Appendix E: Agency Comment Letters

- USEPA Comment Letter dated 5 September 2019
- MassDCR Comment Letter dated 10 September 2019
- EMC Comment Letter dated 13 September 2019

COMMONWEALTH OF MASSACHUSETTS
EXECUTIVE OFFICE OF ENERGY & ENVIRONMENTAL AFFAIRS
ENVIRONMENTAL MANAGEMENT COMMISSION
Building 3468, Beaman Street, Camp Edwards, MA 02542-5003

CHARLES D. BAKER
Governor

KARYN E. POLITO
Lieutenant Governor

KATHLEEN A. THEOHARIDES
Secretary

RONALD AMIDON

MARTIN SUUBERG

LEO ROY
Commissioners

September 13, 2019

Mr. Keith Driscoll
NEPA/MEPA Manager
Joint Force Headquarters
Massachusetts National Guard
2 Randolph Road
Hanscom AFB, MA 01731-3001

AECOM
Attn: Ms. Kathryn Barnicle
9 Jonathan Bourne Drive
Pocasset, MA, 02559

Project Name: Multi-Purpose Machine Gun (MPMG) Range
Proponent: Massachusetts National Guard
Location: Camp Edwards, Massachusetts
Document: Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) for the Environmental Assessment (EA) in accordance with the National Environmental Policy Act (NEPA)

Dear Mr. Driscoll/Ms. Barnicle;

The Environmental Management Commission (EMC) was created within the Executive Office of Environmental Affairs by Chapter 47 of the Acts of 2002. The purpose of the EMC is to provide permanent protection of the drinking water supply and wildlife habitat of the Upper Cape Water Supply Reserve (the Reserve), created as public conservation land by Chapter 47 of the Acts of 2002, by oversight, monitoring and evaluation of all military and other activities on the reserve to ensure they are consistent with this purpose. The Camp Edwards Training Ranges are co-located with and are within the Reserve. The EMC has the following comments on the above referenced IICEP for the EA in accordance with NEPA:

Overview:

As described in the IICEP, the Massachusetts National Guard is preparing environmental documentation for proposed construction and operation of a Multi-Purpose Machine Gun (MPMG) Range at Camp Edwards,

Massachusetts. Construction of a MPMG Range will provide National Guard personnel with a modernized small arms training venue to efficiently accomplish mandatory soldier tasks and mission training to include meeting weapons qualification requirements in a manner that protects human health and the environment.

The proposed MPMG Range would be built over and improve on the existing Known Distance (KD) Range, and is proposed to be developed with range-specific structures to include soil berms and potentially other types of engineered solutions for projectile capture. The KD Range parcel is owned by the Commonwealth and is currently leased to the Department of the Army, with licenses to the Massachusetts National Guard.

The Massachusetts National Guard is currently identifying environmental resources, issues and constraints associated with the proposed project area to effectively assess potential environmental impacts associated with the proposed action. The Massachusetts National Guard is requesting baseline information regarding potential environmental issues at, or in the vicinity of, the proposed project area.

The EMC has been working closely with the Massachusetts National Guard and their consultants to provide guidance and compliance assistance with regard to environmental issues unique to the proposed Project. A site visit to the Project site by the EMC Environmental Officer was made on August 8, 2019 with the Massachusetts National Guard and their consultants, as well as with a representative from the Massachusetts Environmental Policy Act within the Executive Office of Energy and Environmental Affairs and with representatives of the MassWildlife Natural Heritage and Endangered Species Program. In addition, the Massachusetts National Guard has presented information regarding the proposed MPMG Range location and design to the EMC and its advisory councils, the Science Advisory Council (SAC) and the Community Advisory Council (CAC). The CAC assists the EMC by providing advice on issues related to the protection of the water supply and wildlife habitat on the reserve; and the SAC assists the EMC by providing scientific and technical advice relating to the protection of the drinking water supply and wildlife habitat on the Reserve. Finally, the EMC has participated in meetings with the Massachusetts National Guard and MassWildlife to establish a mitigation bank and overall strategy to facilitate implementation of long-term planning efforts including modernization of the Camp Edwards range complex and infrastructure.

General Comment:

EMC Environmental Performance Standards (EPS): The construction, operation and maintenance of the proposed MPMG Range must comply with the current revision of the Environmental Performance Standards, dated April 6, 2017. The final design and the operation, maintenance and monitoring plan for the MPMG Range will require approval by the EMC prior to construction and operation.

Specific Comments:

Solid and Hazardous Waste: The Massachusetts National Guard is advised that there may be soils contaminated with oil and hazardous materials (OHM) and munitions items located at the proposed project location. A plan for the management of OHM and munitions items which may be found during construction should be developed by the Massachusetts National Guard. (EPS 14.0-16.0)

Construction Management Plan: A construction management plan should be provided which defines the limits of the proposed work area, how construction vehicles and personnel will be controlled to remain within work areas, construction and laydown areas, erosion control, dust suppression, vehicle parking and refueling areas and noise during construction. (EPS 4.5, 4.6, 5.0, 8.0, 9.0, 12.0)

Refueling During Construction: EPS 15.3.3 states that no storage or movement of fuels supporting field activities, other than in vehicle fuel tanks is permitted except in approved containers no greater than five gallons in capacity. The Massachusetts National Guard is advised that a waiver of EPS 15.3.3 may be granted by the EMC for the duration of the construction period subject to EMC review and approval of a site specific Spill Prevention, Control and Countermeasure Plan. All construction-related refueling and equipment maintenance activities must be conducted in accordance with an EMC-approved refueling plan.

Access Control/Coordination/Communication: The Massachusetts National Guard is advised to develop an access control and communications plan during construction activities with Camp Edwards Range Control personnel. This plan will be particularly important during the National Guard Annual Training cycle and for the recreational hunting program at Camp Edwards.

Ammunition: The EMC recommends that the MPMG Range be designated as a copper ammunition-only range. (EPS 19.0)

Alternative 2: Southerly Location Alternative: The IICEP states that this alternative would result in greater noise impacts to the community. The Massachusetts National Guard has performed an on-site noise study and noise modeling for the MPMG. The studies concluded that there would be noise impacts to the community during range use (the nearest off post community is approximately 500 meters to the southeast and 1000 meters to the east). The EMC has recommended additional noise studies to be performed during training activities at the MPMG to determine if nuisance conditions exist and if noise mitigation is necessary. (EPS 9.0)

MPMG Range Operation and Maintenance: The EMC recommends that appropriate funding be appropriated to ensure that the MPMG Range will be adequately staffed to ensure operation and maintenance activities are compliant with the required Operation, Maintenance and Monitoring Plan. (EPS 19.0)

Finally, the Massachusetts National Guard should continue to work closely during the permitting and the execution of the Project with the Massachusetts Department of Environmental Protection, the Environmental Management Commission, and the Massachusetts Division of Fisheries and Wildlife, who maintains custody, care and control of the Upper Cape Water Supply Reserve. Early coordination with Commonwealth and municipal resource agencies is recommended with regard to rare species and wetland resources which may be impacted by the proposed project.

Thank you for the opportunity to provide comments on behalf of the EMC. If you have any questions regarding these comments, please contact me at 508-968-5127 or at 508-946-2871.

Sincerely,

Leonard J. Pinaud
Executive Director/Environmental Officer
Environmental Management Commission

Ec: Commissioner Amidon, Department of Fish and Game
Commissioner Suuberg, Department of Environmental Protection
Commissioner Roy, Department of Conservation and Recreation
Environmental management Commission Science Advisory Council

Environmental management Commission Community Advisory Council

Mr. Jason Zimmer, Massachusetts Division of Fisheries & Wildlife, Southeast Wildlife District
Mr. David Paulson, Massachusetts Division of Fisheries & Wildlife, Natural Heritage and Endangered Species Program

BG Christopher Faux, JBCC Executive Director
LTC Matthew Porter, Commander, Camp Edwards
Mr. Paulo A. Baganha, Massachusetts National Guard Environmental Program
Dr. Michael Ciaranca, Massachusetts National Guard Environmental & Readiness Center, Camp Edwards

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
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BOSTON, MA 02109-3912

OFFICE OF THE
REGIONAL ADMINISTRATOR

September 5, 2019

Keith J. Driscoll
NEPA/MEPA Manager
Massachusetts National Guard
2 Randolph Road
Hanscom AFB, MA 01731-3001

RE: Scoping Comments for the Environmental Assessment for the Multi-Purpose Machine Gun Range, Camp Edwards, Massachusetts

Dear Mr. Driscoll:

This letter is provided in response to your August 7th request for input regarding key issues that should be addressed in the Environmental Assessment (EA) for the proposed Multi-Purpose Machine Gun Range at Camp Edwards. According to your letter the project will create a modern small arms range that will support mission training and allow soldiers to meet weapons qualifications requirements. The range is proposed on land leased from the Commonwealth of Massachusetts on an existing area referred to as the Known Distance (KD) Range.

We appreciate the opportunity to comment in advance of the preparation of the EA for the project. Our comments below provide background information and suggestions regarding potential environmental issues relevant to the proposed action that we recommend be considered as you work to develop the EA.

The KD Range has been subject to investigation and cleanup under Section 1431(a) of the Safe Drinking Water Act (SDWA), 42 USC § 300i(a), as amended, and two Administrative Orders (AOs) concerning response actions issued thereunder (U.S. Environmental Protection Agency Region 1 (EPA) AO SDWA 1-97-1019 (AO1) and AO SDWA-1-2000-0014 (AO3)). The Administrative Record containing key supporting documents from the investigation and cleanup is available at the Impact Area Groundwater Study Program Office (IAGWSPO), 1807 West Outer Road, Camp Edwards, MA. Mr. Shawn Cody is the point of contact for that information and he can be reached at 339-202-9370.

The final cleanup remedy under AO3 for the KD Range is contained in two (2) separate Decision Documents (DD). The February 2019 Training Areas Operable Unit DD (KD West is one of 36 sites or locations contained within this DD) presents the selected remedy for the KD West Range. The selected action for KD West was data review and/or confirmatory soil sampling and geophysical screening. Details of these proposed actions are contained in Appendix F to the DD. These actions are ongoing and the findings memo for all Training Areas post-DD work will be

prepared in 2020. The need for Land Use Controls (LUCs) will be determined after completion of the investigations as described in the Decision Document.

The September 2015 Small Arms Ranges (SAR) DD (KD East is one of 40 locations contained within this DD) presents the selected remedy for the KD East Range. The selected action for KD East was confirmatory soil sampling and potential removal actions. Details of these proposed actions are contained in Appendix D to the DD. These actions have been completed and the findings memo for all SAR post-DD work is currently being drafted. LUCs have been established in the DD to protect groundwater monitoring wells and other environmental sampling equipment on and around the small arms ranges.

EPA established use restrictions at the KD Range in May 1997 with the issuance of AO2 (SDWA I-97-1030), but those restrictions were lifted in May 2017 when EPA issued a Final Response to a 31 August 2016 Massachusetts National Guard (MANG) Request to modify the AO2 Scope of Work ("SOW"). EPA modified Sections II.A.1.a and Section II.A.1.f of the SOW to not prohibit firing of lead ammunition or other "live" ammunition at small arms ranges at or near the Training Range and Impact Area to the extent those actions receive approval and oversight from the Environmental Management Commission (EMC) in accordance with the Environmental Performance Standards.

- The authorization was conditioned upon continued compliance with all conditions established by the EMC.
- The authorization was conditioned upon MANG requesting and then receiving funds necessary to ensure compliance with the approved Operations, Maintenance, and Monitoring Plan.
- The authorization does not extend to any other ammunition or training device.
- The proposed use of this ammunition or training device was authorized only to the extent it does not interfere with the completion of investigation and cleanup activities.
- This decision will be reviewed as appropriate, but no less often than every five years. The purpose of the review is to revisit the appropriateness of the decision in providing adequate protection of human health. The scope of the review will include, but is not limited to, the following questions: are the ranges operating as designed (i.e., monitoring or maintenance); have any of the cleanup standards changed since the decision; and is there any new information that would warrant modifying or withdrawing the decision? If appropriate, additional actions (including, if necessary, reopening the decision) may be required as a result of these reviews. EPA retained all its enforcement authorities pursuant to existing Administrative Orders.

Your letter also describes that the proposed project "...includes a process for selection of pollution prevention strategies and best management practices through the joint coordinated review efforts of the Environmental Management Commission, the United States Environmental Protection Agency and the Massachusetts Department of Environmental Protection." As such, the EMC should continue to be consulted during the range design and development process, including the selection of pollution prevention strategies and best management practices that will be codified in an Operations, Management, and Maintenance Plan (OMMP) for the Multi-Purpose Machine Gun Range. These strategies and practices should also be developed to adhere

to the conditions described above. It may also be a worthwhile exercise for the EA to consider how the adaptive management strategies employed during the Juliet, Kilo, Tango and Sierra Range pilot periods might apply to development and use of the KD Range.

Thank you for the opportunity to offer comments in advance of your work to prepare the EA. Please contact me at 617-918-1025 with any comments or questions. We look forward to reviewing the EA when it is available.

Sincerely,

Timothy Timmermann
Director, Office of Environmental Review

cc:

Kathryn Barnicle
AECOM
9 Jonathan Bourne Drive
Pocasset, MA 02559

Kathryn.barnicle@aecom.com

dcr
Massachusetts

September 10, 2019

Keith J. Driscoll
NEPA/MEPA Manager
Massachusetts National Guard
2 Randolph Road
Hanscom AFB, MA 01731

Kathryn Barnicle
AECOM
9 Jonathan Bourne Drive
Pocasset, MA 02559

Dear Mr. Driscoll & Ms. Barnicle,

Thank you for the letter regarding Interagency and Intergovernmental Coordination for Environmental Planning for the proposed construction and operating of a Multi-Purpose Machine Gun Range at Camp Edwards.

The Department of Conservation and Recreation is represented on the Environmental Management Commission (EMC) and Leonard Pinaud is our point of contact. We will prepare comments through the EMC process. We have included Leonard Pinaud as a CC to this letter so that the EMC can be added to this process.

Thank you for your continued support of DCR and our programs which benefit so many Massachusetts citizens and other visitors.

Sincerely,

Leo P. Roy
Commissioner

CC: Leonard Pinaud, EMC
Commissioner Martin Suuberg, MassDEP
Commissioner Ronald Amidon, Dept. of Fish and Game

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Appendix F: Agency and Community Involvement

Massachusetts National Guard
ENVIRONMENTAL & READINESS CENTER

Ensuring Military Readiness in Concert with the Environment at Joint Base Cape Cod

Building 3468, Beaman Rd., Camp Edwards, MA 02542 , 339-202-9342

The Massachusetts National Guard created the E&RC in January 2001 to ensure the realistic training of military units in accordance with state and federal environmental requirements. The E&RC has established successful relationships with governmental, regulatory, and community groups to reach its primary objective of training in concert with the environment. The E&RC will inform, educate, and involve all JBCC stakeholders on issues regarding training and the environment. Furthermore, the E&RC seeks to be a source of information for the community and a trusted partner in the protection of the northern training areas of the JBCC.

The Environmental and Readiness Center will

- Facilitate the flow of information to ensure prompt and accurate response to stakeholder inquiries
- Coordinate with other programs and commands to ensure frequent and open communication with all JBCCcommunities
- Educate and inform stakeholders about Massachusetts National Guard training and environmental programs
- Ensures prompt, adequate and accurate notifications and situations posing immediate threat to human health or the environment or affecting base operations

Stakeholders

Individuals, groups, and organizations interested in JBCC activities are called stakeholders. The E&RC's community involvement team ensures JBCC stakeholders are informed and involved on a continual basis. Stakeholder groups include:

- Elected Officials
- Local and Tribal Governments
- Military
- Media
- Regulators
- JBCC Tenants
- Neighbors
- Special Interest Groups

Advisory Groups

Advisory groups have always played an important role in community involvement and environmental issues at the JBCC. Advisory councils are groups comprised of various members either representing a group, such the Association to Protect Cape Cod, a town, such as a selectmen, or a member at large, any community member with an interest and desire be involved.

These groups meet regularly to discuss JBCC environmental issues that could have an impact on the community surrounding the base. Please refer to the **Community Advisory Group** section of the web site for information on each of the JBCC Related community groups.

Issues - Key Community Concerns

The E&RC work with all stakeholders to understand their issues and concerns regarding training and the environment on the JBCC. Through one-on-one meetings, advisory council meetings, public meetings, and surveys/questionnaires, the E&RC will seek to establish two-way communication with community groups. Key issues already identified include:

- Water quality/supply
- Training and readiness
- Natural Resources
- Environmental compliance (regulatory)
- Cultural resources including preservation archaeological sites, historic buildings and structures, historic objects and archival data, and Native American sacred sites and properties of traditional, religious, and cultural significance
- Development
- Access to infrastructure and services
- Coordination of programs/activities
- Community impacts (human health, infrastructure, and economy)

Scope of E&RC Activities

The E&RC community involvement team implements program objectives in the following ways:

Public Meetings - The Environmental Management Commission, the Community Advisory Council, the Science Advisory Council, and the Senior Management Board provide valuable recommendations, advice, and guidance to the E&RC regarding ways to better accomplish its mission as environmental stewards while ensuring the best training possible for National Guard soldiers. Public meetings held by the various advisory councils offer a forum to inform council members and the public about E&RC activities through presentations, discussions, and question and answer sessions.

Selectmen Update - The E&RC community involvement team will coordinate with the JBCC commands and environmental programs to update the Boards of Selectmen of the four Upper Cape towns annually to detail happenings at the JBCC, allowing the selectmen to be continually informed about issues concerning the environment and training activities at JBCC.

Cape Delegation Update - Similar to the Selectmen Update, the E&RC will coordinate an annual Cape Delegation JBCC briefing.

Boards of Health Update - The E&RC will coordinate with the JBCC environmental and clean up programs to arrange an annual JBCC briefing for the Boards of Health of the four Upper Cape Towns.

Water Coop Update - The E&RC will coordinate an annual Water Coop JBCC briefing.

Local Realtor Group Update - The E&RC will coordinate annual JBCC briefing for the local realtor groups in each of the four Upper Cape Towns.

One-on-one Discussions - Used to further two-way communication, one-on-one discussions provide a pivotal communication resource between the E&RC and JBCC stakeholders. Interviews allow for a sharing of information, ideas, insight, and concerns. Information gained during these discussions can be used by the E&RC to form a better understanding of the community's perspective on issues concerning the JBCC and how to best address the concerns of its stakeholders. This information will also allow the community outreach team to function as a conduit for the community, ensuring their voice is heard internally at the JBCC.

Public Notices

News Releases - The community involvement team uses mass media outlets to inform JBCC stakeholders and the general public. News releases highlight activities, issues, and announce successes at the JBCC. News releases play an important role during E&RC notification protocols to deliver information to the general public in a timely and wide-reaching manner.

Newspaper Advertisements - Newspaper ads serve as a vehicle to regularly highlight upcoming events, documents released by the E&RC to the Information Repository, information about the E&RC and its programs, or news items on the E&RC's web site.

Telephone 'Tree' - The E&RC team will use telephone trees during notification protocols to quickly relay important information internally and externally when situations occur at JBCC that pose an immediate threat to human health or the environment or affect base operations or the community. E-mail trees will be used as secondary sources of communication to deliver follow-up information during these situations.

PUBLICATIONS:

Calendar - The calendar will list monthly public meetings associated with the environmental programs at the JBCC. The calendar will be distributed to the JBCC mailing list monthly and will also be published on the E&RC website.

JBCC Quick Guide - The JBCC Quick guide will highlight the military commands, environmental programs, and federal and state programs located at the JBCC. The guides will be available in the Information Repositories and on the

Fact Sheets - Community involvement professionals will regularly produce facts sheets containing detailed information about E&RC natural resource, environmental compliance, and cultural resources programs, training activities, planning, and other issues regarding the JBCC and its stakeholders. The E&RC will distribute fact sheets to JBCC visitors and at public meetings, open houses, community workshops, and other events.

Web Site - The web site, www.EandRC.org, is a continuously updated tool used to inform the public about the E&RC's mission, its programs and staff, and up-coming events. The site includes an extensive publication library for visitors to download as well as links to other JBCC programs and sites of interest.

Events - The community involvement team will use special events to inform the public about base activities and interact with community members. Specials events may include:

- **Site Tours** - Annually the E&RC arranges a tour for the general public. Attendees tour the base and learn about the military mission and environmental programs first hand
- **Field Trips** - The E&RC arranges field trips upon requests from various groups to include schools, veterans' groups, colleges and universities, and environmental groups to name a few. The field trips are tailored to fit the areas of interest of the group.
- **Internal Meetings** - The community involvement team will attend internal meetings held by various programs and commands at the base to gain an overall understanding of current activities at the JBCC. This knowledge will allow E&RC staff to better facilitate information requests by directing questions to the appropriate information source in a timely fashion.

Massachusetts National Guard
Environmental and Readiness Center
Building 3468
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Office hours 7:00 a.m. to 4:00 p.m.
Monday through Friday
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Massachusetts National Guard
ENVIRONMENTAL & READINESS CENTER

Ensuring Military Readiness in Concert with the Environment at Joint Base Cape Cod

Building 3468, Beaman Rd., Camp Edwards, MA 02542 , 339-202-9342

The purpose of the Environmental Management Commission (EMC) is to ensure the permanent protection of the drinking water supply and wildlife habitat of the Upper Cape Water Supply Reserve (the Reserve). The Reserve is 15,000 acres comprising the northern training area of Camp Edwards, the major training area for the Army National Guard Soldiers in the Northeast. The northern 15,000 acres of Joint Base Cape Cod is the largest piece of undeveloped land on Cape Cod and is home to 37 state-listed species. The Camp Edwards Training Area sits atop an aquifer that is a source of drinking water for Upper Cape Cod.

The EMC is comprised of the commissioners of the Department of Fish and Game, the Department of Environmental Protection (MassDEP) and the Department of Conservation and Recreation. Its authority comes from Massachusetts Chapter 47 of the Acts of 2002 and a Memorandum of Agreement signed in 2001.

The EMC oversees compliance with, and enforcement of, the Environmental Performance Standards. Environmental Performance Standards are a set of standards specifically created through the Massachusetts Environmental Policy Act process to protect the resources in the Reserve.

Chapter 47 of the Acts of 2002 also transferred the care, custody, and control of the northern 15,000 acres of JBCC from the special military reservation commission to the Division of Fisheries and Wildlife of the Department of Fish and Game.

Upper Cape Water Supply Reserve

Upper Cape Water Supply Reserve (Camp Edwards Training Area) and the northern 15,000 acres of JBCC are 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 EMC's Role

The EMC, through the Commissioners and staff, oversees, monitors and evaluates activities in the Reserve. The EMC ensures that all military and other activities on the Reserve are consistent with the purpose of resource protection. The EMC's responsibility in overseeing compliance with the Environmental Performance Standards is a key aspect of their role. The EMC also coordinates with MassDEP, the Environmental Police, and the Division of Fisheries and Wildlife in the enforcement of environmental laws and regulations in the Reserve. Updates on the Reserve are provided at EMC meetings and at the EMC's Community Advisory and Science Advisory Council meetings. The advisory councils assist the EMC in their role to facilitate an open and public review of all activities on the reserve. (**Meeting Minutes**)

Community Advisory Council (CAC)

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 three to four times per year. (**Meeting Minutes**)

Science Advisory Council (SAC)

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 to three times per year. (**Meeting Minutes**)

Oversight Activities

The EMC oversees training and various monitoring activities conducted by the Massachusetts National Guard in the Reserve. An environmental officer is the on-base staff reporting to the EMC. The duties and responsibilities of the environmental officer are to monitor the activities being conducted on, and the uses of, the Upper Cape Water Supply Reserve / Camp Edwards Training Area and the impact of such activities and uses on the water supply and wildlife habitat. The EMC has access to the training areas prior to, during, and immediately following training. The environmental officer evaluates range reports, inspection forms, logs, and other information and data regarding the ongoing activities and uses of the Reserve. The EMC evaluates whether or not a user is in compliance with the Environmental Performance Standards and provides for enforcement therein.

Monitoring and Evaluation

- The EMC determines compliance and may restrict activities in accordance with Chapter 47 of the Acts of 2002, the law relative to the environmental protection of the northern 15,000 acres of JBCC.
- The EMC performs unannounced on-range monitoring of the range users' training to ensure the users are properly informed of range use requirements and are following prescribed procedures.

The Environmental Performance Standards

The Environmental Performance Standards are a list of requirements, or standards for performance, that guide both military and civilian users in the protection of Camp Edwards' natural and cultural resources and the groundwater beneath the Reserve. These standards apply to Massachusetts National Guard properties at Joint Base Cape Cod. The Environmental Performance Standards are based in large part on already 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.
.
The Environmental Performance Standards are divided into general and specific performance standards. There are 19 specific performance standards that apply to the northern training area of Camp Edwards. These specific performance standards pertain to resource management areas such as rare species and habitat management, hazardous materials, solid waste, and pest and fire management, with an emphasis on habitat and groundwater protection. The goal is to ensure the protection of the groundwater and habitat during conduct of compatible military training and civilian use activities, such as hunting.

The Annual State of the Reservation Report

The Environmental Management Commission receives a State of the Reservation Report that provides an assessment of the results of the Massachusetts Army National Guard's environmental management programs in the Reserve as it relates to the Environmental Performance Standards. The Report also provides background information on base infrastructure and the natural and cultural resources found in the Reserve.

More information is available by contacting the EMC's environmental officer at 508- 946-2871. Older minutes may be obtained by calling
339-202-9369.

MEETING MINUTES

Environmental Management Commission (EMC)

- EMC minutes 05-23-19 FINAL
- EMC minutes 10-25-18 FINAL
- EMC minutes 06-01-17 FINAL
  EMC minutes 06-08-16 FINAL

Community Advisory Council (CAC)

- CAC minutes 03-14-19 FINAL
- CAC minutes 10-04-18 FINAL
- CAC minutes 05-02-18 FINAL
- CAC minutes 10-25-17 FINAL
- CAC minutes 05-25-17 FINAL
- CAC minutes 10-05-16 FINAL

Science Advisory Council (SAC)

- SAC minutes 09-20-18 FINAL
- SAC minutes 05-10-18 FINAL
- SAC minutes 10-19-17 FINAL
- SAC minutes 05-18-17 FINAL
- SAC minutes 10-13-16 FINAL
- SAC minutes 04-27-16 FINAL
- SAC minutes 03-23-16 FINAL

Massachusetts National Guard
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Appendix G: Camp Edwards Environmental Performance Standards (EPS) (2017)

APPENDIX A
ENVIRONMENTAL PERFORMANCE STANDARDS

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 1:0 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 weJl, 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 suppol1 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 IOO-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 n 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 bums 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. Tills 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 H: Greenhouse Gas Analysis

Multi-Purpose Machine Gun (MPMG) Range at the Known Distance (KD) Range

Greenhouse Gas Analysis

January 30, 2020

Greenhouse Gas Analysis
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1 BACKGROUND INFORMATION

1.1 MEPA Greenhouse Gas Policy and Protocol

The Executive Office of Energy and Environmental Affairs ("EOEEA") has established a Greenhouse Gas ("GHG") Emissions Policy and Protocol last revised May 5, 2010 ("Policy") in accordance with the Massachusetts Environment Policy Act ("MEPA"). The purpose of the Policy is to inform the MEPA office of the quantity of GHG associated with proposed projects, by assessing the project baseline, considering available alternatives, and evaluating the feasibility and impact of performing the alternatives.

GHGs are emitted from stationary and mobile sources, resulting in trace amounts in the atmosphere. GHGs include water vapor, carbon dioxide ("CO_2"), nitrous oxide, methane, hydrofluorocarbons, perfluorocarbons, and sulfur hexafluoride. Water vapor occurs naturally and is the most abundant GHG, with CO_2 being the second most abundant. Because CO_2 constitutes an abundant amount of human-caused GHG emissions, CO_2 is used as the basis for calculating the equivalent amounts of CO_2 (i.e., CO_2e) other GHGs would emit. The carbon dioxide equivalent ("CO_2e") is therefore used as a measurement of GHGs as a common unit and allows GHGs to be expressed as a single number (USEPA 2016h). CO_2e is an accounting measure of GHGs which takes into account Global Warming Potentials ("GWP") for various GHG chemicals. For example, one ton of CO_2 is equivalent to one ton of CO_2e, one ton of methane ("CH_4") is equivalent to 25 tons of CO_2e, and one ton of nitrous oxide ("N_2O") is equivalent to 298 tons of CO_2e. The combined GHG total, represented as CO_2e, is the amount of CO_2 that has the equivalent global warming impact as the combination of different GHG species.

1.2 Description and Scope of Project

The Massachusetts Army National Guard ("MAARNG") is proposing to construct and operate a Multi-Purpose Machine Gun ("MPMG") Range (the Project) at the existing 600-yard Known Distance ("KD") Range at Camp Edwards (see **Figure 1.1**). The purpose of the Project is to provide the MAARNG with a mission required, Army-standard MPMG Range to allow the MAARNG to efficiently attain required training and weapons qualifications requirements within Massachusetts. A priority for the MAARNG at Camp Edwards is the continued use and development of live-fire ranges to meet the requirement that all Soldiers qualify with their primary weapon systems annually. Currently, the three closest MPMG ranges used for training include Camp Ethan Allen in Jericho, Vermont located over 270 miles away, Fort Dix in Ocean County, New Jersey located over 300 miles away, and Fort Drum located in Jefferson County, New York located over 370 miles away (see **Figure 1.2**). Implementation of the Project would allow the MAARNG to fulfill their mission by meeting their weapons qualifications standards and training requirements using in-State facilities, and to maintain their readiness posture. Construction of the MPMG Range at Camp Edwards within Massachusetts will eliminate the out-of-state travel to the other training facilities with MPMG Ranges.

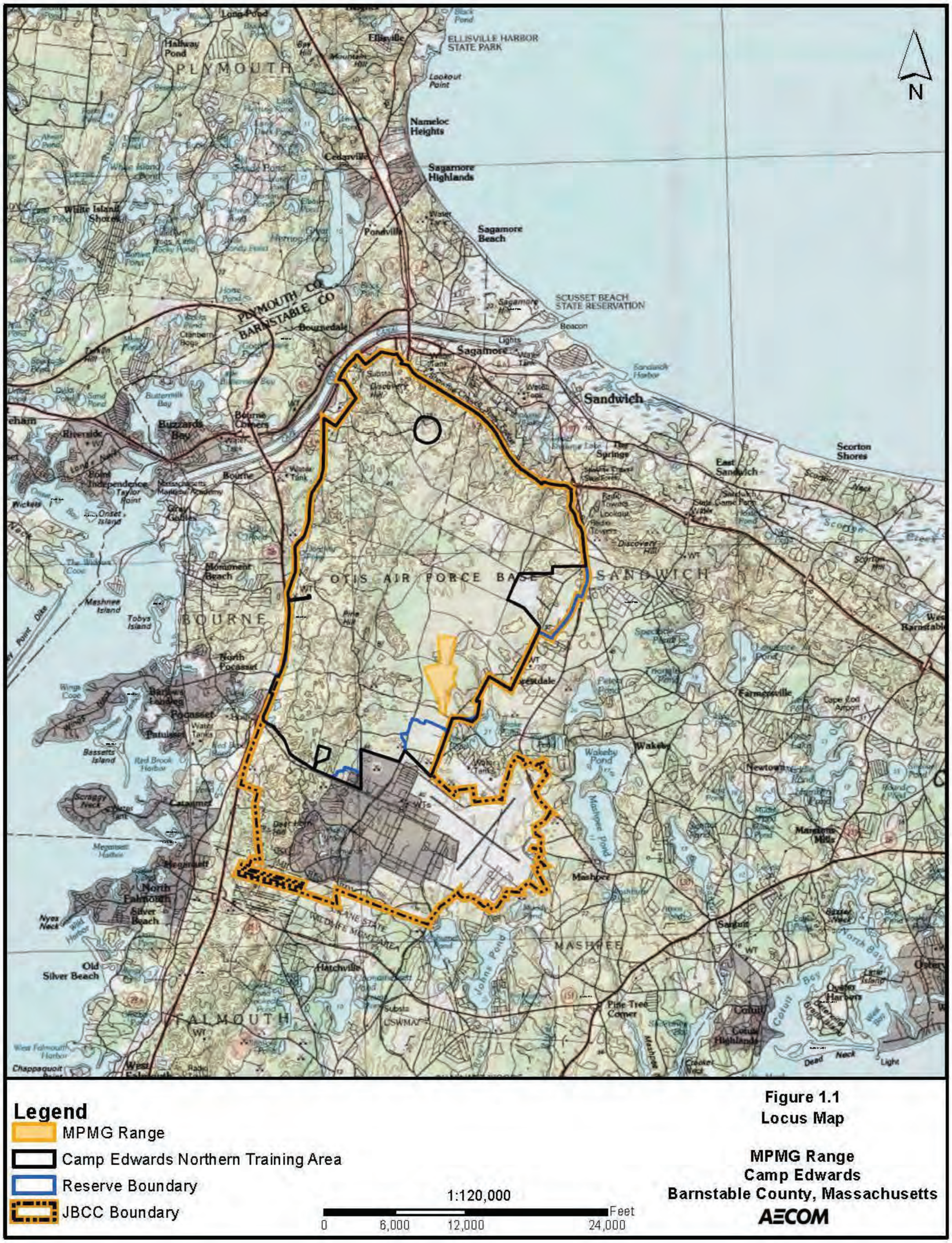


Figure 1.1
Locus Map

MPMG Range
Camp Edwards
Barnstable County, Massachusetts

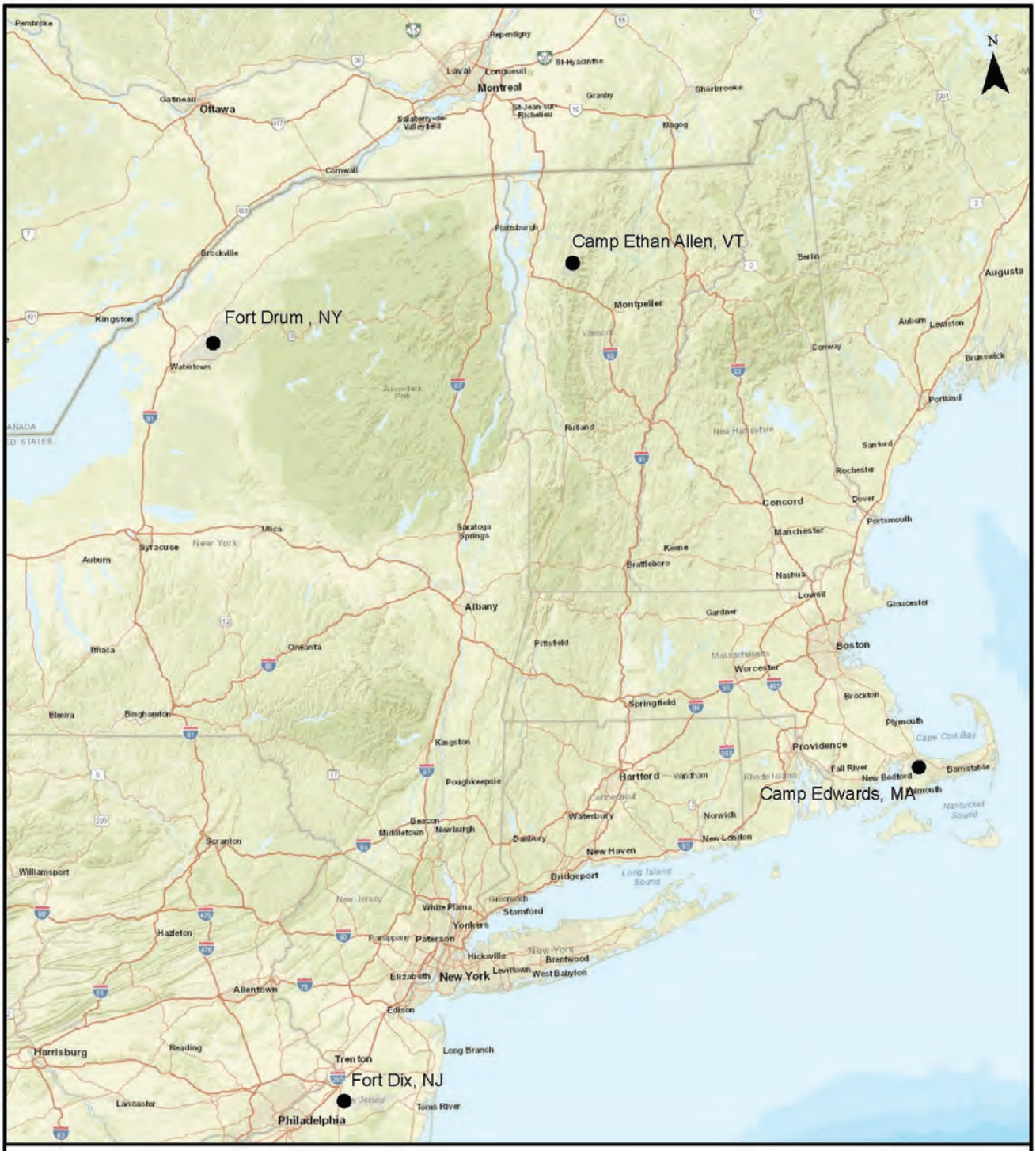


Figure 1.2
Camps of the Northeast

MPMG Range
Camp Edwards
Barnstable County, Massachusetts

AECOM

The Project involves the construction of an eight lane MPMG Range with six lanes 800 meters long with a width of 25 meters at the firing line and a width of 100 meters at a distance of 800 meters. The two middle lanes (Lanes 5 and 6) will extend an additional 700 meters to a distance of 1,500 meters long to accommodate .50 caliber rifles. The proposed MPMG Range is depicted on **Figure 1.3**.

The footprint of the Project would be 209.0 acres which includes improving the existing 600-yard KD Range comprised of approximately 38.5 acres (36.0 acres managed grasslands, 2.5 acres existing range control area) and approximately 170.5 acres of vegetation clearing. The range consists of: (1) the physical range footprint, consisting of the firing positions and targetry, (2) Range Operations Control Area ("ROCA") support structures; which includes a Range Control Tower, Ammunition Storage Building, and Covered Bleachers, and (3) approximately 10.0 acres of clearing for firebreaks. The 170.5 acres of vegetation clearing proposed includes the firebreaks.

Any new projects requiring filing of an Environmental Notification Form ("ENF") or Notices of Project Change ("NPC") initiates MEPA applicability review. Based on certain triggers, MEPA requires GHG analysis for projects with land alteration or clearing and forest conversion greater than 50 acres of land. The proposed MPMG Range Project will exceed the 50 acre threshold for land clearing and, therefore, is subject to MEPA requirements. The requirements include calculation of the Project baseline, estimation of emissions associated with the Preferred Alternative as well as outlining and committing to a series of mitigation measures that will help to reduce GHG emissions from the proposed Project.

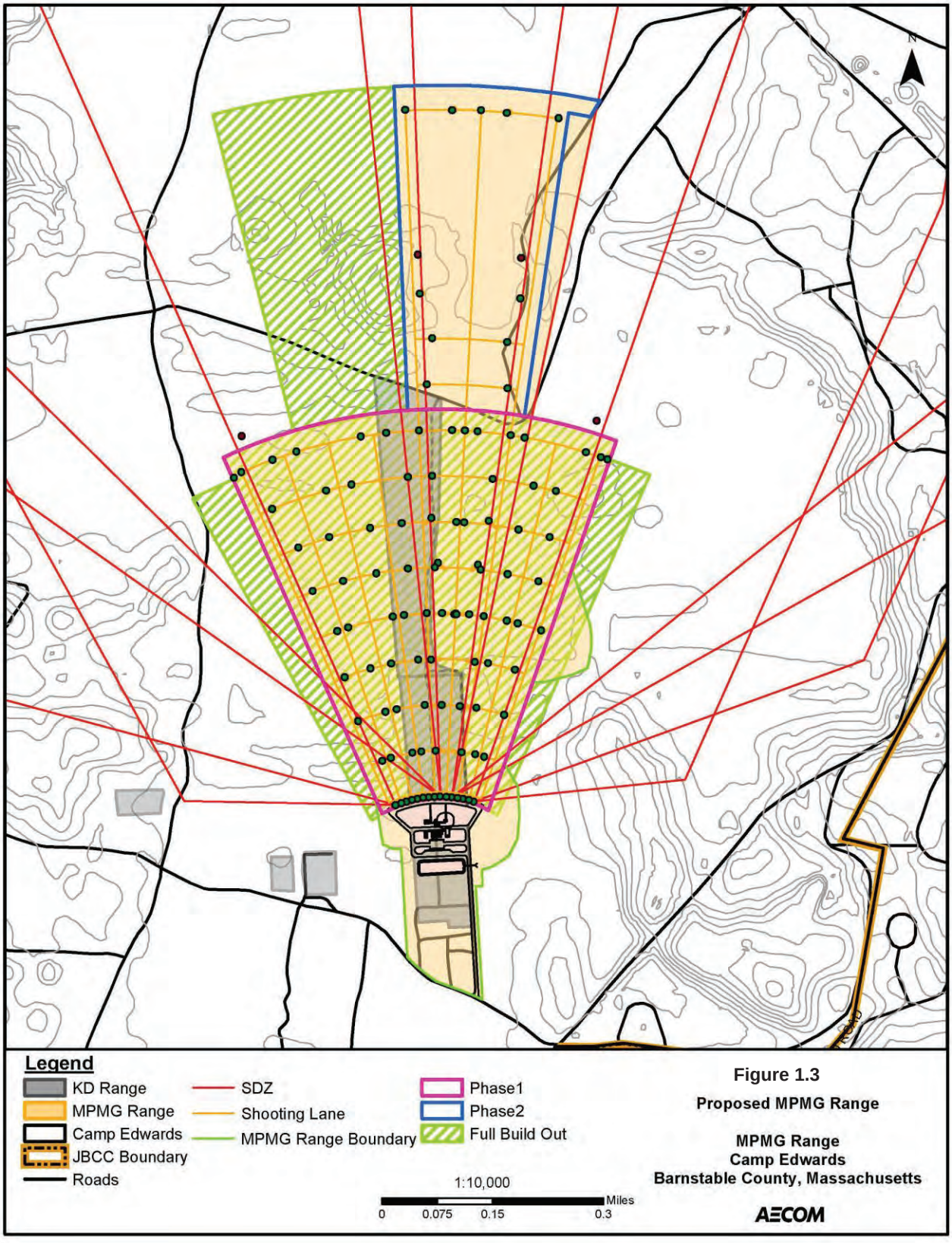
It should be noted that MEPA requires the GHG emissions to be calculated on a short ton (2,000 pounds) (hereinafter US Tons) basis which is in direct contrast with United States Environmental Protection Agency ("USEPA") which requires GHG emissions to be calculated on a metric ton (2,200 pounds) basis (hereinafter Metric Tons). Therefore, the emissions in this report will be expressed in both Short tons and Metric tons.

1.3 Baseline

Under existing baseline conditions (No-Build Alternative), the existing KD Range would continue to be used for training operations such as unmanned aircraft systems (UAS) on the 38.5 acres (36.0 acres managed grasslands, 2.5 acres ROCA) with little or no GHG emissions. The forested areas within the proposed MPMG Range footprint will continue to be vegetated with forests or grasslands providing carbon sequestration as described in **Section 1.8**. Sources of GHG emissions under baseline conditions are primarily due to transportation to out-of-state training activities by MAARNG units as described in **Section 2.1.1**.

1.4 Alternatives

This GHG assessment includes analysis of the three proposed alternatives including the Preferred Alternative, a Reduced-Scale Alternative, and a Full Build Alternative. The No-Build Alternative is represented as a baseline (or existing) condition. The Preferred Alternative will be constructed in two phases. Phase 1 will be the Reduced-Scale Alternative, that is, the eight lanes constructed at 800 meters in length. Phase 2 will add the extension of two lanes to a length of 1,500 meters..


N
Legend
KD Range
MPMG Range
Camp Edwards
JBCC Boundary
Roads
SDZ
Shooting Lane
MPMG Range Boundary
Phase1
Phase2
Full Build Out
1:10,000
Miles
0
0.075
0.15
0.3
Figure 1.3
Proposed MPMG Range
MPMG Range
Camp Edwards
Barnstable County, Massachusetts
AECOM

Both phases combined make up the Preferred Alternative. Acreages of the alternatives are provided in **Table 1**

Table 1: MPMG Range Alternatives

Alternative	800 meter lanes	1500 meter lanes	MPMG Range (acres)	Firebreak (acres)	Total Footprint (acres)	Tree clearing (acres)
Full Standard Build	10	4	294	12	306	267.5
Preferred Alternative	8	2	199	10	209	170.5
Reduced-Scale Alternative	8	0	128	10	138	99.5

1.5 Impacts

The following table summarizes the CO_2 impacts from the Proposed Project (Preferred Alternative) compared to the baseline conditions and the Reduced-Build and Full Build Alternatives. Each activity is described in other sections of this analysis along with a discussion of how the CO_2 emissions in US Tons were calculated.

Table 2: CO_2 Emissions Summary by Alternative (US Tons)

Activity	Baseline	Preferred Alternative	Reduced Build	Full Build
Transportation	**724**	**60**	**60**	**60**
Out-of-State Training	724	0	0	0
Travel of Work Crews	0	1	1	1
Within Camp Edwards after Range Construction	0	59	59	59
Construction	**0**	**897**	**549**	**1,157**
Land Clearing	0	734	430	935
Range Construction	0	129	85	189
ROCA Demolition and Construction	0	34	34	34
Land Clearing (Biomass Removal)	**0**	**39,649**	**23,295**	**61,992**
Range Operations	**0.3**	**1.3**	**1.3**	**1.3**
Firing of Weapons	0.3	0.3	0.3	0.3
ROCA Structures	0	1	1	1
CO_2 Emission Totals	**724.3**	**40,607.3**	**23,904.3**	**63,210.3**

1.6 Mitigation

Mitigation for the Proposed Project includes phasing of the construction and preservation of forested acreage within Camp Edwards. The Project will be constructed in two phases as described in Section 1.4 with the first phase being the Reduced-Build Alternative. Following the construction of the first phase, the two extended lanes will be constructed with the total impacts represented by the Preferred Alternative.

Substantial mitigation efforts are being proposed relative to impacts to rare species in consultation with the Massachusetts Natural Heritage and Endangered Species Program (NHESP) which includes the preservation of approximately 310 acres of land within Camp Edwards that is presently forested. Other management strategies includes the management of approximately 832 acres of forests through mechanical forestry.

In addition to the annual sequestration, mature forests sequester carbon throughout its life. One acre of forest provides 230 US Tons of sequestration. The estimated amount of sequestered carbon in the 13,500 acres of forest at Camp Edwards is estimated to be approximately 3,455,114 US Tons. One acre of mature grassland provides 10 US Tons of sequestration. The estimated amount of sequestered carbon in the 175 acres of grassland at Camp Edwards is estimated to be approximately 1,750 US Tons of sequestration. The annual GHG sequestration and lifetime sequestration from the mitigation acreage is summarized in **Table 3**.

Table 3: Sequestration and Mitigation

Management Action	Acreage	Annual Sequestration		Lifetime Sequestration	
		Rate*	US Tons	Rate	US Tons
Land Preservation	310	0.85 US Tons/ acre/year	263.5	230 US Tons/acre	71,300
Forestry Management	832	0.85 US Tons/ acre/year	707.2	230 US Tons/acre	162,012
Total Mitigation	**1,142**		**967.3**		**233,312**

* see **Section 1.8**

1.7 Sources of Greenhouse Gas Emissions

Sources of GHG emissions from the Project are primarily from following activities:

- Transportation (travel for out-of-state training, travel of work crews, travel to MPMG Range once constructed);
- Land Clearing (biomass removal)
- Construction (land clearing, range construction, ROCA demolition and construction);
- Range Operation (firing of weapons, ROCA structures)

The primary source of GHG emissions from transportation activities include personnel driving tactical and private vehicles to different training centers which are located out-of-state. GHG emissions will be emitted from diesel and gasoline fired tactical vehicles and on-road vehicles driven for travel to other out-of-state training facilities for range training purposes. GHG emissions

associated with transportation activities are CO_2, CH_4, and N_2O from internal combustion engines. The vehicle trips for training and associated GHG emissions occur annually under the existing (No-Build) conditions and will be used as the baseline for analysis of transportation generated GHG. See **Section 2.1.1** for baseline transportation conditions.

Sources of GHG emissions from transportation activities include travel for work crews during the construction period and travel within Camp Edwards during the MPMG Range operations period. Range operation emissions will be from tactical and private vehicles driven to the MPMG Range at Camp Edwards once it is constructed for training purposes. This travel is limited to within Camp Edwards as the Soldiers and units will already be at Camp Edwards for other training. See Section 2.2.1 for Preferred Alternative transportation conditions.

Sources of GHG emissions from land clearing includes CO_2 emissions through the removal of existing trees and shrubs (biomass). See **Section 2.2.2** for Preferred Alternative land clearing conditions.

Sources of GHG emissions from construction activities include diesel and gasoline fired non-road construction equipment and on-road construction vehicles during the construction period of the MPMG Range. GHG emissions associated with construction activities are CO_2, CH_4, and N_2O from internal combustion engines. The GHG emissions during construction will occur during land clearing, range construction, as well as demolition of existing structures and construction of ROCA support structures. See **Section 2.2.3** for Preferred Alternative construction conditions.

Sources of GHG emissions from range operations once the MPMG Range is constructed would include the firing of weapons which have limited CO_2 emissions. Emissions for ranges are calculated depending on the weapon being fired, rounds being fired, and number of soldiers training. It is not expected that the ROCA structures once constructed will emit any significant CO_2 as they are to be constructed without heating and cooling equipment. These buildings are used on a temporary basis while units are training which occurs primarily during the warmer months. See **Section 2.2.3** for Preferred Alternative range operations conditions.

1.8 Greenhouse Sequestration in Vegetation

Camp Edwards is comprised of 15,000 acres of land with approximately 13,500 acres of mature forest land and 175 acres of mature grasslands. The biomass within these forested lands provides carbon sequestration (capturing and storing) on an annual basis. According to USEPA, Inventory of US Greenhouse Gas Emissions and Sinks: 1990–2017, EPA 430-R-19-001, April 2019, between 2007 and 2017, the average annual sequestration of carbon in US forests was 0.23 US Tons (0.21 Metric Tons) per acre per year. This is equivalent of -0.85 US Tons (-0.77 Metric Tons) of CO_2 sequestration per acre of average US forest per year. Sequestration is shown in negative numbers because carbon is being captured or held within the biomass, acting as a sink for carbon. This is based on combustion of 1 molecule of carbon (molecular weight = 12) producing 1 molecule of CO_2 (molecular weight = 44) assuming complete combustion. The amount of carbon sequestered is multiplied by 3.67 (44/12, ratio of CO_2 to carbon) to calculate amount of CO_2 released or sequestered based on complete oxidation (combustion) of carbon. **Table 4** provides this information in table form.

Table 4: Total Sequestration of Forests - Baseline

Carbon Sequestration per acre per year	Carbon		CO2*		Acres at Camp Edwards	CO_2 Sequestration per acre per year	
	US Tons	Metric Tons	US Tons	Metric Tons		US Tons	Metric Tons
Forests	-0.23	-0.21	-0.85	-0.77	13,500	-11,475	-10,395

* 1 molecule of C (molecular weight of 44) = 1 molecule of $C0_2$ (molecular weight of 12)
Conversion factor C to $C0_2$ = 44/12 = 3.67 assuming complete combustion

Therefore, currently, at Camp Edwards, the 13,500 acres of forests provide a total of -11,475 US Tons (-10,395 Metric Tons) of CO_2 sequestered on an annual basis. A negative number indicates sequestration and a positive number indicates releases of CO_2. This represents the baseline sequestration for Camp Edwards. See **Section 2.12** for additional information. Table 4 provides sequestration amounts from proposed Mitigation

In addition to the annual sequestration, mature forests sequester carbon throughout its life. One acre of forest provides 230 US Tons of sequestration. The estimated amount of sequestered carbon in the 13,500 acres of forest at Camp Edwards is estimated to be approximately 3,455,114 US Tons. One acre of mature grassland provides 10 US Tons of sequestration. The estimated amount of sequestered carbon in the 175 acres of grassland at Camp Edwards is estimated to be approximately 1,750 US Tons of sequestration.

The emissions of net atmospheric CO_2 releases were estimated based on values obtained from the 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4 - Agriculture, Forestry and Other Land Use.[1] Because exact Project-specific data is not available for forest composition, appropriate values were chosen from IPCC's options, using conservative estimates in order to derive a conservative estimate of net CO_2 released due to land clearing. The total net GHG release was calculated by subtracting the CO_2 to be sequestered in grasslands from the CO_2 currently sequestered in the vegetation types described above. These CO_2 sequestration amounts were estimated by multiplying Project-specific acreage data by the IPCC inputs summarized below.

1.9 Greenhouse Emissions from Removal of Vegetation

Emissions from the removal of vegetation during land clearing activities are estimated from the amount of biomass in the above ground and below ground parts of a tree (or other vegetation). The biomass (in Metric Tons of dry matter per hectare) numbers are then converted into Metric Tons of carbon and converted to CO_2 in US Tons.

Relevant values for the CO_2 sequestration amounts from forests were obtained from IPCC's Chapter 4 - Forest Land to derive a conservative estimate of the sequestration that will be released when vegetation is cleared. The following inputs were derived from IPCC and multiplied by the Project-specific acreage values:

- Carbon rates from above-ground biomass dry matter per hectare were obtained from Table 4.7. For all vegetation types, the calculations used for this analysis included the

[1] https://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html

high (conservative) end of the range provided for temperate continental forests in North America.

- A ratio of below-ground biomass to above-ground biomass was obtained from the Table 4.4 and multiplied by the above-ground biomass dry matter values to derive an estimate of total dry matter per hectare. The calculations used the conservative end of the range provided for "other broadleaf above-ground biomass >150 tonnes[2] per [hectare]a" temperate forests, to derive a conservative estimate of below-ground biomass.
- Carbon rates per ton of dry matter were obtained from Table 4.3. For all vegetation types, the calculations used the conservative end of the range provided for temperate and boreal forests.

Relevant values for the CO_2 sequestered in mature grasslands were obtained from IPCC's Chapter 6 - Grassland. The following inputs were derived from IPCC:

- Tonnes of dry matter per hectare were obtained from Table 6.4. The calculations used the value provided for the "Warm Temperate – Wet" climate zone.
- Tonnes C per ton of dry matter of herbaceous biomass obtained from Section 6.3.1.4.

As described in **Section 2.2.2**, the Preferred Alternative would release 39,273 US Tons of CO_2 sequestered from the forested areas during land clearing activities and removal of forest cover type. The Preferred Alternative would release 376 US Tons of CO_2 sequestered from the land clearing of the grasslands.

2 Baseline and Alternative Analysis

Pursuant to the MEPA GHG Policy, this section presents a quantification and evaluation of the Projects' baseline, and alternatives to the baseline. The following alternatives will be assessed. Primarily, the differences will be based on acreage of vegetation to be cleared, area to be graded, and the length of the construction period.

2.1 Baseline Conditions

Under existing baseline conditions (No-Build Alternative), the existing KD Range would continue to be used for training operations such as UAS on the 38.5 acres (36.0 acres managed grasslands, 2.5 acres ROCA). This range is not presently used for live-fire training. The forested and grassland areas within the proposed MPMG Range footprint will continue to be vegetated and provide carbon sequestration annually.

Sources of GHG emissions under baseline conditions are primarily transportation to out-of-state training activities. Sources of GHG sequestration include the presence of vegetated areas including grasslands and forests.

[2] The unit of "tonnes" is also used in place of Metric Tons

2.1.1 Transportation

The baseline condition is primarily based on the direct transportation related emissions from the trips taken by convoy for training purposes to the out-of-state locations as there is no MPMG Range in Massachusetts. Currently, the three closest MPMG ranges used for training include Camp Ethan Allen in Jericho, Vermont located over 270 miles away, Fort Dix in Ocean County, New Jersey located over 300 miles away, and Fort Drum located in Jefferson County, New York located over 370 miles away. The vehicles in the convoy deployed for travel to these out-of-state training locations include High Mobility Multipurpose Wheeled Vehicles (HMMWV), Light Medium Tactical Vehicles (LMTV), Family of Medium Tactical Vehicles (FMTV), Medium Armored Tactical Vehicles (MATV), Armored Security Vehicles (ASV), and non-military passenger vehicles.

The calculated GHG emissions for the baseline conditions are summarized in **Table 5**. **Table 6** (following page) provides a breakdown of the mileage by vehicle type from 2019 Camp Edwards data and how the GHG emissions were calculated.

Table 5: Annual Transportation Emissions from Out-of-State Travel to Training Locations from Camp Edwards - Baseline

Vehicle Types by Fuel	CO_2 Emissions (US Tons)	CO_2 Emissions (Metric Tons)
Diesel Vehicles	691.3	628.1
Gasoline Vehicles	32.8	29.8
Total	**724.1**	**657.9**

Annually, the mileage driven by convoy for training purposes is approximately 282,240 miles for diesel and gasoline vehicles which is converted to CO_2 emissions as noted above. **Table 6** provides a summary of mileage driven by each type of vehicle in the convoy based on mileage to different locations where MPMG ranges exist. The backup data for the mileage by facility is provided in **Appendix A**.

The estimated annual fuel consumption (based on the miles per gallon or MPG rating) for diesel vehicles is 61,595 gallons and for gasoline vehicles is 3,348 gallons as shown on **Table 6**. It should be noted that as the emission factors for convoy vehicles are not readily available, CO_2 emissions from the vehicles were based on the estimated fuel consumption provided in the **Table 6**. The Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories, Volume 2 (2006 IPCC) estimates that 8,887 grams of CO_2 is emitted per gallon of gasoline assuming all the carbon in gasoline is converted to CO_2. Similarly, 2006 IPCC guidelines estimates that 10,182 grams of CO_2 is emitted per gallon of diesel consumed assuming all carbon in diesel is converted to CO_2.

Table 6: Annual Fuel Consumption and CO_2 Emissions by Vehicle Type, Camp Edwards - Baseline

Fuel Consumption						CO_2 Emissions		
Vehicle Type	**Vehicle Weight (Pounds)**	**Fuel Type**	**Fuel Capacity Per Vehicle (Gallons)**	**Total Annual Miles Driven**	**Fuel Consumption (Gallons)**	**CO_2 Emission Factor[1] (grams/gallon)**	**US Tons**	**Metric Tons**
HMMWV	12,100	Diesel	25	99,780	19,200	10,182	215.5	195.8
LMTV	22,904	Diesel	35	41,820	11,585	10,182	130.0	118.1
FMTV	28,889	Diesel	35	89,700	25,200	10,182	282.8	257.0
MATV	34,830	Diesel	30	3,000	750	10,182	8.4	7.6
ASV	29,000	Diesel	30	21,660	4,860	10,182	54.5	49.6
Non-military	8,000	Gasoline	18	26,280	3,348	8,887	32.8	29.8
		Annual Total (Diesel)		**255,960**	**61,595**	10,182	691.3	628.1
		Annual Total (Gasoline)		**26,280**	**3,348**	8887	32.8	29.8
		Total Annual Miles Driven		**282,240**	**64,943**	**Annual Total CO_2 Emissions**	**724.1**	**657.9**

[1]Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories, Volume 2 (2006 IPCC)

Source of Data: Camp Edwards Range Control, 2019

HMMWV High Mobility Multipurpose Wheeled Vehicle
LMTV Light Medium Tactical Vehicle
FMTV Family of Medium Tactical Vehicles
MATV Medium Armored Tactical Vehicle
ASV Armored Security Vehicle

2.1.2 Land Clearing (Biomass Removal)

Under the baseline condition (No-Build Alternative), no land clearing will occur. The vegetation at the site is presently comprised of four different cover types; three with woody vegetation:

- **Pine Oak Forest Woodland (PPOF)** - PPOF forest ranges from a low canopy with a dense shrub layer to a taller canopy with a sparser shrub layer. The pitch pine-oak forest woodland of Camp Edwards has a low canopy of pitch pine and tree oaks (black oak, scarlet oak, and white oak and a moderately continuous shrub layer of blueberry, black huckleberry, sheep laurel, and scrub oak.
- **Pitch Pine-Scrub Oak Community (PPSO)** - PPSO overstory community is almost entirely pitch pine with an understory of sometimes very dense scrub oak which creates the pitch pine-scrub oak. The prevalent shrub species of this community are black huckleberry and blueberry which are commonly interspersed among the more dominant scrub oak. White oak is present in understory where fire has been excluded and threatens to convert the community.
- **Scrub Oak Shrubland (SOS) -** This plant community represents one of the earliest states of vegetative succession on Camp Edwards and consists primarily of scrub oak with essentially no pitch pine. Other common plants in the scrub oak barrens include black huckleberry, blueberry, cat brier, and wintergreen. The majority of SOS at Camp Edwards is at significant risk of loss due to forest (pitch pine) encroachment due to lack of fire from artillery and historic sources.
- **Grassland -** Cultural or Managed Grasslands (MG) are human created and maintained open communities dominated by grasses. Mowing is the typical maintenance, however on Camp Edwards; fire has played and is playing a more important role. The grasslands are one of the least diverse plant communities on Camp Edwards, with only 37 identified species during a floristic inventory. The community is dominated by grass species including little bluestem, big bluestem, switchgrass, etc.

Under the baseline condition (No-Build Alternative), the forested land will continue to sequester carbon. As stated in **Section 1.6**, currently at Camp Edwards, an estimated 11,435 US tons of CO_2 will be sequestered on an annual basis and will result in a net reduction of CO_2 annually.

2.1.3 Construction

Under the baseline conditions (No-Build Alternative), there will be no construction at the proposed MPMG Range and no land will be cleared or graded. Therefore, no carbon emissions or sequestration are emitted under baseline conditions relative to construction.

2.1.4 Range Operations

Under the baseline condition (No-Build Alternative), the existing KD Range would continue to be used for training operations such as UAS. This range is not presently used for live-fire training. The ROCA buildings present are not heated or cooled and are not being utilized. Therefore, no CO_2 emissions are occurring as a result of existing range operations.

2.2 Preferred Alternative

The Preferred Alternative will involve the following activities that will generate CO_2 emissions:

- Transportation (travel of work crews, travel to MPMG Range once constructed),
- Land Clearing (biomass removal)
- Construction (land clearing, range construction, ROCA demolition and construction)
- Range Operations (firing of weapons, ROCA structures)

2.2.1 Transportation

Emissions resulting from transportation for the Preferred Alternative includes travel of work crews, during land clearing, range construction, and ROCA construction, and travel for training during range operations once the MPMG Range is constructed. Travel during the construction period for work crews is provided in **Table 7** for all three alternatives based on estimated commuting mileage and length of the construction period. Numbers are rounded to 1 US Ton for each alternative for purposes of the summary table.

Table 8 provides a similar analysis as was done for the baseline conditions for transportation for training purposes but estimates travel within Camp Edwards once the MPMG Range is constructed under the Preferred Alternative. Units and Soldiers would already be at Camp Edwards for training purposes, therefore the mileage estimate is based on round-trip mileage to the MPMG Range from a muster point within Camp Edwards. This estimated amount of 59.0 US Tons would be the same under the Reduced-Build and Full Build Alternatives.

Table 7: Total CO2 Emissions for Travel by Work Crews during Construction Period by Alternative

Alternative	Fuel Consumption		CO_2 Emissions		
	Miles Travelled	Fuel Consumption (Gallons)	CO_2 Emission Factor [1] (grams/ gallon)	US Tons	Metric Tons
Preferred Alternative	3,000	100	8,887	1.0	0.9
Reduced-Build	2,000	67	8,887	0.7 *	0.6
Full Build	4,000	133	8,887	1.3 *	1.2

* Rounded to 1 in summary Table 16
Assumes standard gas driven vehicle with fuel capacity averaging 30 MPG
[1] Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories, Volume 2 (2006 IPCC)

Table 8: Summary of Annual Vehicle Miles and Fuel Consumption by Vehicle Type - Preferred Alternative

Fuel Consumption						CO_2 Emmissions		
Vehicle Type	**Vehicle Weight (Pounds)**	**Fuel Type**	**Fuel Capacity Per Vehicle (Gallons)**	**Total Annual Miles Driven**	**Fuel Consumption (Gallons)**	**CO_2 Emission Factor[1] (grams/ gallon)**	**US Tons**	**Metric Tons**
HMMWV	12,100	Diesel	25	6,840	1,267	10,182	14.2	12.9
LMTV	22,904	Diesel	35	2,800	1,773	10,182	19.9	18.1
FMTV	28,889	Diesel	35	6,200	1,607	10,182	18.0	16.4
MATV	34,830	Diesel	30	200	50	10,182	0.6	0.5
ASV	29,000	Diesel	30	1,560	347	10,182	3.9	3.5
Non-military	8,000	Gasoline	18	1,800	240	8,887	2.4	2.1
		Annual Total (Diesel)		**17,600**	**5,044**			
		Annual Total (Gasoline)		**1,800**	**240**			
		Total Miles Driven		**19,400**	**5,284**	**Annual Total CO2 Emissions**	**59.0**	**53.6**

[1]Intergovernmental Panel on Climate Change (IPCC) Guidelines for National Greenhouse Gas Inventories, Volume 2 (2006 IPCC)

HMMWV High Mobility Multipurpose Wheeled Vehicle
LMTV Light Medium Tactical Vehicle
FMTV Family of Medium Tactical Vehicles
MATV Armored Security Vehicle
ASV Medium Armored Tactical Vehicle

2.2.2 Land Clearing (Biomass Removal)

As shown on **Table 9**, the removal of the trees under the Preferred Alternative will result in the release of 39,273 US Tons of CO_2 and the alteration of grassland will result in the release of 376 US Tons of CO_2. Forests will be converted to managed grasslands as part of the range construction as the range floor will be planted with native grassland species. This will allow for the sequestration on an annual basis of 1,705 US Tons of CO_2 for 170.5 acres of grassland.

The vegetation is comprised of three different cover types with woody vegetation as described in **Section 2.1.2**, which will be cleared and graded for the range and then vegetated with native grasses to be managed as grasslands. The cleared trees and woody vegetation will be chipped on-site and removed off-site, likely to be sold to outside sources for use at biomass energy facilities as a fuel. The following table calculates the release of the CO_2 from land clearing.

Table 9: Estimated Emissions from Land Clearing Activity – Preferred Alternative

Vegetation Type	Acres	Above-Ground Biomass *	Below-Ground Biomass *	Total Biomass *	C per Metric Ton of Dry Matter	C (Metric Tons/ acre)	CO_2 (Metric Tons/ acre)	CO_2 (US Tons)	CO_2 (Metric Tons)
PPOF	50.0	200	88	288	0.49	57	209	11,517	10,470
PPSO	55.0	200	88	288	0.49	57	209	12,669	11,517
SOS	65.5	200	88	288	0.49	57	209	15,087	13,716
Total Forested	**170.5**							**39,273**	**35,703**
Total Grasslands	36.0			13.6	0.47	3	9	376	341
Total Emissions	**206.5**							**39,649**	**36,044**

* Metric Ton of dry matter per hectare
** ROCA acreage (2.5) not included here
Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Agriculture, Forestry and Other Land Use https://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html

2.2.3 Construction

Emissions resulting from vehicles during the construction period of the Preferred Alternative include non-road equipment operation for land clearing, range construction, and ROCA demolition and construction.

2.2.3.1 Land Clearing

RSMeans Site Work Landscape Cost Data (2018) was utilized to estimate the equipment and crew needed for the land clearing and grubbing portion of the task. According to RSMeans Section 31 11 Clearing and Grubbing:

- To cut and chip medium trees up to 12” diameter, a crew of 6 members (1 foreman, 4 laborers and 1 equipment operator) can cut 0.7 acres per day. Equipment required will be one 12” brush chipper (130 hp), one crawler loader (3 CY) and two gas-fired 18” chain saws.

- To clear and grub dense brush including stumps, a crew of 3 members (1 equipment operator and 2 truck drivers) can grub and clear 1 acre per day. Equipment required will be 1 hydraulic excavator (1.5 CY) and 2-400 HP dump trucks (12 CY capacity).

Please see **Table 10** for the estimated hours of operation from the construction vehicles for land clearing. This table provides hours estimated for each of the three alternatives based on acreage to be cleared. Once the hours were determined, the next step was to identify the construction equipment to be used for the land clearing. **Table 11** provides the Project emissions of land clearing equipment by the three alternatives. Approximately 734 US Tons will be emitted during the Preferred Alternative construction period from land clearing equipment.

Table 10: Estimated Hours of Operation for Land Clearing by Alternative

Land Clearing Activity	Preferred Alternative	Reduced-Scale Alternative	Full Build Alternative
Cutting and chipping trees up to 12" diameter			
Acres per day (one 8-hour shift)	0.7	0.7	0.7
Acres to be cleared	170.5	99.5	267.5
Number of days to clear all acreage	244	143	383
Hours of Equipment Operation per day	8	8	8
Total hours for equipment operation	**1,952**	**1,144**	**3,064**
Crew Round Trip Hours for Commuting	1	1	1
Number of crews	6	6	6
Number of commuters by crew/day/pickup truck	6	6	6
Total hours of operation of pickup trucks	**1,464**	**858**	**2,298**
Clear and grub dense shrubs including stumps			
Acres per day (one 8-hour shift)	1.0	1.0	1
Acres to be cleared	170.5	99.5	267.5
Number of days to clear all acreage	171	100	268
Hours of equipment operation per day	8	8	8
Total hours for equipment operation	**1,368**	**800**	**2,144**
Crew round trip hours for commuting	1	1	1
Number of crews	3	3	3
Number of commuters by crew/day/pickup truck	3	3	3
Total hours of operation of pickup trucks	**513**	**300**	**804**

Table 11: Summary of Projected Emissions from Land Clearing Equipment by Alternative

Construction Equipment	Preferred Alternative		Reduced-Scale Alternative		Full Build Alternative	
	Equipment Usage (hr)	CO_2 Emissions (lb)	Equipment Usage (hr)	CO_2 Emissions (lb)	Equipment Usage (hr)	CO_2 Emissions (lb)
Chain saws	3,904	29,479	2,288	17,276	6,128	46,272
Dozer	1,952	276,173	1,144	161,855	3,064	141
Brush Chipper	1,952	133,750	1,144	78,386	3,064	209,944
Excavator, hydraulic, 1.5 cy	1,368	124,356	800	72,723	2,144	194,897
Dump Truck, 12 cy	2,736	347,666	1,600	203,314	4,288	544,880
Pickup Truck, 3/4 Ton	1,977	556,336	1,158	325,866	3,102	872,915
Total Emissions Pounds/year		**1,467,759**		**859,420**		**1,869,050**
Total Emissions US Tons/year (tpy)		**734**		**430**		**935**
Total Emissions Metric Tons/year		**666**		**390**		**850**

Source: Emission factors from USAFCEE Air Emissions Guide For Air Force Mobile Sources, July 2016, Section 4 and 5.
CO_2e = Carbon dioxide equivalent

2.2.3.2 Range Construction

To determine the amount of CO_2 produced during range construction, the number of days of construction were calculated based on acreage and amount of grading that could be completed in one day as shown in **Table 12.** The rate of CO_2 emissions from one dozer per hour would be 63.67 lbs/hr**.** If there are two crews working at the same time for range construction, there would be twice the emissions per hour but only half the hours would be needed, resulting in the same level of emissions. Approximately 129 US Tons of CO_2 will be emitted during the Preferred Alternative construction period from grading equipment.

Table 12: Total CO_2 Emissions from Range Construction

Alternative	Total Footprint (acres)	Total Footprint (s.y.)	Days based on 2,000 s.y. of grading*	Hours (based on an 8 hour day)	CO_2 for Dozer at 63.67 lbs/hr	CO_2 US Tons
Full Build	306	1,481,040	741	5,924	377,191	189
Preferred Alternative	209	1,011,560	506	4,046	257,624	129
Reduced-Scale Alternative	138	667,920	334	2,672	170,106	85

Source: Emission factors from USAFCEE Air Emissions Guide For Air Force Mobile Sources, July 2016, Section 4 and 5.
* Grading estimated at 2,000 s.y. per day for one crew with 2 crew members and one 30,000 lb grader)

2.2.3.3 ROCA Demolition and Construction

There are presently two wooden structures located at the KD Range, a tower and an ammunition building. The existing tower is approximately 400 s.f. in size. The Ammunition building is

approximately 600 s.f. in size. CO_2 will be produced from the equipment used for demolishing the existing buildings. Based on a conservative estimate of 2.5 weeks for the demolition, the CO2 emitted would be approximately 3 US Tons.

Based on conservative estimates of six months for the construction of the ROCA, the CO_2 emitted would be approximately 31 US Tons. The proposed MPMG Range will have approximately 3,968 s.f. of new construction in the following structures:

- Range Control Tower (657 s.f.)
- Range Operations and Storage Facility (800 s.f.)
- Ammunition Breakdown Building (185 s.f.)
- Bleacher Enclosure (726 s.f.)
- Range Classroom Building (800 s.f.)
- Covered Mess Shelter (800 s.f.)

The total amount of CO_2 produced by the ROCA demolition and construction is estimated to be 34 US Tons and will be the same for each of the three alternatives.

2.2.4 Range Operations

Sources of GHG emissions from range operations and from the ROCA structures once the MPMG Range is constructed would include the firing of weapons which have limited CO_2 emissions.

2.2.4.1 Firing of Weapons

The firing of weapons during training exercises at the MPMG Range will occur once constructed. Emissions for ranges are calculated depending on the weapon being fired, rounds being fired, and number of soldiers training. **Table 13** provides estimated annual usage of the MPMG Range based on the three-year (2017-2019) average of actual rounds used at Camp Edwards and the estimate increase of training as a result of the MPMG Range. The CO_2 generated from firing of weapons at the MPMG Ranges is estimated to be 0.3 US Tons/year. This amount would be the same for all three alternatives and the baseline condition although the CO_2 from the baseline condition would be emitted in other states.

Table 13: Estimated CO_2 Emissions from Firing of Weapons at MPMG Range

Ammunition Type	Total Rounds [1]	CO_2 lb
9 mm	139,671	28
5.66 mm	560,235	486
7.62 mm	3,002	3
40 mm	2,954	4
	Total lbs/year	**521**
	Total US Tons/year	**0.3**

[1] AP-42: Compilation of Air Emissions Factors, Environmental Protection Agency, Fifth Editions, Volume 1: Stationary Point and Areas Sources

2.2.4.2 ROCA Demolition and Construction

It is not expected that the ROCA structures once constructed will emit any significant CO_2 as they are to be constructed without heating and cooling equipment. These building are used on a temporary basis while units are training which occurs primarily during the warmer months. For the purposes of this analysis, we have assumed minimal CO_2 being produced from the ROCA Structures during operations. These structures are not heated and do not have air cooling systems and will be serviced by electric through overhead wires. For purposes of this analysis, we have assigned 1 US Ton/year for the ROCA structures.

2.3 Reduced-Scale Alternative

The Reduced-Scale Alternative will result in the following activities:

- Transportation
    - Travel of work crews would emit 1 US Ton (see **Table 7**)
    - Travel to MPMG Range once constructed would emit 59 US Tons (see **Table 8)**
- Land Clearing (biomass removal) would emit 23,295 US Tons (see **Table 14**)
- Construction
    - Land clearing would emit 430 US Tons (see **Table 11**)
    - Range construction would emit 85 US Tons (see **Table 12**)
    - ROCA demolition and construction would emit 34 US Tons (see **Section 2.2.4.1)**
- Range operations
    - Firing of weapons will emit 0.3 US Tons (see **Table 13**)
    - ROCA structures will emit 1 US Tons (see **Section 2.2.5**)

Table 14: Estimated Emission from Land Clearing Activity – Reduced-Scale Alternative

Vegetation Type	Acres	Above-Ground Biomass *	Below-Ground Biomass *	Total Biomass *	C per Metric Ton of Dry Matter	C (Metric Tons/ acre)	CO_2 (Metric Tons/ acre)	CO_2 (Metric Tons)	CO_2 (US Tons)
PPOF	40.0	200	88	288	0.49	57	209	8,376	9,214
PPSO	44.0	200	88	288	0.49	57	209	9,214	10,135
SOS	15.5	200	88	288	0.49	57	209	3,246	3,570
Total Forests	99.5							**20,835**	**22,919**
Total Grasslands	36.0			13.6	0.47	3	9	341	376
Total Emissions	135.5							**21,177**	**23,295**

* Metric Ton of dry matter per hectare
** ROCA acreage (2.5) not included here
Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Agriculture, Forestry and Other Land Use
https://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html

2.4 Full Build Alternative

The Full Build Alternative will result in the following activities:

- Transportation
    - Travel of work crews would emit 1 US Ton (see **Table 7**)
    - Travel to MPMG Range once constructed would emit 59 US Tons (see **Table 8)**
- Land Clearing (biomass removal) would emit 61,992 US Tons (see **Table 15**)
- Construction
    - Land clearing would emit 935 US Tons (see **Table 11**)
    - Range construction would emit 189 US Tons (see **Table 12**)
    - ROCA demolition and construction would emit 34 US Tons (see **Section 2.2.4.1)**
- Range operations
    - Firing of weapons will emit 0.3 US Tons (see **Table 13**)
    - ROCA structures will emit 1 US Tons (see **Section 2.2.5**)

Table 15: Estimated Emissions from Land Clearing Activity - Full Build

Vegetation Type	Acres	Above-Ground Biomass *	Below-Ground Biomass *	Total Biomass *	C per Metric Ton of Dry Matter	C (Metric Tons/ acre)	CO_2 (Metric Tons/ acre)	CO_2 (Metric Tons)	CO_2 (US Tons)
PPOF	78.0	200	88	288	0.49	57	209	16,333	17,967
PPSO	85.0	200	88	288	0.49	57	209	17,799	19,579
SOS	104.5	200	88	288	0.49	57	209	21,882	24,071
Total Forests	267.5							**56,015**	**61,616**
Total Grasslands	36.0			13.6	0.47	3	9	341	376
Total Emissions	303.5							**56,356**	**61,992**

* Metric Ton of dry matter per hectare
** ROCA acreage (2.5) not included here
Source: 2006 IPCC Guidelines for National Greenhouse Gas Inventories, Volume 4, Agriculture, Forestry and Other Land Use https://www.ipcc-nggip.iges.or.jp/public/2006gl/vol4.html

2.5 Summary of Impacts

Table 16 (also included as **Table 2** but repeated here) provides a summary of all GHG emissions generated as a result of this Project compared to the baseline information and the three alternatives. Emission are calculated by transportation ,construction, land clearing, and range operations. Construction related emissions will be temporary and may produce short-term localized impacts limited to the construction period. Emissions from land clearing are also temporary but have the most impact on CO_2 emissions. Transportation related CO_2 emissions will be greatly reduced (by 82%) over existing baseline conditions. Long-term emissions would be generated from the training activities, specifically the firing of ammunition and the ROCA structures which are only estimated at 3 US Tons.

The majority of CO_2 emitted from the Project, all alternatives, is generated from the land clearing and the biomass removal. For each alternative, the biomass removal accounts for anywhere between 97.4% and 98.1% of the total CO_2 generated.

If you eliminate the land clearing (biomass removal) from the calculated totals and compare the emissions to the 726 US Tons under the baseline conditions, the Preferred Alternative result in an increase of emissions of 32%, the Full Build resulting in an increase of 68% over baseline emissions. Mitigation as discussed in the next section focuses primarily on the land clearing emissions.

Table 16: CO_2 Emissions Summary by Alternative (US Tons)

Activity	Baseline	Preferred Alternative	Reduced Build	Full Build
Transportation	**724**	**60**	**60**	**60**
Out-of-State Training	724	0	0	0
Travel of Work Crews	0	1	1	1
Within Camp Edwards after Range Construction	0	59	59	59
Construction	**0**	**897**	**549**	**1,157**
Land Clearing	0	734	430	935
Range Construction	0	129	85	189
ROCA Demolition and Construction	0	34	34	34
Land Clearing (Biomass Removal)	**0**	**39,649**	**23,295**	**61,992**
Range Operations	**0.3**	**1.3**	**1.3**	**1.3**
Firing of Weapons	0.3	0.3	0.3	0.3
ROCA Structures	0	1	1	1
CO_2 Emission Totals	**724.3**	**40,607.3**	**23,904.3**	**63,210.3**
CO_2 Emissions without Land Clearing	**726**	**960**	**611**	**1,220**

3 Mitigation

Mitigation for the Proposed Project includes phasing of the construction and preservation of forested acreage within Camp Edwards. The Project will be constructed in two phases as described in **Section 1.4** with the first phase being the Reduced-Build Alternative. Following the construction of the first phase, the two extended lanes will be constructed with the total impacts represented by the Preferred Alternative. Substantial mitigation efforts are being proposed relative to impacts to rare species in consultation with the Massachusetts Natural Heritage and Endangered Species Program (NHESP) which includes the preservation of approximately 310 acres of land within Camp Edwards that is presently forested. Other management strategies includes the management of approximately 832 acres of forests through mechanical forestry. The land preservation acreage alone provides mitigation for the impacts from the Proposed Project. Mitigation will continue each year with the annual sequestration occurring in the preserved forests. Grassland alteration during land clearing will also result in the release of CO_2 but will be mitigated by the replanting and restoration of the range floor with native grasses.

In addition to the annual sequestration, mature forests sequester carbon throughout its life. One acre of forest provides 230 US Tons of sequestration. The estimated amount of sequestered carbon in the 13,500 acres of forest at Camp Edwards is estimated to be approximately 3,105,000 US Tons. One acre of grassland provides 10 US Tons of sequestration. The estimated amount of sequestered carbon in the 175 acres of grassland at Camp Edwards is estimated to be approximately 1,750 US Tons of sequestration. The annual GHG sequestration and lifetime sequestration from the mitigation acreage is summarized in **Table 17** (also included as **Table 3)**.

Table 17: Sequestration and Mitigation

Management Action	Acreage	Annual Sequestration		Lifetime Sequestration	
		Rate*	US Tons	Rate	US Tons
Land Preservation	310	0.85 US Tons/ acre/year	263.5	230 US Tons/acre	71,300
Forestry Management	832	0.85 US Tons/ acre/year	707.2	230 US Tons/acre	162,012
Total Mitigation	**1,142**	0.85 US Tons/ acre/year	**967.3**	230 US Tons/acre	**233,312**
Forests at Camp Edwards	**13,500**	0.85 US Tons/ acre/year	**11,475**	230 US Tons/acre	**3,105,000**

* see **Section 1.8**

Camp Edwards continues to provide carbon sequestration on an annual basis through maintenance of forested land. Construction of the Proposed Project would only represent 1.3% of the carbon sequestered in the forests at Camp Edwards. The release of CO_2 from the Proposed Project will be mitigated in 3.5 years based on just the annual sequestration of GHG provided by the forested land at Camp Edwards. According to the latest GHG emissions inventory by Massachusetts, in CY 2016, the state sources emitted 74,200,000 million metric tons of CO_2e emissions. This is equivalent of 81,620,000 US tons of CO_2e emissions in CY2016 where complete dataset was available. The estimated CO_2e emissions for the Preferred Alternative (immediately after project completion) represents an insignificant amount (less than one hundredth fraction of 1%). Regardless, after the completion of Project, the continued annual sequestration by forested land at Camp Edwards will make up for the release during Project construction.

APPENDIX A: Annual Vehicle Miles Travelled to Out-of-State MPMG Ranges from Camp Edwards

Training Site and Location	Vehicle Type	Vehicle Weight (Pounds)	Fuel Type	Fuel Capacity Per Vehicle (Gallons)	No. of Vehicles	Roundtrip Distance (Annual Miles per Vehicle)	Total Annual Miles Driven	No. of Times Fuel Tank Filled	Total Fuel Used (Gallons)
Camp Ethan Allen, Jericho, VT	HMMWV	12,100	Diesel	25	117	540	63,180	4	11,700
	LMTV	22,904	Diesel	35	31	540	16,740	4	4,340
	FMTV	28,889	Diesel	35	55	540	29,700	4	7,700
	ASV	29,560	Diesel	30	36	540	19,440	4	4,320
	Non-military	8,000	Gas	18	19	540	10,260	4	1,368
Subtotal					**258**	**2700**	**139,320**		**29,428**
Fort Dix, Ocean City, NJ	HMMWV	12,100	Diesel	25	24	600	14,400	5	3,000
	LMTV	22,904	Diesel	35	27	600	16,200	5	4,725
	FMTV	28,889	Diesel	35	100	600	60,000	5	17,500
	MATV	34,830	Diesel	30	5	600	3,000	5	750
	Non-military	8,000	Gas	18	23	600	13,800	4	1,656
Subtotal					**179**	**3000**	**107,400**		**27,631**
Fort Drum, Jefferson County, NY	HMMWV	12,100	Diesel	25	30	740	22,200	6	4,500
	LMTV	22,904	Diesel	35	12	740	8,880	6	2,520
	ASV	29,000	Diesel	30	3	740	2,220	6	540
	Non-military	8,000	Gas	18	3	740	2,220	6	324
Subtotal					**48**	**2,960**	**35,520**		**7,884**
Total Annual Miles By Vehicle Type	HMMWV	12,100	Diesel	25	171	1880	99,780	15	19,200
	LMTV	22,904	Diesel	35	70	1880	41,820	15	11,585
	FMTV	28,889	Diesel	35	155	1140	89,700	9	25,200
	MATV	34,830	Diesel	30	5	600	3,000	5	750
	ASV	29,000	Diesel	30	39	1280	21,660	10	4,860
	Non-military	8,000	Gas	18	45	1880	26,280	14	3,348
Total					**485**	**8,660**	**282,240**	**68**	**64,943**

Source: Camp Edward Range Control, 2019

HMMWV	High Mobility Multipurpose Wheeled Vehicle
LMTV	Light Medium Tactical Vehicle
FMTV	Family of Medium Tactical Vehicles
MATV	Medium Armored Tactical Vehicle
ASV	Armored Security Vehicle