United States Environmental Protection Agency
Region 1

Decision Document Addendum
Change in RDX Groundwater Cleanup Level for
Impact Area Groundwater Study Program Operable Units
Central Impact Area, Demolition Area 1, J-1 Range
J-2 Range J-3 Range and L Range

Joint Base Cape Cod

Cape Cod, Massachusetts

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A. INTRODUCTION

This Decision Document Addendum: Change in Groundwater Cleanup Level for the Impact Area Groundwater Study Program Operable Units Central Impact Area, Demolition Area 1, J-1 Range, J-2 Range, J-3 Range, and L Range at Camp Edwards on Joint Base Cape Cod, Massachusetts has been prepared to document a revision to the groundwater cleanup level for the contaminant of concern (COC) hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX). This Addendum modifies Decision Documents (DDs) for the Operable Units (OUs) Central Impact Area (CIA) (EPA, 2012), Demolition Area 1 (Demo 1) (EPA, 2006, with addendums EPA, 2009 and 2013), J-1 Range (EPA, 2011), J-2 Range (EPA, 2013b), J-3 Range (EPA, 2015), and L Range (EPA, 2010). These remedies are being addressed as part of the Army National Guard's (ARNG) Impact Area Groundwater Study Program (IAGWSP) at Camp Edwards on Joint Base Cape Cod (JBCC), located on Cape Cod, Massachusetts (Figure 1).

The contaminated ARNG sites at JBCC are being remediated by the IAGWSP. Remedial activities are being conducted per requirements that were developed in accordance with the Safe Drinking Water Act (SDWA) including consideration of the substantive cleanup standards of the Massachusetts Contingency Plan (MCP) 310 Code of Massachusetts Regulations (CMR) 40.0000 promulgated by the Massachusetts Department of Environmental Protection (MassDEP).

B. STATEMENT OF BASIS AND PURPOSE

The remedies addressing groundwater are being conducted pursuant to DDs that have been issued for each site in accordance with Section 1431(a) of the SDWA, 42 USC§300i(a), as amended, and with the following Administrative Orders concerning response actions issued thereunder: U.S. Environmental Protection Agency (EPA) Region 1 Administrative Order Numbers SDWA-1-97-1019 (AO1); SDWA-1-97-1030 (AO2); SDWA-1-2000-0014 (AO3); and RCRA 1-2001-0014. The Regional Administrator of EPA Region 1 has been delegated the authority to select the necessary response action 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.

Documentation to support the decisions that are contained in this DD Addendum supplements, incorporates, and is incorporated into and made part of the DDs for each OU, and every requirement in this DD Addendum is enforceable as a requirement of their respective DDs. Each OU's DD contains a description of the site, selected response action, community participation and state role.

This DD Addendum modifies the DDs to document a change to the groundwater cleanup level associated with the COC RDX. The sites addressed in this DD Addendum have DDs with signature dates as follows:

TABLE 1
SUMMARY OF DECISION DOCUMENTS

OPERABLE UNIT	DECISION DOCUMENT TITLE	DD SIGNATURE DATE
Central Impact Area	Decision Document Central Impact Area Soil and Groundwater Operable Units	3/9/2012
Demolition Area 1	Decision Document Demolition Area 1 Groundwater Operable Unit	11/1/2006 9/29/2009 (Addendum No. 1) 9/30/2013 (Addendum No. 2)
J-1 Range	Decision Document J-1 Range Operable Unit	5/23/2011
J-2 Range	Decision Document J-2 Range Operable Unit	9/30/2013
J-3 Range	Decision Document J-3 Range Operable Unit	9/30/2015
L Range	Decision Document L Range Operable Unit	9/30/2010

The modification outlined in this DD Addendum is 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. The Administrative Record is available for review at the IAGWSP office, 1807 West Outer Road, Camp Edwards, Massachusetts or available online to those with an approved Electronic Data Management System (EDMS) account[1].

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,

[1] To request an EDMS account, contact IAGWSP at (339) 202- 9354.

would create a significant hazard to public health (47 Fed. Reg. 30282). Contaminants from the Training Ranges and Impact Area at Camp Edwards at JBCC are present in and may enter and migrate in the aquifer. As summary of the Site history, contamination and selected remedy described in the DDs are presented in Section E.

D. DESCRIPTION OF CHANGE IN CLEANUP LEVEL

The COCs at the OUs are perchlorate and RDX. The cleanup level for perchlorate is 2 micrograms per liter (µg/L) which was promulgated by MassDEP as a Massachusetts Maximum Contaminant Level (MMCL) in July 2006. The current cleanup level for RDX is 0.6 µg/L, based on the 10^{-6} risk-based concentration (RBC) that results in an increased lifetime cancer risk of one in a million. The goal of the response actions is to ensure that groundwater containing RDX at concentrations greater than 0.6 µg/L and/or perchlorate greater than 2 µg/L is restored to protective levels.

The *Impact Area Groundwater Study Program Final Third Five Year Review, 2017-2021* (KOMAN, 2025) evaluated the groundwater cleanup levels stipulated in the DDs cited in Table 1 and noted that EPA has updated their Regional Screening Levels (RSL) for tap water for RDX in 2018 based on updated toxicity information[2] (EPA, 2018) and more current EPA recommended exposure assumptions[3] (EPA, 2014). This updated tap water RSL for RDX (0.97 µg/L), also based on a target cancer risk of 10^{-6}, is higher than the current cleanup level (0.6 µg/L) used in the DDs.

Based on the follow-up action from the five-year review report, this DD Addendum has been prepared to document the upward change in the cleanup level for RDX as applicable at CIA, Demo 1, J-1 Range, J-2 Range, J-3 Range and L Range groundwater. The expected outcomes of the selected remedies at these OUs are not expected to change because of this modification apart from the L Range where the new cleanup level is currently being met, and site closeout can begin.

E. SUPPORTING DATA

This section presents background and historical information on the CIA, Demo 1, J-1 Range, J-2 Range, J-3 Range and L Range OUs, including a summary of contamination problems, site

[2] In 2018, EPA (2018) updated their cancer slope factor from 0.11 $(mg/kg\text{-}d)^{-1}$ to 0.08 $(mg/kg\text{-}d)^{-1}$ based on their reanalysis of the original study used to develop the previous cancer slope factor by applying updated benchmark dose modeling.
[3] The RBC was calculated using the same formula as the current RSLs. Since the DDs were established, EPA (2014) has updated their recommended default exposure assumptions based on more recent National Health and Nutrition Examination Survey data.

history, and the selected remedies in the respective DDs. Comprehensive descriptions for each OU can be found in the *Impact Area Groundwater Study Program Final Third Five-Year Review 2017-2021* (KOMAN, 2025).

E.1 INSTALLATION LOCATION AND HISTORY

JBCC is in the western area of Cape Cod in Barnstable County, Massachusetts, approximately 60 miles south of Boston and immediately southeast of the Cape Cod Canal. It occupies approximately 22,000 acres within the towns of Bourne, Falmouth, Mashpee, and Sandwich. JBCC provides facilities for the Massachusetts Army National Guard, operating Camp Edwards; the Massachusetts Air National Guard, operating Otis Air National Guard Base; the U.S. Coast Guard, operating Base Cape Cod and Air Station Cape Cod; the U.S. Space Force, operating Cape Cod Space Force Station; and the Veterans Administration, operating the Massachusetts National Cemetery. Past activities at the JBCC have resulted in releases of hazardous substances, wastes, and materials that contaminated soil in source areas and generated plumes of contaminated groundwater in the unconfined sand and gravel aquifer that underlies the JBCC and the surrounding towns.

The IAGWSP investigations and remediation have addressed the impacts from military and defense contractor activities conducted on Camp Edwards. Activities that have had the potential to impact the environment have included the use and disposal of various types of ordnance and munitions, including artillery, mortars, small arms, and explosives materials.

E.2 CIA SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

The CIA is a 330-acre portion of the Impact Area used for artillery and mortar firing from the late 1930s until 1997 (USACE, 2025a).

CIA Source Area Removal Actions: Numerous investigations have been conducted since 1997 within the CIA including geophysical surveys, intrusive investigations of anomalies, removal of unexploded ordnance (UXO) and UXO contaminated soil and soil sampling of historically high-use areas (i.e., targets and test sites). Since 2013, approximately 155 acres have been investigated, 3,000 UXO items have been recovered, and 8,500 pounds of explosives have been removed.

Contamination Summary: Some of the groundwater underlying and downgradient of the CIA is contaminated by explosives (RDX with lesser detections of octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine (HMX), 2,4,6-trinitrotoluene (TNT), 2-amino-4,6-dinitrotoluene (2A-DNT), 4-amino-2,6-dinitrotoluene (4A-DNT), and 1,3,5-trinitrobenzene (1,3,5-TNB) and perchlorate. RDX is the most widespread groundwater contaminant. At the time of the CIA DD, the groundwater plume, which is comprised of multiple parallel and overlapping plumelets, had a maximum RDX concentration of 45 µg/L and a maximum perchlorate concentration of 7 µg/L (USACE, 2025a). This CIA plume is located within the west central region of the Impact Area (Figure 2) and is oriented in a southeast to northwest direction consistent with the regional groundwater flow direction (USACE, 2025a).

Selected Remedy for CIA Groundwater: A DD was issued for CIA (EPA, 2012) which set forth the requirements for the cleanup of the soil and groundwater operable units. The selected remedy for the CIA groundwater was focused extraction with three wells and treatment to ensure that groundwater containing COCs (RDX and perchlorate) is restored to protective levels. The first two extraction wells became operational in January 2014, and the third extraction well became fully operational in late June 2016. All extraction wells pump at a rate of 250 gallons per minute (gpm) and the extracted groundwater is treated in modular treatment units (MTUs); there is one MTU for each well. After treatment, groundwater is reintroduced to the aquifer via one of the two infiltration basins or the injection well placed outside of the plumes to support capture (USACE, 2025a).

E.3 DEMO 1 SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

Demolition Area 1 (Demo 1) is located north of Pocasset-Forestdale Road and south of the Impact Area at JBCC, west of Turpentine Road and east of Frank Perkins Road (Figure 2). Demo 1 is a topographic depression (a geologic kettle hole resulting from the melting of a remnant ice block) that covers approximately one acre at its base, 45 feet below the surrounding grade. A perimeter access road surrounds the entire topographic low and associated sloping sidewalls for a total area of approximately 7.4 acres. The Site also includes a 3.3-acre area immediately outside the perimeter road. Demo 1 was used from the mid-1970s to 1997 for demolition training and ordnance disposal.

Demo 1 Source Area Removal Actions: A major source/soil Rapid Response Action (RRA) was conducted at Demolition Area 1 in 2004 to address contaminated soil and geophysical anomalies potentially associated with ordnance and munitions. The objective of this action was to eliminate

potential ongoing sources of groundwater contamination through the removal of contaminated soil, explosives, and munitions (USACE, 2025d). Over 27,000 tons of soil were excavated from within the perimeter road, most of the soil excavated were treated on site using a low temperature thermal desorption unit. Treated soil was analyzed for explosives and perchlorate to confirm that the soil treatment criteria were achieved. Soils not meeting the criteria were re-treated. Following successful treatment, the soils were used as backfill at Demolition Area 1.

Contamination Summary: Four explosives and propellant compounds (RDX, TNT, 2,4-DNT, and perchlorate) have been detected in groundwater and identified as COCs for Demo 1 groundwater (EPA, 2006). Initial groundwater investigations from 1997 through 2002 identified a 9,000-foot by 1,000-foot area of groundwater contamination migrating west from the Demolition Area 1 source area with maximum concentrations of 370 µg/L for RDX and 500 µg/L for perchlorate.

Selected Remedy for Demo 1**:** A DD and two addendums have been issued for Demo 1 (EPA 2006; 2009; 2013). The selected remedy for the Demo 1 groundwater was a five well extraction system, an active groundwater treatment system, land use controls (LUCs), and groundwater monitoring for COCs (RDX, perchlorate, TNT, 2,4-DNT, and perchlorate) to limit exposure to groundwater contaminants and to reduce groundwater contaminant concentrations to protective levels. The remedy also included an option to expand the groundwater extraction system if future monitoring found that the groundwater plume migration differed from groundwater modeling predictions. The initial DD (EPA, 2006) addressed the groundwater plume on the JBCC migrating from the source area, while the first DD addendum (EPA, 2009) focused on the source area and the second DD (EPA, 2013a) centered on groundwater contamination from Demo 1 that has migrated beyond the base boundary. Groundwater treatment began in 2004, and the remedy has evolved over time in response to data from additional groundwater investigations and system monitoring and optimization efforts. Currently, the treatment consists of two extraction, treatment and reinfiltration (ETR) systems which are both located on JBCC; one at Frank Perkins Road and one at the base boundary, adjacent to Canal View Road. There are three extraction wells in operation and cumulative site extraction rate of 165 gpm.

E.4 J-1 RANGE SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

The J-1 Range is located adjacent to and southeast of the Impact Area and is one of four former training ranges that constitute the Southeast Ranges. It consists of two separate areas, J-1

Northern and J-1 Southern (Figure 2) with each area having a groundwater plume. The J-1 Range Northern plume consists of perchlorate and RDX. The primary sources of the J-1 Range Northern plume are in the “Inter-berm” Area of the J-1 Range, near a regional groundwater divide designated as the Top of Mound (USACE, 2025b). The J-1 Range Southern RDX plume is defined by an on-base portion and a downgradient portion that extends beyond the base boundary.

J-1 Range Source Area Removal Actions: Geophysical investigations, including anomaly resolution and associated soils removals, were conducted from 1997 through 2009 under various investigative phases of the project. These geophysical investigations resulted in the evaluation of over 150 geophysical anomalies with follow-up soil excavations and off-site disposal of approximately 3,850 cubic yards of soil from 19 of the geophysical survey locations. In addition to the soil removals, these investigations also removed munitions and explosives of concern (MEC) from 39 locations from 1999 through 2010.

Contamination Summary: Groundwater monitoring data collected from wells installed in the J-1 Northern plume revealed that the main perchlorate plume was approximately 3,900 feet long and up to 800 feet wide and the maximum detected concentration was 78 µg/L reported in November 2008 (EPA, 2011). The main RDX plume was determined to be approximately 4,900 feet long and up to approximately 1,300 feet wide and the maximum detected concentration of RDX at 87.2 µg/L was reported in 2015.

Groundwater monitoring data collected from wells installed in the J-1 Southern plume area revealed the primary contaminant to be RDX. This plume consists of both upgradient and downgradient portions, which have become separated due to extraction well operation at the base boundary. The maximum detected concentration was 130 µg/L reported in November 2008 (EPA, 2011).

Selected Remedy for the J-1 Range: The DD for the J-1 Range Operable Unit (EPA, 2011) selected separate remedies for the groundwater plumes of two COCs (RDX and perchlorate) in the J-1 Range Northern and Southern areas and determined that no further action was needed for the source area contributing to groundwater. The remedies selected in the DD for groundwater at both the J-1 Range Northern Plume and J-1 Range Southern Plume were focused extraction with two extraction wells, monitored natural attenuation, and LUCs. For the J-1 Range Northern Plume, the DD established the general locations of the two extraction wells: one in-plume well and one

leading edge well. Groundwater treatment began in 2013, and the treatment system consists of a single MTU. Groundwater is pumped from two extraction wells: a leading edge well and an in-plume well operating at a combined rate of 250 gpm. For the J-1 Range Southern Plume, the DD (EPA, 2011) established a requirement for one extraction well to be on-base, the other off-base in a town-owned road in a neighborhood in the town of Sandwich. Water extracted from the off-base well is piped back to a treatment system on the base boundary. The treatment system was originally installed under a 2007 RRA and was designed to mitigate further off-base migration by capturing and treating contaminated groundwater at the base boundary (EPA, 2011). Groundwater treatment began in 2007, and the remedy has evolved over time in response to data from additional groundwater investigations and system monitoring and optimization efforts. Currently the treatment consists of the off-base extraction well operating at a rate of 125 gpm.

E.5 J-2 RANGE SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

The J-2 Range is located southeast of the Impact Area and north of the J-1 Range. It is approximately 3,900 feet long and between 300- and 600-feet wide with the southeastern "uprange" end near Greenway Road and the northwestern "downrange" end extending several-hundred meters beyond Chadwick Road into the Impact Area (Figure 2). Two distinct plumes of RDX and perchlorate contamination have been identified in groundwater downgradient from the J-2 Range (Northern Plume and Eastern Plume). The primary source area of the J-2 Northern plume is a former disposal area where open burning/detonation and burial of munitions and other energetic materials occurred over several years. The primary sources of the J-2 Eastern plume are in Area 2 of the range where a high density of 30mm high explosive incendiary (HEI) T330 projectiles and other munitions items, including several disposal pits, were found. The “Twin Berms” were also found to be an active source of groundwater contamination during investigations (EPA, 2013b).

J-2 Range Source Area Removal Actions: Geophysical investigations were conducted from 1997 through 2009 in several different phases utilizing several approaches to identify and remove munitions and disposal pits. Over the course of these ongoing removal actions, approximately 21,600 munitions containing HE were removed and approximately 11,100 munitions containing small quantities of explosives were removed along with 114,000 pounds of range debris (EPA, 2013b).

Contamination Summary: Two large-scale plumes of comingled RDX and perchlorate contaminated groundwater were identified at the J-2 Range. The J-2 Range Northern plume is thought to be derived from Disposal Area 2 located near Barlow Road and is migrating in a northerly direction. The J-2 Eastern plume is more fan-shaped and consists of a main lobe, which migrates in a northeasterly direction with several smaller lobes that migrate in both an easterly and northerly direction (EPA, 2013b).

In the J-2 Northern area, the groundwater plume consists of perchlorate and RDX. The perchlorate contamination is detached from the source area, has migrated further than the RDX plume, and has the highest detected concentrations in the upgradient portion of the plume. The RDX portion of the plume is co-mingled within the perchlorate plume. The maximum historical detections were 15.5 µg/L for RDX and 198 µg/L for perchlorate (USACE, 2025f).

In the J-2 Eastern area, the groundwater plume also consists of perchlorate and RDX. Since there were multiple sources of contamination, this plume is more heterogeneous in nature. The perchlorate plume is detached from the source area and had the highest detected concentrations in the middle portion of the plume. The maximum historical detections were 17.6 µg/L for RDX and 87.5 µg/L for perchlorate (USACE, 2025c).

Selected Remedy for J-2 Range: The DD for the J-2 Range Operable Unit (EPA, 2013b) selected the same remedy for the groundwater plumes in the J-2 Range Northern and Eastern areas. It included confirmatory soil sampling and UXO clearance in select areas of the range to verify that the source removal was complete.

The selected remedy for COCs (RDX and perchlorate) in the J-2 Range Northern Plume was continued operation of the RRA treatment system of three extraction wells, monitored natural attenuation and LUCs. It also included contingencies to protect the public water supply by requiring complete containment at each extraction well in the current system and requiring further treatment of the contaminated plume if found near Gibbs Road (EPA, 2013b). Groundwater treatment began in 2006, and the treatment system consists of two MTUs and one stand-alone building. Groundwater is pumped from three extraction wells currently operating at a combined rate of 475 gpm.

The remedy selected in the DD for COCs (RDX and perchlorate) in groundwater at the J-2 Range Eastern Plume was continued operation of the RRA treatment system of three extraction wells at an increased total flow rate, monitored natural attenuation and LUCs (EPA, 2013b). Groundwater treatment began in 2008, and the treatment system consists of four MTUs. Groundwater is pumped from three extraction wells currently operating at a combined rate of 370 gpm.

E.6 J-3 RANGE SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

The J-3 Range is located adjacent to and southeast of the Impact Area and is the southernmost of the four former military training and defense contractor test ranges (Figure 2). This 300- by 3,000-foot range was initially used as a mortar range and subsequently used as a defense contractor range used to develop and test tactical weapon systems as well as for other activities including the burial and burning of munitions, excess energetic and other materials (EPA, 2015).

J-3 Range Source Area Removal Actions: During the site investigation, several response actions were taken to remove sources of groundwater contamination. Soil removal actions were conducted at numerous locations in the vicinity of firing points, targets, and areas used for burning and disposing of propellants and explosives at and near the Demolition Area and Melt-Pour buildings believed to be the primary sources of groundwater contamination (EPA, 2015). Approximately 2,400 cubic yards of contaminated soil were excavated and treated on-site or disposed of off-site. Cumulatively, approximately 1,900 UXO items containing high explosives were removed. In addition, approximately 560 UXO items containing small quantities of explosives were removed along with 29,600 pounds of range debris (EPA, 2015).

Contamination Summary: A large-scale plume of comingled RDX and perchlorate contaminated groundwater was found to be migrating from sources at the J-3 Range. The plume flows in a southerly direction and crosses the base boundary downgradient of Greenway Road towards Snake Pond in Sandwich. The maximum historical detections were 38.2 µg/L for RDX and 770 µg/L for perchlorate (USACE, 2025a). During the site investigation, an RRA treatment system was initiated in 2005 to significantly reduce contaminant concentrations and limit further migration of the major portion of this plume.

Selected Remedy for J-3 Range: The selected remedy for COCs (RDX and perchlorate) in DD for the J-3 Range Operable Unit (EPA, 2015) was continued operation of the RRA treatment system

of three extraction wells with the addition of a fourth extraction well, monitored natural attenuation and LUCs. It also included an investigation with soil sampling and removal of additional geophysical anomalies in select additional areas of the range to verify source removal is complete. Groundwater treatment began in 2006, and the remedy has evolved over time in response to data from additional groundwater investigations and system monitoring and optimization efforts. Currently the treatment consists of four extraction wells operating at a combined rate of 255 gpm.

E.7 L RANGE SITE HISTORY, CONTAMINATION, AND SELECTED REMEDY

The L Range is located southeast of the Impact Area between the J-1 and J-3 Ranges and is one of four former training ranges that constitute the Southeast Ranges (Figure 2). The L Range Study Area includes the L Range firing points and targets plus three adjacent areas referred to as Area 46, Area 79, and Cleared Area 11 (EPA, 2010).

L Range Source Area Removal Actions: Munitions investigations at L Range began in 2008 in conjunction with a robotic UXO clearance technology demonstration. The technology demonstration used remotely controlled equipment to remove approximately eight acres of vegetation and targets from the range floor (EPA, 2010).

Contamination Summary: Groundwater investigations began at the L Range in 2000, and more than 70 groundwater monitoring wells have been installed and sampled at the L Range. Results indicated that the primary contaminants detected in groundwater were RDX and perchlorate. Historically the maximum detected concentrations of RDX and perchlorate in groundwater at the L Range were 9 µg/L and 3 µg/L, respectively (EPA, 2010). Perchlorate sampling was discontinued in 2014 as the DD cleanup goal of 2 µg/L was achieved (USACE, 2024).

Selected Remedy for the L Range: The DD for the L Range Operable Unit (EPA, 2010) selected monitored natural attenuation and LUCs to address COCs (RDX and perchlorate) in groundwater. The selected alternative was expected to achieve cleanup goals in a reasonable timeframe and protect human health through the use of groundwater monitoring to ensure that groundwater modeling predictions regarding the reduction and migration of contamination at the L Range are correct and that any residual contamination remains below risk-based levels.

F. BASIS FOR THE DOCUMENT

This section summarizes the information that prompted and supports the differences from the current SDWA remedies. Specifically, updated toxicity parameters have been established for the groundwater COC RDX. This updated toxicity parameter has resulted in increased RSL for RDX since the establishment of the cleanup levels in the DDs; therefore, this DD Addendum is necessary to document an upward change in the RDX cleanup level. RDX is a COC in the DD for the groundwater plumes at CIA, Demolition Area 1, J-1 Range, J-2 Range, J-3 Range and L Range.

In August 2018, EPA revised the non-cancer oral reference dose and the cancer oral slope factor for RDX. These new values indicate that RDX is now considered less toxic from cancer and non-cancer health effects. These toxicity changes would result in decreased cancer risk and decreased non-cancer hazard from exposure to RDX (EPA, 2018). The most recent RSL table (target cancer risk [TR] = 10^{-6} [one in a million], hazard quotient [HQ] = 1) indicates the tap water screening level for RDX is 0.97 µg/L (EPA, 2024).

G. DESCRIPTION OF DIFFERENCES AND EXPECTED OUTCOMES

This section describes differences between the current SDWA remedies as presented in the respective DDs and DD Addendums for CIA, Demo 1, J-1 Range, J-2 Range, J-3 Range and L Range Operable Units.

G.1 DIFFERENCES FROM THE SELECTED REMEDIES

This DD Addendum establishes revised cleanup levels for the COC RDX from 0.6 µg/L to 0.97 µg/L. This revision is not expected to change the scope, performance, or cost of the remedies for the Demo 1, J-1 Range, J-2 Range, J-3 Range Operable Units. For the CIA, it is anticipated that the CIA ETR will be shut down ten years sooner than originally predicted, potentially resulting in a change in cost for the site remedy. For the L Range, most recent groundwater sampling results are less than 0.97 µg/L, therefore, this DD addendum supports the initiation of closeout activities.

RDX does not have established Federal maximum contaminant levels or MMCLs. The DDs listed in Table 1 established a cleanup level for RDX based on an RBC calculated for potential

residential exposure to groundwater using a 10^{-6} cancer risk-based level, toxicity information, and EPA exposure assumptions current at the time. This same approach is applied in this DD Addendum by using the updated tap water RSL of 2018, based on a 10^{-6} cancer risk-based level and current toxicity information and EPA recommended exposure assumptions, as the revised cleanup levels for RDX.

TABLE 2
REVISED CLEANUP TIMEFRAMES

Site	Decision Document RDX Cleanup Time	Model Predicted RDX Cleanup Time (0.6 µg/L)	Revised Predicted RDX Cleanup Time (0.97 µg/L)	Site Cleanup Time*
Central Impact Area	2055	2054	2045	2045
Demolition Area 1	2022	2025	2025	2034
J-1 Range Northern	2047	2054	2048	2048
J-1 Range Southern	2024	2036	2031	2031
J-2 Range Eastern	2022	2031	2029	2031
J-2 Range Northern	2022	2028	2025	2034
J-3 Range	2021	2025	2023	2036
L Range	2027	2031	2025	2025

** = time based on cleanup of all COCs*

G.2 EXPECTED OUTCOMES

Based on the latest data, updating the current RDX cleanup level to 0.97 µg/L, which is based on the 2018 update to the RSL, is expected to accelerate cleanup timelines. At two of the six operable units there will be changes to the remedy. At the L Range, the current cleanup level has already been met and at the CIA it is anticipated that the remedy will now achieve cleanup standards ten years sooner than originally estimated. The anticipated outcomes of the other four selected remedies for these operable units are not expected to change. Details for each Site are presented below.

G.2.1 CIA

It is anticipated that the CIA ETR will be shut down ten years sooner than originally predicted a result of this DD Addendum. The most recent Environmental Monitoring Report (EMR) (based on data from July 2023 through 2024) indicates a maximum RDX concentration of 9.1 µg/L and a maximum perchlorate concentration of 2.2 µg/L (USACE, 2025a). The most recent groundwater data at CIA USACE, 2025a) indicates the site is expected to achieve the revised RDX cleanup level in groundwater in approximately 2045 (earlier than the timeframe estimated in the DD [2055]) (EPA, 2012). Since remedial actions to clean up RDX also address perchlorate, estimated cleanup times were modeled for RDX only. While raising the cleanup level for RDX will reduce the time to achieve cleanup objectives as shown in Table 2, it does not change the remedy for the site at this time as RDX concentrations at CIA remain above the remedial goal, therefore, continued operation of the ETR systems is appropriate.

G.2.2 Demolition Area 1

The expected outcome of the selected remedy at Demolition Area 1 is not anticipated to change as a result of this DD Addendum. The most recent EMR (based on data from July 2023 through June 2024) indicates a maximum RDX concentration of 4.3 µg/L and a maximum perchlorate concentration of 12 µg/L (USACE, 2025d). Based on 2023 plume shell modeling, groundwater cleanup to the current cleanup level (0.6 µg/L) is projected for 2025 (USACE, 2025d), two years later than the estimate provided in the second amendment to the DD (EPA, 2013a). Based on the most recent data, groundwater is anticipated to be below the 0.97 µg/L cleanup level in the near future. While updating the current RDX protective limit (0.6 µg/L) to 0.97 µg/L could accelerate the cleanup timeline based on the current data, remediation efforts will continue as perchlorate concentrations are not expected to reach protective levels until 2029. Therefore, there is no change to the remedy for the site. The current predicted aquifer restoration timeframe for RDX of 2025 remains appropriate.

G.2.3 J-1 Range

The expected outcome of the selected remedy at the J-1 Range is not anticipated to change as a result of this DD Addendum. The most recent EMR (based on data from January 2023 through December 2023) indicates a maximum perchlorate concentration of 12 µg/L and a maximum RDX concentration of 22 µg/L for the J-1 Range Northern Plume (USACE, 2025b). The current maximum concentration of RDX is 1.8 µg/L for the J-1 Range Southern Plume (based on data

from January 2023 through December 2023) (USACE, 2025e). Raising the cleanup levels for RDX results in a reduction in the time to achieve cleanup objectives for both J-1 Northern and J-1 Southern groundwater plumes. For J-1 Northern, the predicted time to reach the 0.97 ug/L cleanup level would change to 2048 from 2054 based on the current cleanup level of 0.6 ug/L. For J-1 South, predicted time to reach the RSL would change to 2031 from 2036 based on the current cleanup level. While raising the cleanup level for RDX reduces the time to achieve cleanup objectives, it does not change the remedy for the site. Continued operation of both the J-1 Northern and J-1 Southern ETR systems is appropriate.

G.2.4 J-2 Range

The expected outcome of the selected remedy at the J-2 Range is not anticipated to change as a result of this DD Addendum. In the J-2 Northern area, the most recent EMR (based on data from November 2022 to October 2023) indicates a maximum perchlorate concentration of 11 µg/L and a maximum RDX concentration of 1.2 µg/L (USACE, 2025f). The J-2 Range DD (2013) estimated that perchlorate and RDX concentrations will reach protective levels by 2027 and 2022, respectively. The RDX groundwater transport model predicts that RDX concentrations at J-2 Northern will be below the current cleanup level of 0.6 µg/L by 2028 (USACE, 2025f). While updating the protective level from the current cleanup level to 0.97 µg/L would accelerate the cleanup timeline from 2028 to 2025 for the J-2 Northern, remediation efforts will continue as perchlorate concentrations are not expected to reach protective levels until 2027.

In the J-2 Eastern area, a maximum perchlorate concentration of 25 µg/L and a maximum RDX concentration of 4.7 µg/L were noted in the most recent EMR (based on data from November 2023 through October 2024) (USACE, 2025c). As noted above, the J-2 Range DD (2013) estimated that perchlorate and RDX concentrations will reach protective levels by 2027 and 2022, respectively. The RDX groundwater transport model predicts that RDX concentrations at J-2 Range Eastern will be below the current cleanup level of 0.6 µg/L by 2031, which is nine years later than the DD estimated cleanup time of 2022 (USACE, 2025c). While updating the protective level from the current cleanup level to 0.97 µg/L would accelerate the cleanup timeline from 2031 to 2029 for the J-2 Range Eastern, remediation efforts will continue as perchlorate concentrations are not expected to reach protective levels until 2027. Therefore, continued operation of both the J-2 Northern and J-2 Eastern ETR systems is appropriate.

G.2.5 J-3 Range

The expected outcome of the selected remedy at the J-3 Range is not anticipated to change as a result of this DD Addendum. Contaminant transport modeling associated with the 2015 DD predicted that RDX and perchlorate concentrations would drop below their protective levels by 2021 and 2022, respectively. Based on an updated transport model simulation using 2023 operating conditions, estimated cleanup times are 2025 for RDX and 2037 for perchlorate. The most recent EMR (based on data from September 2022 to August 2023) indicates a maximum perchlorate concentration of 2.1 µg/L and a maximum RDX concentration of 3.4 µg/L (USACE, 2025g).While the model estimates that RDX concentrations will be below “0.97 µg/L by 2023, there are three wells with concentrations above 0.97 µg/L (USACE, 2025g). However, remediation efforts will continue as perchlorate concentrations are not expected to reach protective levels until at least 2037. Therefore, continued operation of the ETR system is appropriate and there is no change to the remedy for the site.

G.2.6 L Range

As a result of the change in cleanup level documented in this DD Addendum, the L Range has met the remedial goal. The most recent EMR (based on data from March 2023 through February 2024) indicates a maximum RDX 0.40 µg/L (USACE, 2024). The most recent groundwater data at the L Range (USACE, 2024) indicates the revised, higher cleanup level for RDX is already being met, earlier than the timeframe to reach 0.6 µg/L (2027) estimated in the DD (EPA, 2010). As such, the site closeout process can begin for the L Range.

H. COMMUNITY PARTICIPATION

From the time the initial investigations at the Site began, through the present, the IAGWSP regularly presented updates to the JBCC Cleanup Team, a citizen advisory group established to inform and involve the public, on the investigations and response activities at the Site. In accordance with EPA Administrative Order SDWA 1-2000-0014, the IAGWSP published a notice in the local newspapers describing this DD Addendum and its availability in the Administrative Record. This DD Addendum will be presented to the Joint Base Cape Cod Cleanup Team but will not have a public comment period as there are no significant changes to the selected remedies. This DD Addendum and all documents that support the changes and clarifications are contained in the Administrative Record for the IAGWSP at JBCC.

I. DETERMINATIONS

This DD Addendum formally adopts a revised groundwater cleanup level of 0.97 µg/L for the COC RDX. No other changes to the selected remedies or response action objectives have been made and the remedies continue to meet the statutory determinations in accordance with Section 1431(a) of the SDWA, 42 USC§300i(a), as described in the respective DDs shown on Table 1.

J. AUTHORIZING SIGNATURE

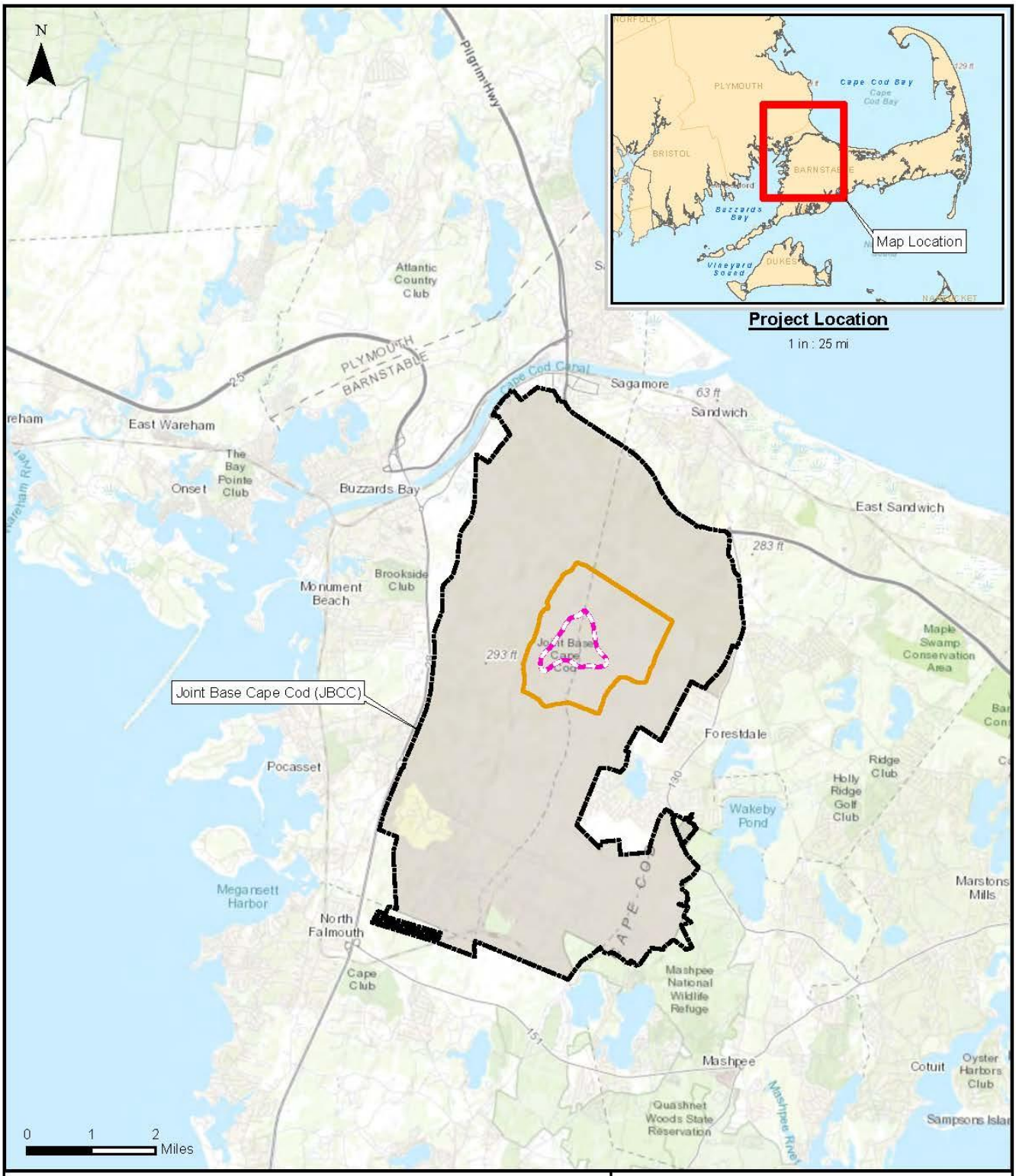
This DD Addendum modifies the DDs for the Central Impact Area, Demolition Area 1, J-1 Range, J-2 Range, J-3 Range, and L Range to document the change to the groundwater cleanup level associated with the COC RDX from the current cleanup level of 0.6 µg/L to 0.97 µg/L, which is based on the 2018 update to the RDX RSL. At two of the six operable units there will be changes to the remedy. At the L Range, the current cleanup level has already been met and at the CIA it is anticipated that the remedy will now achieve cleanup standards ten years sooner than originally estimated. For Demolition Area 1, J-1 Range, J-2 Range, and J-3 Range, raising the cleanup level results in minor reductions in time to achieve the cleanup objectives (Table 2). The L Range has met cleanup goals and site closeout can begin. This change to the groundwater cleanup level was approved by EPA under the authority of the SDWA. MassDEP concurs with the decision.

U.S. Environmental Protection Agency

By: BRYAN OLSON Digitally signed by BRYAN OLSON Date: 2025.12.22 18:53:11 -05'00' Date: _____

Bryan Olson
Director, Superfund and Emergency Management Division
Region 1

FIGURES



Projection: NAD 1983 UTM Zone 19N Transverse Mercator

Legend:

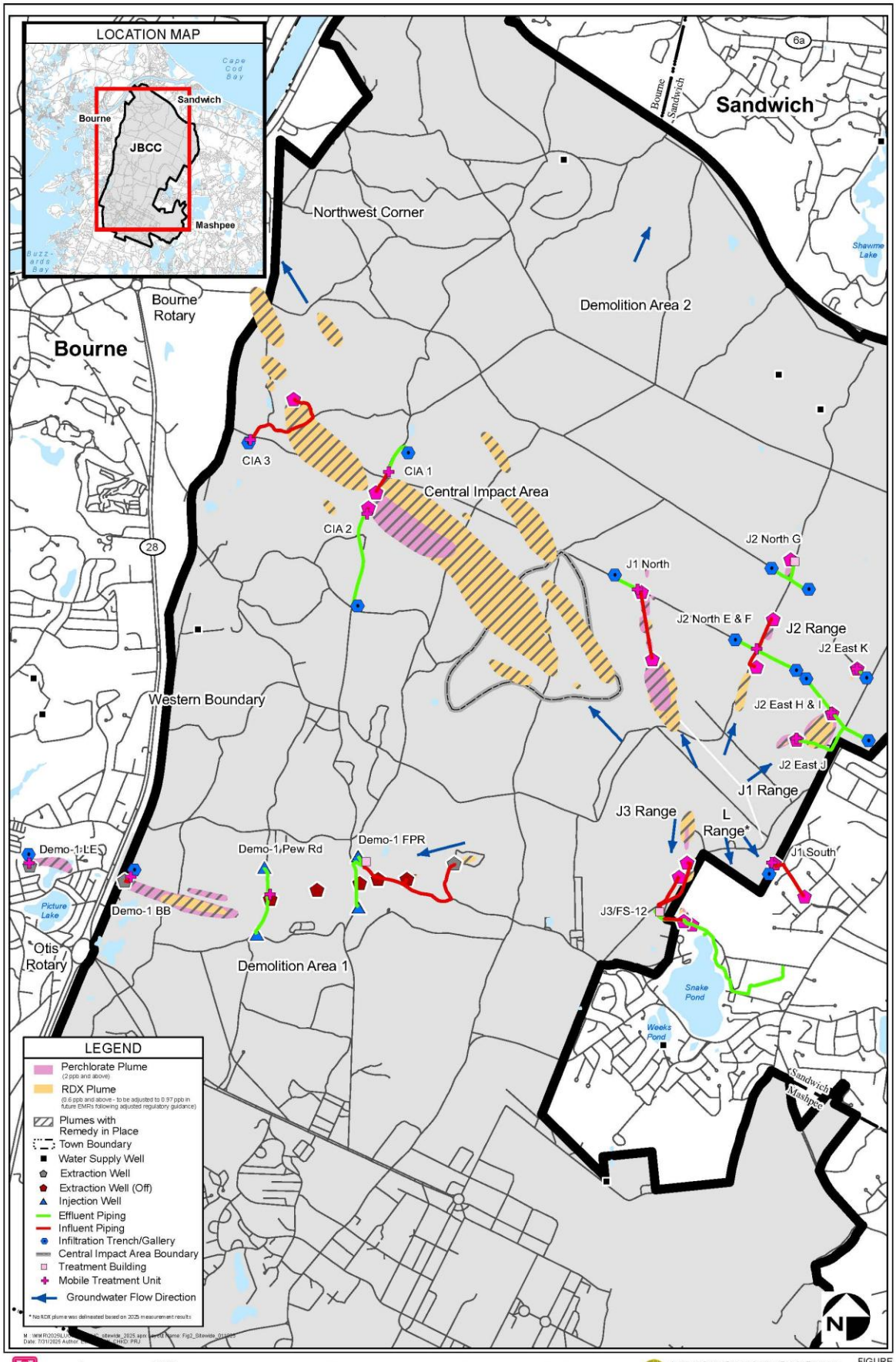
- JBCC Boundary
- Impact Area Boundary
- Central Impact Area

Figure 1
General Location Map

Joint Base Cape Cod

Figure 1

JULY 2025



US Army Corps of Engineers® New England District

0 2,640 Feet

IAGWSP Plumes and Treatment Systems

Impact Area Groundwater Study Program
January 2025

FIGURE 2

APPENDIX A

Massachusetts Department of Environmental Protection Letter of Concurrence

Commonwealth of Massachusetts
Executive Office of Energy and Environmental Affairs
Department of Environmental Protection
Address: 100 Cambridge Street, Suite 900, Boston MA 02114 | **Phone**: 617-292-5500

Maura T. Healey	**Kim Driscoll**	**Rebecca Tepper**	**Bonnie Heiple**
Governor	Lieutenant Governor	Secretary	Commissioner

December 19, 2025

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 Addendum Change in RDX Groundwater Cleanup Level for Central Impact Area, Demolition Area 1, J-1 Range, J-2 Range, J-3 Range and L Range,
Concurrence

Dear Mr. Olson,

The Massachusetts Department of Environmental Protection (MassDEP) has reviewed the document "**Decision Document Addendum, Change in RDX Groundwater Cleanup Level for Impact Area Groundwater Study Program Operable Units Central Impact Area, Demolition Area 1, J-1 Range J-2 Range J-3 Range and L Range**" (DD Addendum), dated October 2025. The DD Addendum has been prepared to document a revision to the groundwater cleanup level for the contaminant of concern (CoC) hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX). The DD Addendum modifies Decision Documents (DDs) for the Operable Units (OUs) Central Impact Area (CIA) (2012), Demolition Area 1 (Demo 1) (2006, with addendums 2009 and 2013), J-1 Range (2011), J-2 Range (2013), J-3 Range (2015), and L Range (2010). The groundwater remedies are being addressed as part of the Army National Guard Impact Area Groundwater Study Program (IAGWSP) at Camp Edwards on Joint Base Cape Cod.

The OUs are being remediated by the IAGWSP per requirements that were developed in accordance with the Safe Drinking Water Act (SDWA) including consideration of the substantive cleanup standards of the Massachusetts Contingency Plan (MCP) 310 CMR 40.0000. The remedies addressing groundwater are being conducted pursuant to DDs that have been issued for each site in accordance with Section 1431(a) of the SDWA, 42 USC § 300i(a), as amended, and with the following Administrative Orders concerning response actions issued thereunder: U.S. Environmental Protection Agency (EPA) Region 1 Administrative Order Numbers SDWA-1-97-1019 (AO1); SDWA-1-97-1030 (AO2); SDWA-1-2000-0014 (AO3); and RCRA 1-2001-0014 (AO4). The Regional Administrator of EPA Region 1 has delegated authority to select the necessary response action pursuant to EPA Delegation No. 9-17 (1200-TN-350) dated May 11, 1994, and further delegated to the EPA Region 1 Director, Office of Site Remediation and Restoration, pursuant to a redelegation of authorities dated April 6, 2010.

The CoCs at the OUs are perchlorate and RDX. The groundwater cleanup level for perchlorate is the Massachusetts Maximum Contaminant Level and MCP GW-1 groundwater standard of 2 micrograms per liter (µg/L). The current groundwater cleanup level for RDX is 0.6 µg/L, based on the pre-2018 EPA Regional Screening Level (RSL) developed for a target lifetime cancer risk level of one in a million (10^{-6}). The MCP GW-1 groundwater standard for RDX is 1 µg/L. The goal of the response actions for the OUs is to ensure that groundwater containing CoCs at concentrations greater than DD-established cleanup levels is restored to protective levels.

EPA updated the RSL for RDX in 2018 based on updated toxicity information and more current EPA recommended exposure assumptions. This updated RSL for RDX (0.97 µg/L), also based on a target lifetime cancer risk level of 10^{-6}, is higher than the current DD cleanup level (0.6 µg/L) and is lower than the MCP GW-1 standard for RDX of 1 µg/L. Therefore, the DD Addendum proposes to revise the cleanup level for RDX from 0.6 µg/L to 0.97 µg/L.

The DD Addendum was prepared to document this change in the cleanup level for RDX in groundwater as applicable at CIA, Demo 1, J-1 Range, J-2 Range, J-3 Range and L Range. No other changes to the selected remedies or response action objectives are proposed. The expected outcomes of the selected remedies at these OUs are not expected to change significantly because of this modification.

At the L Range OU, the current cleanup level has been met, and site closeout can begin. At the CIA OU, it is anticipated that the remedy will now achieve cleanup levels ten years sooner than originally estimated. For the J-1 Range, J-2 Range, and J-3 Range OUs, adjusting the cleanup level is expected to result in minor reductions in time to achieve the cleanup objectives. For the Demolition Area 1 OU, adjusting the cleanup level is not expected to change the time to achieve the cleanup objectives. This change to the groundwater cleanup level was approved by EPA under the authority of the SDWA, is consistent with the MCP GW-1 standard and is not expected to change the scope, performance, or cost of the remedies for the Demo 1, J-1 Range, J-2 Range, and J-3 Range OUs.

Determination

MassDEP concurs with the DD Addendum prepared for Impact Area Groundwater Study Program Operable Units Central Impact Area, Demolition Area 1, J-1 Range, J-2 Range, J-3 Range and L Range. MassDEP's concurrence with the DD Addendum is based upon representations made to MassDEP by 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 Operable Units identified in the DD Addendum 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, regulation, or other authority to require further response actions including, without limitation, additional investigation, remedial measures, and the implementation of land use controls. 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 IAGWSP Operable Units Central Impact Area, Demolition Area 1, J-1 Range, J-2 Range, J-3 Range and L Range. If you have any

questions regarding this matter, please contact Leonard J. Pinaud, Federal Site Management Chief, Bureau of Waste Site Cleanup in MassDEP's Southeast Regional Office at (617) 694-2644.

Sincerely,

Diane M. Baxter for

Millie Garcia-Serrano
Assistant Commissioner
MassDEP Bureau of Waste Site Cleanup

MGS/lp

Ec: Upper Cape Select Boards
Upper Cape Boards of Health
Joint Base Cape Cod Cleanup Team
Shawn Cody, Army National Guard, JBCC IAGWSP
Jodi Lyn Cutler, Remediation Manager, JBCC IAGWSP
Robert Lim, Remedial Project Manager, USEPA R1
Gary Moran, Deputy Commissioner- Operations
John Beling, Deputy Commissioner- Policy
Gerard Martin, Regional Director
Diane Baxter, Division Director, Federal Grants Program
Lucas Rogers, Chief Bureau Counsel, BWSC
John Handrahan, BWSC Deputy Regional Director
Leonard J. Pinaud, Chief, Federal Site Management
Andrew Fowler, Regional Counsel
MassDEP Boston/Southeast Region

APPENDIX B
Glossary of Terms and Acronyms

GLOSSARY OF TERMS AND ACRONYMS

2,4-DNT	2,4-Dinitrotoluene
AO	Administrative Order
ARNG	Army National Guard
CIA	Central Impact Area
COC	Contaminant of Concern
CMR	Code of Massachusetts Regulations
DD	Decision Document
Demo 1	Demolition Area 1
EDMS	Electronic Data Management System
EMR	Environmental Monitoring Report
EPA	United States Environmental Protection Agency
ETR	Extraction, Treatment and Reinfiltration
GPM	gallons per minute
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.
HMX	octahydro-1,3,5,7-tetranitro-1,3,5,7-tetrazocine
IAGWSP	Impact Area Groundwater Study Program
JBCC	Joint Base Cape Cod
LUC	Land Use Control
MassDEP	Massachusetts Department of Environmental Protection
MCL	Maximum Contaminant Level (federally-promulgated)
MCP	Massachusetts Contingency Plan
MMCL	Massachusetts Maximum Contaminant Level (State-promulgated)
MMR	Massachusetts Military Reservation
MTU	Modular or mobile treatment unit
OU	Operable Unit
RBC	Risk Based Concentration
RDX	Hexahydro-1,3,5-trinitro-1,3,5-triazine / Royal Demolition Explosive, an explosive compound
RRA	Rapid Response Action
RSL	Regional Screening Level
SDWA	Safe Drinking Water Act
TNT	2,4,6-Trinitrotoluene
UXO	Unexploded ordinances
µg/L	Micrograms per Liter

APPENDIX C
Index of Key Supporting Documents

INDEX OF KEY SUPPORTING DOCUMENTS

EPA. (2006). *Decision Document, Demolition Area 1 Grondwater Operable Unit. Camp Edwards, Joint Base Cape Cod, Cape Cod, Massachusetts, United States Environmental Protection Agency, Region 1, Boston, MA. November.*

EPA. (2009). *Decision Document Addendum No. 1, Demolition Area 1. Camp Edwards, Joint Base Cape Cod, Cape Cod, Massachusetts, United States Environmental Protection Agency, Region 1, Boston, MA. September.*

EPA. (2010). *Decision Document, L Range Groundwater Operable Unit, Camp Edwards, Joint Base Cape Cod, Cape Cod, Massachusetts. United States Environmental Protection Agency, Region 1, Boston, MA. September.*

EPA. (2011). *Decision Document, J-1 Range Groundwater Operable Unit, Camp Edwards, Joint Base Cape Cod, Cape Cod, Massachusetts. United Stated Environmental Protection Agency, Region 1, Boston, MA. May.*

EPA. (2012). *Decision Document, Central Impact Area, Soil and Groundwater Operable Units. Camp Edwards, Joint Base Cape Cod, Cape Cod, Massachusetts, United States Environmental Protection Agency, Region 1, Boston, MA. March.*

EPA. (2013a). *Decision Document Addendum No. 2, Demolition Area 1 Off-Base Leading Edge Groundwater Plume. Camp Edwards, Joint Base Cape Cod, Cape Cod, Massachusetts, United States Environmental Protection Agency, Region 1, Boston, MA. September.*

EPA. (2013b). *Decision Document, J-2 Range Operable Unit, Camp, Joint Base Cape Cod, Cape Cod, Massachusetts. United States Environmental Protection Agency, Region 1, Boston, MA. September.*

EPA. (2014). *Memo from D. Stalcup (Office of Solid Waste and Emergency Reponse) to Superfund National Policy Managers, Region 1-10 re: Human Health Evaluation Manual Supplemental Guidance; Update of Standard Default Exposure Factors. OSWER Directive 9200.1-120.*

EPA. (2015). *Decision Document, J-3 Range Operable Unit, Camp, Joint Base Cape Cod, Cape Cod, Massachusetts. United States Environmental Protection Agency, Region 1, Boston, MA. September.*

EPA. (2018). *Toxicological Review of Hexahydro-1,3,5-trinitro-1,3,5-triazine (RDX). EPA/635/R-18/211Fa. August.*

EPA. (2024). *Regional Screening Levels (RSLs) – Generic Tables. November.*

KOMAN. (2025). *Impact Area Groundwater Study Program Third Five-Year review 2017-2021. Camp Edwards, Joint Base Cape Cod, Cape Cod, Massachusetts. March.*

USACE. (2024). *Final L Range Environmental Monitoring Report for March 2023 through February 2024, Camp Edwards, Joint Base Cape Cod. November.*

USACE. (2025a). *Final Central Impact Area Environmental Monitoring Report for July 2023 through June 2024, Camp Edwards, Joint Base Cape Cod. August.*

USACE. (2025b). *Draft J-1 Range Northern Environmental Monitoring Report for January 2023 through December 2023, Camp Edwards, Joint Base Cape Cod. March.*

USACE. (2025c). *Draft J-2 Range Eastern Environmental Monitoring Report for November 2023 through October 2024, Camp Edwards, Joint Base Cape Cod. July.*

USACE. (2025d). *Final Demolition Area 1 Environmental Monitoring Report for July 2023 through June 2024, Camp Edwards, Joint Base Cape Cod. May.*

USACE. (2025e). *Final J-1 Range Southern Environmental Monitoring Report for January 2023 through December 2023, Camp Edwards, Joint Base Cape Cod. July.*

USACE. (2025f). *Final J-2 Range Northern Environmental Monitoring Report for November 2022 through October 2023. April.*

USACE. (2025g). *Final J-3 Range Environmental Monitoring Report for September 2022 through August 2023, Camp Edwards, Joint Based Cape Cod. March.*