneuvers and Bivouacs	Simulated Chemical Warfare Training and use of Pyrotechnics	MW-435 LRMW0001	Full Groundwater Suite	Some RDX detects - likely from Demo 2	Samples collected for Demolition Area 2 only	NA	NA	No soil removal actions	No further action
C-15	Training Area - Maneuvers and Bivouacs - also SLZ (Southern Landing Zone)	Simulated Chemical Warfare Training and use of Pyrotechnics	MW-17 MW-52 MW-53	Full Groundwater Suite	Molybdenum in some well samples - also chromium	2 5-Point composite and 2 soil boring samples	Composites-full soil suite Borings- VOCs and SVOCs only	Phenol detected in one SB sample - low SLZ SVOC/metals detects	No soil removal actions	Conduct confirmatory sampling for pyrotechnics and smoke.
Land Nav II (Eastern portion of Training Area A-5)	Training Area - Maneuvers and Bivouacs - Land Navigation	Simulated Chemical Warfare Training and possible use of Pyrotechnics	See Training Area A-5	See Training Area A-5	See Training Area A-5	No soil samples collected	NA	NA	No soil removal actions	No further action
1949 Engineer Training Site (Location assumed to be in Training Area C-14)	Engineer Training - including bridge building and mine warfare site	Demolition Explosives/Claymore Mines	MW-435	Explosives	Some RDX detects - likely Demo 2	No soil samples collected	NA	NA	No soil removal actions	Confirmatory investigation for munitions required.
Trenches, Pits and Excavations	Combat Unit Training Gun and Mortar Impact Area	Training Rounds/possible UXO	MW-09	Full Groundwater Suite	A few explosives or perchlorate detects	10 5-Point composite and 10 discrete samples	Explosives Only	Explosives were non-detect at Pit-1 and Ex-2	No soil removal actions	No further action
Bunkers	Observation Posts and Protection - reinforced concrete structures	No confirmed MC use	MW-15 MW-71	Full Groundwater Suite	Some perchlorate and metals detects	BK-1 - 10 5-point composite and 10 discrete samples	Explosives Only	Explosives were non-detect at BK-1	No soil removal actions	No further action
Former Buildings	NA - Located in J Ranges and CS-19 - other operable units	NA	NA	NA	NA	NA	NA	NA	No soil removal actions	No further action
Cleared Areas	Uncertain Use - Possible troop assembly or logistics staging areas	No confirmed MC use	No Appropriate Wells	NA	NA	42 5-Point composite and 42 discrete samples	Full Soil Suite for most samples	Elevated metals at CA-4 - Some low pesticides and metals at CA-7 all below screening levels	No soil removal actions	No further action
Ground Scars	Uncertain Use - Several located in impact cratered areas	No confirmed MC use	No Appropriate Wells	NA	NA	26 5-Point composite and 26 discrete samples	Explosives Only	Two RDX detects at GS-7 - One RDX, HMX and 2A-DNT detect at GS-8	No soil removal actions	No further action
Demolition Area 3	Demolition Training - Demolition of large rocks	Demolition Explosives and Perchlorate	MW-42	Full Groundwater Suite	One perchlorate detect (out of 37 samples)	7 Discrete soil samples	Explosives Only	2A-4,6-DNT detected in one sample	No soil removal actions	No further action
Demolition Area 4	Demolition Training - Possible demolition of trucks	Demolition Explosives and Perchlorate	No Appropriate Wells	NA	NA	No soil samples collected	NA	NA	NA	No further action
Inactive Demolition Sites	Demolition Training	Demolition Explosives and Perchlorate	MW-150	Full Groundwater Suite	No explosives or perchlorate detects	6 5-Point composite and 6 discrete samples	Explosives, SVOCs and TAL Metals	Explosives were non-detect - low metals detects in some samples	No soil removal actions	No further action
Bailey's Pond	No Training Use	No confirmed MC use - possible discarded ammunition disposal	MW-202 MW-278	Explosives and Perchlorate	Some perchlorate detects - may be from CIA	3 Surface water and 3 sediment samples	Full Surface Water/Sediment Suite (4)	Some low SW SVOC and metals detects - also SED metals detects below screening levels	No sediment removal actions	No further action
Donnely Pond	No Training Use	No confirmed MC use - possible discarded ammunition disposal	No Appropriate Wells	NA	NA	3 Surface water and 4 sediment samples	Full Surface Water/Sediment Suite	One SW BHC and low metals detects - some SED metals detects below screening levels	No sediment removal actions	No further action
Deep Bottom Pond	Engineer Training Landing Zones Nearby	No confirmed MC use	95-6ED 95-6ES	Full Groundwater Suite	A few perchlorate detects - likely Former A or CIA	7 Surface water and 8 sediment samples 4 composite soils	Full Surface Water/Sediment Suite Full Soil Suite	Some SW and SED low pesticide detects below screening levels	No sediment removal actions	Confirmatory sampling for pyrotechnics and smoke will be conducted at adjacent landing zone.
Opening Pond	No Training Use	No confirmed MC use - possible metal debris disposal	MW-255 MW-271	Explosives and Perchlorate	Explosives and perchlorate detects - possibly Demo 1	3 Surface water and 3 sediment samples	Full Surface Water/Sediment Suite	SW low metals detects - one SED pesticide and some metals detects below screening levels	No sediment removal actions	No further action
Gibbs Pond	No Training Use	Possible defoliant use nearby (power lines)	No Appropriate Wells	NA	NA	2 Surface water and 2 sediment samples	Full Surface Water/Sediment Suite	Some SW and SED low pesticide detects below screening levels	No sediment removal actions	No further action

Table 2
JBCC Training Areas Summary

Range/Site	Past Use	Focus of Investigation (Area of Concern)	Representative Wells	Groundwater Analyses	Groundwater Detections	Soil Sampling	Soil Analyses	Soil Detections	Removal Actions	Findings/Recommendations
BA-1	Combat Unit Training Pyrotechnics Use - Gun Positions - Grenade Courts	Small Arms Ammunition - Explosives - Rifle Smoke Grenades	03MW-0707 27MW-0705 27MW-2061	Full Groundwater Suite	No explosives or perchlorate - A few trace level metals	~28 Composite and 31 discrete soil samples	Explosives, SVOCs, VOCs, TAL Metals and some Pesticides	Some 2,4-DNT detects Former F Range - some bromoform detects subject of removal action	Soil excavations for bromoform removal in 2001 and 2005	No further action
GN1/GN2 Grenade Court	Grenade Use Training	Grenades	MW-496	Explosives Metals Perchlorate Semivolatiles	Two perchlorate detects	12 Composite and 9 discrete soil samples	Full Soil Suite for some samples	Elevated metals in some samples - 2,4-DNT detects (from GP-11)	No soil removal actions	No further action
Mock Village [5]	Urban Reconnaissance and Street Fighting	0.30 Cal. Blank Rounds - Explosives - Pyrotechnics - Grenades	XXLRWS4-1	Metals Semivolatiles Water Quality	A few trace metal detects	3 Discrete soil samples	Explosives, SVOCs, TAL Metals and Dyes	No explosives detects - some low SVOC and metals detects below screening levels	No soil removal actions	This site is being evaluated under the Military Munitions Response Program by the Installation Restoration Program
Former Ammunition Supply Points[5]	Ammunition Storage and Distribution	Small Arms Ammunition - Munitions	MW-156	Pesticides	A few trace pesticide detects	25 Discrete soil samples	Explosives, Metals and Pesticides	Some metals detects (zinc) - a few pesticide detects (dieldrin) below screening levels	No soil removal actions	This site is being evaluated under the Military Munitions Response Program by the Installation Restoration Program
1940s Era Latrines	Field Bathrooms	Possible waste disposal - none confirmed	No Appropriate Wells	NA	NA	No soil samples collected	NA	NA	No soil removal actions	No further action
Stables[5]	Enclosure for Horses	No associated MC	No Appropriate Wells	NA	NA	No soil samples collected	NA	NA	No soil removal actions	This site is being evaluated under the Military Munitions Response Program by the Installation Restoration Program
Bayonet Area[5]	Bayonet Training	No associated MC	No Appropriate Wells	NA	NA	No soil samples collected	NA	NA	No soil removal actions	This site is being evaluated under the Military Munitions Response Program by the Installation Restoration Program
Waste Oil Dump Sites	Associated with Artillery Training Impact Areas	Oil leakage Into subsurface soil	No Appropriate Wells	NA	NA	No soil samples collected	NA	NA	No soil removal action - Groundwater treated under CIA	No further action
Air to Air Target Darts	Anti-Aircraft Training	No associated MC	No Appropriate Wells	NA	NA	3 5-Point composite soil samples	Full Soil Suite	No explosives detects - a few low metals detects	No soil removal action - Groundwater treated under CIA	No further action
E-1/Former E	Artillery and Rocket Firing Machine Gun Training Anti-Tank Training	Explosives 0.50 Cal. Machine Gun Projectiles	MW-74 MW-75 MW-77 MW-78	Explosives Dioxins Perchlorate Volatiles	Some perchlorate detects - a few dioxin detects	12 5-Point soil composite and 14 discrete samples	Explosives, SVOCs, TAL Metals, Dyes and PCNs	No explosives or PCN detects - Some low SVOC/metals detects	No soil removal actions	Additional post-Decision Document investigation required (MEC).
IBC Range	Infantry Assault Course	Small Arms Ammunition - LAW Subcaliber Rounds - Grenades - Explosives	MW-17	Full Groundwater Suite	No explosives or perchlorate detects	16 5-Point soil composite, 4 discrete samples and 5 MIS grids	Full Soil Suite for most samples - also Perchlorate and Dyes	A few elevated metals detects - one RDX detect - SVOC detects (phenol) below screening levels	No soil removal actions	Note lead concentration and further evaluate if range use changes.
KD (West)	Multiple Weapons Training	Small Arms - Rifle - Dragon Missiles - TOW Missiles - 90mm Recoiless Rifle	MW-109 MW-472 MW-473 MW-474	Full Groundwater Suite	No explosives - a few metals or phthalates detects	~93 Composite, 93 discrete soil samples and 2 MIS grids	Full Soil Suite for many samples	Some explosives (NG) and elevated pesticide and metals detects below screening levels	Soil removal from multiple range locations	Munitions debris and targets will be removed and confirmatory soil samples will be collected from beneath the primary target at the middle of the range.
U Range	Multiple Weapons Training	LAW Rockets - 3.5 Inch Rockets - M79 Grenades	MW-62	Full Groundwater Suite	No explosives - a few low metal detects	~35 Composite and 41 discrete samples 4 boring samples	Full Soil Suite for most samples - also PCNs and Perchlorate	No explosives detects - Perchlorate detected at firing line and some phthalate/PAH and metals detects below screening levels	Soil removal from firing line (perchlorate).	No further action

Notes
1] Pyrotechnics - includes flares and/or smokes
2] Full Groundwater Suite - includes explosives, perchlorate, semivolatiles, volatiles, pesticides, metals and water quality parameters
3] Full Soil Suite - includes explosives, perchlorate, semivolatiles, volatiles, pesticides/PCBs, herbicides, TAL metals and miscellaneous parameters (ammonia, nitrate/nitrite, total phosphorus and TOC)
4] Full Surface Water and Sediment Suite - includes explosives, semivolatiles, volatiles, EDB, pesticides/PCBs, herbicides, TAL metals and miscellaneous water quality parameters (ammonia, nitrate/nitrite, total phosphorus and TOC)
5] These sites are being evaluated under the Military Munitions Response Program by the Installation Restoration Program

APPENDIX A
MASSDEP LETTER OF CONCURRENCE

Commonwealth of Massachusetts
Executive Office of Energy & Environmental Affairs

Department of Environmental Protection
One Winter Street Boston, MA 02108 • 617-292-5500

Charles D. Baker
Governor

Karyn E. Polito
Lieutenant Governor

Matthew A. Beaton
Secretary

Martin Suuberg
Commissioner

February 6, 2019

Mr. Bryan Olson, Director
Office of Site Remediation and Restoration
U. S. Environmental Protection Agency, Region 1
5 Post Office Square Suite 100
Boston, MA 02109-3912

RE: **BOURNE--BWSC**
Release Tracking Number: 4-0015031
Joint Base Cape Cod (JBCC)
Decision Document, Training Areas Operable Unit, Concurrence

Dear Mr. Olson,

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed the document entitled "**Decision Document, Training Areas Operable Unit**" (the Decision Document), dated October 2018. The Decision Document was prepared in accordance with Section 1431(a) of the Safe Drinking Water Act (SDWA), 42 USC § 300i(a), as amended, and the Administrative Order (AO) concerning response actions issued thereunder, U.S. Environmental Protection Agency Region 1 (EPA) Administrative Order No. SDWA-1-2000-0014 (AO3). The selected remedies were chosen based on the Administrative Record, which has been developed in accordance with AO3 and with a previous EPA Administrative Order, SDWA 1-97-1019 (AO1), including consideration of the substantive cleanup standards of the Massachusetts Contingency Plan (MCP) 310 CMR 40.0000.

The Decision Document presents the selected remedies for the Training Areas Operable Unit, which are comprised of 36 Training Areas located on the Camp Edwards portion of the Joint Base Cape Cod (JBCC) where various types of military training-related activities have been conducted in the past. The remedies selected for the Training Areas in the Decision Document are necessary to protect the Cape Cod Aquifer, a sole source of drinking water on which the public relies. On July 13, 1982, EPA determined that the Cape Cod Aquifer is the sole or principal source of drinking water for Cape Cod, Massachusetts, and that the Cape Cod Aquifer, if contaminated, would create a significant hazard to public health (47 Fed. Reg. 30282). The Training Areas are also located within the Upper Cape Water Supply Reserve, established pursuant to Chapter 47 of the Massachusetts Acts of 2002, which has been designated a water supply protection area and is conservation land under the care, custody and control of the Massachusetts Division of Fisheries and Wildlife.

The selected remedies for the 36 Training Areas are based upon site inspections and investigations (including multi-media sampling and site-specific geophysical surveys), removal of munitions debris and

munitions and explosives of concern, excavation and disposal of contaminated soil, post-excavation confirmatory sampling, and a risk characterization that determined that concentrations of contaminants remaining in the soil at the Training Areas meet the Decision Document cleanup goals. Extensive groundwater monitoring has been conducted at the Training Areas and an evaluation of representative monitoring well data indicates that groundwater beneath the Training Areas has not been significantly impacted by past training activities. Therefore, the Training Areas are not currently a source of any significant groundwater contamination above Decision Document action levels.

No Further Remedial Action has been selected by the EPA as the remedy for the following Training Areas: A-4, A-5, A-6, B-8, C-13, C-14, Land Navigation II, Trenches Pits and Excavations, Bunkers, Former Buildings, Cleared Areas, Ground Scars, Demolition Area 3, Demolition Area 4, Inactive Demolition Sites, Bailey's Pond, Donnely Pond, Deep Bottom Pond, Opening Pond, Gibbs Pond, BA-1, GN1/GN2 Grenade Courts, Mock Village, Former Ammunition Supply Points, 1940s Era Latrines, Stables, Bayonet Area, Waste Oil Dump Sites, Air to Air Target Darts, and U Range.

It has been determined by the EPA that additional data review and confirmatory soil sampling and/or geophysical screening/survey is necessary for Training Areas B-7, C-15 and IBC Range, 1949 Engineer Training Site, Former E Range, KD Range (West) before a final remedy can be selected. A Decision Document Addendum will be prepared to document the results of the necessary investigation activities and a final remedy for each of the six Training Areas.

Land Use Controls (LUCs) and Five Year Reviews are not required for the Training Areas with a No Further Remedial Action decision. For the Training Areas where data review, confirmatory sampling, and/or geophysical screening/survey is necessary, the need for LUCs and/or Five Year Reviews will be determined after completion of the investigations as described in the Decision Document.

Determination

MassDEP concurs with the Decision Document prepared for the Training Area Operable Units. Contaminant concentrations in soil have been reduced to below MCP S-1/GW-1 Standards for 30 of the Training Areas and confirmatory sampling, and geophysical screening will be conducted at six of the Training Areas to determine if additional response actions are necessary. Response actions performed or selected for these Training Areas are based on the Administrative Record, which has been developed in accordance with AO3 and AO1, including consideration of the substantive cleanup standards of the MCP 310 CMR 40.0000, which are protective of human health and the environment.

MassDEP's concurrence with the Decision Document is based upon representations made to MassDEP by the Impact Area Groundwater Study Program (IAGWSP) and assumes all information is substantially complete and accurate. Without limitation, if MassDEP determines that any material omissions or misstatements exist or if new information becomes available within the Training Areas identified in the Decision Document that potential or actual human exposure or threats to the environment exist, MassDEP reserves its authority under M.G.L. c. 21E, the MCP, CERCLA, the National Contingency Plan (NCP), and any other applicable law or regulation to require further response actions including, without limitation, additional investigation, remedial measures, and the implementation of LUCs. MassDEP will review relevant information as it becomes available, including, without limitation, new regulatory requirements or changes in environmental conditions, to determine if additional investigative and/or remedial measures are necessary for the protection of public health, safety, welfare, or the environment.

Please incorporate this letter into the Administrative Record for the Training Areas. If you have any questions regarding this matter, please contact Leonard J. Pinaud, Chief, Federal Site Management, Bureau of Waste Site Cleanup in the MassDEP's Southeast Regional Office at (508) 946-2871.

Sincerely,

Paul W. Locke
Assistant Commissioner
MassDEP Bureau of Waste Site Cleanup

L/lp/kw

Ec: Joint Base Cape Cod Cleanup Team
Upper Cape Boards of Selectmen
Upper Cape Boards of Health

Gary Moran, Deputy Commissioner
Millie Garcia-Serrano, Regional Director
Gerard Martin, Deputy Regional Director, BWSC
Leonard J. Pinaud, Chief, Federal Site Management
Andrew Fowler, Regional Counsel
MassDEP Southeast Region

APPENDIX B
GLOSSARY OF TERMS AND ACRONYMS

AFCEC	U.S. Air Force Civil Engineer Center
AO	Administrative Order
Cal	caliber
DD	Decision Document
EPA	United States Environmental Protection Agency
HA	Health Advisory; EPA guidelines that represent the concentration of a chemical in drinking water that, given a lifetime of exposure, is not expected to cause adverse, non-cancerous, effects.
IAGWSP	Impact Area Groundwater Study Program
JBCC	Joint Base Cape Cod
JBCCCT	Joint Base Cape Cod Cleanup Team
MassDEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level (Federally-promulgated)
MCP	Massachusetts Contingency Plan
mg/Kg	Milligrams per Kilogram
MMRCT	Massachusetts Military Reservation Cleanup Team
MMR	Massachusetts Military Reservation
OMMP	Operations, Maintenance and Monitoring Plan
perchlorate	A water-soluble salt used as an oxidizer
RDX	hexahydro-1,3,5-trinitro-1,3,5-triazine
SDWA	Safe Drinking Water Act
SVOC	semi-volatile organic compound
UXO	Unexploded Ordnance
VOC	volatile organic compound

APPENDIX C
INDEX OF KEY SUPPORTING DOCUMENTS

Aerial Photographic Site Analysis, Massachusetts Military Reservation, 2/3/1994

Draft Range Use History Report for the Camp Edwards Impact Area Groundwater Quality Study, 7/16/1997

Draft Completion of Work Report for the Camp Edwards Impact Area Groundwater Quality Study, 7/1/1998

Ordnance and Explosives Archives Search Report: Findings, Conclusions and Recommendations for the Massachusetts Military Reservation, 3/1/1999

Final Workplan for Phase IIa Activities, 7/21/1999

Final Workplan for Phase IIb Activities, 1/1/2000

Final Workplan Supplement for Phase IIb Activities, 7/1/2000

Final IAGWSP Technical Team Memorandum 99-01 KD/U Range Investigation Report, 7/1/2000

Final Training Areas Work Plan, 2/8/2002

Final Supplemental Phase IIb Work Plan, 4/1/2002

Revised Ordnance and Explosives Archives Search Report, 8/1/2002

Final Letter Report Munitions Survey Project Phase 2 BA-1 Training Area Investigation, 9/2002

AIRMAG Technology Evaluation and Completion Investigation Report, 11/22/2002

Draft Final Technical Team Memorandum 02-6 Phase IIb Report, 3/31/2003

Munitions Survey Program, Phase 1 Report, 5/2003

Final Revised Training Areas Field Sampling Plan, 7/30/2004

Draft Training Areas Data Summary Report, 2/14/2005

Letter from EPA to Mr. Kent Gonser and Mr. Jonathan Davis on "Final Historical Records Review and Site Inspection Report, Army National Guard Training Site, Camp Edwards, Massachusetts Military Reservation, Massachusetts Military Response Program" dated June 2010, 7/27/2010

Final Gun and Mortar Positions Investigation Report, 10/1/2011

Final Small Arms Ranges Investigation Report, 1/1/2014

Final Five-Year Review 2006-2011, 3/1/2014

Training Areas MEC Investigation, Joint Base Cape Cod IBC and KD Ranges, 1/1/2016

Final Training Areas Investigation Report, 4/2/2018

Final Training Areas Remedy Selection Plan, 4/5/2018

APPENDIX D

FINAL PROJECT NOTE
1949 ENGINEER TRAINING SITE POST-DD CONFIRMATORY GEOPHYSICAL PROGRAM

FINAL PROJECT NOTE

Impact Area Groundwater Study Program
1949 Engineer Training Site Post-DD Confirmatory Geophysical Program
Camp Edwards, MA

Subject: 1949 Engineer Training Site Post-DD Confirmatory Geophysical Investigation

Date: 7 June 2018

1.0 PURPOSE

The purpose of this project note is to document regulatory agency concurrence with the proposed scope of confirmatory intrusive geophysical investigations at the 1949 Engineer Training Site (ETS), as required under the Training Areas Operable Unit Decision Document (June 2018). Regulatory agency concurrence with this project note is provided in Section 4.0.

2.0 BACKGROUND

Although not conclusive, available records suggest that the ETS was located in the area north of Gibbs Road within Training Area C-14 (Figure 1).

A 1949 Joint Base Cape Cod range use map suggested that, among other training devices, claymore mines were used at a possible ETS located north of Gibbs Road in the vicinity of Training Area C-14. Similar training activities were reported in Training Area C-16, though no reference to it as an ETS has been identified. Engineer training activities likely also included field fortifications, rope tying and rigging, an engineer equipment site, and a dummy mine warfare site.

Due to limited access and available information on where engineer training activities actually took place in the northern training areas, an aerial reconnaissance inspection was conducted jointly by the National Guard Bureau and regulatory agencies over Training Areas C-14, C-15, and C-16. Several small concrete structures were noted in Training Area C-16 that might have been associated with past engineer training, but little else was observed.

In the absence of conclusive discoveries, additional reconnaissance inspections were conducted into Training Area C-14. During an October 2001 inspection, the remnants of a structure, that was physically consistent with that described as the ETS, was discovered north of Demolition Area 2. The structure appeared to be a mock set of bridge abutments that presumably was used for bridge building training exercises. With the exception of numerous wooden beams (in various stages of decay) and small caliber blank shell casings, little else associated with the training activities was found there. There was no evidence of use of high explosives or bulk propellants. The ETS was again observed near the center of Training Area C-14 during 2017 site inspection.

3.0 SCOPE OF WORK

The results of site reconnaissance inspections indicated the absence of evidence of high explosives or bulk propellants associated with training activities at the ETS. However, for verification, a hand-held magnetometer (ferrous) survey will be conducted at the ETS to check for

the presence of munitions, as recommended in the Final JBCC Training Areas Investigation Report (April 2018).

Munitions of Explosive Concern (MEC) and Munitions Debris (MD) removal (clearance to detection depth) will performed over the entire extent of an approximately ¼ acre grid shown on the attached Figures 2 and 3 where remnants of a structure were observed during the 2001 and 2017 site inspections. Unexploded Ordnance technicians will use hand-held magnetometers to identify and remove any MEC and MD items detected. The use of hand-held instruments will allow for the identification and removal of MEC and MD without the need to clear-cut the existing vegetation; although some vegetation may need to be cut when vegetation impacts their use. If MEC items are uncovered the need for follow-up soil sampling will be determined in consultation with the EPA and MassDEP. All MEC and MD recovered will be managed in accordance with established protocols. The associated findings will be reported in a project note at the conclusion of the investigation.

4.0 CONCURRENCE

Concurrence with the recommendations presented in this project note is represented by the signatures below:

6/7/18

EPA Representative

MassDEP Representative

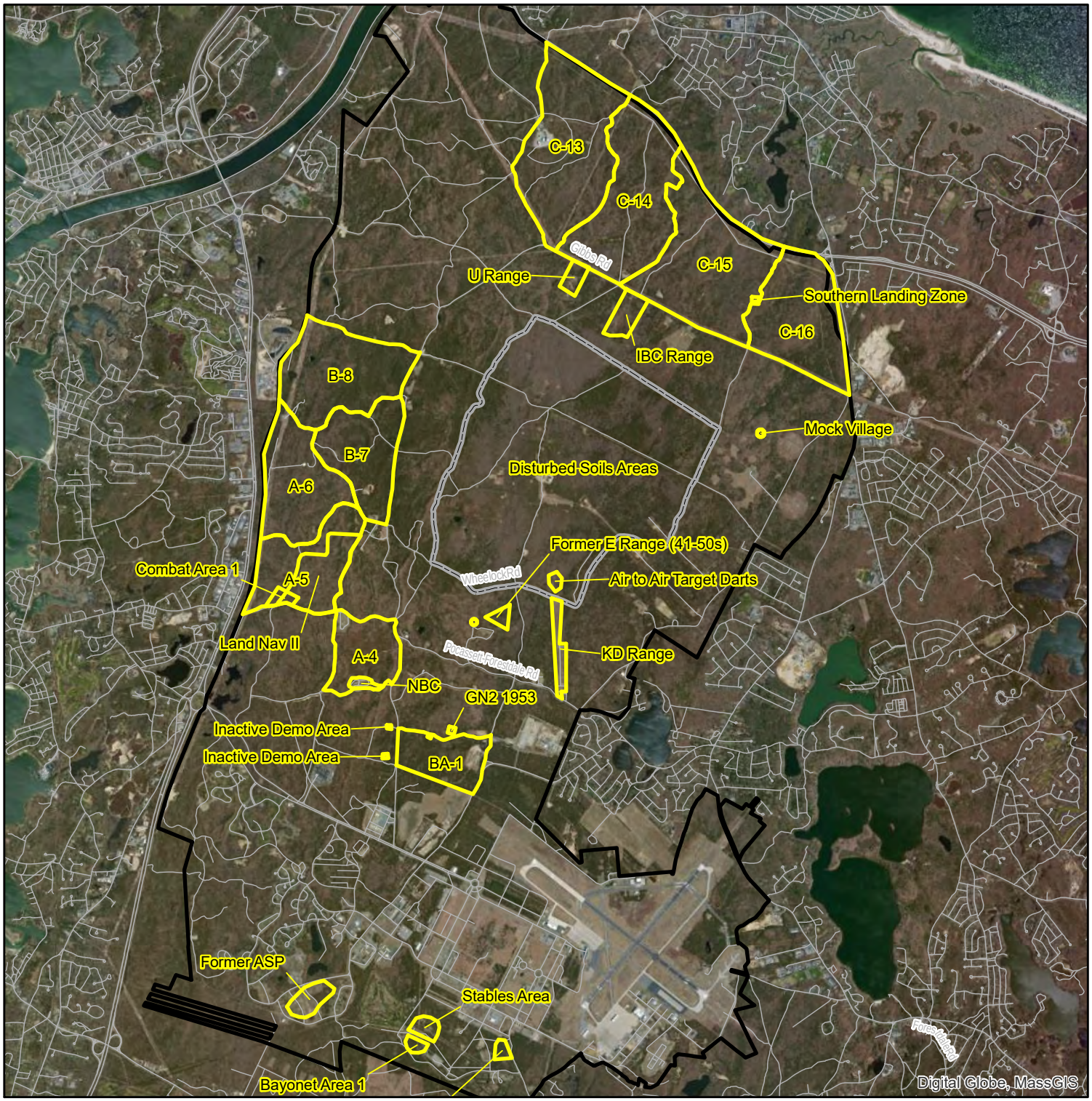
6/6/2018

IAGWSP Representative

Figure 1 Location of Training Areas

Figure 2 Training Area C-14 ETS Investigation Area

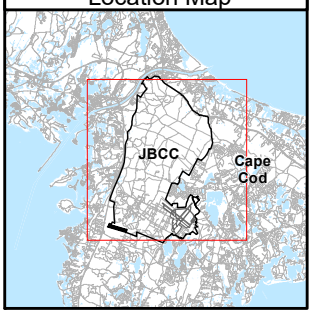
Figure 3 Training Area C-14 ETS Investigation Area (Zoomed In)



Legend

- JBCC Boundary
- Impact Area Boundary
- Training Areas

Location Map



0 3,000 6,000 Feet

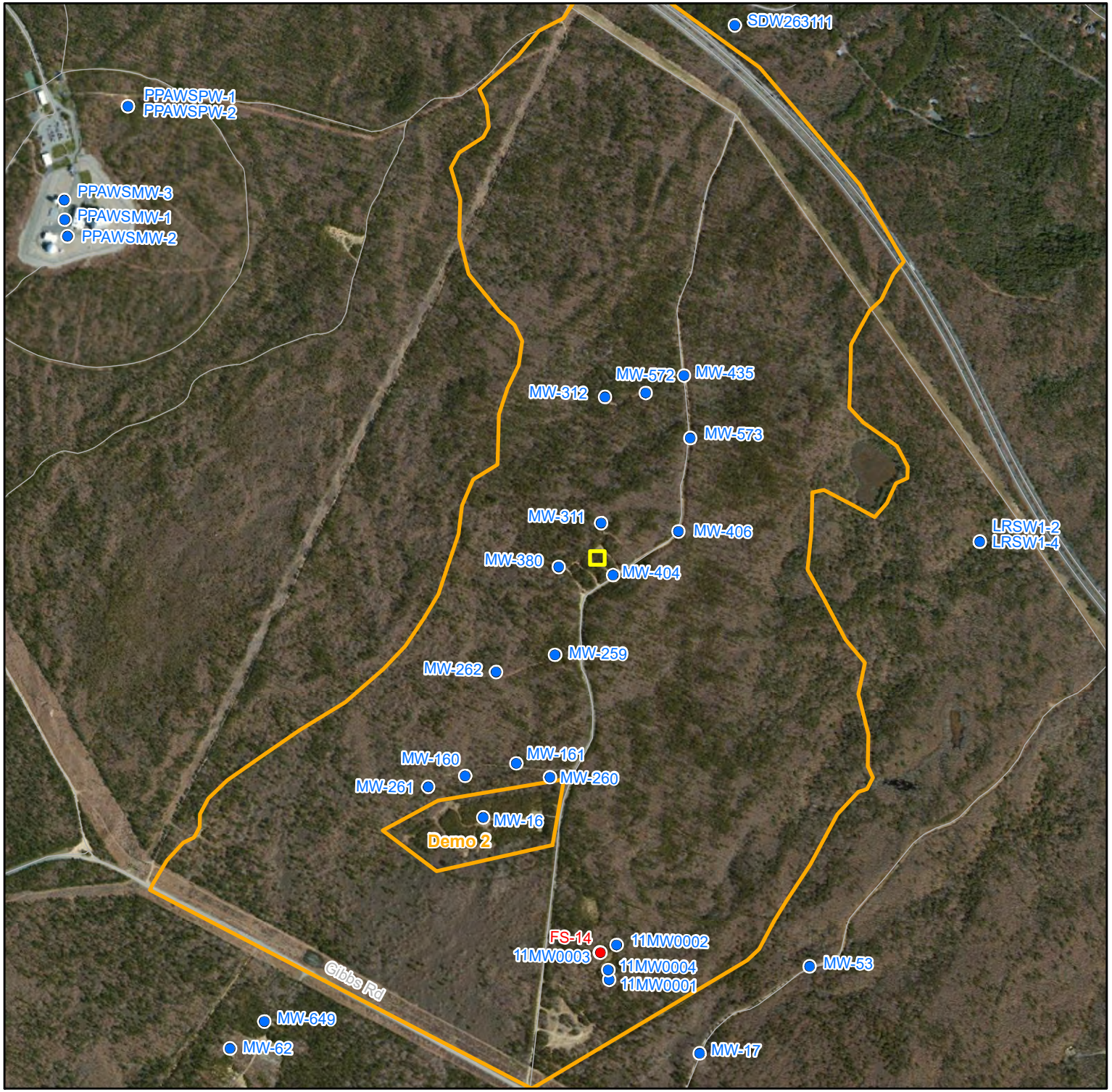
US Army Corps of Engineers
New England District

Location of Training Areas

FIGURE 1

M:\MMR\2018\TrainingAreas\PostDD_Rpt\Figures\Fig1_032118.pdf
M:\MMR\2018\TrainingAreas\PostDD_Rpt\MXDs\Fig1_031218.mxd
March 21, 2018 DWN: MTW CHKD: DRS

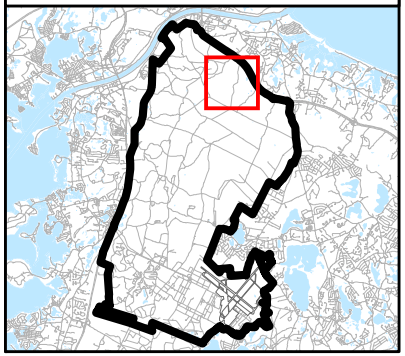
Impact Area Groundwater Study Program



LEGEND

- Monitoring Well
- Fuel Spill FS-14
- ETS Investigation Area
- Training Area

LOCATION MAP



NOTES & SOURCES

Basemap data from US Geological Survey
7 1/2 minute Topographic Maps
Source: MassGIS

TITLE

Training Area C-14 ETS Investigation Area

0 1,000 Feet

N

US Army Corps of Engineers
New England District

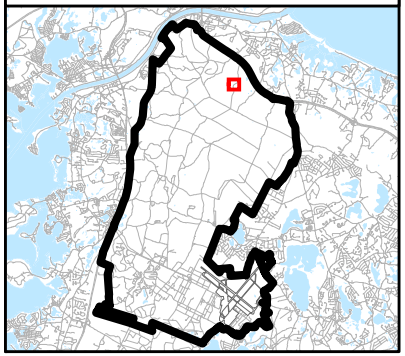
FIGURE 2

M:\MMR\2018\TrainingAreas\PostDD_Rpt\Figures\Fig2_032118.pdf
M:\MMR\2018\TrainingAreas\PostDD_Rpt\MXDs\Fig2_031218.mxd
March 21, 2018 DWN: MTW CHKD: DRS

LEGEND

- Monitoring Well
- ETS Investigation Area

LOCATION MAP



NOTES & SOURCES

Basemap data from US Geological Survey
7 1/2 minute Topographic Maps
Source: MassGIS

TITLE

Training Area C-14 ETS Investigation Area
(Zoomed In)

0 200
Feet

N

US Army Corps of Engineers
New England District

FIGURE
3

M:\MMR\2018\TrainingAreas\PostDD_Rpt\Figures\Fig3_052518.pdf
M:\MMR\2018\TrainingAreas\PostDD_Rpt\MXDs\Fig3_052518.mxd
May 25, 2018 DWN: MTW CHKD: DRS

APPENDIX E

FINAL PROJECT NOTE
FORMER E RANGE POST-DD CONFIRMATORY SAMPLING PROGRAM

FINAL PROJECT NOTE

Impact Area Groundwater Study Program
Former E Range Post-DD Confirmatory Sampling Program
Camp Edwards, MA

Subject: Former E Range Post-DD Confirmatory Geophysical and Soil Investigation

Date: 12 June 2018

1.0 PURPOSE

The purpose of this project note is to document regulatory agency concurrence with the proposed scope of confirmatory intrusive geophysical and soil investigations at the Former E Range, as required under the Training Areas Operable Unit Decision Document (June 2018). Regulatory agency concurrence with this project note is provided in Section 4.0.

2.0 BACKGROUND

This original E Range was constructed in 1941, and at that time, access to the range was gained via a road extending north from Pocassett-Forestdale Road (Figure 1). The range was designed and used as an anti-tank training range until the late 1950s or early 1960s at which time the "E Range" designation was given to a small arms range located at Current G Range on Pocassett-Forestdale Road. Records indicate that 2.36-inch and 3.5-inch rockets, 37mm and 75mm practice artillery rounds, and .50 caliber ball ammunition were fired at the Former E Range. No information on training activities at the Former E Range after the early 1960s has been discovered.

According to historical records, Former E Range was comprised of a single firing point and a 12-acre, triangular-shaped target area located 1,000 feet to the east. The purpose of the range was to develop proficiency in firing artillery at tanks approaching from various directions, over rolling terrain, at varying speeds. Records suggest that the predominant weaponry used in training included 37mm and 75mm artillery, as well as .50 caliber machine guns. Weapons were aimed at cloth and wood frame targets mounted on sleds that moved within the target area by a system of cables. The cable system was operated from a bomb-proof shelter equipped with a three-drum hauler from which the operator moved the targets in random directions and distances to simulate moving tanks or trucks. The targets appear to have traversed the target area along lines radiating outward from the western apex of the target area.

During the July 6, 2000 site investigation of the Former E Range, both the target area and presumed firing point were inspected. A limited number of ordnance rounds and related debris were discovered in the heavily overgrown target area. Little written information is available on the exact whereabouts of the firing point. A historical range map circa 1941 places the firing point approximately 1,000 yards south at the location of Gun Position 6 on Mitton Road. Aerial photographic evidence of its location is also inconclusive; however, a clearing visible 1,000 feet west of the target area could also be an historical range configuration. Inspection of this presumed former firing point area revealed that significant revegetation has also occurred there since the range was last used. A ¼-acre leveled terrace, slightly higher than the surrounding hummocky terrain and backed by a 3- to 4-foot high earthen berm, was discovered at the western end of the

access road leading from the target area. Based on evidence from a 1943 aerial photograph and the configuration of the terrace relative to the target area, it was interpreted to be a former firing point.

A heavily-fortified concrete bunker was discovered further to the west of this presumed firing point area. Records describe a similar structure as the moving target operator's dugout. A steel plate fastened to the side of this structure designated it as an ammunition storage bunker. Thus, it may have been used to store rocket and artillery rounds at some time in the past for use at the range. Several rounds of 5.56mm (M16) ammunition were observed nearby the bunker. It was unclear if these 5.56mm, and other small caliber ammunition discovered in the vicinity, were used at the range.

A second field inspection of Former E Range was conducted in November 2001 after aeromagnetic survey data of the target area became available. This field inspection was conducted, with the aid of a 1958 aerial photograph, in areas exhibiting magnetic anomalies. Most of the anomalies were determined to be attributed to steel cable leftover from the abandonment of the moving target mechanism.

Additional field reconnaissance work was conducted in 2017. During these recons, several historical range features were identified. These include a concrete bunker at the west end of the range which is suspected to have housed a target cable retrieval apparatus and personnel when the range was used as an anti-tank range. A three-bay concrete storage bunker was seen to the north which contained some remnants of wooded targets. Remnants of the steel target cables were observed on the east end of the range in the former target area. A small steel bunker was also noted in the target area as was a range limit marker and warning sign on the east end. A few pieces of munitions debris from 3.5-inch rockets were observed along the north hillside of the range along with target frames and several metal drums with bullet holes.

Later in 2017, vegetation clearance and Munitions and Explosives of Concern (MEC) surface clearance was performed in four approximately 6-foot by 1,000-foot transects totaling approximately 0.5 acres and in continuous firebreaks totaling approximately 1.2 acres on the Former E Range (Figure 2). Vegetation was cut flush to the ground surface and MEC surface clearance was performed by Unexploded Ordnance (UXO) technicians using hand-held magnetometers (ferrous) over the entire extent of each transect and firebreak. All MEC and munitions debris (MD) identified were removed. A total of two MEC items, both 3.5-inch HE M20 rockets, were uncovered in one of the transects (Figure 2). All MEC and MD was managed for disposal in accordance with previously established protocols. The two 3.5-inch rockets were moved to the Central Impact Area MEC staging area awaiting destruction in the Buried Explosion Module.

3.0 SCOPE OF WORK

As recommended in the Final JBCC Training Areas Investigation Report (April 2018), further investigation will be performed to determine if explosives contamination is present in the soils and if additional UXO exist on the range. Vegetation clearance and UXO surface clearance will be performed in an approximately 20-acre area (Former E Study Area) shown on Figure 2. Vegetation clearance will generally be limited to immature pitch pine, scrub oaks and low shrubs. Mature trees will be left in place to the extent possible. Surface clearance will performed by UXO

technicians using hand-held magnetometers (ferrous) over the entire extent of the 20-acre area. All MEC and MD identified will removed and managed for disposal in accordance with previously established protocols.

On completion of vegetation and surface clearance six multi-increment soil samples will be collected for explosives and perchlorate analyses from select areas. At this time, it is anticipated that the multi-increment sampling will consist of 100-foot by 100-foot grids with 100 increments collected from 0 to 3 inches in each grid. Initially, replicates will not be collected in the six sample grids. The final sampling approach, including grid locations and sizes, and the number of increments will be proposed based on historic range information and surface clearance findings in consultation with the EPA and MassDEP, and will be documented in an addendum to this project note. If results received from the initial six grids are near or below risk screening values, follow-up sampling will consist of replicate samples (three samples total) in those grids. (Note: this approach was reviewed with MassDEP Office of Research and Standards and they concluded that it would be acceptable for replicates to be collected several weeks after the initial incremental sampling provided that: 1) the same sampling technique is used for both initial and replicate samples; 2) if possible, the same sampling team collects the replicates; and, 3) the sample grids are marked in the field with stakes and/or GPS coordinates to make sure the replicates are collected in the same grid location as the initial samples.) If contaminants are detected at levels above risk screening values or if further investigation is warranted, new multi-increment sample grids will be proposed in consultation with EPA and MassDEP and will be documented in a project note addendum.

Information from the surface clearance and soil sampling will then be used to determine areas and an approach for a follow-up geophysical investigation and munitions removal. The scope of follow-up geophysical investigation activities will be proposed in consultation with EPA and MassDEP and will be documented in a project note addendum.

All MEC and MD recovered at Former E Range will be managed in accordance with established protocols. The associated findings will be provided in a project note at the conclusion of the investigation.

4.0 CONCURRENCE

Concurrence with the recommendations presented in this project note is represented by the signatures below:

6/21/2018
EPA Representative

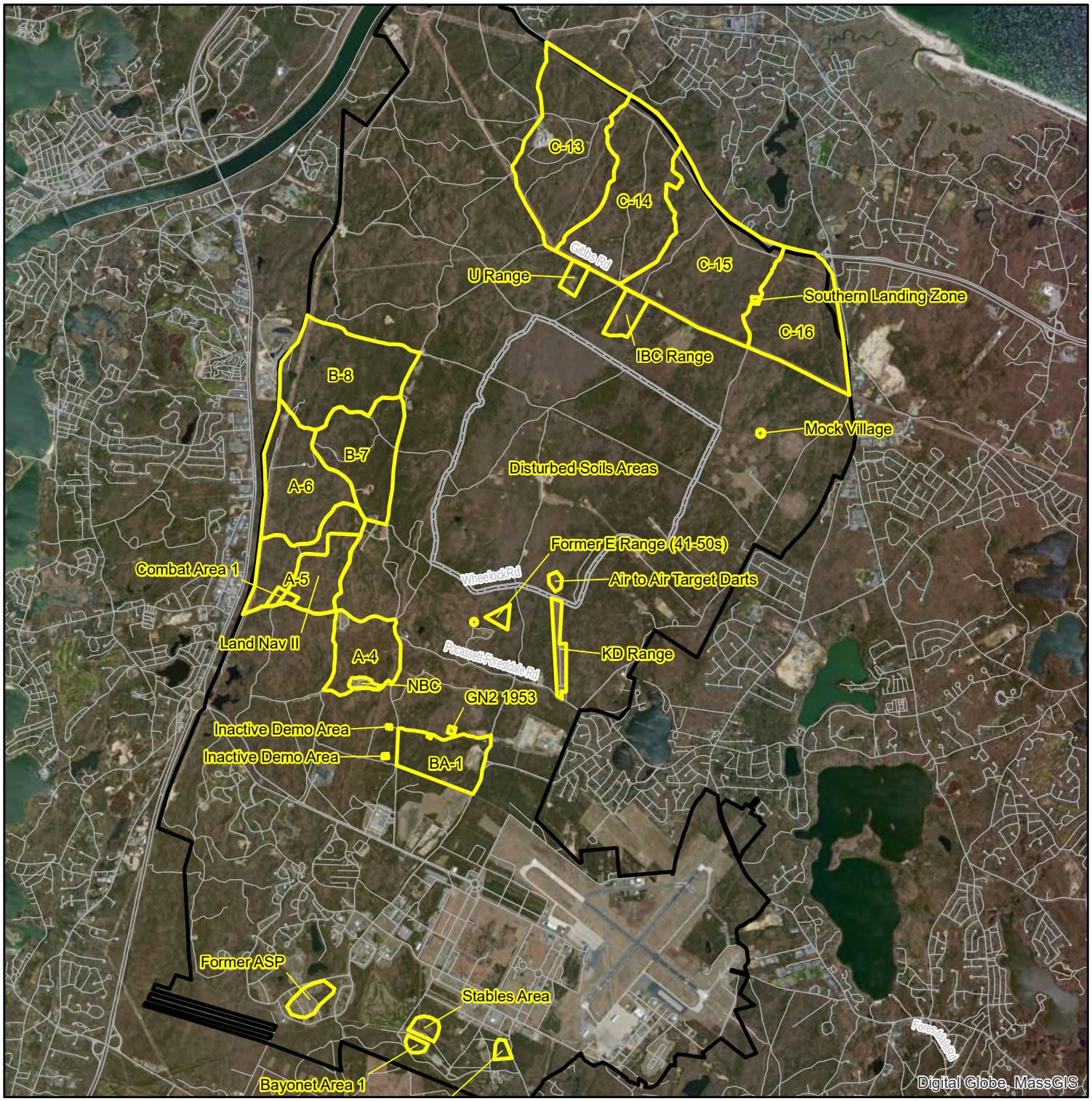
6/14/18
MassDEP Representative

6/14/2018
IAGWSP Representative

IAGWSP Representative

Figure 1 Location of Training Areas

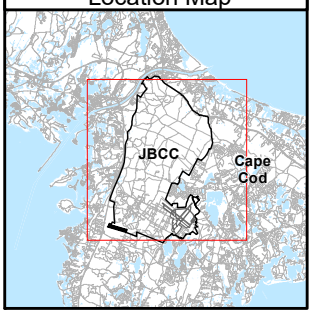
Figure 2 Former E Range



Legend

- JBCC Boundary
- Impact Area Boundary
- Training Areas

Location Map



0 3,000 6,000 Feet

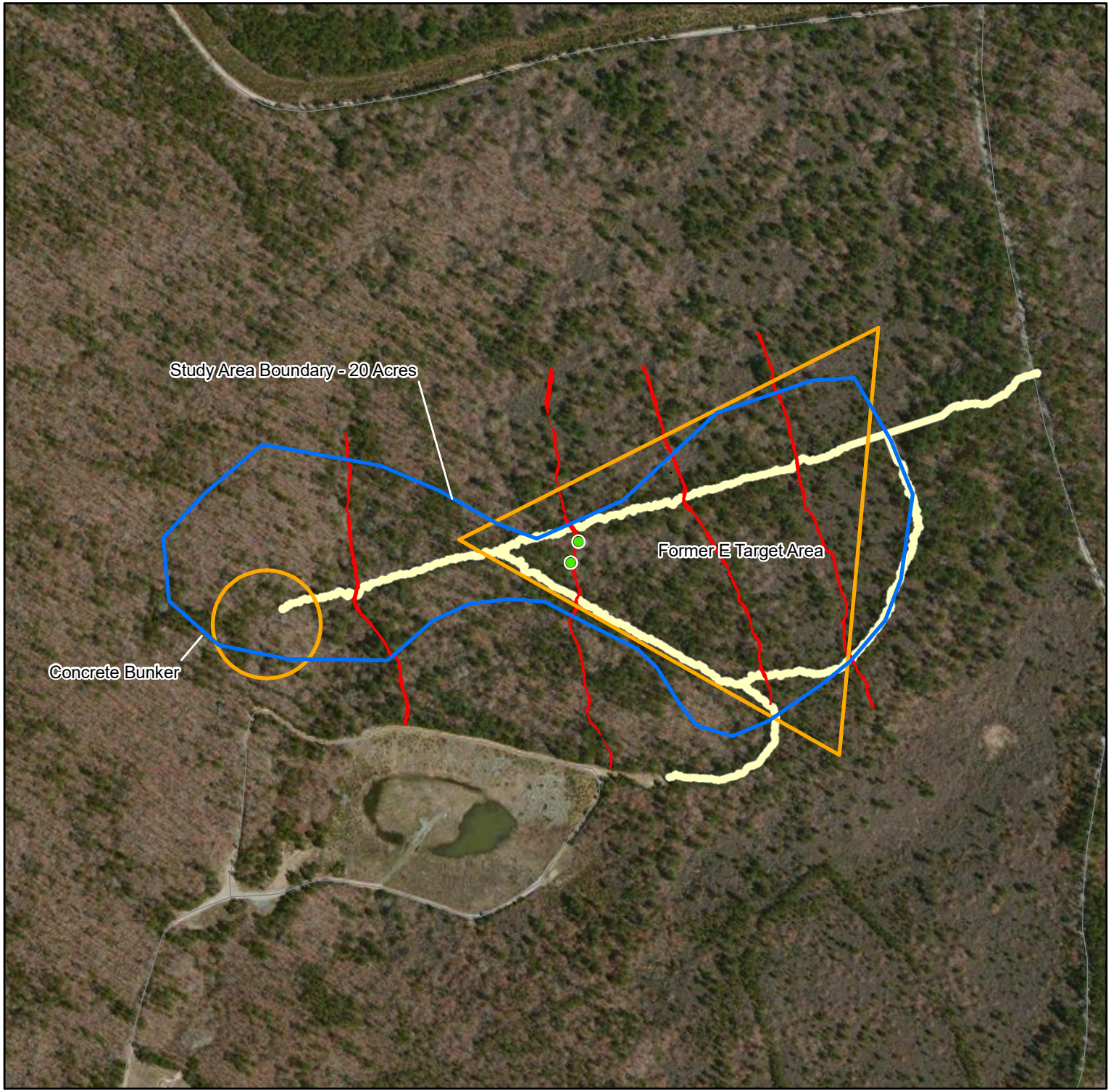
US Army Corps of Engineers
New England District

Location of Training Areas

FIGURE 1

M:\MMR\2018\TrainingAreas\PostDD_Rpt\Figures\Fig1_032118.pdf
M:\MMR\2018\TrainingAreas\PostDD_Rpt\MXDs\Fig1_031218.mxd
March 21, 2018 DWN: MTW CHKD: DRS

Impact Area Groundwater Study Program

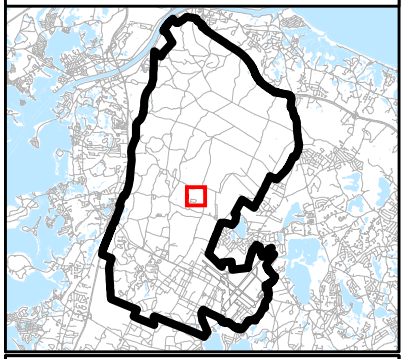


Impact Area
Groundwater Study Program

LEGEND

- 3.5 Inch Rocket HE
- Training Area
- Former E Study Area
- Former E Range Firebreaks (2.1 acres)
- Mag and Dig Path

LOCATION MAP



NOTES & SOURCES

TITLE

Former E Range

0 350 Feet

N

US Army Corps of Engineers
New England District

FIGURE 2

M:\MMR\2017\SmallArmsRanges\Figures\FormerE_0427187.pdf
M:\MMR\2017\SmallArmsRanges\MXDs\FormerE_042718.mxd
April 27, 2018 DWN: MTW CHKD: DRS

APPENDIX F

FINAL PROJECT NOTE
KD RANGE POST-DD CONFIRMATORY GEOPHYSICAL PROGRAM

FINAL PROJECT NOTE

Impact Area Groundwater Study Program
KD Range Post-DD Confirmatory Geophysical Program
Camp Edwards, MA

Subject: KD Range Post-DD Confirmatory Geophysical and Soil Investigation

Date: 7 June 2018

1.0 PURPOSE

The purpose of this project note is to document regulatory agency concurrence with the proposed scope of confirmatory intrusive geophysical and soil investigations at the KD Range, as required under the Training Areas Operable Unit Decision Document (June 2018). Regulatory agency concurrence with this project note is provided in Section 4.0.

2.0 BACKGROUND

The KD Range is an active operational range consisting of approximately 98 acres and located on Pocassett-Forestdale Road (Figure 1), southeast of the Central Impact Area. It received its KD (known distance) designation in the mid-to late-1980s and was used for rifle, grenade launcher, and missile training exercises. The KD Range consists of two separate parallel ranges: KD Range (East) and KD Range (West). The west side of KD Range is cleared of brush and is maintained by Range Control as an open field. The area is flat and is used for various training activities including unmanned aircraft testing.

Historically, KD Range (West) was used for a variety of types of ordnance, including Dragon and tube-launched, optically-tracked, wire-guided (TOW) missiles and 90mm recoilless rifle high explosive anti-tank (HEAT) rounds. A 600-meter known distance rifle range is situated on KD Range (East). The range consists of six mounded firing lines, each having 20 firing points positioned at various distances from a raised target line.

Historic aerial photographs suggest that the KD Range was constructed during 1966. Subsequent records indicate the range was in use by the mid-1970s. At that time, the range was referred to as CTR-1, or the CTR-1 Aerial Gunnery Range. The “KD” designation replaced CTR-1 in the mid-to late 1980s. Training exercises at the KD Range included small arms marksmanship, grenade launching, and rocket-type munitions training. Currently, the range is not used for live fire training exercises.

The KD Range (West) includes a 25-meter rifle range with 55 firing points, two firing points for Dragon missiles, 90mm recoilless rifle training, and one firing point for TOW missiles. A portion of the range has also been used for helicopter gunship, machine gun, and grenade launcher training. Information from an ASR interviewee indicates live tank gunnery was also performed in this area.

Camp Edwards Range Safety Regulations indicated that the following anti-tank munitions were authorized for use at the KD Range:

- M371 HEAT (90mm cartridge, recoilless rifle), M371E1 2/89 to 2/90
- M183 PD (14.5mm, M31 artillery trainer) 2/89
- 40mm practice grenade 2/89
- Dragon, M222 HEAT, M223 practice inert warhead (Anti-Tank) 2/90 to 2/94
- 90mm recoilless rifle 2/90
- 90mm recoilless rifle HEAT and practice recoilless rifle 9/91 to 3/94
- M31 artillery trainer with M183 (smoke) 9/91 to 3/94
- TOW, inert warhead (Anti-Tank) 9/91 to 3/94

Rocket firing points for the KD Range were located at two 20-foot by 20-foot gravel pads located near the parking lot. Other former firing points located further down range are also identified. These other firing points were used for TOW missiles, the 90mm recoilless rifle and Dragon missiles. Based on the amount of re-vegetation, these three downrange firing points have not been used over recent history.

An armored personnel carrier (APC) target is located approximately midway downrange of the KD Range cleared area. Based on damage to the target and the amount of ordnance debris in the immediate vicinity, it is presumed to be the primary range target. Visible debris from fired rockets and missiles includes portions of housings, fins, and electronic circuitry.

Before being moved in 2017, a second APC target was located at the end of the range on the north side of Wheelock Road. This presumed target shows less impact damage and little munitions debris (MD) was found at its former location. A junk forklift truck is also located on the KD Range, but does not appear to have been targeted by rocket and missile fire based on its condition and the absence of MD surrounding it.

During a June 2017 inspection, dirt mounds and a grassy area were observed to the north of Wheelock Road at the end of the KD Range. The general area, approximately 5 acres, was subsequently cleared of vegetation, then the entire extent of the area was surface cleared by UXO technicians using hand-held magnetometers (ferrous) and found to be free of munitions. Large subsurface anomalies were also investigated in the area and found to be a refrigerator and car parts; no munitions were found. The APC that was located on the north side of Chadwick Road was moved to the south side of the road. No munitions were found in, around or under the APC.

2.1 Source Area Investigations

1999 Soil Sampling

A field investigation of the KD Range began in 1999. Composite and discrete soil samples were collected at 10 firing point grid locations. Samples were collected from these locations at both the front and back of the firing points. Sample grid locations were located at two rocket-firing points and at the former 90mm, former Dragon and former TOW missile firing points. Composite and discrete samples were also collected from 10 target grids. Sample grid locations were positioned around the primary target, around the secondary target furthest down-range and within a cleared area presumed to be a former TOW target.

Both composite and discrete soil samples were collected from three depths (0 to 3 inches, 3 to 6 inches and 6 to 12 inches bgs) at 22-foot by 22-foot grids established around each location. The composite samples were submitted for a full suite of analyses including explosives, VOCs, SVOCs, pesticides/PCBs, herbicides, TAL metals and miscellaneous parameters (ammonia, nitrate/nitrite, total phosphorous and TOC). All discrete samples were submitted for explosives analysis; the discrete samples collected from the firing points were also submitted for SVOC analysis.

Low level estimated concentrations of VOCs (acetone), SVOCs (mostly phthalate compounds) and/or herbicides (chloramben and 2,4,5-T) were reported in one or more sample. The pesticide, dieldrin, was detected in several samples at concentrations ranging from 1.4 to 1,800 µg/Kg with the highest concentrations reported in samples collected from 0 to 3 inches bgs. Nitroglycerin was detected in 21 samples collected from the current rocket and former TOW firing points at levels ranging from 2,900 µg/Kg to 130,000 µg/Kg. The highest detections were in samples collected from 0 to 3 inches. RDX, HMX and TNT were also detected in the samples collected from the primary target area with the highest detections in the sample collected from 0 to 3 inches. RDX was reported at 43,000 µg/Kg, HMX at 10,000 µg/Kg and TNT at 2,100 µg/Kg. Several TAL metals were detected in all samples. The maximum concentrations of copper and lead were in samples collected from the former suspected target area; copper was detected at 1,820 mg/Kg and lead at 595 mg/Kg in a sample collected from 0 to 3 inches.

2000 Rapid Response Action

A Rapid Response Action (RRA) was completed on KD Range in 2000 to reduce the explosives, pesticide and metals contaminant concentrations in soil. If the 1999 soil data exceeded the RRA soil cleanup standard, additional grids were established surrounding the original grid to delineate the extent of contamination. Samples were collected at various depths from May through August 2000 and submitted for VOCs, explosives, pesticides and metals analyses. Nitroglycerin, dieldrin and lead were detected above the RRA soil cleanup in a few of the expanded locations and additional grids beyond these grids were sampled. Soil grid locations with elevated concentrations of nitroglycerin, RDX, HMX, TNT, dieldrin, and/or lead were excavated in September and October 2000 from the rocket firing positions and the two target areas. The excavations were as deep as two feet below the ground surface.

2015 Soil Investigation

Additional sampling was conducted in winter 2015 to confirm previous investigation results at KD Range (West). A 100-point multiple increment sample and two replicates were collected from a grid established in the primary target area. The grid encompassed an area of approximately 100 feet by 100 feet. Samples were analyzed for explosives and perchlorate. In addition, a 100-point multiple increment sample and two replicates were collected from a grid established at the former target line used for small arms firing. This grid was approximately 150 feet long and 60 feet wide. Samples were analyzed for selected metals (antimony, copper, lead and tungsten).

The only explosive detected in the samples from the primary target area was HMX which was detected at a maximum concentration of 219 µg/Kg. Perchlorate was detected in all three samples at concentrations of <1.0 µg/Kg. The select metals were detected at varying concentrations in all samples collected from the former small arms target line area. Antimony concentrations were <1.0

µg/Kg in all samples. The maximum reported copper concentration was 9.1 mg/Kg. The maximum lead concentration was 45.0 mg/Kg and the maximum tungsten concentration was 5.3 mg/Kg.

Munitions Source Assessment

The JBCC EDMS database was reviewed to identify items that were found at KD Range. Three potential munitions and explosives of concern (MEC) items were found in three separate locations. One 40mm projectile of unknown filler type and one 4.2-ich HE projectile were found in 2000.One HE dragon missile rocket motor and two small arms, blank M200 5.56mm cartridges, were found in 2008.. The locations of these items are included on Figure 2.

2015 Munitions Survey

MEC removal was performed within a meandering path zigzagging across the KD Range (Figure 3). The entire extent of the meandering path was investigated to detection depth by unexploded ordnance (UXO) personnel using hand-held magnetometers and all-metals detectors.

No MEC were found during the investigation. Munitions debris recovered were items expected to be found in association with this range including:

- M73 light anti-tank weapons system (LAW) sub-caliber (expended)
- M781 40mm practice grenade (expended)

Other MD included two expended 155mm low intensity training round (LITR) projectiles that were found at the northern end of the range. These items are likely a result of Impact Area over shoots or ricochet.

3.0 SCOPE OF WORK

As recommended in the Draft Final JBCC Training Areas Investigation Report (March 2018), remaining targets and associated MD will be removed from the KD range and confirmatory surface soil samples will be collected at the primary target. The locations of the items proposed for removal are shown on Figure 4.

Targets being removed include the APC in the middle of the range (the primary target), the APC that was originally located on the north side of Wheelock Road and moved to the south side of the road onto the KD range during the 2015 munitions survey, and the junk forklift truck. The APCs and the forklift truck will be brought to the Turpentine Road staging area. Prior to removal of the primary target APC and the junk forklift truck, UXO technicians will use hand-held magnetometers and all-metals detectors to identify and remove MD and/or MEC remaining in the vicinity. Technicians will also perform MEC and MD removal (to detection depth) using hand-held magnetometers and all-metal detectors at former locations of these items after they are removed. All MEC and MD recovered will be managed in accordance with established protocols.

In addition, soils sample will be collected from a 20-foot by 20-foot grid centered on the location of the primary target after it is removed and UXO clearance is performed. Three multi-increment 30-point samples (triplicates) will be collected from a depth of 0-3 inches. The samples will be analyzed for perchlorate (Method 6850) and explosives compounds (Method 8330B). The results will be reviewed with the regulatory agencies and the associated findings will be reported in a project note at the conclusion of the investigation.

4.0 CONCURRENCE

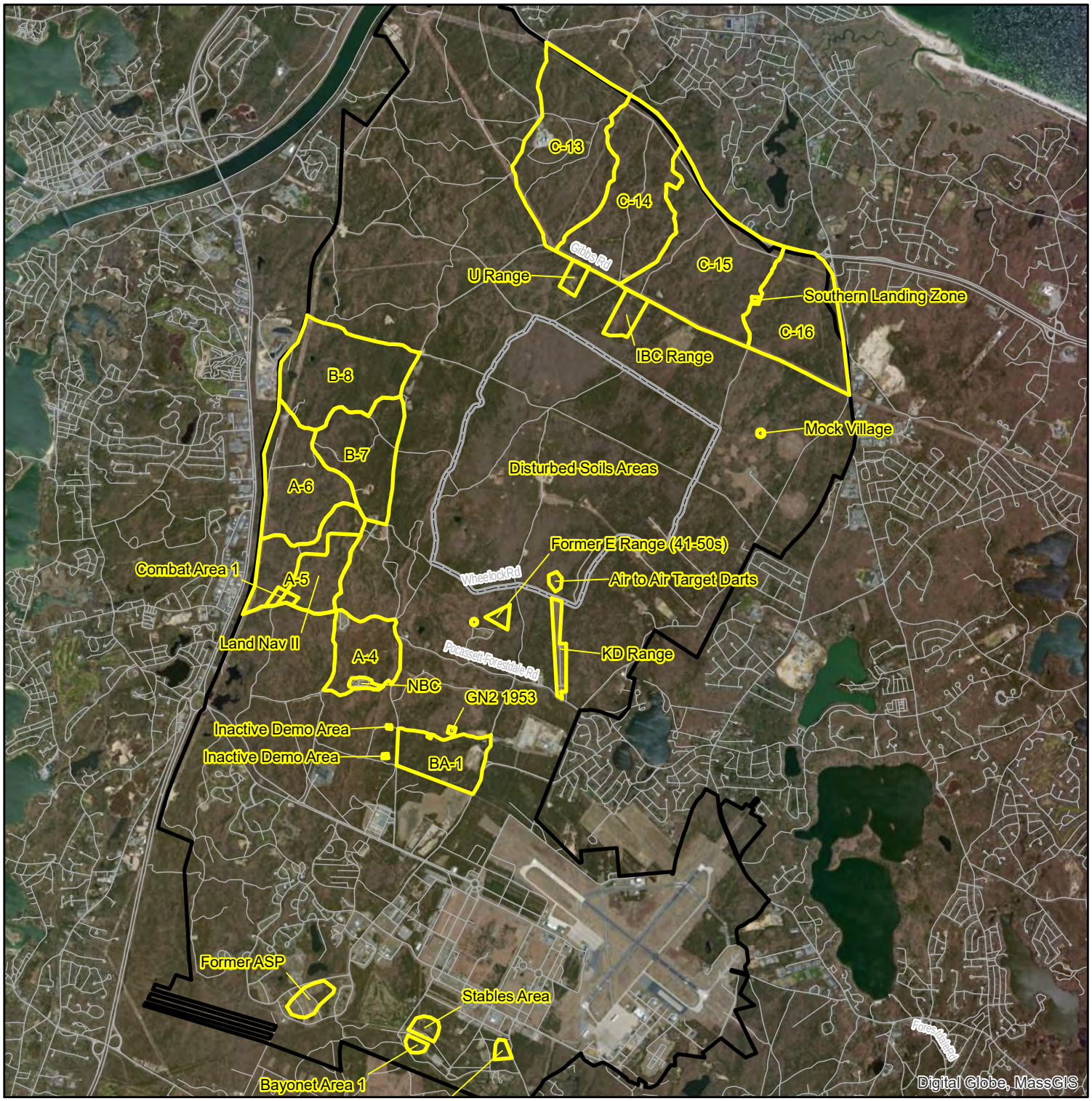
Concurrence with the recommendations presented in this project note is represented by the signatures below:

EPA Representative

MassDEP Representative

6/6/2018
IAGWSP Representative

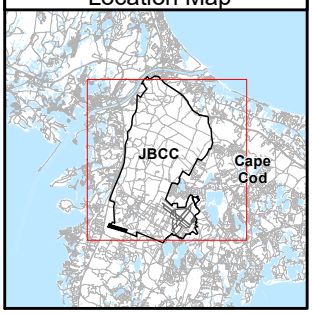
Figure 1 Location of Training Areas
Figure 2 KD Range – Items Previously Removed
Figure 3 KD Range – Meandering Path
Figure 4 KD Range – Items to be Removed



Legend

- JBCC Boundary
- Impact Area Boundary
- Training Areas

Location Map



0 3,000 6,000 Feet

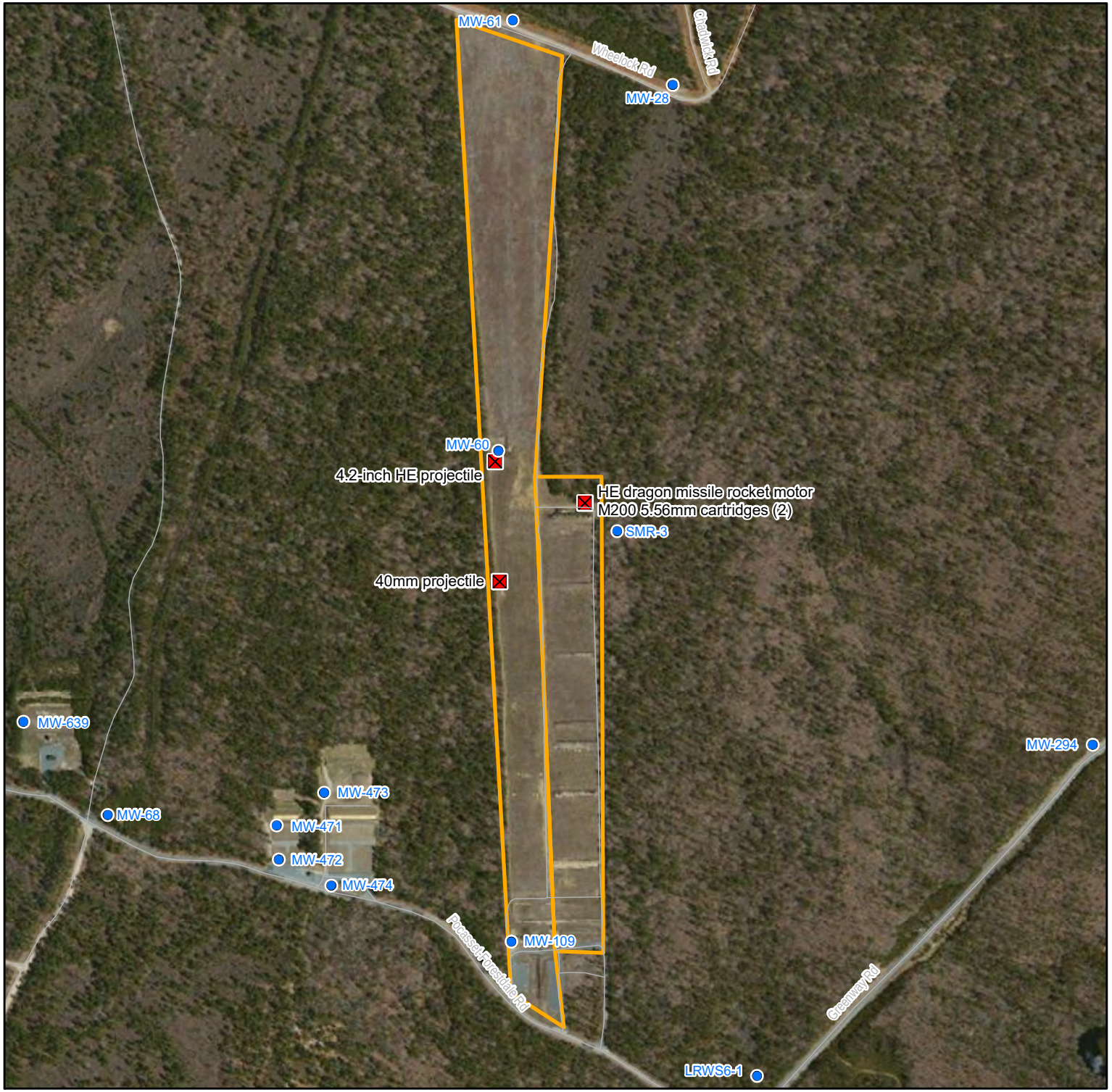
US Army Corps of Engineers
New England District

Location of Training Areas

FIGURE 1

M:\MMR\2018\TrainingAreas\PostDD_Rpt\Figures\Fig1_032118.pdf
M:\MMR\2018\TrainingAreas\PostDD_Rpt\MXDs\Fig1_031218.mxd
March 21, 2018 DWN: MTW CHKD: DRS

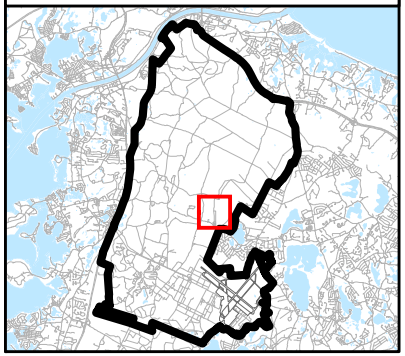
Impact Area Groundwater Study Program



LEGEND

- Monitoring Well
- Item Previously Removed
- Training Area

LOCATION MAP



NOTES & SOURCES

Basemap data from US Geological Survey
7 1/2 minute Topographic Maps
Source: MassGIS

TITLE

KD Range – Items Previously Removed

0 600 Feet

N

US Army Corps of Engineers
New England District

FIGURE 2

M:\MMR\2018\SmallArmsRanges\Figures\Fig2_KD_Range_053118.pdf
M:\MMR\2018\SmallArmsRanges\MXDs\Fig2_KD_Range_053118.mxd
May 31, 2018 DWN: MTW CHKD: DRS

KD Range
Joint Base Cape Cod, MA

EMDC, Baltimore District
US Army Corps of Engineers

Legend

Meandering Path

KD Range - Meandering Path

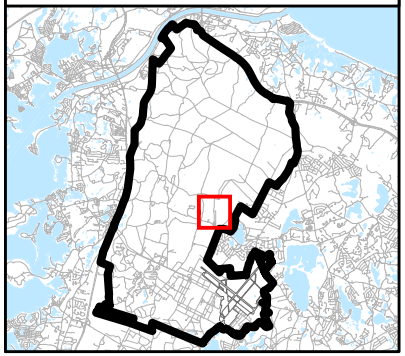
FIGURE 3

N

LEGEND

- Monitoring Well
- Training Area

LOCATION MAP



NOTES & SOURCES

Basemap data from US Geological Survey
7 1/2 minute Topographic Maps
Source: MassGIS

TITLE

KD Range – Items to be Removed

0 600 Feet

N

US Army Corps of Engineers
New England District

FIGURE 4

M:\MMR\2018\SmallArmsRanges\Figures\Fig4_KD_Range_053118.pdf
M:\MMR\2018\SmallArmsRanges\MXDs\Fig4_KD_Range_053118.mxd
May 31, 2018 DWN: MTW CHKD: DRS

APPENDIX G

FINAL PROJECT NOTE
TRAINING AREAS POST-DD PYROTECHNICS SOIL SAMPLING PROGRAM

PROJECT NOTE

Impact Area Groundwater Study Program
Training Areas Post-DD Confirmatory Pyrotechnics Soil Sampling Program
Camp Edwards, MA

Subject: Training Areas Post-DD Confirmatory Pyrotechnics Soil Investigation

Date: July 16, 2018

1.0 PURPOSE

The purpose of this project note is to document regulatory agency concurrence with the proposed scope of confirmatory soil sampling for pyrotechnic (including smokes and flares) filler constituents in the Training Areas at Joint Base Cape Cod (JBCC), as required under the Training Areas Operable Unit Decision Document (Draft June 2018). Soil samples will be collected in select areas where pyrotechnics are suspected of being used, specifically the Deep Bottom Pond Landing Zone and the Southern Landing Zone, to confirm the results of historic sampling and determine if further sampling is needed. Regulatory concurrence with this project note is provided in Section 4.0.

2.0 BACKGROUND

According the Final Training Areas Investigation Report (April 2018), during archive search investigations, several interviewees referenced the historic use of pyrotechnic smokes in the open areas of Training Areas A-4, A-5, C-13, C-14, C-15, Land Nav II, and Pine Hill. They did not provide specific information on the quantities or locations of smoke grenades used within each identified area.

Archival information indicates that pyrotechnic smoke was used in certain training exercises at JBCC. The chemical constituents that comprise the various types of pyrotechnic smoke grenades typically include fuel (usually powdered sugar), an oxidizing compound (usually potassium chlorate), diatomaceous earth as a binder, a coolant (usually magnesium carbonate), and various colored dyes. Smoke was also produced through the vaporization of various petroleum fuels. Some of the chemical constituents of the dyes used in these smokes prior to the early 1980s are of possible health concern. Typical chemical constituents for smoke grenades are: 1,4-bis (p-toluidino) anthraquinone, benzanthrone, barium carbonate, barium nitrate, boric acid, calcium carbonate, copper (II) oxychloride, copper carbonate, copper(II) oxide, cryolite, sodium bicarbonate , strontium carbonate , strontium nitrate. Green, purple and yellow smoke grenades were allegedly used in troop training exercises along with other devices including flares, star clusters, parachute flares, trip flares, M80s, and grenade and artillery simulators.

<u>Deep Bottom Pond Landing Zone</u>

The Deep Bottom Pond is located west of the Impact Area along Deep Bottom Pond Road (Figure 1). Three cleared areas have been observed adjacent to Deep Bottom Pond, which are presumed to have been active landing zones (LZs). These LZs presumably were used in a fashion similar to that of the SLZ of Training Area C-15 for field helicopter landing using pyrotechnic smoke during training exercises.

A single smoke grenade (M8 or M18) was discovered at the southern cleared area located on the eastern bank of the pond. The moderate corrosion on this spent grenade rendered a positive identification impossible. The third cleared area in the vicinity of Deep Bottom Pond was discovered on the eastern side of the pond at the top of a nearby hill. Though no evidence of spent smoke grenades was found there, this LZ appeared to be the most frequently used site, based on historic aerial photographs.

Soil samples were collected from two locations (SS214A and SS214B) in September of 2004 from an area identified as a probable landing zone near Deep Bottom Pond (Figure 2). A total of four 5-point composite samples were collected from a 0 to 6 inches and 18 to 24 inches below-ground-surface (bgs) in 22-foot by 22-foot grids. Samples were submitted for a full suite of analyses including explosives, VOCs, SVOCs, pesticides/PCBs, herbicides, TAL metals and miscellaneous parameters (ammonia, nitrate/nitrite, total phosphorous and TOC).

The results for herbicides, explosives and perchlorate were non-detect in all four samples. The results for SVOCs, VOCs and pesticide/PCBs were non-detect in both samples collected from location SS214A. Low levels of acetone and/or MEK (common laboratory contaminants) were detected in all samples. Certain SVOCs, mostly PAH compounds, were detected in the soil samples collected from location SS214B, with the highest detections in the shallow sample (0 to 6 inches bgs). A few pesticide compounds were also detected in the soil samples collected from location SS214B, with the highest detection in the shallow sample. Several TAL metals including aluminum, arsenic, antimony, barium, beryllium, boron, calcium, chromium, cobalt, copper, iron, magnesium, manganese, molybdenum, nickel, potassium, vanadium and zinc were detected in both samples at levels generally comparable to JBCC background. The maximum concentrations of copper (37 mg/Kg) and lead (126 mg/Kg) were detected in the sample collected from 18 to 24 inches bgs at location SS214B. The miscellaneous parameters, noted above, were reported in one or both samples with TOC results ranging from 4,100 mg/Kg to 28,200 mg/Kg.

Training Area C-15 Southern Landing Zone

The Southern Landing Zone (SLZ) of Training Area C-15 is located on the boundary of Training Areas C-15 and C-16 along Barlow Road (Figure 1). The SLZ is situated on the western side of Barlow Road adjacent to a bivouac area approximately one-half mile north of the intersection with Gibbs Road. The open area of the SLZ was approximately one acre in size and was essentially unvegetated apparently due to occasional regrading.

Training area landing zones, such as the SLZ, were typically used to train pilots and ground troops in maneuvers involving the field landing of helicopters. The use of smoke-generating pyrotechnic devices was an integral component to these training exercises in directing pilots to safe landing areas. Interviewees specifically referenced the use of pyrotechnic smokes in Training Area C-15 at this location. However, no record of ordnance discovery in the vicinity of this site has been identified. Several items including a single smoke grenade were found in adjacent Training Area C-16. Though details on the exact discovery locations were not provided, they may have been used in conjunction with training exercises at the SLZ and an adjacent bivouac site.

During a field reconnaissance in April 2000, a single smoke grenade activation clip (spoon) was discovered on the northern edge of the SLZ. The discovery of this grenade spoon, recognized as

a component of an M18 smoke grenade, is consistent with the use of the cleared area as a field landing site.

As a result of the April 2000 field reconnaissance conducted by the IAGWSP and EPA at the SLZ, a single soil grid location (22-foot by 22-foot) was established at the SLZ centered on the location of a discovered smoke grenade. Two 5-point composite samples (SS213A) were collected from 0 to 6 inches and 18 to 24 inches bgs (Figure 3). Samples were submitted for a full suite of analyses including explosives, perchlorate, dyes, VOCs, SVOCs, pesticides/PCBs, herbicides, TAL metals and miscellaneous parameters (ammonia, nitrate/nitrite, total phosphorous and TOC).

The results for explosives, perchlorate, dyes, herbicides and pesticides/PCBs were non-detect in both samples. Low levels of the common laboratory contaminant acetone were detected in both samples with chloromethane and methyl ethyl ketone also detected in the shallow sample. Estimated levels (<50 µg/Kg) of four SVOCs (benzoic acid, chrysene, fluoranthene and pyrene) were detected in the shallow sample but were all non-detect in the deeper sample. Several TAL metals including aluminum, arsenic, barium, cadmium, calcium, chromium, cobalt, iron, magnesium, manganese, lead, nickel, potassium, vanadium and zinc were detected in both samples at levels comparable to JBCC background. The maximum concentration of copper detected was 6.6 mg/Kg in the shallow sample collected from 0 to 6 inches bgs. Lead was non-detect in both samples. The miscellaneous parameters, noted above, were reported at low levels in one or both samples with the exception of TOC from the 0 to 0.5 inch bgs sample at 10,700 mg/Kg.

3.0 SCOPE OF WORK

The Final Training Areas Investigation Report (April 2018) recommended limited soil and groundwater sampling to screen for the presence of pyrotechnics constituents due to uncertainty regarding residual contaminant levels.

Confirmation soil samples will be collected from three grids, two in the Deep Bottom Pond Landing Zone and one in the Southern Landing Zone. The grids (each 100-foot by 100-foot) will be centered on former sampling locations SS214A and SS214B in the Deep Bottom Pond Landing Zone (Figure 2) and SS213A in the Southern Land Zone (Figure 3). Three multi-increment 100-point samples (triplicates) will be collected from a depth of 0-3 inches bgs at each grid. The samples will be analyzed for perchlorate (Method 6850), explosives compounds (Method 8330B), TAL metals (Method 6010C), including mercury (Method 7471A), and SVOCs (Method 8270). (These analyses were recommended by the US Army Corps of Engineers project chemist for sites where pyrotechnics were believed to have been used to determine if significant residual contamination remains.) The samples will be processed in accordance with Method 8330B prior to analysis, with the exception of analysis for SVOCs. The results will be reviewed with the regulatory agencies and the associated findings will be reported in a project note at the conclusion of the investigation.

The location and scope of the proposed groundwater sampling will be based on the results of the soil sampling and may include samples from existing and/or newly installed monitoring wells. The proposed work will be documented in an addendum to this project note.

4.0 CONCURRENCE

Concurrence with the recommendations presented in this project note is represented by the signatures below:

Robert Lim 7/16/18 — EPA Representative

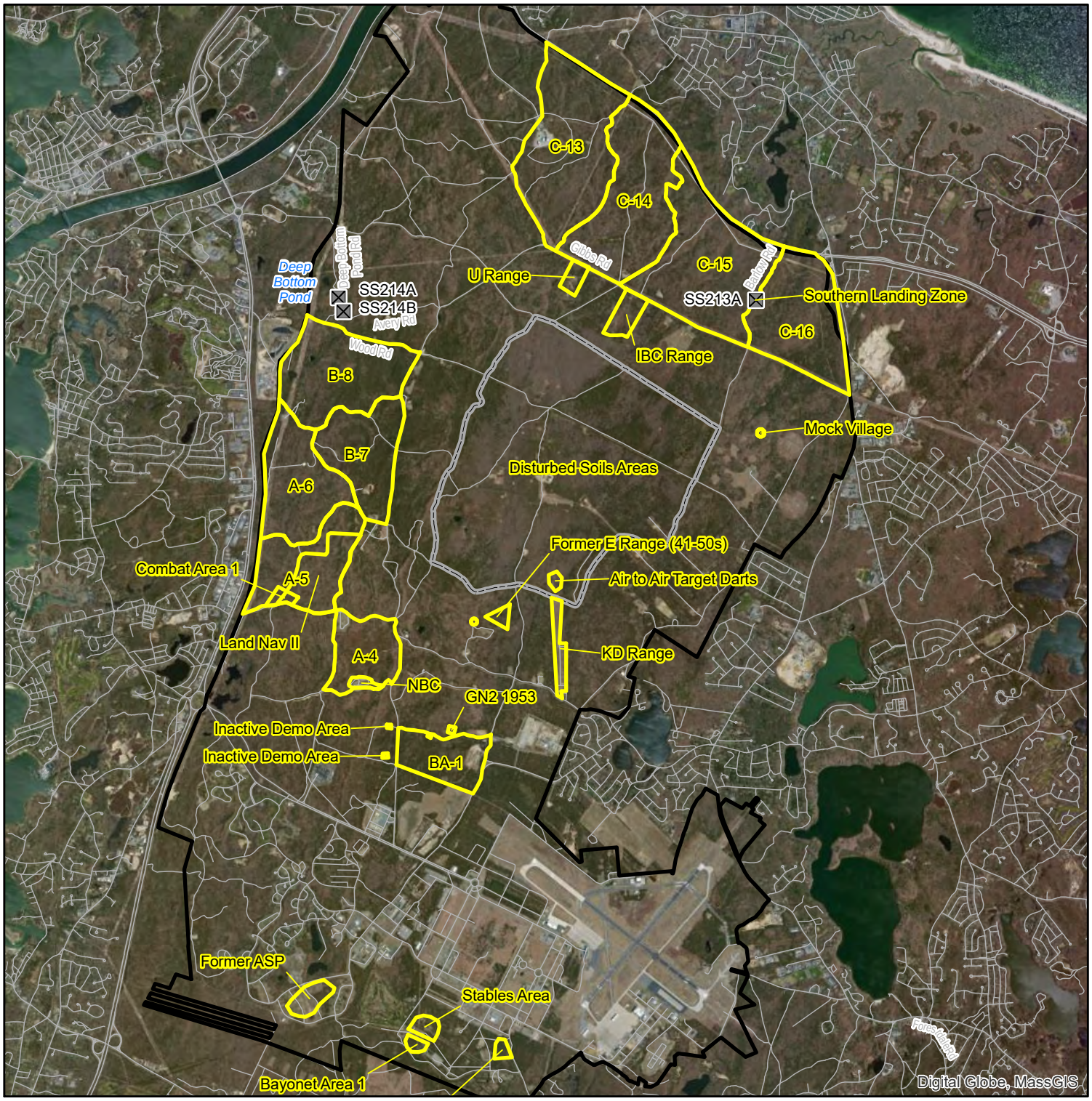
Kendall Walker 7/16/18 — MassDEP Representative

Benjamin P. Gregson 7/16/2018 — IAGWSP Representative

Figure 1 Location of Training Areas

Figure 2 Deep Bottom Pond Soil Grid Locations

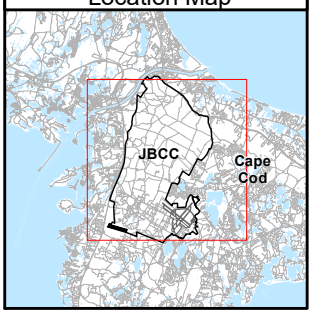
Figure 3 Training Area C-15 Southern Landing Zone Soil Grid Location



Legend

- 5-pt Composite Soil Grid (2004)
- JBCC Boundary
- Impact Area Boundary
- Training Areas

Location Map



0 3,000 6,000 Feet

US Army Corps of Engineers
New England District

Location of Training Areas

FIGURE 1

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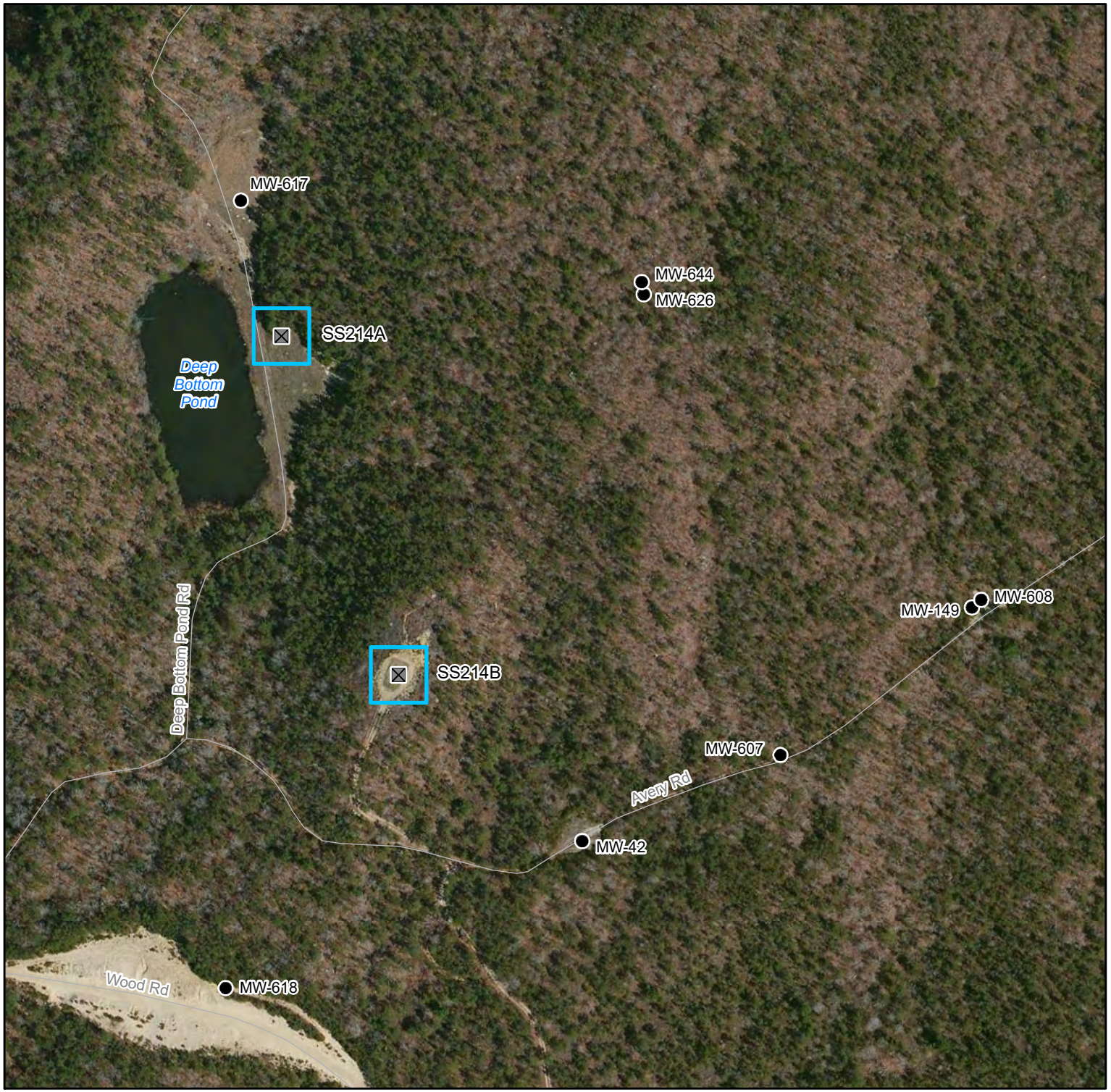
May 7, 2018 DWN: MTW CHKD: DRS

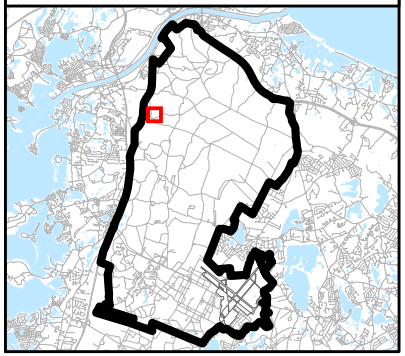
Impact Area Groundwater Study Program



LEGEND

- 5-pt Composite Soil Grid (2004)
- Existing Monitoring Well
- ISM Soil Grid (2018)

LOCATION MAP



NOTES & SOURCES

Basemap data from US Geological Survey
7 1/2 minute Topographic Maps
Source: MassGIS

TITLE

Deep Bottom Pond
Soil Grid Locations

0 250 Feet

N

US Army Corps of Engineers
New England District

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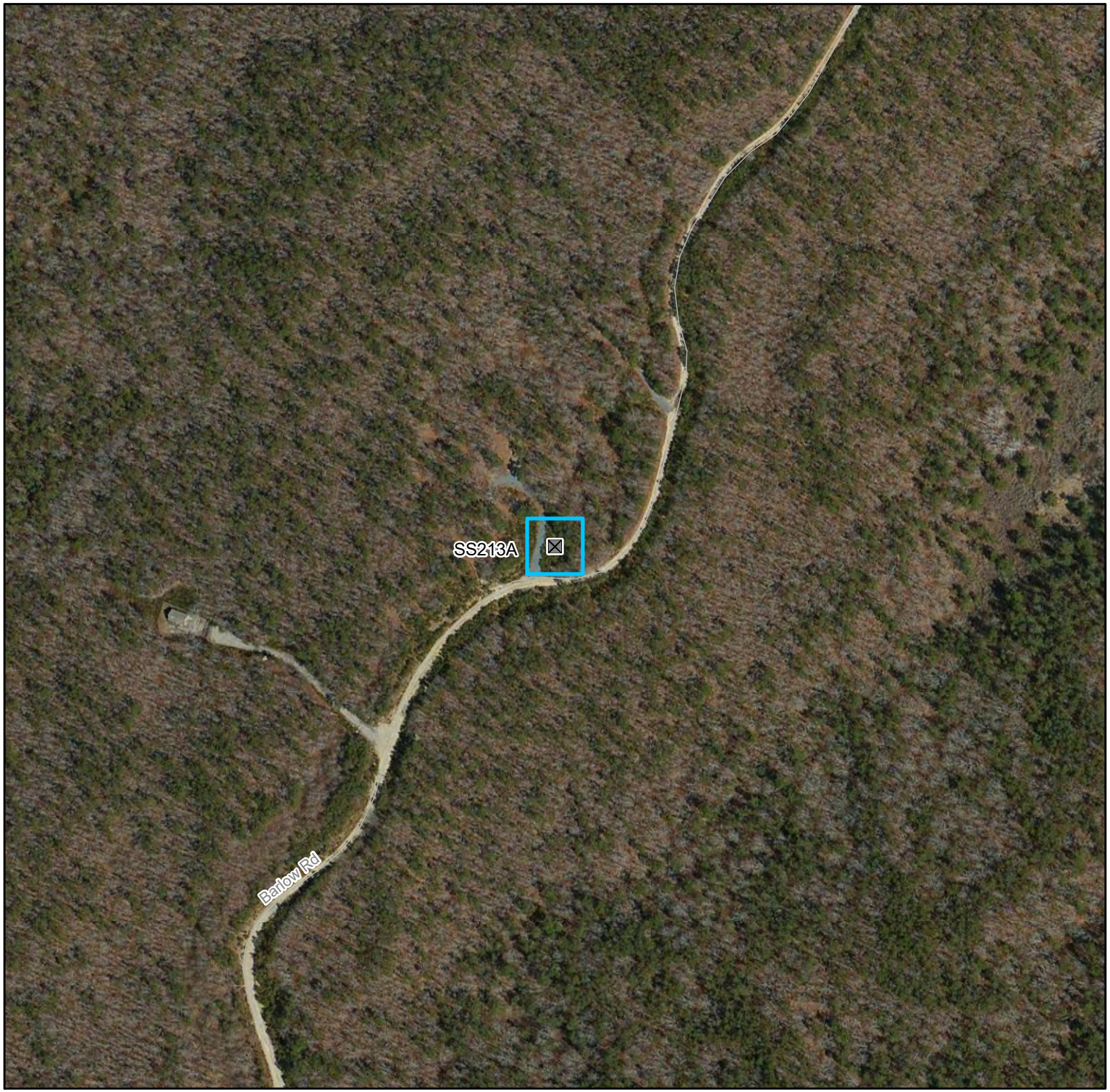
May 7, 2018 DWN: MTW CHKD: DRS

FIGURE 2

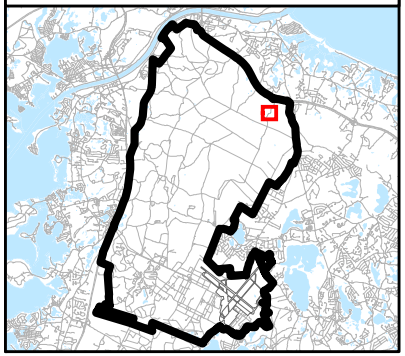


LEGEND

5-pt Composite Soil Grid (2004)

ISM Soil Grid (2018)

LOCATION MAP



NOTES & SOURCES

Basemap data from US Geological Survey
7 1/2 minute Topographic Maps
Source: MassGIS

TITLE

Training Area C-15
Southern Landing Zone
Soil Grid Location

0 250
Feet

N

US Army Corps of Engineers
New England District

FIGURE
3

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May 7, 2018 DWN: MTW CHKD: DRS