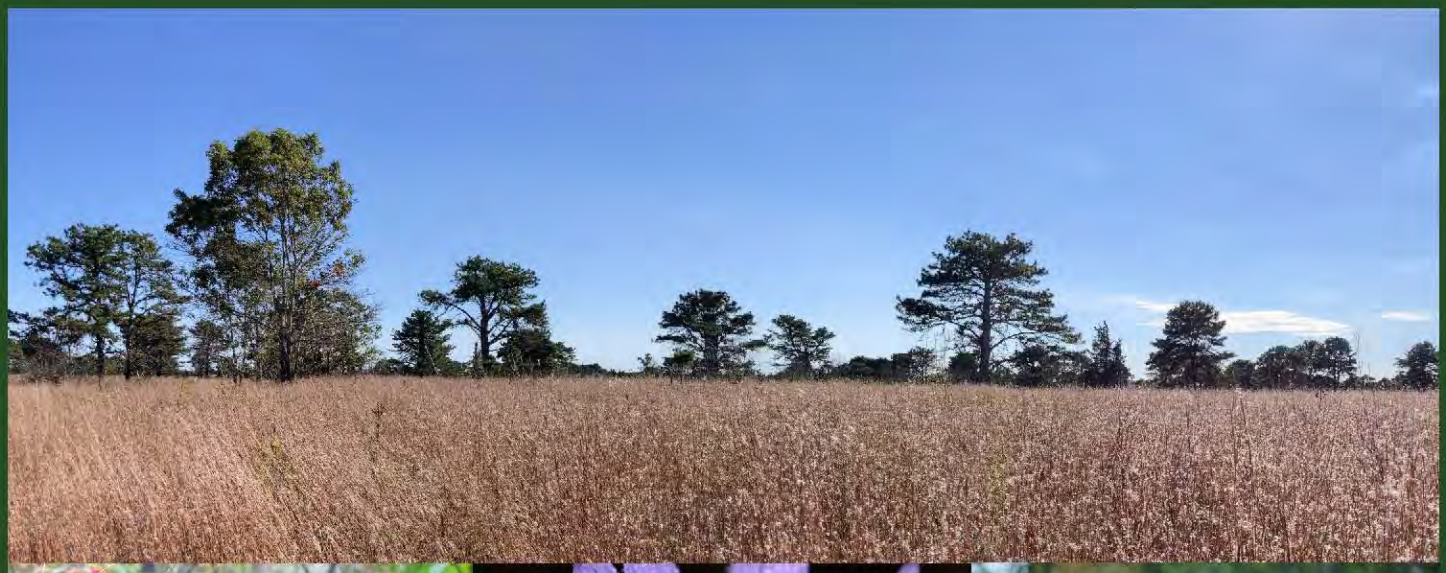
STATE OF THE RESERVATION REPORT

TRAINING YEAR 2025• CAMP EDWARDS
FINAL



Final Annual State of the Reservation Report, Camp Edwards, Training Year 2025
March 2026

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Preface

The Annual *State of the Reservation Report* (the Annual Report), established by the Massachusetts Environmental Policy Act process and required by state law (Chapter 47 of the Acts of 2002), is the result of many years of environmental reviews and submissions by the Massachusetts Army National Guard.

The Annual Report describes the nature and extent of military training and other activities taking place in the Camp Edwards Training Area/Upper Cape Water Supply Reserve. In addition, it describes the status of the Massachusetts Army National Guard's compliance with environmental laws, regulations and the Environmental Performance Standards, a set of 19 standards established in Chapter 47 of the Acts of 2002 guiding military and civilian usage of the Camp Edwards Training Area/Upper Cape Water Supply Reserve (Training Area/Reserve). The Annual Report illustrates that coordinated military training can occur in the Camp Edwards Training Area/Upper Cape Water Supply Reserve in a manner that is compatible with the natural resources purposes of water supply and wildlife habitat protection.

The Annual *State of the Reservation Report* covers the Massachusetts National Guard's Training Year 2025, which ran from October 1, 2024 to September 30, 2025; therefore, information provided in this report generally encompasses an individual training year rather than calendar year. The Annual Report's primary focus is the review of the Massachusetts Army National Guard's environmental programs relative to compliance with applicable local, state, and federal regulations. Each year, the Annual Report provides information on military training levels, range area usage, resource management activities, environmental indicators for training activities, and coordination among other activities and projects, such as the regional water supply and the remediation program activities.

The Annual Report also provides information on environmental reviews for proposed Massachusetts National Guard and other projects within the Upper Cape Water Supply Reserve.

The Annual Report is structured as follows:

Section 1, Introduction, discusses the organizational structure of Joint Base Cape Cod and the environmental management structure pertaining to activities in the northern training areas of Camp Edwards.

Section 2, Small Arms Ranges and Military Training Activities, provides an update on live fire at the Small Arms Ranges at Camp Edwards and associated activities. This section also provides information on military training that occurred in the Training Area/Reserve during Training Year 2025. Data are provided on the levels of training in the various training areas in the Training Area/Reserve and range usage, as well as at the various training support area facilities in the Cantonment Area on Camp Edwards.

Section 3, Environmental Program Management, focuses on environmental management programs operated by the Massachusetts Army National Guard in the Training Area/Reserve and program compliance with the Environmental Performance Standards for the Training Area/Reserve for the training year.

Section 4, Remediation Program Activities, provides a summary of remediation activities undertaken in the Training Area/Reserve during the training year by the Installation Restoration Program and the Impact Area Groundwater Study Program.

Section 5, Miscellaneous Military and Civilian Activities and Environmental Program Priorities, provides information on major activities undertaken during Training Year 2025 that may not be directly related to a Massachusetts Army National Guard Environmental Management Program, actions in the Training Area/Reserve, or specific Environmental Performance Standards for the Training Area/Reserve.

The Annual Report is the culmination of a year-long effort by the military and civilian employees of the Massachusetts Army National Guard, Training Site Camp Edwards, the Environmental & Readiness Center, the Natural Resource Program, and the Environmental Management Commission to provide valuable information on the state of the Training Area/Reserve to interested stakeholders and the community at large. In good faith, the Annual Report is provided to the Environmental Management Commission's Environmental Officer, and the Commission's Science Advisory Council and Community Advisory Council for their input.

Referenced Documents

The Annual *State of the Reservation* report encompasses a large amount of information and makes reference to many letters, reports and other documents that were developed over the course of Training Year 2025. Many of these are available on-line and any letter, document or report, such as the *Camp Edwards Natural Resources & Training Lands Management Annual Report Fiscal Year 2025*, referenced in the *Annual State of the Reservation Report* is available by contacting Emily Kelly, Community Involvement Specialist, Massachusetts National Guard Environmental & Readiness Center, 339-202-9341, emily.d.kelly2.nfg@army.mil. Many documents are also available on the Massachusetts Army National Guard Camp Edwards Training Site website and the Environmental Management Commission's website.

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Acronyms

AFCEC	Air Force Civil Engineer Center
AgCS	Agassiz's Clam Shrimp (*Eulimnadia agassizii)*
AmCS	American Clam Shrimp (*Limnadia lenticularis*)
ANGB	Air National Guard Base
AR	Army Regulation
ASUS	American States Utility Services, Inc.
ATV	All Terrain Vehicle
BP	Battle Position
BMP	Best Management Practice
CAA	Clean Air Act
CAC	Community Advisory Council
CER	Camp Edwards Regulation
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulation
CIA	Central Impact Area
CLP	Cleaning/lubricating/preservative
CMP	Conservation and Management Plan
CMR	Code of Massachusetts Regulations
CPMPP	Construction Period Monitoring and Protection Plan
CRREL	Cold Regions Research and Engineering Laboratory
CS	Chemical Spill
CSE	Comprehensive Site Evaluation
DBH	Diameter at Breast Height
DCR	Department of Conservation and Recreation
DFG	Department of Fish and Game
DFW	Division of Fisheries and Wildlife
DoD	Department of Defense
E&RC	Environmental & Readiness Center
EDB	Ethylene Dibromide
EIS	Environmental Impact Statement
EMC	Environmental Management Commission
EPA	Environmental Protection Agency
EPR	Enhanced Performance Round
EPS	Environmental Performance Standard
FS	Fuel Spill
GIS	Geographic Information System

Acronyms, continued

IAGWSP	Impact Area Groundwater Study Program
IED	Improvised Explosive Device
IMT	Individual Movement Techniques
INRMP	Integrated Natural Resources Management Plan
IOMMP	Integrated Operations, Maintenance and Monitoring Plan
IWFMP	Integrated Wildland Fire Management Plan
IRP	Installation Restoration Program
ITAM	Integrated Training Area Management
IWFMP	Integrated Wildland Fire Management Plan
JBCC	Joint Base Cape Cod
LQG	Large Quantity Generator
MAANG	Massachusetts Air National Guard
MAARNG	Massachusetts Army National Guard
MANG	Massachusetts National Guard
MassDEP	Massachusetts Department of Environmental Protection
MassDOT	Massachusetts Department of Transportation
MA SHPO	Massachusetts State Historic Preservation Office
MEC	Munitions and Explosives of Concern
MEPA	Massachusetts Environmental Policy Act
MESA	Massachusetts Endangered Species Act
MGL	Massachusetts General Law
MIPAG	Massachusetts Invasive Plants Advisory Group
mm	millimeter
MMRP	Military Munitions Response Program
MOUT	Military Operations on Urban Terrain
MPMG	Multipurpose Machine Gun Range
MW	Megawatt
NBC	Nuclear-Biological-Chemical
NEPA	National Environmental Policy Act
NHESP	Natural Heritage and Endangered Species Program
NRTLP	Natural Resources and Training Lands Program
NWCG	National Wildfire Coordinating Group
OB/OD	open burning/open detonation
OMMP	Operation, Maintenance and Monitoring Plan
P2	Pollution Prevention
PAI	pounds of active ingredient
PAVE PAWS	Precision Acquisition Vehicle Entry – Phased Array Warning System
ppb	parts per billion
ppm	parts per million

Acronyms, continued

PFAS	Per- and polyfluoroalkyl substances
RDX	Royal Demolition Explosive
REC	Record of Environmental Consideration
RI	Remedial Investigation
ROA	Record of Action
ROCA	Range Operations and Control Area
ROD	Record of Decision
RP	Rare Plant
ROTC	Reserve Officers Training Corps
SAC	Science Advisory Council
SGCN	Species of Greatest Conservation Need
SFS	Space Force Station
Sb	Antimony
SOP	Standard Operating Procedure
SR/ES	Source Registration/Emissions Statement
SVL	Soldier Validation Lane
TA	Training Area
TSA	Training Support Area
TTB	Tactical Training Base
TY	Training Year
UAS	Unmanned Aerial System
UMass	University of Massachusetts
URI	University of Rhode Island
USCG	United States Coast Guard
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UTES	Unit Training and Equipment Site
UTM	Ultimate Training Munition
WFPC	Wildland Fire Program Coordinator
WPA	Wetlands Protection Act
WWTP	Wastewater Treatment Plant

Glossary of Terms

Action Levels: If reference concentration levels for soil, porewater or groundwater are exceeded, training activities at a small arms range may be temporarily paused while results are reviewed in coordination with the EMC to identify potential causes and determine appropriate actions to protect the resource.

Air Force Civil Engineer Center: The Air Force Civil Engineer Center, located at Joint Base San Antonio-Lackland, Texas, is responsible for providing responsive, flexible full-spectrum installation engineering services. AFCEC missions include facility investment planning, design and construction, operations support, real property management, energy support, environmental compliance and restoration, and audit assertions, acquisition and program management. AFCEC manages the Installation Restoration Program at Joint Base Cape Cod.

Algonquin: The Algonquin Gas Transmission Pipeline is a 1,100-mile-long pipeline system, which delivers natural gas to New England.

Bullet pocket: The part of the target or backstop berm that receives the fired bullets.

Calero Mobile Military Operations on Urban Terrain Site: The Calero Military Operations on Urban Terrain site on Camp Edwards comprises 29 single and multi-floor structures designed to provide a training environment in which units learn the individual and unit skills necessary to fight and defeat an enemy in an urban environment. The facility is also used to conduct Law Enforcement, Civil Disturbances, Emergency Responses, and other related training.

Camp Edwards Training Area: The Massachusetts Army National Guard Camp Edwards Training Site (Camp Edwards Training Area) is the major training area for Army National Guard soldiers in the Northeast. It is approximately 14,886 acres located on the northern portion of Joint Base Cape Cod. At Camp Edwards, soldiers practice maneuvering exercises, bivouacking, and use the small arms ranges. The Upper Cape Water Supply Reserve also is located on the 14,886 acres of Camp Edwards. It comprises—and for the purposes of this report, may be synonymous with—Camp Edwards' 14,886-acre northern training area.

Cantonment Area: The southern 7,200-acre developed area of Joint Base Cape Cod with roads, utilities, office and classroom buildings, training support areas, and housing. There are numerous federal, state and county entities located there.

Cape Cod Space Force Station: Cape Cod Space Force station, which includes the PAVE PAWS early warning radar system, is located on an 87-acre parcel of land on the northwest corner of Joint Base Cape Cod.

Community Advisory Council: The EMC's Community Advisory Council assists the commission on issues related to protection of the water supply and wildlife habitat in the Reserve. The 15-member council consists of one representative from each of the surrounding towns (Bourne, Falmouth, Mashpee, and Sandwich), one resident of base housing, two representatives from the military, one representative from the Cape Cod Commission, one representative from the Upper Cape Regional Water Supply Cooperative, one representative from the Wampanoag Tribe, and five other members appointed by the governor. Meetings are held two times per year.

CONEX Box: A type of cargo container used to transport and store supplies.

Converge/American States Utility Services (ASUS): Converge is a global investment and development company which owns and operates businesses that provide essential services. In 2022, the US Air Force entered into an

agreement to transfer ownership of the Otis Air National Guard Base water and wastewater systems to Converge LLC. Converge then selected American States Utility Services, Inc. (ASUS) to operate and maintain the systems.

Department of Conservation and Recreation (DCR): DCR manages state parks and oversees more than 450,000 acres throughout Massachusetts. It protects, promotes, and enhances the state's natural, cultural, and recreational resources.

Department of Environmental Protection (MassDEP): MassDEP's mission is to protect and enhance the Commonwealth's natural resources - air, water, and land - to provide for the health, safety, and welfare of all people, and to ensure a clean and safe environment for future generations.

Department of Fish and Game: The Department of Fish and Game's mission is to conserve the Commonwealth's abundant marine and freshwater fisheries, wildlife, plants, and natural communities, as well as the habitats that support them, for the benefit and enjoyment of all people.

Environmental & Readiness Center: The mission of the Environmental & Readiness Center is to integrate protection of the environment with compatible military training within the Camp Edwards Training Area and Upper Cape Water Supply Reserve.

Environmental Management Commission: The Environmental Management Commission (EMC) ensures the permanent protection of the drinking water supply and wildlife habitat of the Upper Cape Water Supply Reserve. The EMC is comprised of the commissioners of the Department of Fish and Game, the Department of Environmental Protection and the Department of Conservation and Recreation. Its primary authority comes from Massachusetts Chapter 47 of the Acts of 2002.

Environmental Officer: The Environmental Officer reports to the EMC Commissioners. The duties and responsibilities of the Environmental Officer include monitoring the activities being conducted on, and the uses of, the Upper Cape Water Supply Reserve and the impact of such activities and uses on the water supply and wildlife habitat.

Environmental Performance Standards: The Environmental Performance Standards (Appendix A) are a list of requirements, or standards for performance, that guide both military and other users in the protection of Camp Edwards' natural and cultural resources and the groundwater beneath the Training Area/Reserve. The Environmental Performance Standards were specifically created through the Massachusetts Environmental Policy Act process to protect the resources in the Training Area/Reserve and codified in Chapter 47 of the Acts of 2002. They are based in large part on existing federal, state, and Department of Defense regulations. In some cases, the protections offered by the performance standards are more stringent than those offered by other regulations. These standards apply to the Upper Cape Water Supply Reserve within the Camp Edwards Training Area.

Eversource: Eversource is a utility providing electric, gas and water service in New England.

Frost Bottom: A low-lying area where early frost occurs in the fall and late frost in spring.

Glyphosate: Glyphosate is a broadleaf plant and grass herbicide.

Impact Area: The 2,200-acre Impact Area is located in the center of the Upper Cape Water Supply Reserve/Camp Edwards Training Site. The small arms ranges, both active and inactive, are situated around the perimeter of the Impact Area, with range firing toward the Impact Area. The 330-acre Central Impact Area is located within the Impact Area; it was the primary target area for artillery, mortar, and other firing activities from the early 1900s until firing ceased in 1997.

Impact Area Groundwater Study Program: The Impact Area Groundwater Study Program is an environmental cleanup program at Camp Edwards addressing areas of groundwater contamination and its sources from the northern portion of Joint Base Cape Cod and some off-base areas. The program is managed by the Army National Guard and is regulated under the Safe Drinking Water Act.

Installation Restoration Program: The Installation Restoration Program, an environmental cleanup program regulated under the Comprehensive Environmental Response, Compensation and Liability Act, is addressing contamination caused by military-related activities and found primarily in the southern portion of JBCC and off-base. The program is managed by the Air Force Civil Engineer Center.

Integrated Training Area Management Program: The Integrated Training Area Management (ITAM) Program is responsible for maintaining the land to help the Army to meet its training requirements. The Integrated Training Area Management Program is the U.S. Army standard for sustaining the capability of installation land units to support their military training missions.

Lysimeter: A lysimeter is a container buried in the ground that is used to measure water movement through soils and collect soil moisture samples.

Massachusetts Environmental Policy Act (MEPA): The MEPA review process provides meaningful opportunities for public review of the environmental impacts of projects for which agency actions are needed. It requires agencies to study the environmental impacts of projects requiring agency permits or other approvals, financial assistance, or land transfers, and to use all feasible measures to avoid, minimize, and mitigate damage to the environment.

Natural Resource Program: Camp Edwards Natural Resources and Training Lands Program staff is responsible for maintaining and enhancing soldier training lands in the Training Area through ecosystem conservation, stewardship and partnership.

National Environmental Policy Act (NEPA): NEPA ensures agencies consider the significant environmental consequences of proposed actions and inform the public about decision making. NEPA establishes procedural requirements for proposals for major Federal actions significantly affecting the quality of the human environment by requiring Federal agencies to prepare a detailed statement on the environmental impact of the proposed action; any adverse effects that cannot be avoided; alternatives to the proposed action; the relationship between local short-term uses of man's environment and the maintenance and enhancement of long-term productivity; and any irreversible and irretrievable commitments of resources that would be involved in the proposed action

Operations, Maintenance, and Monitoring Plan: Operations, Maintenance, and Monitoring Plans outline range-specific monitoring to protect the environment. All active ranges at Camp Edwards operate under an OMMP.

Pop-up targets: A pop up target is a mechanical target that is used during shooting practice on Echo Range and Sierra Range. A mechanism raises and lowers the targets in a pre-determined pattern.

Porewater: Porewater is water that fills the tiny spaces between soil particles or sediment grains.

Pyrotechnics: Military pyrotechnics are devices that create light, smoke, and sound for signaling, illumination, and simulation. They are used in a variety of military applications, including battle simulation, chemical detection, and obstacle breaching.

Range Operations: Camp Edwards's Range Operations manages and controls the use of training ranges and airspace to ensure safe and efficient training operations.

Range Operations and Control Area (ROCA): ROCA structures support range operations and safety on small arms ranges. ROCA structures include buildings like a mess shelter, ammunition breakdown building, bleachers, control tower, storage buildings, and classroom facilities.

Records of Environmental Consideration: A Record of Environmental Consideration (REC) is a signed statement submitted with project documentation that briefly documents that an Army action has received environmental review. While a REC may document compliance with the requirements of NEPA, it does not fulfill the requirements of other environmental laws and regulations. For full text please see 40 CFR 651.19.

Remediation: Environmental remediation is the process of cleaning up pollution and contamination from the environment.

Science Advisory Council: The EMC's Science Advisory Council provides scientific and technical assistance to the commission as it relates to protection of natural resources of the Reserve. The Science Advisory Council, appointed by the governor, consists of scientists and engineers recognized for their expertise in the areas of public health, water protection, wildlife habitat management, and land use management. Meetings are held two times per year.

Sentry Well: A sentry well is a groundwater monitoring well that can detect chemicals in groundwater and is installed to provide early warning of chemical contamination.

Simulated munitions: Wax marking tipped ammunition that can be used in a standard weapon. They can be shot at a Soldier wearing proper personal protective equipment with the wax projectile leaving a colored mark on their clothing letting them know they are hit. Simulated munitions are best used in concert with other simulators to be effective for most units.

Small Arms Ranges: Small arms ranges allow live-fire qualification training with weapons of a small caliber, i.e., pistols, rifles and semi-automatic and automatic rifles. Small arms training is designed to train a soldier to be "qualified" in the use and maintenance of his or her assigned weapon. There are four operational active small arms ranges on Camp Edwards, which the Massachusetts Army National Guard uses for weapons familiarization, weapons zeroing (essentially customizing it to give the soldier a more accurate shot) and qualification. There are two ranges currently undergoing redesign/reconfiguration.

Sea Cadets: The United States Naval Sea Cadet Corps *(*Sea Cadets*)* is the Navy's youth development program. The Sea Cadets give young Americans skills, knowledge, and confidence through a variety of training opportunities.

Soldier Validation Lane: The Soldier Validation Lane (SVL) training concept was developed to enhance the effectiveness and realism of existing pre-mobilization training. The SVL is a Home Station Training Lane for Counter Improvised Explosive Device-related training utilizing containerized structures to create flexible "villages" or "urban clusters" at various locations throughout the Camp Edwards training area.

Sole Source Aquifer: A Sole Source Aquifer is an aquifer that has been designated by the United States Environmental Protection Agency as the sole or principal source of drinking water for an area. By definition, a Sole Source Aquifer is an aquifer that supplies at least 50 percent of the drinking water consumed in the area overlying the aquifer.

Training Year: A training year runs from October 1 to September 30 and is based on the federal fiscal year. Information found in the annual *State of the Reservation Report* is compiled by training year. This *Annual State of the Reservation Report* is for Training Year 2024 (October 1, 2024 – September 30, 2025).

Training Support Area: There are facilities and equipment that can simulate live military training that are separate from the Camp Edwards Training area; these are grouped under the Training Support Area. The majority of the training activities associated with these facilities are conducted in the Cantonment Area of Camp Edwards. Training Support Areas include Kelley Tactical Training Base, the Calero Mobile Military Operations on Urban Terrain Site, the Engagement Skills Trainer, and the Virtual Convoy Operations Trainer, which are all outside of the Upper Cape Water Supply Reserve/Camp Edwards Training Area.

Triclopyr: Triclopyr is a systemic herbicide applied to woody plants, invasive vines, and broadleaf weeds.

US Army Corps of Engineers Cold Regions Research and Engineering Laboratory (CRREL): The Cold Regions Research and Engineering Laboratory, located in Hanover, New Hampshire, and with facilities in Alaska, comprises more than 250 engineers, scientists, technicians, and support personnel working together to address current and emerging technical challenges related to cold regions. Research at CRREL focuses on geospatial research and engineering, installations and environment, military engineering, and water resources.

United States Coast Guard Communications Station: The US Coast Guard operates high seas communication stations used to communicate with ships throughout the Atlantic and Pacific Ocean and provide a variety of services to the maritime public.

United States Geological Survey: The U.S. Geological Survey serves the Nation by providing reliable scientific information to describe and understand the Earth; minimize loss of life and property from natural disasters; manage water, biological, energy, and mineral resources; and enhance and protect our quality of life. The USGS combines and enhances its diverse programs, capabilities, and talents to provide science leadership and contribute to the resolution of complex issues.

Unit Training Equipment Site: A vehicle maintenance facility located in Camp Edwards Cantonment Area, where major repairs and other maintenance activities and training may occur.

Upper Cape Regional Water Supply Cooperative: The Upper Cape Regional Water Supply Cooperative consists of three water supply wells and seven sentry monitoring wells located in the northern part of JBCC. The wells provide water to Bourne, Mashpee, Sandwich, Falmouth, the Barnstable County Correctional Facility and the Converge/American States Utility Services (ASUS) water supply system located on JBCC.

Upper Cape Water Supply Reserve: The Upper Cape Water Supply Reserve was established by Chapter 47 as public conservation land dedicated to three primary purposes: water supply and wildlife habitat protection; the development and construction of public water supply systems, and the use and training of the military forces of the commonwealth; provided that, such military use and training is compatible with the natural resource purposes of water supply and wildlife habitat protection. The Upper Cape Water Supply Reserve is located on, and is contiguous with, the 14,886 acres of the Camp Edwards Training Area.

Vernal Pool: A vernal pool is a shallow, temporary wetland that fills with water in the spring and dries up in the summer. They are important habitats for many species of wildlife, including frogs, salamanders, and insects. Vernal pools are protected if they are located within a jurisdictional resource area protected under the Wetland Protection Act.

Zeroing Range: A 25-meter range that Soldiers can use to zero their weapons. Zeroing is the process of calibrating the weapon’s sites to cause the shot to impact where the Soldier aims.

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Section 1
Introduction

1.0 Introduction

The Annual *State of the Reservation Report* (Annual Report) illustrates that coordinated military training can occur in the Camp Edwards Training Area/Upper Cape Water Supply Reserve (Training Area/Reserve) in a manner that is compatible with the natural resources purposes of water supply and wildlife habitat protection and the Massachusetts Army National Guard (MAARNG) is proud to report that the there are no documented negative impacts to the water supply and wildlife habitat of the Training Area/Reserve.

This section of the Annual *State of the Reservation Report* (Annual Report) provides information on Joint Base Cape Cod (JBCC) and the environmental management structure overseeing activities in the approximately 14,886-acre Training Area/Reserve. The Upper Cape Water Supply Reserve is located on, and is contiguous with, the 14,886 acres of the Camp Edwards Training Area. (See Section 1.1 and Figure 1-1).

1.1 Joint Base Cape Cod Structure

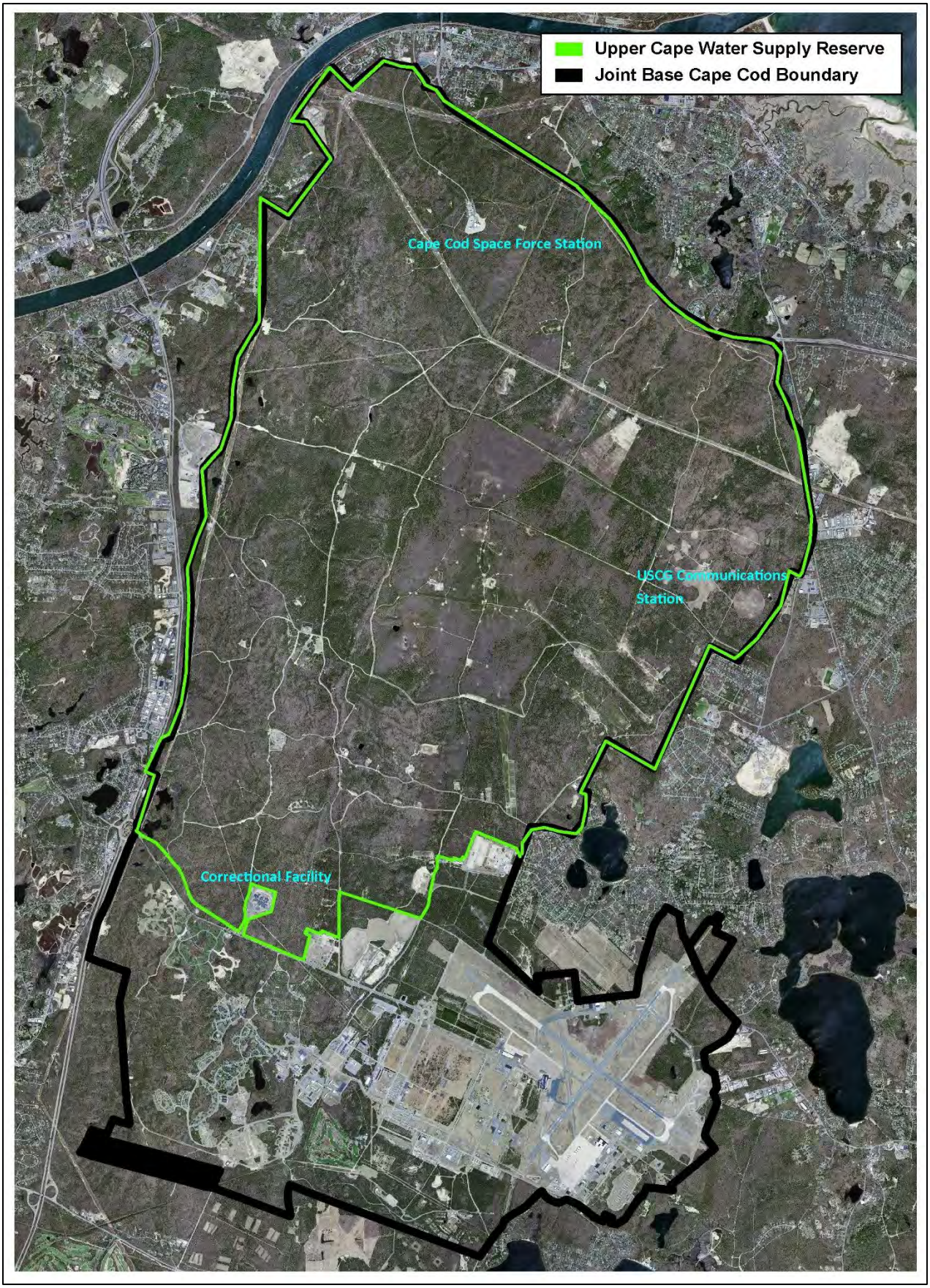
Joint Base Cape Cod is a multi-service military installation and is home to the MAARNG's Camp Edwards, the Massachusetts Air National Guard's (MAANG) Otis Air National Guard Base (ANGB), the United States Coast Guard's (USCG) Base Cape Cod, USCG Air Station Cape Cod, the U.S. Space Force's Cape Cod Space Force Station (SFS), and the Department of Veterans Affairs Cemetery. Joint Base Cape Cod is located in the upper western portion of Cape Cod, immediately south of the Cape Cod Canal in Barnstable County, Massachusetts. It includes parts of the towns of Bourne, Mashpee and Sandwich, and abuts the Town of Falmouth. Joint Base Cape Cod covers nearly 21,000 acres – approximately 30 square miles (Figure 1-1).

The Camp Edwards Training Area comprises 14,886 acres of the northern portion of JBCC. The remaining Camp Edwards military-controlled area of JBCC lies in the southern portion, or Cantonment Area. The Commonwealth of Massachusetts owns the land comprising Camp Edwards and leases the property to the Department of the Army, who in turn licenses the land to MAARNG for training.

The MAARNG and MAANG are part of the Commonwealth of Massachusetts Military Division. However, federal law largely dictates their activities, make-up, training, and functions. For example, most of the day-to-day activities conducted at JBCC by the National Guard, including annual and weekend training, are federal military activities funded by the federal government. In conducting federal military activities, the National Guard is required by federal law to follow Department of Defense (DoD) regulations, Army regulations, Air Force instructions, and applicable federal and state laws and regulations.

There are two major facilities in the northern portion of JBCC that are on land not under the operational control of the Massachusetts National Guard. Cape Cod SFS, which includes the PAVE PAWS ballistic missile early warning radar system, is located on an 87-acre parcel of land on the northwest corner of the Training Area/Reserve. The USCG's Communications Station is located on a 542-acre parcel along the northeastern side of the Training Area/Reserve. The Barnstable County Correctional Facility that opened in 2004 is located on a 29-acre parcel of land between Connery Avenue and the southern edge of the Training Area/Reserve. The locations of these facilities are shown in Figure 1-1. These facilities are located on land not under the control of the Massachusetts National Guard; therefore, detailed information concerning activities at these facilities is not included in the Annual Report. Questions pertaining to activities at Cape Cod SFS, the Coast Guard

Figure 1-1 Map of Joint Base Cape Cod



Communications Station, and the Barnstable County Correctional Facility should be addressed to the persons listed in Appendix A of this report.

The Commonwealth of Massachusetts has issued three utility easements on its state-owned property in the Training Area/Reserve: an electrical power line easement (Eversource), a natural gas pipeline easement (National Grid), and a natural gas pipeline easement (Algonquin - that partially overlays the National Grid easement).

Additionally, there are easements issued to the Upper Cape Regional Water Supply Cooperative and to the Bourne Water District. The locations of the utilities and facilities are shown in Figure 1-2.

1.2 Environmental Management Structure

1.2.1 Environmental Management Commission

Chapter 47 of the Acts of 2002 (hereafter Chapter 47) established the Environmental Management Commission (EMC), consisting of the Commissioner of the Department of Fish and Game (DFG), the Commissioner of the Massachusetts Department of Environmental Protection (MassDEP), and the Commissioner of the Department of Environmental Management (now the Department of Conservation and Recreation [DCR]). The EMC oversees compliance with and enforcement of the Environmental Performance Standards (EPSs) (see Appendix B) in the Training Area/Reserve, coordinates the actions of environmental agencies of the Commonwealth in the enforcement of environmental laws and regulations in the Training Area/Reserve, as appropriate, and facilitates an open and public review of all activities in the Training Area/Reserve. The legislation also states that the environmental agencies on the EMC retain all their respective, independent enforcement authority.

Chapter 47 also directed that the EMC be assisted by two advisory councils, appointed by the Governor of Massachusetts. The Community Advisory Council (CAC), consisting of 15 members, assists the EMC by providing advice on issues related to the protection of the water supply and wildlife habitat within the Training Area/Reserve. The Science Advisory Council (SAC), consisting of up to nine members, assists the EMC by providing scientific and technical advice relating to the protection of the drinking water supply and wildlife habitat within the Training Area/Reserve. Table 1-1 lists the CAC and SAC members as of October 2025.

Table 1-1 Community Advisory Council and Science Advisory Council Members

Community Advisory Council Member	*Area*
Andrew Campbell	Bourne Representative
Robert Catalanotti	At-Large Member
Shawn Cody	Military Member
Rob Crevey	Falmouth Representative
Jane Dolan	At-Large Member
Mark Forest	At-Large Member
Virginia Gaglio	Military Member
Andrew Gottlieb	Mashpee Representative
Mark Harding	Wampanoag Representative
John Kelly	At-Large Member
Heather McElroy	Cape Cod Commission
Robert Prophett	Upper Cape Water Supply Reserve Cooperative
Ralph Vitacco	Sandwich Representative
Vacant	At-Large Member
Vacant	JBCC Family Member

Table 1-1 Community Advisory Council and Science Advisory Council Members, continued

Science Advisory Council Member	*Area*
Paul Cavanagh	Subject Matter Expert, Natural Resources
Mark Faherty	Subject Matter Expert, Wildlife Habitat Management
Phil Gschwend	Subject Matter Expert, Chemistry
Denis LeBlanc	Subject Matter Expert, Hydrogeology
Tara Lewis	Subject Matter Expert, Natural Resources
Melissa Lombard	Subject Matter Expert, Water Protection

Chapter 47 also established an Environmental Officer for the Training Area/Reserve. Mr. Leonard Pinaud of MassDEP is the current Environmental Officer. In this capacity, the Environmental Officer provides monitoring of military and civilian activities on and uses of the Training Area/Reserve and the impact of those activities and uses on the water supply and wildlife habitat. Working directly for the EMC, the Environmental Officer has unrestricted access to all data and information from the various environmental and management programs in the Training Area/Reserve. The Environmental Officer has full access to all points in the Training Area/Reserve and conducts inspections at any time in order to monitor, oversee, evaluate, and report to the EMC on the environmental impact of military training and other activities. The Environmental Officer's on-site monitoring occurs prior to, during, and immediately following training and other activities. The Environmental Officer's monitoring activities include but are not limited to training sites, pollution prevention and habitat protection activities for both military and military contractors and civilians and civilian contractors in the Training Area/Reserve, as well as coordinating with and consulting with the Massachusetts National Guard Environmental & Readiness Center (E&RC) on various projects, initiatives and issues.

The Environmental Officer acts as a liaison between the EMC, SAC, CAC, military, general public, and various state agencies. The Environmental Officer identifies and monitors ongoing issues regarding training procedures and the environment in the Training Area/Reserve and keeps the EMC, SAC and CAC apprised of the progress of these issues in addition to bringing issues to the E&RC for resolution. The Environmental Officer also participates in community outreach activities with the E&RC and facilitates the EMC, SAC and CAC public meetings under the legislation.

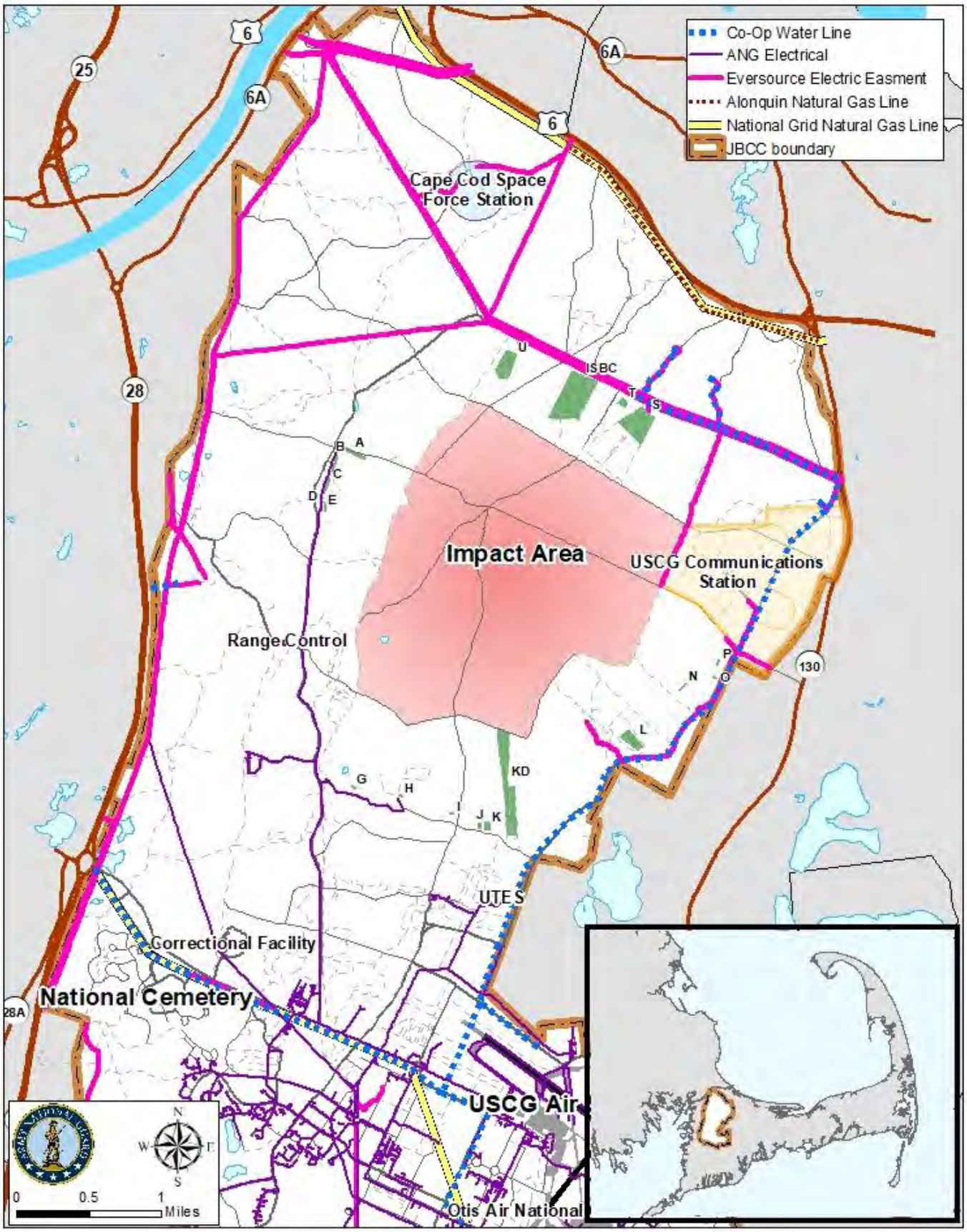
During TY 2025, the SAC met in May and September 2025, and the CAC met in October 2024 and May 2025. The EMC met in October 2024 and June 2025. The advisory councils discussed a number of topics, all of which are covered in this report. Minutes from the meetings are posted on the EMC's website after they are approved at a subsequent meeting.

1.2.2 Science Advisory Council Ad Hoc Committee

On November 2, 2017, the EMC formed an Ad Hoc Committee to the SAC to review the current small arms range environmental monitoring process and aid in developing the most appropriate monitoring processes for those ranges. Current committee members are SAC member Phil Gschwend, a geochemist, and SAC member Denis LeBlanc, US Geological Survey. The committee had a sunset clause of two years; however, based on the effectiveness of the body and emerging issues, e.g., range monitoring and pyrotechnics, the EMC voted to allow the Ad Hoc committee to continue. The Ad Hoc Committee was most recently extended to 2026 during the EMC meeting in May 2024.

The Ad Hoc Committee did not meet during TY 2025.

Figure 1-2 Utility Easements and Leases



Camp Edwards's ranges are shown in green on the figure above.

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Section 2
Small Arms Ranges and Military Training Activities

2.0 Introduction

Section 2 of the Annual Report provides an update on actions associated with operational active small arms ranges in the Training Area/Reserve including range maintenance, environmental sampling, and levels of military and civilian use of the ranges.

This section also provides information on the use of Training Areas, Training Support Areas (TSA) in the Cantonment Area of Camp Edwards, information on simulated munitions, and off-site training during TY 2025.

The Massachusetts National Guard (MANG) reports on some Cantonment Area training activities to provide context for why soldiers then move into the Training Area/Reserve to conduct the most realistic training possible to provide for trained and ready soldiers. In the words of the MAARNG trainers, soldiers are provided training in a “crawl, walk, run” scenario. The crawl phase is in the classroom where they learn theory and the basics of the training they are about to undertake; the walk phase is where soldiers can literally walk through the training event in a classroom setting, use simulators, or go into the field and walk through a scenario. Finally, the run phase is where the crawl and the walk phases are put into the most realistic field setting possible in the Training Area/Reserve.

2.1 Camp Edwards Training Area/Upper Cape Water Supply Reserve

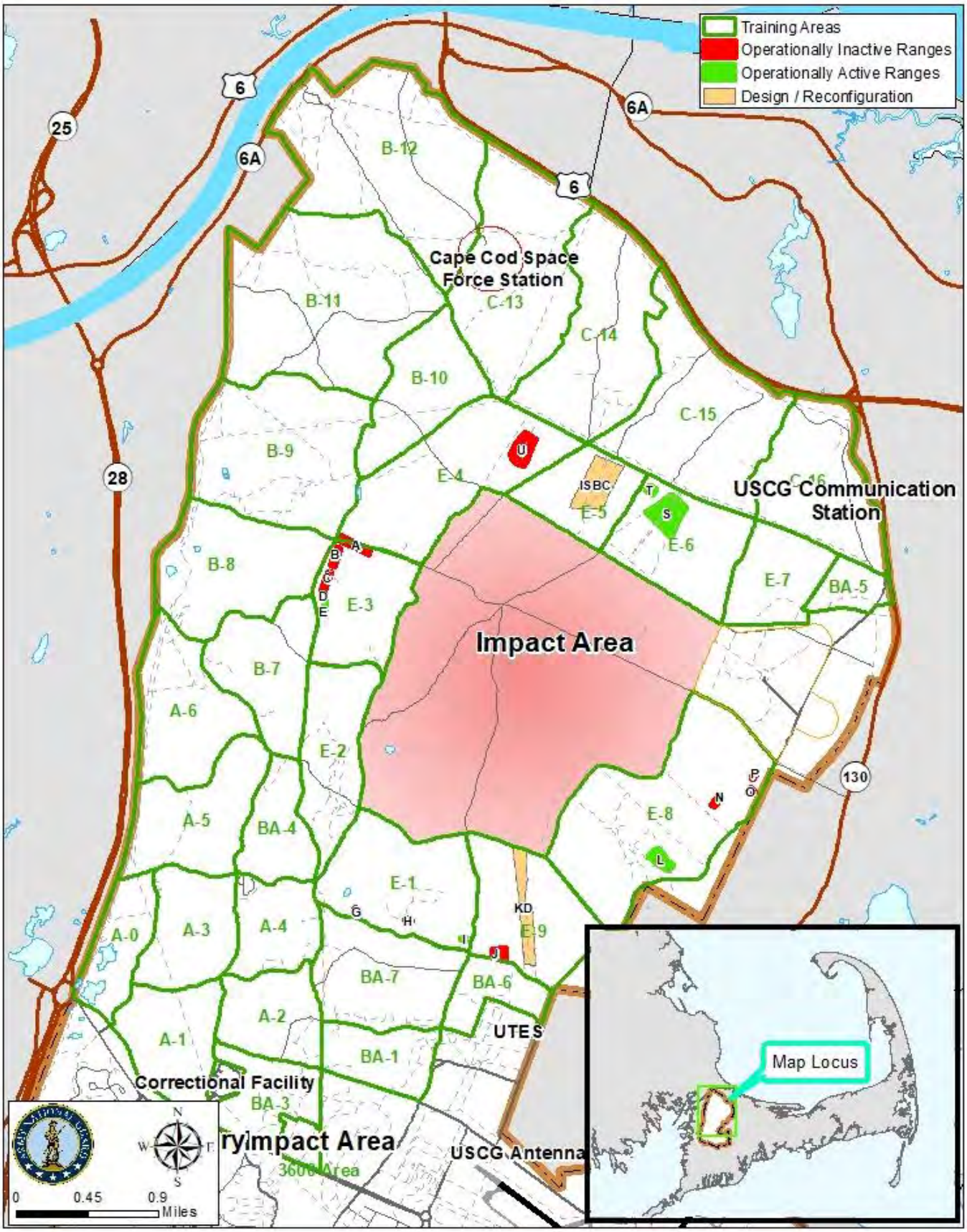
2.1.1 Military and Civilian Use

The MAARNG has approximately 5,625 soldiers who train on average one weekend per month and one two-week cycle during a training year. The Training Area/Reserve is also utilized by other DoD and law enforcement agencies (i.e.: Marines, US Coast Guard, Barnstable County Sheriff's Department, and Federal and local law enforcement). Units start planning their training several years in advance of the year in which they actually conduct their training. The unit leadership assesses the strengths and limitations of its personnel and begins to schedule training sites and resources to best support the training their units require. During the year prior (TY 2024) to the year of execution (TY 2025) units confirm geographical areas and training sites within the Training Area/Reserve. Figure 2-1 shows the locations of the training areas and small arms ranges in the Training Area/Reserve.

Military training activities in the Training Area/Reserve are tracked by Camp Edwards Range Operations based on individual training area use and the number of personnel participating in this use. This method records the number of times each training area is utilized and the number of personnel and vehicles utilizing the areas for each event. Range Operations is operational 24 hours per day when units are training and, during a training day, personnel from Range Operations will observe units at various locations to ensure that they are following range, safety, and environmental regulations.

Military training activities in the Training Area/Reserve are tracked by the number of times each training area is utilized per day and by the number of personnel and vehicles utilizing the areas for each use. In many cases personnel and vehicles utilize more than one training area per day and may be counted for the same training area more than once per day.

Figure 2-1 Camp Edwards Training Areas and Ranges



Fluctuations in training usage are influenced by deployment cycles and changes to training doctrine and directives. Increases in usage are also related to the inaccessibility of other training bases for the MAARNG to use for their readiness training needs. In addition, over the past two decades, legacy contamination cleanup activities (contamination caused in the past and managed by Air Force Civil Engineer Center (AFCEC)/Impact Area Groundwater Study Program (IAGWSP) [See Section 4.0]) in the Training Area/Reserve have resulted in small arms ranges and other training venues being unavailable for use. However, as clean-up activities have been completed these training venues are again available for compatible military use. So, with updated ranges and training venues, and investment in modernizing the Range Operations and Control Area, and the eventual completion of the cleanup program, Training Area use and numbers will fluctuate accordingly.

Soldiers rappel from a helicopter during the Air Assault Course held at Camp Edwards in September 2025. *Photograph courtesy Massachusetts National Guard Public Affairs*

Table 2-1 shows the overall utilization of the ranges, training areas and training support areas during TY 2025, while Table 2-2 shows their utilization for each of the past ten training years.

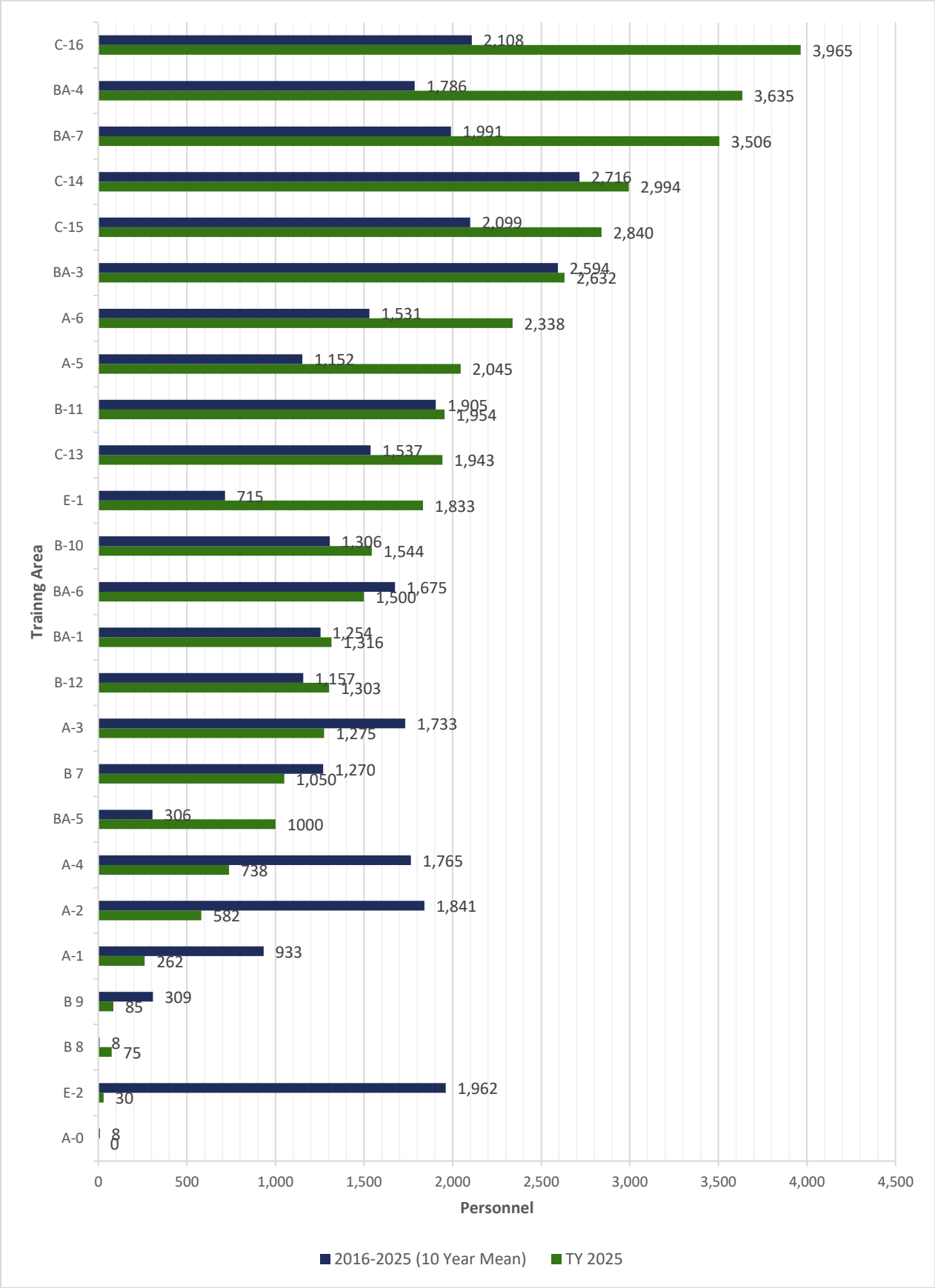
In Table 2-1 and Table 2-2, civilian use includes use of the ranges and training areas in the Training Area/Reserve and the Training Support Areas (TSA) in the Cantonment Area; civilian use ranges from unmanned aircraft systems ground operations and flight testing, to practicing land navigation, to training in the Calero Mobile Military Operations on Urban Terrain Site, to use of classrooms and other facilities. In addition, there were also public deer and turkey hunting seasons during TY 2025. Information on these activities is provided in Sections 3.5.3 and 3.5.4 of this report. Fluctuations in training days and event numbers from year to year is a result of inaccessibility of other training bases, differing unit training requirements, combined training needs, and deployment cycles (see above paragraph).

Graph 2-1 shows personnel use by training area for TY 2025 and the average personnel use by training area for TY 2016 to TY 2025. Graph 2-2 shows training area usage by days used for TY 2025 and the average days used by training area for TY 2016 to TY 2025. Usage increased in 13 training areas, decreased in nine training areas, and remained the same in three training areas. Use of specific training areas is dependent upon its capacity to hold Soldiers, its appropriateness to support a given training exercise, and restoration of training venues through the AFCEC and IAGWSP cleanup and the Integrated Training Area Management (ITAM) programs. For specific training area use for TY 2025 see Section 2.1.2.

A Soldier conducts pistol marksmanship on Echo Range during Annual Training at Camp Edwards in July 2025. *Photograph courtesy Massachusetts National Guard Public Affairs.*

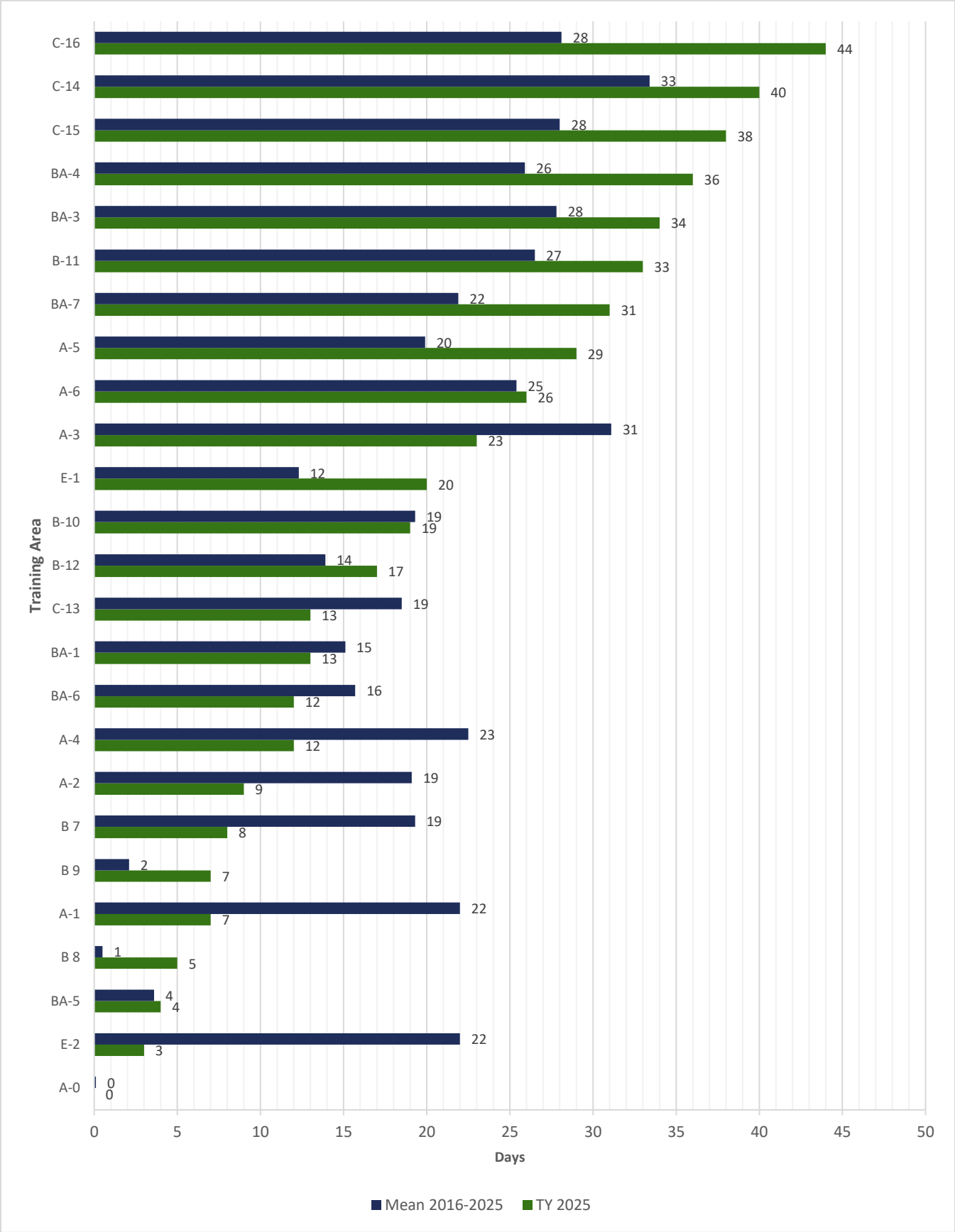
During TY 2025, Camp Edwards supported standard National Guard training such as weapons qualification, land navigation and maneuvers. In addition, TY 2025 was a busy year for mobilization training at Camp Edwards. The 26th Maneuver Enhancement Brigade and two other units deployed during the training year, conducting their pre-mobilization training at Camp Edwards; one of the main purposes of National Guard training sites is to ensure Soldiers can meet their premobilization requirements and conduct mobilization activities. A number of training events happened in the Camp Edwards Cantonment Area with some Training Area/Reserve involvement including Best Warrior Competition, where Soldiers where Soldiers test their physical fitness, tactical proficiency and mental agility; Regional Cooperation 25, which is US Central Command sponsored command-post and field training exercise where military personnel from nations including Mongolia, Kyrgyz Republic, Tajikistan and others in the region traveled to Camp Edwards for two weeks of various training exercises, such as basic maneuver training in the Training Area/Reserve. Camp Edwards also hosted the Garrison Commanders Leadership Course, teaching new Garrison Commanders and Sergeant Majors how to run a garrison training center, and the Air Assault Course, which includes rappelling and sling loading operations. Table 2-1 shows the military and civilian personnel training numbers for TY 2025.

Graph 2-1 Personnel Use by Training Area



See Figure 2-1 for Training Area locations on Camp Edwards.

Graph 2-2 Training Area Usage by Days Used



See Figure 2-1 for Training Area locations on Camp Edwards.

Table 2-1 Overview Of Training Use - TY 2025

Area	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*
Ranges	143	6,264	48
Training Areas	1,058	72,037	161
Training Support Areas	1,728	101,426	4,628
Total	**2,929**	**179,727**	**4,837**

Note: Military and civilian personnel usage is tracked by the daily count of personnel, which may involve counting the same personnel multiple times as they move within the Training Area/Reserve.

Table 2-2 Training Use History

Training Year	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*
TY 2025	2,929	179,727	4,837
TY 2024	3,784	216,103	7,250
TY 2023	3,261	192,039	7,168
TY 2022	3,894	147,303	12,139
TY 2021	3,947	168,145	6,021
TY 2020	3,041	138,474	6,828
TY 2019	2,481	94,874	12,424
TY 2018	2,118	103,864	1,673
TY 2017	2,268	144,671	3,450
TY 2016	2,065	92,083	2,271
Total	**29,788**	**1,477,283**	**64,061**
Mean	2,979	147,728	6,406

Note: Military and civilian personnel usage is tracked by the daily count of personnel, which may involve counting the same personnel multiple times as they move within the Training Area/Reserve.

2.1.2 Training Areas

Camp Edwards has numerous areas that support military training: training areas, battle positions, observation posts, training roads, etc. The training areas also support a variety of training activities including land navigation, bivouacs, Soldier Validation Lanes, meteorological data collection, engineer/infantry/artillery skills training, driver (day and night) training, and Reserve Officer Training Corps (ROTC) training.

Other military users of the training areas during TY 2025 included the US Air Force, the MA Air National Guard, US Army, US Army Reserve, US Coast Guard Reserve, and the US Navy.

Civilian organizations using the training areas during TY 2025 included the Civil Air Patrol, Eversource, and environmental remediation and restoration contractors.

Information on utilization of the training areas and major locations within them during TY 2025 is provided in Table 2-3 and 2-4. The total overall utilization of the training areas for the past 10 training years is included in Table 2-5. The variations over the years in training days and personnel numbers is a result of differing unit training requirements, combined training needs, and deployment cycles. During TY 2025, some type of training was conducted in at least one of the training areas and ranges on 223 calendar days.

The numbers in Tables 2-3 to 2-5 do not include employees and vehicles from the remediation programs and private contracting firms. Also, hunters using the Training Area/Reserve during the deer and turkey seasons are not tracked as they move through the various training areas. During TY 2025, hunter days in the Training Area/Reserve accounted for around 1.4 percent of the usage, and approximately 70% of the Training

Area/Reserve was available to hunters during the deer hunting season. Please see Sections 3.5.3 and 3.5.4 for information about the deer and turkey hunting seasons.

Graphs 2-3 and 2-4 provide a visual representation of military and civilian personnel use in the training area over the past 10 training years. Graph 2-3 shows a general upward trend over time in military personnel use with a particular increase in training in TY 2024 due to units moving to a changing training doctrine that requires more field training. Graph 2-4 shows a drop in civilian usage in TY 2020 due to Covid-19 related civilian agency restrictions; in addition, the Camp Edwards turkey hunting season was canceled. During TY 2019, civilian use numbers are higher than in past years due to the Cape Cod Police Academy's use of facilities in the Cantonment Area as well as a Federal Emergency Management Agency training that took place.

Table 2-3 Training Area Use – TY 2025

Training Area	*Training Days*	*Military Personnel*	*Civilian Personnel*	*Vehicles (Wheeled)#*	*Vehicles (Tracked)#*
A 1	7	262	0	60	0
A 2	9	582	0	75	0
A 3	23	1,275	0	63	0
A 4	12	738	0	8	0
A 5	29	2,045	0	145	0
A 6	26	2,338	0	223	0
B 7	8	1,050	0	23	0
B 8	5	75	0	2	0
B 9	7	75	10	5	0
B 10	19	1,544	0	19	0
B 11	33	1,944	10	40	0
B 12	17	1,293	10	16	0
BA 1	13	1,316	0	31	0
BA 3	34	2,632	0	636	0
BA 4	36	3,635	0	75	0
BA 5	4	1,000	0	15	0
BA 6	12	1,500	0	18	0
BA 7	31	3,493	13	26	0
C 13	13	1,943	0	12	0
C 14	40	2,981	13	27	0
C 15	38	2,840	0	30	0
C 16	44	3,965	0	48	0
Total	**460**	**38,526**	**56**	**1597**	**0**

See Figure 2-1 for Training Area locations on Camp Edwards. Note: Military and civilian personnel usage is tracked by the daily count of personnel, which may involve counting the same personnel multiple times as they move within the Training Area/Reserve. Vehicle usage in the Training Area/Reserve is counted in the same manner.

Table 2-4 Training Venue Use in the Training Areas – TY 2025

Location	*Training Area*	*Training Days*	*Military Personnel*	*Civilian Personnel*	*Vehicles (Wheeled)*	*Vehicles (Tracked)*
SVL-OBJ 1	A-4	31	2,405	0	75	0
SVL-OBJ 2	BA-4	3	142	0	7	0
SVL-OBJ 4	C-14	2	318	0	8	0
OP 1	E-2	3	30	0	4	0
BP 2	BA-4	28	1,005	0	16	0
BP 7	BA-7	10	218	0	6	0
BP 8	BA-7	2	60	0	20	0
BP 9	BA-7	11	522	0	9	0
BP 10	BA-7	11	342	0	5	0
BP 12	B-11	4	1,000	0	27	0
BP 14	B-11	19	1,930	0	27	0
BP 16	B-11	19	1,510	0	25	0
BP 20	B-11	8	1,235	0	30	0
BP 24	A-6	24	1,556	0	17	0
BP 27	E-1	20	1,833	0	25	0
NBC 01	A-4	8	590	0	9	0
NBC 02	A-4	2	60	0	5	0
NBC 03	A-4	2	60	0	6	0
NBC 04	A-4	2	60	0	4	0
NBC 05	A-4	2	60	0	8	0
Training Roads	Multiple	46	4,850	0	80	0
Wheelock Hill	A-5	14	1,565	0	102	0
Land Nav 1	A-2	34	1,677	105	18	0
Land Nav 2	A-5	14	850	0	9	0
Land Nav 3	A-1	27	1,924	0	21	0
Land Nav 4 Alpha	C-15	22	818	0	12	0
Land Nav 4 Bravo	C-16	8	339	0	8	0
Land Nav 4 Charlie	C-15/16	120	579	0	7	0
Dig Site 1	B-9	19	1,341	0	15	0
Dig Site 2	C-14	5	335	0	8	0
Dig Site 3	BA-1	25	1,573	0	19	0
Landing Zones	Multiple	42	2,724	0	28	0
R-4101 Airspace	N/A	11	0	0	0	0
Total		**598**	**33,511**	**105**	**660**	**0**

See Figure 2-1 for Trainng Area locations on Camp Edwards. Note: Military and civilian personnel usage is tracked by the daily count of personnel, which may involve counting the same personnel multiple times as they move within the Training Area/Reserve. Vehicle usage in the Training Area/Reserve is counted in the same manner.

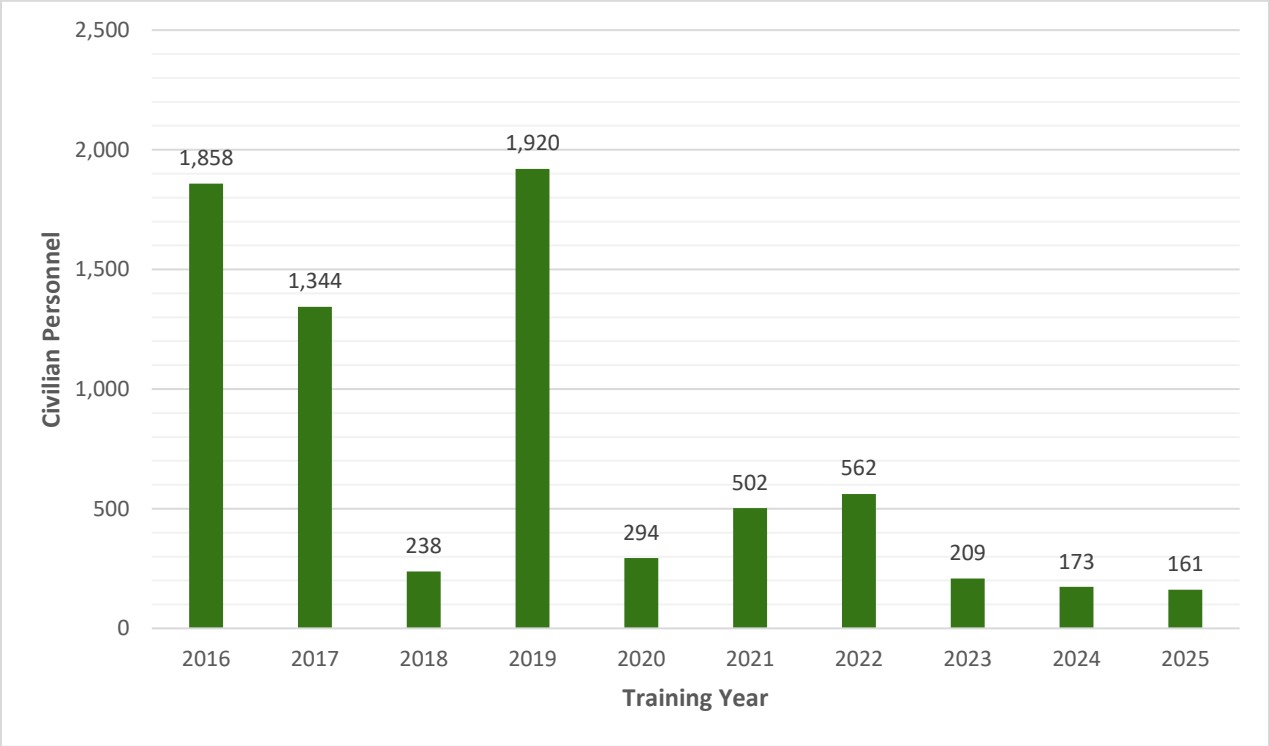
Table 2-5 Training Area Use History

Training Year	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*	*Vehicles (Wheeled)*	*Vehicles (Tracked)*
TY 2025	1,058	72,037	161	2,257	0
TY 2024	1,276	112,396	173	172	5
TY 2023	881	73,154	209	0	0
TY 2022	1,088	56,246	562	9	0
TY 2021	1,277	66,374	502	36	0
TY 2020	898	59,994	294	110	0
TY 2019	702	49,716	1,920	618	0
TY 2018	893	69,652	238	530	12
TY 2017	688	42,478	1,344	1,244	12
TY 2016	551	24,344	1,858	2,805	0
Total	**9,312**	**626,391**	**7,261**	7,781	**29**
Mean	931	62,639	726	778	3

Note: Military and civilian personnel usage is tracked by the daily count of personnel, which may involve counting the same personnel multiple times as they move within the Training Area/Reserve. Vehicle usage in the Training Area/Reserve is counted in the same manner.

Graph 2-3 Training Area Use History: Military Personnel

Graph 2-4 Training Area Use History: Civilian Personnel



2.1.3 Training Support Areas (Cantonment Area)

There are separate facilities and equipment that can simulate live military training; these are grouped under the Training Support Area (TSA). The majority of the training activities associated with these facilities are conducted in the Cantonment Area of Camp Edwards.

Table 2-6 presents the total number of training days/events and personnel that used each TSA during TY 2025.

Table 2-6 Training Support Area Use – TY 2025

Training Support Area	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*
1100 Training Area (Drivers Training)	39	4,485	0
1600 Training Area	5	1,500	0
3400 Training Area/Rail Load Ramp	8	2,040	0
3500 Training Area	14	350	0
Walking Track	24	3,140	0
Asymmetric Threat Classroom	6	456	0
Battle Simulation Ctr - Bldg 1206	107	10,591	600
Battle Simulation Ctr - Rear Offices	29	2,040	0
Battle Simulation - Bldg 1213, 1st Floor	41	3,081	300
Battle Simulation - Bldg 1213, 2nd Floor	41	3,390	300
Battle Simulation - Tactical Operations Center Pads	3	540	0
Bldg 3499 – Individual Weapons Qualification	12	708	0
Calero Mobile Military Operations on Urban Terrain	53	2,881	332
Call for Fire Trainer II 1:30	37	1,260	0
Connery Army Fitness Test Field	51	4,987	0

Training Support Area	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*
Counter-Improvised Explosive Device Visual Indicator Lane	2	240	0
Distance Learning Lab 5218	117	10,058	0
Engagement Skill Trainer 2000 - A	41	350	0
Engagement Skill Trainer 2000 - B	70	1,222	64
Engagement Skill Trainer 2000 - C	64	1,065	23
1243-High Risk Entry Facility-Control	18	912	240
1244-High Risk Entry Facility	18	912	240
JBCC Theater _ Bldg 5219	103	14,007	1700
Leadership Reaction Course	39	2,096	177
Lee Field	12	2,155	300
Obstacle Course	42	2,559	79
Rappel Tower 1	10	1,109	0
Rappel Tower 2	3	319	0
Shaw Field	69	8,622	184
Structural Collapse Site	28	2,903	19
TTB Kelley (Containerized Kitchen/Mobile Kitchen Trailer)	14	2,100	0
TTB Kelley (Detainee Facility)	4	180	0
Unstabilized Gunnery	2	17	0
Vault 1 – Training Support Center	51	216	0
Vault 2 - Training Support Center	181	362	0
Vault 3 - Training Support Center	193	422	0
Virtual Battlespace 3 Classroom - Bldg 3494	25	900	0
Virtual Convoy Opns Trainer #98	10	211	0
Weapons Cleaning - Bldg 3498	36	1,487	0
Welcome Center	97	4,117	20
Yankee Division Memorial Park	9	1,436	50
TY 2025 Total	**1,728**	**101,426**	**4,628**

Note: Military and civilian personnel usage is tracked by the daily count of personnel, which may involve counting the same personnel multiple times as they move within the Training Area/Reserve.

Overall historical use of the TSA for the past 10 training years is included in Table 2-7. Figure 2-2 shows TSA locations in the Cantonment Area. Because unit commanders maximize training time by rotating personnel through several different events or exercises in a given training cycle, this again presents an inflated figure for training days compared to calendar days.

Table 2-7 Training Support Area Use History

Training Year	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*	*Total*
TY 2025	1,728	101,426	4,628	106,054
TY 2024	2,203	94,042	6,987	101,029
TY 2023	2,214	111,365	6,959	118,324
TY 2022	2,625	83,499	11,551	95,050
TY 2021	2,484	94,055	5,305	99,306
TY 2020	1,931	71,586	5,833	77,419
TY 2019	1,554	39,888	10,223	51,665

Training Year	*Training Days/Events*	*Military Personnel*	*Civilian Personnel*	*Total*
TY 2018	1,061	39,619	4,285	43,904
TY 2017	1,299	96,783	1,150	97,933
TY 2016	1,224	50,463	282	50,745
Total	**18,323**	**782,726**	**57,203**	**841,429**
Mean	1,832	78,273	5,720	84,143

Note: Military and civilian personnel usage is tracked by the daily count of personnel, which may involve counting the same personnel multiple times as they move within the Training Area/Reserve. Vehicle usage in the Training Area/Reserve is counted in the same manner.

Civilian organizations using the TSA in the Cantonment Area of Camp Edwards during TY 2025 included Allied Universal Security, Barnstable County Sheriff's Department, Brookline SRT, Boy Scouts of America, Cape & Islands Regional Swat, Cape Cod Technical School, Civil Air Patrol, FBI Boston, Massachusetts State Police, Rhode Island State Police, Sea Cadets, US Department of Transportation, the United States Geological Survey, and the US Postal Service Inspector General.

2.2 Off-Site Training

During TY 2025, the MAARNG had 84 units conduct their annual two-week training cycle. Of these, 52 units trained in Massachusetts, 34 of which trained solely at Camp Edwards (approximately 2,609 Soldiers). Two units trained in Iowa; one unit trained in Vermont; seven units trained in New Jersey, seven units trained in New York, two units trained in Louisiana; one unit trained in Virginia; one unit trained in West Virginia; nine units trained in Pennsylvania; one unit trained in Alabama and one unit trained in Kenya. Six units were mobilized and deployed in support of contingency operations; four units deployed overseas and two units mobilized and deployed in support of the Southwest border mission.

The total number of Massachusetts Soldiers trained during annual training for TY 2025 was 4,592 out of 5,625. Sixteen units conducted year-round annual training consisting of 910 Soldiers. The number of MAARNG Soldiers that completed a two-week annual training cycle by general geographical locations is: 3,548 in Massachusetts, 859 in other states, and 185 in Kenya.

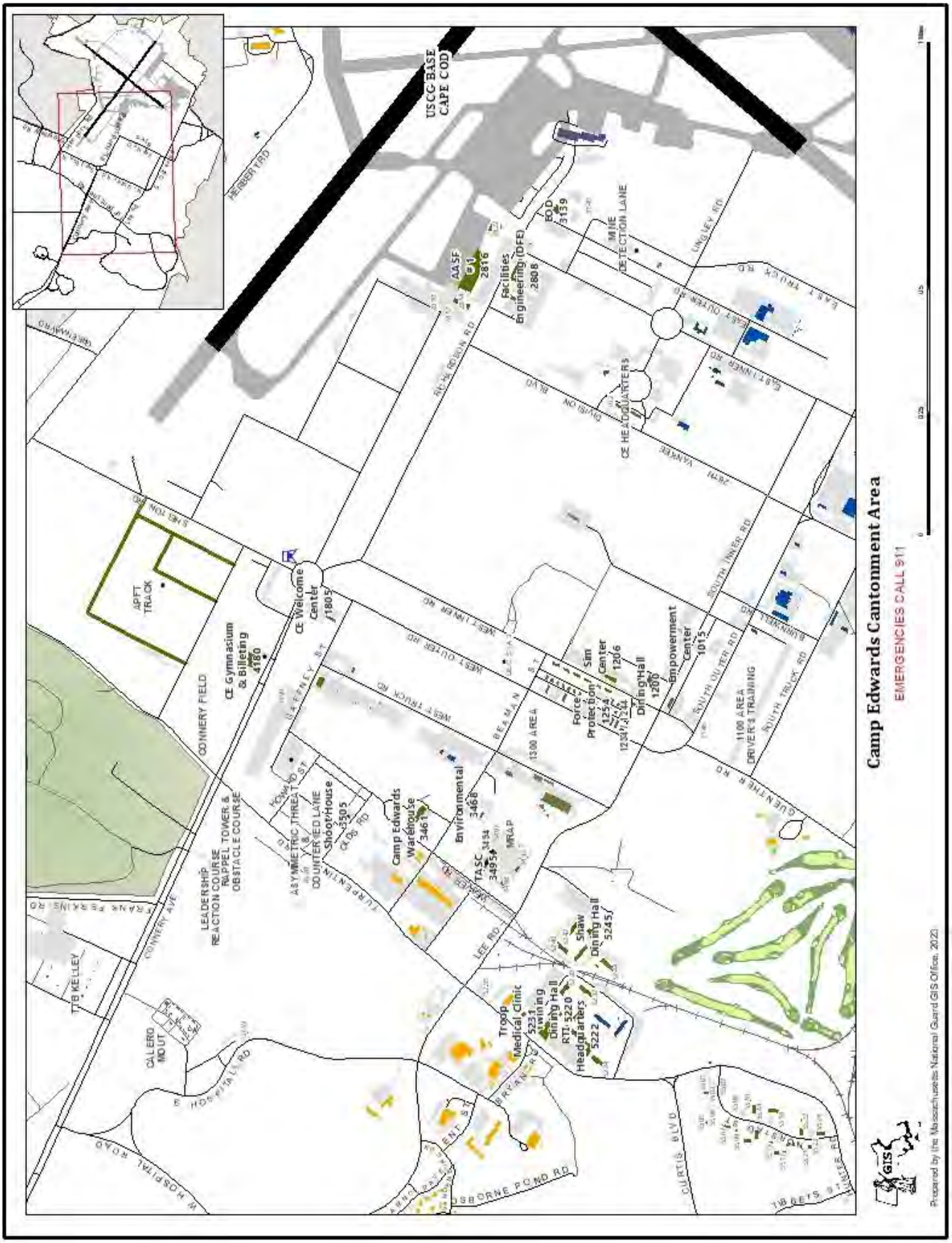
2.3 Range Update

This section relates to EPS 19, Range Performance Standards. The current operational active small arms ranges on Camp Edwards are Echo, India, Sierra, and Tango ranges. The MAARNG conducts marksmanship training on Camp Edwards small arms ranges. Currently, weapons used for training at Camp Edwards include the M16 and M14 rifles, the M249 light machine gun, the M240 machine gun, the M17/M18 pistol, and shotguns. These weapons use 5.56 mm copper ammunition for the rifles and light machine gun, 7.62 mm copper ammunition for the machine gun, 9mm copper jacketed lead ammunition for pistols, and lead slugs and buckshot where approved. Although not a small arms range, Lima Range, a 40 mm practice grenade range, using the M203 or M320 grenade launcher with practice 40mm grenades, will be discussed in this section. The locations of these ranges are shown in Figure 2-1.

2.3.1 Operations, Maintenance and Monitoring Plans

Each range is guided by an Operations, Maintenance, and Monitoring Plan (OMMP) that outlines range-specific monitoring to ensure the environment is protected to the maximum extent practicable. Operations, Maintenance and Monitoring Plans are living documents that are in continuous review and updated as coordinated with the EMC Environmental Officer. In accordance with the OMMP for each range, the MAARNG is required to

Figure 2-2 Training Support Areas



capture, contain, and recover bullets/projectiles to the greatest extent practical. Recovery of projectiles is based on usage, time, and projectile density. The OMMPs define when this is required for each range. The purpose of removing projectiles is to maintain appropriate capture and containment of the projectiles, which prevents

significant bullet on bullet impact, where projectiles leave the bullet pocket (an area on the capture berms where rounds are concentrated) by ricocheting, and projectile fragmentation.

The OMMPs are reviewed annually and updated every three years. The goal of the review and updates is to ensure Best Management Practices (BMPs) are functioning as intended, determine if there is new information that can improve BMPs and that current monitoring and BMPs are protective of the environment. The OMMP revisions planned for 2026 include consolidating the individual, range-specific OMMPs into one document, an Integrated OMMP (IOMMP), to ensure effective and efficient use for the end user and consistent administration across all ranges. Best Management Practices outlined in the OMMPs are being reviewed for effectiveness and being adjusted as the need is identified.

2.3.2 Small Arms Range Monitoring

From the monitoring of the small arms ranges, it has been shown that there are no exceedances of the OMMP standards for soil at the ranges. It must be noted for this section that according to the USGS the current groundwater levels are at a 21-year low; a trend observed on Cape Cod and southeastern Massachusetts because of drought conditions in the region (see Section 3.1.2). This is reflected in this year's annual small arms range sampling / monitoring where proper groundwater samples could not be taken for Echo, Sierra, and Tango ranges. This is also reflected in porewater sampling where some lysimeters could not be sampled due to low or no water. As a result, the MAARNG, in coordination with the EMC Environmental Officer, have contracted and are scheduling resampling of the groundwater wells and lysimeters where not enough water was available for sampling. The EMC will be informed of the results as received.

Soil, porewater and groundwater sampling conducted at each range are discussed in the sections below.

Graphs at the end of Appendix C present an overall snapshot of the average levels of antimony, copper, lead and the background levels of those elements in soil and groundwater. All levels are within the background levels established for Camp Edwards by MassDEP and USEPA (AMEC, 2009), (Ogden Environmental and Energy Services, 2002).

2.4 Echo Range

Echo Range became operational in 2019. Echo Range, a dual-purpose range, is a Combat Pistol/Military Police Qualification Course, consisting of 15 firing lanes with seven pop-up targets per lane offset along the firing lanes at varying distances with one fixed Military Police target at the end of the lane. Two courses of fire, on the same range, are referred to as an automated combat pistol/military police firearms qualification course. Echo Range is approved for lead ammunition as a 9 mm copper round is not available in the Army inventory.

The backstop berm is utilized as the primary projectile capture area. Single Individual Target frontal berms are the capture location for extreme low shot projectiles. The backstop berm was constructed of core material (native), landscape fabric as a demarcation line, a projectile capture medium that is sand, and capped with topsoil that slows projectiles and allows for vegetation and slope stabilization.

2.4.1 Range Maintenance and Sampling

At Echo Range, maintenance included repairing and filling bullet pockets. A list of Range Operations' maintenance and inspection activities at Echo Range in TY 2025 is included in Appendix C.

In October 2025, environmental monitoring at Echo Range was conducted to assess soil and groundwater conditions. While soil sample results were within acceptable limits, "grab samples" from groundwater revealed

elevated levels of certain contaminants. Proactive measures, including resampling and the future installation of lysimeters, are scheduled and planned to address these findings. Standard groundwater sampling could not be performed because water levels in the monitoring wells were too low. To assess the groundwater, grab samples were collected directly from the bottom of the wells. Analysis of these grab samples indicated high concentrations of antimony, copper, and lead when compared with typical groundwater samples. A comprehensive resampling of the groundwater is scheduled. The results of this resample will be reported as required.

Surface soil samples were collected and analyzed for a comprehensive list of parameters, including antimony, copper, lead, and others. The results showed no anomalies, trends, or exceedances of the soil action levels specified for Echo Range.

Currently, there are no lysimeters at Echo Range. To improve future monitoring capabilities, the MAARNG will coordinate with the EMC to identify suitable locations and install representative lysimeters.

A figure showing soil sampling locations on Echo Range and the sampling results for TY 2025 are available in Appendix C.

2.5 India Range

India Range became operational in 2012. India Range is a 25-meter small arms range using copper-only ammunition to train soldiers on the skills necessary to align the sights on their weapons and practice basic marksmanship techniques against stationary targets. It has 20 firing positions with one target in each firing lane. The range is also used for short-range marksmanship training and qualifications. The weapons used on India Range are the M16 and M14 rifles, the M249 light machine gun, and the M240 machine gun. Ammunition used is the copper 5.56 mm and 7.62 mm.

2.5.1 Range Maintenance and Sampling

Maintenance activities on India Range included bullet pocket maintenance. A list of Range Operations' inspection and maintenance activities at India Range in TY 2025 is included in Appendix C.

In October 2025, groundwater, porewater, and surface soil samples were collected from India Range. The samples were analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen where appropriate for the media being sampled. Results of the soil analyses contain no anomalous, trending, or exceedances of the action levels specified in the OMMP.

For porewater there was an action level exceedance (6 ppb) for antimony at 7.04 ppb in lysimeter LYIRNG002, down from 11.0 ppb in 2024. This exceedance is consistent with past exceedances for this lysimeter; continued exceedances of antimony in porewater are a result of pH and alkalinity levels in soil at the impact berm soils. During TY 2024, a lysimeter (LYIRNG003) was installed beneath a bullet pocket on the backstop berm at India Range. Copper in this lysimeter was elevated, 725 ppb, but did not exceed action levels in the OMMP. Antimony and lead were just above background levels in this lysimeter.

For groundwater there was no anomalous, trending, or exceedance of the action levels specified in the OMMP.

A figure showing the monitoring wells, lysimeters and soil sampling locations on India Range and the sampling results for TY 2025 are available in Appendix C.

2.5.1.1 Antimony in Porewater

Porewater is subsurface water present in soil. For porewater, collected via lysimeters, there have been exceedances of the OMMP action levels for antimony (Sb) at ranges that have used legacy soil for backstop berm construction, including operationally active India and Tango ranges and operationally inactive Juliet and Kilo

ranges. There were no porewater exceedances at the firing line or mid-range lysimeters. Antimony exceedances at the ranges that used legacy soils began to occur approximately two years after their use began.

Antimony is in lead alloy projectiles as a hardener and in bullet primers as a control agent. There are two causes of increased antimony in porewater:

- Legacy range soils, where lead-antimony projectiles were fired, were used for berm and range construction at Inda, Juliet, Kilo, and Tango ranges.
- Phosphates added to range soils (1998-1999) and lime (2007-2010) to adjust pH and to theoretically immobilize lead in legacy soils

A finding of the Ad Hoc Committee and through lab studies at Cold Regions Research and Engineering Laboratory (CRREL) is that antimony is not threatening groundwater. The work determined that the previous use of phosphates for lead immobilization and pH amendments was the cause of increased antimony in porewater and that there is not a threat to the groundwater. Soil amendments were halted. It has also been determined through soil sampling that antimony mobility is limited to surface soils where amendments were applied. A description of the work conducted by CRREL can be found in the TY 2022 *Annual State of the Reservation Report*.

2.6 Lima Range

Lima Range became operational in 2013. Lima Range is used to train and test individual soldiers on the skills necessary to engage and defeat stationary target emplacements with the 40mm grenade launcher. The range has four self-contained stations and is 30-meters wide by 400-meters long. The stations consist of firing positions and targets of various types and distances, ranging from 100 to 350 meters. Station 1 consists of a prone fighting position with sandbags for support and two zeroing targets at 200 meters. Station 2 consists of an upright log or wall, a kneeling firing position about four feet high, and two point-type targets. The targets include a simulated window or door of a building at 100 meters and a small bunker or fighting position at 125 meters. Station 3 consists of a fighting position and two targets. The targets are a two-person bunker at 175 meters and an automatic weapon position at 200 meters. The bunker represents a point target, while the automatic weapons position represents an area target. Station 4 consists of a prone fighting position with a log or sandbag support and two area type targets at 250 meters and 350 meters.

On Lima Range the M203 or M320 grenade launchers are used. The M781 is a 40 mm practice grenade that is fired as a projectile composed of a hollow plastic “windshield” filled with Day-Glo-Orange marking powder. According to the Safety Data Sheet, the Day-Glo-Orange marking powder is non-toxic.

2.6.1 Range Maintenance and Sampling

In October 2025 porewater and surface soil samples were collected from Lima Range and analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen, where appropriate for the media being sampled. There were no action level exceedances for soil and porewater. Groundwater at Lima Range is being monitored by the IAGWSP.

A figure showing the monitoring wells, lysimeters and soil sampling locations on Lima Range and the sampling results for TY 2025 are available in Appendix C. A list of Range Operations’ inspection and maintenance activities for Lima Range in TY 2025 is included in Appendix C.

2.7 Sierra Range

Sierra Range became operational in 2012. Sierra Range is an automated 300-meter pop-up Modified Record of Fire Range using copper ammunition only and is used to qualify soldiers in marksmanship proficiency. The firing

line is 200 meters long with 10 firing lanes. There are nine stationary, pop-up targets in each firing lane. The targets are located at 50, 100, 150, 200, 250, and 300 meters, with two targets at the 50-meter distance and one each at the other distances. The weapons used on Sierra Range are the M16 and M14 rifles, the M249 light machine gun, and the M240 machine gun. Ammunition used is the Copper Enhanced Performance Round (EPR) 5.56 mm and 7.62 mm.

2.7.1 Range Maintenance and Sampling

Maintenance activities during TY 2025 at Sierra Range included bullet pocket maintenance and clearing the Stationary Infantry Target locations of debris such as dirt and weeds. A list of Range Operations' inspection and maintenance activities at Sierra Range in TY 2025 is included in Appendix C.

In October 2025, groundwater, porewater, and surface soil samples were collected from Sierra Range. The samples were analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen where appropriate for the media being sampled. Results of the soil analyses continue to show no anomalous, trending, or exceedance of the action levels specified in the OMMP. For porewater there were no action level exceedances. Groundwater could not be sampled as groundwater levels were too low at both Sierra Range wells.

Figures showing the monitoring wells, lysimeters and soil sampling locations on Sierra Range and the sampling results for TY 2025 are available in Appendix C.

2.8 Tango Range

Tango Range is a 25-meter copper zeroing range with 32 firing lanes with one target in each lane. Tango Range was redeveloped as a copper range during TY 2021 in support of weapons qualification at Sierra Range. Soldiers zero their weapons at Tango Range and then move to the adjacent Sierra Range to conduct weapons qualifications. The weapons used on Tango Range are the M16 and M14 rifles, the M249 light machine gun, and the M240 machine gun. Ammunition used is the Copper EPR 5.56 mm and 7.62 mm.

2.8.1 Range Maintenance and Sampling

In October 2025, porewater, groundwater, and surface soil samples were collected from Tango Range. The samples were analyzed for antimony, copper, lead, chloride, sulfate, calcium, magnesium, phosphate, potassium, sodium, pH, alkalinity, specific conductance, dissolved organic carbon and oxygen where appropriate for the media being sampled. Results of the soil and porewater analyses show no anomalous, trending, or exceedance of the action levels specified in the OMMP. For groundwater, there was insufficient water to sample.

A figure showing the monitoring wells, lysimeters, and soil sampling locations on Tango Range and the sampling results for TY 2025 are available in Appendix C. A list of Range Operations' inspection activities at Tango Range in TY 2025 is included in Appendix C.

2.9 Range Usage Data

A total of 2,894,552 rounds of copper ammunition has been fired at Camp Edwards since its use was approved at Sierra and India ranges in 2012 and Tango Range in 2021: 1,865,943 at Sierra Range, 641,789 at India Range, and 327,502 at Tango Range. The total number of copper ammunition rounds fired includes 23,318 at the inactive operational ISBC Range, which was used for two approved, non-standard training events in June and July 2022, an approved, non-standard training event in April 2023, and an approved, non-standard training event in January/February 2025; and 36,125 rounds fired on Echo Range during two non-standard training events in TY 2021 and two approved, non-standard training events in TY 2022.

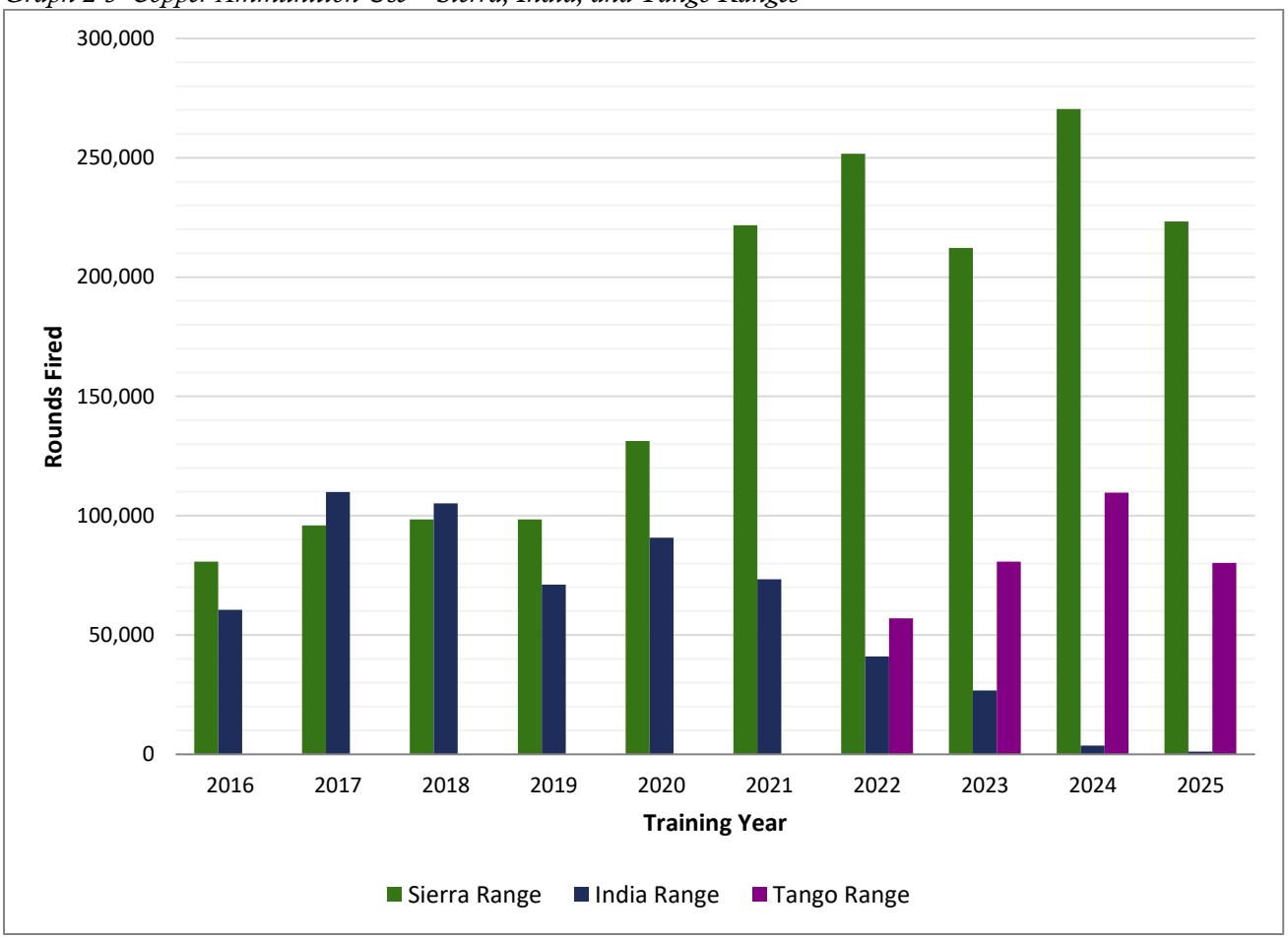
Graph 2-5 provides a summary of copper ammunition fired at Sierra, India and Tango ranges since use of copper ammunition was approved at them. During TY 2020, the MAARNG transitioned to all copper-based rifle ammunition. The graph shows an upward trend in copper ammunition use overall. On India Range, range use has declined since India Range ceased to be the primary zeroing range for Sierra Range due to a change in standard in 2020 that eliminated the use of Alternate Course of Fire for qualification. When Tango Range was redeveloped into a copper ammunition range in TY 2021, it became the primary zeroing range, and it is easy for Soldiers to walk to Sierra Range to qualify. Information on the number of copper ammunition fired on Sierra, India, and Tango ranges each training year is provided in Appendix C.

Since TY 2019, a total of 377,398 rounds of 9mm lead ammunition has been fired at Echo Range. During TY 2025, 1,180 rounds of 12 Gauge ammunition (lead) were fired on Echo Range in July 2025 as part of an approved, non-standard training event. Graph 2-6 shows the number of 9mm rounds of lead ammunition fired on Echo Range.

During TY 2025, 1,130 rounds of 9mm lead ammunition was fired on India Range in an approved, non-standard training event in April 2025.

Information on lead ammunition fired from TY 2007 through TY 2025, including amounts and types, is provided in Appendix C.

Graph 2-5 Copper Ammunition Use – Sierra, India, and Tango Ranges

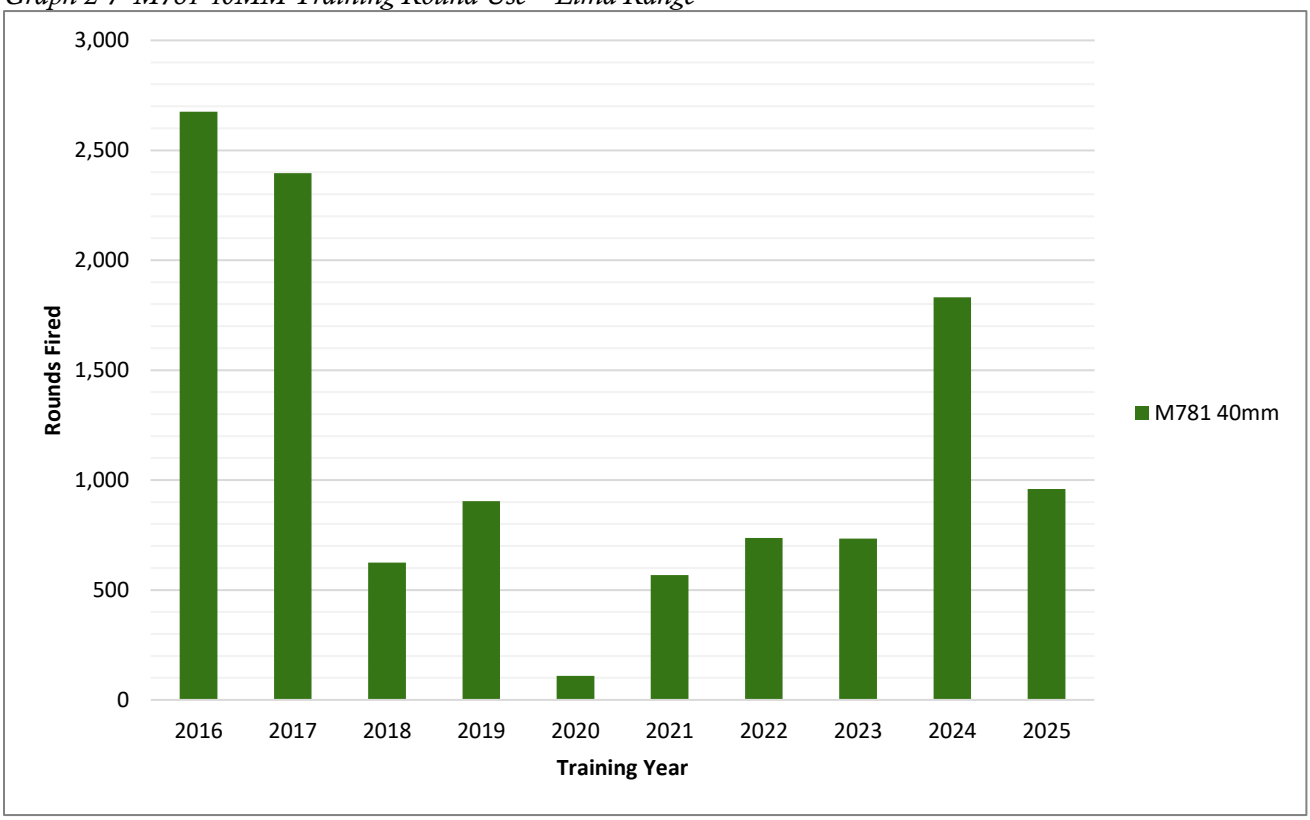


Note: Tango Range became operational utilizing copper ammunition during TY 2022.

Graph 2-6 9mm Lead Ammunition Round Use – Echo Range

A total of 15,166 M781 40mm Training Rounds have been fired at Lima Range since its use was approved. Graph 2-7 provides information on the number of M781 40mm Training Rounds fired at Lima Range. The graph reflects the cyclic requirement for qualification for grenadiers. Units that have grenadiers only have one to two soldiers with that requirement in the unit; not every soldier uses this weapon.

Graph 2-7 M781 40MM Training Round Use – Lima Range



There was no civilian use of the small arms ranges during TY 2025.

During TY 2025, some type of weapons firing was conducted on at least one of the ranges on 93 calendar days.

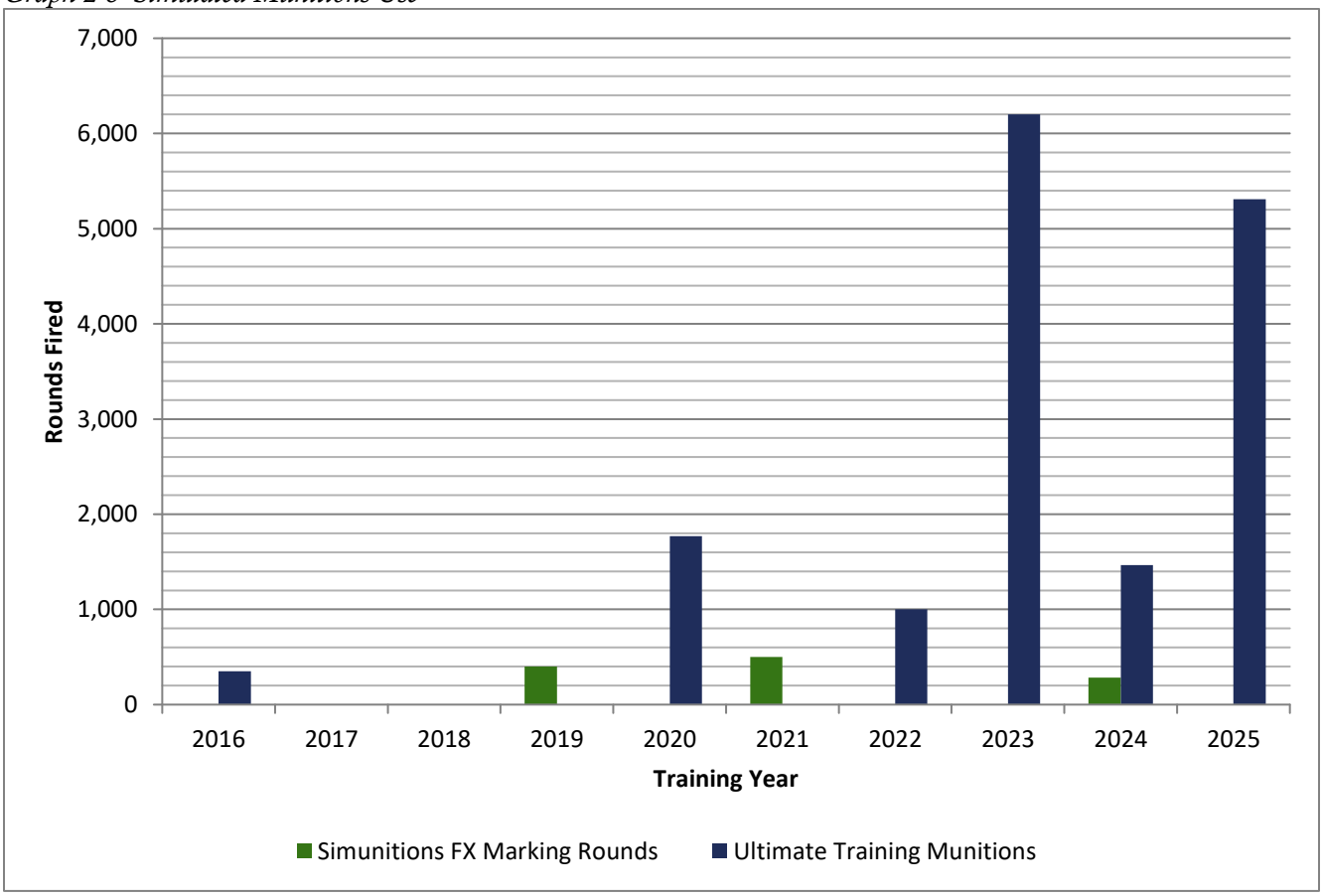
2.10 Simulated Munitions

The MAARNG uses two types of simulated munitions at Camp Edwards: an Ultimate Training Munitions (UTM) Man Marker Round and a Simunitions FX Marking Round. Simulated munitions are wax marking tipped ammunition that can be used in a standard weapon. They can be shot at a Soldier wearing proper personal protective equipment with the wax projectile leaving a colored mark on their clothing letting them know they are hit. Simulated munitions are best used in concert with other simulators to be effective for most units. The UTM Man Marker Round and the Simunitions FX Marking Round are on the Camp Edwards Approved Munitions List. These munitions are primarily used at Training Area venues such as the Soldier Validation Lanes.

The EMC required that the Annual Report include steps taken by the National Guard and progress associated with converting to the use of lead-free primer in simulated munitions. The Massachusetts National Guard monitors the availability of alternate munitions through the Guard's own ammunition supply program and through contacting the munitions command for the Army. Currently, there has been no change in munitions for the ammunition used at Camp Edwards.

Graph 2-8 provides the number of UTM and Simunitions FX Marking Rounds fired in the Training Area/Reserve since 2016. Fluctuations in training usage is largely influenced by deployment cycles and changes to training doctrine and directives. Increases in usage are also related to the inaccessibility of other training bases for the MAARNG to use for their readiness training needs.

Graph 2-8 Simulated Munitions Use



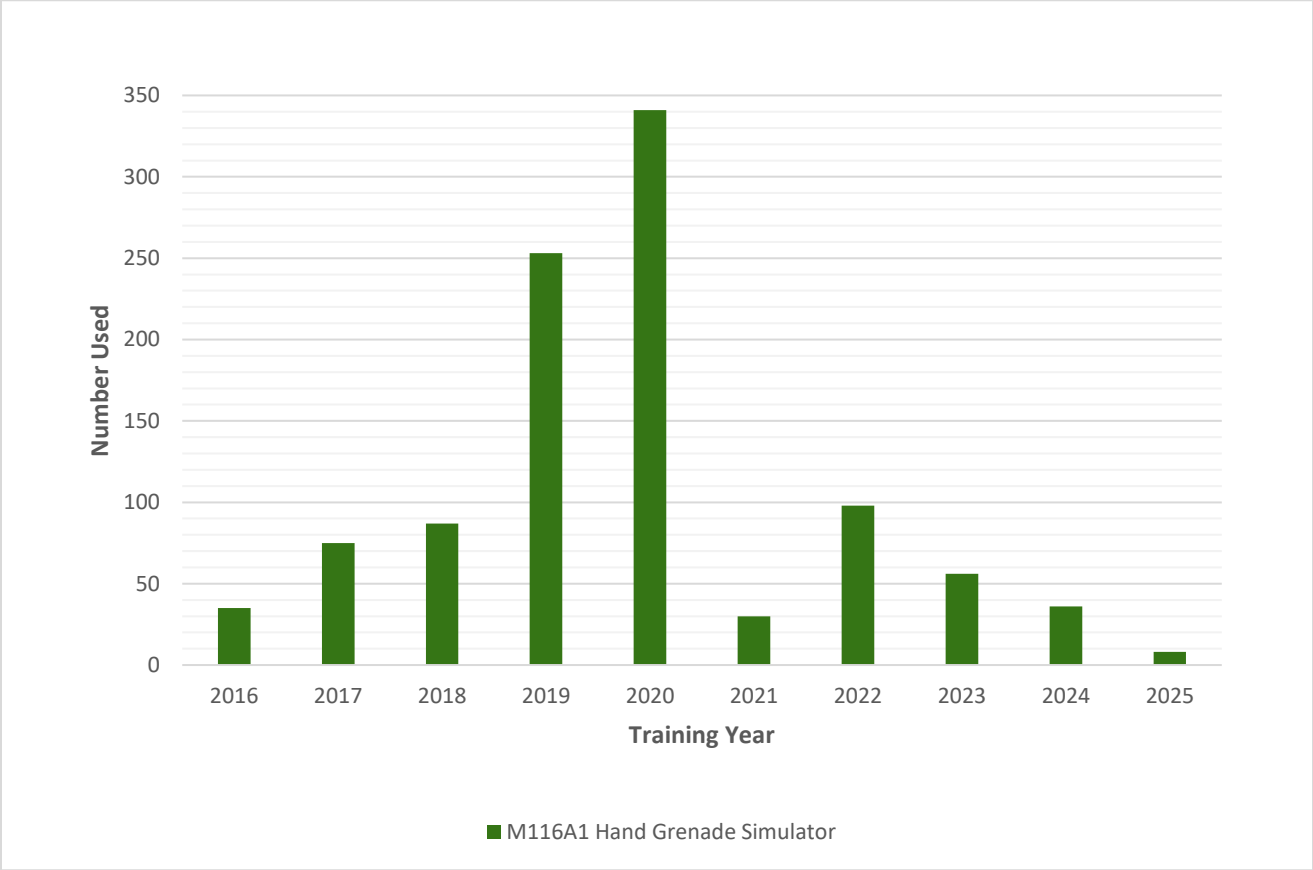
2.11 Pyrotechnics

Military pyrotechnics are used to simulate battlefield noises and effects during troop maneuvers and training. Use of these devices is to prepare soldiers for the rigors of combat by simulating the stress and confusion of war. Currently the M116A1 and M69 Hand Grenade Simulators are approved for training use at Camp Edwards and are on the Camp Edwards Approved Munitions List.

2.11.1 M116A1 Hand Grenade Simulator

The M116A1 Hand Grenade Simulator was approved for use at Camp Edwards in March 2010. Eight were used in the Training Area/Reserve during TY 2025. Graph 2-9 shows the number used each training year since TY 2016. The M116A1 is used primarily during collective unit training and is used to simulate battlefield conditions during training events. However, during the last few years, Camp Edwards has supported more standard, individual/Annual National Guard training rather than collective training exercises.

Graph 2-9 M116A1 Hand Grenade Simulator Use



2.11.2 M69 Hand Grenade Simulator

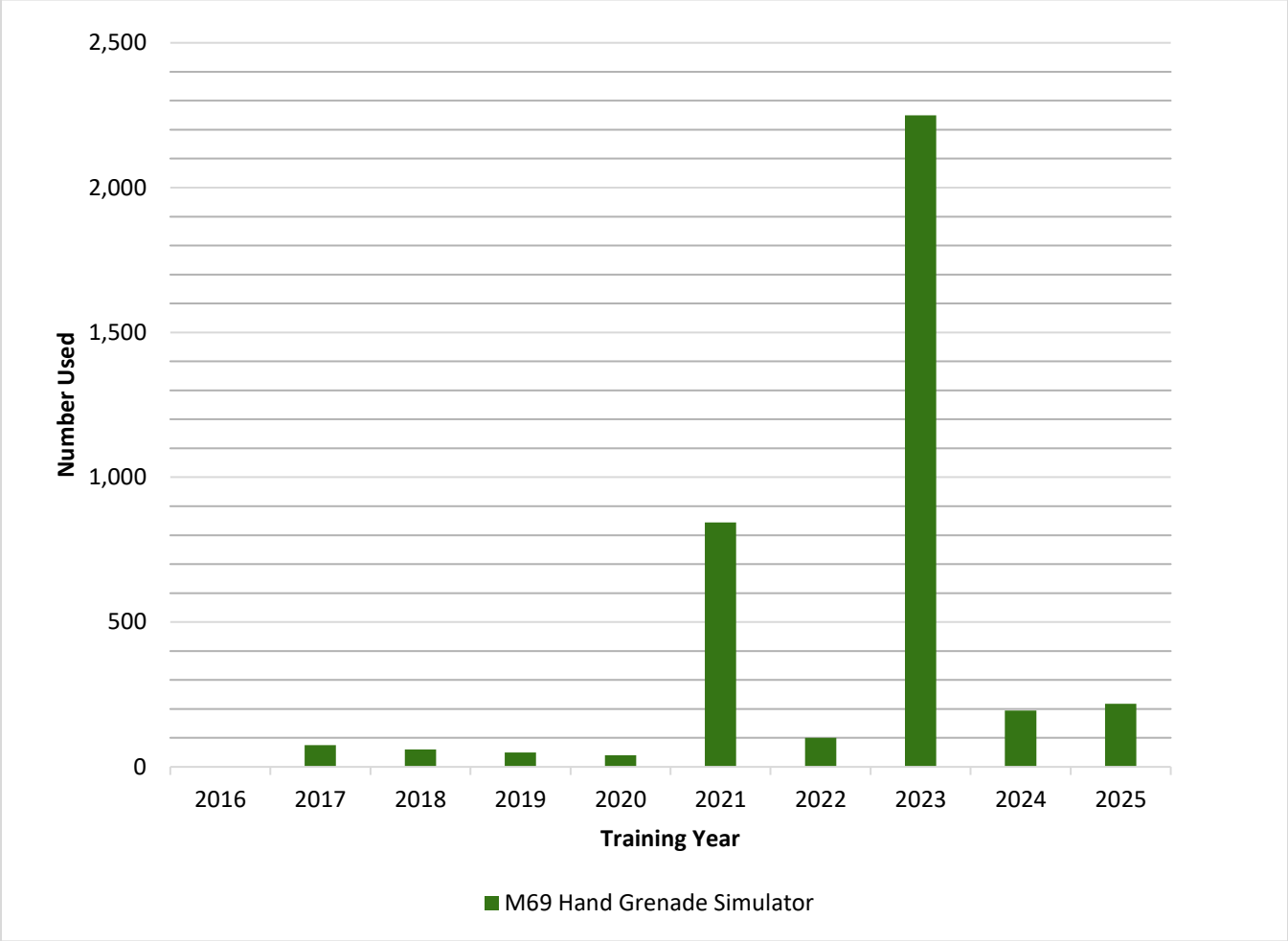
In 2013, EPA Region 1 and the EMC approved the use of the M69 Hand Grenade Simulator on Camp Edwards.

The M69 provides realistic training and familiarizes soldiers with the functioning of a fragmentation hand grenade. After a delay of four to five seconds, the M69 emits a small puff of white smoke and makes a popping noise. The grenade bodies are reused repeatedly by replacing the fuse assembly.

Camp Edwards developed a Standard Operating Procedure and Course Management Plan for the M69 Hand Grenade Simulator, approved by the EMC in 2014. The plan allows for maximum effective use of the M69 Hand Grenade Simulator with the M288 Fuse in the Camp Edwards training areas and on the Hand Grenade Qualification Course while abiding by training and environmental guidelines. Use of the M69 Hand Grenade

Simulator began in September 2014. During TY 2025, 218 were used in the Training Area/Reserve. Graph 2-10 shows the number of M69 Hand Grenade Simulators from TY 2016 to TY 2025. M69 Hand Grenade Simulator use showed a decrease during TY 2025; the nature of required M69 grenade training is cyclical, and during TY 2023, some units that may have trained at Fort Devens trained at Camp Edwards as Fort Devens was unavailable.

Graph 2-10 M69 Hand Grenade Simulator Use

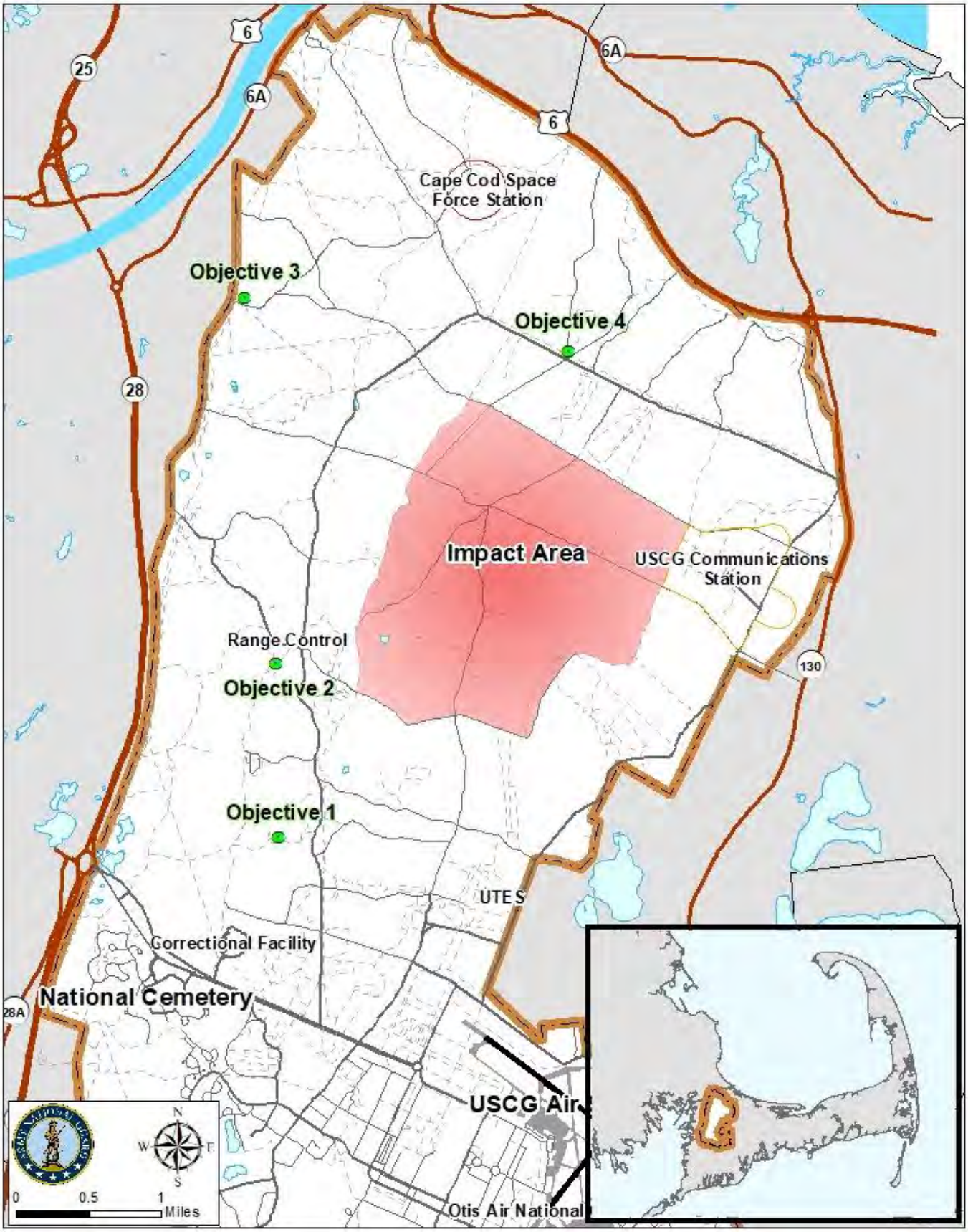


2.12 Soldier Validation Lane

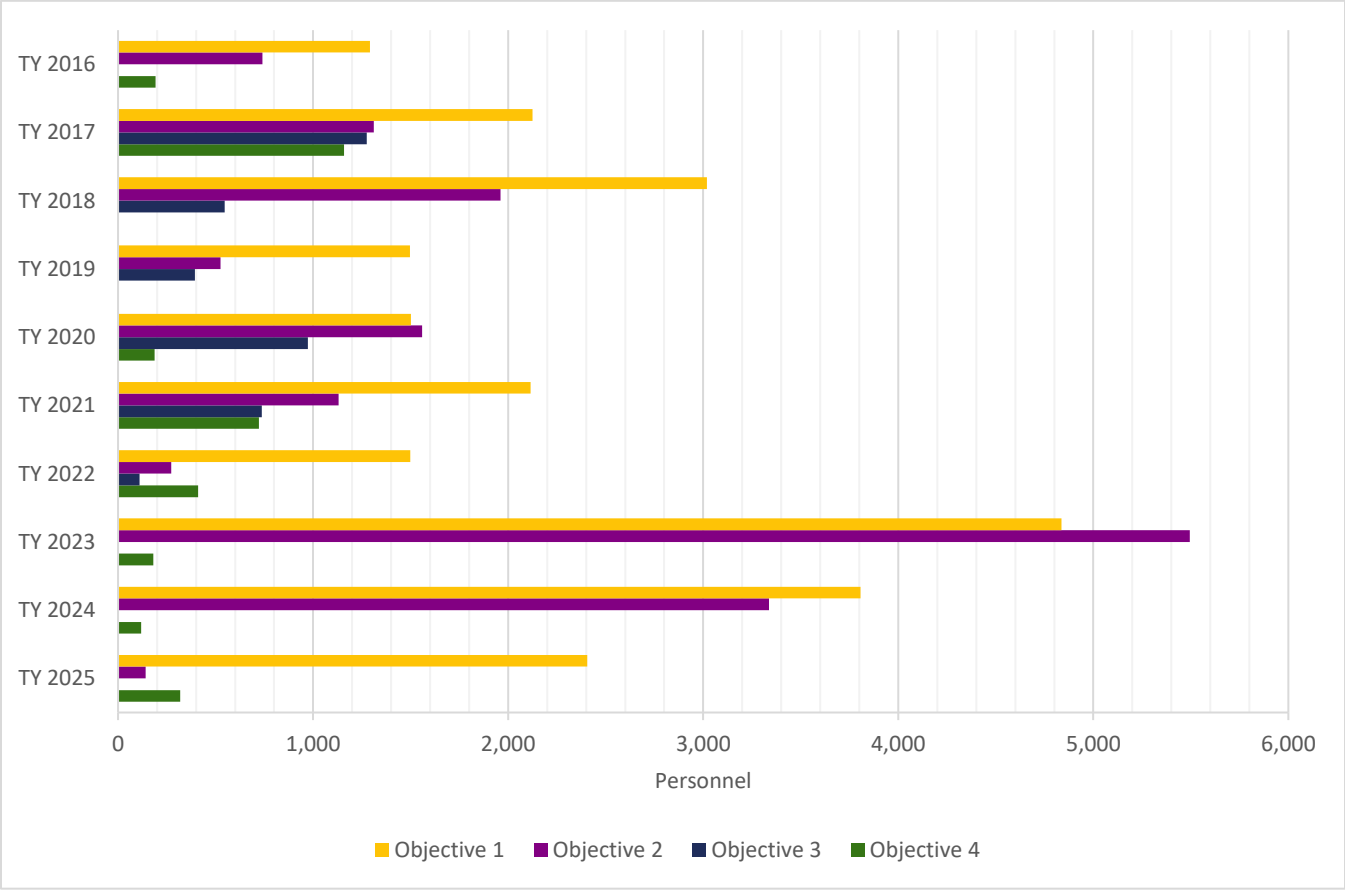
The SVL uses conex-like shipping containers as training aids, which can be reconfigured to mimic small villages and used for Improvised Explosive Device (IED) training. The containers are located in open or previously cleared, historically-used locations including training and bivouac sites within the Training Area. The ability to periodically reconfigure the portable training aides within the Training Area will critically enhance the ability to adapt scenarios to the most current combat situations, ultimately helping to save the lives of soldiers on the battlefield.

Three SVL locations (called objectives) were used during TY 2025 to meet military training needs: Objective 1 in Training Area A-4; Objective 2 in Training Area BA 4; and Objective 4 in Training Area C-14. Objective 3 in Training Area B 11 was not used. Graph 2-11 shows the use of all four SVL Objectives since TY 2016. The locations of the SVL Objectives are shown in Figure 2-3. The Soldier Validation Lane Annual Monitoring Report for TY 2025 is available in Appendix C.

Figure 2-3 Soldier Validation Lane Objective Locations



Graph 2-11 Soldier Validation Lane Use



2.13 Range Operations and Control Area (ROCA)

During TY 2024, Camp Edwards began upgrading the Range Operations and Control Area (ROCA) support facilities on India, Sierra, and Tango ranges. ROCA structures support range operations and improve safety on small arms ranges. The support buildings currently on those ranges were either dilapidated or not on the range at all. The support structures being upgraded or constructed include range towers, ammunition break-down buildings, equipment storage, bleacher overhangs and covered mess areas. There is no significant change in use on these ranges.

In March 2024, a Notice of Project Change to the Final Environmental Impact Report, June 2001 (Executive Office of Energy Environmental Affairs project #5834), was submitted to MEPA describing the proposed support facilities and on April 22, 2024, the Secretary of the Executive Officer of Energy and Environmental Affairs issued a certificate for the project. Work on the project began in May 2024 and was completed in early 2025.

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Section 3
Environmental Program Management

3.0 Introduction

Chapter 47 requires the Annual Report to contain information describing the range of resource management activities conducted by the MAARNG in the Training Area/Reserve and to report on activities associated with the EPSs for the Training Area/Reserve. Sections 3.1 through 3.15 include information for each EPS where there were associated activities. Section 3.16 provides similar information for the generic Cultural Resources EPS that also applies to MAARNG activities in the Training Area/Reserve. In addition to meeting this requirement, Section 3 provides information on required mitigation measures undertaken by the MAARNG and information on any noncompliance with the EPSs or other laws and/or regulations.

Chapter 47 also requires the Annual Report to describe long-term trends in the major areas of resource management and activities. Data are provided in this report back through TY 2016, when available, or longer when appropriate to illustrate long-term trends. Additional information on environmental management activities performed in the Training Area/Reserve can be found on the Camp Edwards Training Site website.

During TY 2025, Records of Environmental consideration (RECs) were prepared to assess the potential impacts of two proposed actions on natural and cultural resources in the Training Area/Reserve. RECs are an internal environmental review document based on NEPA. The RECs reviewed were for minor tree removal and fire break roadwork.

Appendix D identifies the relevant federal, state, DoD, and U.S. Army environmental regulations governing MAARNG activities in the Training Area/Reserve.

3.1 Groundwater Resources Management

The MAARNG complied with EPS 1, Groundwater Resources Performance Standard during TY 2025. Travel in Zone 1 Wellhead Protection Areas was limited to foot travel or to vehicles required for construction, operation, or maintenance of wells. The Upper Cape Regional Water Supply Cooperative continues to have fencing around its three water supply wells and appropriate signage around each of the well's 400-foot radius in the Training Area/Reserve. Both the Upper Cape Regional Water Supply Cooperative, the 102nd Intelligence Wing, and Converge/ASUS (see Section 3.1.3) operated within the water withdrawal limits of their respective MassDEP issued permit or registration. The Bourne Water District has a well in the Training Area/Reserve that is part of its overall water supply system. The JBCC Groundwater Protection Policy is available at: https://campedwards.ng.mil/Publications/

3.1.1 Precipitation

Precipitation information included in the Annual Report is obtained from the Northeast Regional Climate Center at Cornell University in Ithaca, New York, based on recordings from a station in East Sandwich, Massachusetts. That station reported a total of 40.91 inches of precipitation for TY 2025 (Graph 3-1).

Graph 3-1 Precipitation Recorded

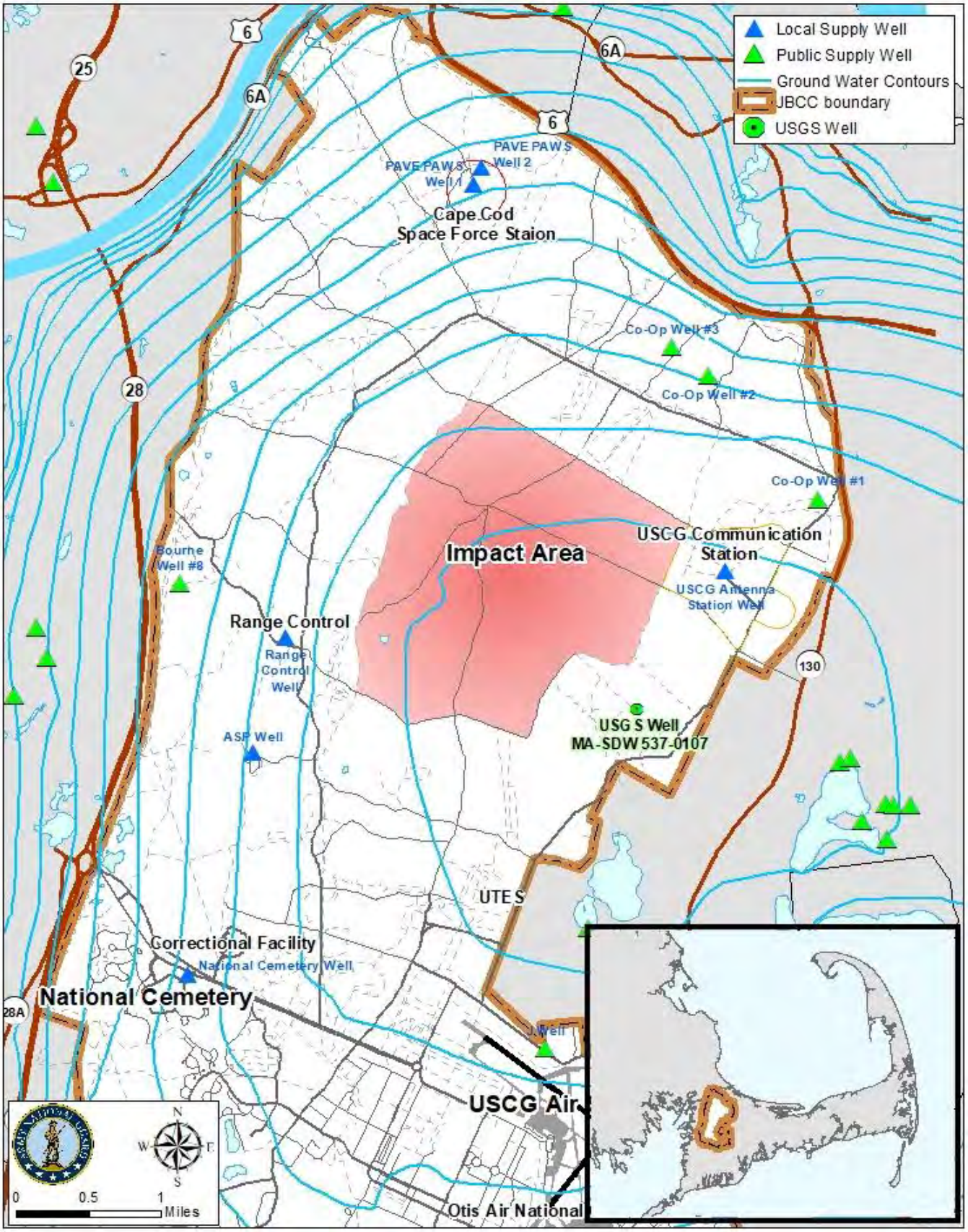
3.1.2 Groundwater Level

During the early part of TY 2005, the U.S. Geological Survey (USGS) installed a monitoring well (USGS number MA-SDW 537-0107) on Camp Edwards to record the altitude of the water table in the Cape Cod aquifer. The well is located west of Greenway Road on the J-1 Range of the Training Area/Reserve and is about 107 feet deep. A recording device in the well electronically transmits a continuous record of the water level near the top of the water-table mound that forms the Sagamore groundwater-flow system on western Cape Cod. The well's location is shown in Figure 3-1.

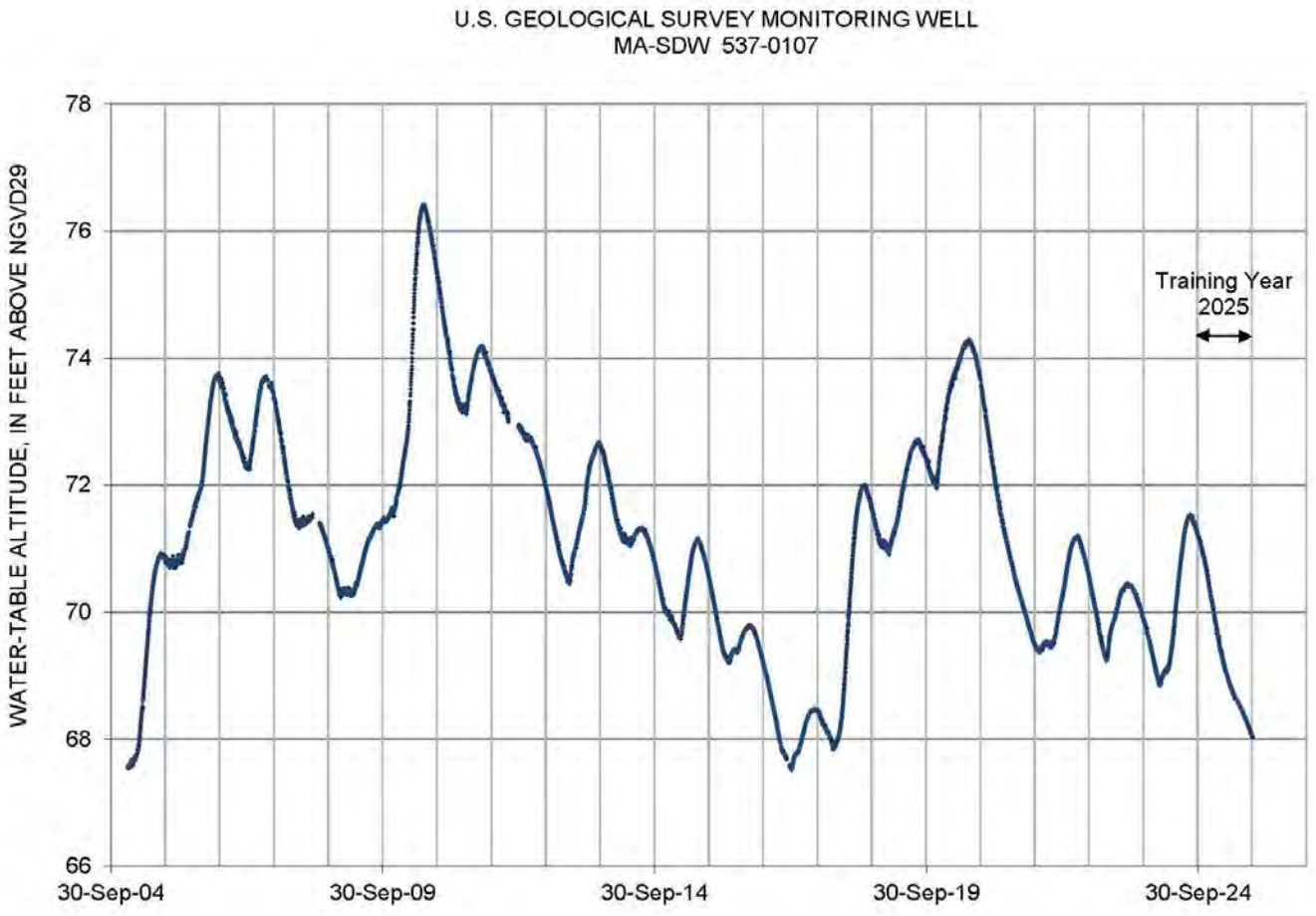
The pattern of water-level changes observed at the monitoring well is caused by natural seasonal and year-to-year variations in recharge from precipitation. Graph 3-2 shows the trend in the water-table altitude at the USGS monitoring well for the 2005-2025 training years. The water-table altitude declined about 3.2 feet between October 2024 and September 2025. The water level at the end of the training year was near its lowest recorded level for the 21-year-long monitoring period. A similar trend of declining groundwater levels was observed this year elsewhere on Cape Cod and southeastern Massachusetts because of drought conditions in the region (https://www.usgs.gov/centers/new-england-water/data-tools).

The well became operational in January 2005. Information about the well and the observed groundwater levels are publicly available on the USGS website.

Figure 3-1 Well Locations



Graph 3-2 U.S. Geological Survey Monitoring Well



3.1.3 Water Supply Systems

Upper Cape Regional Water Supply Cooperative

The Upper Cape Regional Water Supply Cooperative provided 357,085,000 gallons of water (a daily average of 978,315) from its three wells to the six public water supply systems it services during TY 2025: Bourne Water District, Mashpee Water District, Sandwich Water District, the Town of Falmouth water system, the Barnstable County Correctional Facility, and the Converge/ASUS water supply system (formerly the Otis ANGB system). The Cooperative is authorized to withdraw up to 3.0 million gallons per day. Graph 3-3 shows the daily average pumping rate of the Cooperative since TY 2016. The locations of the Cooperative's three water supply wells (WS-1, WS-2, WS-3) and its seven sentry monitoring wells (C-1 through C-7) are shown in Figure 1 in Appendix E. The Cooperative's Long Term Monitoring Sentry Well Sampling are available by contacting Dan Mahoney at the Sandwich Water District. The Cooperative's most recent Consumer Confidence Report is provided in Appendix E.

Converge/ASUS Public Water Supply System

In 2022, the US Air Force entered into an agreement to transfer ownership of the Otis Air National Guard Base water and wastewater systems to Converge LLC. Converge then selected American States Utility Services, Inc. (ASUS) to operate and maintain the systems. In April 2024, Converge/ASUS began operations at the facilities.

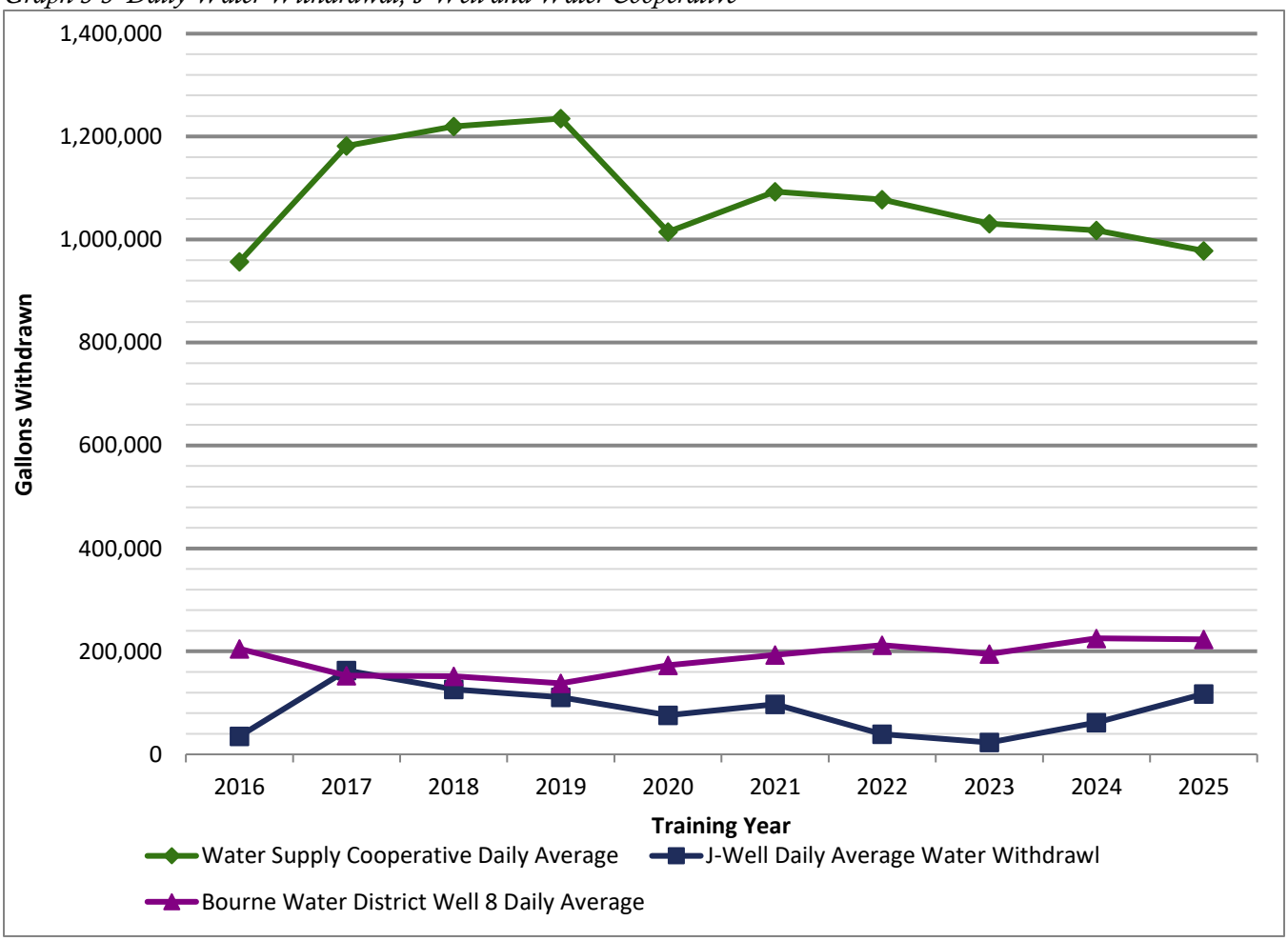
The Converge/ASUS system pumped an average of 117,683 gallons of water per day, a total of 42,954,160 gallons of water from its well, known as J-Well (located in the Cantonment Area), during TY 2025. The Converge/ASUS system did not receive any water from the Cooperative during TY 2025; the Cooperative connection is utilized on an as-needed basis. Graph 3-3 shows the daily average pumping rate of the Otis system

since TY 2016. A copy of the most recent Consumer Confidence Report for Otis ANGB is provided in Appendix E.

Bourne Water District Water Supply Well

During TY 2025, Bourne Water District Well 8 pumped a total of 81,535,000 gallons, with a daily average of 223,384 gallons pumped. Graph 3-3 shows the daily average pumping rate of Well 8 for TY 2016 through TY 2025. The well's location is shown in Figure 3-1. The Bourne Water District's most recent Consumer Confidence Report is provided in Appendix E.

Graph 3-3 Daily Water Withdrawal, J-Well and Water Cooperative



Other Water Wells

There are two water supply wells located within the boundary of the Training Area/Reserve. These are located at Cape Cod SFS (PWS# 4036008) and the USCG Communications Station. Further information on water supply wells is available on MassDEP's website.

3.2 Wetlands and Surface Water Management

The MAARNG did not take any actions during TY 2025 that resulted in the loss of any wetland resources or their 100-foot buffer areas. Environmental Performance Standard 2 is the Wetlands and Surface Water Performance Standard. No new bivouac areas were created in the Training Area/Reserve during the year within 500 feet of any wetland and no land alteration activities were conducted by the MAARNG within 100 feet of a certified vernal pool during the year. Consistent with EPS 2.7, in TY 2025 trails and roads listed within 500 feet of wetlands were closed to vehicle access from February 15 to May 15 to protect migrating and breeding amphibians.

Environmental Program representatives routinely attended coordination meetings held by various parties (e.g., Camp Edwards, IAGWSP, utility companies) to ensure activities were appropriately reviewed and that wetland impacts were avoided or, if necessary, permitted. No official permitting actions were required in TY 2025.

Throughout TY 2025, the Natural Resources and Training Lands Program (NRTLP) coordinated with the Bourne and Sandwich Conservation Departments in advance of prescribed burns and structural maintenance work occurring within or near wetland buffer zones. The location and nature of these activities did not trigger additional review under the Massachusetts Wetlands Protection Act (MGL Ch. 131, Sec. 40) and its implementing regulations (310. CMR 10.00), the Bourne Wetlands Protection By-Law (Article 3.7), or the Sandwich Wetlands By-Laws (Chapter 7).

As part of the April 2025 prescribed burn in Training Area BA-7, the NRTLP prepared a brief before-and-after assessment of GP-3, a small (<0.5 acre) kettlehole wetland located near the center of the 74-acre burn unit. Kettlehole wetlands and associated frost-bottom features are components of the fire-adapted pine barrens at Camp Edwards, and while prescribed fire may influence vegetation structure, it is not expected to impair wetland function.

Site visits were conducted one day before the burn (April 16, 2025) and again four months after the burn (August 8, 2025). Pre-burn conditions showed early-season dormancy with emerging Canada Reed Grass and dormant woody stems of Steeplebush and White Meadowsweet. Post-burn photos and field observations documented vigorous regrowth of wetland graminoids and forbs, including Sallow Sedge, Woolgrass, Rice Cut Grass, Three-way Sedge, and Dotted Smartweed. Fire-adapted shrubs such as Steeplebush and White Meadowsweet resprouted strongly from rootstocks, demonstrating expected fire-resilience. Overall, the assessment found no adverse effects to the wetland's structure or ecological function. Instead, results indicate a positive vegetative response, including reduced thatch, enhanced herbaceous vigor, and maintenance of the frost-bottom condition through the reduction of encroaching pitch pine saplings. While a single pre- and post-burn visit cannot quantify long-term ecological benefit, the findings are consistent with the role of low- to moderate-intensity fire in sustaining pine barrens and their unique kettlehole features.

3.2.1 Vernal Pools

Vernal pools are protected under the Massachusetts Wetlands Protection Act when located within jurisdictional resource areas and when they meet biological and physical criteria for certification. Pools may qualify through documentation of obligate species (e.g., Spotted Salamander, Wood Frog, fairy shrimp) and lack of a permanent outlet, or through evidence of multiple facultative species combined with proof there is no permanent outlet and that the pool periodically dries. The Bourne and Sandwich Wetland Protection bylaws can provide additional protection to vernal pools including pools in wetlands that fall outside state jurisdiction.

In TY 2025, no activities impacted vernal pool habitat. Consistent with EPS 2.7, all trails and roads within 500 feet of wetlands were closed to vehicle use between February 15 to May 15 to protect migrating and breeding amphibians. The NRTLP participated in internal and external project reviews to ensure that facility upgrades at the Utility Training Equipment Site (UTES) and Rod and Gun Club building, re-sighting of gas pipelines as part of the Cape Cod Canal Bridges Relocation Project, and a feasibility study for lead contamination remediation at the Otis Gun Club, avoid or minimize impacts to vernal pools and their surrounding habitat.

A planning effort, initiated in 2021, assessed the feasibility of creating new vernal pool habitat at Camp Edwards. SWCA Environmental Consultants completed a siting analysis using Geographic Information System (GIS) review and field verification to identify potential creation sites that would not conflict with training. but that provide ecological benefits. Because several sites were in archaeologically sensitive areas, the next step would have required archaeological survey and evaluation. After further consideration of program priorities, ecological implications, and long-term oversight and maintenance needs often associated with creating vernal pools or wetland features, in TY 2024 the NRTLP decided to postpone vernal pool creation for the foreseeable future.

3.3 Rare Species Management

Environmental Performance Standard 3 is the Rare Species Performance Standard. Rare species monitoring and management is an integral part of adaptive management for a healthy ecosystem. Rare species are often important indicators of regional or local ecological threats and trends. Collaborative planning and prioritization of rare species efforts is a priority for MAARNG within and outside the Training Area/Reserve and are key to DoD conservation. The NRTLP in TY 2025 undertook rare species monitoring and management efforts through contracted and in-house projects. This includes numerous efforts documenting and reporting wildlife and plant species listed under the Massachusetts Endangered Species Act (MESA) on Camp Edwards.

The tables below only include state-listed (MESA) and federally listed species. The NRTLP also reports observations of "Tracking List" species to NHESP as a standard condition of scientific collection permits for reptiles and amphibians. Additionally, observations of species on the MassWildlife Plant Watch List are reported annually. The following subsections outline efforts for species or species groups during TY 2025. The tables below present raw number counts that are reported to NHESP based on sightings, including formal surveys and casual encounters. Some of the totals reported include results of formalized surveys that are used to evaluate populations, however, the raw count totals in the following tables should not be used to infer population trends or similar. Counts are highly dependent on within-year project priorities and efforts, as well as external influences (location availability during survey windows, etc.). Zeros most often represent a lack of effort relative to a particular species, rather than absence.

3.3.1 Rare Plants and Focal Species

Camp Edwards supports six state-listed rare plant species (see Table 3-1 in Section 3.3.1.7) and no federally listed species. The NRTLP plans and coordinates surveys to monitor populations and to inform management strategies and conservation efforts through contracted and in-house projects. Surveys and management activities are prioritized and implemented through permit requirements and/or partner agency communication as well as through internal programmatic or base-wide interest and needs. In addition to projects that are directed at rare species, monitoring and management for uncommon and important flora, such as Wild Lupine (*Lupinus perennis*, a recent MESA addition) and Milkweed (genus *Asclepias*), are also conducted to maintain and understand their populations.

Efforts to increase Wild Lupine resiliency at Camp Edwards include wild seed collection and planting as well as habitat management. The vibrant lavender blooms are seen here in one of Camp Edward's new areas. *Photograph by Erin Hilley, Natural Resources and Training Lands Program*

3.3.1.1 Frost Bottom Rare Plants

In TY 2025, surveys and research efforts continued to refine the understanding of rare plant distribution and identity at Camp Edwards, including new field detections of Broad Tinker's-weed (*Triosteum perfoliatum*) and further assessment of its presence in frost bottom landscape features. The NRTLP conducts recurring surveys to monitor Broad Tinker's-weed (state Endangered) and Adder's Tongue Fern (*Ophioglossum pusillum*, state Threatened), two rare species that co-occur within frost bottom and depressional landforms. Some of these rare plant (RP) sites have been surveyed for decades with NHESP records for Broad Tinker's-weed and Adder's Tongue Fern going back as far as 1997. The NRTLP carries out surveys at RP sites on a rotational schedule to minimize disturbance while maintaining oversight. Since 2010, twelve RP sites support Broad Tinker's-weed and five Adder's Tongue Fern. Two of the Broad Tinker's-weed sites were found in the last couple of years, in TY 2023 at the edge of an inactive firing range—its first new detection in many years and outside of a depressional feature—and in TY 2025 within a small depression between two known frost bottom RP sites.

A major TY 2025 accomplishment for this species was the publication of the Triosteum genetic study, initiated in TY 2020 by the NRTLP, to resolve long-standing uncertainty regarding the identity of the Camp Edwards population. Plants on the installation exhibit a mix of morphological features characteristic of both Broad Tinker's-weed and the more common, Orange-fruited Horse-gentian (*Triosteum aurantiacum*), making reliable field identification difficult and raising the possibility of misidentification or hybridization. The genetic study found no evidence of recent hybridization and concluded that the Camp Edwards Triosteum population is most closely related to Broad Tinker's-weed, providing scientific basis for treating all Camp Edwards Triosteum, regardless of morphological features, as Broad Tinker's-weed for conservation and land management purposes. Further information is available in the *Camp Edwards Natural Resources & Training Lands Management Annual Report for Fiscal Year 2025.*

Surveys

No formal rare plant surveys for Broad Tinker's-weed or Adder's Tongue Fern were conducted in TY 2025; instead, the NRTLP dedicated effort to revisiting "historical RP sites" where past negative findings or older records warranted re-evaluation. This work was prompted in part by the TY 2025 Triosteum genetic study, which confirmed that historical observations of Orange-fruited Horse gentian on the installation likely represent Broad Tinker's-weed, and by ongoing concern that Adder's Tongue Fern—a small, easily overlooked species experiencing statewide decline—may have been overlooked in earlier surveys. The TY 2025 revisits combined desktop review, site reconnaissance, and habitat assessment to determine whether these historical frost-bottom or depressional sites provided suitable conditions and whether targeted rare plant surveys or habitat management (e.g., selective tree and shrub removal to restore frost-bottom structure) were warranted. The results collected during these revisits will be further reviewed in TY 2026, with follow-up targeted surveys or information gathering to develop future site management or frost bottom restoration recommendations.

Management

In TY 2025, the NRTLP undertook an effort to revisit historical and previously suspected rare-plant sites to assess their current ecological function as frost-bottoms, evaluate habitat conditions, and determine whether management actions—such as selective tree or shrub removal—may be warranted or feasible. Management of frost-bottom rare plant sites focuses on setting back woody succession and reducing tree and shrub canopy within depressional landforms where encroachment may limit habitat suitability. While small-scale management—such as removal of trees, shrubs, and invasive plants—has occurred intermittently over the years, a larger-scale project would aim to restore frost-bottom structure more fully in areas where conditions suggest it was historically present. The TY 2025 revisits also provided an opportunity to verify older negative findings and confirm whether these sites retain the microhabitat features necessary to support *Triosteum perfoliatum* or *Ophioglossum pusillum*. Information gathered during these assessments will be further reviewed in TY 2026 to identify locations where targeted rare plant surveys or habitat restoration should be prioritized. Invasive plants continue to pose a low to negligible

threat at most frost-bottom sites due to their remote positions and the ongoing early-detection and rapid-response efforts conducted at rare plant sites.

Further information is available in the *Camp Edwards Natural Resources & Training Lands Management Annual Report for Fiscal Year 2025.*

3.3.1.2 Sandplain Grassland/Heathland Rare Plants

Camp Edwards manages approximately 360 acres of sandplain grassland and heathland habitat in the Cantonment Area of the base. These early successional plant communities are declining regionally in area and occurrence and are critically important to many of the state's rare and uncommon species. About half of Camp Edward's rare species are associated with these relatively treeless habitats. Sandplain grassland and heathlands are maintained or perpetuated by natural and human disturbance necessary to set back the encroachment of woody trees and shrubs that leads to reforestation. In the northern training area, smaller patches of open habitat representative of sandplain grassland and heathland communities exist as natural and human established openings in the woodlands and shrublands including on firing ranges, battle positions, and other soldier training venues, as well as on mowed roadsides and utility easements. Many of these areas provide similar or complimentary ecological functions and wildlife benefits as the larger grassland/heathland expanses.

The NRTLP manages the sandplain grassland and heathland units in the Cantonment Area through prescribed burns, mowing, and mechanical and chemical removal of woody and invasive plants. In TY 2025, the NRTLP carried out various in-house projects in the Cantonment Area and grassland units concentrating on a continuing effort from TY 2024 to remove Autumn Olive (*Elaeagnus umbellata*) but also other invasive plants. In TY 2025, the contract initiated by NRTLP in TY 2024 for invasive plant management was completed. The project prioritized the removal of Autumn Olive in an approximately 9-acre wooded unit adjacent to the grassland units and including 61 acres of follow-up control to remove persistent invasive woody plants that were treated in TY 2023. During TY 2025, 108.5 acres in the managed grassland/heathland at Camp Edwards were managed with prescribed fire, more than the 66.5 acres in TY 2024.

Habitat protection signs with mowing time of year restrictions are posted along the grassland unit boundaries and convey protections to rare species occurring in the managed grasslands and heathlands of the Cantonment Area. In TY 2025 continued coordination with entities who mow around or within the grasslands (Camp Edwards Road and Grounds, US Department of Transportation Volpe Center, etc.) to ensure mowing supports rare species. Species such as Stiff Yellow Flax (*Medium var. texanum*, state Threatened) and Whorled Milkwort (*Polygala verticillata*, Watch List) often grow where mowing and other human activity maintains a patchiness of bare mineral soil and herbaceous vegetation (e.g., mowed roadside adjacent to grassland unit and a site sometimes used to stage equipment). Other Watch List species, including Nutall's Milkwort (*Polygala nuttallii*), Narrow-leaved Bush-clover (*Lespedeza angustifolia*), and Butterfly Milkweed (*Asclepias tuberosa*) are relatively common in the open grasslands and related habitat and observed in TY 2025 to be in at least roughly stable numbers.

Battle position 11 in training area BA-7 provides important open habitat representative of a sandplain grassland.
Photograph by Jake McCumber, Natural Resources and Training Lands Program

3.3.1.3 Wild Lupine

Effective August 16, 2024, Wild Lupine (*Lupinus perennis*) became protected under MESA, now as a species of Special Concern instead of its previous Watch List status. The proposal to list Wild Lupine cites a decline in the number of locations where it occurs in Massachusetts, due primarily to habitat loss and habitat degradation from development and from the suppression of natural disturbance regimes like fire. The rarity of this species and the fact that it was only known from one location on the base makes it a species of conservation interest for NRTLP. In the past few years NRTLP has started two new satellite populations using seed collected from the original population in the Training Area/Reserve, called RP10. The two satellite populations (RP10a and RP10b) are in the Cantonment Area which facilitates monitoring and intervention, such as watering in the first year or two when the seedlings are most vulnerable to desiccation. Seeds collected from the new sites will be used to augment and expand on the existing populations as well as to establish new locations.

Survey

Wild Lupine surveys focus on counting reproductive stems because the species' clonal growth form makes it difficult to distinguish individual plants. In TY 2025, the NRTLP recorded 230 reproductive stems at the primary RP10 population—a normal and healthy count that remains well within the long-term range of 100–350 stems documented since 2019. This aligns with the earliest detailed record for RP10, first reported in 1997 by a MAARNG field technician, who documented 243 mature and 198 immature stems in 76 clumps. Surveys were also conducted at the two satellite populations established from RP10 seed. The first planted site, initiated in 2022, continued to expand and produced 194 reproductive stems in TY 2025, up from 130 stems in TY 2024. The newest satellite population, now in its second growing season, showed strong vegetative growth but—consistent with early-stage lupine establishment—did not yet produce reproductive stems; 26 vegetative clumps were counted, and flowering is expected in TY 2026.

Further information is available in the *Camp Edwards Natural Resources & Training Lands Management Annual Report for Fiscal Year 2025.*

One of two satellite populations of Wild Lupine was established using seed collected from the RP10 source population. Natural Resources and Training Lands Program staff conduct a count of reproductive stems. *Photograph by Erin Hilley, Natural Resources and Training Lands Program*

Management

In TY 2025, the NRTLP began efforts to expand the original Wild Lupine site (RP10) by thinning trees and shrubs in an area adjacent to the population. This increases sunlight reaching the forest floor and better mimics vegetative conditions within RP10. Tree removal was conducted when the lupine was dormant in the winter. A prescribed burn that incorporates RP10 is planned for the spring TY 2026 and will help to reduce leaf litter and expose pockets of bare soil conducive to seed germination. Wild Lupine seed collected from the satellite populations will be planted into the newly opened areas. Increasing the number of Lupine sites and site sizes will increase the species' resiliency and will support numerous species that are either host specific to Lupine or a combination of Lupine and Wild Indigo (*Baptisia tinctoria*). Wild Lupine is the sole plant that the federally Endangered Karner Blue Butterfly larvae can eat and while the butterfly does not currently occur in Massachusetts, bolstering its critical food source could have real benefits in the future.

3.3.1.4 New England Blazing Star Translocation Project

In TY 2025, the NRTLP submitted a proposal and permit application to NHESP to establish New England Blazing Star (*Liatris novae-angliae*), state-listed Special Concern, within the managed sandplain grasslands at Camp Edwards. Although the species is not currently known from the base, it is within the species' regional range, has abundant suitable habitat, and is surrounded by multiple extant populations. Historical land use at the base may be responsible for its absence.

In August, NHESP approved the proposal and issued a permit for seed collection and translocation of New England Blazing Star to locations at Camp Edwards. Seed collection for the translocation project began in late October and continued through November 2025, with a portion of the collected seed provided to Eastern Connecticut State University for propagation by collaborating botanist, Dr. Bryan Connolly and his students. Less than half of the seed was direct-sown in late November 2025 into small test areas within two grassland management units. The remaining seed will be sown in early spring 2026 in comparable areas of the same units to evaluate potential differences in establishment based on timing of sowing. In addition, the NRTLP will receive and out-plant greenhouse-grown transplants from the university later in the spring. These early actions mark the first phase of the project, with expanded reporting to be provided in the TY 2026 annual reporting.

Further information is available in the *Camp Edwards Natural Resources & Training Lands Management Annual Report for Fiscal Year 2025.*

3.3.1.5 Violet Survey Protocol (Eastern Regal Fritillary Host-Plant Assessment)

In TY 2025, the NRTLP developed and implemented a rapid assessment protocol to evaluate the abundance of native violets, particularly Arrow-leaved Violet (*Viola sagittata* var. *ovata*), the obligate larval host plant of the Eastern Regal Fritillary. This evaluation was undertaken to determine whether Camp Edwards could meet the habitat thresholds identified in the Eastern Regal Fritillary Reintroduction Site Guidelines developed by the Pennsylvania Department of Military and Veterans Affairs Wildlife Office, which recommend host-plant densities on the order of several thousand violets per acre for successful establishment. Because violet occurrence at Camp Edwards appeared in scattered and low-density patches, based on preliminary observations, the team used a sampling approach that targeted areas where violets where habitat conditions appeared most favorable.

The protocol consisted of 100 × 40-meter (4,000 m² ≈ 1-acre) plots, each containing ten transects spaced 10 meters apart, with surveyors searching a roughly 2-meter-wide swath along each transect--using outstretched arm length as a measure. All violets encountered within each transect were counted and identified to species. On May 5, 2025, NRTLP staff completed three plots, two located in the sandplain grassland units and one in the northern training area.

NRTLP staff conducted a violet survey to measure their density for an Eastern Regal Fritillary reintroduction project by USFWS. Bird-foot Violets can be seen in the foreground brightening up the patchily vegetated field. *Photograph by Erin Hilley, Natural Resources and Training Lands Program*

Results confirmed that violet densities at Camp Edwards are substantially below levels required to support a future regal fritillary reintroduction. Across the three plots, densities ranged from 0.1 to 0.3 violets per square yard, well below even the minimum suitability benchmark of 1 violet per square yard. Three violet species were documented: Bird-foot Violet (V. pedata), Lance-leaved Violet (V. lanceolata), and Arrow-leaved Violet (V. sagittata var. ovata), with Arrow-leaved present but consistently in the lowest numbers. Violets generally occurred as relatively small low-density patches rather than the large, well-connected patches preferred by the species, as described in the Candidate Conservation Agreement (USFWS, 2023) and Reintroduction Site Guidelines.

These findings indicate that current host-plant availability is insufficient to support an Eastern Regal Fritillary population under present conditions. However, the completed surveys provide an efficient, repeatable baseline for future assessments and can help guide discussions regarding potential habitat enhancement or restoration should the Army and partner agencies pursue reintroduction or connectivity projects in the long term.

3.3.1.6 Papillose Nut-sedge

Papillose Nut-sedge (*Scleria pauciflora*, state Endangered) was first observed at Camp Edwards in September of 2023 during a contracted planning level survey targeted at rare plant species. The contractor's observations

included two general locations; at KD Range and within the highly restricted Impact Area in localized areas where vegetation was previously removed to ground level for purposes of detecting metals. Two NRTLP seasonal field technicians discovered another population existing within a mowed fire break in the retired portion of Tango Range. In TY 2024, another population was discovered by NRTLP staff. This population, like Tango Range, is small, covering less than 115 square meters, and is near a regularly maintained fence line and mowed area in association with the Unit Training Equipment Site facility.

Significant effort in TY 2023 and TY 2024 was dedicated to surveying, protecting, and incorporating Papillose Nut-sedge into an Amendment to the Multipurpose Machine Gun Range Conservation and Management Plan (CMP) following its discovery in TY 2023. No new survey or management activities were conducted in TY 2025 in part because the population had been so thoroughly surveyed over the two prior years. Planning and coordination occurred between NRTLP and Camp Edwards Roads and Grounds to prepare for basic habitat maintenance (range mowing) to occur in early TY 2026. The Papillose Nut-sedge populations are considered stable, as site conditions have remained unchanged since the initial discoveries other than targeted mowing to support the species.

3.3.1.7 State-listed Species Reporting

The Massachusetts Army National Guard reports all observations of state-listed species on MAARNG lands to the DFW through the Heritage Hub website portal. State-listed plant surveys are described in detail above. In the table below, reported values reflect varying effort and/or sites year to year and do not represent consistent data for trend analysis. “Stable” indicates that a dedicated count/survey did not occur, but that the species was observed in the field to be consistent with prior reports. A list of rare species reported to NHESP from TY 2016 to TY 2025 is in Appendix F.

Table 3-1 State-Listed Plants Reported to NHESP

Common/Scientific Names	*Fed Status*[1]	*State Status*[2]	*2021*	*2022*	*2023*	*2024*	*2025*
Adder’s Tongue Fern (Ophioglossum pusillum)	-	T	N/A	225	215	292	Stable
Grass-leaved Ladies'-tresses (Spiranthes vernalis)	-	T	6	0	31	Stable	Stable
Broad Tinker’s-weed (Triosteum perfoliatum)	-	E	N/A	1,883	3,161	3,637	Stable
Stiff Yellow Flax (Linum medium var. texanum)	-	T	0	0	92	Stable	Stable
Papillose Nut-sedge (Scleria pauciflora)	-	E	0	0	41,081	82,034	Stable
Wild Lupine (*Lupinus perennis*)	-	SC	N/A	133	245	480	424

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)
[2] State Status: E = Endangered, T = Threatened, SC = Special Concern
Note: Quantities shown are not only results of standardized surveys and should not be interpreted as population trends.
N/A indicates that no targeted survey was conducted for the species and it is not casually observed. Zeroes indicate that a targeted survey was conducted and no individuals were observed.

3.3.2 Bats

Cave-hibernating bat species in New England, particularly the Northern Long-eared Bat, Tricolored bat, and Little Brown Bat, have seen population declines of 90% or more due to the *Pseudogymnoascus destructans* fungus, which leads to white-nose syndrome. Due to these declines, the Northern Long-eared Bat is now federally listed as endangered, Tricolored Bat is proposed for listing as endangered, and the Little Brown Bat is currently under review for listing.

The NRTLP has been surveying for bats on Camp Edwards since 2014. In TY 2024, all past acoustic data was compiled to determine the spatial and temporal use of the base by declining Myotid bats. A summary of the acoustic and mist netting results was provided in the TY 2024 Annual Report and was used to support consultations under the federal Endangered Species Act.

Acoustic monitoring for bats was completed in TY 2025 across the base in support of ongoing and completed consultations with USFWS. The NRTLP contracted BSC Group to complete acoustic surveys at 40 points across forested landscapes at Camp Edwards during the maternity season for Myotis and Perimyotis bats (includes Northern Long-eared Bat [*Myotis septentrionalis*], Little Brown Bat [*Myotis lucifugus*], and Tricolored Bat [*Perimyotis subflavus*]). The call recordings from the summer maternity season surveys will be vetted in the fall of 2025 and a report will be received in the winter of 2025-2026.

3.3.3 New England Cottontail Rabbit Study

The NRTLP began a study in TY 2010 on the New England Cottontail Rabbit (*Sylvilagus transitionalis*), at the time a candidate species for federal listing. Original study objectives were to determine the home range and habitat preferences of the species. This information can be used regionally to influence effective management efforts for this species. Current and future efforts are transitioning more from research into population monitoring, though with a strong emphasis on evaluating the effects of habitat management on cottontails. New England cottontails occur in suitable scrub oak or dense shrub habitat along powerlines or in the Impact Area on Camp Edwards.

In 2015, the USFWS removed New England cottontail from the federal candidate list. The finding was based upon the conservation implementation enacted and future commitments by the large regional partnership, including MAARNG and Camp Edwards. Continued habitat management and monitoring are critical to New England cottontail success and keeping the species from being federally listed.

The NRTLP performed pellet searches for the New England Cottontail (*Sylvilagus transitionalis*) again in TY 2025 in regional plots and in areas with previous management history. In TY 2024, the Program also continued collaborating with the State University of New York College of Environmental Science and Forestry and USFWS to monitor experimental management plots for New England cottontail, bird, and bat utilization.

In TY 2025, a manuscript on the detailed analysis of New England Cottontail data from USFWS and MAARNG was submitted for publication. Revisions in response to reviewers are in process for resubmittal. In TY 2021, the Program contracted the USFWS working with the University of Rhode Island to perform statistical analysis and reporting for the New England cottontail data compiled since the beginning of research and monitoring for New England Cotttontail at Camp Edwards. The University of Rhode Island completed their report in late TY 2023 with results reported in the TY 2024 *Annual State of the Reservation Report*.

3.3.4 Clam Shrimp

Puddles in dirt/gravel roads in the Camp Edwards northern training area provide habitat for three uncommon clam shrimp species. Agassiz's Clam Shrimp (*Eulimnadia agassizii*, state Endangered) were discovered in roadway puddles on base in TY 2015 during an effort to resurvey rare species records older than 15 years. One of only eight or so global records known at the time for Agassiz's Clam Shrimp was a collection made at Camp Edwards in 1999. A separate, but visually similar species, the American Clam Shrimp (*Limnadia lenticularis*, state Special Concern), was identified by the NRTLP in TY 2021. A third species, the Mattox Clam Shrimp (*Cyzicus gynecia*), while not listed under MESA, is apparently uncommon in Massachusetts and has been infrequently observed in roadway puddles. Mattox Clam Shrimp was unknown in Massachusetts until 2000 when it was discovered in two puddles in western Massachusetts. The most ubiquitous species in dirt road puddles at Camp Edwards is the Endangered Agassiz's Clam Shrimp.

Monitoring of puddles for clam shrimp, habitat management, and other conservation efforts are carried out on an annual basis. Monitoring protocols and the framework that supports habitat protection and management were established and are carried out through the Agassiz's Clam Shrimp and Training Area Roads Conservation and Management Permit (CMP).

Agassiz's Clam Shrimp with eggs shown under magnification. The eye is at right. *Photograph by Sophia Roemer, Natural Resources and Training Lands Program*

3.3.4.1 Clam Shrimp Annual Monitoring

Standardized clam shrimp monitoring was carried out for the eighth consecutive year in TY 2025. The NRTLP surveyed twelve puddles across the northern training area from May through October, surveying every two weeks from mid-May to mid-July and monthly until mid-October, totaling eight survey dates. In TY 2025, a ninth survey was added in mid-September to sample puddles where clam shrimp had previously been absent, taking advantage of recent rainfall that had been sporadic, hindering clam shrimp detection. One alternate puddle was also surveyed due to make up for insufficient water holding capacity in one of the monitoring puddles.

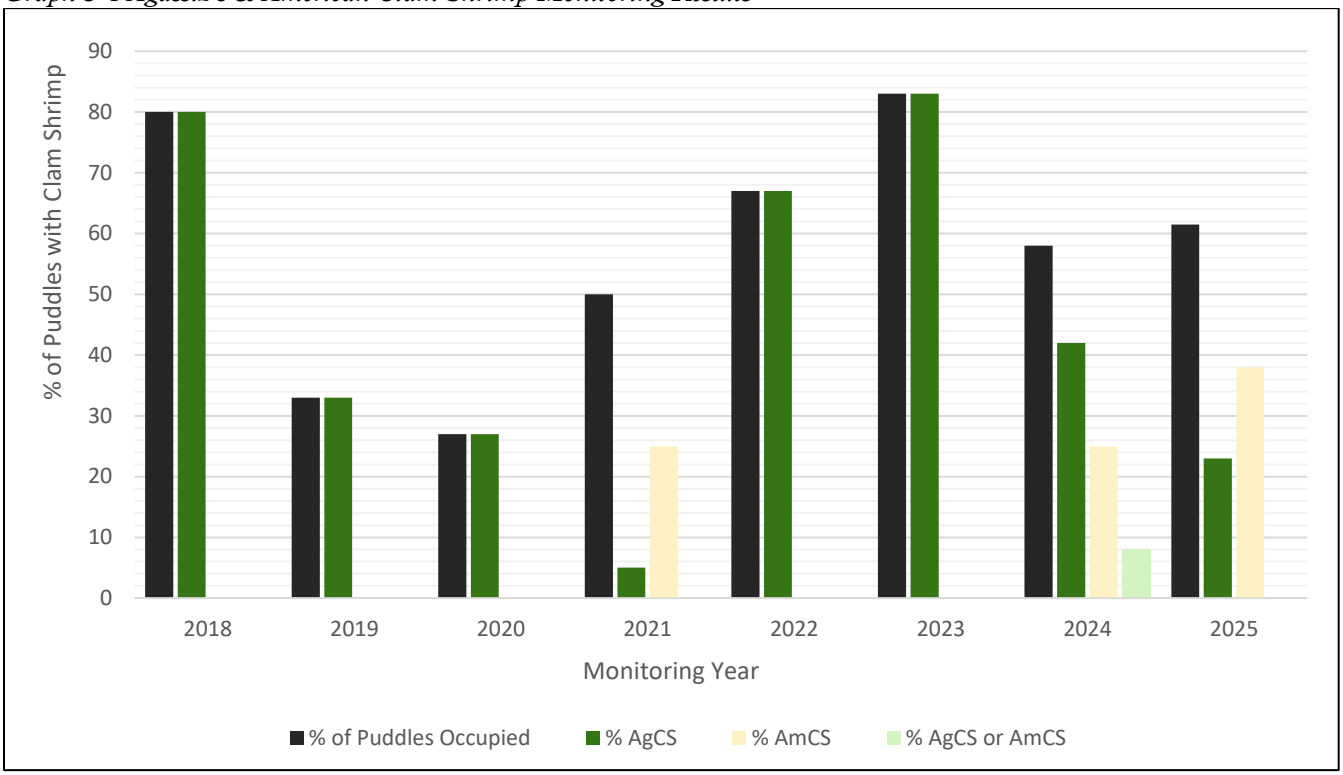
Each year, a mix of known clam shrimp puddles, mitigation puddles, modified puddles, and puddles not previously documented to contain clam shrimp are monitored across the 5 zones (as defined in the CMP) within the Camp Edwards northern training area. Surveys record puddle area, depth, clarity, temperature, and pH in puddles with standing water. Clam shrimp, aquatic invertebrates, and amphibians are detected visually and sampled using shallow dip trays and dip nets. Clam shrimp specimens are collected for further identification in the lab.

During TY 2025, 61.5% of surveyed puddles (8 out of 13) at Camp Edwards contained rare clam shrimp species: either Agassiz's or American Clam Shrimp. Of these, three puddles had Agassiz's Clam Shrimp, while five contained American Clam Shrimp. Interestingly, one site (CAVI7) supported both Mattox and Agassiz's Clam Shrimp simultaneously. The eight positive sites were distributed in four of the five Zones within the training area.

Five of the eight puddles with rare clam shrimp had not been previously surveyed; the remaining three were already documented to support Agassiz's Clam Shrimp. One of them, called CAVI1, dates to an observation from 2016, during which no specimens were taken but Agassiz's was the suspected identification. Two sites were surveyed that had prior Agassiz's presence (Battle Position [BP]1-2 and BP1-4) and in-situ modifications made in 2024 to enhance vehicle access by reducing their size and depth (see Clam Shrimp Habitat Management Section 3.3.4.2). Agassiz's were found at BP1-2, but not at BP1-4, during TY 2025 surveys, although they were observed at BP1-4 shortly after the 2024 modifications. Additional improvements may be needed at BP1-4 to extend the ponding period and depth. As part of mitigation in 2021, Agassiz's Clam Shrimp were introduced to two puddles (CROWX1 and CROWX2). CROWX1 consistently supported Agassiz's as shown in 2021 and 2022 monitoring, but were absent in TY 2025 monitoring, likely due to insufficient water hydroperiod. The majority of the summer was very dry, which likely played a significant role in detection of clam shrimp, but they are quite resilient to years of drought.

During TY 2025 surveys, Agassiz's Clam Shrimp was found at fewer sites (three puddles) than American Clam Shrimp (five puddles). This is a reversal of past years; however, the two species are difficult to tell apart. It's possible that more experience with identification and accuracy in distinguishing the two has some influence on results. Survey challenges included sporadic and light rainfall events not aligned with scheduled survey dates. This led to an opportunistic survey effort in mid-September that resulted in American Clam Shrimp in three of the seven previously negative puddles. Mattox Clam Shrimp remain rare in roadway puddles, with only one collection site in TY 2025 and few previous records since 2015 at Camp Edwards. This species is not state-listed but is considered Globally Imperiled by NatureServe though there is no state rank likely reflecting a lack of knowledge or data. Clam shrimp specimens were collected and identified in the lab under an annually renewed Scientific Collection Permit issued by MassWildlife.

Graph 3-4 Agassiz's & American Clam Shrimp Monitoring Results



Results from standardized annual monitoring showing the total percentage of puddles containing Agassiz's Clam Shrimp (AgCS) and/or American Clam Shrimp (AmCS) and the percentage of puddles broken down by species. The number of puddles surveyed each year ranged between 10 and 12 with 13 surveyed in 2025.

Ongoing monitoring shows Agassiz's Clam Shrimp populations at Camp Edwards are stable but detections fluctuate with temporary pool availability and weather conditions. Seasonal droughts can dry up all monitored puddles, affecting counts. Low rainfall in 2022, for instance, led to fewer observed clam shrimp sites (three puddles). While the seasonal pooling and drying is an adapted benefit and requirement of the brief and irruptive clam shrimp life cycle, it undoubtedly impacts year-to-year monitoring results.

3.3.4.2 Clam Shrimp Habitat Management

Habitat management for state-listed clam shrimp is planned and coordinated through the CMP. The Clam Shrimp Conservation and Road Maintenance Plan (Road Work Plan), a primary component of the CMP, provides a comprehensive long-term plan allowing for necessary road maintenance in the training area while maintaining habitat for rare clam shrimp. Habitat management often involves the *in-situ* alteration of a road puddle, occurring when puddle size thresholds (depth, width, and duration of ponding) impact normal road function. Rock and other material is added to the puddle to reduce the size but to maintain the ponded feature. Sediment from the puddle

floor that would contain the durable clam shrimp eggs is retained while work is conducted and added back to the puddle upon completion. This helps to more quickly restore clam shrimp. To date, this work has been carried out with much success.

Following TY 2025 monitoring, five additional puddles were designated with protected habitat signs, marking a total of 48 sites that support Agassiz's and American Clam Shrimp.

Clam shrimp signs mark road puddles that support Agassiz's and American Clam Shrimp. They alert site users not to fill or otherwise alter the area. *Photograph by Erin Hilley, Natural Resources and Training Lands Program*

Beyond these designated puddles, the Road Work Plan specifies a fixed number of puddles in each of the five Zones in the northern training area to be conserved as available suitable habitat for clam shrimp. Road maintenance activities that intersect or that may affect clam shrimp habitat, as well as other habitat improvement or conservation initiatives, are scheduled annually in coordination with Camp Edwards entities and consolidated into a comprehensive Road Work Plan. The status of each puddle --whether it is confirmed to support rare clam shrimp or simply identified as potential habitat -- determines the necessity and nature of required mitigation measures (such as in-situ puddle improvement or puddle creation). The completed Road Work Plan, along with its mitigation components, and subsequent Summary Reports, are submitted to MassWildlife in accordance with the CMP for review and approval.

In TY 2025, according to the approved Road Work Plan, NRTLP completed general road maintenance, grading and smoothing, on sections of Cat and Jefferson roads, addressing wear from heavy equipment travelling to and

from a helicopter landing zone project. No designated clam shrimp puddles were affected. Habitat improvement projects, including modifications to oversized clam shrimp puddles, are planned but not yet started.

3.3.5 Eastern Box Turtle

3.3.5.1 Turtle Protection

Extensive Eastern Box Turtle (*Terrapene carolina*, state Special Concern) protection planning and efforts exist in support of the Multi-Purpose Machine Gun Range Project, which has been described in detail in previous reports. In TY 2025, MPMG turtle protection efforts were focused on basic monitoring of area turtles.

Work on the physical fitness track and field construction (outside the Training Area/Reserve) was completed in TY 2025. Contractors provided construction oversight and turtle protection during the construction phase and is currently working on closing out that project with NHESP.

Natural Resources and Training Lands Program staff provided turtle protection oversight in coordination with MassWildlife for the installation of the ROCA buildings at Sierra, Tango and India ranges, which was completed in TY 2025.

Training on box turtles was not completed in TY 2025 as there were no new personnel and the NRTLP has decided to make this a biennial requirement. The training targets base personnel, including Roads and Grounds Maintenance staff, Range Operations, and others. Primary instruction covers how to effectively conduct turtle sweeps and basic avoidance, protection, and reporting procedures. The Roads and Grounds staff have received this training over multiple years and the other main personnel conducting mowing are in the NRTLP and are also actively involved in Eastern box turtle work. Therefore, this training will move to a schedule of every other year unless otherwise necessary.

3.3.5.2 Eastern Box Turtle Monitoring

In-house 2025 Eastern Box Turtle telemetry efforts focused on tracking tagged turtles during spring emergence and changing out transmitters. Turtles were assessed for the presence of fly larvae when found above ground. Tagged turtles are mostly in Training Areas C-14, E-5 (Sierra and Tango Ranges) and E-9, which are areas with future construction projects or areas with previously tagged turtles. Other turtles are also tracked in mitigation areas and forest retention areas. In TY 2025, four turtles that were being tracked with radio telemetry were found deceased. Two were from unknown causes, one from a recent burn, and another was possibly from predation. Four others were lost due to transmitters coming off the turtle or signal being lost. Forty-four turtles were being tracked by the end of the fiscal year.

In TY 2025, contractors completed a report on past turtle monitoring. The contractor compiled data on box turtle observations spanning 29 years from 1995 to May 2024 totaling 4,143 records. Most observations were of unmarked turtles along roads; however, 181 turtles were marked/numbered. The data includes two periods of radiotelemetry monitoring of turtles: 1998-2004 and 2018 to 2024. These time periods include 94% of observations.

Eastern box turtles were found most often in forested upland or wetlands habitats (76% of points). Turtles were also found in early successional habitats (14% of points), including powerline rights-of-way, maintained lawns or ranges, and in grassland and shrubland habitats. Ten percent of points were associated with roads or parking lots, but this is likely an overestimation of use, since they are more easily observed in these areas. Twenty percent of observations associated with roads were of turtles in road puddles.

The timing of hibernation varies regionally for Eastern box turtles due to varying climates throughout their range. The observations on turtles included information on activity. With this data, AECOM was able to calculate the average date of entry into hibernacula on Camp Edwards to be October 31st ±8.2 days and emergence from hibernation to be April 24 ±12.7 days. In comparison to other sites in Massachusetts, turtles tend to enter

hibernation later in the fall and emerge later in the spring, which is consistent with ocean effects keeping temperatures warmer in the fall and slowing warming in the spring.

From 1995 to May 2024, eighty-four turtles have been found deceased on Camp Edwards. About half (39 out of 84) of these mortalities were associated with roads or parking lots. This proportion may be positively biased as mortalities on roads are more easily observed than those occurring in forested habitat. Eight of the 39 road mortalities (21%) occurred in puddles on roads where turtles have been found to congregate for the purposes of rehydration and thermoregulation. In this way, road puddles may be attracting turtles, increasing their risk of vehicle strikes. Drivers also cannot see turtles in the puddles whereas turtles on roads are sometimes seen and avoided or seen and moved off the roadway. Since the discovery of clam shrimp in road puddles on Camp Edwards, many puddles have been conserved for clam shrimp habitat, leaving the risk for box turtles.

Thirty of the 143 turtles (21%) that were being tracked using radio telemetry were found deceased. Most of these mortalities (28) occurred between 2018 and 2024. The majority of these turtles (60.7%, 17/28) had been documented to have parasitic fly larvae infestations (myiasis) within a year of death. The first documented case of turtle myiasis on Camp Edwards was August 22, 2018. Vehicle strikes accounted for three deaths (two in road puddles) during the most recent telemetry effort (11% of turtles), and prescribed fire associated mortalities accounted for 3 additional mortalities (11% of turtles). The remainder of mortalities (18%, 5/28) were from unknown causes. The NRTLP is planning to look more closely on the data on myiasis impacts on turtles as more data has been accumulated. There is particular curiosity and concern around the unknown causes of mortality for this typically long-lived species.

Male Eastern Box Turtle in 2025, tracked as TECA99 since 2022, at Camp Edwards. *Photograph by A. Greyfield, Natural Resources and Training Lands Program*

The NRTLP has focused on efforts to educate users and particularly grounds maintenance, contractors, and habitat management practitioners on the best management practices to prevent harm to turtles while conducting their needed activities. This includes training Roads and Grounds, ITAM, Range Operations, and impact area contractors on measures to avoid impacts to turtles, including timing, sweeps, and reporting. Additionally, the NRTLP has successfully implemented turtle protection protocols for several construction projects, whose measures included silt fencing, monitoring, contractor education, and reporting to NHESP. These efforts to educate other users has led to an increase in reporting, with 46% of all one-time observations occurring since 2016, while the other 54% occurred in the 21 years prior. Reporting of mortalities has also increased with this effort and the implementation of post burn surveys to document burn conditions and any mortalities.

The effects of prescribed burns on eastern box turtles is not well understood for this region, though it has been more heavily studied in southern states finding box turtles burrowing or moving to unburned or less flammable areas to avoid fire effects. The NRTLP had worked with NHESP to get a PhD student to study the effects of fire on box turtles on base. A student started in 2023 but left the program soon thereafter. This is still an area of study that both parties are interested in pursuing.

To reduce the incidence of turtle mortalities, the NRTLP is looking at eliminating road depressions in high use areas, relocating depressions away from roadways, and addressing with NHESP the divergent needs of the eastern box turtles and clam shrimp. The NRTLP is planning to look more closely on the data on myiasis impacts on turtles as more data has been accumulated to better understand impacts from fly infestations. The NRTLP will also continue to conduct post burn surveys and collaborate when possible with NHESP to collect data on fire impacts.

3.3.5.3 State-listed Species Reporting

The MAARNG reports all observations of state-listed species on MAARNG lands to DFW through the Heritage Hub website portal. The Eastern Box Turtle receives much attention at Camp Edwards so the numbers in Table 3-2 are an aggregate of known, tracked individuals from multiple studies and opportunistic observations reported to the NRTLP by a wide variety of site users, including Soldiers, maintenance personnel, and contractors. Recent observations of Eastern Hog-nosed Snake (*Heterodon platirhinos*, state Special Concern) are primarily opportunistic observations made while conducting other surveys and site visits in the training area. This species, much like the Eastern Box Turtle, shows a preference for diverse Pine Barrens mosaic habitat and transitions between pine-oak woodland and grassy woodland openings, such as battle positions and ranges. A list of rare species reported to NHESP from TY 2016 to TY 2025 is in Appendix F.

Table 3-2 State-Listed Reptiles and Amphibians Reported to NHESP

Common/Scientific Names	*Fed. Status[1]*	*State Status[2]*	*2021*	*2022*	*2023*	*2024*	*2025*
Eastern Box Turtle *(Terrapene carolina carolina)*	-	SC	83	62	96	77	66
Eastern Hog-nosed Snake *(Heterodon platirhinos)*	-	SC	2	6	7	4	1

Note: Quantities shown are not resulting of standardized surveys and should not be interpreted as population trends
[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)
[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

3.3.6 Lepidoptera (Moths and Butterflies)

Camp Edwards and the Upper Cape Water Supply Reserve are home to a high number of listed and otherwise rare butterflies and moths, many of which are closely tied to a single host-plant and/or barrens habitat conditions. Nearly half (22 of 51[*]) of the listed species at Camp Edwards are butterflies (2) or moths (20). Many other declining Lepidoptera species are found at Camp Edwards and few other locations in Massachusetts. Active monitoring efforts and incidental observations show a strongly positive response from many of these species to active habitat management efforts and soldier training support. Monitoring of populations and subsequent outreach, including public and scientific presentations, and data sharing (USFWS, Monarch Joint Venture) are both increasing parts of the program. These serve to more formally and fully evaluate the influence of

[*] The total of 49 MESA species is the "primary" list at Camp Edwards, which excludes seven bird species that do not breed on-site, but winter, migrate through, or show up erratically.

management on these species, implement adaptive management, communicate the ecological benefits of pine barrens restoration, and aid in evaluations of the species population for potential listing at the federal level.

3.3.6.1 Moths

The Conservation and Management Permit for range projects on Camp Edwards requires habitat mitigation in the form of mechanical forestry and prescribed fire treatments. Many of the Lepidoptera species on base are expected to benefit greatly from the reintroduction and increased frequency of fire as well as increased habitat patch diversity. The monitoring component of the CMP requires long-term Lepidoptera surveys to evaluate effects of the overall range development, fire hazard reduction actions, and habitat restoration (i.e., mitigation) actions on the Lepidoptera community over both short and long time periods. Monitoring of moth and butterfly species will guide adaptive management for habitat management including fire (e.g., seasonality, intensity, return interval) and forestry.

The NRTLP contracted a consulting company in TY 2021 to provide a robust analysis of sampling designs to make the most use of moth monitoring data. They worked with the consultant, MassWildlife, and others through 2022 to develop effective, informative, and achievable monitoring protocols for moths and habitat. Annual efforts broadly sample sites using vegetation sampling to monitor habitat conditions, including vegetation structure and plant species composition. Moths are monitored at a smaller subset of sites using ultraviolet light traps. Daytime caterpillar surveys are included to sample Buck Moth (*Hemileuca maia*, state Special Concern), a state-listed species believed to be an effective indicator for positive habitat condition.

3.3.6.2 Frosted Elfin Butterfly

The Frosted Elfin is classified as an At-risk Species by the USFWS and it is currently under federal review for listing under the Endangered Species Act based on the significant population loss and fragmentation of remnant populations. The species is state-listed in Massachusetts and, although it is widespread across 31 states and provinces in eastern North America, it is classified as Imperiled, Critically Imperiled, or Extirpated throughout (NatureServe, 2024; USFWS, 2018). The Frosted Elfin is associated with native savannah habitats and in the Northeastern United States it is primarily associated with sandplain grassland/heathland habitat with patchy, sparse Pitch Pine cover. Populations feed exclusively on either Sundial Lupine (*Lupinus perennis*) or Wild Indigo (*Baptisia tinctoria*). The population at Camp Edwards and nearby sites (Myles Standish State Forest, Frances A. Crane Wildlife Management Area) feed on Wild Indigo.

The “Frosted Elfin Habitat and Butterfly Survey Protocol” from the USFWS has been implemented annually at Camp Edwards since its start in 2018. The effort aids the USFWS in support of a range-wide status assessment and federal listing evaluation. The formal protocol combines plot mapping, host plant assessment, adult flight surveys, and larval (caterpillar) surveys. Typically, the only deviation from the protocol at Camp Edwards is delineation of surveys sites. The majority of locations throughout their range are isolated patches of host plant and the survey protocol samples an entire host patch. However, at Camp Edwards, the Wild Indigo is so abundant and widespread that sample plots are artificially constrained within the habitat (e.g., segment of powerline corridor, grassland habitat, etc.).

There are eleven known sites for Frosted Elfin on Camp Edwards: all with abundant Wild Indigo. They include grassland/heathland savannah habitat, powerline corridors with open Scrub Oak shrubland, managed battle positions, former small arms ranges, and restored pine barrens. Frosted Elfins tend to be found along edges where an opening meets the woods (dappled shade as in savannah conditions) or along roads and trails within more shrub dominated habitats. Maintaining or expanding grass/forb cover within habitats, including with skid roads from active habitat restoration and intentional mosaic treatment to increase structure and species diversity is important to restoring Frosted Elfin populations and many other species relying on diverse habitats. Camp Edwards will continue to monitor and manage for Frosted Elfin in years to come and will continue to play an active role in recovery and conservation efforts.

The NRTLP's focus for Frosted Elfin work in TY 2025 was dominated by a research opportunity that arose in February. Alexandra Thornton, a master's student under Dr. David Wagner at the University of Connecticut, expressed interest in researching the life history of the Frosted Elfin at Camp Edwards. She spent three intensive months in the Cantonment grasslands surveying the butterflies daily, including mark-recapture studies of both adult and caterpillar stages and documenting all life-stages, including tracking individuals from observed egg-laying through pupation. During her study she caught and marked 123 adult Frosted Elfins and found and tracked roughly 350 caterpillars.

In-house staff focused effort on supporting the research effort and, as such, did not conduct formal surveys to evaluate Frosted Elfins in the Reserve/Training Area. However, two brief surveys were conducted in May. The first, before the irruption of cicadas, was a walk in Training Area E-2 to check roadside habitat for adult Frosted Elfins after finding caterpillars in 2024. A single, very fresh adult was observed actively within the roadside grass/heath mix that is mowed annually in the fall. The second location was in Training Area C-14 where both adults and caterpillars have been documented in the past and a cluster of at least four individuals was documented, again using roadside fuel-break grass/heath habitat with abundant Wild Indigo (*Baptisia tinctoria*). While no formal surveys occurred in the northern training area it was positive to confirm a new location from last year and document continuation at the other. Both sites have received significant habitat restoration efforts in the recent past to support species like the Frosted Elfin.

Color-marked Frosted Elfin with a purple dot over a teal one. Color-marking allows individuals to be identified when resighted on subsequent surveys informing observers relative to population estimates, longevity, dispersal, and other behaviors. *Photograph by Jake McCumber, Natural Resources and Training Lands Program*

3.3.6.3 Monarch Butterfly

Monarch butterflies have been proposed for listing under the Endangered Species Act, and the Department of Defense (DoD) created the "Department of Defense's 7(a)(1) Conservation Strategy for the Monarch Butterfly (*Danaus plexippus*) for Mission and Sustainment Operations within the Continental United States" and initiated a formal conference with USFWS. The Conservation Strategy includes efforts to protect milkweed patches and monitor populations, which the NRTLP has been implementing.

Surveys were completed at four sites in 2025 following the Monarch Larva Monitoring Project (https://mlmp.org/) protocol. This project is a collaboration between the Monarch Joint Venture and the University of Wisconsin-Madison Arboretum which provides a broad and standardized larval (caterpillar) survey across the butterfly's range to track population health and success. The surveys consist of weekly visits to consistent milkweed patches from early June through mid-September, representing a signficant investment of staff time and effort. All sites surveyed supported Monarch eggs and caterpillars.

In 2025, the NRTLP completed a review of the 5 years of monitoring data on Monarchs on base. Since 2021, technicians have been identifying milkweed patches across the site and monitoring patches of significant size. Fourteen unique patches have been surveyed with four sites being surveyed for multiple years. This effort has provided good information on the distribution of the species on base, identified patches for protection, and provided a baseline for monitoring. Future surveys will select twelve focal survey sites that will be monitored on rotation, each year four sites will be surveyed. Choosing sites to focus on will provide information for the larger joint effort and keep eyes on the larger populations to detect any shifts in pollinator or host plant abundance or Monarch presence. Due to the prolonged season for egg laying and larval phases introducing problems with double counting individuals and potential for missing individuals, population numbers are difficult to work with for this species for trend analysis. However, the effort did show that all milkweed patches that were monitored regularly each year had both eggs and larvae. Given that milkweed patches are consistently used by Monarchs on base, the NRTLP is looking at maintenance or expansion of habitat as the best indicator of the species continued success on base.

As of 2025, there are now 16 “Milkweed Protection Areas” with permanent signage. These areas are prioritized for maintenance with mowing and/or prescribed fire but have mowing restrictions (avoidance) during the egg and caterpillar development timeframe. This provides an abundant, widespread, and diverse source area for monarch butterflies at Camp Edwards. Milkweed patches within the grassland are abundant but were not signed as milkweed protection areas due to the existing prioritization of sandplain grassland/heathland habitat, ensuring milkweed conservation. An interesting observation in patches of Butterfly Milkweed (*Asclepias tuberosa*) is that the state-listed Collared Cycnia Moth (*Cycnia collaris*) can have notable impact on milkweed availability through herbivory. However, Collared Cycnia tends towards host specificity, while the Monarch Butterfly is less selective and has a much more widespread milkweed food source.

3.3.6.4 Acadian Hairstreak Butterfly

The Acadian Hairstreak (*Satyrium acadica*) was added to the MESA in 2024. Camp Edwards hosts one of only two extant populations of the species in Massachusetts and it has been declining and difficult to find at both locations. Four searches were conducted for Acadian Hairstreak in July 2025, all focused on the central zone of Gibbs Road between Uniform and Tango ranges. One of these events was a field trip for the Massachusetts Butterfly Club on July 12. Acadians were only observed on July 11 (two individuals) and July 12 (one individual). The challenge in finding this formerly common butterfly is concerning, but detections were an improvement over 2024 when none were observed either at Camp Edwards or in Pittsfield. Much like the Slender Clearwing Moth (*Hemaris gracilis*) this species appears to be retreating northward with changing climatic conditions.

Butterfly enthusiasts from throughout the Northeast visited Camp Edwards on July 12th for a field trip led by Jake McCumber highlighting hairstreak butterflies, including the Acadian Hairstreak. *Photograph by Jake McCumber, Natural Resources and Training Lands Program*

3.3.6.5 Regal Fritillary Butterfly

There has been some discussion with National Guard Bureau and the State of Pennsylvania regarding introduction of the Regal Fritillary Butterfly (*Speyeria idalia*), which was last seen in Massachusetts in the 1980s. Fort Indiantown Gap in Pennsylvania supports the only remaining population of the eastern subspecies (S. i. idalia) and Army has some interest in increasing the population and distribution to lessen the stewardship burden on Fort Indiantown Gap and provide species resilience to stochastic events. The subspecies is now federally listed as Endangered, which would present some complexity for reintroduction efforts. The primary considerations, however, are based on habitat, host plant, and building connectivity to populations. Camp Edwards has sufficient sandplain grassland habitat that extends onto neighboring parcels within JBCC and the adjacent F.A. Crane Wildlife Management Area, but the site is over 300 miles away from the existing population. Biologists familiar with the species provided host plant (*Viola* species, especially Arrow-leaved Violet *Viola sagittata*) metrics and the NRTLP conducted a survey within habitat patches of varying scale and context. While the sandplain habitats of Camp Edwards host multiple species of Violet and meet most of the required metrics for structure and species composition it does not have nearly the density or abundance of violets desired for supporting a population.

3.3.6.6 State-listed Species Reporting

The Massachusetts Army National Guard reports all observations of state-listed species on MAARNG lands to DFW through the Heritage Hub website portal. Moth and butterfly observations are highly influenced by effort. As with any wildlife surveys, whether formalized or casual, must occur in the right habitat within the right season, which sometimes is a two-week window. The listed butterflies require significant dedicated effort and training to find and identify. Most of the moths are even more specialized with nocturnal habitats and a wide array of flight times across the listed species. Even robust monitoring programs will miss the flight times of certain species and year-to-year variation is often substantial. The preponderance of zeroes in the table below likely does not represent absence of the species, but the lack of detections under recent monitoring efforts. The long-term moth sampling protocol, developed with MassWildlife and others, knowingly will miss certain species and time periods, but seeks to represent the barrens moth community overall through sampling of various habitats and portions of the growing season. Note that clusters of communal caterpillars (e.g., Buck Moth, Collared Cycnia) are reported as a single observation. Buck Moth numbers are highly influenced by level of effort to document during the October flight period as the species is fairly abundant and widespread at Camp Edwards. A list of rare species reported to NHESP from TY 2016 to TY 2025 is in Appendix F.

Table 3-3 List of Rare Butterflies and Moths

Common/Scientific Names	*Fed Status[1]*	*State Status[2]*	*2021*	*2022*	*2023*	*2024*	*2025*
Buck Moth (*Hemileuca maia*)	-	SC	74	133	23	72	58
Pine Barrens Speranza (*Macaria exonerata*)	-	SC	0	4	0	3	N/A
Sandplain Euchlaena (*Euchlaena madusaria*)	-	SC	0	0	0	1	N/A
Heath Metarranthis (*Metarranthis pilosaria*)	-	SC	0	0	0	0	N/A
Melsheimer's Sack Bearer (*Cicinnus melsheimeri*)	-	T	0	0	0	0	N/A
Gerhard's Underwing (*Catocala herodias*)	-	SC	0	35	6	0	N/A
Pine Barrens Zale (*Zale lunifera*)	-	SC	0	0	0	4	N/A
Barrens Dagger Moth (*Acronicta albarufa*)	-	T	0	0	0	0	N/A

Common/Scientific Names	*Fed Status*[1]	*State Status*[2]	*2021*	*2022*	*2023*	*2024*	*2025*
Sandplain Heterocampa (*Heterocampa varia*)	-	T	N/A	1	0	0	N/A
Chain-dotted Geometer (*Cingilia catenaria*)	-	SC	0	0	0	0	N/A
Drunk Apamea (*Apamea inebriata*)	-	SC	0	0	0	0	N/A
Pink Sallow (*Psectraglaea carnosa*)	-	SC	0	0	6	8	N/A
Pink Streak (*Dargida rubripennis*)	-	T	1	1	2	0	2
Collared Cycnia (*Cycnia collaris*)	-	T	200	7	4	4	1
Coastal Heathland Cutworm (*Abagrotis benjamini*)	-	SC	0	0	0	0	N/A
Woolly Gray (*Lycia ypsilon*)	-	T	0	0	0	0	N/A
Water-willow Stem Borer (*Papaipema sulphurata*)	-	T	0	0	0	0	N/A
Waxed Sallow Moth (*Chaetaglaea cerata*)	-	SC	0	0	0	0	N/A
Frosted Elfin[3] (*Callophrys irus*)	-	SC	57	13	64	49	473
Slender Clearwing Sphinx (*Hemaris gracilis*)	-	SC	3	26	3	1	2
Acadian Hairstreak (*Satyrium acadia*)	-	T	4	5	2	0	3

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)
[2] State Status: E = Endangered, T = Threatened, SC = Special Concern
[3] A graduate student researched Frosted Elfins in 2025, resulting in a large increase in effort and count.
Note: Quantities shown are not purely from standardized surveys and should not be interpreted as population trends. N/A indicates that no targeted survey was conducted for the species and it is not casually observed. Zeroes indicate that a targeted survey was conducted and no individuals were observed.

3.3.7 Other Insects

While other insects tend to lack the standardized protocols and regulatory emphasis of the moths and butterflies described above, Camp Edwards has four other state-listed insects and many additional species that are highly specialized and localized within pine barrens habitats. Overall, insect diversity is a powerful indicator of ecosystem health and resilience. Insect populations are also highly dynamic in this period of change with range shifts (including contraction, loss, and expansion) happening regularly. Many groups of insects warrant more detailed study, even basic planning level surveys at Camp Edwards, including beetles (Coleoptera) and grasshoppers and allies (Orthoptera). Initial planning level surveys and some supplemental work have been completed for other groups including Odonata (dragonflies and damselflies), bees (Anthophila), and tiger beetles (Cicindelidae).

3.3.7.1 Periodical Cicada

Undoubtedly the most significant insect event of the year was the emergence of the Periodical Cicada, AKA Pharaoh Cicada (*Magicicada septendecim*). This species has a 17-year life-cycle, spending roughly a month above ground as an adult when billions of cicadas emerge at once to mate and lay eggs to start the next generation of the cycle. One of only two populations of Periodical Cicada in New England is localized on Upper Cape Cod where JBCC is roughly one-quarter of the range of the highly isolated population and is the majority of the undeveloped land.

Periodical Cicadas perched on vegetation at Camp Edwards. *Photograph by Jake McCumber, Natural Resources and Training Lands Program*

Adult Periodical Cicadas began emerging on May 18 at Camp Edwards with activity starting in the open grasslands habitat that warmed earlier than shaded woodlands. Activity ramped up notably during the last week of May and by the first week of June there was widespread levels of high to extreme cicada density across Camp Edwards. During the second week of June extreme levels of activity were recorded across Camp Edwards with activity beginning to taper in the third week of June, particularly in the more open areas that led the emergence timing. Forested areas continued with activity through the end of June, but the first week of July was functionally the end of the adult emergence for the cicadas. The evidence of their density and distribution, however, was apparent through the summer and fall shown by browned leaves on branch tips broken by ovipositing (egg-laying) damage. This damage is temporary with no long-term harm to the trees.

A somewhat formalized survey effort was developed and fielded during the emergence in the interest of describing the event for managers during subsequent events. Competing projects and other constraints made it difficult to regularly sample all the designated points, but a total of 70 sample events occurred at 47 different locations on Camp Edwards. The immensity of the cicada emergence precluded accurate counting beyond a few hundred individuals so the categories were broken down roughly and approximately logarithmic as they are more specific at lower counts, but increase in bin size dramatically towards the upper end. Some cicada emergences have been estimated at approximately 1 million individuals per acre. The density of cicadas throughout the woods was astounding and it was a remarkable natural phenomenon to experience. A much more detailed report was developed summarizing the formal survey effort, field observations, and the overall emergence patterns supplemented by citizen science data contributed to iNaturalist.

3.3.7.2 Walsh's Digger Bee

Walsh's Digger Bee (Anthophora walshii, state Endangered) is broadly distributed in the Great Plains region, but has a highly isolated population in Southeastern Massachusetts. The species was first identified at Camp Edwards by Michael Veit in 2017 who found multiple active nests (Veit, 2017). During a subsequent, targeted survey in 2019 Mr. Veit documented a robust and fairly widespread population of the species across Camp Edwards, including throughout the more open portions of the Cantonment grasslands and the Gibbs Road powerline right-

of-way. Walsh's Digger Bee depends on very open, maintained grassland habitat with abundant open sand and abundant Wild Indigo.

No formal surveys were conducted for the Walsh's Digger Bee (*Anthophora walshii*, state Endangered) during TY 2025. However, one survey effort was conducted briefly in the Cantonment Area grasslands and a few opportunistic observations were made. During the single survey an area of roughly 10 acres was covered by a single observer with a circuitous route along which at least four distinct individuals were observed, two of which were confirmed as females. All were actively visiting flowers of Wild Indigo. One of the opportunistic observations was very positive as it was during the Massachusetts Butterfly Club field trip and everyone was able to get exceptional looks at a perched individual and fleeting looks at a few others. The most notable observation was with the discovery that Walsh's Digger Bee lightly fluoresces under ultraviolet, which was found while conducting surveys for Frosted Elfin caterpillars. Ultraviolet flashlights are extremely useful for finding caterpillars of many species as well as some other invertebrates. Two individual males were observed with their typical resting or perching behavior – clamped onto the stem of little bluestem (*Schizachyrium scoparium*) with their jaws.

Walsh's Digger Bee (right of center) fluorescing under ultraviolet light while sleeping or resting on a stem of Little Bluestem grass. *Photograph by Jake McCumber, Natural Resources and Training Lands Program*

3.3.7.3 Tiger Beetles

Though mostly opportunistic searches, substantial effort was applied to survey and document Purple Tiger Beetles (*Cicindela purpurea*, state Special Concern) at Camp Edwards during 2025 with focus on further documenting their distribution by checking new locations. The species was documented at 15 new locations scattered throughout all of Camp Edwards. The majority of effort was during the spring active period from late March through mid May of 2025. Little additional effort was made during the fall active period though Purple Tiger Beetles were observed in good numbers during both seasons. New sites included current and former small arms ranges, battle positions, roads and trails, utility easements and other areas with a suitable mix of pine barrens or sandplain habitat and open sand. Across 27 observations recorded a total of 430 Purple Tiger Beetles were estimated. Given the high level of activity and challenging observation of tiger beetles, aggregations of more than a few had estimated counts. Some of the areas had very high estimates and were by far the highest counts/estimates yet observed at Camp Edwards including three areas with estimates of 65, 70, and 80; all in different parts of Camp Edwards. Several other locations had a dozen or more Purple Tiger Beetles. This rare species with a highly isolated distribution in Massachusetts is doing very well at Camp Edwards. Behaviorally, one repeated observation was of particular interest beyond just the impressive numbers. Multiple observations were made of numerous tiger beetles in recently burned areas with significant levels of char throughout and this was observed both in sandplain grassland and Pitch Pine – Scrub Oak habitats.

A new species of tiger beetle was documented at Camp Edwards during TY 2025. The Festive Tiger Beetle (*Cicindela scutellaris*) is much more widespread in Massachusetts but has few recent records on Cape Cod. A single individual was documented in June by surveyors assessing rare species and habitats in the proposed pipeline corridor. They documented another individual when they returned in September and the NRTLP was able to observe the species as well. All observations were in the far northwestern corner of Camp Edwards and it was associated with multiple other species of tiger beetle.

3.3.7.4 State-listed Species Reporting

The Massachusetts Army National Guard reports all observations of state-listed species on MAARNG lands to the DFW through the Heritage Hub website portal. Purple Tiger Beetle and Walsh's Digger Bee received a fair amount of attention through casual and opportunistic searches (i.e., not formalized survey protocols) during TY 2025. Counting individuals, especially with groups of nectaring bees can be quite difficult so the numbers are estimates based on highest count visible at one time to avoid overcounting.

Table 3-4 State-Listed Beetles and Bees Reported to NHESP

Common/Scientific Names	*Fed. Status[1]*	*State Status[2]*	*2021*	*2022*	*2023*	*2024*	*2025*
Purple Tiger Beetle *(Cicindela purpurea)*	-	SC	0	0	25	90	421
Twelve-spotted Tiger Beetle *(Cicindela purpurea)*	-	SC	0	0	0	1	0
Walsh's Anthophora *(Anthophora walshii)*	-	E	N/A	1	9	27	9

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)
[2] State Status: E = Endangered, T = Threatened, SC = Special Concern
Note: Quantities shown are not resulting of standardized surveys and should not be interpreted as population trends.
N/A indicates that no targeted survey was conducted for the species and it is not casually observed. Zeroes indicate that a targeted survey was conducted and no individuals were observed.

3.3.8 Eastern Whip-poor-will

The Eastern Whip-poor-will is state listed (SC) in Massachusetts, classified as a Species of Greatest Conservation Need (SGCN), and considered an At-risk Species by the Northeast Region of the USFWS. This species has been a focus of long-term monitoring and focal research at Camp Edwards due to its status, association with remnant pine barrens, and positive response to habitat restoration. The Eastern Whip-poor-will is a strong indicator of pine barrens ecosystem health and diversity due to its reliance on moths as a primary food source and their reliance upon healthy host plants. It is also an important monitoring species and indicator of site quality due to its sensitivity and significant declines throughout the northeastern United States. Along with the vast majority of species of conservation concern in southeastern Massachusetts, the Eastern Whip-poor-will is closely tied to wildland fire, which maintains open mid-stories and vigorous plant communities that support a high degree of species diversity.

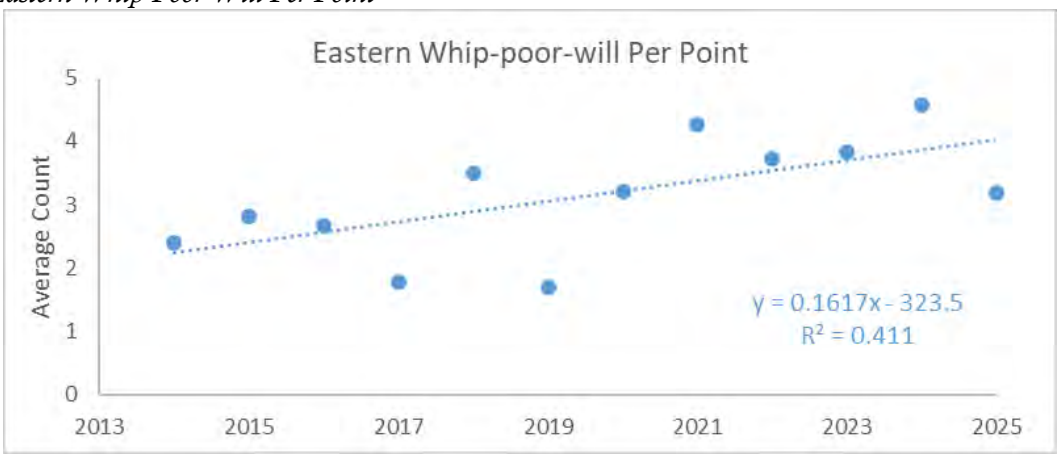
Annual implementation of the Northeastern Nightjar Survey facilitates the evaluation of population trends throughout Camp Edwards using a standardized protocol implemented throughout the eastern United States. A subset of 10 points originally set by MassWildlife has been surveyed annually since 2013. Three full routes were established the following year to provide better coverage with 32 point-count locations. The routes are run one time each per year with supplemental surveys at subsets of points prior to the formal count night.

The standard three Northeast Nightjar Survey routes were run on May 11, 2025. Whip-poor-wills were observed at 31 of 32 sampled points (0.97 occupancy), which maintains the typical trend of widespread presence. The long-term occupancy mean from 2013-2025 is 0.92 (range 0.64 – 1.0), which is impacted by results from 2017 and 2019 where surveys were conducted in sub-ideal conditions. Sampled points had an average of 3.2 birds per point (range 0 – 7). Zone averages ranged from 1.6 in the northeast to 4.1 in the southeast. All zones also have

stable to increasing trends, which is useful to evaluate the overall pattern at Camp Edwards and whether increases represent a redistribution of birds or an overall population increase. The zone patterns suggest the site-wide trend represents an overall increase. Two zones – southeast and center-west have statistically significant abundance trends, increasing with slopes of 0.20 (p=0.001) and 0.25 (p=0.003), respectively. All zones except the northeast had a decline in the mean Whip-poor-will count, as did two of the three routes.

While counts at Camp Edwards remain remarkably high for the Northeastern United States and trends are stable to substantially increasing, 2025 was a down year for the base. This is expected during long-term monitoring efforts and wildlife management. Additionally, initial assessment of overall breeding bird results at Camp Edwards suggests a consistently down year for the majority of species. This likely indicates an impact of weather and/or climatic conditions and could even be a carried-over impact from the preceding year to lead to a broad depression of breeding season counts across bird taxa. As always with long-term monitoring it will be interesting to continue assessing populations through the coming years and hopefully see an increase. One concern at Camp Edwards is the impact of development and night-time lighting along the highway corridors of Route 28 (west), Route 6 (north), and Route 130 (east). There are no survey points on Camp Edwards where highway noise cannot be heard and numerous points where artificial lights are visible. If populations of rare species are pushed further interior by development and expanding impacts (noise, lighting, etc.), then the challenge of restoring and maintaining populations in isolated landscape remnants increases substantially.

Graph 3-5 Eastern Whip-Poor-Will Per Point



The overall trend from the 2014-2025 Whip-poor-will surveys is increasing with statistical significance (p=0.025). The 2025 average count was down for the year but not outside normal results and patterns. This figure shows the annual mean count across all points (typically 32) for each year for a basic metric of the species at Camp Edwards. The dotted line is a simple linear regression trendline.

Further information is available in the *Camp Edwards Natural Resources & Training Lands Management Annual Report for Fiscal Year 2025.*

3.3.8.1 State-listed Species Reporting

The MAARNG reports observations of state-listed species on MAARNG lands to the DFW Heritage Hub portal. Practical considerations for conservation and management mean that bird observations are treated differently under MESA and for annual reporting. The species included below with reported numbers are the unique observations from formal survey efforts. Northern Harrier and Bald Eagle were only observed as wintering individuals and any breeding season activity would be separately reported. Note that the numbers below are raw data and not analyzed for effort and other considerations in contrast to results reported above.

Table 3-5 State-Listed Birds Reported to NHESP

Common/ Scientific Names	*Fed. Status[1]*	*State Status[2]*	*2021*	*2022*	*2023*	*2024*	*2025*
Grasshopper Sparrow *(Ammodramus savannarum)*	-	T	36	29	30	26	17
Northern Harrier *(Circus cyaneus)*	-	T	W	W	W	W	W
Upland Sandpiper *(Bartramia longicauda)*	-	E	2	1	4	3	4
Eastern Meadowlark *(Sturnella magna)*	-	SC	17	9	21	15	12
Eastern Whip-poor-will *(Antrostomus vociferous)*	-	SC	123	101	105	130	91
Bald Eagle *(Haliaeetus leucocephalus)*	-	SC	0	0	0	W	W

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)
[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

3.4 Soil Conservation Management

All military and civilian uses and activities in the Training Area/Reserve during the year were reviewed by the NRTLP to ensure that they were compatible with the limitations of the underlying soils (EPS 4, Soil Conservation Performance Standards). All users were instructed to report evidence of soil erosion to Range Operations so that potential repairs to roads, bivouac areas and well pads could be identified in a timely manner. None of the existing unimproved roads in the Training Area/Reserve were made into improved roads because of IAGWSP remediation activities during the year. Additionally, any maintenance on unimproved roads during the year did not involve paving the roads.

All repairs were coordinated with the EMC's Environmental Officer. All projects were also coordinated closely with Natural Resources to follow the Conservation and Management Permit for Agassiz's Clam Shrimp that ensures conservation of that species while supporting critical operations through road maintenance.

3.5 Vegetation, Habitat and Wildlife Management

Section 3.5 discusses the NRTLP's actions related to EPS 5, Vegetation Management Performance Standard, EPS 6, Habitat Management Performance Standards, and EPS 7, Wildlife Management Performance Standards.

The NRTLP manages for a diversity of natural communities, plants, and animals with an ecosystem-based conservation approach. This supports a sustainable military training site and high-quality habitat for rare species, as described above, as well as common ones. Particular emphasis is on maintenance and restoration of earlier successional habitats (e.g., grasslands, shrublands, pine/shrub savannah) due to the conservation value of these habitats and rapidity at which they are lost to both natural processes (in absence of disturbance) and development. However, overall ecosystem management with a diversity of habitat maturity and composition is important to habitat management and climate resilience efforts.

Mechanical restoration, prescribed fire, resource monitoring, invasive plant management and others are important tools used within the Reserve to manage for a healthy, sustainable ecosystem and ensure the required protection of wildlife habitat and species.

Management and conservation planning for holistic ecosystem health are fundamental to Department of Defense conservation and efforts at Camp Edwards within and outside the Training Area/Reserve. Rare species habitat management integrates climate resilience, carbon sequestration, risk minimization (e.g., fire and southern pine

beetle), military training objectives, habitat diversity, and other considerations. Monitoring and research continue to develop and support informed management and integration of these multiple objectives. Rigorous vegetation and moth study designs were developed in TY 2021 for long-term monitoring supporting the master development plan CMP. Breeding bird surveys continue to show positive or stable trends for Species of Greatest Conservation Need while more targeted efforts such as Eastern Whip-poor-will monitoring and research continue to show a strong, positive association with soldier training and habitat management. A critical outreach element continued to be communicating through public tours and other venues that the entirety of Camp Edwards, especially within the Training Area/Reserve, is managed for wildlife habitat – including small arms ranges and other military training venues that provide critical open field habitat for a wide variety of pollinators and other fauna within the greater pine barrens mosaic.

3.5.1 Vegetation Surveys

In TY 2025, the NRTLP completed the fifth year of vegetation surveys, a component of the long-term Lepidoptera monitoring protocol. The protocol was developed to monitor rare moth species response to broad Pine Barrens management and is a requirement of the MPMG Range Conservation and Management Permit. The protocol includes active moth monitoring but prioritizes habitat assessments that use vegetation structure and the presence of key host plants—such as blueberry and scrub oak—as a habitat-based proxy for moth diversity and abundance. The vegetation protocol requires approximately three weeks of field effort annually and includes a 200-meter transect at each unit, with substrate, growth form, and species recorded at regular intervals across multiple vertical strata. The protocol was designed collaboratively by ecologists, land managers, and statisticians to balance rigor with feasibility and to ensure the dataset captures meaningful vegetation trends across a range of habitats.

An NRTLP staff member carries out vegetation monitoring along a transect. *Photograph by Erin Hilley, Natural Resources and Training Lands Program*

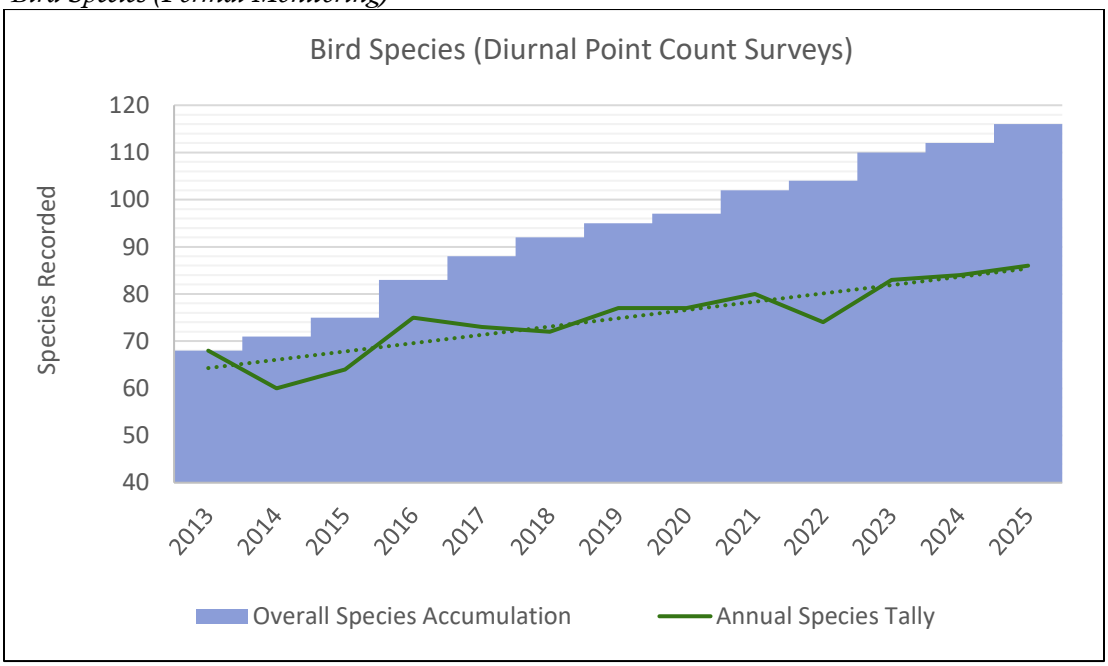
In TY 2025 all vegetation work was completed in-house by NRTLP staff and seasonal technicians. A total of 25 sites were sampled between July 17 and September 19, and all data were entered into the electronic database designed for the moth protocol. Completion of this fifth year positions the program to begin the first cycle of trend analyses, which will evaluate habitat response over time and strengthen interpretation of associated faunal survey results. This long-term effort will provide valuable response and trend data for a variety of habitats to inform management activities and strengthen interpretation of faunal survey results.

3.5.2 Bird Surveys

Training Year 2025 marked the 32nd year of annual bird monitoring at Camp Edwards – a remarkable effort and data set providing for analysis of bird populations and habitat conditions. It was also the thirteenth year following the updated point-count protocol, providing a good longevity for evaluating trends. The standard set of 79 bird point-counts (14 grassland, 65 training area) were surveyed in two successive rounds for a total of 158 point-counts from May 8 through June 5. In addition, three other points were surveyed twice each on KD Range. A total of 5,583 observations were recorded for a total of 5,773 individual birds, averaging about 34.0 observations per point-count event. A total of 86 species were recorded during the 2025 breeding bird point-counts, which is the fourth year in a row with a new high species tally.

A total of 116 species have been recorded at Camp Edwards during the formalized, diurnal breeding bird point-count surveys. This is 62% of the 186 total bird species documented at Camp Edwards (including wintering, migrant, and erratic species). Four species were newly documented for the survey effort in 2025, one of which (Red-headed Woodpecker) was altogether new for Camp Edwards. The other new species for the point-count effort were Belted Kingfisher, Blue-headed Vireo, and Laughing Gull. Of the 116 species 47 have been recorded in all of the last 13 years (period of current point-count protocol). Twenty-three species have been recorded in only one or two of the 13 years, which is mostly species that may be late migrants or uncommon flyovers, but occasionally are unusual species that breed for a season or two somewhat erratically.

Graph 3-6 Bird Species (Formal Monitoring)



The annual species tally from formal daytime breeding bird surveys continues to increase at Camp Edwards as shown (solid blue line with trend shown as a dotted line). The total number of species recorded during the thirteen-year effort (orange columns) continues to increase as well.

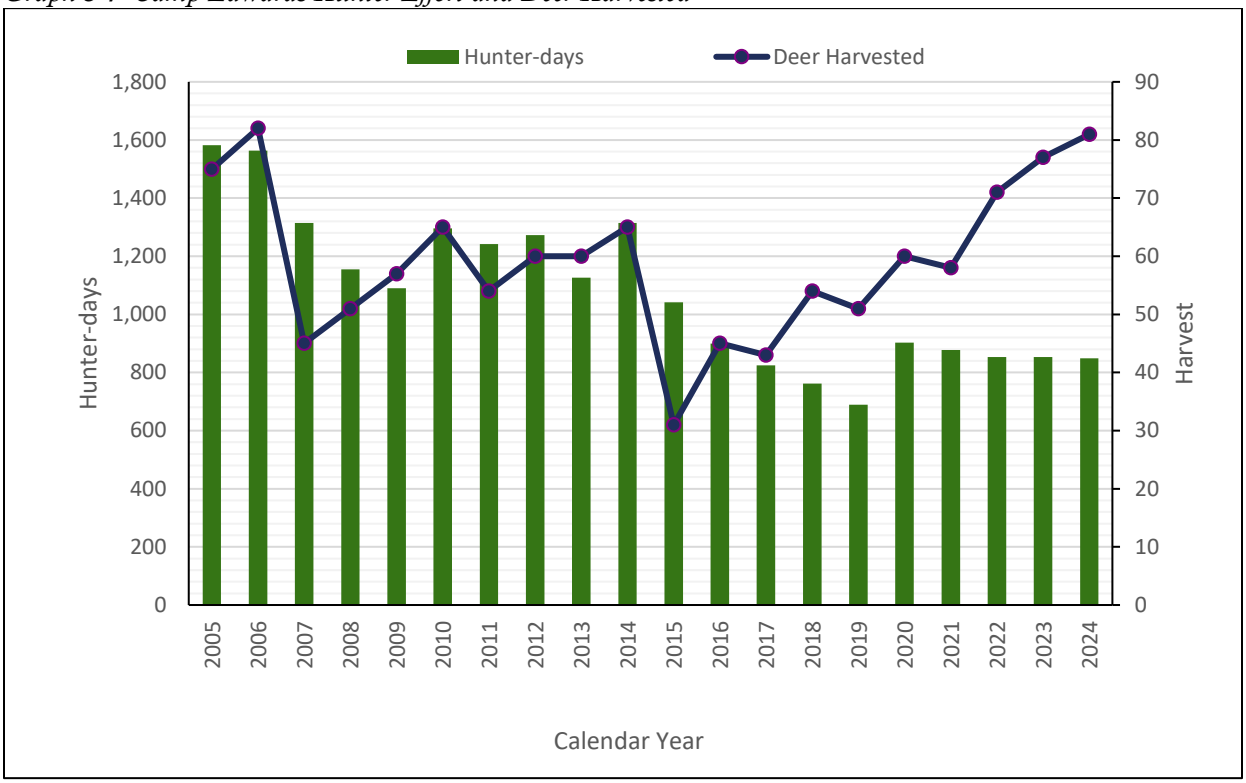
An analysis of breeding bird survey data incorporating detection probabilities is planned for TY 2026. Species specific detection probabilities will inform how well each species can be detected in a single survey and inform potential adjustments to repeat surveys in future years. Additionally, changes in occupancy due to management will also be explored along with updating the analysis of population trends for species of conservation concern.

3.5.3 Deer Hunt

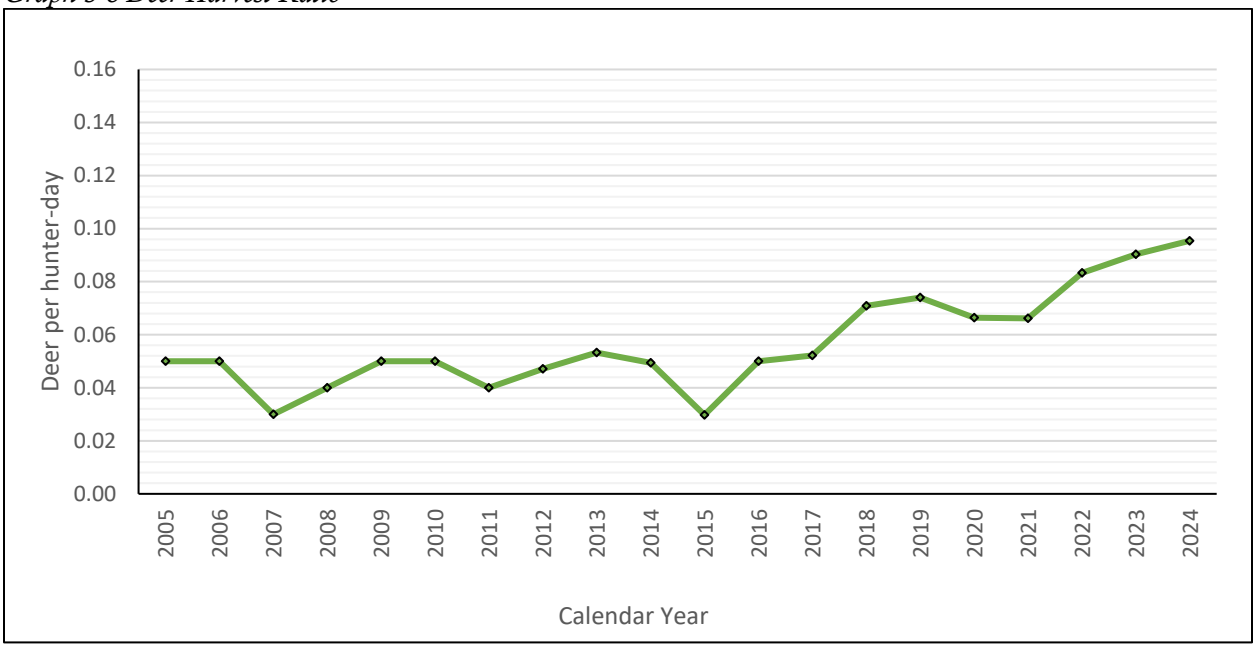
The TY 2025 deer hunting season at Camp Edwards ran from September 27, 2024 through late December 2024. In total, 81 deer were taken during 849 hunter-days—a 9.5% hunter success rate. The NRTLP continues to provide a variety of hunting opportunities to best engage the hunting community and encourage new hunters

through events such as the youth day, archery, and military and first responder sportsmen hunt. Hunting during TY 2025 included a three-day hunt by paraplegic sportsmen (October 31-November 2, 2024), a one-day youth hunt (September 28, 2024), a two-day opening for archery scouting (November 14-16, 2024), a three-day archery season (November 16-18, 2024), a one-day hunt for military and first responder sportsmen (December 6, 2024), a six-day shotgun season (December 9-14, 2024), and a two-day primitive firearms (muzzleloader) season (December 18-19, 2024). Graph 3-7 and Graph 3-8 present the hunter effort and deer harvest success over the last twenty years at Camp Edwards. In Graph 3-7 Hunter effort and participation (green columns), measured by MassWildlife as hunter-days (sum of each hunter, each day) declined over the last two decades with some recovery and leveling. Harvest (blue line) declined during the earlier decade and has recovered steadily since. This combination has led to an increasing harvest ratio (deer per hunter-day), seen in Graph 3-8.

Graph 3-7 Camp Edwards Hunter Effort and Deer Harvested



Graph 3-8 Deer Harvest Ratio

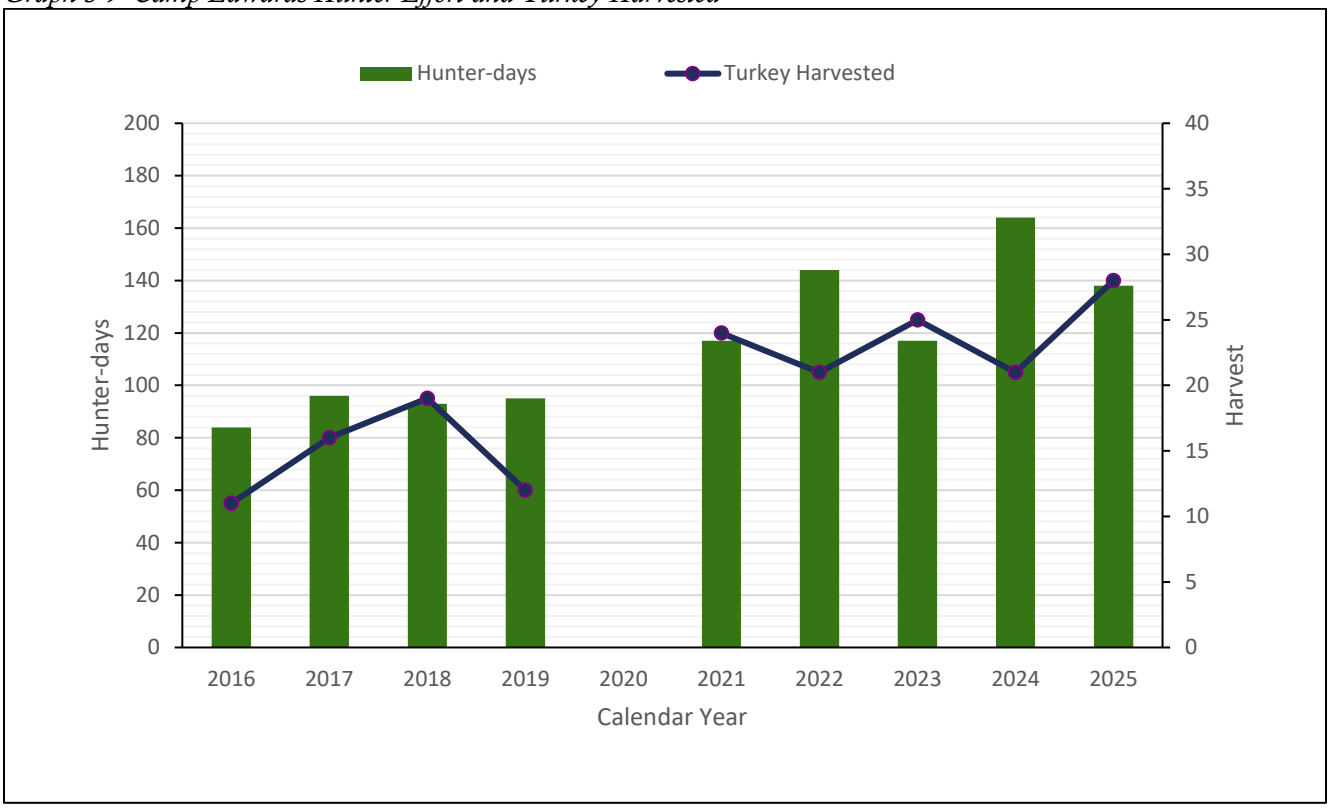


The NRTLP supports a hunt with the goals of sufficient to maintaining a healthy deer herd and healthy ecosystem along with a recreation opportunity. MAARNG and MassWildlife target a harvest level that is compatible with those goals and generally feel that the recent average of 60-plus deer per year meets the objectives. MassWildlife primarily relies on the biological data collected at the deer check to adjust the number of tags that are available each year. Browse surveys have indicated little to no browse pressure at Camp Edwards, other than some specific species, such as the state-Endangered Broad Tinkers'-weed. Deer will commonly preferentially browse certain species, which at Camp Edwards includes state-listed plants for which herbivory is a contributor to decline and loss. The NRTLP has successfully tested some methods to exclude deer from sites where this species-specific browse has been observed.

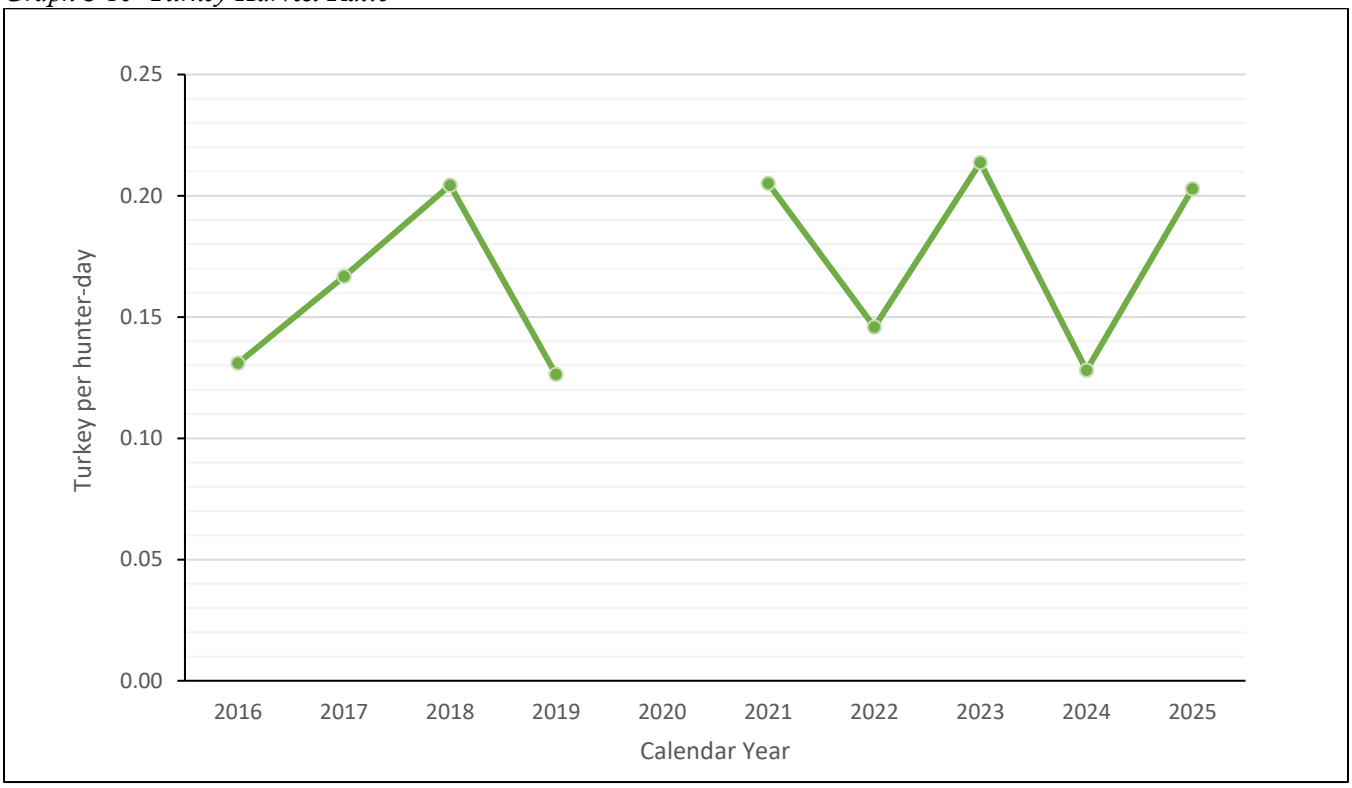
3.5.4 Wild Turkey Hunt

The TY 2025 turkey hunt at Camp Edwards lasted six days from May 5-10, 2025, during which 123 hunters took 24 turkeys. In addition, a one-day youth turkey hunt was held on April 26, 2025, in which six youths participated with one turkey taken. For the second time, a one-day adult mentored turkey hunt occurred on May 15, 2025, during which nine hunters and eight mentors participated, and three turkeys were taken. Graph 3-9 and Graph 3-10 show turkey hunting effort and harvest ratio over the past 10 years (2016 through 2025). In Graph 3-9 hunter effort is shown as green columns plotted against the left axis on the left chart. Harvest success (blue line against right axis) has increased along with hunter effort. In Graph 3-10 harvest ratio has held relatively steady over the decade. There was no turkey hunt at Camp Edwards in the spring of 2020.

Graph 3-9 Camp Edwards Hunter Effort and Turkey Harvested



Graph 3-10 Turkey Harvest Ratio



3.5.5 Restoration Activities

In TY 2025 the major restoration effort was focused on one moderate-sized habitat conversion project in the Training Area/Reserve. Other non-fire restoration efforts in following sections focused on reclaiming grassland

units in the Cantonment Area to remove a combination of invasive plants and native woody encroachment, and make them suitable for prescribed fire, and maintaining training sites that were previously cleared through contracted forestry.

3.5.5.1 BP-16 Landing Zone Expansion

In the northwest corner of the base, BPs 14 and 16 were two pre-existing clearings along Jefferson Road (Training Area B-11). BP-14 had no meaningful training utility but BP-16 saw frequent use as a popular, albeit cramped landing zone for Blackhawk helicopters. We developed a project to connect and expand these two training areas to meet two long-standing aviation-related training site requests including (1) a brown out landing zone, where pilots can practice landing in zero visibility dusty conditions, and (2) larger landing zones to land multiple aircraft in formation.

Aerial view of BPs 14 (left) and 16 (right) looking north from a helicopter in September, 2024. The Cape Cod Canal is visible at the top left. *Photograph by Jake McCumber, Natural Resources and Training Lands Program*

The BP-16 Landing Zone Expansion project began with contracted mechanical forestry to expand the previous BP-16 footprint into surrounding woods and to connect it to BP-14. The core of the project removed all trees and stumps from 10 acres of land, extending south and east of the pre-existing landing zone at BP-16. The contractors also removed all trees in an additional six acres to eliminate potential rotor strike hazards along likely helicopter approaches, although they did not remove stumps, understory vegetation, or any resulting woody debris in these six acres.

Once the contractors completed their work, ITAM staff used installation-owned equipment to conduct rough grading on the site and collect exposed rocks and smaller organic debris left by the contractor. This debris remained on site and was used to begin filling several depressions that were an impediment to helicopter training. This debris removal was a necessary step for reducing foreign object hazards for aviation and setting conditions for dormant-season grass seeding.

The final step of the project in the spring/summer was provided by a MAARNG Engineer Company, which greatly assisted with finish grading and with hauling sandy material to the site to finish capping the aforementioned depressions. All sandy material brought in for this step of the project was sourced from on base, had been previously tested for contaminants, and approved for use. In December 2025, contractors will seed eight

of the stumped and cleared acres with a mix of cool and warm season grasses and a pollinator-friendly legume. The two remaining acres will be left unseeded to maintain the sandy/dusty conditions required for brown out landing training.

In addition to greatly expanding aviation opportunities in the northwest training area, this project was designed to significantly improve habitat conditions for rare species, like the Frosted Elfin Butterfly, Walsh's Digger Bee, and Purple Tiger Beetle, all of which have been observed in the area. The project created 4,500 feet of new forest edge with a wavy and feathered boundary to meet habitat needs for the Frosted Elfin and benefit other species such as Eastern Whip-Poor-Wills and American Woodcocks, both of which have responded extremely well to similar restoration projects in the past. This project continues the effort to provide vibrant habitat restoration scattered throughout Camp Edwards with a diverse array of treatment prescriptions providing woodland openings, thinned woodlands, shrublands, etc. within the dominant forested matrix. This also furthers a recent effort to provide for facilitated dispersal of species off of utility easements to provide population and habitat resilience beyond narrow, linear corridors subject to a single management regime. Restoration of Battle Positions and bivouac sites has played a critical role in expanding and restoring populations of some of our rarest species at Camp Edwards and within southeastern Massachusetts including Frosted Elfin Butterfly, Purple Tiger Beetle, Plain Prominent Moth (*Coelodasys apicalis*), *Pelochrista argentifurcatana*, and many others.

3.5.5.2 Battle Positions and Bivouacs

For 2025, training area maintenance was focused on three primary functional areas. The NRTLP completed a winter mow on 50 acres of BPs, bivouacs, and landing zones throughout the training area as regular maintenance of the woodland opening areas. The Program also completed a second year effort of rotational mowing of the perimeter of Demo 2 as it's mowing a section around Demo 2 each year to provide a diversity of structural composition. The NRTLP also mowed six acres of scrub oak regeneration at the TY 2021 restoration site adjacent to the TTB Kelley landing zone. The restoration at the latter site has led to a significant diversity of plants, including multiple rare species on the state watch list that were not previously identified in the vicinity.

Big bluestem (*Andropogon gerardi*) and wildflowers at Battle Position 1 in 2025. *Photograph by Jake McCumber, Natural Resources and Training Lands Program*

BP-1 was given a rest year during 2025. The NRTLP coordinated with Range Operations prior to the training year to set the area off-limits to training and other activities. This provided a full growing season for plants to flower and set seed. BP-1 is probably the most used battle position for bivouacking and other training uses due to its proximity to TTB Kelley. Despite this use, the native plant community remains highly vigorous and diverse, responding well to the occasional disturbance. The regular training use ensures areas of bare sand remain present, which facilitates the presence of numerous rare insects and plants that require woodland openings with bare sand. Other high use battle positions will be set on a schedule for occasional rest years.

3.5.6 Invasive and Nuisance Vegetation Management

Section 3.5.6 encompasses activities related to Environmental Performance Standard 10, Pest Management Performance Standards.

Invasive plants are non-native species that have spread into natural, minimally managed, or disturbed plant systems in Massachusetts. They can cause economic or environmental harm by developing self-sustaining populations and becoming dominant and/or disruptive to those systems. As defined here, "species" includes all synonyms, subspecies, varieties, forms, and cultivars of that species unless proven otherwise by a process of scientific evaluation. Invasive species are primarily from the Massachusetts Invasive Plants Advisory Group (MIPAG) lists, but also include emerging invasive species as coordinated with partner agencies.

Nuisance species are more selectively or situationally defined and may include native plants under certain conditions. Several native species have displayed such aggressive establishment and regeneration that they require targeted management in order to preserve the training and preferred habitat value of some training venues. Although not exotic, these species, under certain conditions, can display the same dominant and disruptive characteristics normally associated with invasive species. Pitch Pine in particular has historically taken advantage of neglected training sites to create impenetrably dense, overstocked monocultures that exclude nearly all other species of plants and animals, produce unhealthy trees, present significant fire hazard, and impede training. Other native, desirable species that may situationally present a nuisance condition from a habitat perspective include Bayberry and Sweet-Fern, due to tendencies towards monoculture through chemical defenses.

Exotic invasive plants are a management concern both in the Training Area/Reserve and within the Cantonment Area. Effective management of these species, primarily Autumn Olive, Oriental Bittersweet (*Celastrus orbiculatus*), and Shrub Honeysuckles (Lonicera spp.), is both labor and cost intensive. Natural Resources-ITAM has five trained and licensed Massachusetts core pesticide applicators on staff. This functionality has allowed our program to respond to invasive species as they're identified on ranges, in training areas, at facilities, or in valued habitat.

The majority of TY 2025's invasive plant management was conducted in the Cantonment grassland area. The programmatic goal of this year was to continue a concerted effort of eradicating Autumn Olive in units throughout the Cantonment Area. The NRTLP used in-house mechanical methods (mowing with tractor and skid-steer loader attachments) and in-house/contracted herbicide applications to control Autumn Olive (*Elaeagnus umbellata*) and other common exotic invasive species in 70 acres of grasslands. These combined herbicide applications used both foliar and basal bark treatments and altogether applied 130 pounds of active ingredient (PAI). The most commonly used products were Triclopyr, Fosamine and Glyphosate based. The Program has reported use of the following PAIs for our principal active ingredients: 115 lbs. of Triclopyr, 10 lbs. of Fosamine and 5 lbs. of Glyphosate. Individual applications and programmatic best practices are approved by the MAARNG Integrated Pest Management Coordinator.

The total herbicide PAI for TY 2024 was 94 pounds, making 2025 a ~40% increase. This is largely explained by the fact the Program contracted Davey Resource Group to conduct a significant grassland herbicide treatment towards the end of TY 2024 but, due to weather and growing season, could not execute the project until TY 2025.

Individual applications and programmatic best practices are approved by the MAARNG Integrated Pest Management Coordinator. Any herbicide product must be approved at the National Guard Bureau level by the Pest Management Program Manager. The NRTLP complies with all licensing requirements and management practices required by the Department of Defense in addition to those required by the Massachusetts Department of Agricultural Resources.

3.6 Wildland Fire Management

Section 3.6 summarizes Natural Resource Program actions related to Environmental Performance Standard 11, Fire Management Performance Standards. Wildland fire is an important process in the fire prone Northern Atlantic Coastal Plain Pitch Pine Barrens that dominate the remnant landscape of Camp Edwards and the Upper Cape Water Supply Reserve. Wildfire can reduce military readiness through the loss of training days, threaten life and property on and around Camp Edwards, and negatively impact natural resources if the occurrence of the fire is outside the historical and/or natural range of variability. The 2023 National Cohesive Wildland Fire Management Strategy update, provides common nationwide guidance on achieving effective wildland fire management. The vision statement of the national strategy is "To safely and effectively extinguish fire, when needed; use fire where allowable; manage our natural resources; and collectively, learn to live with wildland fire." The three overarching goals in support of this vision statement are:

- Resilient Landscapes – Landscapes, regardless of jurisdictional boundaries are resilient to fire, insect, disease, invasive species and climate change disturbances, in accordance with management objectives.
- Fire Adapted Communities – Human populations and infrastructure are as prepared as possible to receive, respond to, and recover from wildland fire.
- Safe, Effective, Risk-based Wildfire Response – All jurisdictions participate in making and implementing safe, effective, efficient risk-based wildfire management decisions.

Ignition operations on the March 12, 2025 16-acre grassland prescribed burn west of the Camp Edwards Headquarters building. *Photograph by Joel Carlson, Natural Resources and Training Lands Program*

Using the principles outlined in the National Cohesive Wildland Fire Management Strategy the NRTLP conducts wildland fire management to support military readiness and to meet the goals and objectives outlined in the 2020 version of the INRMP and 2006 version of the Integrated Wildland Fire Management Plan (IWFMP) for Camp Edwards. The current versions of the IWFMP and INRMP are available at: https://campedwards.ng.mil/Publications/

3.6.1 Wildland Fire Management Administration

Wildland fire administration such as planning, training, resource management, and reporting are undertaken in support of goals and objectives outlined in the IWFMP and INRMP for Camp Edwards. Administrative actions adhere to Army Wildland Fire Policy and National Wildfire Coordinating Group's (NWCG) standards.

3.6.1.1 Integrated Wildland Fire Management Plan

Installations characterized by unimproved grounds that present a wildfire hazard and/or installations that utilize prescribed fire as a land management tool are required to develop an IWFMP in accordance with AR 200-1 and AR 420-1.

The update of the 2006 Camp Edwards IWFMP is being edited to meet new agency policy on content and is in the final stages of preparation for signatures. The IWFMP update was prepared in a format consistent with the March 15, 2021, Army Installation Wildland Fire Program Implementation Guidance Memorandum which was rescinded in 2025 and is currently being updated. The final version of the IWFMP is expected to be signed in late 2026.

3.6.1.2 Prescribed Fire Burn Plans

Prescribed fire burn plans are required for each fire application ignited for management. Plans remain valid after approval until conditions change for the area described in the plan, usually 5 years or less. Prescribed fire burn plans for Camp Edwards are drafted following the requirements and standards outlined in the NWCG Standards for Prescribed Fire Planning and Implementation publication (PMS 484).

No new prescribed fire burn plans were drafted in TY 2025 due to competing demands for time and the requirement for development and review by separate qualified burn bosses. There are three active prescribed burn plans covering 2,041 acres for broadcast burning and one programmatic Camp Edwards prescribed fire burn plan for pile burns. Table 3-6 summarizes the areas under prescription and the plan's expiration date.

Table 3-6 TY 2025 Prescribed Fire Burn Plans

Prescribed Fire Burn Plan	*Acres*	*Expiration*
Camp Edwards Programmatic Piled Vegetation	N/A	02/01/27
A-3, A-4, A-5, and BA-4	914	06/30/26
BA-1, BA-2, and BA-7	634	06/30/26
Cantonment Area Grasslands	493	11/30/25

3.6.1.3 Wildland Fire Dedicated Staff

An Environmental Analyst III (Prescribed Fire and Fuels Specialist) position was created to meet critical capacity gaps and allow for the safe and effective expansion of current wildland fuels management to better address critical needs. The position was posted and broadly advertised three times during the year but was not able to be filled. The lack of this specialized position presents a significant challenge to meeting the increasing demands for fuels management and wildland fire – both operational and administrative – especially with declining funding and a lack of local wildland fire contractors to fill staffing gaps.

3.6.1.4 Wildland Fire Fuels Plans

During TY 2025 no wildland fire fuels plans were prepared due to competing demands for time.

3.6.1.5 Wildland Fire Agreements

The NRTLP manages the Master Cooperative Wildland Fire Management and Stafford Act Agreement for the MAARNG that is between the Northeastern Region of the National Park Service, Eastern Region of the Bureau of Indian Affairs, Northeast Region of the U.S. Fish and Wildlife Service, Northeastern Area State and Private Forestry of the U.S. Department of Agriculture, Connecticut Department of Energy and Environmental Protection, Massachusetts DCR, Massachusetts DFG, and the Massachusetts Military Division. The agreement establishes a commitment of the parties to improve efficiency by facilitating the coordination and exchange of personnel, equipment, supplies, services, and funds among the parties to the agreement in sustaining wildland fire management activities, such as prevention, preparedness, communication and education, fuels treatment and hazard mitigation, fire planning, response strategies, tactics and alternatives, suppression and post-fire rehabilitation and restoration.

The agreement was established in 2017 and expired in 2023. In 2023 and again in 2024 a modification of the agreement was provided to all signing parties to extend the agreement into 2025 to allow for a renewal of the Master Cooperative Wildland Fire Management and Stafford Act Agreement.

The Master Cooperative Wildland Fire Management and Stafford Act Agreement is currently operating under the 2024 extension which expires on April 11, 2026.

3.6.1.6 Prescribed Fire Permits

Prescribed burns are authorized under permit by MassDEP. The authorization by MassDEP has been determined under criteria outlined in 7.07 Open Burning as contained in 310 CMR 7.00 “Air Pollution Control” regulations adopted by MassDEP pursuant to the authority granted by Massachusetts General Laws, Chapter 111, Section 142 A-N, Chapter 21C, Section 4 and 6, and Chapter 21E, Section 6 of the “Air Pollution Control Regulations”.

The current permit (#4F02008) for Camp Edwards was renewed on February 28, 2025 and is valid through December 31, 2027. The permit’s allowable annual acres have been increased from 1,300 to 2,000 acres per year and sets air quality and implementation criteria for the permit period.

Final ignition on a 154-acre prescribed burn on April 24, 2025 (Training Area BA-1) in pine barrens fuels that have not burned in over 50 years. *Photograph by Joel Carlson, Natural Resources and Training Lands Program*

3.6.1.7 Wildland Fire Training

Wildland fire trainings conducted during TY 2025 consisted of classroom, hybrid online/in person, and performance-based training and evaluations. These trainings were focused on building the skill sets of the Camp Edwards Prescribed Burn Team and partner agencies to increase wildland fire operational capacity and safety. Trainings were selected to ensure effective progress towards compliance with the 2021 Army Wildland Fire Policy that requires the transition to NWCG qualifications standards. A summary of trainings and participation in the trainings is presented in Table 3-7.

Table 3-7 TY 2025 Wildland Fire Training Summary

Trainings, Trainee Assignments, and Qualifications	*Prescribed Burn Team*	*MAARNG Soldiers*	*Partner Agency Crew*
Wildland Fire Safety Training Annual Refresher (RT-130)	16	-	-
Wildland Fire Safety Training Annual Refresher (RT-130)	-	8	-
Aviation Wildland Fire Refresher	-	10	-
First Aid, CPR, and AED	16	-	-
Basic Air Operations (S-270)	2	6	43
Helicopter Crewmember (S-271)	3	4	42
Facilitative Instructor (M-410)	1	1	16
Qualification – Firefighter Type 2, Crewmember (FFT2)	1	-	-
Fire Effects Monitor (FEMO)	2	-	-
Firefighter Type 1 Squad Boss (FFT1)	1	-	-
Position Trainee Assignments	22	2	4

To enhance military wildland fire training approximately $70,000 of Fiscal Year 2025 Congressional Interest Wildland Firefighting funds was requested and awarded for use by the 179th/180th Engineer Firefighting Detachments located at Camp Edwards. The funds were used to acquire wildland fire equipment and to enable soldiers to attain wildland fire training and wildland fire experience on prescribed burns at Camp Edwards.

3.6.1.8 Prescribed Fire Resources

To effectively and safely conduct wildland fire operations, resources in the form of qualified crew and appropriate equipment are required. The Camp Edwards Prescribed Burn Team size remains constant at approximately 15 active participants. Qualifications and experience of all team members is effectively being maintained and expanded on with training and prescribed burn operations. However, wildland fire assignments are currently a limiting factor to progress on some qualifications. Partner agencies such as DCR and DFW provided approximately 33% of the crew and equipment needed for prescribed fire operations. The JBCC Fire Department provided approximately another 33% of the crew and equipment needed for prescribed fire operations with the remaining 33% of crew and equipment coming from the Camp Edwards Prescribed Burn Team.

In TY 2025, the NRTLP applied for and received a $490,000 Environmental Resilience Funds Grant from the Department of the Army for wildland fire management. The grant funded the purchase of critical wildland fire equipment, personal protective equipment and supplies. The equipment, personal protective equipment, and supplies increase the organic capacity of the MAARNG's NRTLP to apply increased prescribed fire on the Camp Edwards landscape in an integrated manner. This is essential for the MAARNG to preserve environmental systems, prepare for future environmental hazards, and maintain environmental readiness to meet the training mission at Camp Edwards.

The NRTLP's Type 6 Engine was taken out of service and turned in to the Commonwealth as a result of age and the lack of a proper storage building. The time and cost of maintenance resulting from exposure to the elements continually reduced the viability of retaining the engine until it was no longer a functional or affordable option.

Lacking a Type 6 Engine will limit training opportunities for the prescribed burn team, potentially hinder some prescribed burn operations, and reduce the ability to assist with wildfire response if called upon.

3.6.1.9 Wildfire Reporting

The JBCC Fire Department has primary response authority for wildfires on Camp Edwards and within JBCC. Wildland fires originating from unplanned ignitions for 2022 to 2025 are summarized in Table 3-8. Fiscal Years 2014 to 2021 are not reported due to missing data and/or inconsistent reporting.

Table 3-8 Wildfire Incidents and Acres for Camp Edwards

Wildfire Cause	*TY 2022 Incidents*	*TY 2022 Acres*	*TY 2023 Incidents*	*TY 2023 Acres*	*TY 2024 Incidents*	*TY 2024 Acres*	*TY 2025 Incidents*	*TY 2025 Acres*
Electrical Transmission	1	0.01	1	0.25	-	-	-	-
Military Training	3	0.50	5	11.57	2	0.20	17	6.23
Escape Prescribed Burn	-	-	-	-	-	-	1	181.00
Total	**4**	**0.51**	**6**	**11.82**	**2**	**0.20**	**18**	**187.23**

While conducting a 133-acre prescribed burn on May 1, 2025, in the eastern portion of Training Area A-5, south of Wheelock Overlook, an escape fire occurred. It is presumed the escape originated from a spot fire started by embers lofted from several torching trees located in the northwest corner of the prescribed burn area. The spot fire was not rapidly detected because resources were committed to locating an individual, not associated with the burn, who had encroached into the burn vicinity. When the spot fire was located, additional suppression resources were requested through the JBCC Fire Department. Contingency actions were effective and kept the 181-acre escape within the A-6 and B-7 Training Areas and a single operational period. No facilities or infrastructure were damaged and no personnel were injured.

3.6.1.10 Wildland Firefighting Equipment Ignition Fuels Use

In January 2023 following review by the NRTLP, JBCC Fire Department, Headquarters Camp Edwards, and the EMC's Environmental Officer, the Use and Reporting of Wildland Firefighting Water Additives Standard Operating Procedure (SOP) was adopted for use at Camp Edwards and the Upper Cape Water Supply Reserve. The SOP guides the use of Wildland Firefighting Ignition Equipment to the extent that is practicable during wildland fire operations (wildfire, prescribed fire, and wildland fire training) but does not under any circumstances hinder management decisions and actions taken by an Incident Commander when protecting life and property. When conducting planned operations such as prescribed burns and wildland fire trainings, every effort shall be made to apply the SOP to pre-operational planning. Information collected post wildland fire operations shall be used to identify products that are not currently listed in this SOP. This information will be used to update the SOP, initiate coordination efforts to prevent or guide future use of a product, and/or facilitate as required any post use mitigation efforts. All items that were purchased, stored, and/or used were listed within the approved SOP. A summary of TY 2025 Wildland Firefighting Equipment Ignition Fuels is provided in Table 3-9.

Table 3-9 TY 2025 Wildland Firefighting Equipment Ignition Fuels Summary

Product Name	*Type Use: Wildfire*	*Type Use: Prescribed Fire*	*Type Use: Wildland Fire Training*	*Total*
Dragon Balls (Potassium Permanganate)	-	5 oz	-	5 oz
Catalyst for Dragon Balls (Ethylene Glycol)	-	25 ml	-	25 ml
Drip Torch Fuel (3/1 Diesel to Gas Mix)	11 gal	109 gal	-	120 gal
Fusees, Backfiring	-	6 fusees	4 fusees	10 fusees
Firequick Flares - Hotshots	-	70 flares	-	70 flares

3.6.2: Wildland Fire Operations

Wildland fire operations at Camp Edwards and within the Upper Cape Water Supply Reserve in support of land management objectives are designed and conducted to control the flammability and reduce the resistance to control of wildland fuels through mechanical, chemical, biological, manual means, or using prescribed fire.

3.6.2.1 Prescribed Fire

Prescribed fire is wildland fire originating from a planned ignition in accordance with applicable laws, policies, and regulations to meet specific objectives. It is the most important ecosystem and land management tool at Camp Edwards and throughout the region. It is used at Camp Edwards and within the Upper Cape Water Supply Reserve to support military readiness and to meet the goals and objectives outlined in the Camp Edwards INRMP and IWFMP, including restoration and maintenance of pine barrens and sandplain grasslands. To meet the wildland fire management goals at Camp Edwards approximately 3,000 acres/year, averaging 200 acres/burn, and 16 burn days/year are required each year.

Black-lining operations on a 3-acre grassland burn in preparation for follow up prescribed burning; March 10, 2025.
Photograph by Joel Carlson, Natural Resources and Training Lands Program

During TY 2025, 702.5 acres of the Training Areas within the Upper Cape Water Supply and 108.5 acres in the grassland within the Cantonment Area at Camp Edwards were burned with prescribed fire (Graph 3-11, Tables 3-10 and 3-11, and Figure 3-2). The 811 total broadcast burn acres were burned during a total of 10 operational burn days and averaged 81 acres/day (Graph 3-11). An additional three pile burns were burned during one operational day in TY 2025. The accomplished prescribed burns were high priority for long-term management strategies and key ecosystem restoration areas. The map shows a strategic layout of burns in which fire is used patchily throughout Camp Edwards, but also with a “clumped” pattern to facilitate future burns and expand in a localized way on the many benefits of wildland fire.

3.6.2.2 Mechanical Wildland Fire Fuel Treatments

During TY 2025 there were no projects with primary design intent as mechanical wildland fuel treatment. These are projects to manipulate or remove wildland fuels to reduce the likelihood of ignition and/or lessen potential fire damage and resistance to the control of wildland fire.

Graph 3-11 10 Year Period Broadcast Prescribed Burn Acres and Burn Days for Training Area/Reserve and Cantonment Area

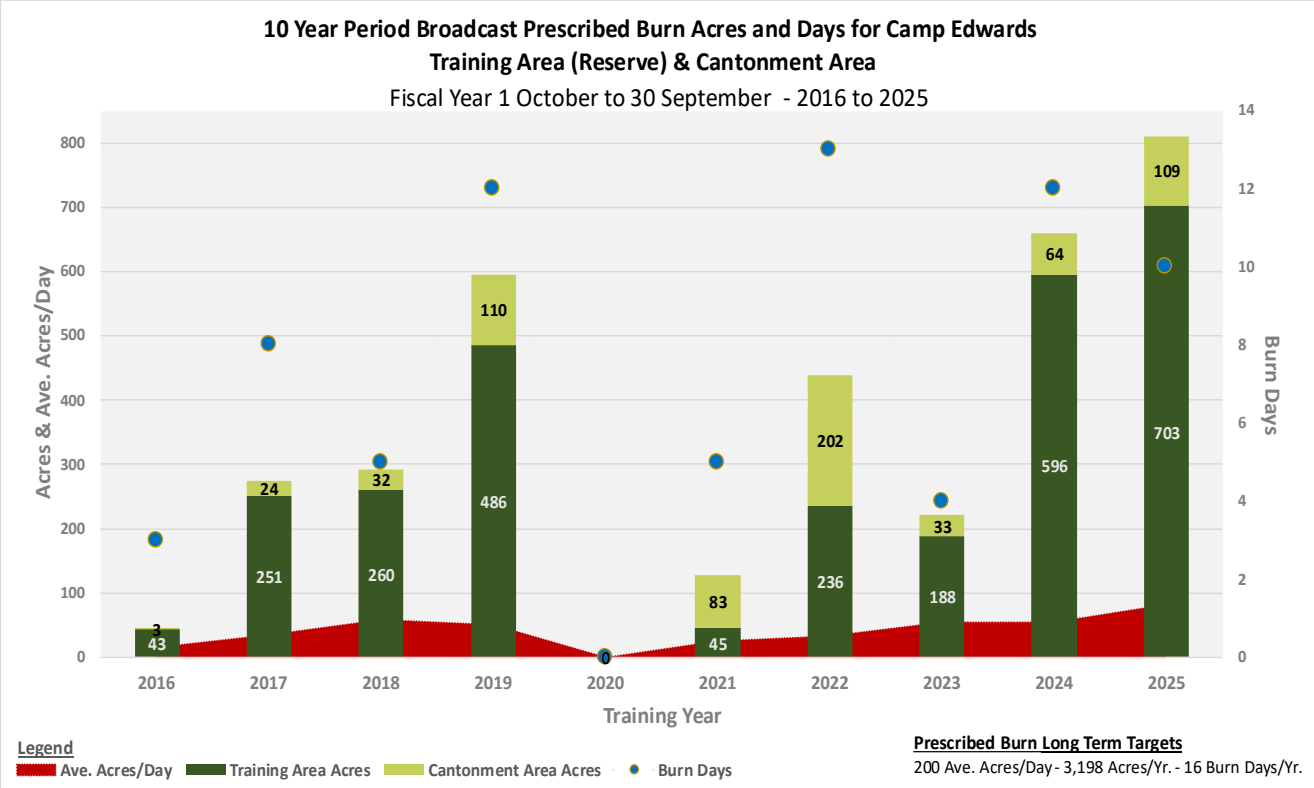


Table 3-10 Grassland Unit (GLU) Prescribed Burn Operations

GLU	*Date*	*Acres**	*Notes*	*Prior burn*
GLU 1A/1B	03/10/2025	33	Sandplain Grassland Community maintenance	2021
GLU 4C	03/10/2025	3	Sandplain Grassland/Heathland Community maintenance	2022
GLU 6	03/12/2025	30	Sandplain Grassland Community maintenance	2022
GLU 9A	03/12/2025	15.5	Sandplain Grassland Community restoration	2015
GLU 4C	04/09/2025	27.5	Sandplain Grassland/Heathland Community maintenance	2022

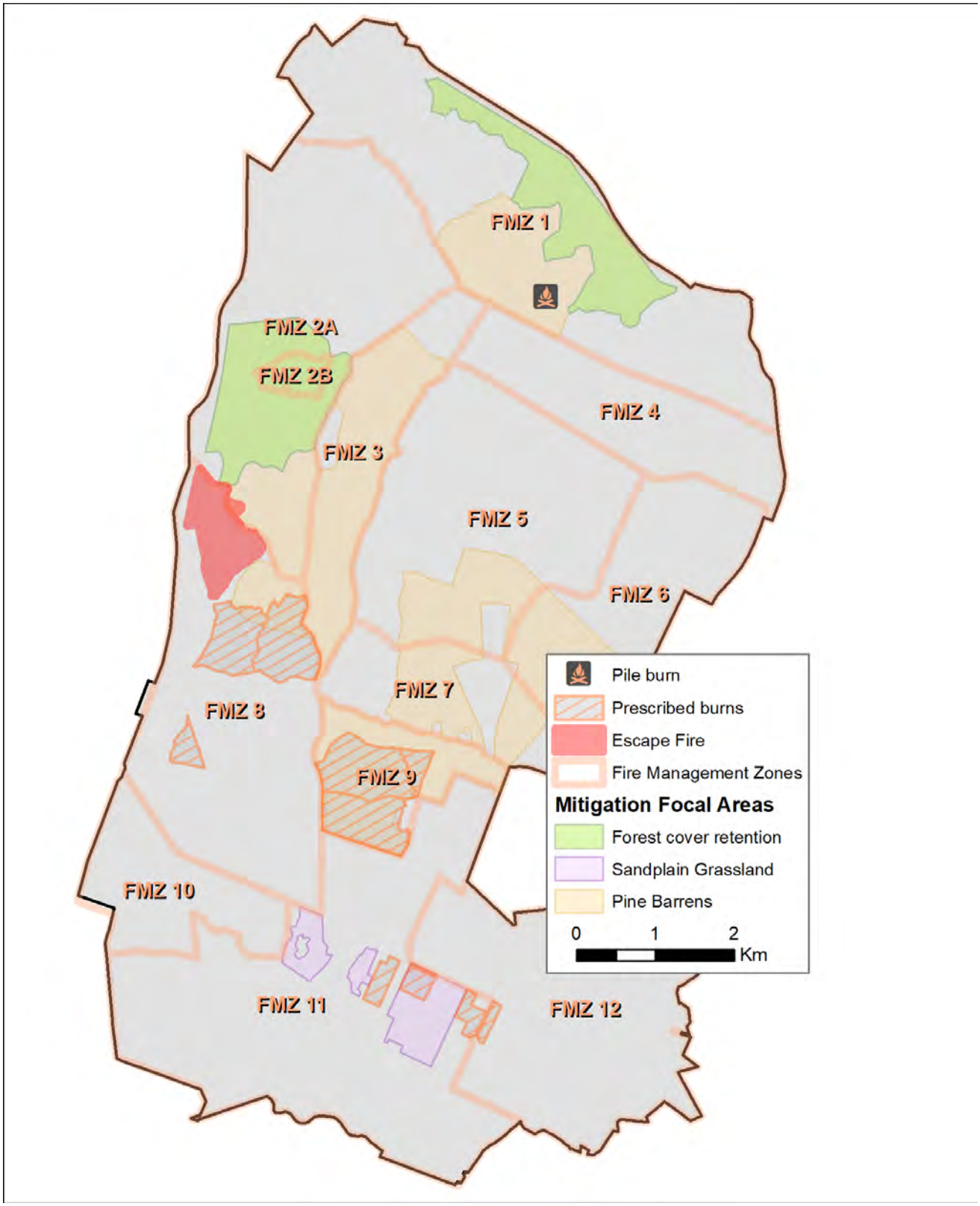
* rounded to the nearest half acre

Table 3-11 Training Area Prescribed Burn Operations

Burn Unit	*Date*	*Acres**	*Notes*	*Prior burn*
C-14	03/06/2025	0	Pile burns of woody restoration debris	N/A
BA-7 South	04/10/2025	31.5	Pitch Pine – Scrub Oak Community maintenance and fuel reduction	2013
BA-7 South	04/17/2025	181	Pitch Pine – Scrub Oak and Scrub Oak Shrubland Communities maintenance and fuel reduction	2013
BA-1	04/18/2025	1	Pitch Pine – Scrub Oak Community maintenance and fuel reduction. Ended during test fire due to weather conditions and fire behavior.	No record
BA-1	04/24/2025	153.5	Pitch Pine – Oak Woodland and Pitch Pine – Scrub Oak Community maintenance and fuel reduction	No record
BA-4	04/29/2025	161.5	Pitch Pine – Scrub Oak Community maintenance and fuel reduction	2015
A-3	04/29/2025	34.5	Pitch Pine – Oak Woodland maintenance	2004
A-5	01/05/2025	133	Pitch Pine – Oak Woodland maintenance and fuel reduction. Escape fire occurred (described above).	2013

* rounded to the nearest half acre

Figure 3-2 Map of Wildland Fire Activities and Fire Management Zones



Map of wildland fire activities and Fire Management Zones (FMZs; orange perimeters) during TY 2025. Prescribed burns (gray polygons with red outline and hashing) were primarily conducted within FMZ 8 (southwestern training areas), FMZ 9 (southeastern training areas), and FMZ 11 (cantonment). Pile burns, denoted by a campfire symbol, were completed in FMZ 1. The escaped fire is shown in solid red in FMZ 8.

3.6.2.3 Wildland Fire Control Lines

Constructed and treated control lines are used for the control of wildland fire at Camp Edwards and consist of two types. Fire control roads are cleared paths wide enough to permit vehicular passage with natural or manmade changes in fuel characteristics on one or both sides. Fuel-breaks are generally temporary treatments that make changes to fuel characteristics. Both are treated to affect fire behavior so that fires burning into them can be more readily controlled.

During TY 2025 all fire control roads were maintained so that they were passable by vehicles and no new fire control roads were created. Approximately 25 miles of existing fuel-breaks were maintained and approximately 1 mile of fuel-break was improved to facilitate the implementation of prescribed fire and wildfire response.

3.7 Air Quality Management

Environmental Performance Standard 8, Air Quality Performance Standard, is covered in Section 3.7.

3.7.1 Air Quality Permits

Potential air emissions from stationary sources at Camp Edwards are below the established federal and state thresholds for the designated primary air pollutants (carbon monoxide, nitrogen oxide, particulate matter, sulfur dioxide, and volatile organic compounds); therefore, Camp Edwards does not require an air quality control permit for stationary source emissions under the provisions of the Clean Air Act (CAA) or to measure and report actual emissions from its stationary sources.

The prescribed burn program requires an air quality control permit. The MassDEP Southeast Regional Office renewed the Camp Edwards smoke management and prescribed burn permit (#4F02008) on February 28, 2025. The permit is valid through December 31, 2027.

3.7.2 Air Quality Reports

310 CMR (Code of Massachusetts Regulations) 7.12(2)(b) requires that any person having control of a fuel burning facility or facilities with a maximum energy input capacity of 10,000,000 Btu/hr of natural gas report certain information to MassDEP once every three years. Because of the number of facilities at Camp Edwards, the MAARNG is required to submit a Source Registration/Emissions Statement (SR/ES) report for Camp Edwards every three years. The Camp Edwards SR/ES report was submitted in November 2025.

The only MAARNG stationary source emissions locations in the Training Area/Reserve on Camp Edwards are Range Operations and the Ammunition Supply Point.

3.8 Noise Management

Section 3.8 provides information related to Environmental Performance Standard 9, Noise Management Performance Standards.

The MAARNG's Statewide Operational Noise Management Plan provides a strategy for noise management at MAARNG facilities, including Camp Edwards. The plan includes a description of noise environments, including levels from small arms and aircraft training activities. Elements of the plan include education, complaint management, possible noise and vibration mitigation, noise abatement procedures, and land use management. Specific procedures are provided for noise complaints and protocols are provided for providing public notification for detonation of unexploded ordnance in place and for other unusual noise events.

In May, a noise complaint was made via voicemail to the NRTLP by a Forestdale resident relating to helicopters traveling over his residence during the wildfire response (see Section 3.6.1.9) and helicopter training utilizing "Bambi buckets" (a water-carrying device used in aerial firefighting). The Camp Edwards Commander responded to the complaint with all parties satisfied.

3.9 Stormwater Management

Environmental Performance Standard 12, Stormwater Performance Standards: There were no new stormwater runoff increases in the Training Area/Reserve due to military training activities, and no new stormwater discharges from military training activities were made directly into wetland resource areas in the Training Area/Reserve.

3.10 Wastewater Management

Information related to Environmental Performance Standard 13, Wastewater Performance Standards, is included in Section 3.10.

Depending on the location of facilities, wastewater and sewage from MAARNG training activities in the Training Area/Reserve was pumped from portable toilet facilities and hauled off base for disposal at licensed disposal facilities or discharged through the normal operation of existing septic systems (1,000 gallon) at Range Operations and the Ammunition Supply Point that are regulated by MassDEP. (Note: There is a septic system at the former Otis Fish & Game Club located on Camp Edwards in the southwestern corner of the Training Area/Reserve; it is not in use at this time because the building is out of service. There are septic systems within the boundary of the Training Area/Reserve, at Cape Cod AFS and the USCG Communications Station, which are regulated by MassDEP.)

3.10.1 Wastewater Treatment Plant Discharge

The Converge/ASUS wastewater treatment plant operated within the discharge volume limits of its wastewater discharge permit during TY 2025. In 2022, the US Air Force entered into an agreement to transfer ownership of the Otis ANGB water and wastewater systems to Converge LLC. Converge then selected American States Utility Services, Inc. (ASUS) to operate and maintain the systems. In April 2024, Converge/ASUS began operations at the facilities.

The plant discharged 32,056,000 gallons of sewage into the sand filtration beds in the Training Area/Reserve; a daily average of 87,825 gallons versus its permitted twelve-month moving average flow of 360,000 gallons. Graph 3-12 shows the daily average pumping rate of the system since TY 2016.

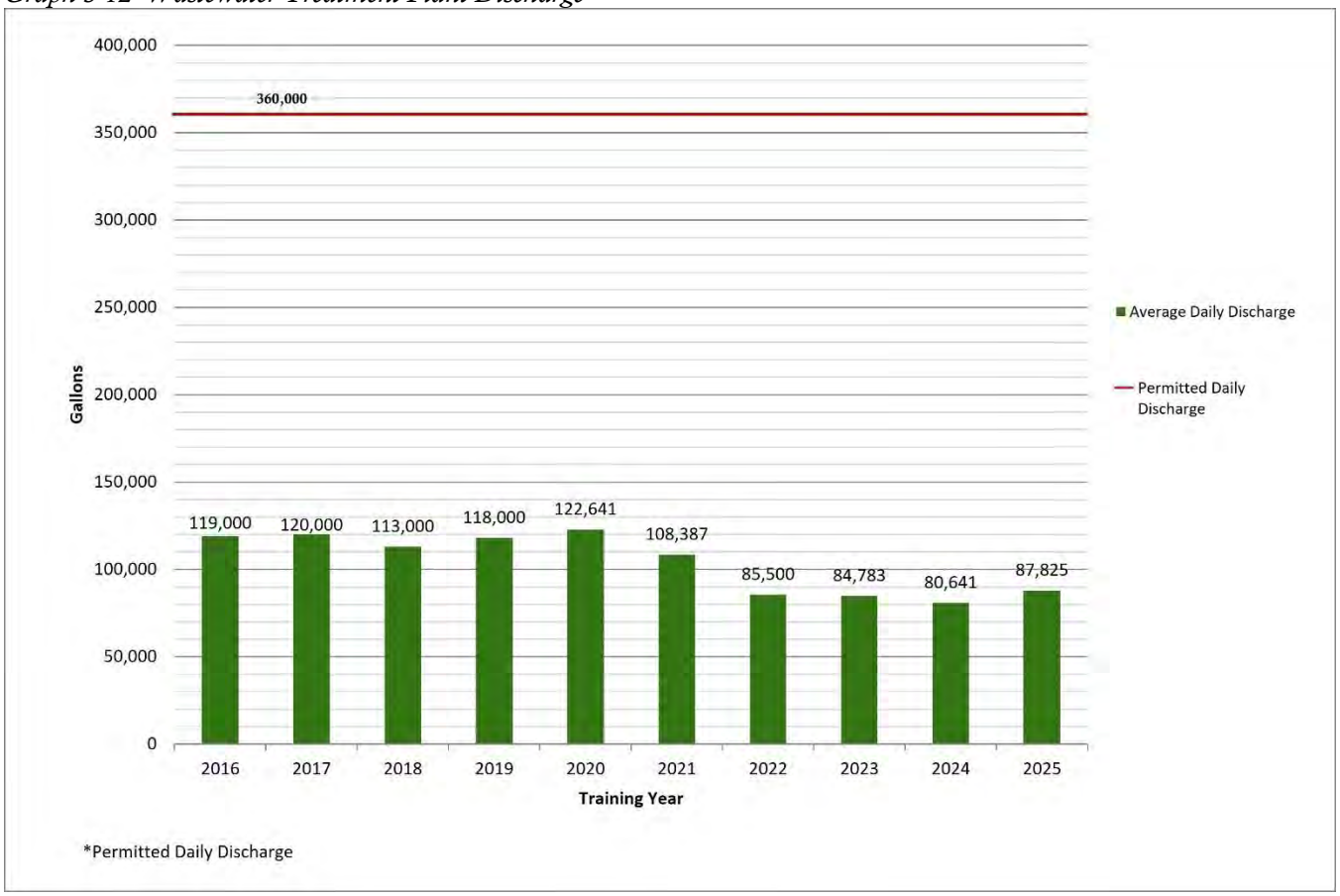
3.11 Solid Waste Management

This section provides information related to Environmental Performance Standard 14, Solid Waste Performance Standards.

The Camp Edwards Ammunition Supply Point did not turn in any ammunition casings for recycling to the Defense Logistics Agency office in Groton, Connecticut, during TY 2025. Casings are turned in periodically when economical.

The MAARNG has a Statewide Integrated Solid Waste Management Plan for all of its Army National Guard facilities. The plan establishes MAARNG policy, responsibilities, goals, and objectives for compliance with statutory requirements for waste minimization, recycling, and solid waste disposal. Chapter 8 of the plan includes solid waste management procedures specific to Camp Edwards, as well as identifying potential future solid waste management alternatives.

Graph 3-12 Wastewater Treatment Plant Discharge



3.12 Hazardous Materials Management

This section provides information related to Environmental Performance Standard 15, Hazardous Materials Performance Standards.

There were no spills in the Training Area/Reserve during TY 2025.

Camp Edwards has appropriate protocols in place to respond to oils or hazardous materials releases, such as fuel spills, in the Training Area/Reserve. These protocols include the Soldiers Field Card that outlines how Training Area/Reserve users respond if a spill occurs, and Camp Edwards has trained staff to initiate all required spill response actions in accordance with the Camp's Spill Prevention, Control and Countermeasure plan and/or Massachusetts Contingency Plan (310 CMR 40.00) if applicable. The EMC Environmental Officer is notified of all reported spills in accordance with Chapter 47, and MassDEP is notified, if applicable. All users of the Camp Edwards training lands, including civilians, are required to complete a series of Range Operations briefings. Users are directed via verbal instruction, as well as in training videos, to immediately report petroleum, oils, and lubricants hazardous materials spills and/or releases of any size to Range Operations.

3.12.1 Vehicle Use, Fueling and Maintenance

Pumping fuel in the Training Area/Reserve has been prohibited by the EPSs since 2002. Currently, the fuel point and the secondary containment pads in the Tactical Training Base Kelley area represent the designated location for units to refuel and park and store tanker trucks at Camp Edwards. Environmental Performance Standard 15.3.3 states "No storage or movement of fuels for supporting field activities, other than in vehicle fuel tanks, will be permitted except in approved containers no greater than five gallons in capacity." Exemptions to EPS 15.3.3 have been granted to the MAARNG by the EMC Environmental Officer to refuel in the Training Area/Reserve

for critical training events, remediation and natural resource restoration work, and utility company modernization and maintenance. Refueling activities in the Training Area/Reserve during these exemptions were all completed with no adverse environmental impacts.

At the end of TY 2025, the MAARNG proposed to modify EPA 15.3.3 to request that vehicle refueling in the Training Area/Reserve be allowed under certain conditions. The proposed revisions to EPS 15.3.3 would allow refueling with a 150-gallon maximum capacity vehicle mounted day-tank in support of maintenance and construction activities and refueling in support of maintenance, construction and/or military training with HEMTT or civilian fuel tanker trucks containing a maximum of 1,500 gallons. HEMTT and civilian fuel tanker truck travel and refueling would only occur on approved roads and locations as established in an SOP.

Civilian entities such as Eversource and other utility companies, the IAGWSP, or the NRTLP's Wildland Fire Program need to refuel to support their missions, and there is a requirement for MAARNG Soldiers to be able to train effectively with refueling in a tactical, field training environment.

On September 30, 2025, the MAARNG presented the proposed modification of EPS 15.3.3 to the SAC at their public meeting and to the CAC and the EMC at their meetings in early TY 2026. A Notice of Availability of the proposed revisions to the EPSs was placed in the Environmental Monitor on December 23, 2025, with a 30-day public comment period planned.

3.13 Hazardous Waste Management

Information related to Environmental Performance Standard 16, Hazardous Waste Performance Standard, is in Section 3.13.

The MAARNG complied with its policy of not performing maintenance activities on military vehicles in the Training Area/Reserve throughout the year. Personnel in the field are authorized only to check fluid levels, add small amounts, and repair flat tires or track sections that separate during training. Thus, hazardous wastes normally associated with vehicle maintenance and repair facilities were not generated or stored in the Training Area/Reserve.

Major repairs and other maintenance activities and training occur at the Unit Training Equipment Site (UTES) facility located in the Cantonment Area of Camp Edwards. The UTES facility is a vehicle and motor pool area; the Massachusetts National Guard has also designated the area as a Satellite Accumulation Point to store hazardous waste. Satellite Accumulation Points are defined areas to accumulate hazardous waste (oily solids, flammable solids, etc.) Once the 55-gallon drums are full, they are transported to the 90-day central accumulation area located at the Camp Edwards warehouse. Hazardous waste is picked up on a regular schedule of approximately 70-80 days.

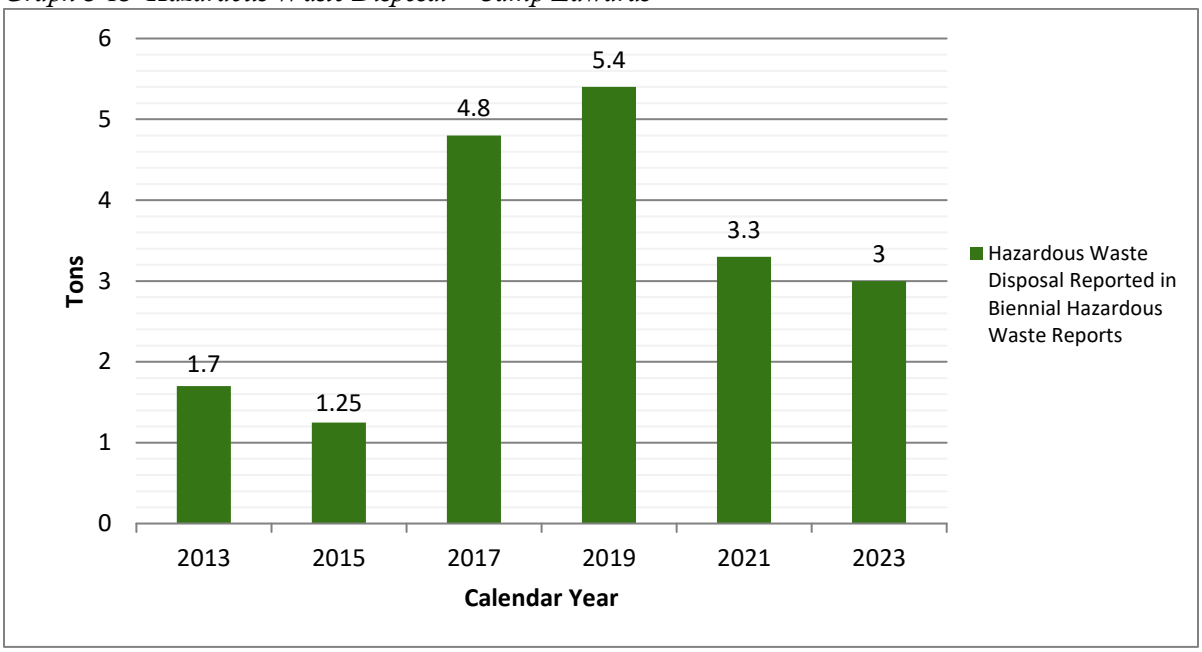
In instances where the Installation Restoration Program or IAGWSP use the EPA identification number of the MAARNG to dispose of wastes generated by remediation activities in the Training Area/Reserve, MAARNG Environmental tracks the procedure to ensure compliance with applicable regulations.

Hazardous wastes generated within the Training Area/Reserve are managed within the existing accumulation area located at UTES, which is located outside of the Training Area/Reserve. Cleaning/lubricating/preservative (CLP) and other used cleaning materials such as rags and patches used when on a small arms range are collected in a designated 5-gallon bucket lined with a plastic bag; this is removed by the visiting unit and disposed of in accordance with applicable regulations at their home station. This bucket is then inspected by Range Operations and subsequently transported by a trained Range Operations employee for disposal at the central accumulation point.

3.13.1 Hazardous Waste Disposal and Reporting

A biennial Hazardous Waste Report must be prepared and submitted to the EPA and MassDEP in March of even-numbered years reporting on hazardous waste generated by large quantity generators (LQG) during the preceding odd-numbered year. The last report for Camp Edwards was in March 2024 for hazardous waste disposed of during calendar year 2023. Graph 3-13 provides information on the volumes of hazardous waste disposal reported for the past six biennial reports. In general, the majority of the reported waste is generated from the repair and maintenance of military vehicles, aircraft, and equipment. These wastes include vehicle fuels, oils, antifreeze and associated rags and clean-up materials. The quantities of waste disposed of will fluctuate year to year based on the operational tempo of the MAARNG within that year.

Graph 3-13 Hazardous Waste Disposal – Camp Edwards



3.14 Vehicle Management

This section provides information associated with Environmental Performance Standard 17, Vehicle Management Performance Standards.

Unauthorized All Terrain Vehicle (ATV), dirt bike, bicycle, and e-bicycle access to the Training Area continued to be a problem. During TY 2025, the SAC Chair reported to the EMC Environmental Officer, who notified Camp Edwards, that it was posted on several apps (AllTrails, and others) that large portions of the Training Area/Reserve were available to hike and bicycle. In some cases, Camp Edwards GIS staff were able to mark the Training Area/Reserve as restricted; in another case Camp Edwards contacted the company by writing notifying them that the area is a military installation and is posted as off limits; the company ultimately complied.

3.15 General Use and Access Management

This section relates to Environmental Performance Standard 18, General Use and Access Management Standards. Public access to Camp Edwards is limited; however, under certain circumstances regulated public access to Camp Edwards may be available such as hunting during the deer and turkey seasons (See Section 3.5.3 and 3.5.4). The Massachusetts Butterfly Club and the Botanical Club of Cape Cod made use of the Training Area/Reserve for guided walks in summer 2025. Other civilian groups that utilized the Training Area/Reserve in TY 2025 are listed in Section 2.1.2.

3.16 Cultural Resources Management

All MAARNG actions in the Training Area/Reserve are reviewed by the MAARNG Cultural Resource Manager to ensure compliance with all applicable federal, state, and local cultural resource regulations. The MAARNG consults regularly with the Massachusetts State Historic Preservation Office (MA SHPO) ensuring actions are in compliance with Section 106 of the National Historic Preservation Act. In addition to the MA SHPO, the MAARNG consults regularly with the leadership of the Wampanoag Tribe of Gay Head (Aquinnah) and the Mashpee Wampanoag Tribe on undertakings that may affect historic properties that the Tribe has attached religious and cultural significance.

3.17 EPS Violations

There were no EPS violation notices issued during TY 2025. Appendix G lists violations reported since TY 2016.

3.18 Mitigation

The Massachusetts Army National Guard received a Conservation and Management Permit in 2020 that established a master planning framework for projects implemented at JBCC by both Air and Army National Guard. A comprehensive mitigation plan was developed, including an on-site mitigation bank covering multiple habitats. The primary projects incorporated into the master planning mitigation strategy include the Multi-Purpose Machine Gun Range at the current KD Range, Infantry Squad Battle Course at the formerly used Infantry Battle Course, expansion of Tango and Sierra ranges, Cantonment modernization including a running track and classroom buildings, and potential solar development. The mitigation plan combines project design and impact minimization, take avoidance, land transfers, extensive habitat improvement, and long-term monitoring to provide for Net Benefit of a large number of state-listed species. It also establishes a framework for ongoing site development (including additional or modified projects) and land use planning while providing for proactive mitigation and demonstrable net benefit for state-listed species.

The mitigation plan focuses on species guilds (pine barrens and sandplain grassland) for the majority of species with similar habitat condition needs and/or threats (e.g., loss of open canopy condition through forest closure). The Eastern Box Turtle is treated separately as it has differing needs and threats compared to the other species. Mitigation focal areas, tied to the guilds, have been identified to localize various mitigation actions for maximized benefit. Standards for mitigation have been developed for each type of guild and focal area to ensure sufficient conservation commitments are included in the plan and to provide assurances to DFW for net benefit. For example, pine barrens mitigation will require 20% to 40% of habitat improvement work to be in the form of mechanical forestry, as the majority of the pine barrens guild species are threatened and declining due to tree encroachment and canopy closure where suitable and protected habitat exists. In addition to pine barrens and grassland focal areas, forest canopy retention areas are identified for box turtle hibernation and these areas are prioritized for maintenance of later successional forest condition and closed tree canopy.

3.18.1 Permit Amendment for Papillose Nut-sedge

In TY 2024, the Natural Resource Program coordinated with MassWildlife and Camp Edward's stakeholders to amend the MPMG CMP Permit, to account for the detection of Papillose Nut-sedge (*Scleria pauciflora*), a state-listed Endangered plant, within the project area for the MPMG Range. Papillose Nut-sedge had been included in the MAARNG's original CMP application to MassWildlife but was not specifically named in the issued permit. On February 9, 2024, the NRTLP submitted the request to MassWildlife with a detailed conservation plan to avoid and minimize impacts to the species and provide a Net Benefit. The approved amendment was issued on April 5, 2024. The project for which the CMP and Amendment were developed is not under contract and does not have funding. The NRTLP will coordinate with MassWildlife and other internal stakeholders and intends to carry out monitoring and some management activities if resources are available.

TY 2025 Permit Amendment Conditions and Compliance

No significant actions relating to Papillose Nut-sedge were conducted at KD Range during TY 2025.

- Plant Protection Areas were passively maintained with signage at KD Range. NRTLP coordinated with the Camp Edwards Roads and Grounds to conduct a fall mow of the entire range floor to suppress woody plant (primarily Pitch Pine) overgrowth.
- A long-term range maintenance plan that supports Papillose Nut-sedge and is conducive to range use and minimizing wildfire risk is not being pursued at this time due to the MPMG Range status but will be initiated if status changes.
- The Conservation Plan, or Amendment, is an update to the original MPMG Range CMP. Like the original Permit, the Amendment with the associated Conservation Plan will be appended to the INRMP annual review documents and formally included in the next INRMP update (2026).

3.18.3 Construction Projects

Range Operations Control Areas (Tango, India, and Sierra Ranges): The final stage of the Tango Range redevelopment (included in the original CMP, September 29, 2020) is construction of basic range support facilities. This project was completed in early 2025. A request for a certificate of compliance will be sent along with as-built documents and a summary report. Additionally, ROCA buildings were contracted for India and Sierra Ranges, which was consulted with MassWildlife prior to MEPA review and approval. The initial preparatory work for Tango Range was mitigated in 2022 with one acre of habitat mitigation. The remainder of the work, including the other sites had no habitat or species take. While associated administratively with this CMP, no mitigation was required due to the lack of take. Standard conservation measures from the CMP and typical best practices were applied, including NRTLP staff conducting regular wildlife sweeps within the sediment barrier and inspecting buildings to be demolished.

Physical Fitness Track & Field: This project is located outside of the Training Area/Reserve adjacent to the Camp and was completed in early 2025. Camp Edwards Facilities Engineers will provide summary reporting on the project including, as-built drawings and compliance with the CMP requirements and a request for a certificate of compliance has been sent to MassWildlife. Three acres of mitigation were applied during pre-construction coordination in 2023.

3.18.4 Mitigation Implementation

The framework of the CMP was erected to encourage early and abundant investment in monitoring and active mitigation efforts supporting the overall mitigation bank and evaluation of long-term monitoring results. The MAARNG has consistently, effectively, and extensively managed for and monitored state-listed species, their habitats, and overall ecosystem health. CMP reportable and funded actions are a specific subset of MESA-related conservation, which itself is a subset of overall natural resources management and ecosystem sustainability efforts. All of these efforts are guided by and captured within the Camp Edwards INRMP (https://campedwards.ng.mil/Publications/) and frequent coordination with Sikes Act partner agencies (DFW, USFWS), multiple other partner agencies, conservation collaboratives, universities, and others. CMP mitigation actions are implemented within mitigation focal areas (Pine Barrens, Sandplain Grassland, Forest Canopy Reserves). They also meet specified objectives of the CMP, associated plans, and interagency coordination (e.g., annual review meetings). The master development plan CMP effectively doubled the NRTLP project budget for active conservation efforts, including monitoring and habitat restoration and management.

Projects with mitigation acres or monitoring applied to TY 2025 totaled a direct (non-salary) investment of $182,575. Estimated internal costs (staff salary for in-house projects and contract management) of an additional $219,000 means a total of over $401,000 during TY 2025. A total of 552 acres benefited from mitigation projects including initial treatments on 154.5 acres in Pine Barrens Mitigation Focal Areas and 300 acres of habitat

maintenance (second or further follow-up treatments) with fire or mechanical work. Within the Primary Sandplain Grassland Mitigation Focal Area 97.5 acres of habitat maintenance activities occurred. Table 3-12 and Table 3-13 are summary tables for types of mitigation (project type, mitigation area, etc.), broken into acreages applied and financial investment. Under the established CMP and mitigation banking process both habitat take and mitigation offsets are treated in acres and not converted to monetary values. However, the necessary financial investment is critical context to understanding the overall mitigation.

As shown in the tables, the net mitigation action through active habitat restoration and maintenance at Camp Edwards is 2,747 acres. These are projects within designated Mitigation Focal Areas and planned and implemented to demonstrably improve habitat conditions and populations of state-listed species. Long-term monitoring and other surveys continue to demonstrate the broad ecological benefit from this remarkable mitigation investment while scientifically evaluating the results of management. State-listed plants and animals of widely different taxa are increasing with regular documentation of assisted colonization within restored areas. A wide array of otherwise rare and endemic species is thriving with the active mitigation efforts and the conservation management outside of mitigation areas. This ongoing effort, in its seventh year, is dramatically improving biodiversity and supporting overall ecosystem health and resilience.

Table 3-12 Mitigation Acres and Expenditures to Date at Camp Edwards

	FY 2019	*FY 2020*	*FY 2021*	*FY 2022*	*FY 2023*	*FY 2024*	*FY 2025*	*Grand Total*
Pine Barrens	527	401	184	189	89	327	454	2,194
Construction: Pine Barrens		-6		-1	-3			-10
Mitigation: Initial treatment, fire	448			104		56	154.5	762
Mitigation: Initial treatment, mechanical	79	106	164	27	49	16		441
Mitigation: Maintenance treatment, fire			20	59	13	206	278.5	576
Mitigation: Maintenance treatment, mechanical						23.5	21.5	45
Mitigation: Maintenance treatment, other		40			30	48		118
Mitigation: Real Property		261						261
Sandplain Grassland	62	80	47	79	116	72	97.5	554
Mitigation: Initial treatment, fire	62				33			95
Mitigation: Initial treatment, mechanical		80						80
Mitigation: Maintenance treatment, fire			47	65		64	30.5	207
Mitigation: Maintenance treatment, mechanical						8	67	75
Mitigation: Maintenance treatment, other				14	83			97
Grand Total	**589**	**481**	**231**	**268**	**205**	**399**	**552**	**2,747**

Note: This table summarizes all mitigation acres, including take and applied mitigation actions within focal areas. The totals are net acres. All Pine Barrens mitigation is in the Training Area/Reserve. All Sandplain Grassland acres are outside the Training Area/Reserve.

Table 3-13 Sum of Contract Cost by Project Type

	FY 2019	*FY 2020*	*FY 2021*	*FY 2022*	*FY 2023*	*FY 2024*	*FY 2025*	*Grand Total*
Mitigation: Administrative	$48,020	$45,169	$11,262	$32,557	$10,000	$47,000	$12,000	$206,008
Mitigation: Construction support		$221,876		$540		$420		$222,836
Mitigation: Monitoring	$62,810	$103,248	$123,739	$151,431	$73,893	$87,944	$41,500	$644,564
Mitigation: Other		$9,700						$9,700
Mitigation: Initial treatment, fire	$64,480					$1,200	$400	$66,080

Mitigation: Initial treatment, mechanical	$179,986	$88,458	$148,900		$175,900	$78,890	$123,575	$795,709
Mitigation: Maintenance treatment, other		$55,950	$8,000	$118,840	$124,459			$307,249
Mitigation: Maintenance treatment, fire						$4,400	$1,600	$6,000
Mitigation: Maintenance treatment, mechanical						$13,040	$3,500	$16,540
Grand Total	**$355,295**	**$524,401**	**$291,900**	**$303,368**	**$384,252**	**$232,894**	**$182,575**	**$2,274,686**

Note: This table estimates fiscal investment, including direct contracting and equipment costs and staff salary for mitigation actions.

Further information related to mitigation may be found in *Camp Edwards Natural Resources & Training Lands Management Annual Report, Fiscal Year 2025.*

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Section 4
Remediation Program Activities

4.0 Introduction

This section of the Annual Report provides summaries on remediation activities in the Training Area/Reserve during TY 2025.

4.1 Investigation and Remediation Programs

There are two independent cleanup programs operating at JBCC: the Installation Restoration Program (IRP) and the Impact Area Groundwater Study Program.

The IRP was initially established at the installation in 1982. Oversight of the program was transitioned to the Air Force Center for Environmental Excellence, now known as the Air Force Civil Engineer Center (AFCEC), in 1996. The program operates under the regulatory guidance of the federal Comprehensive Environmental Response, Compensation and Liability Act (CERCLA). Most of the activity of the IRP has been focused in the Cantonment Area and in off-installation plumes emanating from the Cantonment Area. AFCEC is responsible for two IRP sites in the Training Area/Reserve: Chemical Spill-19 (CS-19) and Fuel Spill-12 (FS-12). and three Military Munitions Response Program (MMRP) sites: Old K Range, Mock Village, and Otis Gun Club. Five groundwater treatment systems are currently operating on five groundwater plumes to clean 6.5 million gallons of groundwater per day. More than 95 billion gallons of groundwater have been treated to date.

The IAGWSP at Camp Edwards working in cooperation with the EPA and MassDEP, is committed to the cleanup of groundwater contamination and its sources. The IAGWSP's investigations and cleanup have been conducted under the authority of EPA's Safe Drinking Water Act Administrative Orders and in consideration of the substantive cleanup standards of the Massachusetts Contingency Plan (310 CMR 40.00). Investigation of the environmental impacts of legacy training in the upper 14,886 acres of JBCC began in 1996 and cleanup of groundwater contamination began in 2004. As of September 30, 2025, fifteen treatment systems are operating on seven groundwater plumes to clean more than 3.6 million gallons of groundwater per day. More than 21 billion gallons of groundwater have been treated to date. The program maintains a robust Land Use Controls program that works to prevent access to or use of the groundwater from plume areas. Land Use Controls are administrative and/or legal controls that limit exposure to contaminated groundwater that exceeds regulatory standards, health advisories, and/or risk-based levels. The program also maintains the integrity of monitoring wells and treatment systems. Information on the IAGWSP can be obtained on its website: http://jbcc-iagwsp.org.

Both the IRP and IAGWSP have active regulatory participation and community involvement programs. The communities surrounding the installation are kept informed through neighborhood notices and meetings, media releases, community updates, fact sheets, publication and distribution of plans and reports, websites, and information repositories at local libraries.

The programs meet regularly with EPA Region 1 and MassDEP to discuss findings and determine appropriate response actions. Public comment periods are held, as necessary, to present and solicit input on proposed actions. The programs also provide updates on their activities to public meetings of the joint citizens' advisory team, the JBCC Cleanup Team. The JBCC Cleanup Team includes representatives from the surrounding communities and the regulatory agencies.

The IRP and IAGWSP each operate under different regulatory directives and mostly address different contaminants of concern. However, they share sampling results, equipment, technical innovations, and even a

treatment facility. Figure 4-1 shows the areas under remediation by the IRP and the IAGWSP in the Training Area/Reserve.

4.2 Installation Restoration Program Activities in the Training Area/Reserve

The three MMRP sites that are in the Training Area/Reserve are:

- Mock Village MMRP site: A World War II-era Mock Village that had no munitions and explosives of concern (MEC) or munitions constituents were identified at the site and a Record of Decision (ROD) prescribing Land Use Controls/Long-Term Management was finalized in TY 2022. Three Land Use Controls/Long-Term Management annual inspection events were completed at the Mock Village from TY 2022 to TY 2025.
- Old K Range MMRP site: A Remedial Investigation (RI) was completed in TY 2019 at the World War II-era Old K Range and an FS was finalized in TY 2022. Numerous 2.36-inch rockets and other ordnance were discovered at the Old K Range during the Comprehensive Site Evaluation Phase II and RI field work. Because some of the rockets contained high explosives, this site is off limits and ordnance warning signage was placed around the perimeter of the site and along site roads. The Proposed Plan and ROD (TY 2025) are final which specify the preferred remedy: Alternative 3, Long-Term Management with groundwater monitoring, unexploded ordnance construction support and full annual MEC sweeps. Interim Land Use Controls have been implemented, and one interim Land Use Controls/Long Term Management inspection event was completed in TY 2024.
- Otis Gun Club MMRP site: An RI was completed for the former Otis Gun Club and a Feasibility Study was drafted but identified data gaps; therefore, a Supplemental RI was conducted to collect additional data, and the report has been finalized. A Revised Draft Feasibility Study is currently under regulatory review.

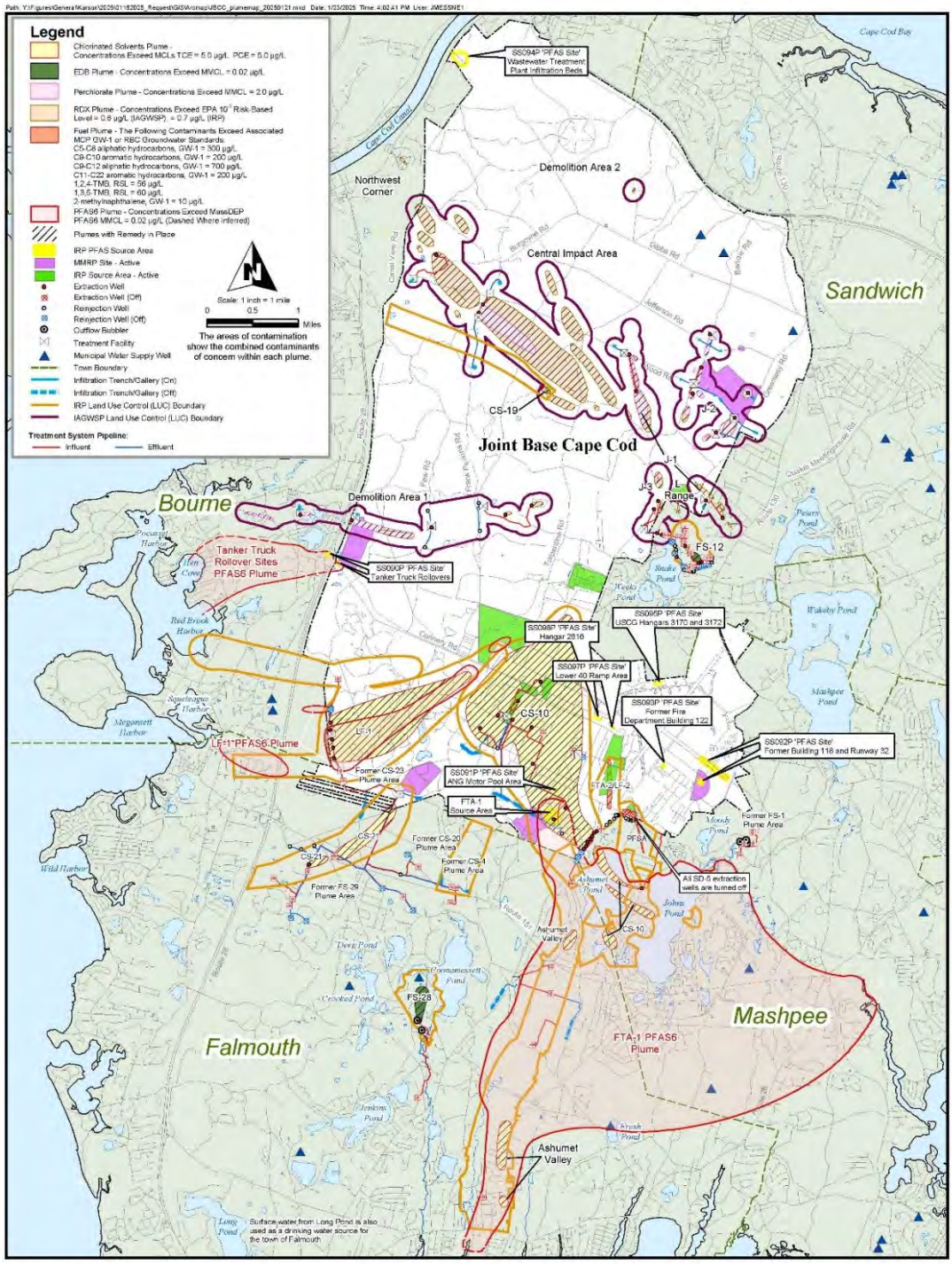
In addition to the MMRP sites, AFCEC manages two groundwater plumes in the Training Area/Reserve: CS-19 and FS-12.

- Chemical Spill-19 (CS-19): In TY 2025, groundwater monitoring was conducted at CS-19 where the contaminant of concern is RDX. RDX was detected above the EPA risk-based level of 0.97 µg/L in two of five monitoring wells sampled. The highest RDX concentration was 1.4 µg/L.

- Fuel Spill-12 (FS-12): In TY 2025, the FS-12 groundwater treatment system continued to remove ethylene dibromide (EDB) using four extraction wells operating between 190-280 gallons per minute (gpm). The maximum EDB concentration detected in groundwater at FS-12 in TY 2024 was 1.3 micrograms per liter (µg/L) compared to 740 µg/L in 1997. The Massachusetts Maximum Contaminant Level for EDB is 0.02 ug/L.

AFCEC also manages three 1.5 megawatt (MW) wind turbines at JBCC, two of which are in the Training Area/Reserve. The turbines offset the energy use in the IRP by 100% (approximately $1.5 million per year). The turbine operation is curtailed for the Northern Long-Eared Bat from July 15 to October 15, 30 minutes before sunset to 30 minutes after sunrise for wind speeds less than 4.5 meters per second. There were no reported bat or bird strikes during TY 2025.

Figure 4-1 JBCC Groundwater Plume Map



Contaminant of Concern (COC)	Type of Contaminant	Risk-Based Level
TCE = trichloroethene	solvent	MCL = 5 µg/L
PCE = perchloroethene	solvent	MCL = 5 µg/L
CCl_4 = carbon tetrachloride	solvent	MCL = 5 µg/L
EDB = ethylene dibromide	fuel-related compound	MMCL = 0.02 µg/L
benzene	fuel-related compound	MCL = 5 µg/L
VC = vinyl chloride	solvent	MCL = 2 µg/L
1,1,2,2-TeCa = 1,1,2,2-tetrachloroethane	solvent	GW-1 = 2 µg/L
1,4-DCB = 1,4-dichlorobenzene	solvent	MMCL = 5 µg/L
Mn = manganese	metal	EPA Health Advisory = 300 µg/L
thallium	metal	MCL = 2 µg/L
lead	metal	15 µg/L (treatment technique action level for water distribution systems)
toluene	fuel-related compound	MCL = 1,000 µg/L
RDX - hexahydro-1,3,5-trinitro-1,3,5-triazine	explosive	HA = 2 µg/L GW-1 = 1 µg/L 10^{-6} = 0.6 µg/L (IAGWSP); = 0.7 µg/L (IRP)
perchlorate	oxidizer	HA = 15 µg/L MMCL = 2 µg/L
C5-C8 aliphatic hydrocarbons	fuel-related compound	GW-1 = 300 µg/L
C9-C10 aromatic hydrocarbons	fuel-related compound	GW-1 = 200 µg/L
C9-C12 aliphatic hydrocarbons	fuel-related compound	GW-1 = 700 µg/L
C11-C22 aromatic hydrocarbons	fuel-related compound	GW-1 = 200 µg/L
1,2,4-TMB	fuel-related compound	RSL = 56 µg/L
1,3,5-TMB	fuel-related compound	RSL = 60 µg/L
2-methylnaphthalene	fuel-related compound	GW-1 = 10 µg/L
1,4-dioxane	solvent	RG = 0.46 µg/L

Joint Base Cape Cod Groundwater Plume Map, and IRP and IAGWSP LUC Areas

Issued January 2025

Note: MCL – Maximum Contaminant Level
MMCL – Massachusetts Maximum Contaminant Level
HA – Federal Lifetime Health Advisory
PFAS - Per- and Polyfluoroalkyl substances
GW-1 – State default cleanup value to be used in lieu of site-specific risk-based level
10^{-6} – EPA level resulting in an excess cancer risk of one in a million
RG – Site Specific Risk Based Remediation Goal
RSL – Regional Screening Level

The map is available at https://jbcc-iagwsp.org/community/facts/jbcc_plume_map_012125.pdf

4.3 Impact Area Groundwater Study Program Activities

All the IAGWSP sites originate in the Training Area/Reserve, with a few plumes of groundwater contamination extending off-base. The operable units investigated by the IAGWSP include: Demolition Area 1 (Demo 1), Northwest Corner, J-1 Range, J-2 Range, J-3 Range, L Range, Central Impact Area (CIA), Training Areas, Small Arms Ranges, Gun and Mortar Positions (closed), Former K Range (closed), Former A Range (closed) and the Western Boundary (closed). All the IAGWSP's sites have final Decision Documents in place. Decision Documents record the selected response action for each site; explain why it was chosen and how it will be implemented. Significant activities that occurred during TY 2025 included:

Treatment Systems

The IAGWSP operated groundwater treatment systems for plumes associated with Demo 1, J-3 Range, J-2 Range (northern and eastern), the J-1 Range (southern and northern), and the CIA. These systems treat approximately 3.9 million gallons of water per day. Ongoing monitoring of treatment plant operations and groundwater wells is in place to observe changes in the plumes and make certain the selected remedies are working as predicted.

New Monitoring Wells

Six new monitoring wells were added in TY 2025 in support of groundwater investigations at the J-2 Range and J-3 Range sites (Figure 4-2). The J-2 Northern wells (MW-742 and MW-743) and J-3 Range wells (MW-744 through MW-747) will be used to determine if per- and polyfluoroalkyl substances (PFAS) are present in groundwater.

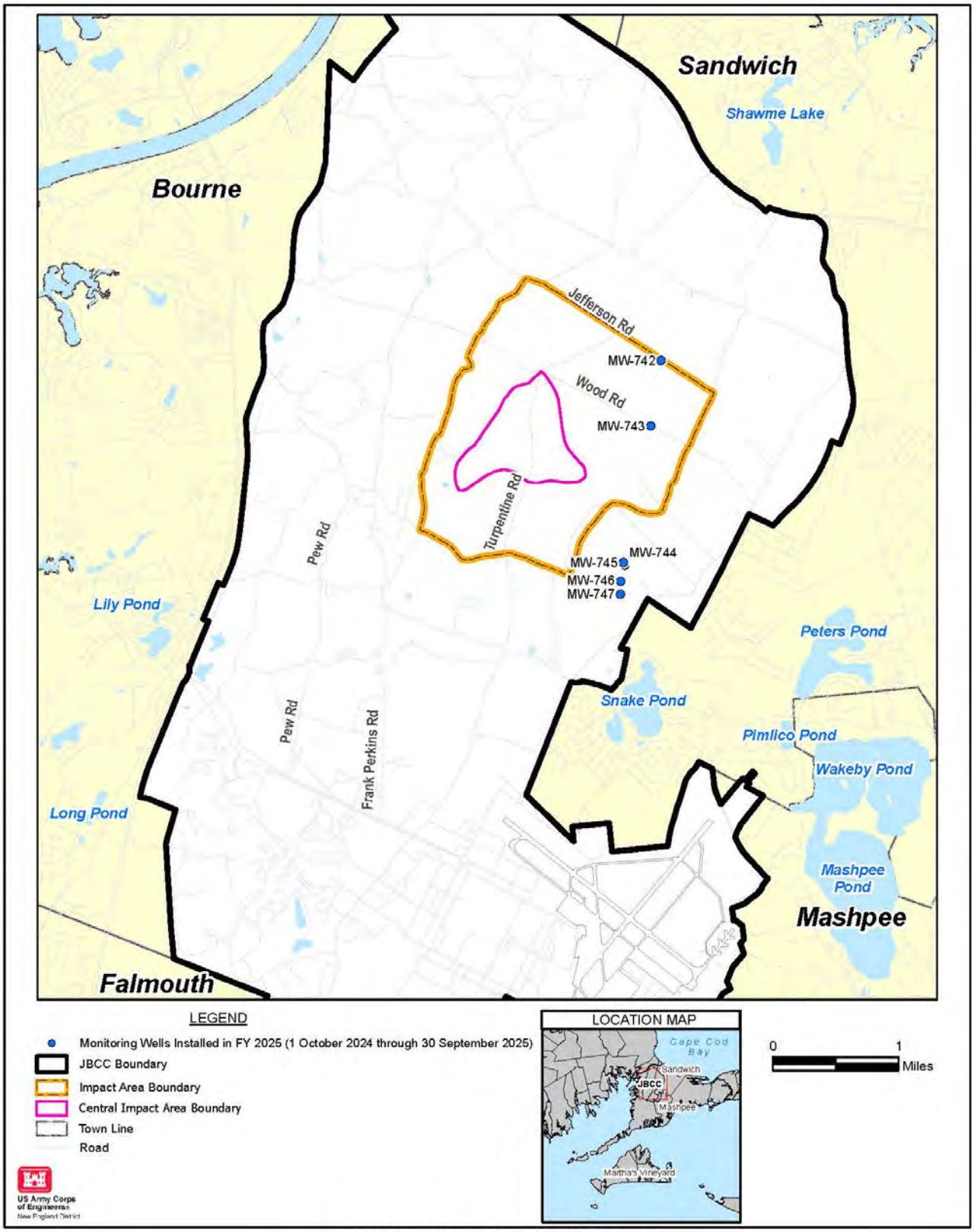
PFAS

The IAGWSP continued to conduct sampling to evaluate whether PFAS are present in the groundwater from sites where former open burning/open detonation (OB/OD) is known to have occurred. While no known releases of PFAS have occurred on Camp Edwards, IAGWSP began analyzing groundwater samples for PFAS in 2019 at OB/OD munitions disposal sites due to the possibility that PFAS-containing aqueous film-forming foam may have been released or used at OB/OD sites, though no aqueous film-forming foam usage is documented. If firefighting foams were used at these sites, they likely would have been used in conjunction with the OB/OD activities and, therefore, any PFAS compounds that were released would have been co-released with other contaminants associated with those activities. Groundwater sampling conducted in TY 2025 was conducted as follow-up to detections from 2024 PFAS sampling. Review of the data is ongoing, and a comprehensive report has been developed for EPA and MassDEP review and approval. The IAGWSP's *Draft Comprehensive PFAS Report, Camp Edwards, Joint Base Cape Cod*, is scheduled to be finalized in 2026.

Central Impact Area Source Removals

The removal of munitions and explosives from the source of the CIA groundwater plume continued. Work on Phase IV Area 4 (approximately 3.195 acres) of the CIA long-term source area response continued in TY 2025. Teams from the Army Corps of Engineers used Metal Mapper, a multi-sensor electromagnetic detection technology, for the removal efforts. This geophysical technology is designed to discriminate between munitions and scrap metal in the subsurface. Use of the Metal Mapper allows the program to increase the efficiency of unexploded ordnance removal while reducing impacts to the surface soil and vegetation when compared to traditional excavation techniques.

Figure 4-2 Monitoring Wells Installed by IAGWSP in TY 2025



Impact Area Groundwater Study Program
Monitoring Wells Installed in FY 2025

FIGURE 1

M : \MMR\2025\NewWells\MXDs\NewWells_2025.aprx
Layout Name: NewWells_100725
Date: 10/7/2025 Author: SAW CHKD: PJR

Impact Area Groundwater Study Program

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Section 5
Miscellaneous Military and Civilian Activities and Environmental Program Priorities

5.0 Miscellaneous Military Activities

5.0.1 Camp Edwards Tours and Community Involvement

In fall 2024, Camp Edwards wrapped up its fourth public tour season, and, along with the other JBCC commanders, leadership conducted their annual update to the selectboards of the Upper Cape towns. The calendar year was punctuated with a JBCC briefing for Lieutenant Governor Kim Driscoll.

In its fifth season, Camp Edwards public tours continue to be the most popular and most impactful outreach initiative. Strategic improvements were made to 2025 tours, including: commencing at the JBCC Welcome Center with an introductory video; concluding at Wheelock Overlook; focusing commentary on the day-to-day realities of Soldier training; and offering the post-tour survey anonymously. Most of the tours were at capacity and had a waiting list of attendees. Approximately 105 members of the community attended the tours this year; over the five years, 535 community members have joined the tours. Along with the general public, tour attendees included: MassDevelopment representation, Town of Sandwich employees, Barnstable County personnel, prospective EMC representatives, and JBCC community members such as staff from MASSTC. For the second year, MassDEP representation was included in the tours.

It has been a longstanding goal of Camp Edwards to connect more with the student population. Training Year 2025 provided opportunities to begin building those connections. In coordination with the IAGWSP, specialized tours were offered to Massachusetts Maritime Academy students, Plymouth 5th graders, and Cape Organization for Rights of the Disabled youth. Extensive planning was conducted to host Latham Centers, but the event had to be delayed until 2026. Additionally, Cub Scout Pack #266 from Suffield, Connecticut, received a guided tour of the Camp Edwards grasslands, explored the JBCC Fire Station, participated in a flag ceremony at the Y-D Memorial, explored Army Humvees, and stayed overnight in the barracks.

Along with welcoming groups on the base, Camp Edwards is always pleased to be invited to present at various community centers. In April, COL Matthew Porter spoke to the Yarmouth Council on Aging. In July, LTC Alexander McDonough briefed both Otis Civilian Advisory Council and the Falmouth Community Veteran's Center about Camp Edwards history and current events.

For the fourth time, Camp Edwards was asked by the Cape Cod Community Leadership Institute to be the kick-off presenter for their learners' day focused on state government, including a visit to the State House in Boston. Cape Cod Community Leadership Institute's mission is to develop and connect a diverse cohort of leaders to foster an engaged, sustainable, and inclusive Cape Cod.

Each year, Camp Edwards receives a few inquiries from citizens, from both near and far, who've traced a loved one's military history to Camp Edwards. Camp Edwards assists them with their family history search and occasionally welcomes them on base to view historic photos and the Y-D Memorial.

The Camp Edwards Training Support Center always does an excellent job supporting the Employer Support of the Guard and Reserve annual tour. Attendees are very engaged with learning about how Soldiers qualify on their weapons and enjoy the opportunity to try the virtual trainer themselves.

Officials from Camp Edwards hosted the command team and soldiers from the 57th Expeditionary Signal Battalion-Enhanced, located in Texas. During the visit, a freshly painted heritage rock commemorating the unit's history at Camp Edwards was unveiled at Overlook Point-1. This location was chosen not only for its scenic view over the forested landscape of the Northern Training Area, but also because that site is currently used for RETRANS training (setup, operation, and maintenance of radio retransmission systems to extend the range of communications) – a nod to the legacy of the unit. Their rock is emblazoned in orange and portrays a bee holding a lightning rod. The 57th's visit, which included a personalized history presentation about their unit's origin here at Camp Edwards in 1941, was highlighted in the June 2025 issue of the Otis Notice. *Photograph courtesy Massachusetts National Guard Public Affairs*

Thanks to three meetings between leadership, Camp Edwards was able to establish communication channels and develop a working relationship with the Mashpee Wampanoag Tribe. A draft of Memorandum of Understanding has been submitted to the National Guard Bureau to cement the relationship and open opportunities for collaboration.

Camp Edwards Community Outreach works in conjunction with the State Public Affairs Office to support all Soldier training events, including annual training, Garrison Commanders Leadership Course, and Air Assault. Camp Edwards was honored to be a presenter at Garrison Commanders Leadership Course, sharing both the successes and struggles of community engagement.

Camp Edwards representation is a constant presence at JBCC public meetings (EMC, Military-Civilian Community Council, Joint Operations Group, Military Community Support Network), always ready and willing to provide updates to the public and to answer any questions/concerns.

The Camp Edwards NRTLP Manager presented at the Fall (October 2024) meeting of the Massachusetts Butterfly Club on "Butterflies of the Barrens: Lepidoptera Conservation at Camp Edwards." The NRTLP manager also gave two talks about bird populations, monitoring efforts, and conservation at Camp Edwards, one for the Avian Knowledge Network and the other for the Falmouth Community Veterans Center. The Natural Resource Program held the 13th year of bird tours in the grasslands of Camp Edwards in 2025 with five walks hosting approximately 20 individuals per tour and held walks for the Massachusetts Butterfly Club and Botanical Club of Cape Cod and

the Islands. Natural Resources and Training Lands Program staff continued partnerships with MassWildlife and regional conservation organizations through several rare flora surveys and outreach efforts and also coordinated with the Native Plant Trust's Plant Conservation Volunteer Program and participated in surveys and seed collection efforts.

Members of the Cape Cod Botanical Club walk up slope from out of a frost bottom at Camp Edwards during a hosted walk in June. *Photograph by Erin Hilley, Natural Resources and Training Lands Program*

5.0.2 National Academy of Sciences

In May 2024, Camp Edwards announced the MAARNG and the US Army planned to collaborate with the National Academy of Sciences to fund an 18-month study focused on the mobility of metals in soils at Camp Edwards. This initiative aims to address environmental concerns and gather insights from subject matter experts in fields like groundwater hydrology, geology, geochemistry, risk assessment, and toxicology. The National Academies of Sciences met for a one-day gathering on October 30, 2024, which brought together selected experts and government officials in fields like groundwater hydrology, geology, geochemistry, risk assessment, and toxicology to examine potential impacts on the aquifer. The recommendation of that meeting was that a consensus study be prepared on Camp Edwards small arms ranges. During TY 2025, the MAARNG secured $1 million in federal funding from National Guard Bureau to support the consensus study. The study will deliver a comprehensive consensus report on Camp Edwards' small arms ranges covering fate and transport of metals, potential migration to groundwater, and effective monitoring and management efforts.

5.1 Joint Base Cape Cod Executive Director

The primary roles of the JBCC Executive Director are to ensure inter-agency communication and coordination are implemented and practiced, and that government and community stakeholders are kept informed. Additionally, the Executive Director is responsible for looking at efficiencies that might be gained through consolidation and cost-sharing of base operations and activities.

The Executive Director serves as the Adjutant General's representative to the Joint Oversight Group that considers items of mutual concern. The Executive Director also is the military co-chair of the JBCC Military-Civilian Community Council, an advisory board formed to provide interaction between community representatives and base officials for timely and consistent notification regarding military mission projects,

policies, and activities of mutual interest. Colonel Matthew Porter was appointed JBCC Executive Director in September 2025.

5.2 Miscellaneous Civilian Activities

5.2.1 Cape Cod Canal Bridges Program

The Massachusetts Department of Transportation (MassDOT) is addressing the Bourne and Sagamore Bridges and improvements to the approach roadway network through the Cape Cod Bridges Program. MassDOT filed the Draft Environmental Impact Statement for the replacement of the Cape Cod Bridges under NEPA in October 2025. Information related to the program may be found at the Cape Cod Bridge Program website.

The Cape Cod Canal Transportation Study, led by MassDOT, covered areas in Bourne and Sandwich and west along Route 25 into Wareham. Some changes detailed in the Cape Cod Canal Transportation Study: Final Report could have potential impacts to JBCC and specifically the Camp Edwards Training Site. The final report is available online.

5.2.2 Cape Cod Canal Pipeline Relocation project

The Cape Cod Canal Pipeline Relocation project will realign Algonquin Gas Transmission's existing pipeline near the Cape Cod Canal to accommodate the Department of Transportation's Cape Cod Canal Bridges Program (see Section 5.2.1 above) while continuing to provide uninterrupted service to National Grid.

There will be approximately 5.25 miles of replacement pipeline to maintain service to National Grid, and approximately 4.26 miles of removed or relocated pipeline to accommodate the Bridges Program activities. Two meter stations will be removed and relocated on the mainland to accommodate the Bridges Program and two new meter stations will be constructed on Cape Cod to maintain service to National Grid.

Part of the pipeline will be constructed and co-located on Eversource's right of way that runs through the Camp Edwards Training Area/ Reserve (Figure 1-2 shows Eversource's easement in the Training Area/Reserve). A new meter station will be located by the PAVE PAWS Access Road in the Training Area/Reserve and another will be located by Route 28 in Bourne near an existing solar panel site.

The Federal Energy Regulatory Commission is the lead agency for the NEPA process (FERC Docket Number PF25-4). Algonquin will complete both the NEPA and the MEPA processes. An Environmental Notification Form was filed with MEPA in April 2025, and a Draft Environmental Impact Report was submitted in January 2026. Algonquin will work with federal and state agencies for consultation and permitting, including the EMC. Algonquin has coordinated with the EMC Environmental Officer to ensure preliminary survey activities follow the EPSs and will coordinate with the EMC Environmental Officer and Camp Edwards as the project moves forward.

More information is available on Enbridge's website.

5.2.3 Barnstable County Composting Initiative

Barnstable County's Cape Cod Cooperative Extension, in partnership with the Upper Cape towns and JBCC, is leading future development of a composting facility on JBCC to divert compostable organics (food waste and wood products) to an on-Cape facility. Currently, towns on the Upper Cape are not well resourced to meet state regulations regarding composting as solid waste diversion for food scraps. Two parcels on JBCC that are not MAARNG managed are under evaluation as potential sites for the facility, which would serve as a proof of concept facility.

The current phase of the project involves logistical and administrative actions, including determining leadership of any divested land, navigating legal and permitting processes, and securing a third-party operator for the facility.

The project has a projected timeline of at least two years for permitting and site design. More information is available on the Barnstable County Cape Cod Cooperative Extension's website.

5.2.4 Cantonment Area Master Planning

Early in TY 2024, MassDevelopment (the Commonwealth's development finance agency and land bank) and others proposed developing public housing on a parcel on JBCC currently held by the Massachusetts Division of Capital Asset Management and Maintenance. That initial plan has developed into a master planning effort for the Cantonment Area of JBCC. The goals of the JBCC Cantonment Area Master Plan are to optimize the use of JBCC and increase organizational efficiency, support current missions, accommodate future needs, and facilitate adaptive re-use of excess property, as appropriate.

In July 2025, VHB, Inc. was selected to develop the master plan working with the Cape Cod Commission and other partners. MassDevelopment has provided updates and presentations about the effort at JBCC Military-Civilian Community Council meetings during TY 2025 and early TY 2026. As it moves forward, the master planning process will include public engagement opportunities such as listening sessions, visioning sessions, and workshops.

More information is available on MassDevelopment's website.

5.3 Environmental Program Priorities

5.3.1 TY 2025 Environmental Program Priorities

The following subsections provide a list of the environmental program priorities established for TY 2025 as published in the TY 2024 Annual Report for its activities associated with the Training Area/Reserve and the status of achieving them.

Natural Resources and ITAM Management

- Continue to develop wildland fire capabilities and capacity through program and personnel development and increasing available fire windows by addressing barriers to fire. Key barriers include qualified planning capacity, aging and inadequate equipment, lack of adequate radio communications, a need for additional crew, greater agency administrative and credentialing requirements, and increased restrictions on potential burn windows. Increasing capacity and implementation of prescribed fire is consistent with the habitat management priorities, supported by long-term monitoring of flora and fauna, and essential to reducing wildfire hazard.
    - Status: TY 2025 was an overall successful year with prescribed fire implementation. Additionally, the Army resilience funding for wildland fire equipment addressed numerous concerns and equipment gaps for the program. However, many significant barriers continue to exist, including the lack of success hiring a fire and fuels specialist, the need for increased investment in wildland fire infrastructure (fuel breaks, equipment storage, etc.), and others. Progress was made as possible, but many of the programmatic barriers are outside the control of the NRTLP.
- Continue to develop partnerships and efforts to address funding gaps for natural resources monitoring and management and training lands management.
    - NRTLP has maintained partnerships well and continue to develop others. However, given everything that has happened over the last year these partnerships have not led to external funding as staffing is significantly reduced, budgets cut, and many/most grant opportunities are unavailable.
- Continue to implement extensive ecosystem resilience efforts, particularly pine barrens restoration, to address ongoing changes and emerging environmental threats. Projects are planned and implemented to enhance ecosystem health and Soldier training together with notable benefit for training opportunities,

rare species, and natural communities with the BP 14/16 project and prescribed fire in the southern half of Camp Edwards being key priorities during TY 2025.

- The key priorities were well met and NRTLP was able to contract a small mechanical restoration project in C-13 along with in-house efforts. Southern pine beetle combined with a severe lack of funding will make this challenging in TY 2026 and beyond, but it is a critical and fundamental effort for the program.

- Continue annual monitoring and survey requirements and habitat maintenance and improvement projects to meet requirements of Conservation and Management Permits.
  - NRTLP is meeting this as well as it can. The moth monitoring program was designed with MassWildlife with the understanding that some years of moth trapping may be missed due to funding or other constraints. It appears that TY 2026 will be a second year missed so hopefully this will be funded in the future to be compliant with the permit. Other efforts have continued by adjusting in-house efforts to ensure coverage and completion.
- Continue annual monitoring and habitat management projects related to ecosystem management and conservation and protection of At-risk, MESA listed, or USFWS priority species that are not directly related to a CMP.
  - As described with various projects and efforts this has continued to the best extent possible given funding constraints. NRTLP continues to monitor the majority of species and habitats and find healthy population of species of conservation concern.
- Continue broad and informative natural resources monitoring and public outreach sharing the results and importance of restoration and management in a globally important Atlantic Coastal Pine Barrens remnant.
  - Public outreach remained a high priority with numerous, positive engagements and continued expansion of efforts.

Cultural Resources Management

- Conduct applicable reviews of all IAGWSP, IRP and MAARNG proposed activities in the Training Area/Reserve for potential cultural resources impacts. (Ongoing)
- Document any new occurrences of identified cultural resources. (Ongoing)

Other E&RC Environmental Management Programs

- Coordinate required soil, lysimeter and groundwater sampling at operational active small arms ranges in accordance with approved range management plans. (Accomplished)
- Provide appropriate support to Camp Edwards for small arms range development. (Accomplished)
- Continue to support Camp Edwards through the environmental process for proposed training venues in the Training Area/Reserve. (Accomplished)
- Provide support as needed to the JBCC Executive Director Office with regards to community involvement and environmental and training issues. (Accomplished)
- Attend all scheduled EMC, CAC and SAC meetings, both internally and externally, that may involve activities within and surrounding the Training Area/Reserve. (Accomplished)
- Provide information on environmental program activities regarding the Training Area/Reserve. (Accomplished)
- Work closely with Camp Edwards, the NRTLP, and the EMC to ensure training is compatible with the EPSs. (Accomplished)
- Provide support for the EMC and its advisory councils as required in Chapter 47. (Accomplished)
- Publish the final TY 2024 State of the Reservation Report. (Accomplished)

5.3.2 TY 2026 Environmental Program Priorities

The following subsections provide a list of environmental program priorities for Camp Edwards for activities associated with the Training Area/Reserve in TY 2026. Natural Resources and Training Lands Program priorities for TY 2026 are largely the same, carried over from previous years within a well-established program.

Natural Resources and ITAM Management

Training Year 2026 is forecast to have no project funding for Natural Resources and minimal funding for ITAM. All efforts will have to be completed with in-house staff and prioritization based on requirements and ability.

- A dominant effort is finalizing management plan updates including the 5-year update of the INRMP (on schedule; anticipated completion December 2026), the Integrated Wildland Fire Management Plan, and Integrated Pest Management Plan.
- Southern Pine Beetle is a sudden and highly significant emerging threat and impact on Cape Cod. Surveys, planning, and treatments will be a priority along with developing a regional partnership for effective communication and action.
- The NRTLP will be continuing to advocate and inform for smart planning for the Cantonment area and other potential development plans and encroachment effects that could impair military training and conservation efforts at Camp Edwards.
- The NRTLP will prioritize and implement the majority of our typical ongoing actions for monitoring and habitat management to the greatest extent possible with our in-house team.

Cultural Resources Management

- Conduct applicable reviews of all IAGWSP, IRP and MAARNG proposed activities in the Training Area/Reserve for potential cultural resources impacts.
- Document any new occurrences of identified cultural resources.

Other E&RC Environmental Management Programs

- Coordinate required soil, lysimeter and groundwater sampling at operational active small arms ranges in accordance with approved range management plans.
- Coordinate with Camp Edwards and the EMC's Environmental Officer to revise the OMMP to consolidate the individual, range-specific OMMPs into one document, an Integrated OMMP.
- Provide support to Camp Edwards and coordinate with the EMC's Environmental Officer to modify the EPSs and revise EPS 15.3.3 to allow refueling in the Training Area/Reserve with certain conditions.
- Provide support to Camp Edwards to update the Camp Edwards Approved Munitions List.
- Support Camp Edwards as it works with the National Academy of Sciences' consensus study on Camp Edwards small arms ranges.
- Provide appropriate support to Camp Edwards for small arms range development.
- Continue to support Camp Edwards through the environmental process for proposed training venues in the Training Area/Reserve.
- Provide support as needed to the JBCC Executive Director Office with regards to community involvement and environmental and training issues.
- Attend all scheduled EMC, CAC and SAC meetings, both internally and externally, that may involve activities within and surrounding the Training Area/Reserve.
- Provide information on environmental program activities regarding the Training Area/Reserve.
- Work closely with Camp Edwards, the Natural Resources Office, and the EMC to ensure training is compatible with the EPSs.
- Provide support for the EMC and its advisory councils as required in Chapter 47.
- Publish the final TY 2025 State of the Reservation Report.

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Appendix A
List of Contacts

List of Contacts

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Appendix B
Environmental Performance Standards as Amended on April 6, 2017

ENVIRONMENTAL PERFORMANCE STANDARDS
APRIL 6, 2017

For Massachusetts National Guard Properties at the Massachusetts Military Reservation

CAMP EDWARDS TRAINING AREA GENERAL PERFORMANCE STANDARDS

None of the following banned military training activities shall be allowed in the Camp Edwards Training Areas:
-Artillery live fire
-Mortar live fire
-Demolition live fire training
-Artillery bag burning
-Non-approved digging, deforestation or vegetation clearing
-Use of' 'CS', riot control, or tear gas for training outside the NBC bunkers
-Use of field latrines with open bottoms
-Vehicle refueling outside designated Combat Service Area and Fuel Pad locations
-Field maintenance of vehicles above operator level

Limitations on the use of small arms ammunition and live weapon fire fall into the following two categories:

- Live weapon fire is prohibited outside of established small arms ranges. Live weapon fire is not allowed on established small arms ranges except in accordance with Environmental Performance Standard 19, other applicable Performance Standards, and a range-specific plan approved through the Environmental Management Commission (EMC).

- Blank ammunition for small arms and simulated munitions may be used in areas outside of the small arms ranges, using only blank ammunition and simulated munitions identified on an approved list of munitions. Joint review and approval for inclusion on the list shall be through by the Environmental & Readiness Center (E&RC) and the EMC.

Each user will be responsible for proper collection, management, and disposal of the wastes they generate, as well for reporting on those actions.

Use and application of hazardous materials or disposal of hazardous waste shall be prohibited except as described in the Groundwater Protection Policy.

Vehicles are only authorized to use the existing network of improved and unimproved roads, road shoulders, ranges and bivouac areas, except where necessary for land rehabilitation and management, water supply development, and remediation, or where roads are closed for land rehabilitation and management.

Protection and management of the groundwater resources in the Camp Edwards Training Area will focus on the following:

- Development of public and Massachusetts Military Reservation water supplies.
- Preservation and improvement of water quality and quantity (recharge).
- Activities compatible with the need to preserve and develop the groundwater resources.

All users of the Camp Edwards Training Area must comply with the provisions of the Groundwater Protection Policy and any future amendments or revisions to the restrictions and requirements. These will apply to all uses and activities within the overlays relative to Wellhead Protection, Zone II's within the Cantonment Area, and the Camp Edwards Training Areas.

Development of water supplies will be permitted within the Camp Edwards Training Area after review and approval by the managing agencies, principally the Department of the Army and its divisions, together with the Massachusetts Department of Environmental Protection, and the Massachusetts Division of Fish and Wildlife.

All phases of remediation activities will be permitted within the Camp Edwards Training Area after review and approval by the managing agencies, principally the Department of the Army and its divisions, together with the federal and state agencies who will have jurisdiction for remediation.

Pollution prevention and management of the Camp Edwards training ranges will focus on and include the following:

The Camp Edwards Training Area, including the Small Arms Ranges (SAR) and their associated "Surface Danger Zones," and any areas where small arms or other munitions or simulated munitions are used, shall be managed as part of a unique water supply area under an adaptive management program that integrates pollution prevention, and best management practices (BMP), including the recovery of projectiles. This will be done through individual range-specific plans that are written by the Massachusetts National Guard and approved for implementation through the EMC and any other regulatory agency having statutory and/or regulatory oversight. Adaptive, in this context, means making decisions as part of a continual process of monitoring, reviewing collected data, evaluating advances in range monitoring, design and technology, and responding with management actions as dictated by the resulting information and needs of protecting the environment while providing compatible military training within the Upper Cape Water Supply Reserve.

A range plan shall be designed and followed to reduce the potential for an unintended release to the environment outside of the established containment system(s) identified in the range-specific plans. All users must be aware of, and comply with, the Environmental Performance Standards that are applicable to all SAR activities. Any range specific requirements will be coordinated through the E&RC with the EMC, incorporating those specific requirements into the appropriate range-specific plans and range information packets. Camp Edwards SAR Pollution Prevention Plan shall be followed to prevent or minimize releases of metals or other compounds related to the normal and approved operation of each SAR. The adaptive SAR management program components required in each range-specific plan shall include:

- Consultation with applicable agencies with oversight of the training area before undertaking any actions that are subject to state and/or federal regulatory requirements.
- Specific recovery plans for the removal and proper disposition of spent projectiles, residues and solid waste associated with the weapons, ammunition, target systems, and/or their operation and maintenance.
- Reduction of adverse impacts to the maximum extent feasible, including consideration for the design/redesign and/or relocation of the activity or encouraging only those activities that result in meeting the goal of overall projectile and/or projectile constituent containment.
- Internal and external coordination of documentation for the Camp Edwards range management programs and other related Camp Edwards management programs including: the Integrated Training Area Management Program, Range Regulations, Camp Edwards Environmental Management System, Civilian Use Manual, and Standard Operating Procedures.
- Long-term range maintenance, monitoring and reporting of applicable parameters and analysis.

The Massachusetts National Guard shall ensure that all training areas where munitions or simulated munitions are used or come to be located, including range areas, range surface danger zones, and any other areas within the Upper Cape Water Supply Reserve that are operational ranges are maintained and monitored following approved management plans that include planning for pollution prevention, sustainable range use and where applicable, restoration.

Protection and management of the vegetation of the Camp Edwards Training Area for focus on the following:

- Preservation of the habitat for federal- and state-listed rare species and other wildlife.
- Preservation of the wetland resource areas.
- Activities compatible with the need to manage and preserve the vegetative resources.
- Realistic field training needs.
- Identification and restoration of areas impacted by training activities.

Goals for the Adaptive Ecosystem Management approach to management of the Camp Edwards properties will be as follows:

- Management of the groundwater for drinking water resources
- Conservation of endangered species.
- Management of endangered species habitat for continuation of the species.
- Ensuring compatible military training activities.
- Allowing for compatible civilian use.
- Identification and restoration of areas impacted by training activities.

The Environmental Performance Standards will be incorporated into the programs and regulations of the Massachusetts National Guard as follows. Those standards relating to natural resources management shall be incorporated as standards into each of the state and federal environmental management programs and attached as an appendix or written into the documentation accompanying the plan or program. All the Environmental Performance Standards will be attached to the Integrated Training Area Management Plan 'Trainer's Guide' and to the Camp Edwards Range Regulations. Modification of the Standards Operating Procedures will include review and conformance with the Environmental Performance Standards for trainers and soldiers at Camp Edwards.

SPECIFIC RESOURCE PERFORMANCE STANDARDS IN THE CAMP EDWARDS TRAINING AREA

1. Groundwater Resources Performance Standards

1.1. All actions, at any location within the Camp Edwards Training Areas, must preserve and maintain groundwater quality and quantity, and protect the recharge areas to existing and potential water supply wells. All areas within Camp Edwards Training Areas will be managed as State Zone U, and, where designated, Zone I, water supply areas.

1.2 The following standards shall apply to designated Wellhead Protection Areas:

- The 400-foot radius around approved public water supply wells will be protected from all access with signage. That protection will be maintained by the owner and/or operator of the well, or the leaseholder of the property.
- No new stormwater discharges may be directed into Zone I areas.
- No in ground septic system will be permitted within a Zone I area.
- No solid wastes may be generated or held within Zone I areas except as incidental to the construction, operation, and management of a well.
- Travel in Zone I areas will be limited to foot travel or to vehicles required for construction, operation, and maintenance of wells.
- No new or existing bivouac activity or area shall be located within a Zone I area.
- All other areas will be considered as Zone II designated areas and will be subject to the standards of the Groundwater Protection Policy.

1.3 Land-use activities that do not comply with either the state Wellhead Protection regulations (310 CMR 22.00 et seq.) or the Groundwater protection Policy are prohibited.

1.4 All activities will support and not interfere with either the Impact Area Groundwater Study and/or the Installation Restoration Program. All activities shall conform to the requirements of Comprehensive Environmental Response, Compensation and Liability Act, the Massachusetts Contingency Plan, and the Safe Drinking Water Act.

1.5 Extraction, use, and transfer of the groundwater resources must not de- grade [e.g. draw down surface waters] in freshwater ponds, vernal pools, wetlands, and marine waters, unless properly reviewed, mitigated, and approved by the managing and regulating agencies.

1.6 Land uses and activities in the Camp Edwards Training Areas will meet the following standards:

- Will conform to all existing and applicable federal, state and local regulations.
- Must be able to be implemented without interference with ongoing remediation projects.

- Allow regional access to the water supplies on the Massachusetts Military Reservation.

1.7 The following programs and standards will be used as the basis for protecting groundwater resources in the Camp Edwards Training Areas:

- Groundwater Protection Policy.
- Federal and Department of Defense environmental programs: Integrated Natural Resources Management Plan, Integrated Training Area Management Program, Range Regulations, Spill Prevention Control and Countermeasures Plan (or equivalent), Installation Restoration *Plan*, Impact Area Groundwater Study, or other remediation programs.
- State and federal laws and regulations pertaining to water supply.

2. Wetlands and Surface Water Performance Standards

2.1 Since there are relatively few wetland resources found at the Massachusetts Military Reservation, and since they are important to the support of habitat and water quality on the properties, the minimum standard will be no net loss of any of the wetland resources or their 100-foot buffers.

2.2 Land uses and activities will be managed to prevent and mitigate new adverse impacts and eliminate or reduce existing conditions adverse to wetlands and surface water resource areas. Impacts from remediation activities may be acceptable with implementation of reasonable alternatives.

2.3 Wetland area management priorities:

- Protection of existing; wetland resource areas for their contributions to existing and potential drinking water supplies.
- Protection of wetlands for rare species and their habitats.
- Protection of human health and safety.

2.4. Activities will be managed to preserve and protect wetlands and vernal pools as defined by applicable, federal, state, and local regulations. These activities will include replacement or replication of all wetland resource buffer areas, which are lost after completion of an activity or use.

2.5 All land altering activities within 100 feet of a certified vernal pool must be reviewed before commencement by the Massachusetts Department of Environmental Protection/Wetlands Unit and the Natural Heritage and Endangered Species Program within the Division of Fish and Wildlife for impacts to wildlife and habitat. The certification of vernal pools will be supported by the on site personnel and will proceed with the assistance of the appropriate state agencies.

2.6 All new uses or activities will be prohibited within the wetlands and their 100-foot buffers, except those associated with an approved habitat enhancement or restoration program; those on existing improved and unimproved roads where appropriate sediment and erosion controls are put in place prior to the activity; or those where no practicable alternative to the proposed action is available. No new roads should be located within the 100-foot buffers. Existing roads within such buffers should be relocated provided that:

- The relocation does not cause greater environmental impact to other resources.
- There are funds and resources allocated for resource management and that those resources are approved and available for the relocation.

2.7 During the period of 15 February to 15 May, listed roads/trails within 500 feet of wetlands will be closed to vehicle access to protect the migration and breeding of amphibians. Emergency response and environmental management activities will not be restricted.

- Donnelly and Little Halfway Ponds maneuver trails (excluding the permanently closed section along the eastern edge of Donnelly Pond) from Frank Perkins Road north to Wood Road
- Red Maple Swamp trail from Wood Road north and east to Avery Road

- Orchard and Jefferson Roads (continuous) from Cat Road south and east to Burgoyne Road
- Maneuver trail(s) in powerline easement north of Gibbs Road from Goat Pasture Road west to the boundary of training areas C-13 and C-14
- Grassy Pond trail (side access to Sierra Range) from Gibbs Road south to Sierra Range
- Sandwich Road from the powerline easement north to the gas pipeline right of way
- Bypass Bog/Mike Range Road from entrance to Mike Range south and west to Greenway Road

2.8 No new bivouac area shall be located within 500 feet of any wetland. Any existing bivouac within a wetland buffer shall be relocated provided there are funds and resources allocated for the relocation.

3. Rare Species Performance Standards

3.1 As the Natural Heritage and Endangered Species Program of the Massachusetts Division of Fisheries & Wildlife has identified the entire Massachusetts Military Reservation as State Priority Habitat for state-listed species (version dated 2000-2001), all activities and uses must comply with the Massachusetts Endangered Species Act and its regulations.

3.2 Where activities and uses are not specifically regulated under the Camp Edwards Training Area Range and Environmental Regulations, including these Environmental Performance Standards, the MMR Environmental and Readiness Center must review the activities for conformance with the Integrated Natural Resource Management Plan, and shall- consult with the Natural Heritage and Endangered Species Program regarding potential impacts to state-listed species.

3.3 All activities impacting rare species habitat must be designed to preserve or enhance that habitat as determined by the MMR Environmental and Readiness Center in consultation with the Natural Heritage and Endangered Species Program.

3.4 Users are prohibited from interfering with state and federal listed species.

3.5 Users will report all sightings of recognized listed species, e.g. box turtles, within any area of the Massachusetts Military Reservation.

4. Soil Conservation Performance Standards

4.1 Activities and uses must be compatible with the limitations of the underlying soils. Limitations on uses and activities may be made where the soils or soil conditions would not support the activity.

4.2 Agricultural soil types will be preserved for future use.

4.3 Any perennial or intermittent stream identified by the Environmental & Readiness Center Office will be protected from siltation by retaining undisturbed vegetative buffers to the extent feasible.

4.4 Cultural resource evaluations must be completed before any earth-moving operation may take place in undisturbed areas with high potential for cultural resources, and earth moving may be limited to specific areas (See Cultural Resource Performance Standards).

4.5 An erosion control analysis will be made part of the land management programs (Integrated Natural Resource Management Plan, the Integrated Training Area Management Program, Range Regulations, Civilian Use, and Standard Operating Procedures) for the Camp Edwards Training Area, including appropriate mitigation measures where existing or potential erosion problems are identified.

4.6 For all improved and unimproved roads, ditches and drainage ways:

- All unimproved roads, ditches, roads and drainage ways identified for maintenance will be cleaned of logs, slash and debris.

- Unimproved roads and roads may not otherwise be improved unless approved for modification.
- Any trail, ditch, road, or drainage way damaged by activities will be repaired in accordance with the hazard and impact it creates.

4.7 Erosion-prone sites will be inspected periodically to identify damage and mitigation measures.

5. Vegetation Management Performance Standards

5.1 All planning and management activities impacting vegetation

- Will ensure the maintenance of native plant communities, and
- Shall be performed to maintain the biological diversity.

5.2 Revegetation of disturbed sites will be achieved by natural and artificial recolonization by native species.

5.3 Timber harvesting or clear-cutting of forested areas should not occur on steep slopes with unstable soils or with in the buffers to wetland resources.

5.4 Vegetation management will be subject to a forest management and fire protection program prepared by the users in accordance with federal standards, and carried out in a manner acceptable to the Massachusetts Military Reservation Committee and other state agencies or commissions, as may be designated by the Commonwealth of Massachusetts.

6. Habitat Management Performance Standards

6.l The Camp Edwards Training Area will be managed as a unique rare species and wildlife habitat area under an adaptive ecosystem management program that integrates ecological, socio-economic, and institutional perspectives, and which operates under the following definitions:

- Adaptive means making decisions as part of a continual process of monitoring, reviewing collected data, and responding with management actions as dictated by the resulting information and needs of the system.
- Ecosystem means a system-wide understanding of the arrangements of living and non-living things, and the forces that act upon and within the system.
- Management entails a multi-disciplinary approach where potentially competing interests are resolved with expert analysis, user and local interest considerations, and a commitment to compromise interests when the broader goal is achieved to manage the Camp Edwards Training Area as a unique wildlife habitat area.

6.2 The adaptive ecosystem management program will include:

- Coordinated documentation for the management programs, Integrated Natural Resource Management Plan, the Integrated Training Area Management Program, Range Regulations, Civilian Use, and Standard Operating Procedures.
- The Massachusetts National Guard Environmental and Readiness Center staff and necessary funding to support its ecosystem management plans, as related to the amount of training occurring.
- Cooperative agreements to create a management team of scientific and regulatory experts.
- Long-term land maintenance, monitoring of resources and trends, study and analysis.
- Recovery plans for species and habitats identified for improvement.
- Consultation with Federal and State agencies charged with oversight of the Endangered Species Program before any actions that may affect state and federal-listed species habitat.
- Reduction of adverse impacts to the maximum extent possible, including consideration for the relocation of the activity or encouraging only those activities that result in meeting a habitat management goal.
- Habitat management activities designed to promote protection and restoration of native habitat types.

7. Wildlife Management Performance Standards

7.1 Native wildlife habitats and ecosystems management will focus on the following:

- Protecting rare and endangered species, and,
- Maintaining biodiversity.

7.2 Hunting, recreation and educational trips must be approved, scheduled, planned, and supervised through Range Control.

7.3 Any activity or use will prioritize protection of life, property, and natural resource values at the boundaries of the Camp Edwards Training Area where wildlife interfaces with the surrounding built environment.

7.4 Wildlife management will include the following actions, specific to the species targeted for management:

- Development and implementation of a plan to monitor hunting of game species.
- Planning for multi-use objectives for recreation and hunting that incorporate public input and recommendations.
- Development of suitable monitoring programs for federal and state-listed species, and regular exchange of information with the Natural Heritage and Endangered Species Program.

8. Air Quality Performance Standard

8.1 All uses and activities will be responsible for compliance with both the State Implementation Plan for Air Quality and the Federal Clean Air Act.

8.2 Air quality management activities will include air sampling if required by regulation of the activity.

9. Noise Management Performance Standards

9.1 Noise management activities shall conform to the Army's Environmental Noise Management Program policies for evaluation, assessment, monitoring, and response procedures.

10. Pest Management Performance Standards

10.1 Each user will develop and implement an Integrated Pest Management Program to control pest infestations that may include outside contracting of services. Non-native biological controls should not be considered unless approved by federal and state agencies.

10.2 Each user will be held responsible for management of pests that threaten rare and endangered species, or are exotic and invasive species, Invasive plant species that may be considered pest species are those defined by the United States Fish and Wildlife Service and the Massachusetts Natural Heritage and Endangered Species Program of the Division of Fisheries and Wildlife office. Site-specific analysis will be performed before implementation of any proposed pest management plans.

10.3 Pest vegetation control must be balanced against environmental impact and any proposed pest management activities, including the use of herbicides and mechanical methods, within rare species habitat areas must be approved by the Natural Heritage and Endangered Species Program, or in the case of federally listed species, by the United States Fish and Wildlife Service.

10.4 Only herbicide formulations approved by the United States Environmental Protection Agency, the Department of Agriculture, the agency managing the user, and the Commonwealth of Massachusetts may be applied.

10.5 Herbicides and pesticides will not be applied by aerial spraying unless required by emergency conditions and approved under applicable state and federal regulations.

11. Fire Management Performance Standards

11.1 All activities and uses shall manage, prevent, detect, and suppress fires on the Camp Edwards Training Area in coordination with the local and state fire services and natural resource managers in the Environmental & Readiness Center.

11.2 Prescribed burns will be used as a habitat management and fire prevention tool. Prescribed burns will be used to reduce natural fire potential and create or maintain diverse and rare species habitat.

11 .3 Pre-suppression activities will include strategic firebreaks and other management of vegetation in high risk and high-incidence areas. The Integrated Natural Resource Management Plan and Fire Management Plan will be consulted for proposed actions.

11.4 Other than the above, no open fires are allowed.

12. Stormwater Management Performance Standards

12.1 All stormwater facilities shall comply with the State Department of Environmental Protection Guidelines for Stormwater Management, including Best Management Practices and all other applicable standards for control and mitigation of increased storm water flow rates and improvement of water quality.

12.2 All increases in stormwater runoff will be controlled within the user's property.

12.3 No new stormwater discharges will be made directly into wetlands or wetland resource areas.

13. Wastewater Performance Standards

13.1 All wastewater and sewage disposal will be in conformance with the applicable Federal and Massachusetts Department of Environmental Protection agency regulations.

14. Solid Waste Performance Standards

14.1 All solid waste streams (i.e., wastes not meeting the criteria for hazardous wastes) will be monitored and managed to substitute, reduce, recycle, modify processes, implement best management practices, and/or reuse waste, thereby reducing the total tonnage of wastes,

14.2 All users will be held responsible for collection, removal and disposal outside of the Camp Edwards Training Areas of solid wastes generated by their activities.

14.3 All users must handle solid wastes using best management practices to minimize nuisance odors, windblown litter, and attraction of vectors.

14.4 No permanent disposal of solid waste within the Groundwater protection Policy area/Camp Edwards field training areas will be permitted.

15. Hazardous Materials Performance Standards

15.1 Where they are permitted, use and application of hazardous materials shall be otherwise minimized in accordance with pollution prevention and waste minimization practices, including material substitution.

15 .2 No permanent disposal of hazardous wastes within the Groundwater protection Policy area/Camp Edwards field training areas will be permitted.

15.3 Fuel Management

> 15.3.1 Spill Prevention, Control, and Countermeasure Plan, is in place to reduce potential for a release. Camp Edwards Spill Response Plan is in place to respond to a release if an event should occur. All users will comply with these plans at the Camp Edwards Training Area.

15.3.2 If found, non-complying underground fuel storage tanks will be removed in accordance with state and federal laws and regulations to include remediation of contaminated soil.

15 .3.3 No storage or movement of fuels for supporting field activities, other than in vehicle fuel tanks, will be permitted except in approved containers no greater than five gallons in capacity.

15.3.4 New storage tanks are prohibited unless they meet the following requirements:

- Are approved for maintenance heating, or, permanent emergency generators and limited to propane or natural gas fuels.
- Conform to the Groundwater Protection Policy and applicable codes.

15.4 Non-fuel Hazardous Material Storage

15.4 .1 No storage above those quantities necessary to support field training activities will be allowed within the Camp Edwards Training Area except where necessary to meet regulatory requirements, and where provided with secondary containment.

15.4.2 When required by applicable regulation, the user shall implement a Spill Prevention, Control and Containment/Emergency Response or other applicable response plan.

16. Hazardous Waste Performance Standards

16.1 All uses shall comply with applicable local, state, and federal regulations governing hazardous waste generation, management, and disposal (including overlays relative to Wellhead Protection, Zone II' s within the Cantonment Area) .

16.2 Accumulations of hazardous waste shall be handled in accordance with regulations governing accumulation and storage.

16.3 Existing facilities must implement pollution prevention and waste minimization procedures (process modifications, material substitution, recycling, and best management practices) to minimize waste generation and hazardous materials use.

16.4 Occupants and users will be held responsible for removing all solid or hazardous wastes generated during the period of use/tenancy/visitation upon their departure or in accordance with other applicable or relevant regulations.

16.5 Remedial activities undertaken under the Installation Restoration Program, the Impact Area Groundwater Study Program, the Massachusetts Contingency Plan, or other governing remediation programs are exempt from additional regulation (e.g., waste generation volume limits). Removal, storage, and disposal of contaminated material are required to comply with all state, and federal regulations.

16.6 Post-remedial uses and activities at previously impacted sites will be allowed in accordance with terms and conditions of the applicable regulations.

16.7 All hazardous wastes will be transported in accordance with federal Department of Transportation regulations governing shipment of these materials.

16.8 Transport shall reduce the number of trips for transfer and pick-up of hazardous wastes for disposal to extent feasible. This may include planning appropriate routes that minimize proximity to sensitive natural resource areas, and reducing internal transfers of material, including transfers from bulk storage tanks to drums, tankers, carboys, or other portable containers or quantities.

16.9 No permanent disposal of hazardous wastes within the Groundwater Protection Policy area/Camp Edwards field training areas will be permitted.

17. Vehicle Performance Standards

17.1 Vehicles within the Camp Edwards Training Area will be limited to the existing improved and unimproved road system except where required for natural resource management or property maintenance or where off-road activity areas are located and approved by the Environmental and Readiness Center in consultation with the Massachusetts Division of Fisheries and Wildlife.

17.2 Unimproved, established access ways will be limited to use by vehicles in accordance with soil conditions as described in the Soil Conservation Performance Standards.

17.3 The number of military and civilian vehicles within the Camp Edwards Training Area will be controlled using appropriate scheduling and signage.

18. General Use and Access Performance Standards

18.1 General User Requirements. Requirements that will apply to all users, both public and private, in the Camp Edwards Training Area include the following:

- All acts that pollute the groundwater supply are prohibited.
- No litter or refuse of any sort may be thrown or left in or on any property.
- All users will be held responsible for providing, maintaining, and re- moving closed-system, sanitary facilities necessary for their use and activity.
- No person shall wade or swim in any water body except for activities approved by the Massachusetts National Guard including remediation, scientific study, or research.
- Vehicles may only be driven on roads authorized and designated for such use and parked in designated areas, and may not cross any designated wetland.
- Public users may not impede the military training activities.

18.2. Civilian Use Manual. To guide public conduct on the Massachusetts Military Reservation, a Civilian Use Manual will be prepared and periodically updated. All civilian users will obtain and follow this Manual.

18.3. Siting and Design Performance Standards

18.3.1 New or expanded buildings should not be proposed within the Camp Edwards Training Areas, with the following exceptions:

- Buildings to support allowed training, operations and activities, including upgrading of those facilities currently in place,
- Buildings used for the purposes of remediation activities,
- Buildings used for the purposes of development, operation and maintenance of water supplies,
- Buildings used for the purpose of natural resource and land management.

19. Range Performance Standards

19.1. All operational ranges including but not limited to small arms ranges (SAR) shall be managed to minimize harmful impacts to the environment within the Upper Cape Water Supply Reserve. Range management at each range shall include to the maximum extent practicable metal recovery and recycling, prevention of fragmentation and ricochets, and prevention of sub-surface percolation of residue associated with the range operations. Camp Edwards shall be held responsible for the implementation of BMPs by authorized range users, including collection and removal of spent ammunition and associated debris.

19.2. Small arms ranges shall only be used in accordance with approved range plans. These plans shall be designed to minimize to the maximum extent practicable the release of metals or other contaminates to the environment outside of specifically approved containment areas/systems. Occasional ricochets that result in rounds landing outside of these

containment areas is expected and every effort to minimize and correct these occurrences shall be taken. Failure to follow the approved range plans shall be considered a violation of this EPS.

19.3. All operational SARs shall be closely monitored by the Massachusetts National Guard to assess compliance of the approved range plans as well as the implementation and effectiveness of the range specific BMPs.

19.4. Camp Edwards/Massachusetts National Guard Environmental and Readiness Center shall staff and request appropriate funding to support its SAR management plans.

19.5. All users must use and follow Camp Edwards' Range Control checklists and procedures to:

- Minimize debris on the range (e.g. shell casings, used targets)
- Minimize or control residues on the ranges resulting from training (e.g., unburned constituents, metal shavings from the muzzle blast)
- Ensure the range is being used for the designated purpose in accordance with all applicable plans and approvals

19.6. Camp Edwards is responsible for following range operation procedures and maintaining range pollution prevention systems. Range BMPs shall be reviewed annually for effectiveness and potential improvements in their design, monitoring, maintenance, and operational procedures in an effort to continually improve them. Each year the annual report shall detail the range-specific activities including, but not limited to, the number of rounds fired, number of shooters and their organization, and the number of days the range was in use. The annual report will also detail active SAR groundwater well and lysimeter results, as well as any range maintenance/management activities that took place that training year and the result of such activities, i.e. lbs. of brass and projectiles recovered and recycled, etc. The Massachusetts National Guard shall provide regular and unrestricted access for the EMC to all its data and information, and will provide immediate access to environmental samples from the range, including range management and monitoring systems and any other applicable activities operating on the ranges.

19.7. Range plans and BMPs for training areas shall be reviewed and/or updated at least every three years. Management plans for new and upgraded ranges shall be in place prior to construction or utilization of the range. Range plans, at a minimum, will address long-term sustainable use, hydrology and hydrogeology, physical design, operation, management procedures, record keeping, pollution prevention, maintenance, monitoring, and applicable technologies to ensure sustainable range management. Range plans shall be integrated with other training area planning processes and resources.

19.8. The Massachusetts National Guard shall establish procedures for range maintenance and where applicable, maintenance and/or clearance operations to permit the sustainable, compatible, and safe use of operational ranges for their intended purpose within the Upper Cape Water Supply Reserve. In determining the frequency and degree of range maintenance and clearance operations, the Massachusetts National Guard shall consider, at a minimum, the environmental impact and safety hazards, each range's intended use, lease requirements, and the quantities and types of munitions or simulated munitions expended on that range.

Appendix C
Small arms Range and Soldier Validation Lane Information

Operations Maintenance and Monitoring Activities

Operations, Maintenance & Monitoring Activities
Echo Range
TY 2025

Date	*Activity*
18, 19 Oct 24	Pre/Post-Firing Inspection
25, 27 oct 24	Pre/Post-Firing Inspection
6 Nov 24	Detailed Inspection
6 Dec 24	Detailed Inspection
15 Jan 25	Detailed Inspection
11 Feb 25	Detailed Inspection
1 Mar 25	Pre/Post-Firing Inspection
7, 8 Mar 25	Pre/Post-Firing Inspection
26 Mar 25	Pre/Post-Firing Inspection
4, 5 Apr 25	Pre/Post-Firing Inspection
11, 12 Apr 25	Pre/Post-Firing Inspection
9 May 25	Pre/Post-Firing Inspection
3, 5 Jun 25	Pre/Post-Firing Inspection
6, 7 Jun 25	Pre/Post-Firing Inspection
20, 21 Jun 25	Pre/Post-Firing Inspection
27 Jun 25	Pre/Post-Firing Inspection
17 Jul 25	Pre/Post-Firing Inspection
18 Jul 25	Pre/Post-Firing Inspection
1, 2 Aug 25	Pre/Post-Firing Inspection
8 Aug 25	Pre/Post-Firing Inspection
15 Aug 25	Pre/Post-Firing Inspection
27 Aug 25	Pre/Post-Firing Inspection
9 Sep 25	Pre/Post-Firing Inspection
12 Sep 25	Pre/Post-Firing Inspection
19, 20 Sep 25	Pre/Post-Firing Inspection

Operations, Maintenance & Monitoring Activities
India Range
TY 2025

Date	*Activity*
4 Oct 24	Maintenance
22 Oct 24	Berm Maintenance
6 Nov 24	Monthly Inspection
17 Dec 24	Monthly Inspection
31 Jan 25	EMC Inspection
25 Feb 25	Monthly Inspection
5 Mar 25	Monthly Inspection
9 Apr 25	Pre/Post-Firing Inspection
9 May 25	Monthly Inspection
17 Jun 25	Monthly Inspection
15 Jul 25	Monthly Inspection
13 Aug 25	Monthly Inspection
9 Sep 25	Monthly Inspection

Operations, Maintenance & Monitoring Activities
Lima Range
TY 2025

Date	*Activity*
8 Oct 24	Monthly Inspection
6 Nov 24	Monthly Inspection
17 Dec 24	Monthly Inspection
15 Jan 25	Monthly Inspection
25 Feb 25	Monthly Inspection
5 Mar 25	Monthly Inspection
2 Apr 25	Monthly Inspection
9 May 25	Pre/Post-Firing Inspection
17 Jun 25	Monthly Inspection
15 Jul 25	Pre/Post-Firing Inspection
13 Aug 25	Monthly Inspection
9 Sep 25	Monthly Inspection

Operations, Maintenance & Monitoring Activities
Sierra Range
TY 2025

Date	*Activity*
4 Oct 24	Maintenance
4, 5 Oct 24	Pre/Post-Firing Inspection
18, 20 Oct 24	Pre/Post-Firing Inspection
22 Oct 24	Berm Maintenance
25 Oct 24	Pre/Post Firing Inspection
23, 24 Nov 24	Pre/Post Firing Inspection
17 Dec 24	Monthly Inspection
31 Jan 25	Monthly; EMC Inspection
25 Feb 25	Monthly Inspection
1 Mar 25	Pre/Post Firing Inspection
7, 8 Mar 25	Pre/Post Firing Inspection
14, 16 Mar 25	Pre/Post Firing Inspection
4 Apr 25	Pre/Post Firing Inspection
5 Apr 25	Pre/Post Firing Inspection
9 Apr 25	Pre/Post Firing Inspection
11-13 Apr 25	Pre/Post Firing Inspection
9 May 25	Pre/Post Firing Inspection
16 May 25	Pre/Post Firing Inspection
1 Jun 25	Pre/Post Firing Inspection
3, 5 Jun 25	Pre/Post Firing Inspection
7 Jun 25	Pre/Post Firing Inspection
20 Jun 25	Pre/Post Firing Inspection
22, 23 Jun 25	Berm Maintenance
27, 28 Jun 25	Pre/Post Firing Inspection
18 Jul 25	Pre/Post Firing Inspection
26, 27 Jul 25	Pre/Post Firing Inspection
1 Aug 25	Pre/Post Firing Inspection
3 Aug 25	Pre/Post Firing Inspection
8 Aug 25	Pre/Post Firing Inspection
15, 17 Aug 25	Pre/Post Firing Inspection
26 Aug 25	Pre/Post Firing Inspection
6, 8 Sep 25	Pre/Post Firing Inspection
12, 14 Sep 25	Pre/Post Firing Inspection
19, 20 Sep 25	Pre/Post Firing Inspection

Operations, Maintenance & Monitoring Activities
Tango Range
TY 2025

Date	*Activity*
4 Oct 24	Maintenance
4, 5 Oct 24	Pre/Post-Firing Inspection
18, 20 Oct 24	Pre/Post-Firing Inspection
22 Oct 24	
25, 27 Oct 24	Pre/Post-Firing Inspection
23, 24 Nov 24	Pre/Post-Firing Inspection
17 Dec 24	Monthly Inspection
30 Jan 25	Pre/Post-Firing Inspection
31 Jan 25	EMC Inspection
25 Feb 25	Monthly Inspection
1 Mar 25	Pre/Post-Firing Inspection
7, 8 Mar 25	Pre/Post-Firing Inspection
4 Apr 25	Pre/Post-Firing Inspection
5 Apr 25	Pre/Post-Firing Inspection
11, 12 Apr 25	Pre/Post-Firing Inspection
16 May 25	Pre/Post-Firing Inspection
1 Jun 25	Pre/Post-Firing Inspection
3, 5 Jun 25	Pre/Post-Firing Inspection
7 Jun 25	Pre/Post-Firing Inspection
20, 21 Jun 25	Pre/Post-Firing Inspection
25 Jun 25	Berm Maintenance
25, 28 Jun 25	Pre/Post-Firing Inspection
17 Jul 25	Pre/Post-Firing Inspection
19 Jul 25	Pre/Post-Firing Inspection
26, 27 Jul 25	Pre/Post-Firing Inspection
26 Aug 25	Pre/Post-Firing Inspection
6, 7 Sep 25	Pre/Post-Firing Inspection
12, 14 Sep 25	Pre/Post-Firing Inspection
19, 20 Sep 25	Pre/Post-Firing Inspection

Lead Ammunition Use

Echo Range

Lead Ammunition Use History, Echo Range

Training Year	*.40 Cal Lead*	*12 Gauge Buckshot*	*9 mm Lead*	*Total*
TY 2025	0	1,180	65,152	66,332
TY 2024	2,740[1]	430[1]	57,830	61,000
TY 2023	0	30[1]	80,996	81,026
TY 2022	0	0	78,021	78,021
TY 2021	2,996[1]	0	51,438	54,914
TY 2020	0	0	14,308	14,308
TY 2019	0	0	4,350	4,350
TY 2018	0	0	0	0
TY 2017	0	0	0	0
TY 2016	0	0	0	0
TY 2015	0	0	347[2]	347
TY 2008 - TY 2014	0	0	0	0
TY 2007	0	0	100[2]	100
Total	**5,736**	**5,782**	**356,569**	**360,398**

Notes: Echo Range became operational in Fall 2019.
[1] Ammunition was used on Echo Range as part of approved, non-standard training events.
[2] Firing at Echo Range in TY 2007 and TY 2015 were part of tests for reintroducing lead ammunition.

Lead Ammunition Use History, Cumulative

Training Year	*Echo Range*	*Sierra Range*	*KD Range*	*Tango Range*	*Juliet[1] Range*	*Kilo[1] Range*	*India Range*	*Total*
TY 2025	66,332	0	0	0	0	0	01,130[5]	67,463
TY 2024	61,000	0	0	0	0	0	0	61,000
TY 2023	81,026	0	0	0	0	0	0	81,026
TY 2022	78,021	0	0	0	0	0	0	78,021
TY 2021	54,914	0	0	0	0	0	0	54,914
TY 2020	14,308	0	0	0	7,690	84,032	0	106,030
TY 2019	4,350	0	0	0	30,089	81,179	0	115,618
TY 2018	0	0	0	0	36,583	119,342	0	155,925
TY 2017	0	0	0	16,495	51,897	115,662	0	184,054
TY 2016	0	0	0	4,200	61,052	49,638	0	114,890
TY 2015	347[2]	0	1,993[4]	6,960	65,266	69,973	0	144,539
TY 2014	0	0	0	3,220	36,937	80,356	0	120,513
TY 2013	0	0	0	9,950	40,196	73,742	0	123,888
TY 2012	0	0	0	12,117	31,026	59,912	0	103,055
TY 2011	0	2,120[3]	0	37,122	63,541	125,154	0	227,937
TY 2010	0	0	0	90,328	34,371	60,362	0	185,061
TY 2009	0	0	0	137,362	16,262	29,783	0	183,407
TY 2008	0	0	0	17,725	0	0	0	17,725
TY 2007	100[2]	0	0	8,547	0	0	0	8,647
Total	**360,398**	**2,120**	**1,993**	**344,026**	**474,910**	**949,135**	**1,130**	**2,133,712**

Notes: [1] Juliet and Kilo ranges are currently operationally inactive ranges; their STAPP systems were dismantled in Fall 2020.
[2] Firing at Echo Range in TY 2007 and TY 2015 were part of tests for reintroducing lead ammunition.
[3] Firing at Sierra Range in TY 2011 was part of a Line of Sight Analysis test.
[4] Firing at KD Range in TY 2015 was part of a planning-level noise assessment.
5 Firing at India Range in TY 2025 was part of an approved, non-standard training event in April 2025.

Copper Ammunition Use

Sierra, India, and Tango Ranges

Copper Ammunition Use History

Training Year	*Sierra Range 5.56 Copper*	*Sierra Range 7.62 Copper*	*India Range 5.56 Copper*	*India Range 7.62 Copper*	*Tango Range[1] 5.56 Copper*	*ISBC Range 5.56 Copper*	*Echo Range 5.56 Copper*	*Total*
TY 2025	223,331	0	1,157	0	80,197	6,600[2]	0	311,285
TY 2024	269,399	1,000	3,600	0	109,633	0	0	383,632
TY 2023	212,298	0	26,700	0	80,726	2,620[2]	0	322,344
TY 2022	251,672	0	41,041	0	56,946	14,098[2]	16,150[3]	379,907
TY 2021	221,756	0	73,400	0	0	0	19,975[3]	315,131
TY 2020	131,274	0	90,849	0	0	0	0	222,123
TY 2019	98,426	0	71,098	0	0	0	0	169,524
TY 2018	98,393	0	105,143	0	0	0	0	203,536
TY 2017	95,905	0	105,099	4,793	0	0	0	205,797
TY 2016	80,747	0	60,571	0	0	0	0	141,318
TY 2015	66,086	0	12,947	0	0	0	0	79,033
TY 2014	46,804	0	27,872	0	0	0	0	74,676
TY 2013	34,493	0	10,918	0	0	0	0	45,411
TY 2012	34,359	0	6,601	0	0	0	0	40,960
Total	**1,864,943**	**1,000**	**636,996**	**4,793**	**327,502**	**173,784**	**361,256**	**2,894677**

Note: [1]Tango Range became operationally active for copper ammunition in TY 2022.

[2]Copper ammunition was used on the operationally inactive ISBC Range for two approved, non-standard training events during TY 2022, an approved, non-standard training event in TY 2023, and an approved, non-standard training event in January/February 2025.

[3]Copper ammunition was used on Echo Range during two non-standard training events in TY 2021 and two approved, non-standard training events in TY 2022.

Small Arms Range Sampling Reports

Soil Sampling Results

Fall 2025

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
Echo	SSERNG001A-OCT25-10072025	10/7/2025	SW6020B	Antimony	mg/kg	0.137	0.0758	0.189	0.152	J
Echo	SSERNG001A-OCT25-10072025	10/7/2025	SW6020B	Calcium	mg/kg	449	18.6	37.9	37.1	
Echo	SSERNG001A-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	mg/kg	8.2	6.40	11	13	J
Echo	SSERNG001A-OCT25-10072025	10/7/2025	SW6020B	Copper	mg/kg	4.15	0.171	0.379	0.34	
Echo	SSERNG001A-OCT25-10072025	10/7/2025	SW6020B	Iron	mg/kg	7,240	9.25	18.9	17.5	
Echo	SSERNG001A-OCT25-10072025	10/7/2025	SW6020B	Lead	mg/kg	13.0	0.072	0.189	0.15	
Echo	SSERNG001A-OCT25-10072025	10/7/2025	SW6020B	Magnesium	mg/kg	675	4.64	9.47	9.28	
Echo	SSERNG001A-OCT25-10072025	10/7/2025	SW9045D	pH	pH Units	5.0	0.01	0.01	0.01	
Echo	SSERNG001A-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	mg/kg	418	31.9	79.4	63.7	J
Echo	SSERNG001A-OCT25-10072025	10/7/2025	SW6020B	Potassium	mg/kg	412	15.2	37.9	30.3	
Echo	SSERNG001A-OCT25-10072025	10/7/2025	SW6020B	Sodium	mg/kg	32.8	22.7	47.4	45.5	J
Echo	SSERNG001A-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	mg/kg	<14	9.1	16	14	
Echo	SSERNG001B-OCT25-10072025	10/7/2025	SW6020B	Antimony	mg/kg	0.135	0.0785	0.196	0.157	J
Echo	SSERNG001B-OCT25-10072025	10/7/2025	SW6020B	Calcium	mg/kg	510	19.2	39.2	38.4	
Echo	SSERNG001B-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	mg/kg	8.8	6.70	11	13	J
Echo	SSERNG001B-OCT25-10072025	10/7/2025	SW6020B	Copper	mg/kg	4.41	0.177	0.392	0.35	
Echo	SSERNG001B-OCT25-10072025	10/7/2025	SW6020B	Iron	mg/kg	7,740	9.57	19.6	18.1	
Echo	SSERNG001B-OCT25-10072025	10/7/2025	SW6020B	Lead	mg/kg	12.6	0.0745	0.196	0.16	
Echo	SSERNG001B-OCT25-10072025	10/7/2025	SW6020B	Magnesium	mg/kg	743	4.81	9.81	9.61	
Echo	SSERNG001B-OCT25-10072025	10/7/2025	SW9045D	pH	pH Units	4.8	0.01	0.01	0.01	
Echo	SSERNG001B-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	mg/kg	564	28.6	71.3	57.2	J
Echo	SSERNG001B-OCT25-10072025	10/7/2025	SW6020B	Potassium	mg/kg	419	15.7	39.2	31.4	
Echo	SSERNG001B-OCT25-10072025	10/7/2025	SW6020B	Sodium	mg/kg	40.8	23.5	49	47.1	J
Echo	SSERNG001B-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	mg/kg	<14	9.1	17	14	
Echo	SSERNG001C-OCT25-10072025	10/7/2025	SW6020B	Antimony	mg/kg	0.172	0.0748	0.187	0.150	J
Echo	SSERNG001C-OCT25-10072025	10/7/2025	SW6020B	Calcium	mg/kg	519	18.3	37.4	36.7	
Echo	SSERNG001C-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	mg/kg	9.2	6.80	11	14	J
Echo	SSERNG001C-OCT25-10072025	10/7/2025	SW6020B	Copper	mg/kg	4.37	0.168	0.374	0.34	
Echo	SSERNG001C-OCT25-10072025	10/7/2025	SW6020B	Iron	mg/kg	8,660	9.13	18.7	17.2	
Echo	SSERNG001C-OCT25-10072025	10/7/2025	SW6020B	Lead	mg/kg	13.1	0.0711	0.187	0.150	
Echo	SSERNG001C-OCT25-10072025	10/7/2025	SW6020B	Magnesium	mg/kg	937	4.58	9.35	9.16	
Echo	SSERNG001C-OCT25-10072025	10/7/2025	SW9045D	pH	pH Units	4.8	0.01	0.01	0.01	
Echo	SSERNG001C-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	mg/kg	526	33.4	83.1	66.7	J
Echo	SSERNG001C-OCT25-10072025	10/7/2025	SW6020B	Potassium	mg/kg	427	15	37.4	29.9	
Echo	SSERNG001C-OCT25-10072025	10/7/2025	SW6020B	Sodium	mg/kg	38.0	22.4	46.8	44.9	J
Echo	SSERNG001C-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	mg/kg	<15	9.6	17	15	
Echo	SSERNG002-OCT25-10072025	10/7/2025	SW6020B	Antimony	mg/kg	0.116	0.0765	0.191	0.153	J

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
Echo	SSERNG002-OCT25-10072025	10/7/2025	SW6020B	Calcium	mg/kg	478	18.7	38.2	37.5	
Echo	SSERNG002-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	mg/kg	7.0	6.60	11	13	J
Echo	SSERNG002-OCT25-10072025	10/7/2025	SW6020B	Copper	mg/kg	4.54	0.172	0.382	0.34	
Echo	SSERNG002-OCT25-10072025	10/7/2025	SW6020B	Iron	mg/kg	8,600	9.33	19.1	17.6	
Echo	SSERNG002-OCT25-10072025	10/7/2025	SW6020B	Lead	mg/kg	14.9	0.0727	0.191	0.15	
Echo	SSERNG002-OCT25-10072025	10/7/2025	SW6020B	Magnesium	mg/kg	789	4.68	9.56	9.37	
Echo	SSERNG002-OCT25-10072025	10/7/2025	SW9045D	pH	pH Units	4.8	0.01	0.01	0.01	
Echo	SSERNG002-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	mg/kg	513	32.4	80.8	64.8	J
Echo	SSERNG002-OCT25-10072025	10/7/2025	SW6020B	Potassium	mg/kg	429	15.3	38.2	30.6	
Echo	SSERNG002-OCT25-10072025	10/7/2025	SW6020B	Sodium	mg/kg	32.0	22.9	47.8	45.9	J
Echo	SSERNG002-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	mg/kg	<14	9.4	17	14	
Echo	SSERNG003-OCT25-10072025	10/7/2025	SW6020B	Antimony	mg/kg	0.0845	0.0728	0.182	0.146	J
Echo	SSERNG003-OCT25-10072025	10/7/2025	SW6020B	Calcium	mg/kg	457	17.8	36.4	35.7	
Echo	SSERNG003-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	mg/kg	9.5	6.90	11	14	J
Echo	SSERNG003-OCT25-10072025	10/7/2025	SW6020B	Copper	mg/kg	3.76	0.164	0.364	0.33	
Echo	SSERNG003-OCT25-10072025	10/7/2025	SW6020B	Iron	mg/kg	8,030	8.88	18.2	16.8	
Echo	SSERNG003-OCT25-10072025	10/7/2025	SW6020B	Lead	mg/kg	11.4	0.0692	0.189	0.15	
Echo	SSERNG003-OCT25-10072025	10/7/2025	SW6020B	Magnesium	mg/kg	906	4.46	9.10	8.92	
Echo	SSERNG003-OCT25-10072025	10/7/2025	SW9045D	pH	pH Units	5.0	0.01	0.01	0.01	
Echo	SSERNG003-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	mg/kg	605	31.7	79.1	63.5	J
Echo	SSERNG003-OCT25-10072025	10/7/2025	SW6020B	Potassium	mg/kg	358	14.6	36.4	29.1	
Echo	SSERNG003-OCT25-10072025	10/7/2025	SW6020B	Sodium	mg/kg	27.5	21.8	45.5	43.7	J
Echo	SSERNG003-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	mg/kg	<15	9.7	17	15	
Echo	SSERNG004-OCT25-10072025	10/7/2025	SW6020B	Antimony	mg/kg	0.109	0.0742	0.185	0.148	J
Echo	SSERNG004-OCT25-10072025	10/7/2025	SW6020B	Calcium	mg/kg	522	18.2	37.1	36.3	
Echo	SSERNG004-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	mg/kg	8.1	6.40	11	13	J
Echo	SSERNG004-OCT25-10072025	10/7/2025	SW6020B	Copper	mg/kg	4.71	0.167	0.371	0.334	
Echo	SSERNG004-OCT25-10072025	10/7/2025	SW6020B	Iron	mg/kg	8,520	9.05	18.5	17.1	
Echo	SSERNG004-OCT25-10072025	10/7/2025	SW6020B	Lead	mg/kg	15.3	0.0704	0.185	0.15	
Echo	SSERNG004-OCT25-10072025	10/7/2025	SW6020B	Magnesium	mg/kg	825	4.54	9.27	9.08	
Echo	SSERNG004-OCT25-10072025	10/7/2025	SW9045D	pH	pH Units	5.0	0.01	0.01	0.01	
Echo	SSERNG004-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	mg/kg	625	31.4	78.3	62.9	J
Echo	SSERNG004-OCT25-10072025	10/7/2025	SW6020B	Potassium	mg/kg	467	14.8	37.1	29.7	
Echo	SSERNG004-OCT25-10072025	10/7/2025	SW6020B	Sodium	mg/kg	33.5	22.2	46.3	44.5	J
Echo	SSERNG004-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	mg/kg	<14	9.1	16	14	
Echo	SSERNG005-OCT25-10072025	10/7/2025	SW6020B	Antimony	mg/kg	0.179	0.0717	0.179	0.143	
Echo	SSERNG005-OCT25-10072025	10/7/2025	SW6020B	Calcium	mg/kg	557	17.6	35.8	35.1	

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
Echo	SSERNG005-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	mg/kg	11	6.90	12	14	J
Echo	SSERNG005-OCT25-10072025	10/7/2025	SW6020B	Copper	mg/kg	5.17	0.161	0.358	0.32	
Echo	SSERNG005-OCT25-10072025	10/7/2025	SW6020B	Iron	mg/kg	8,300	8.74	17.9	16.5	
Echo	SSERNG005-OCT25-10072025	10/7/2025	SW6020B	Lead	mg/kg	16.4	0.0681	0.179	0.14	
Echo	SSERNG005-OCT25-10072025	10/7/2025	SW6020B	Magnesium	mg/kg	822	4.39	8.96	8.78	
Echo	SSERNG005-OCT25-10072025	10/7/2025	SW9045D	pH	pH Units	4.9	0.01	0.01	0.01	
Echo	SSERNG005-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	mg/kg	684	30.9	76.9	61.7	J
Echo	SSERNG005-OCT25-10072025	10/7/2025	SW6020B	Potassium	mg/kg	471	14.3	35.8	28.7	
Echo	SSERNG005-OCT25-10072025	10/7/2025	SW6020B	Sodium	mg/kg	35.0	21.5	44.8	43	J
Echo	SSERNG005-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	mg/kg	<15	9.8	17	15	
Echo	SSERNG006-OCT25-10072025	10/7/2025	SW6020B	Antimony	mg/kg	0.131	0.0850	0.213	0.170	J
Echo	SSERNG006-OCT25-10072025	10/7/2025	SW6020B	Calcium	mg/kg	454	20.8	42.5	41.7	
Echo	SSERNG006-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	mg/kg	11	6.80	11	14	J
Echo	SSERNG006-OCT25-10072025	10/7/2025	SW6020B	Copper	mg/kg	5.74	0.191	0.425	0.38	
Echo	SSERNG006-OCT25-10072025	10/7/2025	SW6020B	Iron	mg/kg	7,480	10.4	21.3	19.6	
Echo	SSERNG006-OCT25-10072025	10/7/2025	SW6020B	Lead	mg/kg	16.8	0.0808	0.213	0.170	
Echo	SSERNG006-OCT25-10072025	10/7/2025	SW6020B	Magnesium	mg/kg	715	5.21	10.60	10.4	
Echo	SSERNG006-OCT25-10072025	10/7/2025	SW9045D	pH	pH Units	5.0	0.01	0.01	0.01	
Echo	SSERNG006-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	mg/kg	650	32.6	81.3	65.3	J
Echo	SSERNG006-OCT25-10072025	10/7/2025	SW6020B	Potassium	mg/kg	364	17	42.5	34	
Echo	SSERNG006-OCT25-10072025	10/7/2025	SW6020B	Sodium	mg/kg	36.4	25.5	53.1	51	J
Echo	SSERNG006-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	mg/kg	<15	9.6	17	15	
India	SSIRNG001-OCT25-10072025	10/7/2025	SW6020B	Antimony	mg/kg	1.19	0.0731	0.183	0.146	
India	SSIRNG001-OCT25-10072025	10/7/2025	SW6020B	Calcium	mg/kg	941	17.9	36.6	35.8	
India	SSIRNG001-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	mg/kg	8.8	6.80	11	14	J
India	SSIRNG001-OCT25-10072025	10/7/2025	SW6020B	Copper	mg/kg	34.9	0.164	0.366	0.33	
India	SSIRNG001-OCT25-10072025	10/7/2025	SW6020B	Iron	mg/kg	10,400	8.92	0.183	0.146	
India	SSIRNG001-OCT25-10072025	10/7/2025	SW6020B	Lead	mg/kg	91.8	0.0694	0.183	0.15	
India	SSIRNG001-OCT25-10072025	10/7/2025	SW6020B	Magnesium	mg/kg	1,550	4.48	9.14	8.96	
India	SSIRNG001-OCT25-10072025	10/7/2025	SW9045D	pH	pH Units	5.0	0.01	0.01	0.01	
India	SSIRNG001-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	mg/kg	3,690	177	440	353	J
India	SSIRNG001-OCT25-10072025	10/7/2025	SW6020B	Potassium	mg/kg	710	14.6	36.6	29.2	
India	SSIRNG001-OCT25-10072025	10/7/2025	SW6020B	Sodium	mg/kg	35.7	21.9	45.7	43.9	J
India	SSIRNG001-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	mg/kg	<15	9.6	17	15	
Lima	SSLRNG001-OCT25-10082025	10/8/2025	SW6020B	Antimony	mg/kg	0.170	0.0912	0.228	0.182	J
Lima	SSLRNG001-OCT25-10082025	10/8/2025	SW6020B	Calcium	mg/kg	620	22.4	45.6	44.7	
Lima	SSLRNG001-OCT25-10082025	10/8/2025	EPA 300.0	Chloride	mg/kg	9.5	6.90	12	14	J

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
Lima	SSLRNG001-OCT25-10082025	10/8/2025	SW6020B	Copper	mg/kg	7.93	0.205	0.456	0.41	
Lima	SSLRNG001-OCT25-10082025	10/8/2025	SW6020B	Iron	mg/kg	10,300	11.1	22.8	21	
Lima	SSLRNG001-OCT25-10082025	10/8/2025	SW6020B	Lead	mg/kg	12.6	0.0867	0.228	0.18	
Lima	SSLRNG001-OCT25-10082025	10/8/2025	SW6020B	Magnesium	mg/kg	1,210	5.59	11.4	11.2	
Lima	SSLRNG001-OCT25-10082025	10/8/2025	SW9045D	pH	pH Units	5.1	0.01	0.01	0.01	
Lima	SSLRNG001-OCT25-10082025	10/8/2025	EPA 365.1	Phosphate (PO4)	mg/kg	395	35.4	88.1	70.7	J
Lima	SSLRNG001-OCT25-10082025	10/8/2025	SW6020B	Potassium	mg/kg	614	18.2	45.6	36.5	
Lima	SSLRNG001-OCT25-10082025	10/8/2025	SW6020B	Sodium	mg/kg	36.5	27.4	57	54.7	J
Lima	SSLRNG001-OCT25-10082025	10/8/2025	EPA 300.0	Sulfate	mg/kg	<15	9.8	17	15	
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	SW6020B	Antimony	mg/kg	0.734	0.0688	0.172	0.138	
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	SW6020B	Calcium	mg/kg	825	16.9	34.4	33.7	
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	EPA 300.0	Chloride	mg/kg	12	6.40	11	13	J
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	SW6020B	Copper	mg/kg	31.7	0.155	0.344	0.31	
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	SW6020B	Iron	mg/kg	7,460	8.39	17.2	15.8	
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	SW6020B	Lead	mg/kg	17.7	0.0653	0.172	0.14	
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	SW6020B	Magnesium	mg/kg	914	4.21	8.60	8.43	
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	SW9045D	pH	pH Units	5.1	0.01	0.01	0.01	
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	EPA 365.1	Phosphate (PO4)	mg/kg	593	33	82.2	66	J
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	SW6020B	Potassium	mg/kg	398	13.8	34.4	27.5	
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	SW6020B	Sodium	mg/kg	30.6	20.6	43	41.3	J
Sierra	SSSRNG001-OCT25-10062025	10/6/2025	EPA 300.0	Sulfate	mg/kg	<14	9.1	16	14	J
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	SW6020B	Antimony	mg/kg	0.142	0.0853	0.213	0.171	J
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	SW6020B	Calcium	mg/kg	1,760	20.9	42.6	41.8	
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	EPA 300.0	Chloride	mg/kg	10	6.90	12	14	J
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	SW6020B	Copper	mg/kg	63.7	0.192	0.426	0.38	
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	SW6020B	Iron	mg/kg	8,010	10.4	21.3	19.7	
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	SW6020B	Lead	mg/kg	24.1	0.081	0.213	0.17	
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	SW6020B	Magnesium	mg/kg	1,150	5.22	10.70	10.4	
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	SW9045D	pH	pH Units	5.3	0.01	0.01	0.01	
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	EPA 365.1	Phosphate (PO4)	mg/kg	759	33	82.3	66	J
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	SW6020B	Potassium	mg/kg	557	17.1	42.6	34.1	
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	SW6020B	Sodium	mg/kg	41.2	25.6	53.3	51.2	J
Sierra	SSSRNG002-OCT25-10092025	10/9/2025	EPA 300.0	Sulfate	mg/kg	<15	9.8	17	15	J
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	SW6020B	Antimony	mg/kg	1.37	0.0877	0.219	0.175	
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	SW6020B	Calcium	mg/kg	3,170	21.5	43.8	43	
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	EPA 300.0	Chloride	mg/kg	17	6.80	11	14	
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	SW6020B	Copper	mg/kg	30.9	0.197	0.438	0.40	

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	SW6020B	Iron	mg/kg	12,300	10.7	21.9	20.2	
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	SW6020B	Lead	mg/kg	295	0.0833	0.219	0.18	
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	SW6020B	Magnesium	mg/kg	1,550	5.37	11.00	10.7	
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	SW9045D	pH	pH Units	6.2	0.01	0.01	0.01	
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	EPA 365.1	Phosphate (PO4)	mg/kg	3,930	178	444	357	J
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	SW6020B	Potassium	mg/kg	786	17.5	43.8	35.1	
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	SW6020B	Sodium	mg/kg	61.8	26.3	54.8	52.6	
Sierra	SSSRNG003-OCT25-10062025	10/6/2025	EPA 300.0	Sulfate	mg/kg	<15	9.6	17	15	J
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	SW6020B	Antimony	mg/kg	0.203	0.0858	0.215	0.172	J
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	SW6020B	Calcium	mg/kg	811	21	42.9	42.9	
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	EPA 300.0	Chloride	mg/kg	8.5	7.00	12	14	J
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	SW6020B	Copper	mg/kg	102	0.193	0.429	0.386	
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	SW6020B	Iron	mg/kg	10,700	10.5	21.5	19.8	
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	SW6020B	Lead	mg/kg	32.9	0.0815	0.215	0.17	
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	SW6020B	Magnesium	mg/kg	1,180	5.26	10.70	10.5	
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	SW9045D	pH	pH Units	5.7	0.01	0.01	0.01	
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	EPA 365.1	Phosphate (PO4)	mg/kg	672	28.7	71.6	57.4	J
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	SW6020B	Potassium	mg/kg	608	17.2	42.9	34.3	
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	SW6020B	Sodium	mg/kg	45.4	25.8	53.7	51.5	J
Sierra	SSSRNG004-OCT25-10062025	10/6/2025	EPA 300.0	Sulfate	mg/kg	<15	9.9	18	15	J
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	SW6020B	Antimony	mg/kg	0.436	0.0767	0.192	0.153	
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	SW6020B	Calcium	mg/kg	3,400	18.8	38.4	37.6	
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	EPA 300.0	Chloride	mg/kg	15	6.50	11	13	
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	SW6020B	Copper	mg/kg	16.4	0.173	0.384	0.345	
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	SW6020B	Iron	mg/kg	18,800	9.36	19.2	17.7	
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	SW6020B	Lead	mg/kg	25.3	0.0729	0.192	0.15	
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	SW6020B	Magnesium	mg/kg	3,150	4.70	9.59	9.4	
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	SW9045D	pH	pH Units	5.7	0.01	0.01	0.01	
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	EPA 365.1	Phosphate (PO4)	mg/kg	1,100	161	402	322	J
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	SW6020B	Potassium	mg/kg	1,260	15.3	38.4	30.7	
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	SW6020B	Sodium	mg/kg	43.3	23	48	46	J
Tango	SSTRNG001A-OCT25-10062025	10/6/2025	EPA 300.0	Sulfate	mg/kg	56	9.2	16	14	J
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	SW6020B	Antimony	mg/kg	0.240	0.0786	0.197	0.157	
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	SW6020B	Calcium	mg/kg	2,860	19.3	39.3	38.5	
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	EPA 300.0	Chloride	mg/kg	<13	6.40	11	13	
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	SW6020B	Copper	mg/kg	12.2	0.177	0.393	0.354	
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	SW6020B	Iron	mg/kg	12,700	9.59	19.7	18.1	

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	SW6020B	Lead	mg/kg	16.4	0.0747	0.197	0.157	
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	SW6020B	Magnesium	mg/kg	2,100	4.82	9.83	9.63	
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	SW9045D	pH	pH Units	5.7	0.01	0.01	0.01	
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	EPA 365.1	Phosphate (PO4)	mg/kg	1,470	157	390	313	J
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	SW6020B	Potassium	mg/kg	978	15.7	39.3	31.4	
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	SW6020B	Sodium	mg/kg	36.1	23.6	49.1	47.2	J
Tango	SSTRNG001B-OCT25-10062025	10/6/2025	EPA 300.0	Sulfate	mg/kg	58	9.1	16	14	J
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	SW6020B	Antimony	mg/kg	0.599	0.0825	0.206	0.165	
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	SW6020B	Calcium	mg/kg	3,380	20.2	41.2	40.4	
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	EPA 300.0	Chloride	mg/kg	<13	6.50	11	13	
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	SW6020B	Copper	mg/kg	15.3	0.186	0.412	0.37	
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	SW6020B	Iron	mg/kg	18,900	10.1	20.6	19	
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	SW6020B	Lead	mg/kg	22.2	0.0783	0.206	0.17	
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	SW6020B	Magnesium	mg/kg	2,900	5.05	10.30	10.1	
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	SW9045D	pH	pH Units	5.6	0.01	0.01	0.01	
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	EPA 365.1	Phosphate (PO4)	mg/kg	1,220	157	391	314	J
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	SW6020B	Potassium	mg/kg	1,200	16.5	41.2	33	
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	SW6020B	Sodium	mg/kg	52.5	24.7	51.5	49.5	
Tango	SSTRNG001C-OCT25-10062025	10/6/2025	EPA 300.0	Sulfate	mg/kg	55	9.2	16	14	J
Tango	SSTRNG002-OCT25-10072025	10/7/2025	SW6020B	Antimony	mg/kg	0.283	0.0901	0.225	0.180	
Tango	SSTRNG002-OCT25-10072025	10/7/2025	SW6020B	Calcium	mg/kg	986	22.1	45.1	44.2	
Tango	SSTRNG002-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	mg/kg	12	7.30	12	15	
Tango	SSTRNG002-OCT25-10072025	10/7/2025	SW6020B	Copper	mg/kg	17.3	0.203	0.451	0.405	
Tango	SSTRNG002-OCT25-10072025	10/7/2025	SW6020B	Iron	mg/kg	9,450	11	22.5	20.8	
Tango	SSTRNG002-OCT25-10072025	10/7/2025	SW6020B	Lead	mg/kg	36.0	0.0856	0.225	0.180	
Tango	SSTRNG002-OCT25-10072025	10/7/2025	SW6020B	Magnesium	mg/kg	1,230	5.52	11.30	11	
Tango	SSTRNG002-OCT25-10072025	10/7/2025	SW9045D	pH	pH Units	5.2	0.01	0.01	0.01	
Tango	SSTRNG002-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	mg/kg	811	149	372	299	J
Tango	SSTRNG002-OCT25-10072025	10/7/2025	SW6020B	Potassium	mg/kg	614	18	45.1	36	
Tango	SSTRNG002-OCT25-10072025	10/7/2025	SW6020B	Sodium	mg/kg	49.0	27	56.3	54.1	J
Tango	SSTRNG002-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	mg/kg	<16	10	18	16	J

Small Arms Range Sampling Reports

Lysimeter Sampling Results

Fall 2025

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
India	LYIRNG001-OCT25-10072025	10/7/2025	SM2320B	Alkalinity, Total	ug/l	4,750	2600	8000	6000	J
India	LYIRNG001-OCT25-10072025	10/7/2025	SW6020B	Antimony	ug/l	3.57	0.200	1.00	0.500	
India	LYIRNG001-OCT25-10072025	10/7/2025	SW6020B	Calcium	ug/l	5,530	50.0	120	100	
India	LYIRNG001-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	ug/l	9,500	600	1500	1200	J
India	LYIRNG001-OCT25-10072025	10/7/2025	SW6020B	Copper	ug/l	12.0	0.850	1.00	0.900	J
India	LYIRNG001-OCT25-10072025	10/7/2025	SM5310C	Dissolved Organic Carbon	ug/l	4,470	500	1000	900	
India	LYIRNG001-OCT25-10072025	10/7/2025	SW6020B	Iron	ug/l	37.8	20.0	50.0	40.0	J
India	LYIRNG001-OCT25-10072025	10/7/2025	SW6020B	Lead	ug/l	3.25	0.120	0.500	0.240	
India	LYIRNG001-OCT25-10072025	10/7/2025	SW6020B	Magnesium	ug/l	1,200	16.0	50.0	32.0	
India	LYIRNG001-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	ug/l	<150	92.0	150	150	
India	LYIRNG001-OCT25-10072025	10/7/2025	SW6020B	Potassium	ug/l	991	65.0	200	180	
India	LYIRNG001-OCT25-10072025	10/7/2025	SW6020B	Sodium	ug/l	3,860	90.0	200	180	J
India	LYIRNG001-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	ug/l	<1,000	500	1500	1000	
India	LYDUP01-OCT25-10072025	10/7/2025	SM2320B	Alkalinity, Total	ug/l	4,780	2600	8000	6000	J
India	LYDUP01-OCT25-10072025	10/7/2025	SW6020B	Antimony	ug/l	3.33	0.200	1.00	0.500	
India	LYDUP01-OCT25-10072025	10/7/2025	SW6020B	Calcium	ug/l	5,330	50.0	120	100	
India	LYDUP01-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	ug/l	9,400	600	1500	1200	J
India	LYDUP01-OCT25-10072025	10/7/2025	SW6020B	Copper	ug/l	11.1	0.850	1.000	0.900	J
India	LYDUP01-OCT25-10072025	10/7/2025	SM5310C	Dissolved Organic Carbon	ug/l	4,470	500	1000	900	
India	LYDUP01-OCT25-10072025	10/7/2025	SW6020B	Iron	ug/l	27.1	20.0	50.0	40.0	J
India	LYDUP01-OCT25-10072025	10/7/2025	SW6020B	Lead	ug/l	3.05	0.120	0.500	0.240	
India	LYDUP01-OCT25-10072025	10/7/2025	SW6020B	Magnesium	ug/l	1,130	16.0	50.0	32.0	
India	LYDUP01-OCT25-10072025	10/6/2025	EPA 365.1	Phosphate (PO4)	ug/l	<150	92.0	150	150	
India	LYDUP01-OCT25-10072025	10/7/2025	SW6020B	Potassium	ug/l	904	65.0	200	180	
India	LYDUP01-OCT25-10072025	10/7/2025	SW6020B	Sodium	ug/l	3,360	90.0	200	180	J
India	LYDUP01-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	ug/l	<1,000	500	1500	1000	
India	LYIRNG002-OCT25-10072025	10/7/2025	SM2320B	Alkalinity, Total	ug/l	6,330	2600	8000	6000	J
India	**LYIRNG002-OCT25-10072025**	**10/7/2025**	**SW6020B**	**Antimony**	**ug/l**	**7.04**	**0.200**	**1.00**	**0.500**	
India	LYIRNG002-OCT25-10072025	10/7/2025	SW6020B	Calcium	ug/l	17,500	50.0	120	100	
India	LYIRNG002-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	ug/l	8,300	600	1500	1200	J
India	LYIRNG002-OCT25-10072025	10/7/2025	SW6020B	Copper	ug/l	248	0.850	1.000	0.900	
India	LYIRNG002-OCT25-10072025	10/7/2025	SM5310C	Dissolved Organic Carbon	ug/l	11,400	500	1000	900	
India	LYIRNG002-OCT25-10072025	10/7/2025	SW6020B	Iron	ug/l	<40.0	20.0	50.0	40.0	
India	LYIRNG002-OCT25-10072025	10/7/2025	SW6020B	Lead	ug/l	0.155	0.120	0.500	0.240	J
India	LYIRNG002-OCT25-10072025	10/7/2025	SW6020B	Magnesium	ug/l	3,240	16.0	50.0	32.0	
India	LYIRNG002-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	ug/l	29,700	92.0	150	150	
India	LYIRNG002-OCT25-10072025	10/7/2025	SW6020B	Potassium	ug/l	1,190	65.0	200	180	

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
India	LYIRNG002-OCT25-10072025	10/7/2025	SW6020B	Sodium	ug/l	4,320	90.0	200	180	J
India	LYIRNG002-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	ug/l	15,000	500	1500	1000	
India	LYIRNG003-OCT25-10072025	10/7/2025	SM2320B	Alkalinity, Total	ug/l	--	--	--	--	
India	LYIRNG003-OCT25-10072025	10/7/2025	SW6020B	Antimony	ug/l	2.12	0.200	1.00	0.500	
India	LYIRNG003-OCT25-10072025	10/7/2025	SW6020B	Calcium	ug/l	26,200	50.0	120	100	
India	LYIRNG003-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	ug/l	17,000	600	1500	1200	J
India	LYIRNG003-OCT25-10072025	10/7/2025	SW6020B	Copper	ug/l	725	0.850	1.000	0.900	
India	LYIRNG003-OCT25-10072025	10/7/2025	SM5310C	Dissolved Organic Carbon	ug/l	--	--	--	--	
India	LYIRNG003-OCT25-10072025	10/7/2025	SW6020B	Iron	ug/l	74.6	20.0	50.0	40.0	J
India	LYIRNG003-OCT25-10072025	10/7/2025	SW6020B	Lead	ug/l	0.358	0.120	0.500	0.240	J
India	LYIRNG003-OCT25-10072025	10/7/2025	SW6020B	Magnesium	ug/l	5,210	16.0	50.0	32.0	
India	LYIRNG003-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	ug/l	<150	92.0	150	150	
India	LYIRNG003-OCT25-10072025	10/7/2025	SW6020B	Potassium	ug/l	10,500	65.0	200	180	
India	LYIRNG003-OCT25-10072025	10/7/2025	SW6020B	Sodium	ug/l	5,920	90.0	200	180	J
India	LYIRNG003-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	ug/l	9,400	500	1500	1000	

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
Lima	LYLRNG001-OCT25-10082025	10/8/2025	SM2320B	Alkalinity, Total	ug/l	<6,000	2600	8000	6000	
Lima	LYLRNG001-OCT25-10082025	10/8/2025	SW6020B	Antimony	ug/l	<0.500	0.200	1.00	0.500	
Lima	LYLRNG001-OCT25-10082025	10/8/2025	SW6020B	Calcium	ug/l	1,560	50.0	120	100	
Lima	LYLRNG001-OCT25-10082025	10/8/2025	EPA 300.0	Chloride	ug/l	3,100	600	1500	1200	
Lima	LYLRNG001-OCT25-10082025	10/8/2025	SW6020B	Copper	ug/l	7.53	0.850	1.000	0.900	
Lima	LYLRNG001-OCT25-10082025	10/8/2025	SM5310C	Dissolved Organic Carbon	ug/l	8,740	500	1000	900	
Lima	LYLRNG001-OCT25-10082025	10/8/2025	SW6020B	Iron	ug/l	32.7	20.0	50.0	40.0	J
Lima	LYLRNG001-OCT25-10082025	10/8/2025	SW6020B	Lead	ug/l	0.759	0.12	0.500	0.240	
Lima	LYLRNG001-OCT25-10082025	10/8/2025	SW6020B	Magnesium	ug/l	413	16.0	50.0	32.0	
Lima	LYLRNG001-OCT25-10082025	10/8/2025	EPA 365.1	Phosphate (PO4)	ug/l	179	92.0	150	150	
Lima	LYLRNG001-OCT25-10082025	10/8/2025	SW6020B	Potassium	ug/l	748	65.0	200	180	
Lima	LYLRNG001-OCT25-10082025	10/8/2025	SW6020B	Sodium	ug/l	2,400	90.0	200	180	
Lima	LYLRNG001-OCT25-10082025	10/8/2025	EPA 300.0	Sulfate	ug/l	1,000	500	1500	1000	J
Lima	LYLRNG002-OCT25-10082025	10/8/2025	SM2320B	Alkalinity, Total	ug/l	45,400	2600	8000	6000	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	SW6020B	Antimony	ug/l	<0.500	0.200	1.00	0.500	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	SW6020B	Calcium	ug/l	18,300	50.0	120	100	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	EPA 300.0	Chloride	ug/l	3,300	600	1500	1200	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	SW6020B	Copper	ug/l	1.54	0.850	1.000	0.900	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	SM5310C	Dissolved Organic Carbon	ug/l	3,680	500	1000	900	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	SW6020B	Iron	ug/l	67.5	20.0	50.0	40.0	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	SW6020B	Lead	ug/l	<0.240	0.120	0.500	0.240	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	SW6020B	Magnesium	ug/l	781	16.0	50.0	32.0	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	EPA 365.1	Phosphate (PO4)	ug/l	<150	92.0	150	150	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	SW6020B	Potassium	ug/l	2,250	65.0	200	180	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	SW6020B	Sodium	ug/l	2,460	90.0	200	180	
Lima	LYLRNG002-OCT25-10082025	10/8/2025	EPA 300.0	Sulfate	ug/l	780	500	1500	1000	J
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	SM2320B	Alkalinity, Total	ug/l	30,300	2600	8000	6000	J
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	SW6020B	Antimony	ug/l	1.78	0.200	1.00	0.500	
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	SW6020B	Calcium	ug/l	14,800	50.0	120	100	
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	EPA 300.0	Chloride	ug/l	9,900	600	1500	1200	
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	SW6020B	Copper	ug/l	4.10	0.850	1.000	0.900	
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	SM5310C	Dissolved Organic Carbon	ug/l	6,540	500	1000	900	
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	SW6020B	Iron	ug/l	38.2	20.0	50.0	40.0	J
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	SW6020B	Lead	ug/l	<0.240	0.120	0.500	0.240	
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	SW6020B	Magnesium	ug/l	1,350	16.0	50.0	32.0	
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	EPA 365.1	Phosphate (PO4)	ug/l	<150	92.0	150	150	
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	SW6020B	Potassium	ug/l	<180	65.0	200	180	

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	SW6020B	Sodium	ug/l	5,010	90.0	200	180	
Sierra	LYSRNG001-OCT25-10062025	10/6/2025	EPA 300.0	Sulfate	ug/l	2,800	500	1500	1000	
Tango	LYTRNG001-OCT25-10062025	10/6/2025	SM2320B	Alkalinity, Total	ug/l	30,300	2600	8000	6000	J
Tango	LYTRNG001-OCT25-10062025	10/6/2025	SW6020B	Antimony	ug/l	0.220	0.200	1.00	0.500	J
Tango	LYTRNG001-OCT25-10062025	10/6/2025	SW6020B	Calcium	ug/l	20,600	50.0	120	100	
Tango	LYTRNG001-OCT25-10062025	10/6/2025	EPA 300.0	Chloride	ug/l	4,500	600	1500	1200	J
Tango	LYTRNG001-OCT25-10062025	10/6/2025	SW6020B	Copper	ug/l	0.884	0.850	1.000	0.900	J
Tango	LYTRNG001-OCT25-10062025	10/6/2025	SM5310C	Dissolved Organic Carbon	ug/l	3,120	500	1000	900	
Tango	LYTRNG001-OCT25-10062025	10/6/2025	SW6020B	Iron	ug/l	<40.0	20.0	50.0	40.0	
Tango	LYTRNG001-OCT25-10062025	10/6/2025	SW6020B	Lead	ug/l	<0.240	0.120	0.500	0.240	
Tango	LYTRNG001-OCT25-10062025	10/6/2025	SW6020B	Magnesium	ug/l	1,360	16.0	50.0	32.0	
Tango	LYTRNG001-OCT25-10062025	10/6/2025	EPA 365.1	Phosphate (PO4)	ug/l	105	92.0	150	150	J
Tango	LYTRNG001-OCT25-10062025	10/6/2025	SW6020B	Potassium	ug/l	2,310	65.0	200	180	
Tango	LYTRNG001-OCT25-10062025	10/6/2025	SW6020B	Sodium	ug/l	3,300	90.0	200	180	
Tango	LYTRNG001-OCT25-10062025	10/6/2025	EPA 300.0	Sulfate	ug/l	6,500	500	1500	1000	

Small Arms Range Sampling Reports

Groundwater Sampling Results

Fall 2025

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
Echo	MW-468SM-OCT25-10072025	10/7/2025	SM2320B	Alkalinity, Total	ug/l	<6,000	2600	8000	6000	J
Echo	MW-468SM-OCT25-10072025	10/7/2025	SW6020B	Antimony	ug/l	1.73	0.200	1.00	0.500	J
Echo	MW-468SM-OCT25-10072025	10/7/2025	SW6020B	Calcium	ug/l	8,870	50.0	120	100	
Echo	MW-468SM-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	ug/l	10,000	600	1500	1200	
Echo	MW-468SM-OCT25-10072025	10/7/2025	SW6020B	Copper	ug/l	402	0.850	1.00	0.900	
Echo	MW-468SM-OCT25-10072025	10/7/2025	SM5310C	Dissolved Organic Carbon	ug/l	14,100	500	1000	900	
Echo	MW-468SM-OCT25-10072025	10/7/2025	SW6020B	Iron	ug/l	111,000	20.0	50.0	40.0	J
Echo	**MW-468SM-OCT25-10072025**	**10/7/2025**	**SW6020B**	**Lead**	**ug/l**	**51.4**	**0.120**	**0.500**	**0.240**	
Echo	MW-468SM-OCT25-10072025	10/7/2025	SW6020B	Magnesium	ug/l	8,430	16.0	50.0	32.0	J
Echo	MW-468SM-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	ug/l	3,260	92.0	150	150	J
Echo	MW-468SM-OCT25-10072025	10/7/2025	SW6020B	Potassium	ug/l	6,020	65.0	200	180	J
Echo	MW-468SM-OCT25-10072025	10/7/2025	SW6020B	Sodium	ug/l	9,260	90.0	200	180	
Echo	MW-468SM-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	ug/l	9,400	500	1500	1000	
Echo	MWDUP2-OCT25-10072025	10/7/2025	SM2320B	Alkalinity, Total	ug/l	<6,000	2600	8000	6000	J
Echo	**MWDUP2-OCT25-10072025**	**10/7/2025**	**SW6020B**	**Antimony**	**ug/l**	**3.08**	**0.200**	**1.00**	**0.500**	**J**
Echo	MWDUP2-OCT25-10072025	10/7/2025	SW6020B	Calcium	ug/l	9,830	50.0	120	100	
Echo	MWDUP2-OCT25-10072025	10/7/2025	EPA 300.0	Chloride	ug/l	9,200	600	1500	1200	
Echo	MWDUP2-OCT25-10072025	10/7/2025	SW6020B	Copper	ug/l	375	0.850	1.00	0.900	
Echo	MWDUP2-OCT25-10072025	10/7/2025	SM5310C	Dissolved Organic Carbon	ug/l	724	500	1000	900	J
Echo	MWDUP2-OCT25-10072025	10/7/2025	SW6020B	Iron	ug/l	200,000	20.0	50.0	40.0	J
Echo	**MWDUP2-OCT25-10072025**	**10/7/2025**	**SW6020B**	**Lead**	**ug/l**	**59.2**	**0.1**	**0.500**	**0.240**	
Echo	MWDUP2-OCT25-10072025	10/7/2025	SW6020B	Magnesium	ug/l	13,000	16.0	50.0	32.0	J
Echo	MWDUP2-OCT25-10072025	10/7/2025	EPA 365.1	Phosphate (PO4)	ug/l	1,150	92.0	150	150	J
Echo	MWDUP2-OCT25-10072025	10/7/2025	SW6020B	Potassium	ug/l	9,340	65.0	200	180	J
Echo	MWDUP2-OCT25-10072025	10/7/2025	SW6020B	Sodium	ug/l	10,300	90.0	200	180	
Echo	MWDUP2-OCT25-10072025	10/7/2025	EPA 300.0	Sulfate	ug/l	9,800	500	1500	1000	
India	MW-639S-OCT25-10092025	10/9/2025	SM2320B	Alkalinity, Total	ug/l	3,010	2600	8000	6000	J
India	MW-639S-OCT25-10092025	10/9/2025	SW6020B	Antimony	ug/l	<0.500	0.200	1.00	0.500	
India	MW-639S-OCT25-10092025	10/9/2025	SW6020B	Calcium	ug/l	2,120	50.0	120	100	
India	MW-639S-OCT25-10092025	10/9/2025	EPA 300.0	Chloride	ug/l	11,000	600	1500	1200	
India	MW-639S-OCT25-10092025	10/9/2025	SW6020B	Copper	ug/l	3.86	0.850	1.00	0.900	J
India	MW-639S-OCT25-10092025	10/9/2025	SM5310C	Dissolved Organic Carbon	ug/l	2,420	500	1000	900	
India	MW-639S-OCT25-10092025	10/9/2025	SW6020B	Iron	ug/l	1,470	20.0	50.0	40.0	
India	MW-639S-OCT25-10092025	10/9/2025	SW6020B	Lead	ug/l	1.89	0.120	0.500	0.240	
India	MW-639S-OCT25-10092025	10/9/2025	SW6020B	Magnesium	ug/l	1,790	16.0	50.0	32.0	
India	MW-639S-OCT25-10092025	10/9/2025	EPA 365.1	Phosphate (PO4)	ug/l	252	92.0	150	150	
India	MW-639S-OCT25-10092025	10/9/2025	SW6020B	Potassium	ug/l	720	65.0	200	180	

Site	Sample ID	Sample Date	Test Method	Analyte	Unit	Result Value	MDL	LOQ	LOD	Qualifier
India	MW-639S-OCT25-10092025	10/9/2025	SW6020B	Sodium	ug/l	6,770	90.0	200	180	
India	MW-639S-OCT25-10092025	10/9/2025	EPA 300.0	Sulfate	ug/l	6,200	500	1500	1000	
Sierra	MW-466S-OCT25-10062025	10/6/2025	SM2320B	Alkalinity, Total	ug/l	16,600	2600	8000	6000	J
Sierra	MW-466S-OCT25-10062025	10/6/2025	SW6020B	Antimony	ug/l	<0.500	0.200	1.00	0.500	
Sierra	MW-466S-OCT25-10062025	10/6/2025	SW6020B	Calcium	ug/l	6,240	50.0	120	100	
Sierra	MW-466S-OCT25-10062025	10/6/2025	EPA 300.0	Chloride	ug/l	6,700	600	1500	1200	
Sierra	MW-466S-OCT25-10062025	10/6/2025	SW6020B	Copper	ug/l	1.27	0.850	1.00	0.900	J
Sierra	MW-466S-OCT25-10062025	10/6/2025	SM5310C	Dissolved Organic Carbon	ug/l	1,670	500	1000	900	
Sierra	MW-466S-OCT25-10062025	10/6/2025	SW6020B	Iron	ug/l	153	20.0	50.0	40.0	J
Sierra	MW-466S-OCT25-10062025	10/6/2025	SW6020B	Lead	ug/l	0.309	0.120	0.500	0.240	J
Sierra	MW-466S-OCT25-10062025	10/6/2025	SW6020B	Magnesium	ug/l	2,780	16.0	50.0	32.0	J
Sierra	MW-466S-OCT25-10062025	10/6/2025	EPA 365.1	Phosphate (PO4)	ug/l	163	92.0	150	150	
Sierra	MW-466S-OCT25-10062025	10/6/2025	SW6020B	Potassium	ug/l	745	65.0	200	180	
Sierra	MW-466S-OCT25-10062025	10/6/2025	SW6020B	Sodium	ug/l	7,280	90.0	200	180	
Sierra	MW-466S-OCT25-10062025	10/6/2025	EPA 300.0	Sulfate	ug/l	8,200	500	1500	1000	J
Sierra	MWDUP1-OCT25-10062025	10/6/2025	SM2320B	Alkalinity, Total	ug/l	14,500	2600	8000	6000	J
Sierra	MWDUP1-OCT25-10062025	10/6/2025	SW6020B	Antimony	ug/l	<0.500	0.200	1.00	0.500	
Sierra	MWDUP1-OCT25-10062025	10/6/2025	SW6020B	Calcium	ug/l	4,520	50.0	120	100	
Sierra	MWDUP1-OCT25-10062025	10/6/2025	EPA 300.0	Chloride	ug/l	5,900	600	1500	1200	
Sierra	MWDUP1-OCT25-10062025	10/6/2025	SW6020B	Copper	ug/l	4.60	0.850	1.00	0.900	J
Sierra	MWDUP1-OCT25-10062025	10/6/2025	SM5310C	Dissolved Organic Carbon	ug/l	<900	500	1000	900	
Sierra	MWDUP1-OCT25-10062025	10/6/2025	SW6020B	Iron	ug/l	144	20.0	50.0	40.0	J
Sierra	MWDUP1-OCT25-10062025	10/6/2025	SW6020B	Lead	ug/l	0.357	0.120	0.500	0.240	J
Sierra	MWDUP1-OCT25-10062025	10/6/2025	SW6020B	Magnesium	ug/l	1,990	16.0	50.0	32.0	J
Sierra	MWDUP1-OCT25-10062025	10/6/2025	EPA 365.1	Phosphate (PO4)	ug/l	108	92.0	150	150	J
Sierra	MWDUP1-OCT25-10062025	10/6/2025	SW6020B	Potassium	ug/l	639	65.0	200	180	
Sierra	MWDUP1-OCT25-10062025	10/6/2025	SW6020B	Sodium	ug/l	6,720	90.0	200	180	
Sierra	MWDUP1-OCT25-10062025	10/6/2025	EPA 300.0	Sulfate	ug/l	12,000	500	1500	1000	J

Small Arms Range Sampling Reports

pH Sampling

Fall 2025

CAMP EDWARDS SMALL ARMS RANGE ANNUAL SOIL SAMPLING OCTOBER 2025
FIELD PH SAMPLING LOCATIONS AND DEPTHS
INDIA RANGE

Site	Date:	10/7/2025	
India	Depth (in) bgs	pH Reading	Time of Reading
SSIRNG001A	0-3	6.40	1351
SSIRNG001B	3-6	6.61	1353
SSIRNG001C	6-9	6.20	1356
SSIRNG001D	9-12	5.92	1359
SSIRNG001E	12-15	5.88	1403
SSIRNG001F	15-18	6.07	1406
SSIRNG001G	18-21	5.57	1412
SSIRNG001H	21-24	5.79	1415
SSIRNG002A	0-3	6.39	1424
SSIRNG002B	3-6	6.15	1425
SSIRNG002C	6-9	6.07	1427
SSIRNG002D	9-12	6.19	1429
SSIRNG002E	12-15	5.65	1431
SSIRNG002F	15-18	5.59	1435
SSIRNG002G	18-21	5.49	1439
SSIRNG002H	21-24	5.50	1441
SSIRNG003A	0-3	6.13	1500
SSIRNG003B	3-6	6.40	1502
SSIRNG003C	6-9	6.16	1505
SSIRNG003D	9-12	6.04	1508
SSIRNG003E	12-15	5.85	1510
SSIRNG003F	15-18	5.80	1513
SSIRNG003G	18-21	6.43	1517
SSIRNG003H	21-24	6.61	1520

pH method measurement: EPA SW 846 Method 9045D

INDIA RANGE
CAMP EDWARDS SMALL ARMS RANGE ANNUAL SOIL SAMPLING OCTOBER 2025
FIELD PH SAMPLING LOCATIONS AND DEPTHS
JULIET RANGE

Site	Date:	10/9/2025	
Juliet	Depth (in) bgs	pH Reading	Time of Reading
SSJRNG001A	0-3	6.20	0807
SSJRNG001B	3-6	6.01	0809
SSJRNG001C	6-9	6.25	0812
SSJRNG001D	9-12	6.16	0814
SSJRNG001E	12-15	6.16	0816
SSJRNG001F	15-18	5.89	0818
SSJRNG001G	18-21	5.82	0820
SSJRNG001H	21-24	5.77	0824
SSJRNG002A	0-3	5.92	0829
SSJRNG002B	3-6	6.32	0830
SSJRNG002C	6-9	6.08	0831
SSJRNG002D	9-12	6.02	0832
SSJRNG002E	12-15	6.22	0833
SSJRNG002F	15-18	6.20	0834
SSJRNG002G	18-21	6.16	0835
SSJRNG002H	21-24	6.30	0836
SSJRNG003A	0-3	5.82	0841
SSJRNG003B	3-6	6.08	0842
SSJRNG003C	6-9	6.38	0843
SSJRNG003D	9-12	6.33	0846
SSJRNG003E	12-15	6.54	0847
SSJRNG003F	15-18	6.49	0848
SSJRNG003G	18-21	6.53	0850
SSJRNG003H	21-24	6.33	0851

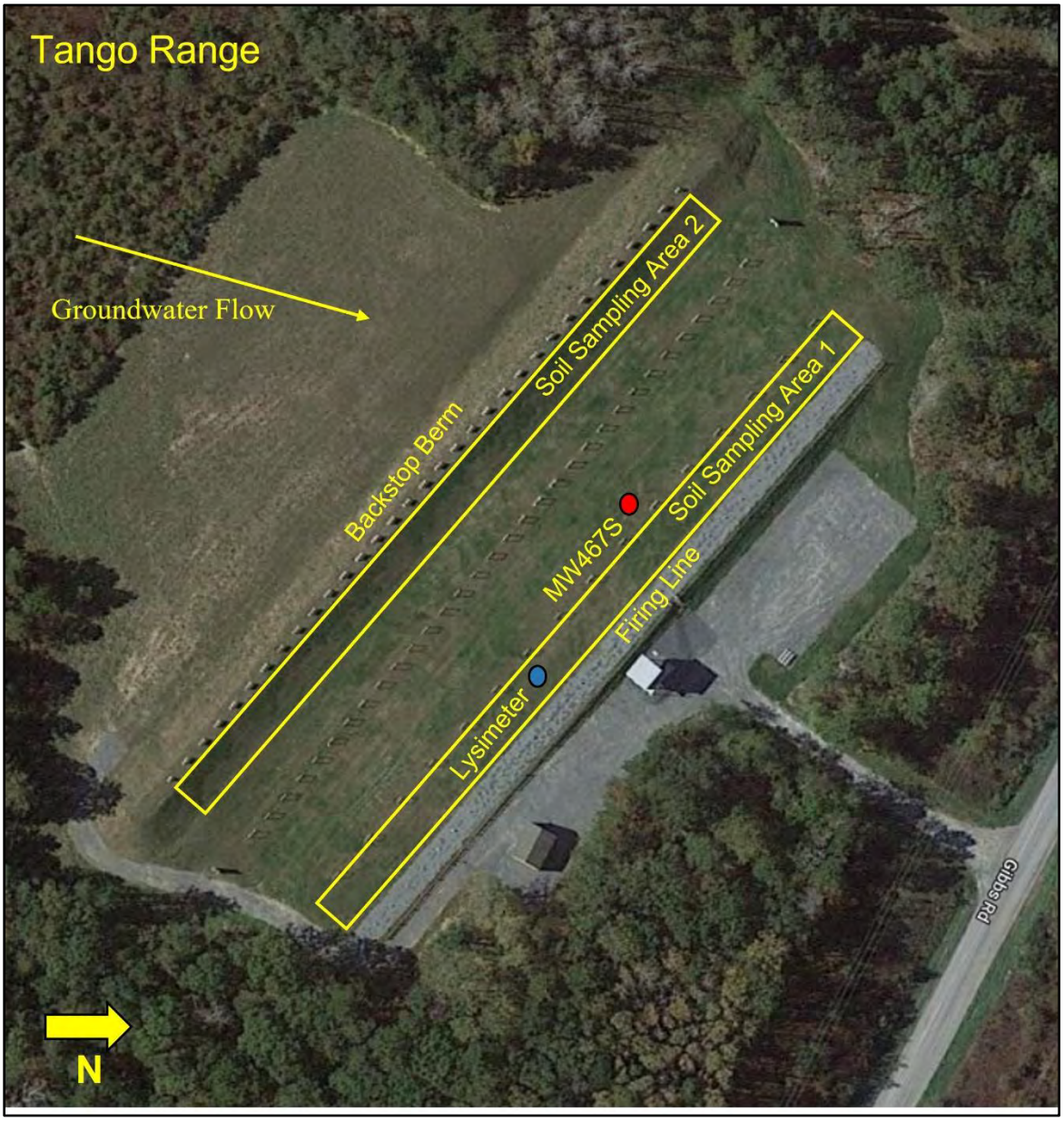
pH method measurement: EPA SW 846 Method 9045D

INDIA RANGE
CAMP EDWARDS SMALL ARMS RANGE ANNUAL SOIL SAMPLING OCTOBER 2025
FIELD PH SAMPLING LOCATIONS AND DEPTHS
KILO RANGE

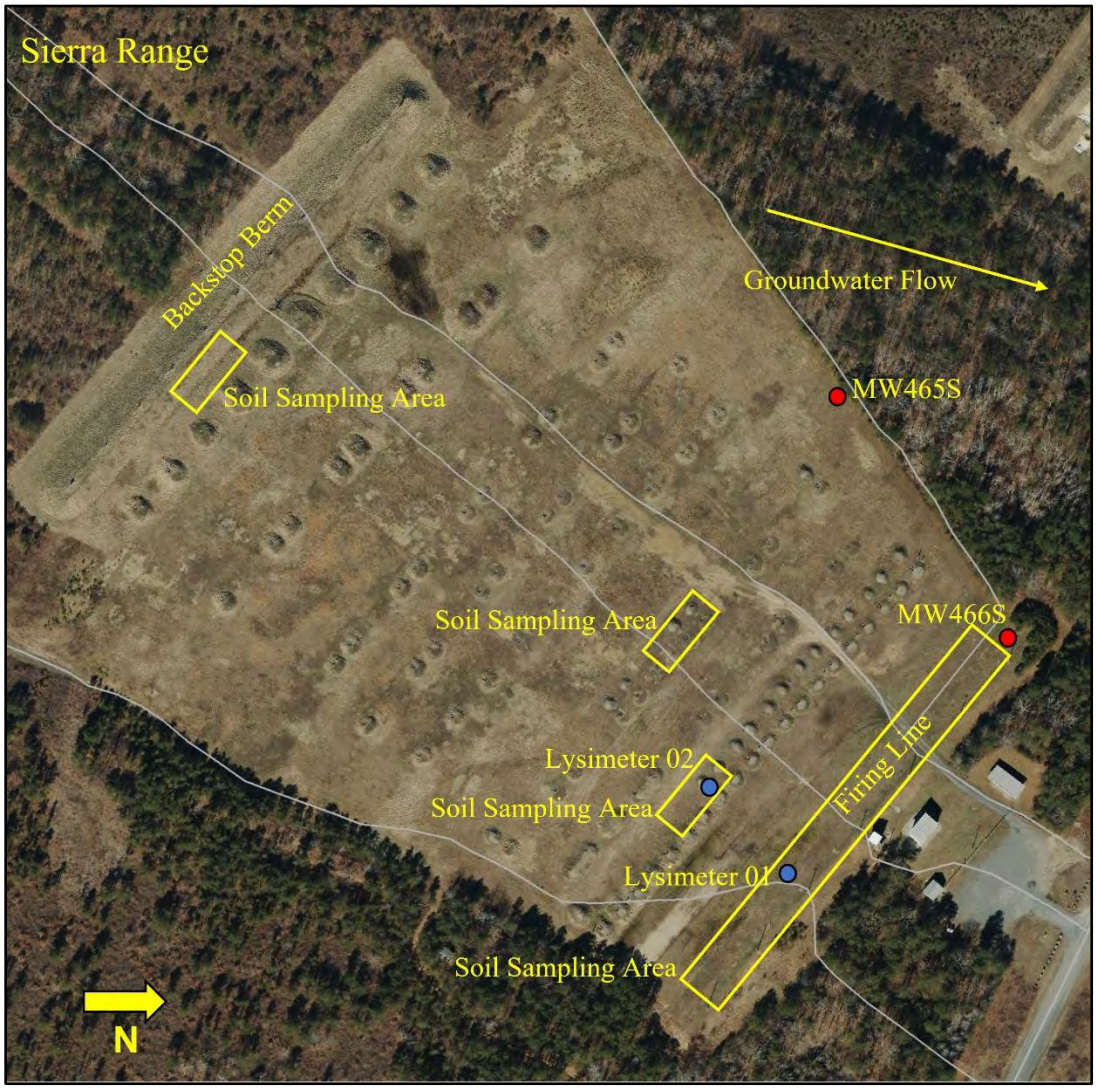
Site	Date:	10/9/2025	
Kilo	Depth (in) bgs	pH Reading	Time of Reading
SSKRNG001A	0-3	6.30	0935
SSKRNG001B	3-6	6.00	0936
SSKRNG001C	6-9	5.99	0938
SSKRNG001D	9-12	6.06	0940
SSKRNG001E	12-15	6.16	0943
SSKRNG001F	15-18	6.14	0945
SSKRNG001G	18-21	6.23	0946
SSKRNG001H	21-24	5.91	0947
SSKRNG002A	0-3	5.04	0953
SSKRNG002B	3-6	6.09	0954
SSKRNG002C	6-9	6.05	0955
SSKRNG002D	9-12	6.07	0956
SSKRNG002E	12-15	6.05	0957
SSKRNG002F	15-18	6.16	0958
SSKRNG002G	18-21	6.20	0959
SSKRNG002H	21-24	6.32	1000
SSKRNG003A	0-3	6.37	1002
SSKRNG003B	3-6	6.55	1004
SSKRNG003C	6-9	6.21	1006
SSKRNG003D	9-12	6.01	1007
SSKRNG003E	12-15	6.06	1009
SSKRNG003F	15-18	6.21	1010
SSKRNG003G	18-21	6.19	1011
SSKRNG003H	21-24	6.34	1012

pH method measurement: EPA SW 846 Method 9045D

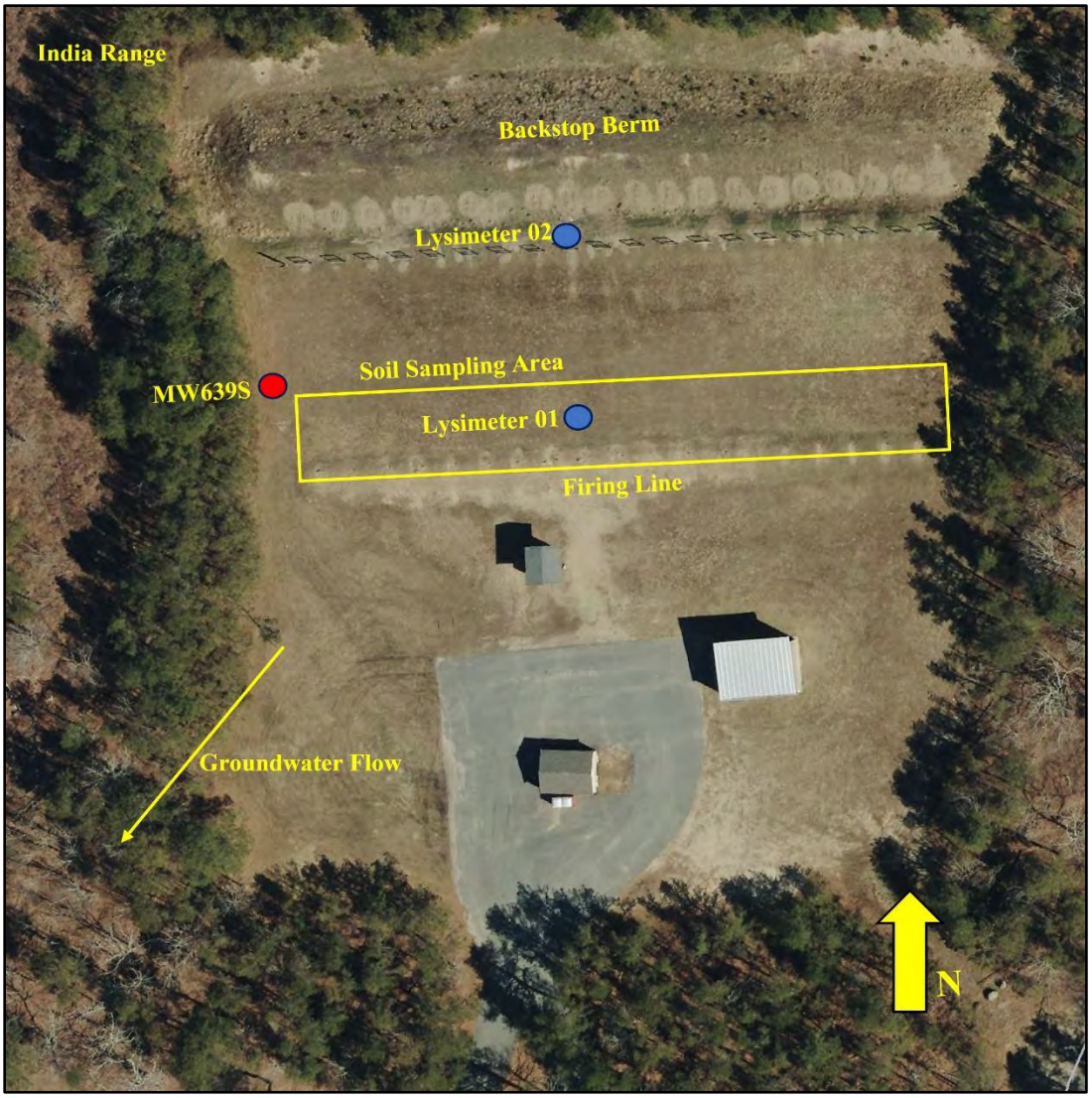
Small Arms Range Sample Area Figures



Tango Range (copper only), Structures, and Sampling Areas
Camp Edwards, Massachusetts

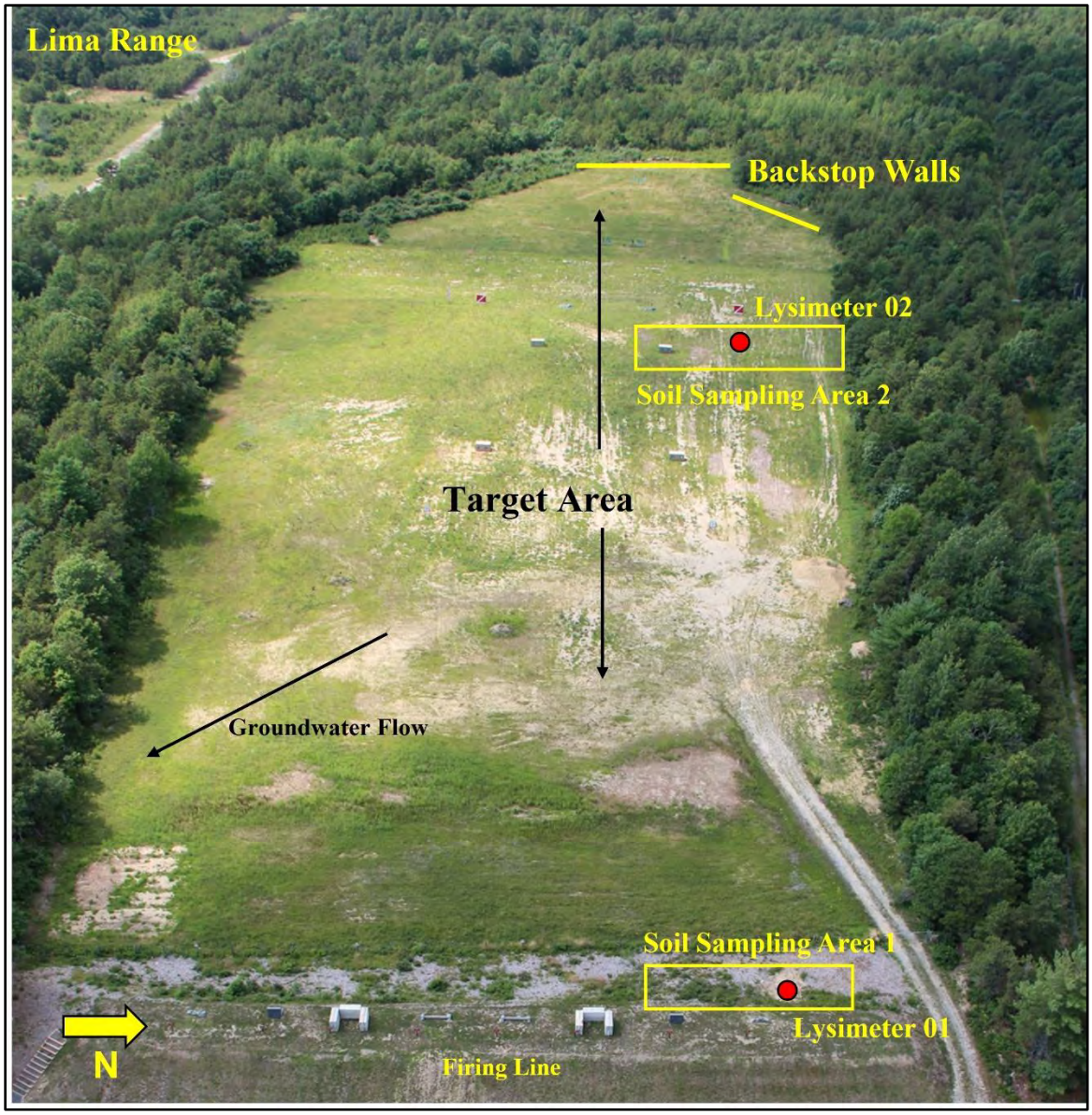


Sierra Range (copper only) Sampling Areas
Camp Edwards, Massachusetts
MW=Monitoring Well

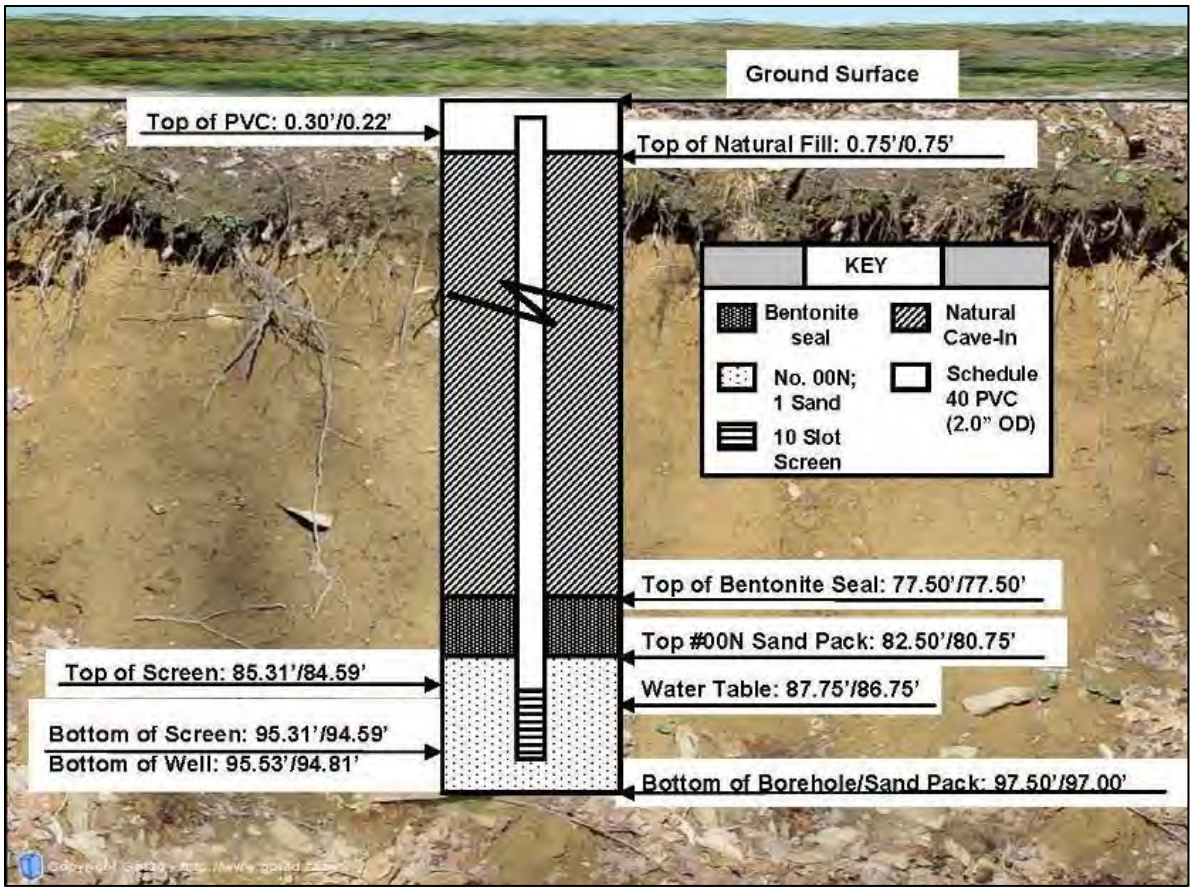


India Range (copper only) Sampling Areas
Camp Edwards, Massachusetts
MW=Monitoring Well

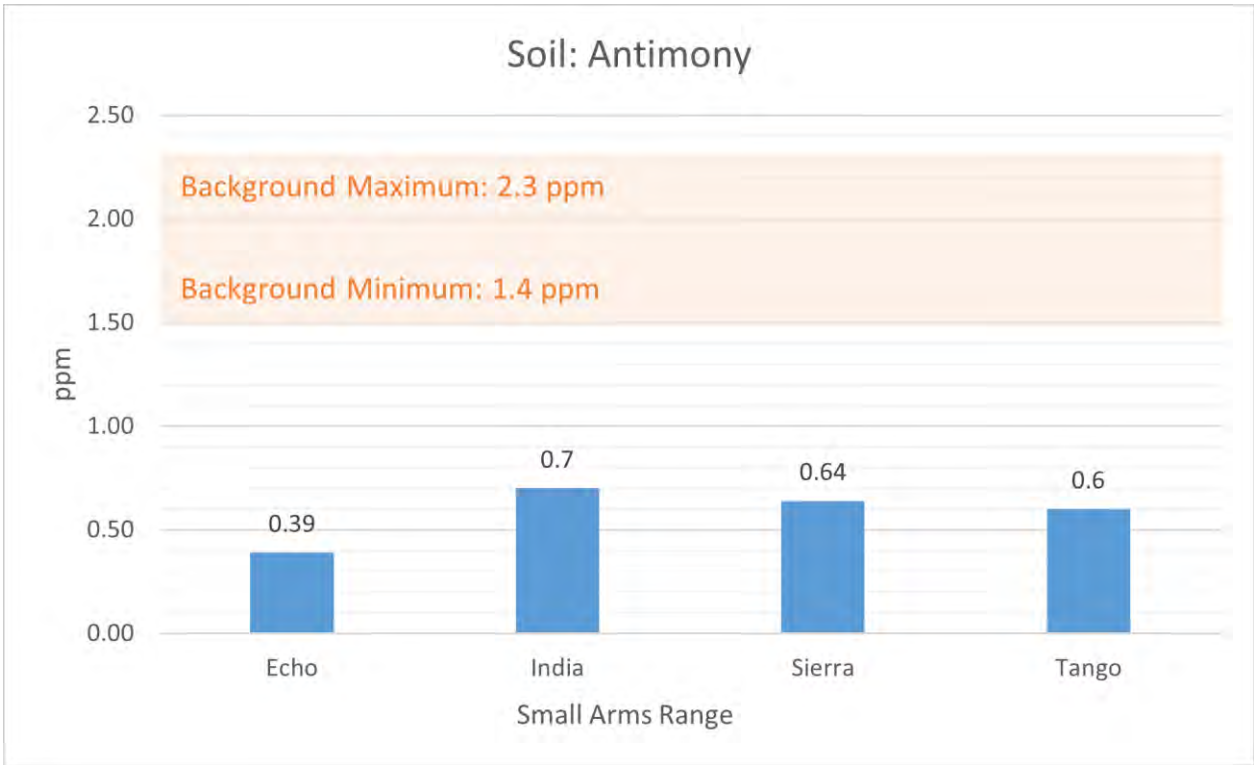
Echo Range Sampling Areas
Camp Edwards, Massachusetts
MW=Monitoring Well



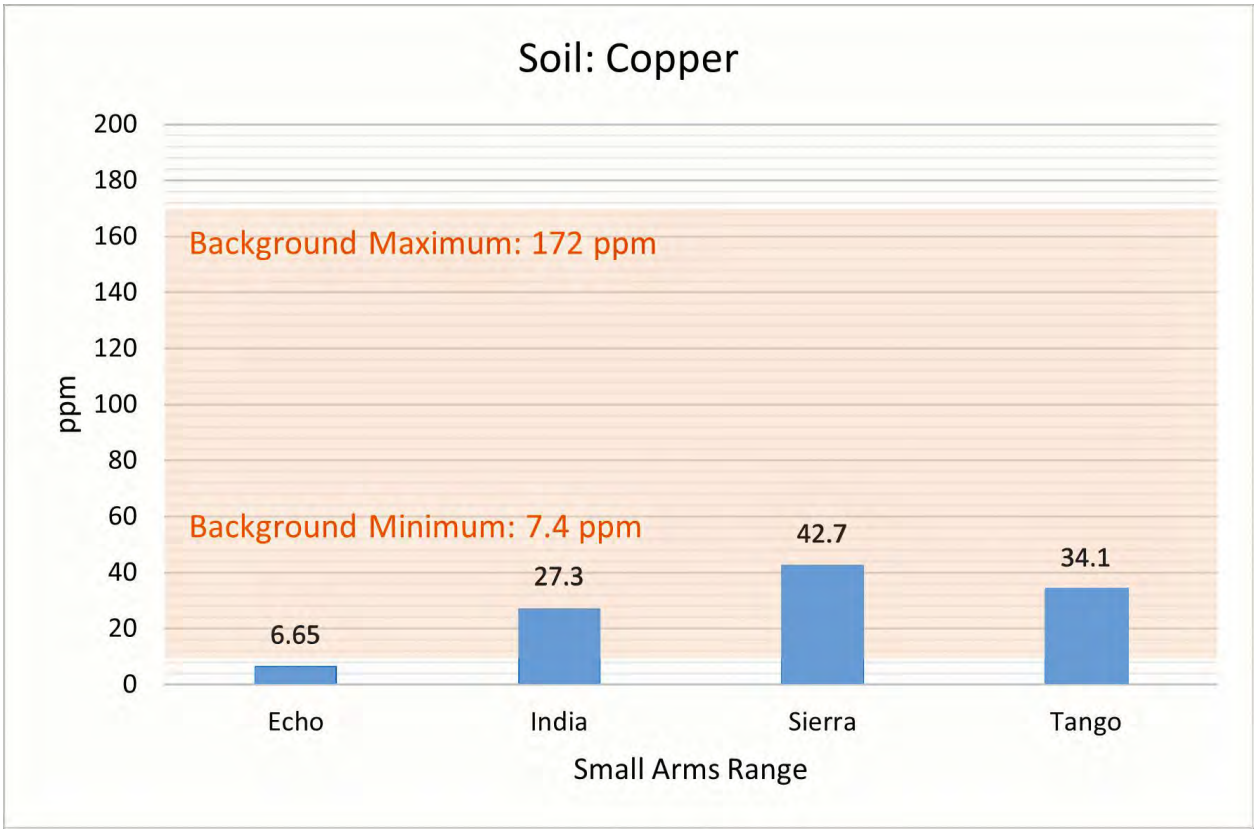
Lima Range
Camp Edwards, Massachusetts.



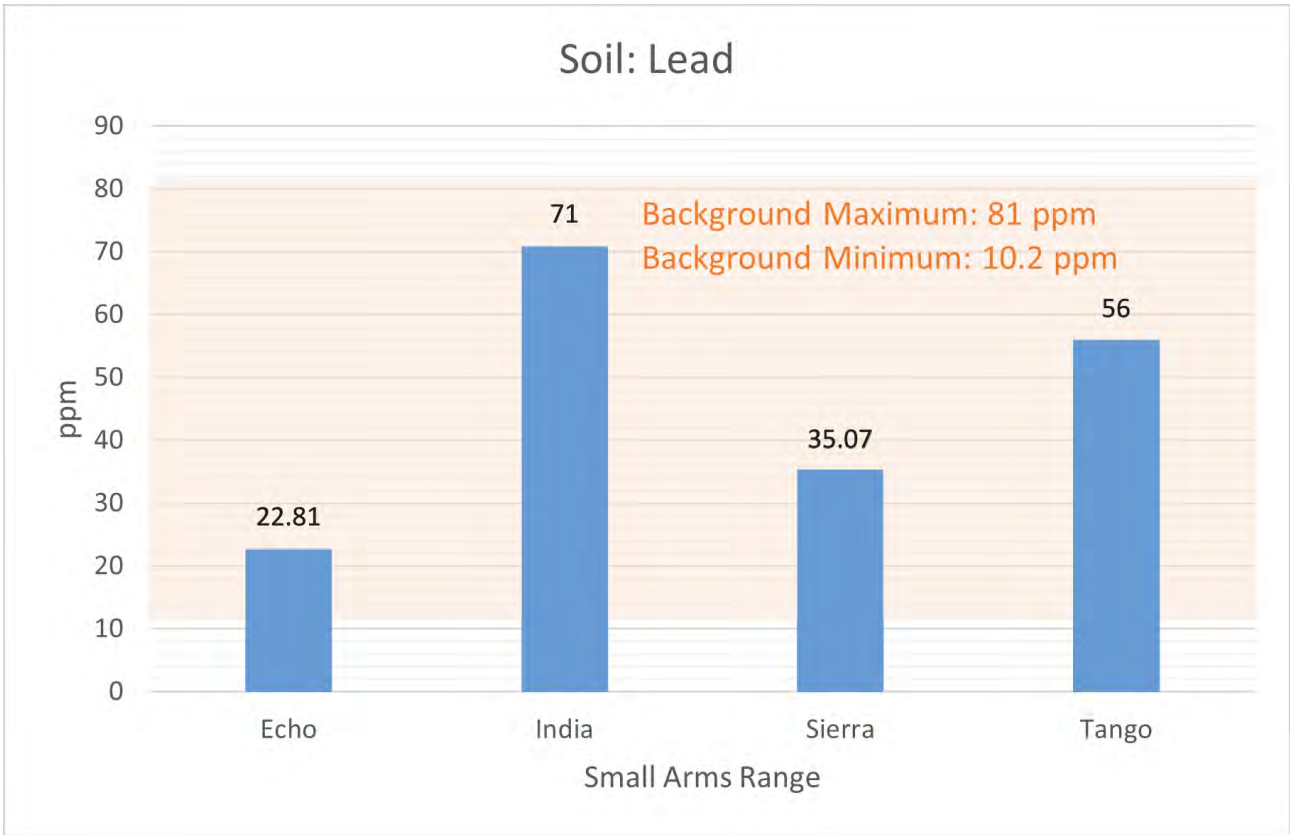
An example of a groundwater well installation.



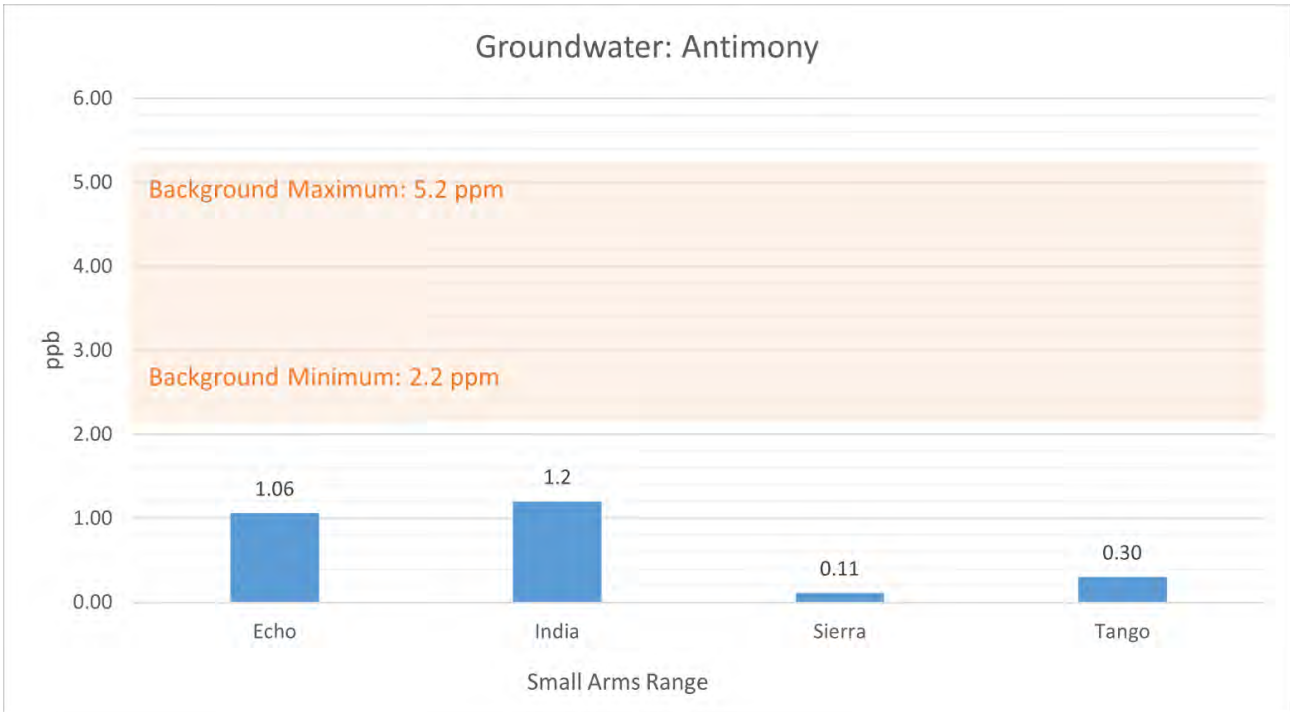
Surface soil action levels for antimony as referenced in the OMMPs are: 300 mg/Kg. mg/Kg=milligrams per kilograms or ppm Background levels were established for Camp Edwards by MassDEP and USEPA (AMEC, 2009), (Ogden Environmental and Energy Services, 2002).



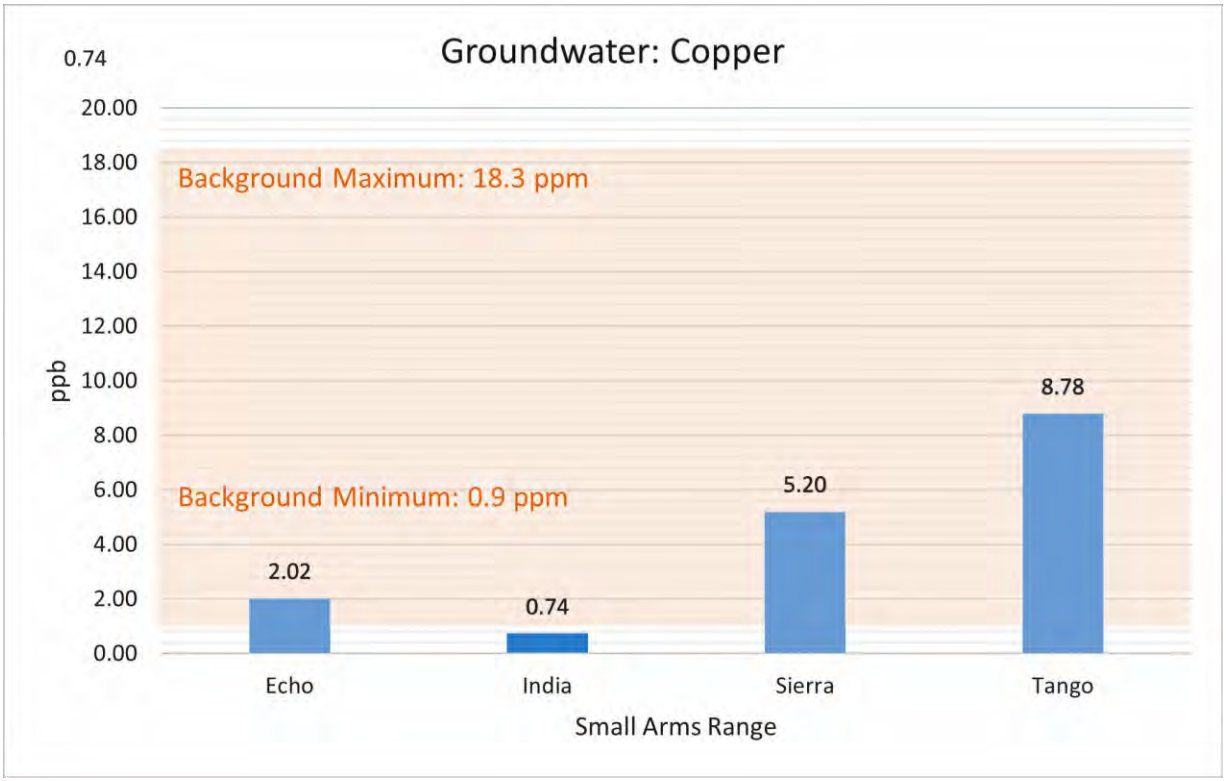
Surface soil action levels for copper as referenced in the OMMPs are: 10,000 mg/Kg. mg/Kg=milligrams per kilograms or ppm Background levels were established for Camp Edwards by MassDEP and USEPA (AMEC, 2009), (Ogden Environmental and Energy Services, 2002).



Surface soil action levels for lead as referenced in the OMMPs are 3,000 mg/Kg. mg/Kg=milligrams per kilograms or ppm
Background levels were established for Camp Edwards by MassDEP and USEPA (AMEC, 2009), (Ogden Environmental and Energy Services, 2002).



Groundwater action levels for antimony as referenced in the OMMPs are 3 ug/L. ug/L=micrograms per liter or ppb
Background levels were established for Camp Edwards by MassDEP and USEPA (AMEC, 2009), (Ogden Environmental and Energy Services, 2002).



Groundwater action levels for copper as referenced in the OMMPs are 650 ug/L. ug/L=micrograms per liter or ppb
Background levels were established for Camp Edwards by MassDEP and USEPA (AMEC, 2009), (Ogden Environmental and Energy Services, 2002).

Groundwater action levels for lead as referenced in the OMMPs are 7.5 ug/L. ug/L=micrograms per liter or ppb
Background levels were established for Camp Edwards by MassDEP and USEPA (AMEC, 2009), (Ogden Environmental and Energy Services, 2002).

Soldier Validation Lane Annual Report

Camp Edwards --- Massachusetts Army National Guard

Soldier Validation Lane Annual Monitoring Report

January, 2026

(NHESP Tracking No.: 08-24210)

Soldier Validation Lane Use

No site composition changes occurred in FY25.

SVL Assessments after 2025 Training Season

All sites with containers were visited on January 6th, 2026 to evaluate training impacts during the 2025 training season. The assessment methodology matched the assessment performed in the Baseline Condition Assessment Report and FYs 12-24, to provide a means of comparison. The containers replicate buildings (conex), and prop materials are utilized to create a more realistic setting, such as barrels, bicycles, grills, tires, wall sections, etc. No major changes were made to sites during 2025 and management activity was limited to mowing by the Training Lands Specialist in November 2025. Limited training impacts occurred at SVL sites and the sites are stable with regular training use.

Conclusion

All regulatory conditions were followed during use of the SVLs and BPs for training. Erosion and rutting impacts have remained static at most sites on the lanes as expected, with regular levels of vehicle use and regular storm water runoff on dirt roads.MAARNG will continue to strive to minimize environmental impacts from these lanes by following the established guidelines.

An important note on the Soldier Validation Lane sites and their continued maintenance and use for training is that these sites play an important role in the pine barrens mosaic of Camp Edwards. They function as woodland openings supporting sandplain and barrens species including endemic plants and listed flora and fauna. This includes observations of Purple Tiger Beetle (*Cicindela purpurea*), Agassiz's Clam Shrimp (*Eulimnadia agassizii*), Pine Barrens Golden-heather (*Hudsonia ericoides*), and others. Their stable land condition with ongoing maintenance and use provides habitat benefit and soldier training benefit.

Figure 1: SVL1

Figure 2: SVL 2

Figure 3: SVL 2

Figure 4: NBC

Figure 5: NBC

Figure 6:NBC

Figure 7: BP-12

Figure 8: BP-20

Figure 9: BP-24

Figure 10: Pew Rd

Appendix D
Environmental Laws and Regulations

Environmental Laws and Regulations
Governing MAARNG Activities in the Training Area/Reserve

Reserve EPS	*Federal Law / Regulation*	*State Law / Regulation*	*DoD Regulation*
Groundwater Resources	Clean Water Act Safe Drinking Water Act	Drinking Water Quality Standards (310 CMR 22.00) State Wellhead Protection (310 CMR 22.21) Water Management Act (310 CMR 36.00)	AR 200-1 AR 200-2 Camp Edwards Regulation (CER) 385-63
Wetlands and Surface Water	Clean Water Act Coastal Zone Management Act Floodplains Management (EO 11988) Protection of Wetlands (EO 11990) Rivers and Harbors Act of 1899 Sikes Act Wetlands Management (EO 11990)	Massachusetts Wetlands Protection Act (M.G.L. c. 131, s40; 310 CMR 100.00)	AR 200-2 CER 385-63
Rare Species	Federal Endangered Species Act Sikes Act	Massachusetts Endangered Species Act (M.G.L. c. 131A, 321 CMR 10.00)	AR 200-1 AR 200-2 AR 200-3 CER 385-63
Soil Conservation	Sikes Act Soils and Water Conservation Act Use of Off-Road Vehicles on Public Lands (EO 11989)		AR 200-1 AR 200-2 AR 200-3 CER 385-63
Vegetation Management	American Indian Religious Freedom Act Environmental Justice (EO 12898) Exotic Organisms (EO 11987) Sikes Act		AR 200-1 AR 200-2 AR 200-3 CER 385-63
Habitat Management	Sikes Act	Massachusetts Endangered Species Act (M.G.L. c. 131A, 321 CMR 10.00)	AR 200-1 AR 200-2 AR 200-3 CER 385-63
Wildlife Management	Fish and Wildlife Conservation Act Migratory Bird Conservation Act Migratory Bird Treaty Act Sikes Act		AR 200-1 AR 200-2 AR 200-3 CER 385-63

Environmental Laws and Regulations
Governing MAARNG Activities in the Training Area/Reserve

Reserve EPS	*Federal Law / Regulation*	*State Law / Regulation*	*DoD Regulation*
Air Quality	Clean Air Act	State Air Quality Regulations (310 CMR 4.00)	AR 200-1 AR 200-2 CER 385-63
Noise Management	Federal Interagency Committee Land Noise Control Act Occupational Safety & Health Act Use Planning Standards on Urban Noise, Guidelines for Considering Noise in Land Planning and Control (June 1990)		AR 200-1 AR 200-2
Pest Management	Animal Damage Control Act Federal Insecticide, Fungicide, and Rodenticide Act Noxious Weed Act Resource Conservation and Recovery Act Sikes Act Toxic Substances Control Act		DoD 4150.7 AR 200-1 AR 200-2 AR 200-5 AR 420-47
Fire Management	Clean Air Act Sikes Act The National Fire Code Uniform Fire Code	State Air Quality Regulations (310 CMR 4.00)	AR 200-1 AR 200-2 AR 200-3 AR 420-90 CER 385-63
Storm Water Management	Clean Water Act NPDES discharge permitting and limitations	Massachusetts Wetlands Protection Act (M.G.L. c. 131 s.40, 310 CMR 10.00.)	AR 200-1 AR 200-2
Wastewater	Clean Water Act	Title V (310 CMR 15.00)	AR 200-1 CER 385-63
Solid Waste	Resource Conservation and Recovery Act Toxic Substances Control Act	State Solid Waste Handling and Disposal (310 CMR 16.00/19.00)	AR 200-1 AR 200-2 AR 420-47 CER 385-63

Environmental Laws and Regulations
Governing MAARNG Activities in the Training Area/Reserve

Reserve EPS	*Federal Law / Regulation*	*State Law / Regulation*	*DoD Regulation*
Hazardous Materials	Asbestos Hazard Emergency Response (40 CFR 763) Federal Insecticide, Fungicide and Rodenticide Act Hazard Communication Standard Program (29 CFR 1910.1200) Lead Contamination Control Act OSHA (29 CFR 1910, 29 USC 91-596) Poison Prevention Packaging Act Toxic Substances Control Act	Hazardous Substances Labeling Law (105 CMR 650.00)	AR 200-1 AR 200-2 CER 385-63
Hazardous Waste	Clean Air Act Clean Water Act Emergency Preparedness and Community Right-To-Know Act Federal Facilities Compliance Act Hazardous Waste Operations and Emergency Response Medical Waste Tracking National Fire Code Oil Pollution Act Pollution Prevention Act Resource Conservation and Recovery Act The National Contingency Plan Underground Storage Tank Program (RCRA, Title I) Uniform Building and Fire Codes Comprehensive Environmental Response, Compensation, and Liability Act	Department of Transportation regulations regarding shipping and transportation, Hazardous Waste Management and Transportation (310 CMR 30.000) Management of Medical Waste (105 CMR 480) Pesticide use (333 CMR 1.00 – 12.00) Solid waste facilities management (310 CMR 16.00/19.00) State right-to-know requirements (105 CMR 670.00) Title V (310 CMR 15.00) Toxic use reduction (310 CMR 5.00) Underground storage tanks standards (527 CMR 4.00 and 9.0) Massachusetts Contingency Plan (310 CMR 40.00)	AR 200-1 AR 200-2 AR 420-47 CER 385-63
Vehicle	Use of Off-Road Vehicles on Public Lands (EO 11989)		AR 200-2 CER 385-63
General Use And Access	Use of Off-Road Vehicles on Public Lands (EO 11989)		AR 200-1 AR 200-2 CER 385-63

Environmental Laws and Regulations
Governing MAARNG Activities in the Training Area/Reserve

Reserve EPS	*Federal Law / Regulation*	*State Law / Regulation*	*DoD Regulation*
Cultural Resources (This EPS refers to archeological resources only; the list of regulations cited here has therefore been restricted to those that pertain to protection of archeological resources)	Antiquities Act of 1906 Archeological and Historic Preservation Act of 1974 Archeological Resources Protection Act of 1979 Consultation and Coordination with Indian Tribal Governments (Executive Order 13175) Curation of Federally Owned/Administered Archeological Collections Executive Memorandum of April 19, 1994 – Government-to-Government Relations with American Tribal Governments National Environmental Policy Act of 1966, as amended Native American Graves Protection and Repatriation Act of 1990	Massachusetts General Laws, Chapter 9, sections 26-27C as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00) Massachusetts Environmental Policy Act (MEPA) Massachusetts General Laws Chapter 30, sections 61 through 62H, inclusive (301 CMR 11.00) Massachusetts General Laws, Chapter 38, section 6B: Chapter 9, sections 26A and 27C; Chapter 7, section 38A; Chapter 114, section 17; as amended by Chapter 659 of the Acts of 1983 and Chapter 386 of the Acts of 1989	AR 200-2 AR 200-4 DA PAM 200-4 Office of the Secretary of Defense, Annotated Policy Document for the American Indian and Alaska Native Policy (27 October 1999)

DOD Regulations include all regulations and directives of the Department of Defense, Department of the Army, and National Guard Bureau.
AR = Army Regulation
CER – Camp Edwards Regulation
CFR – Code of Federal Regulations
CMR - Code of Massachusetts Regulations
DA PAM = Department of Army Pamphlet
EO – Executive Order
M.G.L – Massachusetts General Laws
RCRA – Resource Conservation and Recovery Act

Appendix E
Water Supply Information

Upper Cape Water Supply Cooperative
Long-Term Monitoring Well Network

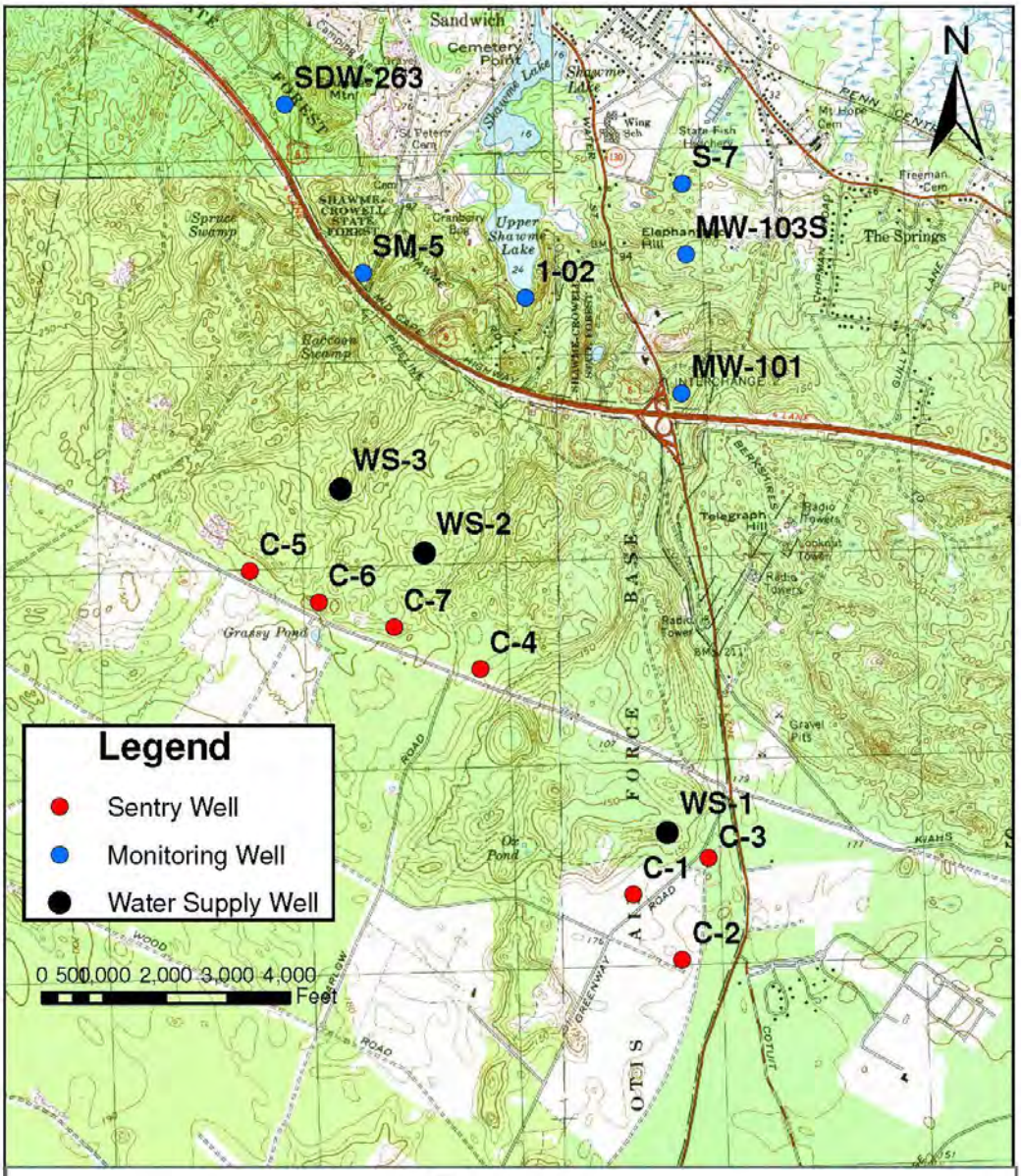


Figure 1
Long-term Monitoring Well Network
Upper Cape Regional Water Supply Cooperative
Cape Cod, Massachusetts

Upper Cape Regional Water Supply Cooperative
2024 Consumer Confidence Report

UPPER CAPE REGIONAL WATER SUPPLY COOPERATIVE

2024 Consumer Confidence Report

PWS ID # 4261024

The Upper Cape Regional Drinking Water Supply Cooperative consists of three groundwater supply wells located in Sandwich, MA on Joint Base Cape Cod (JBCC). A Board of Managers representing four-member public water supply systems manages the Cooperative. The Cooperative has the capacity to provide a supplemental supply of water to its member public water systems, which include the Town of Falmouth, the Bourne Water District, the Mashpee Water District and the Sandwich Water District. The Cooperative also supplies water to the Otis Air National Guard public water system on JBCC and the Barnstable County Jail.

Wells #1, #2 and #3 are located in a forested area of the northeastern portion of the JBCC. In July 2004, the Department of Environmental Protection completed a source water assessment (SWAP) report for the Cooperative water supply wells. A SWAP report is a planning tool to support local and state efforts to improve water supply protection by identifying land uses within water supply protection areas that may be potential sources of contamination. The report identifies potential sources of contamination including a gas station, a medical facility and a military facility, and helps focus protection efforts on appropriate Best Management Practices. A susceptibility ranking of high was assigned to the Cooperative using information that was collected during the assessment. A copy of the report is available, upon request, from the Cooperative. JBCC has adopted a Groundwater Protection Plan to prohibit inappropriate activities on JBCC property within the Zone II areas of community public water supply wells. In addition, the Environmental Management Commission provides oversight over activities on the northern portion of the JBCC. For questions regarding SWAP or other information contained within this document call Marisa Picone-Devine at 508-888-7262.

2024 WATER QUALITY DATA

Listed below are the substances detected in water samples collected during the most recent sampling period from the three (3) wells that comprise the Upper Cape Drinking Water Supply Cooperative.

Inorganic Contaminants	**Year Sampled**	**Highest Result**	**Range of Detections**	**MCL**	**MCLG**	**Violation (Y / N)**	**Possible Sources**
Barium	2020	0.002 ppm	0.002 ppm	2 ppm	2 ppm	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Nitrate	2024	0.12 ppm	0.12 ppm	10 ppm	10 ppm	No	Runoff from fertilizer use; Leaching form septic tanks, sewage; Erosion of natural deposits
Radioactive Contaminants	**Year Sampled**	**Highest Result**	**Range of Detections**	**MCL**	**MCLG**	**Violation (Y / N)**	**Possible Sources**
Gross Alpha	2021	-.210 (+-.331) pCi/l	-.210 (+-.331) pCi/l	15 pCi/l	0	No	Erosion of Natural Deposits
Radium 226 & 228	2021	0.377 pCi/L	0 – 0.377 pCi/l	5 pCi/l	0	No	Decay of natural and manmade deposits
Unregulated and Secondary Contaminants	**Year Sampled**	**Amount Detected**	**Range of Detections**	**SMCL**	**ORSG**	**Violation**	**Possible Sources**
Chloroform	2024	1.91 ppb	1.41 – 1.91 ppb	NA	70 ppb	No	Trihalomethane: by-product of drinking water chlorination. In non-chlorinated sources, chloroform may be naturally occurring
Chloride	2024	9.9 ppm	8.4 – 9.9 ppm	250 ppm	--	NO	Runoff and leaching from natural deposits; seawater influence
Copper	2024	0.042 ppm	0.010-.042 ppm	1 ppm	--	No	Internal corrosion of household plumbing; erosion of natural deposits
Sodium	2023	6.6 ppm	6.6 ppm	--	20 ppm	No	Discharge from the use and improper storage of sodium-containing de-icing compounds or in water-softening agents
Sulfate	2024	4.8 ppm	4.5 – 4.8 ppm	250 ppm	--	No	Runoff and leaching from natural deposits; industrial wastes
Zinc	2024	0.025 ppm	0.0 – 0.025	5 ppm	--	No	Corrosion of household plumbing systems; erosion of natural deposits

Maximum Contaminant Level (MCL): The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.
Maximum Contaminant Level Goal (MCLG): The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.
Office of Research and Standards Guideline (ORSG): This is the concentration of a chemical in drinking water, at

or below which, adverse health effects are unlikely to occur after chronic (lifetime) exposure. If exceeded, it serves as an indicator of the potential need for further action

Parts per million (ppm) or Milligrams per liter (mg/l): One part per million corresponds to one minute in two years.

Parts per billion (ppb) or Micrograms per liter (ug/l): One part per billion corresponds to one minute in 2,000 years.

Picocuries per liter (pCi/L): A measure of radioactivity.

Secondary Maximum Contaminant Level (SMCL): These standards are developed to protect the aesthetic qualities of drinking water and are not health based.

Unregulated Contaminants: Substances for which EPA has not established drinking water standards. The purpose of unregulated monitoring is to assist EPA in determining their occurrence in drinking water and whether future regulation is warranted.

Important Information about Your Drinking Water

Availability of Monitoring Data for Unregulated Contaminants for

The Upper Cape Regional Water Supply Cooperative

As required by US Environmental Protection Agency (EPA), our water system has sampled for a series of unregulated contaminants. Unregulated contaminants are those that don't yet have a drinking water standard set by EPA. The purpose of monitoring for these contaminants is to help EPA decide whether the contaminants should have a public health protection standard. The contaminants sampled for were:

Lithium, Perfluorotridecanoic acid (PFTrDA); Perfluorotetradecanoic acid (PFTDA);N-Ethyl perfluorooctanesulfonamidoacetic acid (NEtFOSAA); N-Methyl perfluorooctanesulfonamidoacetic acid (NMeFOSAA); Perfluorooctanoic acid (PFOA); Perfluorooctanesulfonic acid (PFOS); Perfluorohexanoic acid (PFHxA); Perfluoroheptanoic acid (PFHpA); Perfluorononanoic acid (PFNA); Perfluorodecanoic acid (PFDA);

Perfluoroundecanoic acid (PFUnA); Perfluorododecanoic acid (PFDoA); Perfluorobutanesulfonic acid (PFBS) ;

Perfluorohexanesulfonic acid (PFHxS); Hexafluoropropylene oxide dimer acid (HFPO-DA); 4,8-Dioxa-3H-perfluorononanoic acid (ADONA); Perfluorobutanoic acid (PFBA); Perfluoroheptanesulfonic acid (PFHpS);

Perfluoropentanoic acid (PFPeA); Perfluoropentanesulfonic acid (PFPeS); 8:2 Fluorotelomersulfonic acid (8:2FTS); 9-Chlorohexadecafluoro-3-oxanonane-1-sulfonic acid (9Cl-PF3ONS); 11-Chloroeicosafluoro-3-oxaundecane-1-sulfonic acid (11Cl-PF3OUdS); 6:2 Fluorotelomersulfonic acid (6:2FTS), 4:2 Fluorotelomersulfonic acid (4:2FTS) ; Nonafluoro-3,6-dioxaheptanoic acid (NFDHA) ; Perfluoro (2-ethoxyethane) sulfonic acid (PFEESA); Perfluoro-3-methoxypropanoic acid (PFMOPrA); Perfluoro-4-methoxybutanoic acid (PFMOBA);

The first of two rounds of UCMR 5 samples were taken in December 2024: there were **NO** detections of any of the analytes in any of the samples.

What should I do?

You do not have to do anything but as our customers you have a right to know that these data are available. You may share this information with other people who drink this water, especially those who may not have received this notice directly (for example, people in apartments, nursing homes, schools, food establishments, medical facilities and businesses).

For information on the Unregulated Contaminant Monitoring Program, visit the MassDEP website (http://www.mass.gov/eea/agencies/massdep/water/drinking/water-systems-ops.html) and navigate to Unregulated Contaminant Monitoring Program.

If you want to speak with someone at the Upper Cape Regional Water Supply Cooperative about the results, please contact Marisa Picone-Devine at 508-888-7262.

This notice is being sent to you by The Upper Cape Regional Water Supply Cooperative

PWS ID#: 4261024 Date distributed: January 2, 2025

Otis Air National Guard Base
2024 Consumer Confidence Report

2024 Consumer Confidence Report

For
Otis Air National Guard Base
Otis ANGB, Massachusetts
MassDEP PWS ID #4096001

This report is a snapshot of the drinking water quality that we provided last year. Included are details about where your water comes from, what it contains, and how it compares to state and federal standards. We are committed to providing you with this information because informed customers are our best allies.

PUBLIC WATER SYSTEM INFORMATION

Address: 156 Reilly St., Box 12 Otis Air National Guard Base on Joint Base Cape Cod, Massachusetts

Contact Person: Mr. Bernie Marshall

Telephone #: (774) 392-7410

Water System Improvements
Our water system is routinely inspected by the Massachusetts Department of Environmental Protection (MassDEP). MassDEP inspects our system for its technical, financial, and managerial capacity to provide safe drinking water to you. To ensure that we provide the highest quality of water available, your water system is operated by a Massachusetts certified operator who oversees the routine operations of our system. As part of our ongoing commitment to service, the MassDEP Drinking Water Program has determined that the public water supply system at Otis Air National Guard Base is compliant with all national Primary Drinking Water Standards and MassDEP Drinking Water Regulations.

Opportunities for Public Participation
If you would like to participate in discussions regarding your water quality, you may attend the following meetings or educational events: *Please see the Otis Notice for any future meetings.*

YOUR DRINKING WATER SOURCE

Where Does My Drinking Water Come From?
Your water is provided by the following sources listed below:

Our drinking water supply is provided entirely by groundwater. J-Well (4096001-01G), which is located on Herbert Road, is our primary pumping station. We are also interconnected to the Upper Cape Regional Water Supply Cooperative. The Cooperative's water sources come from three wells located in the northeastern corner of Joint Base Cape Cod. On average, we provide up to 300,000 gallons of high-quality water every day. All of the Otis public water supply is drawn from the Sagamore Lens of the Cape Cod single-source aquifer. This lens runs from the Cape Cod Canal eastward into the town of Yarmouth. To learn more about our watershed on the Internet, go to the U.S. Environmental Protection Agency's (EPA) "How's My Waterway" website at the following link: *https://www.epa.gov/waterdata/hows-my-waterway.*

Source Name	MassDEP Source ID#	Source Type	Location of Source
J-Well	4096001-01G	Groundwater	Herbert Road

Is My Water Treated?
Our water system makes every effort to provide you with safe and pure drinking water. To improve the quality of the water delivered to you, we treat the system with potassium carbonate and sodium hypochlorite. The water in this geographic area is naturally acidic, with an average pH of 5.9 (7.0 is neutral). Acidic water can be harmful to the

distribution system. Potassium carbonate is used to buffer the water to as close to a neutral pH as possible. At the request of the U.S. Coast Guard, which is the owner and operator of the family housing area, sodium fluoride is added to the water. This compound has proven effective in strengthening teeth. Finally, sodium hypochlorite is used to disinfect the water supply by killing bacteria. The water quality of our system is constantly monitored by us and MassDEP to determine the effectiveness of existing water treatment and to determine if any additional treatment is required. We add a disinfectant to protect you against microbial contaminants.

How Are These Sources Protected?
The Source Water Assessment and Protection (SWAP) Program, established under the federal Safe Drinking Water Act, requires every state to inventory land uses within the recharge areas of all public water supply sources; to assess the susceptibility of drinking water sources to contamination from these land uses; and to publicize the results to provide support for improved protection. MassDEP has prepared a SWAP Report for the water supply source(s) serving this water system. The SWAP Report assesses the susceptibility of public water supplies.

What is My System's Ranking?
A susceptibility ranking of HIGH was assigned to this system due to the absence hydrogeological barriers (i.e., clay) that can prevent contaminant migration.

Where Can I See The SWAP Report?
Information on obtaining the complete SWAP Report is available by contacting the Water Supply Superintendent at (508) 968-4102. To access the SWAP Report on the Internet, go to the Source Water Assessment & Protection (SWAP) Program Website at the following link: *https://www.mass.gov/service-details/the-source-water-assessment-protection-swap-program.*

Members can help protect sources by:
• practicing good septic system maintenance
• proper disposal of hazardous chemicals and materials
• limiting pesticide and fertilizer use, etc.

SUBSTANCES FOUND IN TAP WATER

Sources of drinking water (both tap water and bottled water) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally-occurring minerals, and in some cases, radioactive material, and can pick up substances resulting from the presence of animals or from human activity.

Contaminants that may be present in source water include:

Microbial contaminants – such as viruses and bacteria, which may come from sewage treatment plants, septic systems, agricultural livestock operations, and wildlife.

Inorganic contaminants – such as salts and metals, which can be naturally-occurring or result from urban stormwater runoff, industrial, or domestic wastewater discharges, oil and gas production, mining, and farming.

Pesticides and herbicides – which may come from a variety of sources such as agriculture, urban stormwater runoff, and residential uses.

Organic chemical contaminants – including synthetic and volatile organic chemicals, which are by-products of industrial processes and petroleum production, and can also come from gas stations, urban stormwater runoff, and septic systems.

Radioactive contaminants – which can be naturally occurring or be the result of oil and gas production and mining activities.

In order to ensure that tap water is safe to drink, the Department of Environmental Protection (MassDEP) and U.S. Environmental Protection Agency (EPA) prescribe regulations that limit the amount of certain contaminants in water provided by public water systems. The Food and Drug Administration (FDA) and Massachusetts Department of Public Health (DPH) regulations establish limits for contaminants in bottled water that must provide the same protection for public health.

All drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the EPA's Safe Drinking Water Hotline (800-426-4791).

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly, and some infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/Centers for Disease Control and Prevention (CDC) guidelines on lowering the risk of infection by cryptosporidium and other microbial contaminants are available from the Safe Drinking Water Hotline (800-426-4791).

If present, elevated levels of lead can cause serious health problems, especially for pregnant women and young children. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing. Otis Air National Guard Base is responsible for providing high quality drinking water but cannot control the variety of materials used in plumbing components. When your water has been sitting for several hours, you can minimize the potential for lead exposure by flushing your tap for 30 seconds to 2 minutes before using water for drinking or cooking. If you are concerned about lead in your water, you may wish to have your water tested. Information on lead in drinking water, testing methods, and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at *http://www.epa.gov/safewater/lead*.

IMPORTANT DEFINITIONS

Maximum Contaminant Level (MCL) – The highest level of a contaminant that is allowed in drinking water. MCLs are set as close to the MCLGs as feasible using the best available treatment technology.

Maximum Contaminant Level Goal (MCLG) –The level of a contaminant in drinking water below which there is no known or expected risk to health. MCLGs allow for a margin of safety.

Secondary Maximum Contaminant Level (SMCL) – These standards are developed to protect the aesthetic qualities of drinking water and are not health based.

Unregulated Contaminants
Unregulated contaminants are those for which EPA has not established drinking water standards. The purpose of unregulated monitoring is to assist EPA in determining their occurrence in drinking water and whether future regulation is warranted.

Massachusetts Office of Research and Standards Guideline (ORSG) – This is the concentration of a chemical in drinking water, at or below which, adverse health effects are unlikely to occur after chronic (lifetime) exposure. If exceeded, it serves as an indicator of the potential need for further action.

Maximum Residual Disinfectant Level (MRDL) – The highest level of a disinfectant (chlorine, chloramines, chlorine dioxide) allowed in drinking water. There is convincing evidence that addition of a disinfectant is necessary for control of microbial contaminants.

Maximum Residual Disinfectant Level Goal (MRDLG) – The level of a drinking water disinfectant (chlorine, chloramines, chlorine dioxide) below which there is no known expected risk to health.
MRDLG's do not reflect the benefits of the use of disinfectants to control microbial contaminants.

MFL = Million Fibers per Liter
ppm = parts per million, or milligrams per liter (mg/l)
ppb = parts per billion, or micrograms per liter (ug/l)
ppt = parts per trillion, or nanograms per liter (ng/l)
pCi/l = picocuries per liter (a measure of radioactivity)
NTU = Nephelometric Turbidity Units
ND = Not Detected
N/A = Not Applicable
mrem/year = millirems per year (a measure of radiation absorbed by the body)

WATER QUALITY TESTING RESULTS

What Does This Data Represent?
The water quality information presented in the table is from the most recent round of testing done in accordance with the regulations. All data shown was collected during the last calendar year unless otherwise noted in the table (within the last 5 years).

Substance (unit of measurement)	Date(s) Collected	90TH percentile	Action Level	MCLG	# of sites sampled	# of sites above Action Level	Possible Source of Contamination
Lead (mg/l)	Sep 25 – Oct 10 2024	0.0015	0.015	0	**40**	**0**	Corrosion of household plumbing systems; Erosion of natural deposits
Copper (mg/l)	Sep 25 – Oct 10 2024	0.394	1.3	1.3	**40**	**0**	Corrosion of household plumbing systems; Erosion of natural deposits; Leaching from wood preservatives

Regulated Contaminant	Date(s) Collected	Highest Amount Detected	Range Detected	MCL (MRDL)	MCLG (MRDLG)	Violation (Y/N)	Possible Source(s) of Contamination
Inorganic Contaminants							
Antimony (ug/l)	2024	ND	N/A	6	6	N	Discharge from fire retardants; ceramics; electronics; solder
Arsenic (ug/l)	2024	ND	N/A	10	N/A	N	Erosion of natural deposits; runoff from orchards; runoff from glass and electronics production wastes
Asbestos (MFL)	2024	ND	N/A	7	7	N	Decay of asbestos cement watermains; Erosion of natural deposits
Barium (mg/l)	2024	0.012	0.00-0.012	2	2	N	Discharge of drilling wastes; discharge from metal refineries; erosion of natural deposits
Beryllium (ug/l)	2024	ND	N/A	4	4	N	Discharge from electrical, aerospace, and defense industries; erosion of natural deposits
Cadmium (ug/l)	2024	ND	N/A	5	5		Corrosion of galvanized pipes; erosion of natural deposits; discharge from metal refineries; runoff from waste batteries and paints
Cyanide (mg/l)	2024	ND	N/A	0.2	0.2	N	Discharge from metal factories; discharge from plastic and fertilizer factories

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Regulated Contaminant	Date(s) Collected	Highest Amount Detected	Range Detected	MCL (MRDL)	MCLG (MRDLG)	Violation (Y/N)	Possible Source(s) of Contamination
Fluoride* (mg/l)	2024	ND	N/A	4	4	N	Erosion of natural deposits; water additive which promotes strong teeth; discharge from fertilizer and aluminum factories
*Fluoride also has a secondary contaminant level (SMCL) of 2 ppm.							
Nitrate (mg/l)	2024	1.6	0.0-1.6	10	10	N	Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits
Nitrite (mg/l)	2024	ND	N/A	1	1	N	Runoff from fertilizer use; leaching from septic tanks; sewage; erosion of natural deposits
Perchlorate (ug/l)	2024	ND	N/A	2.0	N/A	N	Rocket propellants, fireworks, munitions, flares, blasting agents
Organic Contaminant							
PFAS6 (ppt)	2024	2.2	0.20-2.2	4.0	N/A	N	Discharges and emissions from industrial and manufacturing sources associated with the production or use of these PFAS, including production of moisture and oil resistant coatings on fabrics and other materials. Additional sources include the use and disposal of products containing these PFAS, such as fire-fighting foams.
Selenium (ug/l)	2024	ND	N/A	50	50	N	Discharge from metal refineries; erosion of natural deposits; discharge from mines
Thallium (ug/l)	2024	ND	N/A	2	0.5	N	Leaching from ore-processing sites; discharge from electronics, glass, and drug factories
Volatile Organic Contaminants							
Benzene (ug/l)	2024	ND	N/A	5	0	N	Discharge from factories; leaching from gas storage tanks and landfills
Carbon tetrachloride (ug/l)	2024	ND	N/A	5	0	N	Discharge from chemical plants and other industrial activities
o-Dichlorobenzene (ug/l)	2024	ND	N/A	600	600	N	Discharge from industrial chemical factories
p-Dichlorobenzene (ug/l)	2024	ND	N/A	5	5	N	Discharge from industrial chemical factories
1,2-Dichloroethane (ug/l)	2024	ND	N/A	5	0	N	Discharge from industrial chemical factories
1,1-Dichloroethylene (ug/l)	2024	ND	N/A	7	7	N	Discharge from industrial chemical factories
cis-1,2-Dichloroethylene (ug/l)	2024	ND	N/A	70	70	N	Breakdown product of trichloroethylene and tetrachloroethylene

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Regulated Contaminant	Date(s) Collected	Highest Amount Detected	Range Detected	MCL (MRDL)	MCLG (MRDLG)	Violation (Y/N)	Possible Source(s) of Contamination
trans-1,2-Dichloroethylene (ug/l)	2024	ND	N/A	100	100	N	Discharge from industrial chemical factories
Dichloromethane (ug/l)	2024	ND	N/A	5	0	N	Discharge from pharmaceutical and chemical factories
1,2-Dichloropropane (ug/l)	2024	ND	N/A	5	0	N	Discharge from industrial chemical factories
Ethylbenzene (ug/l)	2024	ND	N/A	700	700	N	Leaks and spills from gasoline and petroleum storage tanks
Styrene (ug/l)	2024	ND	N/A	100	100	N	Discharge from rubber and plastic factories; leaching from landfills
Tetrachloroethylene (PCE) (ug/l)	2024	ND	N/A	5	0	N	Discharge from factories and dry cleaners; residual of vinyl-lined water mains
1,2,4-Triclorobenzene (ug/l)	2024	ND	N/A	70	70	N	Discharge from textile-finishing factories
1,1,1-Trichloroethane (ug/l)	2024	ND	N/A	200	200	N	Discharge from use in septic system cleaners
1,1,2-Trichloroethane (ug/l)	2024	ND	N/A	5	3	N	Discharge from industrial chemical factories
Trichloroethylene (TCE) (ug/l)	2024	ND	N/A	5	0	N	Discharge from metal degreasing sites and other factories
Toluene (mg/l)	2024	ND	N/A	1	1	N	Leaks and spills from gasoline and petroleum storage tanks; discharge from petroleum factories
Vinyl Chloride (ug/l)	2024	ND	N/A	2	0	N	Leaching from PVC piping; discharge from plastics factories
Xylenes (mg/l)	2024	ND	N/A	10	10	N	Leaks and spills from gasoline and petroleum storage tanks; discharge from petroleum factories; discharge from chemical factories
Radioactive Contaminants							
Gross Alpha▲ (pCi/l) (minus uranium)	2021	-0.210 (+ -0.331)	-0.461 to -0.210	15	0	N	Erosion of natural deposits
▲The MCL for beta particles is 4 mrem/year. EPA considers 50 pCi/L to be the level of concern for beta particles.							
Radium 226 & 228 (pCi/L) (combined values)	2021	0.377	-0.178 to 0.377	5	0	N	Erosion of natural deposits
Disinfectants and Disinfection By-Products							
Total Trihalomethanes (TTHMs) (ug/l)	QTR3 (2024)	5.08	3.2 - 5.08	80	N/A	N	Byproduct of drinking water chlorination
Haloacetic Acids [HAA5] (ug/l)	QTR3 (2024)	ND	N/A	60	N/A	N	Byproduct of drinking water disinfection

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Regulated Contaminant	Date(s) Collected	Highest Amount Detected	Range Detected	MCL (MRDL)	MCLG (MRDLG)	Violation (Y/N)	Possible Source(s) of Contamination
Chlorine (mg/l) (free, total or combined)	Monthly (2024)	3.10	0.00 – 3.10	4	4	N	Water additive used to control microbes
Chloramines (mg/l)	Monthly (2024)	0.87	0.36 – 0.87	4	4	N	Water additive used to control microbes

Unregulated and Secondary Contaminants

Unregulated contaminants are those for which there are no established drinking water standards. The purpose of unregulated contaminant monitoring is to assist regulatory agencies in determining their occurrence in drinking water and whether future regulation is warranted.

Unregulated Contaminants	Date(s) Collected	Highest Detected	Range Detected	SMCL	ORSG	Possible Source
Bromodichloromethane (ug/l)	2024	ND	N/A	N/A	N/A	Trihalomethane; by-product of drinking water chlorination
Bromoform (ug/l)	2024	ND	N/A	N/A	N/A	Trihalomethane; by- product of drinking water chlorination
Chloroform (ug/l)	2024	ND	N/A	N/A	70	By-product of drinking water chlorination (In non-chlorinated sources it may be naturally occurring)
Dibromochloromethane (ug/l)	2024	1.66	1.23 – 1.66	N/A	N/A	Trihalomethane; by-product of drinking water chlorination
Manganese* (ug/l)	2023	N/A	ND	50	300	Erosion of natural deposits
* US EPA has established a lifetime health advisory (HA) value of 300 ppb for manganese to protect against concerns of potential neurological effects, and a one-day and 10-day HA of 1000 ppb for acute exposure.						
Chloride (mg/l)	2024	9.9	8.4 – 9.9	250	N/A	Runoff and leaching from natural deposits; seawater influence.
Copper (mg/l)	2024	0.764	0.010 – 0.764	1	N/A	Internal corrosion of household plumbing; erosion of natural deposits
Sulfate (mg/l)	2024	6.6	0.0 – 6.6	250	N/A	Runoff and leaching from natural deposits; industrial wastes.
Zinc (mg/l)	2024	0.025	0.0 – 0.025	5	N/A	Corrosion of household plumbing systems; erosion of natural deposits
Sodium (mg/l)	2024	14	0.0 - 14	N/A	20	Discharge from the use and improper storage of sodium-containing de-icing compounds or in water-softening agents

COMPLIANCE WITH DRINKING WATER REGS

Does My Drinking Water Meet Current Health Standards?

We are committed to providing you with the best water quality available. We are proud to report that last year your drinking water met all applicable health standards regulated by the state and federal government.

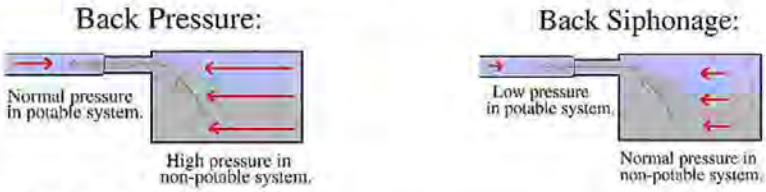
EDUCATIONAL INFORMATON

Cross-Connection Control and Backflow Prevention

Our water system makes every effort to ensure that the water delivered throughout the installation is clean, safe, and free of contamination. Our members work hard to protect the quality of the water delivered to our customers from the time the water is extracted via deep wells from underground aquifers or withdrawal point from a surface water source, throughout the entire treatment and distribution system. But what happens when the water reaches your building? Is there still a need to protect the water quality from contamination caused by a cross-connection? If so, how?

What is a cross-connection?
A cross-connection occurs whenever the drinking water supply is or could be in contact with potential sources of pollution or contamination. Cross-connections exist in piping arrangements or equipment that allows the drinking water to come in contact with non-potable liquids, solids, or gases (hazardous to humans) in event of a backflow.

What is a backflow?
Backflow is the undesired reverse of the water flow in the drinking water distribution lines. This backward flow of water can occur when the pressure created by equipment or a system such as a boiler or air-conditioning is higher than the water pressure inside the water distribution line (back pressure), or when the pressure in the distribution line drops due to routine occurrences such as water main breaks or heavy water demand causing the water to flow backward inside the water distribution system (back siphonage). Backflow is a problem that many water consumers are unaware of, a problem that each and every water customer has a responsibility to help prevent.



What can I do to help prevent a cross-connection?
Without the proper protection something as simple as a garden hose has the potential to contaminate or pollute the drinking water lines in your house. In fact, over half of the country's cross-connection incidents involve unprotected garden hoses. There are very simple steps that you as a drinking water user can take to prevent such hazards, they are:

- NEVER submerge a hose in soapy water buckets, pet watering containers, pool, tubs, sinks, drains, or chemicals.
- NEVER attached a hose to a garden sprayer without the proper backflow preventer.
- Buy and install a hose bibb vacuum breaker in any threaded water fixture. The installation can be as easy as attaching a garden hose to a spigot. This inexpensive device is available at most hardware stores and home-improvement centers.
- Identify and be aware of potential cross-connections to your water line.
- Buy appliances and equipment with backflow preventers.
- Buy and install backflow prevention devices or assemblies for all high and moderate hazard connections.

If you are the owner or manager of a property that is being used as a commercial, industrial, or institutional facility you must have your property's plumbing system surveyed for cross-connection by your water purveyor. If your property has NOT been surveyed for cross-connection, contact your water department to schedule a cross-connection survey.

8

ADDITIONAL INFORMATION

Brown, Red, Orange, or Yellow Water.
Brown, red, orange, or yellow water is usually caused by rust. The different colors can be attributed to varying chemical oxidation states of the iron (rust) and by varying concentrations of the rust in the water. There are two major sources that can cause water to be rusty:

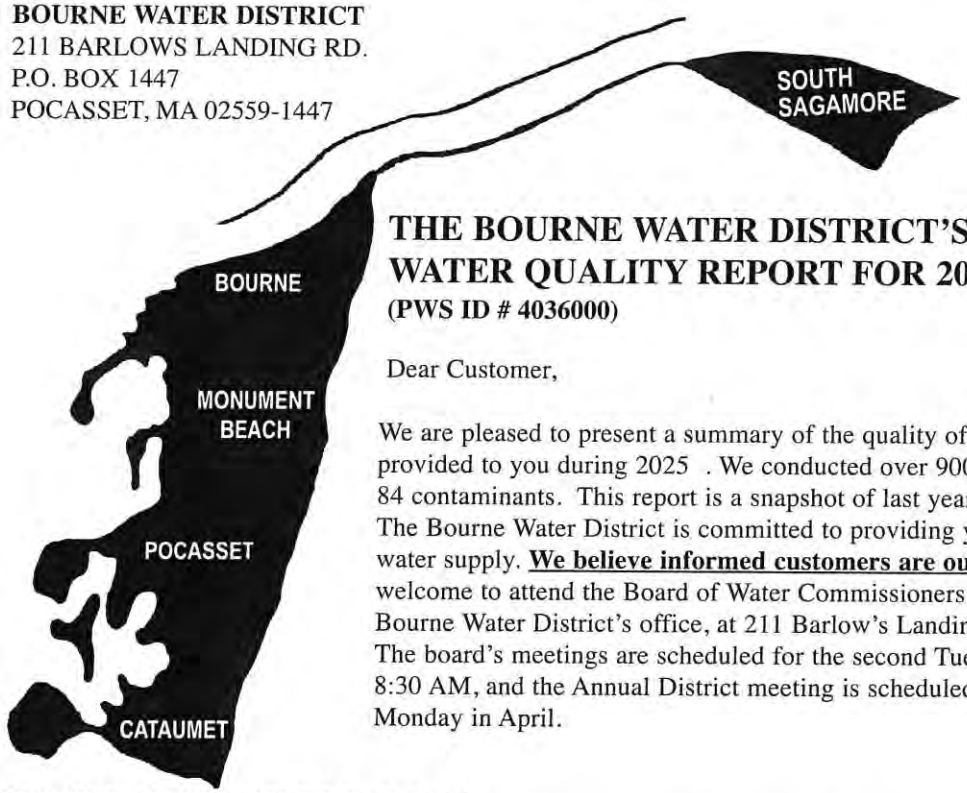
•The water mains, or
•The water pipes in your building

Rusty water occurs from sediment or rust from the inside walls of the water mains. The rust can be disturbed and temporarily suspended in water with unusual water flows from water main breaks or maintenance or by *flushing of a hydrant*. This discolored water is not a health threat.

When the water is discolored it is recommended to either not wash laundry or to use a rust stain remover or regular detergent but not chlorine bleach as it will react with the iron to form a permanent stain. The other major cause of brown, red, orange or yellow water is rusty water pipes in your building. Water that is being discolored by rusty pipes is not a health hazard.

Bourne Water District
2025 Consumer Confidence Report

BOURNE WATER DISTRICT
211 BARLOWS LANDING RD.
P.O. BOX 1447
POCASSET, MA 02559-1447



THE BOURNE WATER DISTRICT'S WATER QUALITY REPORT FOR 2025

(PWS ID # 4036000)

Dear Customer,

We are pleased to present a summary of the quality of the drinking water provided to you during 2025 . We conducted over 900 tests for more than 84 contaminants. This report is a snapshot of last year's water quality. The Bourne Water District is committed to providing you with a reliable water supply. **We believe informed customers are our best allies.** You are welcome to attend the Board of Water Commissioners meetings held at the Bourne Water District's office, at 211 Barlow's Landing Road in Pocasset. The board's meetings are scheduled for the second Tuesday of the month at 8:30 AM, and the Annual District meeting is scheduled on the fourth Monday in April.

WATER SOURCES AND TREATMENT

The Bourne Water District is supplied by 10 different sources, 7 of our own gravel packed well sites and 3 gravel packed well sites from the Upper Cape Regional Water Supply Cooperative. Four of our well sites are in the Monument Beach area of the Town Forest. Two wells are in the Cataumet area of the Town of Bourne. One well is on Joint Base Cape Cod. We have one transfer station on Connery Ave. The Bourne Water District treats all supplies with hydrated lime for corrosion control. The hydrated lime is used to raise the pH of the water. This makes the water less aggressive to the copper pipe and lead joints in your homes to prevent exposure to lead and copper.

WHAT DOES THE FOLLOWING TABLE MEAN?

Action Level (AL) The concentration of a contaminant which if exceeded triggers treatment or other requirements.
Maximum Contaminant Level (MCL) The highest level of a contaminant that is allowed in the drinking water. The MCL is set as close to the MCLG as feasible using the best available treatment technology.
Maximum Contaminant Level Goal (MCLG) The level of a contaminant in the drinking water below which there is no known or expected risk to health. The MCLG allow for a margin of safety.
Office of Research and Standards Guideline (ORSG): This is the concentration of a chemical in drinking water, at or below which, adverse health effects are unlikely to occur after chronic (lifetime) exposure. If exceeded, it serves as an indicator of the potential need for further action.
90th Percentile Out of every 10 houses sampled, 9 were below this level.

KEY TO TABLE

AL = Action Level
MCL = Maximum Contaminant Level
MCLG = Maximum Contaminant Level Goal
MFL = million fibers per liter
Mrem/year = millirems per year (a measure of radiation absorbed by the body)
NTU = Nephelometric Turbidity Units
ORSG = Office of Reasearch and Standards Guideline
pci/l = picocuries per liter (a measurement of radioactivity)
ppm = parts per million, or milligrams per liter (mg/l)
ppb = parts per billion, or micrograms per liter (ug/l)
ppt = parts per trillion, or nanograms per liter
ppq = parts per quadrillion, or picograms per liter
TT = Treatment Technique

DISTRIBUTION SYSTEM WATER QUALITY This report summarizes only those items detected during Sampling-not all contaminants that are monitored

Microbial Results	Highest Detected	Range Detected	MCL	MCLG	Violation	Possible Source of Contamination
Total Coliform Bacteria**	500	0-500	0	0	No	Naturally present in the environment
Fecal Coliform or E. Coli	1	0-1	0	0	No	Human and Animal Fecal Waste

*Compliance with the Fecal Coliform/E.Coli MCL is determined upon additional repeat testing

**Total Coliform:Coliform are bacteria that are naturally present in the environment and are used as an indicator that other potentially harmful bacteria may be present

Lead and Copper	Dates collected	90th Percentile	Action Level	MCGL	# of sites sampled	# Sites above Action Level	Violation	Possible Source of Contamination
Lead (ppb)	9/1/2025 thru 12/31/2025	0.0044	15	0	30	0	No	Corrosion of household plumbing systems: Erosion of natural deposits
Copper (ppm)	9/1/2025 thru 12/31/2025	0.108	1.3	0	30	0	No	Corrosion of household plumbing systems: Erosion of natural deposits

TESTING FOR LEAD - If present, elevated levels of lead can causse serious health problems,especially for pregnant women and young childern. Lead in drinking water is primarily from materials and components associated with service lines and home plumbing .Bourne Water District is responsible for providing high quality drinking water,but cannot control the variety of materials used in plumbing components.When you water has been sitting for several hours,you can minimize the potental for lead exposure by flushing you tap for 30 seconds to 2 minutes before using water for drinking or cooking.If you are concerned about lead in your water,you may wish to have your water tested. Information about lead in drinking water,testing methods and steps you can take to minimize exposure is available from the Safe Drinking Water Hotline or at http://www.epa.gov/safewater/lead.

Regulated Contaminants	Date(s) collected	Highest Detect Value	Range Detected	MCL	MCGL	Violation	
				Inorganic Contaminants:			
Nitrate * (ppm)	2025	0.6	0.15-.60	10	10	No	Runoff from fertilizer use;leaching from septic tanks;sewage;erosion of natural deposits
			Organic Contaminants				
Tetrachloroethylene(PCE)(ppb)	2025	2.07	.52-2.07	5	-	No	Discharge from factories and dry cleaners
Chloroform (ppb	2025	1.71	0-1.71		NA	No	By-product of drinking water chlorination
CIS-1,2 Dichloroethylene (ppb)	2025	2.34	0-2.34	70	NA	No	Breakdown product of tetrachloroethylene

Secondary Contaminents	Date(s) collected	Highest Detect Value	Range Detected	SMCL	OSRG	Possible Source of Contamination
Magnesium (ppm)	2025	2.1	1-2.1	-	-	Natural Mineral and Organic Matter
Chloride (ppm)	2025	44	7.6-44	250	NA	Natural Mineral, Road Salt
Iron (ppb)	2025	0.3	.051-.30	300	NA	Erosion of Natural Deposits and oxidation of iron components
Manganese (ppb)*	2025	0.01	.007-.01	50	NA	Erosion of Natural Deposits
Calcium (ppm)	2025	15	3.5-15	-	-	Natural Mineral and Organic Matter
Sulfate (ppm)	2025	6.3	5.6-6.3	250	250	Natural Sources
Alkalinity	2025	40	Dec-40		NA	
Aluminum	2025	0.051	0.051		0	
Hardness	2025	46	15-46			
pH	2025	8.55	7.05-8.55			

				PER and POLYFLUOROALKYL			
PFOS total of 6 (ppt)	2025	17.2	0-17.2	20 ppt			

NATIONAL PRIMARY DRINKING WATER REGULATION COMPLIANCE

Coliforms are bacteria that are naturally present in the environment and are used as an indicator that other, potentially harmful, waterborne pathogans may be present or that a potential pathway exits through which contamination may enter the drinking water distribution system. We found coliforms indicating the need to look for potential problems in water treatment or distribution. When this occurs, we are required to conduct assessment(s) to identify problems and to correct any problems that were found during these assessments.

Bourne Water District took routine samples on July 2, 2025. Two of those samples came back Coliform positive EColi negative. Bourne was then required to do repeat upstream and downstream samples which all came back clean. On the same day we took a raw water sample at one of the wells which came back EColi positive as the station was off. We isolated the station and did (5) repeat raw water samples which all came back negative. Bourne Water District was required to complete a Level 1 assessment that turned up no issues. The routine samples for all stations and residences was continued on August 5, 2025 and were all negative. After the routine round of testing, Bourne Water was allowed to turn the station back on to the system. It was sampled regularly without detection through December 2025.

If you are interested in a more detailed report, contact Robert Prophett at 508-563-2294.

REQUIRED ADDITIONAL HEALTH INFORMATION:
To insure that tap water is safe to drink, Department of Environmental Protection (DEP) and Environmental Protection Agency (EPA) prescribes limits on the amounts of certain contaminants in water provided by public water systems. Food and Drug Administration (FDA) and the Massachusetts Department of Public Health regulations establish limits for contaminants in bottled water. Drinking water, including bottled water, may reasonably be expected to contain at least small amounts of some contaminants. The presence of contaminants does not necessarily indicate that water poses a health risk. More information about contaminants and potential health effects can be obtained by calling the Environmental Protection Agency Safe Drinking Water Hotline (1-800-426-4791).The sources of drinking water (both tap and bottled) include rivers, lakes, streams, ponds, reservoirs, springs, and wells. As water travels over the surface of the land or through the ground, it dissolves naturally occurring minerals and radioactive material and can pick up substances resulting from the presence of animals or from human activity. Contaminants that may be present in the sources include:

(A) Microbial contaminants such as viruses and bacteria which may come from sewage treatment plants, septic systems, agricultural livestock operations and wildlife.

(B) Inorganic contaminants such as salts and metals which can be naturally-occurring or result from urban storm runoff, industrial or domestic wastewater discharges, oil and gas production, mining or farming.

(C) Pesticides and herbicides, which may come from a variety of sources such as agriculture, storm water runoff and residential uses.

(D) Organic chemical contaminants, including synthetic and volatile organics which are by-products of industrial processes and petroleum production and can also come from gas stations, urban storm water runoff and septic systems.

(E) Radioactive contaminants, which can be naturally occurring or be the results of oil and gas production and mining activities. In order to ensure that tap water is safe to drink, EPA prescribes regulations which limit the amount of certain contaminants in water provided by public water systems. FDA regulations establish limits for contaminants in bottled water which must provide the same protec tion for public health.

Some people may be more vulnerable to contaminants in drinking water than the general population. Immuno-compromised persons such as persons with cancer undergoing chemotherapy, persons who have undergone organ transplants, people with HIV/AIDS or other immune system disorders, some elderly and infants can be particularly at risk from infections. These people should seek advice about drinking water from their health care providers. EPA/CDC guidelines on appropriate means to lessen the risk of infections by Cryptosporidium are available from the Safe Drinking Water Hotline (1-800-426-4791).

SOURCE WATER ASSESSMENT
The Bourne Water District had a source water assessment performed by the MA. Department of Environmental Protection in 2002. The Source Water Assessment and Protection (SWAP) program, established under the Federal Safe Drinking Water Act requires every state to:

- Inventory land uses within the recharge areas of all public water supply sources.
- Assess the susceptibility of drinking water sources to contamination from these land uses.
- Publicize the results to provide support for improved protection.

A susceptibility ranking of high was assigned to the Bourne Water District using the information collected during the assessment by the DEP. The high ranking was due to the potential contamination from land uses such as auto repair shops, truck terminal, furniture refinishing, auto salvage operation, an industrial park and activities in the recharge area (Zone II's) of some of the wells. The complete SWAP report is available at the Bourne Water District's office. For more information contact Robert Prophett at 508-563-2294.

CROSS CONNECTION
A cross connection is a connection between a drinking water pipe and a polluted source. The pollution can come from your own home. For instance, you're going to spray fertilizer on your lawn, and you hook up your hose to the sprayer that contains the fertilizer. If the water pressure drops (say because of a fire hydrant being used or water main break) when the hose is connected to the fertilizer sprayer, the fertilizer may be sucked back into the drinking water pipes through your hose. Using an anti-siphon backflow-prevention device on your sprayer or hose bib can prevent this problem.
The Bourne Water District recommends using devices with an anti-siphon feature or equipping hose bibs with hose bib vacuum breakers to prevent against back flow. For additional information on cross connections and on the status of your water system's cross connection program, please contact Robert Prophett at 508-563-2294.

UPPER CAPE REGIONAL WATER SUPPLY COOPERATIVE
2025 Consumer Confidence Report (PWS ID # 4261024)

The Upper Cape Regional Drinking Water Supply Cooperative consists of three groundwater supply wells located in Sandwich, MA on Joint Base Cape Cod (JBCC). A Board of Managers representing four-member public water supply systems manages the Cooperative. The Cooperative has the capacity to provide a supplemental supply of water to its member public water systems, which include the Town of Falmouth, the Bourne Water District, the Mashpee Water District and the Sandwich Water District. The Cooperative also supplies water to the Otis Air National Guard public water system on JBCC and the Barnstable County Jail.
Wells #1, #2 and #3 are located in a forested area of the northeastern portion of the JBCC. In July 2004, the Department of Environmental Protection completed a source water assessment (SWAP) report for the Cooperative water supply wells. A SWAP report is a planning tool to support local and state efforts to improve water supply protection by identifying land uses within water supply protection areas that may be potential sources of contamination. The report identifies potential sources of contamination including a gas station, a medical facility and a military facility, and helps focus protection efforts on appropriate Best Management Practices. A susceptibility ranking of high was assigned to the Cooperative using information that was collected during the assessment. A copy of the report is available, upon request, from the Cooperative. JBCC has adopted a Groundwater Protection Plan to prohibit inappropriate activities on JBCC property within the Zone II areas of community public water supply wells. In addition, the Environmental Management Commission provides oversight over activities on the northern portion of the JBCC. For questions regarding SWAP or other information contained within this document call Marisa Picone-Devine at 508-888-7262

2025 WATER QUALITY DATA

Listed below are the substances detected in water samples collected during the most recent sampling period from the three (3) wells that comprise the Upper Cape Drinking Water Supply Cooperative.

Inorganic Contaminants	**Year Sampled**	**Highest Result**	**Range of Detections**	**MCL**	**MCLG**	**Violation (Y / N)**	**Possible Sources**
Barium	2020	0.002 ppm	0.002 ppm	2 ppm	2 ppm	No	Discharge of drilling wastes; Discharge from metal refineries; Erosion of natural deposits
Nitrate	2025	0.09 ppm	0.09 ppm	10 ppm	10 ppm	No	Runoff from fertilizer use; Leaching from septic tanks, sewage; Erosion of natural deposits
Radioactive Contaminants	**Year Sampled**	**Highest Result**	**Range of Detections**	**MCL**	**MCLG**	**Violation (Y / N)**	**Possible Sources**
Gross Alpha	2021	-.210 (+-.331) pCi/l	-.210 (+-.331) pCi/l	15 pCi/l	0	No	Erosion of Natural Deposits
Radium 226 & 228	2021	0.377 pCi/L	0 – 0.377 pCi/l	5 pCi/l	0	No	Decay of natural and manmade deposits
Unregulated and Secondary Contaminants	**Year Sampled**	**Amount Detected**	**Range of Detections**	**SMCL**	**ORSG**	**Violation**	**Possible Sources**
Chloroform	2025	2.11 ppb	1.79 – 2.11 ppb	NA	70 ppb	No	Trihalomethane: by-product of drinking water chlorination. In non-chlorinated sources, chloroform may be naturally occurring
Chloride	2025	10 ppm	8.9 – 10 ppm	250 ppm	--	NO	Runoff and leaching from natural deposits; seawater influence
Copper	2025	0.048 ppm	0.03 – 0.048 ppm	1 ppm	--	No	Internal corrosion of household plumbing; erosion of natural deposits
Sodium	2023	6.6 ppm	6.6 ppm	--	20 ppm	No	Discharge from the use and improper storage of sodium-containing de-icing compounds or in water-softening agents
Sulfate	2025	6.3 ppm	4.9 – 6.3 ppm	250 ppm	--	No	Runoff and leaching from natural deposits; industrial wastes

Appendix F
Rare Species Reported to Natural Heritage and Endangered Species Program

Table F-1 List of Rare Species Reported to NHESP - Birds

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*	*TY 2025*
Grasshopper Sparrow *(Ammodramus savannarum)*	-	T	16	15	16	20	34	36	29	30	26	17
Northern Harrier *(Circus cyaneus)*	-	T	W[3]	W	W	W	W	W	W	W	W	W
Upland Sandpiper *(Bartramia longicauda)*	-	E	9	8	7	12	6	2	1	4	3	4
Eastern Meadowlark *(Sturnella magna)*	-	SC	8	3	2	7	14	17	9	21	15	12
Eastern Whip-poor-will *(Antrostomus vociferous)*	-	SC	87	52	110	53	99	136	137	105	130	91
Bald Eagle *(Haliaeetus leucocephalus)*	-	SC	0	0	0	0	0	0	0	0	W	W

Note: Quantities shown should not be interpreted as population trends.
[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)
[2] State Status: E = Endangered, T = Threatened, SC = Special Concern
[3] Wintering

Table F-2 List of Rare Species Reported to NHESP – Reptiles and Amphibians

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*	*TY 2025*
Eastern Box Turtle *(Terrapene carolina carolina)*	-	SC	38	42	43	58	45	83	62	96	77	66
Eastern Hog-nosed Snake *(Heterodon platirhinos)*	-	SC	2	3	8	9	1	2	6	7	4	1

Note: Quantities shown should not be interpreted as population trends.

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

Table F-3 List of Rare Species Reported to NHESP – Plants

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*	*TY 2025*
Adder's Tongue Fern[3] *(Ophioglossum pusillum)*	-	T	98	247	0	25	646	N/A	225	215	292	Stable
Grass-leaved Ladies' Tresses *(Spiranthes vernalis)*	-	T	0	0	0	0	0	6	0	31	Stable	Stable
Broad Tinker's Weed[4] *(Triosteum perfoliatum)*	-	E	113	127	0	200	6	N/A	1883	3,161	3,637	Stable
American Arborvitae[5] *(Thuja occidentalis)*	-	E	4	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A

Note: N/A indicates that no targeted survey was conducted for the species and it is not casually observed. Zeroes indicate that a targeted survey was conducted and no individuals were observed.

Table F-3 List of Rare Species Reported to NHESP – Plants, cont'd

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*	*TY 2025*
Stiff Yellow Flax *(Linum texanum var. medium)*	-	T	0	0	0	0	0	0	0	92	Stable	Stable
Papillose Nut-sedge *(Scleria pauciflora)*	-	E	0	0	0	0	0	0	0	41,081	82,034	Stable

Note: Quantities shown should not be interpreted as population trends.

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

[3] In most years a subset of O. pusillum sites are surveyed. In 2023, the five known extant sites were surveyed. This needs to be considered if comparing total numbers across years. In 2018, only sites with historic records and no recent records were surveyed, and this should not be interpreted as a loss of rare plants between 2017 and 2018. The total number of 2019 numbers are likely under representative, as surveys occurred late in the season.

[4] Triosteum perfoliatum surveys, starting in 2022, are carried out using recent findings from a genetics study that suggest that the two species of Triosteum on the base, the other non-rare T. aurantiacum, are the same genetically and should be treated as the rare T. perfoliatum. Totals for years previous to 2022 consist only of Triosteum individuals that showed certain identification features now not relied on.

[5] NHESP is not interested in tracking this population, as it is likely of anthropogenic origin (pers. comm. with State Botanist, Bob Wernerehl).

Table F-4 List of Rare Species Reported to NHESP – Beetles and Bees

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*	*TY 2025*
Purple Tiger Beetle *(Cicindela purpurea)*	-	SC	0	0	0	0	0	0	0	25	90	421
Twelve-spotted Tiger Beetle *(Cincindela purpurea)*	-	SC	0	0	0	0	0	0	0	0	1	0
Walsh's Digger Bee[3] *(Anthophora walshii)*	-	E	0	5 (1)	0	32 (9)	4	N/A	1	9	27	9

Note: Quantities shown are not resulting of standardized surveys and should not be interpreted as population trends.

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

[3] Lead number is count of flying/foraging records with confirmed nesting activity in parentheses.

Note: N/A indicates that no targeted survey was conducted for the species and it is not casually observed. Zeroes indicate that a targeted survey was conducted and no individuals were observed.

Table F-5 List of Rare Species Reported to NHESP – Butterflies and Moths

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*	*TY 2025*
Buck Moth[3] *(Hemileuca maia)*	-	SC	90	95	0	4	2	74	133	23	72	58
Pine Barrens Speranza *(Speranza exonerata)*	-	SC	44	13	0	0	0	0	4	0	3	N/A
Sandplain Euchlaena *(Euchlaena madusaria)*	-	SC	3	7	0	0	1	0	0	0	1	N/A
Heath Metarranthis *(Metarranthis pilosaria)*	-	SC	1	1	0	0	0	0	0	0	0	N/A
Melsheimer's Sack Bearer *(Cicinnus melsheimeri)*	-	T	2	0	0	0	7	0	0	0	0	N/A
Gerhard's Underwing *(Catocala herodias)*	-	SC	33	10	0	0	2	0	35	6	0	N/A
Pine Barrens Zale *(Zale lunifera)*	-	SC	13	8	0	0	0	0	0	0	4	N/A
Barrens Dagger Moth *(Acronicta albarufa)*	-	T	1	0	0	0	0	0	0	0	0	N/A
Sandplain Heterocampa *(Heterocampa varia)*	-	T		0	N/A	N/A	N/A	N/A	1	0	0	N/A

Table F-5 List of Rare Species Reported to NHESP – Butterflies and Moths, cont'd

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*	*TY 2025*
Chain-dotted Geometer *(Cingilia catenaria)*	-	SC	0	0	0	1	0	0	0	0	0	N/A
Drunk Apamea *(Apamea inebriata)*	-	SC	1	0	0	0	0	0	0	0	0	N/A
Pink Sallow *(Psectraglaea carnosa)*	-	SC	9	5	0	0	0	0	0	6	8	N/A
Pink Streak *(Dargida rubripennis)*	-	T	25	0	0	0	3	1	1	2	0	2
Collared Cycnia *(Cycnia collaris)*	-	T	0	1	0	11	33	200	7	4	4	1
Coastal Heathland Cutworm *(Abagrotis benjamini)*	-	SC	0	1	0	0	0	0	0	0	0	N/A
Woolly Gray *(Lycia ypsilon)*	-	T	0	2	0	0	0	0	0	0	0	N/A
Water-willow Stem Borer *(Papaipema sulphurata)*	-	T	0	1	0	0	0	0	0	0	0	N/A
Waxed Sallow Moth *(Chaetaglaea cerata)*	-	SC	0	2	0	0	0	0	0	0	0	N/A
Frosted Elfin[4] *(Callophrys irus)*	-	SC	5	5	5	TBD	25	57	13	64	49	473

Note: N/A indicates that no targeted survey was conducted for the species and it is not casually observed. Zeroes indicate that a targeted survey was conducted and no individuals were observed.

Table F-5 List of Rare Species Reported to NHESP – Butterflies and Moths, cont'd

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*	*TY 2025*
Slender Clearwing Sphinx *(Hemaris gracilis)*	-	SC	0	0	0	0	5	3	26	3	1	2
Acadian Hairstreak *(Satyrium acadia)*	-	T		4	N/A	2	0	4	5	2	0	3

Note: Quantities shown are not resulting of standardized surveys and should not be interpreted as population trends.

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

[3] Caterpillar clusters are reported as a single observation. Barrens Buckmoths received dedicated flight count attention in 2021 and 2022, thus the large increase in reported observations.

Caterpillar clusters are reported as a single observation. Barrens Buckmoths received dedicated flight count attention in 2021 and 2022, thus the large increase in reported observations.

[4] MAARNG staff did not perform surveys for *Callophrys irus* in 2019, but facilitated USFWS surveys. A graduate student researched Frosted Elfins in 2025, resulting in a large increase in effort and count.

Note: N/A indicates that no targeted survey was conducted for the species and it is not casually observed. Zeroes indicate that a targeted survey was conducted and no individuals were observed.

Table F-6 List of Rare Species Reported to NHESP - Crustaceans

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*	*TY 2025*
Agassiz's Clam Shrimp *(Eulimnadia agassizii)*	-	E	0	6	38	9	3	5	N/A	12	5	3
American Clam Shrimp *(Limnadia lenticularis)*	-	SC	0	0	0	0	0	3	N/A	0	3	5

Note: Counts represent the number of sites (i.e., puddles or pools) where clam shrimp were observed during annual surveys. Annual surveys include a subset of sites that have contained clam shrimp in the past, have not contained clam shrimp in the past, and that have not been surveyed previously.

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

Note: N/A indicates that no targeted survey was conducted for the species and it is not casually observed. Zeroes indicate that a targeted survey was conducted and no individuals were observed.

Table F-7 List of Rare Species Reported to NHESP - Mammals

Common/ Scientific Names	*Fed Status*[1]	*State Status*[2]	*TY 2016*	*TY 2017*	*TY 2018*	*TY 2019*	*TY 2020*	*TY 2021*	*TY 2022*	*TY 2023*	*TY 2024*	*TY 2025*
Northern Long-Eared Bat[3, 4] *(Myotis septentionalis)*	T	E	15 (1)	2	1	3	1	TBD	N/A	0	N/A	TBD
Little Brown Bat[3, 5] *(Myotis lucifugus)*	UR	E	22	4	2	6	2	TBD	N/A	5	N/A	TBD
Tricolored Bat[3,5] *(Perimyotis subflavus)*	UR	E	7	3	2	3	1	TBD	N/A	3	N/A	TBD
Eastern Small-Footed Bat[3, 5] *(Myotis leibii)*[3, 5]	UR	E	0	0	0	1	1	TBD	N/A	0	N/A	TBD

[1] Federal Status: E = Endangered, T = Threatened, UR = Under Review (status assessment or listing determination ongoing)

[2] State Status: E = Endangered, T = Threatened, SC = Special Concern

[3] Acoustic monitoring collects "call sequence" data and the true number of individuals is unknown. Numbers in the table reflect the number of survey sites with acoustic detections confirmed through manual call vetting. Numbers are reported to NHESP but not tracked by them due to current uncertainty in using acoustic identifications.

[4] Number in parentheses is captured individuals trackable by NHESP due to species identification confirmation versus acoustic data.

[5] "UR" indicates a species is currently under review for listing on the federal Endangered Species Act.

Note: N/A indicates that no targeted survey was conducted for the species and it is not casually observed. Zeroes indicate that a targeted survey was conducted and no individuals were observed.

Appendix G
Environmental Performance Standards Violations History

EPS VIOLATIONS HISTORY, TY 2016 – TY 2025

Training Year	Reported Violation	*Explanation of Violation*	*Corrective Action*
TY 2025	None	-----	-----
TY 2024	None	-----	-----
TY 2023	None	-----	-----
TY 2022	General Performance Standard	There was unauthorized use of yellow and white smoke grenades outside of the approved non-standard training plan. White smoke grenades were not approved for use; yellow smoke grenades were used in an unapproved location. The MAARNG reported the nonconformance to the EMC on March 31, 2022.	Full-time range and civilian staff were counseled on their failure to follow established processes for consultation and approval for any non-standard training event; staff were directed that only written non-standard training plans, signed by the EMC EO and the MAARNG representative will be executed, and no verbal authorizations will be authorized. Refresher training was conducted with part-time staff to ensure compliance.
TY 2021	Range Performance EPS (EPS 19)	Additional targets were placed on the 25-meter line on Sierra Range. Transition firing was conducted on Echo Range. No consultation for approval was conducted with Camp Edwards Plans and Training, the Environmental & Readiness Center and the EMC's Environmental Officer. The MAARNG reported the nonconformance to the EMC on February 18, 2021.	Full-time Range Operations staff were counseled on the importance of following established processes of consultation and approval for any non-standard training event; the Range Operations maintenance manager was directed that he shall not alter or install additional targets on a range unless there is an approval in writing or the range is being prepared for an approved proof of concept for a future training event; OIC formalized non-standard training requests (exceptions to policy) in a Standard Operating Procedure; full-time Range Operations staff was retrained; and those personnel involved in approving the non-standard training were given written counseling. In addition to corrective actions instituted by the MAARNG, the EMC required that the full-time Range Operations staff undergo annual training on EPS 19.0 and the BMPs and OMMPs; newly assigned Range Operations staff undergo training on EPS 19.0 and the BMPs and OMMP prior to being given authority for operational control of the small arms ranges; documenting the corrective actions and additional EMC requirements in Camp Edwards Operations and Training Regulation 350-2 and forwarding that to the EMC for review.

Training Year	Reported Violation	*Explanation of Violation*	*Corrective Action*
TY 2020	Training Area Fire Management EPS (EPS 11)	Three burn barrels (55-gallon drums) were found at SVLs 1 and 2. The MAARNG reported the nonconformance to the EMC on October 25, 2019.	All full-time and Mobilization Day staff are instructed to review Training Area Clearing processes and be re-briefed on guiding regulations and standards that apply to the Training Area/Reserve. Clear and obvious signage stating that open burning is prohibited has been posted at Range Operations. The Camp Edwards Operations and Training Regulation 350-2 has been updated to clearly state the requirement for clearing training areas and that open burning is prohibited on Camp Edwards.
TY 2019	General Performance Standard	Three L600 M119 whistling booby trap simulators were used; they are not on the approved munitions list and were not authorized for use. The MAARNG reported a nonconformance to the EMC on September 17, 2019.	All levels: command, units training and the ASP will be provided a list of items permanently and temporarily authorized for a particular training event. The ASP will make a change in their ammunition reservation program that will not allow unauthorized ammunition or simulators to be reserved. Camp Edwards Range Operations will do a final munition check as units check in for their reserved training area or venue.
TY 2018	Rare Species EPS (EPS 3)	A road puddle containing state-listed Agassiz clam shrimp was filled by a unit training at Dig Site 1. The MAARNG forwarded a formal notice of violation to the EMC on May 16, 2018.	Camp Edwards will, after relocation of the clam shrimp and in concert with the CMP, fill the puddles, use signage to avoid infilling of relevant puddles, and educate users as to how they are supposed to coordinate with Camp Edwards before taking actions outside of their training plan while in the Training Area/Reserve.
TY 2017	None	-----	-----
TY 2016	General Performance Standard	Eight thousand paintball rounds were fired by a unit on the IMT range (Dig Site 3) without permission or prior coordination. The MAARNG forwarded a formal notice of violation to the EMC on November 9, 2015.	Unit soldiers cleaned and cleared the area of debris, discussion of the seriousness of the violation with the Unit Commander and told of actions needed for compliance when wanting to train with any unapproved munition. Camp Edwards staff conducted a Range Officer in Charge and Range Safety brief audit to validate content and effectiveness. Range Operations staff will conduct assessments of units while they are training in the Training Area/Reserve to ensure activities are within established performance standards.

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