Integrated Natural Resources Management Plan

Volunteer Training Site – Milan

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December 2019

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Volunteer Training Site – Milan
Revised Integrated Natural Resources Management Plan

Signature Page

This Integrated Natural Resources Management Plan (INRMP) meets the requirements for INRMPs listed in the Sikes Act Improvement Amendments (16 U.S.C. 670a et seq.), AR 200-1, and the "Executive Summary and Scope" within this plan. It has set appropriate and adequate guidelines for conserving and protecting the natural resources of the Volunteer Training Site at Milan.

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ACRONYMS AND ABBREVIATIONS

AR	Army Regulations
ARNG	Army National Guard
ARNG-I&E	Army National Guard Bureau – Installations and Environment
ARNG-TRS	National Guard Bureau – Training Division
AVLB	Armored Vehicle Launch Bridge
BMP	Best Management Practice
BP	Before Present
CEQ	Council for Environmental Quality
CFMO	Construction and Facilities Management Office
CPX	Command Post Exercise
CSMS	Combined Support Maintenance Shop
DA	Department of Army
DBH	Diameter at Breast Height
DEM	Digital Elevation Models
DoD	Department of Defense
DoDD	Department of Defense Directive
DoDI	Department of Defense Instruction
EA	Environmental Assessment
EMS	Environmental Management System
ENV	Environmental Office (of the TNARNG)
EO	Executive Order
EPA	U.S. Environmental Protection Agency
EFT2	Firefighter Type 2 (woodland fire fighter NWCG standards)
FGDC	Federal Geographic Data Committee
FMO	Facilities Maintenance/Engineering Office (of the TNARNG)
FONSI	Finding of No Significant Impact
FTX	Field Training Exercise
GIS	Geographic Information System
GPS	Global Positioning System
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IPMP	Integrated Pest Management Plan
IPP	Invasive Pest Plant
ISO	International Standard Organization
ITAM	Integrated Training Area Management
LCES	Lookouts, Communications, Escape Routes, and Safety Zones
LCTA	Land Condition Trend Analysis (now RTLA)
LRAM	Land Rehabilitation and Maintenance
METL	Mission Essential Task List
MOA	Memorandum of Agreement
MOSQ	Military Occupational Skill Qualification
MP	Military Police
MSL	Mean Sea Level

NAAQS	National Ambient Air Quality Standards
NMSZ	New Madrid Sesmic Zone
NCVS	North Carolina Vegetation Survey
NEPA	National Environmental Policy Act
NFDRS	National Fire Danger Rating System
NFPA	National Fire Protection Act
NGB	National Guard Bureau
NGB-ILI	National Guard Bureau - Director of Engineering
NPS	Non-Point Source Pollution
NRCS	National Resource Conservation Service
NRM	Natural Resources Manager (of the TNARNG)
NWCG	National Wildfire Coordinating Group
NWS	National Weather Service
NWSG	Native Warm Season Grasses
O&M	Operations and Maintenance
POTO	Plans, Operations, and Training Officer (of the TNARNG)
PPE	Personal Protective Equipment
PPK	Projectile Point/Knives
PTI	Pulling Together Initiative
REC	Record of Environmental Consideration
ROA	Report of (Timber) Availability
ROTC	Reserve Officers' Training Corps
RTE	Rare, Threatened, or Endangered Species
RTLA	Range and Training Land Assessment (previously LCTA)
RTLP	Range and Training Land Program
SAIA	Sikes Act Improvement Act of 1997
SDSFIE	Spatial Data Standards for Facilities, Infrastructure and Environment
SHPO	State Historic Preservation Office
SITE	Training Site personnel (of the TNARNG)
SJA	Staff Judge Advocate
SMZ	Streamside Management Zone
SOP	Standard Operating Procedure
SPCC	Spill Prevention, Control, and Countermeasure
SRA	Sustainable Range Awareness
SRP	Sustainable Range Program
SRCC	Southern Regional Climate Center
SWPPP	Storm Water Pollution Prevention Plan
TA	Training Area
TACF	The American Chestnut Foundation
TAG	The Adjutant General
TDEC	Tennessee Department of Environment and Conservation
TMDL	Total Maximum Daily Load
TDF	Tennessee Division of Forestry
TEMA	Tennessee Emergency Management Agency
TIN	Triangulated Irregular Network

TNANG	Tennessee Air National Guard
TNARNG	Tennessee Army National Guard
TNC	The Nature Conservancy
TN-EPPC	Tennessee Exotic Pest Plant Council
TRI	Training Resources Integration
TVA	Tennessee Valley Authority
TWRA	Tennessee Wildlife Resources Agency
UTES	Unit Training Equipment Site
USACE	United States Army Corps of Engineers
USDA	United States Department of Agriculture
USAEC	United States Army Environmental Center
USFS	United States Forest Service
USFWS	United States Fish and Wildlife Service
USGS	United States Geologic Service
VFD	Volunteer Fire Department
VOC	Volatile Organic Compounds
VTS-M	Volunteer Training Site -- Milan
WFMP	Wildland Fire Management Plan

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EXECUTIVE SUMMARY

This updated Integrated Natural Resources Management Plan (INRMP), which is required by the Sikes Act, as amended (16 U.S.C. 670a et seq.), has been developed for use by the Tennessee Army National Guard (TNARNG) to provide guidance on the management and protection of natural resources at the Volunteer Training Site – Milan (VTS-M). The original VTS-M INRMP was implemented in 2002. As the natural resources management program developed, it was determined that the original INRMP format was not serviceable. A complete revision of the 2002 INRMP was completed in 2014 to address the format and other inadequacies of the original INRMP, as well as incorporate appendices containing forest, wildland fire, and invasive pest plant management plans. The 2019 Army National Guard (ARNG) Installations and Environment (I&E) Directorate Policy for Integrated Natural Resource Management Plans (INRMP) defines a "revision" to an INRMP to contain substantial changes that are expected to result in materially different biophysical consequences than the original. An "update" contains limited changes that are not expected to have significantly different biophysical consequences. As this modification of the INRMP only contains formatting changes from the 2014 INRMP and is not likely to result in significant changes to the environment, it has been deemed an update.

Cooperating agencies were contacted in 2019 and informed of the TNARNG intent to update the INRMP for VTS-M (Appendix B). At this time, TNARNG requested input from both the United States Fish and Wildlife Service (USFWS) state field office and from the Tennessee Wildlife Resources Agency (TWRA); no objections were raised from either organization toward the proposed update of the existing INRMP. Therefore, a five year review for operation and effect was incorporated into the update process. In accordance with §670a(2) of the Sikes Act, approval of the INRMP has been noted in writing by the USFWS and the TWRA (Appendix B).

The VTS-M is a 2,470 acres training site located in Carroll and Gibson Counties in western Tennessee. The land is owned by the U.S. Army Corps of Engineers and licensed to the TNARNG. The primary purpose of natural resources management at VTS-M is to support the military training mission. The purpose of this INRMP is to ensure that natural resource conservation measures and military activities on the site are integrated and consistent with responsible stewardship and environmental compliance. This INRMP was prepared in accordance with the Sikes Act, as amended; Army Regulation (AR) 200-1 – Environmental Protection and Enhancement; Department of Defense Instruction (DoDI) 4715.03, Natural Resource Conservation Program, 18 Mar 2011; AR350-19; and DA Memorandum - ITAM Roles & Responsibilities for INRMP Development (3 June 2019).

The Department of Defense Directive (DoDD) 5105.77 dated 2008 (Appendix D) establishes policy and defines the organization and management responsibilities and functions, relationships and authorities of the Chief, NGB, and establishes the NGB as a joint activity of the Department of Defense. The National Environmental Policy Act (NEPA) of 1969 dictates that planners of public actions using federal monies, such as those on military installations, shall consider the environmental impacts and effects of "major federal actions." Section 1508.18 in the Council for Environmental Quality (CEQ) regulations lists the adoption of a formal Integrated Natural Resource Management Plan as a major federal action. An Environmental Assessment (EA) was prepared for the 2014 VTS-M INRMP. This is an update of the 2014 INRMP. TNARNG took a "hard look" at the existing EA per 32 CFR 651.5.g.2, to ascertain the adequacy of the previous EA and see if it is still relevant. After examining the goals, existing conditions, projects, and environmental consequences of the EA, TNARNG has determined there is no significant change since the most recent EA. Therefore, the updated INRMP is being treated as a tiering action and documented in a REC (Appendix K).

The goals of this INRMP are:

- To describe the training site and its physical natural resources;
- To describe the military mission, potential effects of the mission on natural resources at the training site, and options for resolving conflicts between the military mission and natural resources management;
- To show the status of baseline inventories of natural and cultural resources and monitoring requirements for environmental compliance ;
- To present goals for the management of the site's natural resources and tasks designed to achieve those goals;
- To recommend revegetation and erosion control techniques to maintain stable soils and ensure high-quality water resources and training opportunities; and,
- To provide management guidelines that will be effective in maintaining and improving the sustainability and biological diversity of terrestrial and aquatic ecosystems on the training site and that will support the military training mission through integrated, cooperative, and adaptive management.

Benefits to the military mission include improved maneuver lands and better distribution of military activities at VTS-M. This plan will increase training realism in the natural environment. It will also enhance long-range planning efforts at VTS-M. Benefits to the environment include reduced soil erosion and vegetation loss, improvement of water-quality in wetland and riparian ecosystems, and an increase in overall knowledge of the operation of the ecosystems on VTS-M through surveys and monitoring.

This document begins with a description of the subjects: mission and facility details are outlined in Chapter Two, while specifics of the physical environment at VTS-M are presented in Chapter Three. Chapter Four addresses the management goals for VTS-M according to the resource categories specified by the Sikes Act and the projects designed to meet those goals. Implementation of the projects set forth in the original 2002 INRMP is also discussed in Chapter Four (see Section 4.4.2). Chapter Five discusses the ITAM program and related goals, objectives and projects. Chapter Six presents guidelines intended for management and training activities as they relate to natural resources protection.

The eleven Appendices of this document contain supplemental material, including NEPA documentation, additional biological data, records of the annual review process, INRMP implementation table, and an ITAM project implementation table. Three detailed management plans are included as annexes to this document: the Forest Management Plan, Wildland Fire Management Plan, and Invasive Pest Plant Control Plan. Additional management plan annexes may be developed for other activities as needed. For example, the acoustic bat survey component of a 2019 rare, threatened, and endangered species survey has recorded likely detections of gray and northern long-eared bats (federally endangered and threatened respectively), though the calls have not been manually vetted, and none of these bats have captured during three mist net surveys conducted since 2010. If manual vetting and mist net captures confirm the presence of these species, an Endangered Species Management Plan will be developed in coordination with the US Fish and Wildlife Service and the Tennessee Wildlife Resource Agency and added as an annex to the INRMP.

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CHAPTER 1
GENERAL INFORMATION

1.1 PURPOSE

The Tennessee Army National Guard (TNARNG) maintains the Volunteer Training Site –Milan (VTS-M) in Carroll and Gibson Counties, Tennessee for the purpose of training Tennessee National Guardsmen. The TNARNG manages the natural resources on this training site to ensure that the land remains healthy and capable of supporting training activities for the foreseeable future. In addition, the TNARNG hopes to enhance training potential and environmental quality to the greatest extent possible through its management practices. This Integrated Natural Resources Management Plan (INRMP) for VTS-M is the principle guiding document for TNARNG land management activities taking place on the training site. It is an update of the most recent VTS-M INRMP implemented in 2014, which was a revision of the original VTS-M INRMP of 2002.

The Sikes Act, Public Law 105-85, "Sikes Act Improvement Act of 1997," (SAIA) November 18, 1997, requires the preparation of an Integrated Natural Resources Management Plan (INRMP) for those military installations containing significant natural resources and specifies the key information to be included in the Plan. The U.S. Fish and Wildlife Service (USFWS) and the Tennessee Wildlife Resources Agency (TWRA) are required to be cooperators in the process of developing the TNARNG INRMPs.

The SAIA requires a review for operation and effect no less than every five years to keep the INRMP current. Major changes require a revision be conducted while minor changes can be incorporated with an update to the existing INRMP. A revision or update will be used based on the review for operation and effect conducted jointly with the USFWS and the TWRA. The original VTS-M INRMP was implemented in 2002. Internal review of the original INRMP determined that significant revision of its format and information were needed to make it more useful in 2005. Significant work on the revision was initiated in 2008 when cooperating agencies and other interested parties met to discuss the INRMP and appropriate modifications. Contributions from cooperators were incorporated into the revised 2014 INRMP. While there are several significant projects planned on VTS-M in the future, no clear timelines, or in some cases locations, have been determined. These projects may not occur during the life of this INRMP. Additionally, given the uncertain timelines, potential for new information to become available, and potential for new species listings, separate NEPA evaluations and documentation will need to be conducted separately for each project closer to the time of implementation. This INRMP will therefore not contain any significant changes in land use, management, or potential impacts. It has therefore been determined that this INRMP will be an update. A revision may be initiated later in the life of this INRMP if these significant projects will occur during the life of this INRMP or new information becomes available indicating it is warranted.

This updated INRMP for VTS-M will guide TNARNG activities on the training site until revised or supplanted. The overriding goals of this plan are to minimize impact on training lands, to effectively repair damage caused by training activities, to improve the mission-specific qualities of the training lands, and to protect and enhance the ecosystem value of the training site. This is a living document which will be reviewed annually and updated as needed during the five years. Barring earlier need for substantial revision, five years from implementation of this document, the USFWS, TWRA, and TNARNG will coordinate a review for operation and effect to determine whether the INRMP is functioning effectively as needed or whether a large-scale revision is necessary.

Natural resources management is an on-going, long-term process. This and subsequent INRMPs will

serve to shape the direction of that process in order to support the military mission of the TNARNG, encourage sustainable management of natural resources, and ensure compliance with all relevant federal, state, and local laws. The ultimate goals outlined within this INRMP will not be achieved within the five year span of the document but will be carried over into future documents and will continue to direct the focus of projects and management activities on VTS-M.

1.2 MANAGEMENT PHILOSOPHY

The Volunteer Training Sites, are managed in accordance with the Sikes Act and Sikes Act Improvement Amendments (SAIA) through Integrated Natural Resources Management Plans, which guide all activities that may impact natural resources on a site.

The primary goal of land management at VTS-M is to meet military training needs, now and in the future, while maintaining a healthy ecosystem. To ensure the ability to meet those future needs, there must be a healthy natural system in place across the training site. The goals of training and environmental protection should not be seen as opposing. Rather, the one – a healthy environment – supports and enhances the other – training potential.

The basic principle of ecosystem management is to focus on the health of the total environment – ecosystem composition, structure, and function – rather than individual species. It is management driven by goals and designed to be adaptable: monitoring of results should lead to changes in the process if desired outcomes are not achieved. Biodiversity is short for "biological diversity," and it refers simply to the variety, distribution, and abundance of organisms in an ecosystem. Biodiversity is crucial to the stability and functioning of an ecosystem.

Multiple use management, a concept that originated in the forestry field, refers to the practice of integrating different purposes and end products into the management scheme for a single piece of property. Under multiple use management, the goal is to obtain such commodities as timber, wildlife, recreation, water quality, and in this case training opportunities from the same land through appropriate and integrated management.

The multiple uses for which the VTS-M is to be managed include: TNARNG training needs, maintenance of native communities and biodiversity, surface and ground water quality, conservation of soil resources, rare species protection, and timber. It is the role of this INRMP to integrate the management practices for each of these goals such that all needs can be met on a sustainable basis without compromising the health of the ecosystem or mission requirements.

1.3 RESPONSIBILITIES

1.3.1 National Guard Bureau

The National Guard Bureau is the federal component of DoD through which flow funds and guidance to the TNARNG. Two Divisions at NGB are involved in the management of natural resources: Installations and Environment (ARNG-I&E), and the Training Division (ARNG-TRS).

The Sikes Act Coordinator at ARNG-I&E is responsible for reviewing the INRMP and advising the TNARNG before the state formally submits the plan for public review. ARNG-I&E ensures operational readiness by sustaining environmental quality and promoting the environmental ethic and is also responsible for tracking

projects, providing technical assistance, quality assurance and execution of funds. Additionally, ARNG-I&E provides policy guidance and resources to create, sustain, and operate facilities that support the Army National Guard. ARNG-I&E coordinates proposed construction projects with Operations/Training and provides design and construction support, as well as environmental management that is directly related to property maintenance (e.g., grounds maintenance, pest control).

ARNG-TRS is responsible for training and training site support to include sustainable range management. The Integrated Training Area Management (ITAM) program is run by Operations/Training, but must be coordinated with the Environmental and Engineering directorates to ensure methods and results are environmentally sound and meet military needs

1.3.2 TNARNG

The Adjutant General (TAG) of the TNARNG is directly responsible for the operation and maintenance of VTS-M, which includes implementation of this INRMP. TAG ensures that all installation land users are aware of and comply with procedures, requirements, or applicable laws and regulations that accomplish the objectives of the INRMP. TAG also ensures coordination of projects and construction among environmental, training, and engineering staffs.

TAG has an Environmental (ENV) office to provide professional expertise in the environmental arena for VTS-M and all other TNARNG properties. The conservation branch of ENV is responsible for natural and cultural resources. Natural resources, including flora, fauna, forest management, threatened and endangered species protection, riparian areas, wetlands, soils, wildland fire management, and other features that are the focus of this plan. Cultural resources such as archaeology, historical buildings, curation, and American Indian consultation are covered by the Integrated Cultural Resources Management Plan (ICRMP). The compliance branch of ENV handles the legal requirements for managing hazardous materials and waste, drinking water quality, air quality, pollution prevention, and similar tasks. The NEPA process for TNARNG is also coordinated by a branch of the ENV office. Overall, ENV is responsible for characterizing the physical and biological features of TNARNG lands, recommending appropriate management for those features, identifying compliance needs, and advising TNARNG on the best ways to comply with federal and state environmental laws and regulations. The Environmental Office also provides technical assistance to the training site personnel including: developing projects, securing permits, conducting field studies, providing Environmental Awareness materials, locating and mapping natural and cultural resources, and developing and revising management plans, to include the INRMP.

The Plans, Operations and Training Officer (POTO) has the primary responsibility of scheduling military training and ensuring safety of all personnel while training exercises are being conducted. The POTO conducts contingency planning and preparation to provide timely and appropriate military support to meet required Federal, State, and community missions. The POTO is responsible for coordinating the ITAM program; working with the environmental office to develop a baseline of current and projected training requirements and training lands/facilities for the training site; assisting the Environmental Office in determining carrying capacity for the training site by providing military usage and training data; planning for land use based on accomplishing training requirements while minimizing negative environmental effects; prioritizing and scheduling Land Rehabilitation and Maintenance (LRAM) projects with the Environmental Office and the Training Site Manager; and allocating funds and resources to accomplish ITAM requirements.

The Training Site Operations Staff (SITE) is made up of the Base Operations Supervisor, Range Operations, and civilian and military support personnel, who work with the Environmental office to

implement this plan and assure its success. The Training Site Operations Staff is familiar with all aspects of the training site, including training scheduling (and conflicts), locations of training facilities, impairments or problems with human-made structures or natural functions, and needs for improvement or maintenance of the training land. The Training Site Personnel and TNARNG Environmental staff will ensure that all INRMP and ICRMP projects are identified and executed in accordance with all laws and regulations.

The statewide Facilities Management/Engineering Office (FMO) provides a full range of financial and engineering disciplines for all facilities under the jurisdiction of the Military Department of Tennessee, including VTS-M. The FMO is responsible for master planning and ensuring that all construction projects comply with environmental regulations by consulting with the Environmental Office prior to any construction by TNARNG Engineers. The FMO also provides necessary assistance with design of erosion control projects.

The Staff Judge Advocate (SJA) advises the TAG, POTO, FMO, and ENV on laws and regulations that affect training land use and environmental compliance. The joint effort of TAG, Chief of Staff, POTO, Training Site, FMO, and Environmental Office make the INRMP a living document that is updated annually. The Conservation Branch will conduct yearly meetings with the training site manager and staff, the Training Site Commander, POTO, and FMO on proposed projects and plans for the training site. Coordination for the meeting will be the responsibility of the Conservation Branch of the Environmental Office.

1.4 RELEVANT ENVIRONMENTAL REGULATIONS

Natural resources management at VTS-M is subject to a variety of environmental regulations, as referenced in Appendix D. In addition to state and federal law, TNARNG must abide by DOD and Army policy in its handling of the training site. Copies of relevant laws and regulations are compiled in the TNARNG Environmental library and are available for review by all personnel with interests in the subject matter. This library was digitized and is available through the TNARNG CFMO website (https://tnportal.ng.ds.army.mil/fmo/Enviromental/_layouts/15/start.aspx#/Env%20Document%20Library/Forms/AllItems.aspx).

1.5 ENVIRONMENTAL REVIEW (NEPA COMPLIANCE)

An Environmental Assessment was written to review the implementation of the original INRMP. However, the addition of the forest management plan (Annex 1) and wildland fire management plan (Annex 2) to the 2014 INRMP were considered significant enough to warrant re-assessment of the impacts. Therefore, an EA (Appendix A) was prepared for the revised 2014 INRMP. Topics addressed are related to the effects of the proposed plan on natural and cultural resources. The details include, but are not limited to: wildlife, riparian zones, floodplains, wetlands, archaeological and historic sites, sedimentation, erosion, timber harvesting and non-point source pollution. Significant projects planned for the future on VTS-Milan have no clear timelines, in some cases project footprints, and potential ESA listings could occur prior to their implementation. Consequently, they will be considered in separate NEPA actions closer to the time of implementation. As there are no significant changes in this update, possible impacts are considered under a Record of Environmental Consideration (REC) tiering off of the 2014 INRMP EA.

1.6 IMPLEMENTATION AND REVISION

The original VTS-M INRMP was implemented in 2002. During the first years of implementation, it became apparent that the format and content of the original INRMP were not conducive to applied management. TNARNG decided in 2004 to initiate a full revision of the document to bring the structure and project lists more in line with actual management practices and to update it based on new survey data. Revision of the document was completed in 2014. TWRA and USFWS have participated in this update to the INRMP. They have reviewed and provided comments on the draft prior to completion of the final version. Their contributions are documented in the agency correspondence section in Appendix C. Thus, the cooperating agencies have reviewed the document and contributed to the new iteration in accordance with the DoD Supplemental Guidance (DoD - OUSD Memo 1 Nov 2004) and the NGB Interim Guidance (DoD - NGB Memo 30 Nov 2005) which define the process for review for operation and effect.

Chapter Four, section 4.4.2, contains a review of the implementation of INRMP projects set forth in the original 2002 INRMP through now. Of 117 environmental projects over the lifetime of these INRMPs, nine (8%) have not been conducted, 10 (9%) have been partially implemented or fallen out of use, and eight (7%) have been determined unneeded. The majority (77%) have been completed or are regularly recurring aspects of the program; other projects are in progress. Although the original INRMP had a stated effective period of 2001-2006, land management on VTS-M has continued to follow the changing guidance of the versions of this living document over time. Many of the projects from the previous iterations of the INRMP continue on in this document, while others have been added.

This updated INRMP is living document and is effective until a significant revision is deemed necessary. It was developed in cooperation with the USFWS Cookeville, TN, Field Office, and the TWRA. Those agencies have approved the document. The 2014 revision was subjected to public review to satisfy the Sikes Act and NEPA requirements. This update was reviewed through a REC that tiers of the 2014 revision's EA, as the document was thoroughly reviewed and it was determined that no significant changes have been incorporated. Public comments from the 2014 revision were reviewed by the cooperating agencies and incorporated into the final document where appropriate. Public comments from that revision are recorded in Appendix C.

During the lifetime of this INRMP, it is the responsibility of the TNARNG Environmental Office to work with the cooperating agencies to review it annually and update it to stay in step with military mission requirements and to maintain compliance with all applicable laws. USFWS, TWRA, Training Site personnel, and the Environmental Office will review the accomplishments for the year and address any issues. Documentation of this review is maintained in Appendix H. Minor changes will be incorporated when needed into the existing document with agreement of the primary cooperators. In the event of a significant change to management practices, military use, or law, a complete revision may be deemed necessary, requiring collaboration with USFWS and TWRA to produce a new, signed version of the INRMP. Otherwise, five years following implementation of this document, a full scale review for operation and effect will occur in accordance with the SAIA. A revision or update at that time will be used based on this review effort conducted jointly with the USFWS and the TWRA.

Implementation of the INRMP will be realized through the accomplishment of specific goals and objectives as measured by the completion of the tasks identified in Appendix I (INRMP Implementation Table) of this plan. Responsibility for implementation of goals and objectives has been identified and assigned to each project throughout this document. It should be noted that project implementation dates are estimated and are subject to change depending upon funding and staffing availability. The implementation schedule in Annex I, Table I.1, will provide a basis for monitoring and evaluating accomplishments toward reaching the goals. Projects identified in this Plan are reflected in the Status

Tool for Environmental Program (STEP). Funding for these projects is programmed seven years out under this system.

1.6.1 Personnel

Essential to plan implementation is a balanced team of trained professionals and technical staff. Staffing sources for the natural resources program at VTS-M include:

- Permanent Training Site Staff
  - Base Operations Supervisor
  - Range Operations Specialist
  - Training and Operations NCO
  - Administrative Specialist
  - Logistics Specialist
  - Three Target Systems Repair Specialists
  - Two Temporary Technicians
  - One Contract Employee
  - Five state-funded maintenance workers

- Environmental Branch Personnel
  - TNARNG Environmental Program Manager
  - Natural Resources Manager and Staff
  - Cultural Resources Manager
  - Compliance Manager and Staff
  - GIS Manager and Staff

- Troop Labor during Annual or Drill Training may provide benefits to the training site as well as to the troops themselves. Examples of projects executed using troop labor in the past or anticipated in the near future are perimeter vegetation control and fence maintenance; road and trail maintenance; erosion control; and training area vegetation management.

1.6.2 Outside Assistance

Because it is most probable that TNARNG will not be able to hire the specialized expertise needed to achieve some of the projects within this INRMP, considerable expertise from universities, agencies, and contractors will be required to accomplish the tasks. Specific needs from other organizations external to TNARNG are indicated throughout this plan.

Agencies and organizations which may provide substantial support to TNARNG in carrying out this INRMP include:

- Tennessee Department of Environment and Conservation
- Tennessee Wildlife Resources Agency
- Tennessee Division of Forestry
- U.S. Fish and Wildlife Service, Cookeville Field Office
- U.S. Forest Service
- Natural Resources Conservation Service, Huntingdon (Carroll County) Service Center or Trenton (Gibson County) Service Center

Universities are a key source of scientific expertise. TNARNG does not currently have any Memoranda of Understanding with local schools but is working to establish relationships with:

- University of Tennessee at Knoxville
- University of Tennessee at Chattanooga
- Middle Tennessee State University
- Tennessee Technological University

Many of the projects identified in this plan will require expertise and time beyond that available within the permanent TNARNG staff. Such projects will be contracted out to appropriate organizations or corporations and overseen by TNARNG Environmental Office Staff.

1.6.3 Training

Training received by TNARNG personnel and others participating in the management of natural resources at the training site should address practical job-oriented information, legal compliance requirements, applicable DoD/DA regulations, pertinent State and local laws, and current scientific and professional standards as related to the conservation of natural resources. The following annual workshops, professional conferences, and classes are excellent means of obtaining interdisciplinary training for natural resources managers:

- NGB National Environmental Workshop
- Training Support System Workshop
- Land Rehabilitation and Maintenance Conference
- Colorado State University-Center for Ecological Management of Military Lands RTLA Training
- Pesticide Application and Licensing through Tennessee Department of Agriculture
- National Military Fish and Wildlife Association Conference
- U.S. Army Corps of Engineers Wetlands Delineation Courses
- Prescribed Fire Management Course offered by The Nature Conservancy
- Various courses offered by the U.S. Fish and Wildlife Service through the National Conservation Training Center
- Locally available training through the Cooperative Extension Service, universities, professional and trade organizations, state government, and commercial businesses

1.6.4 Funding

Implementation of the INRMP is subject to the availability of annual funding. The following discussion of funding options is not a complete listing of funding sources. Funding sources are continuously changing and the individual focus, restrictions, and requirements of funding sources are volatile.

In 2005, DA created the Sustainable Range/Installations Environmental Activities Matrix to realign and clarify funding responsibilities for environmental requirements on ranges and facilities to avoid redundancy and gaps. The matrix designates that Environmental is the primary funding source for cultural resources, wetlands protection, endangered species, and all environmental plans. Installations are the primary funding source for soils issues (erosion), pest management, and invasive species control. Prescribed burning is a shared responsibility: Environmental funds cover planning and burning for ecosystem management and endangered species protection/management. Installations are responsible for wildfire prevention, response, and control, including fire break maintenance.

Other funding sources may be dictated by circumstance. Training funds are utilized to address issues (such as erosion) created by training activities and for range management actions designed to improve

training opportunities. Planning, environmental review, and any necessary mitigation (e.g., wetland mitigation) required for MILCON projects will be funded through the construction program.

Operations and Maintenance Environmental Funds:
Environmental funds are a special category of Operations and Maintenance (O&M) funds and are controlled by the STEP budget process. They are special in that they are restricted by the DOD solely for environmental purposes, but they are still subject to restrictions of O&M funds. Compliance with appropriate laws and regulations is the key to securing environmental funding. The program heavily favors funding high priority projects with a goal of achieving compliance with federal or state laws, especially if non-compliances are backed by Notices of Violation or other enforcement agency action.

Training Funds:
The VTS-M natural resources management program does not receive training funds except for projects administered through the ITAM program. ITAM funding requests are not submitted via the STEP process. Instead, a 5-year ITAM workplan is used to channel ITAM funding requests from TNARNG, through NGB, to the U.S. Army's Office of the Deputy Chief of Staff for Operations (ODCSOPS). ITAM funding is controlled by the POTO.

Agriculture, Forestry, and Hunting Permit Funds:
The forestry program at VTS-M is supported by the DoD Forestry Reimbursable Program. Income from the sale of forest products is divided: the USACE is reimbursed for expenses accumulated in conducting the sale, 40% of the remainder is provided to the state treasury for county schools and roads, and 60% is deposited into the DoD Forestry Account. Funds from the account can be requested each year for projects directly related to forest management. Such activities that can be reimbursed include timber management, reforestation, timber stand improvement, inventories, fire protection, construction and maintenance of timber area access roads, purchase of forestry equipment, disease and insect control, planning (including compliance with laws), marking, inspections, sales preparations, personnel training, and sales.

There are no agricultural outleases at VTS-M, so funding established for the Agricultural and Grazing Outlease program is not accessed for management at the training site. Likewise, there is no hunting program on the site and so there is no funding from hunting permit fees for wildlife management.

Other Funding Sources:
The Legacy Resource Management Program provides assistance to DOD efforts to preserve natural and cultural resources on federal lands. Legacy projects could include regional ecosystem management initiatives, habitat preservation efforts, archaeological investigations, invasive species control, and/or flora or fauna surveys. Legacy funds are awarded on the basis of project proposals submitted to the program.

National Public Lands Day is an event that occurs once a year when volunteers come together to improve the country's largest natural resource – our public lands. These volunteers gather on a Saturday every September to help improve the public lands they use for recreation, education, and enjoyment. Consult the National Public Lands Day website for more information at http://www.npld.com and follow the link to the DoD contact listed on the Federal Agency Working Group page.

The Pulling Together Initiative (PTI) provides a means for federal agencies to partner with state and local

agencies, private landowners, and other interested parties in developing long-term weed management projects within the scope of an integrated pest management strategy. PTI's goals are: 1) to prevent, manage, or eradicate invasive and noxious plants through a coordinated program of public/private partnerships; and 2) to increase public awareness of the adverse impacts of invasive and noxious plants. Projects that benefit multiple species, achieve a variety of resource management objectives, and/or lead to revised management practices that reduce the causes of habitat degradation are sought. A special emphasis is placed on larger projects that demonstrate a landscape-level approach and produce lasting, broad-based results on the ground. Consult the PTI website link at http://www.denix.osd.mil/Legacy-public for information on current grant proposal criteria.

The Federal Domestic Assistance Program 15.608 (Fish and Wildlife Management Assistance) provides technical information, advice, and assistance to Federal and State agencies and Native Americans on the conservation and management of fish and wildlife resources. Projects for grant funding must be submitted to the Regional Director of the USFWS. Cooperative programs with the State conservation agencies and military installations have included joint studies of fishery and wildlife problems of major watersheds, large reservoirs, or streams. Through the Sikes Act, the Service has established a Memorandum of Understanding with the DoD whereby fish and wildlife values are considered on military installations.

The DoD administers the grant program "Streamside Forests: Lifelines to Clean Water," a competitive grant program designed to help children and others learn about protecting resources by working with installation staff to help restore a streamside ecosystem in their own community. The DoD provides funds up to $5,000 to military installations working in partnership with local school and/or civic organizations to purchase locally native plant material for small streamside restoration projects.

1.6.5 Priorities and Scheduling

The Environmental Quality Conservation Compliance Classes define funding priority with regard to O&M funds. All projects in classes 0, I, and II shall be funded consistent with timely execution to meet future deadlines (DODI 4715.03). The four project classes are:

Class 0: Recurring Natural and Cultural Resources Conservation Management Requirements – includes projects and activities needed to cover the recurring administrative, personnel, and other costs that are necessary to meet applicable compliance requirements (Federal and State laws, regulations, Presidential Executive Orders, and DOD policies) or which are in direct support of the military mission. Examples of recurring costs include:

- Manpower, training, and supplies
- Hazardous waste disposal
- Operating recycling activities
- Permits and fees
- Testing, monitoring, and/or sampling and analysis
- Reporting and record keeping
- Maintenance of environmental conservation equipment
- Compliance self-assessments

Class I: Current Compliance – includes projects and activities needed because an installation is currently or will be out of compliance if projects or activities are not implemented in the current program year.
Examples include:

- Environmental analyses, monitoring, and studies required to assess and mitigate potential

effects of the military mission on conservation resources
- Planning documents
- Baseline inventories and surveys of natural and cultural resources
- Biological assessments, surveys, or habitat protection for a specific listed species
- Mitigation to meet existing regulatory permit conditions or written agreements
- Wetlands delineation
- Efforts to achieve compliance with requirements that have deadlines that have already passed
- Initial documenting and cataloging of archaeological materials

Class II: Maintenance Requirements – includes those projects and activities needed that are not currently out of compliance but shall be out of compliance if projects or activities are not implemented in time to meet an established deadline beyond the current program year. Examples include:
- Compliance with future requirements that have deadlines
- Conservation and Geographic Information System mapping to be in compliance
- Efforts undertaken in accordance with non-deadline specific compliance requirements of leadership initiatives
- Wetlands enhancement, in order to achieve the Executive Order for "no net loss" or to achieve enhancement of existing degraded wetlands
- Environmental awareness and education programs for troops and the public

Class III: Enhancement actions, beyond compliance – includes those projects and activities that enhance conservation resources or the integrity of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or Executive Order and are not of an immediate nature. Examples include:
- Participation in "National Public Lands Day", an annual event where volunteers unite to improve resources on public lands
- Community outreach activities, such as "Earth Day" and "Historic Preservation Week"
- Educational and public awareness projects, such as interpretive displays, oral histories, "Watchable Wildlife" area, nature trails, wildlife checklists, and conservation teaching materials
- Restoration or enhancement of cultural or natural resources when no specific compliance requirement dictates a course or timing of action
- Management and execution of volunteer and partnership programs

CHAPTER 2
TRAINING SITE OVERVIEW

2.1 LOCATION AND REGIONAL CHARACTER

2.1.1 Location, size, general description

The 2,470-acre VTS-M is located in the central part of West Tennessee in Carroll and Gibson Counties. The majority of the training site lies in Carroll County with three small parcels located primarily in Gibson County (Figure 2.1).

The training site lies north of U.S. Interstate 40, approximately 60 miles east of the Mississippi River. Neighboring towns include Milan (to the northwest), Lavinia (to the east), and Humboldt (to the west). Access is provided by State Route 220 and Highway 104. Jackson, Tennessee, on Interstate 40, is approximately 20 miles to the south. The major metropolitan population centers nearest the site are Memphis, 87 miles to the southwest, and Nashville, 110 miles to the east.

2.1.2 Property Ownership

The VTS-M is owned by the U.S. Army Corps of Engineers, Mobile District, and licensed (#DACA01-3-89-272) for use to the TNARNG. The training site comprises 2,470.36 acres which were previously a part of the MAAP. An additional 54 acres of adjacent land may be obtained from Milan Army Ammunition Plant (MAAP) in the near future.

2.1.3 Neighboring Land Ownership and Encroachment

Property adjacent to the training site to the west is part of the MAAP (Figure 2.2). The MAAP is a government-owned, contractor-operated military industrial installation under the jurisdiction of the Industrial Operations Command. The entire site has been designated as a controlled air space with an altitude restriction of 2,000 feet.

Neighbors to the north, south, and east are private citizens in a rural setting that includes small farms and rural residential properties. The small town of Lavinia lies to the east of the Cantonment Area at the junction of State Route 220 and the Lavinia-Atwood Road.

2.1.4 Demographics

The total resident population in 2008 for Carroll County, Tennessee, was 28,020, and 49,045 for Gibson County (Table 2.1). Unemployment rates in these counties are higher than the state average, and median household income is lower.

Table 2.1: Selected demographic data for Carroll and Gibson Counties, Tennessee (U.S. Census Bureau).

	Total Resident Population (2018 estimate)*	Median Household Income (2017 estimate)**	% Persons Below the Poverty Line (2017 estimate)**	Unemployment Rate (%) (2018)***
Carroll Co.	28,020	$38,201	19.5	4.9
Gibson Co.	49,045	$41,315	16.4	4.5
Tennessee	6,770,010	$48,708	15.0	3.5

*U.S. Census Bureau (2019) **U.S. Census Bureau (2019) ***USDA Economic Research Service (2008)

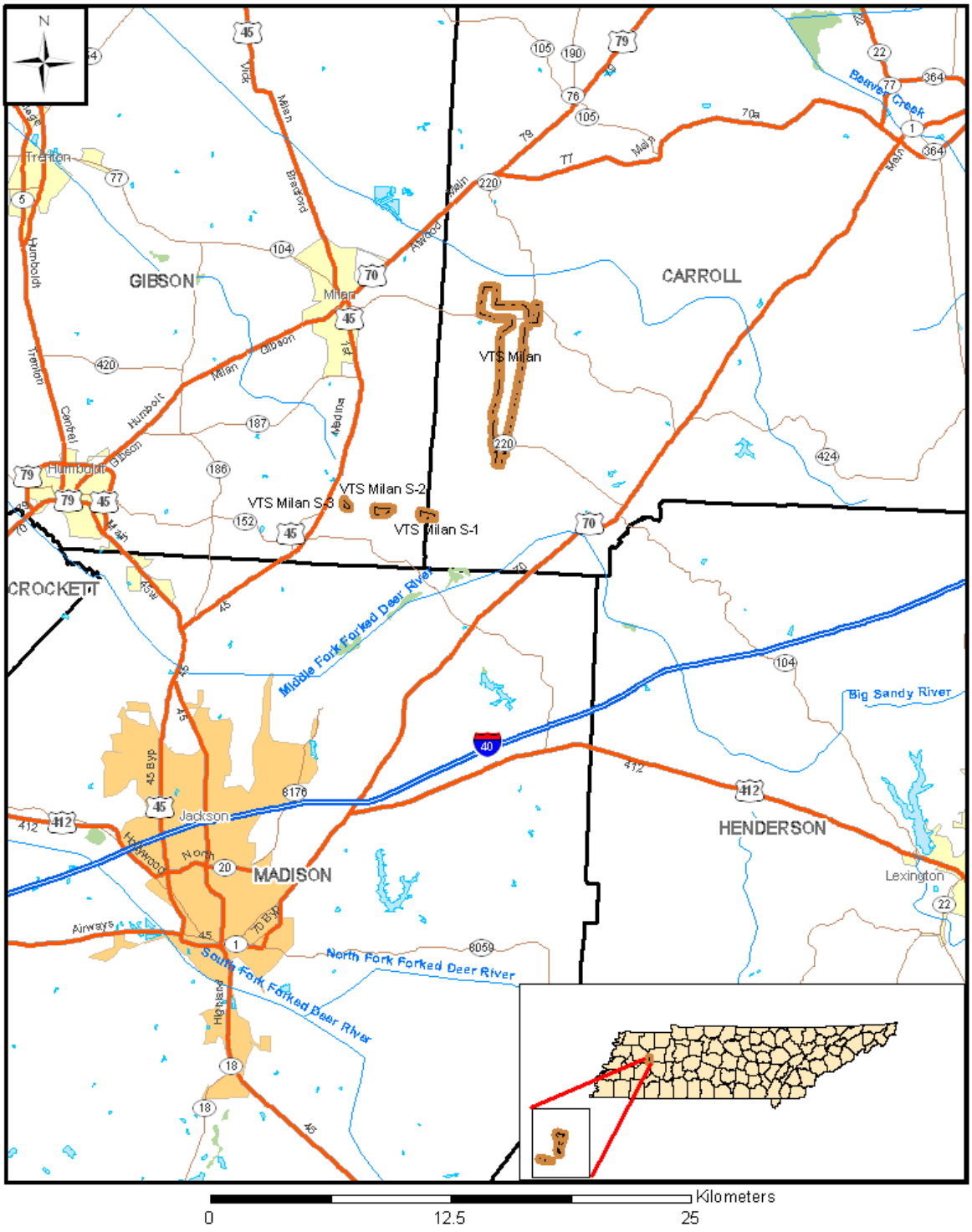

Figure 2.1: Location of the Volunteer Training Site – Milan.

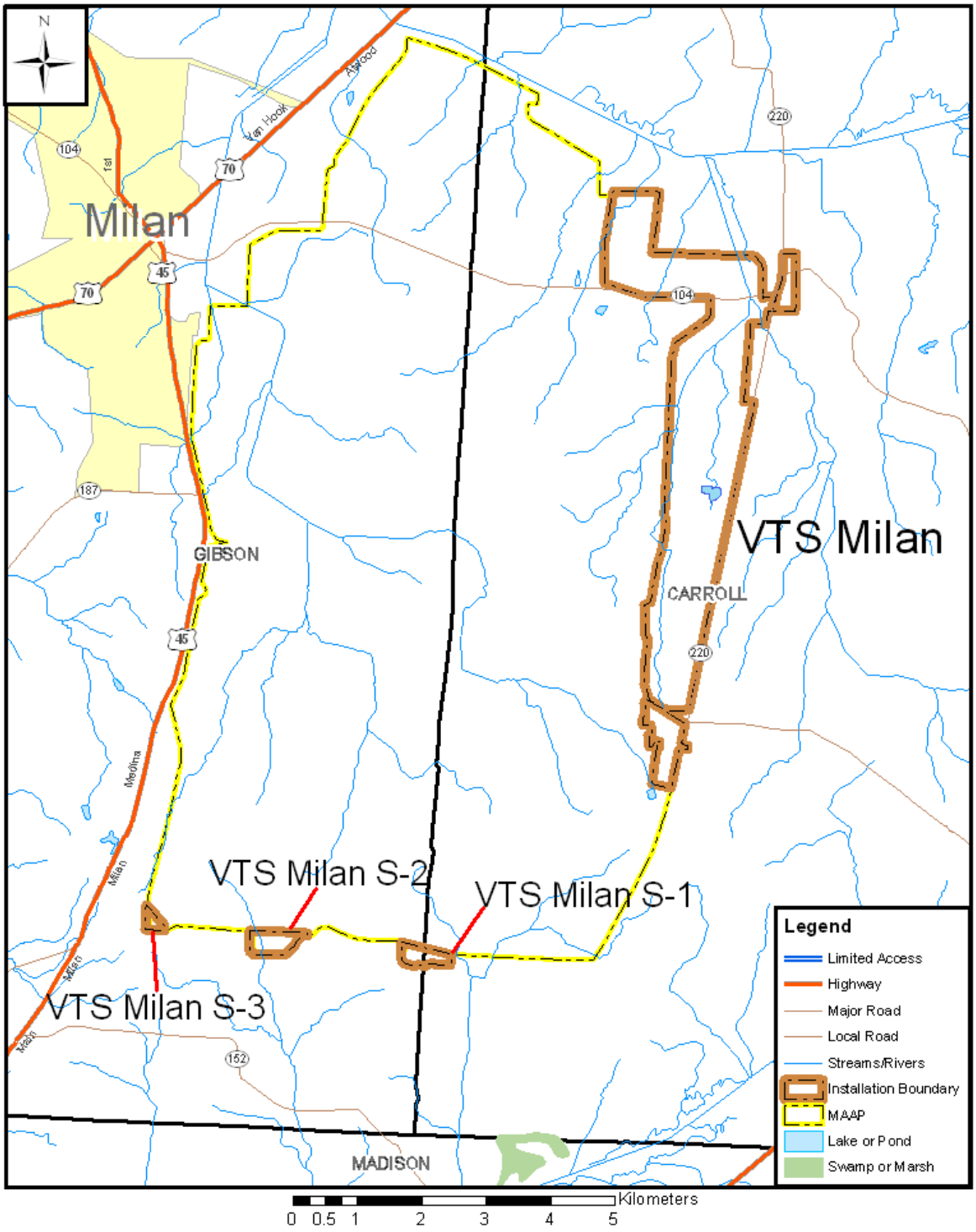

Figure 2.2: Local surroundings and overall facility layout of the VTS-M.

2.1.5 Nearby Natural Areas

There are no designated natural areas within 15 miles of the VTS-M. The Natchez Trace State Park and State Forest is the nearest area of protected public lands. It is approximately 30 miles from the training site near Wildersville, TN, and consists of state forest, state park, and wildlife management area lands totaling approximately 48,000 acres.

Big Cypress Tree State Park is located 35 miles north of the training site in Weakley County. The state park is 330 acres, including a 270 acre designated State Natural Area encompassing bottomlands along the Middle Fork of the Obion River.

Pinson Mounds State Park is located south of Jackson, approximately 35 miles from the VTS-M. It is primarily an archaeological site, but includes 1,200 acres.

Chickasaw State Park and State Forest is also south of Jackson, in Chester and Hardeman Counties, approximately 45 miles from the training site. It encompasses almost 14,400 of timberland managed for timber, wildlife habitat, and recreation.

2.2 INSTALLATION HISTORY

Gibson and Carroll Counties in Tennessee were created in the 1820s from lands ceded by the Chickasaws. Farmers were drawn to the fertile cropland along the creek and river bottoms of the area, and agriculture provided the economic base for the development of the region (University of Tennessee 2002).

In 1940, the Department of the Army purchased 28,521 acres of land from private owners and began construction of a Field Service Storage Depot and Ammunition Production Plant. During 1940 and 1941, the Milan Ordnance Depot and a shell-loading production area, known as the Wolf Creek Ordnance Plant, were constructed. The facility was constructed to produce and store fuses, boosters, and small-and large caliber ammunition. Currently, the plant manufactures no explosives, but receives explosives, projectile and bomb bodies, and fuses from other installations.

The installation has undergone numerous name changes since 1940, including Milan Arsenal, Milan Ordnance Plant, and its present name of MAAP in 1963. The facility has been operated continuously, with the exception of 50 months in 1957 to 1961, when the plant went into standby status. The MAAP was operated by the U.S. Army until 1943, at which time the first operating contractor, Proctor and Gamble, assumed operations. Operations were taken over by Harvey Aluminum Sales, Inc. (1961-1972); Martin Marietta Aluminum Sales, Inc. (1972-1985); Martin Marietta Ordnance Systems (1985-1995); Lockheed-Martin Ordnance Systems (1995-1996); and the current contractor is General Dynamics Ordnance Systems, Inc., which began operating the facility in 1997 (Stephenson, 1998).

Land that was not needed by the military was excised and either sold or licensed to various entities, including a local church congregation, the city of Milan, the TNARNG, and the University of Tennessee Agriculture Experiment station. The current total MAAP acreage is 22,357 acres. The U.S. Army Corps of Engineers, Mobile District, granted the TNARNG a license to utilize 2,190 acres in 1963. Since that time, the license has been revised four times and additional acreage has been added. The total area now available for TNARNG use is 2,470.36 acres.

2.3 MILITARY MISSION

The TNARNG serves both state and federal missions. Both state and federal funding are provided to ensure that the Tennessee Army National Guard is constantly ready to support any mission or need requiring military personnel and equipment. When called by the Governor, the state mission supports civil authorities in the protection of life and property and the preservation of peace, order, and public safety. When called by the President in times of war and national emergency, the federal mission provides trained and equipped personnel and units capable of rapid deployment.

The VTS-M mission statement is to provide state of the art training facilities in support of total force training requirements to sustain operational readiness and exceed mission requirements. Training needs are subject to change in the near future as the TNARNG embraces the transformation of the military force structure.

The VTS-M also supports a Combined Support Maintenance Shop (CSMS) to provide surface maintenance services to specified units from western Tennessee.

2.4 FACILITIES

The site (Figure 2.3) is divided into five major sections (A, B, C, S, and the Cantonment), the first four of which are subsequently broken up into individual Training Areas (TA). The Cantonment is 120 acres and encompasses 65 buildings, including:

- Site headquarters / Administrative buildings
- Combined Support Maintenance Shop #2
- Supply building
- General instruction building
- Barracks
- Dining facilities

Approximately 2,352 acres of the total site are available for field training in 18 Training Areas within A, B, C, and S (see Table 2.2 for training facilities by Training Area). Significant training facilities include:

- Five light maneuver training areas for wheeled vehicle and dismounted training – TAs S1-S3, C1, C2
- Twelve heavy maneuver training areas for tracked and wheeled vehicle training – TAs A1-A9, B1-B3
- Land Navigation Course – in A, B, and S.
- Armored Vehicle Launch Bridge (AVLB)/Dry Span Training Site – TA A6
- Walker Lake – TA A6
- Synchronization Ramp – TA A5
- High / Low Loading Ramp – Cantonment
- Railcar Tie Down Training Site – TA A1
- Tactical Training Base – TA A9
- Urban Assault Course – TA B2
- Artillery Tables – B (no artillery unit currently utilizes VTS-M)
- Live Fire Ranges (Berm and Baffle)
    - Twenty-five-meter Rifle Range: M-16A1, M-16A2, M193; 24 firing points, A16 zero and qualifications using alternative-course standards; 25-meter M-16A2 targets. This

range can be combined with the adjacent 25-meter pistol range to provide a 48-point rifle range – Cantonment

  - 25-meter Pistol Range: .22 cal., .38 cal., .25 cal., and 9mm ball; targets are paper silhouettes on wooden frames; 24 firing points – Cantonment
  - 10-meter M60 Machine Gun Range: M60/SAW and 7.62/5.56 ball; targets are paper silhouettes on wooden frames; 24 firing points – Cantonment
  - 100-meter M2HB Familiarization Range; plastic bullets only – TA A9
- Non-Live Fire Ranges – TAs A1, A7, B2, B3
  - MILES Tank target acquisition laser range – TA A7
  - MILES Bradley target acquisition laser range – TA B3
  - M203 Grenade Launcher Range: 40mm "practice" (paint) rounds only; three fixed targets per lane – TA B3
  - Hand Grenade Qualification Course – TA B2
  - Nuclear, Biological, and Chemical (NBC) Readiness Range (gas chamber) – TA A1
- Inactive Ranges – not currently in use:
  - Tank mini range – Cantonment
  - M31 Artillery Range – B
  - M32 Mortar Range – B
  - Demolition Range – TA A8

2.4.1 Infrastructure

2.4.1.1 Transportation System

Roads – Access to the training site is by Highway 104, off Highway 70, or via State Route 220, off Highway 152 or off Highway 104. The Cantonment area is serviced by paved roads. An extensive network of gravel and dirt trails access the interior of the training site. Trails on the site are maintained in-house by maintenance crews.

Railroads – The MAAP is serviced by Louisville and Nashville Railroad and Illinois Central-Gulf. The Arsenal has the nearest rail spur that can be used for equipment deployment in case of a natural emergency.

Air – Gibson County Airport is located six miles west of the MAAP. This facility is large enough to handle small military aircraft. Commercial air passenger service is available at the Jackson Municipal Airport. The nearest deployment airfields are located at the international airports in Memphis and Nashville. Fort Campbell is the nearest military airport capable of handling deployment aircraft. The VTS-M maintains a helipad for TNARNG and the Tennessee Emergency Management Agency (TEMA) use in the Cantonment area.

2.4.1.2 Potable Water

The MAAP provides drinking water to the majority of the training site. Building I-200 and five field latrines in Area A are supplied with water from the Cedar Grove Water District.

2.4.1.3 Waste Water Treatment

Sewage treatment for most buildings is provided by the MAAP. Building I-200 is on a septic system, and the new Unit Training Equipment Site (UTES) workbay also has its own septic system. Five field latrines with individual septic systems are open during the summer.

2.4.1.4 Solid Waste Disposal

Solid waste disposal for the training site is contracted. The waste is collected in dumpsters supplied by the contractor and hauled for disposal in a licensed landfill

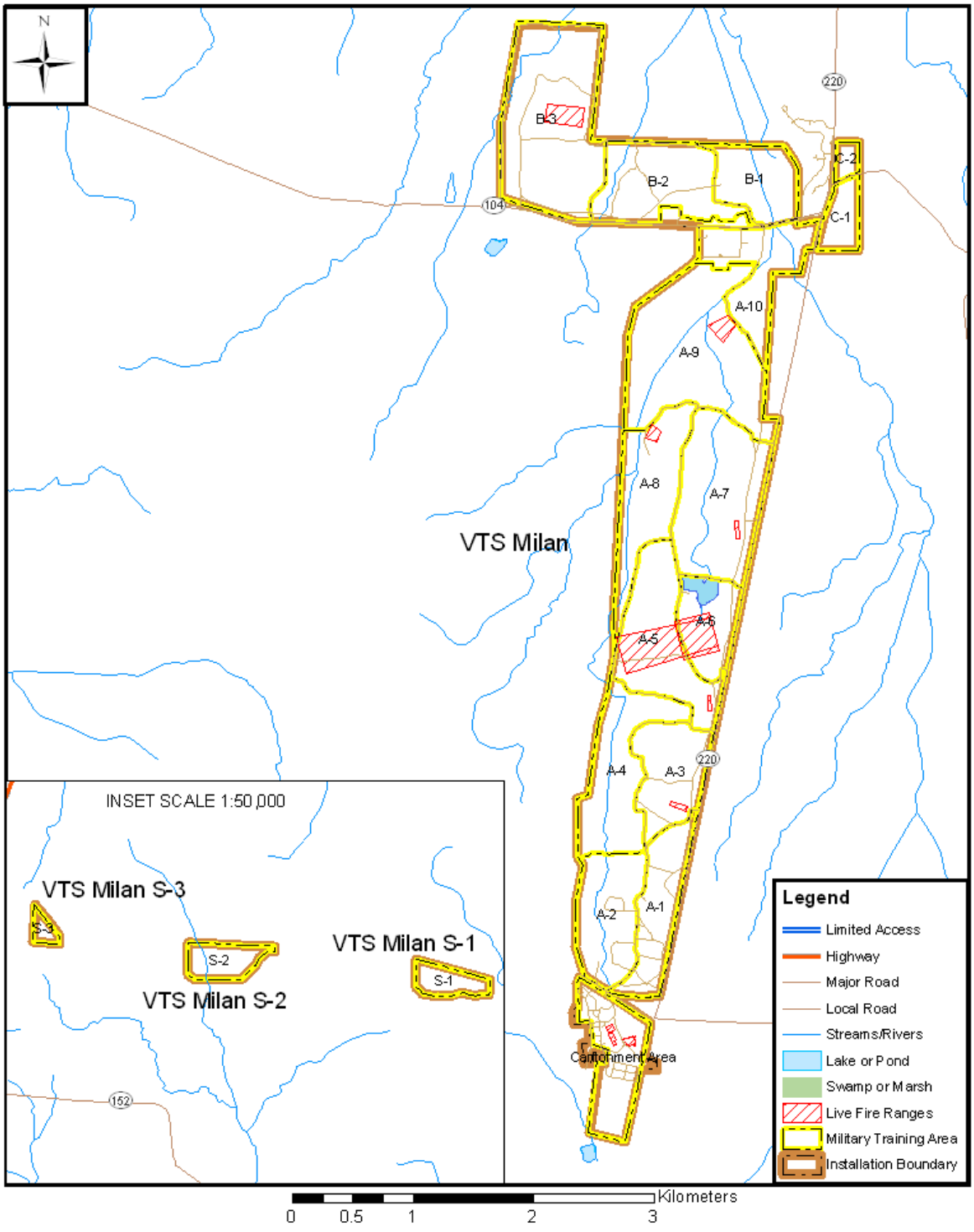

Figure 2.3: VTS-M training areas and ranges.

Table 2.2: Training Area descriptions and facilities.

Training Area	Acreage	Training Facilities and Types of Training Conducted
TA A	**1603**	That portion of the training site lying west of and adjacent to State Route 220 between Lavinia, Tennessee, and State Route Highway 104.
A1	112	Tracked and wheeled vehicle training; land navigation course "A"; railcar tie down training site (mobilization tie down training); bivouac area; NBC chamber.
A2	133	Tracked and wheeled vehicle training.
A3	116	Tracked and wheeled vehicle training; AVLB/Dry span training site; synchronized ramp.
A4	165	Tracked and wheeled vehicle training; engineering training.
A5	173	Tracked and wheeled vehicle training.
A6	91	Lake Walker
A7	222	Tracked and wheeled vehicle training.
A8	165	Tracked and wheeled vehicle training.
A9	300	Tracked and wheeled vehicle training; M2HB familiarization range.
A10	126	Tracked and wheeled vehicle training.
TA B	**563**	That portion of the training site north of Highway 104 between fence along the east side of "K" line and fence separating Area Q, to the MAAP boundary on the north and the administrative complex area (HQ MAAP) on the south.
B1	96	Tracked and wheeled vehicle training; land navigation course "B"; 2 bivouac areas.
B2	164	Tracked and wheeled vehicle training; 1 bivouac area; hand grenade qualification course.
B3	303	Tracked and wheeled vehicle training; 1 bivouac area.
TA C	**56**	Land parcel lying east of Highway 220 at the intersection with westbound Highway 104.
C1	42	Light maneuver area – wheeled and dismounted training.
C2	14	Light maneuver area – wheeled and dismounted training.
TA S	**130**	This training area is in three parcels located on the extreme southern perimeter of the MAAP. They lie adjacent to the East-West County Gravel Road (Brewer Road).
S1	49	Light maneuver area – wheeled and dismounted training; land navigation course "S".
S2	65	Light maneuver area – wheeled and dismounted training.
S3	16	Light maneuver area – wheeled and dismounted training.
Cantonment	**120**	That portion of the training facility outside of the MAAP government fence south of Arsenal Lane and west of Spring Creek-Lavinia Road.
		Site headquarters; CSMA #2; small arms ranges; Hi-low loading ramp; helipad.
Total Acreage	**2,472**	

2.4.1.5 Energy Sources

Electrical power is supplied by the MAAP, except for building I-200 which receives electrical service from the Milan Public Utilities District. Primary and secondary lines within the training site are in good repair and are not close to maximum limits.

A geothermal system provides heating/cooling in the barracks compound. Propane-fired heaters supply heat for all other climate-controlled buildings and are maintained for back-up in the barracks. A local commercial company provides the propane which is stored in aboveground tanks.

2.5 TRAINING SITE UTILIZATION

The VTS-M is the primary training facility for TNARNG units within 100 miles of the training site. Over 90 percent of training site utilization is by military users including the TNARNG, the Tennessee Air National Guard, active U.S. Army components, and U.S. Army Reserves. The primary TNARNG user units are:

- HHC 194th Engineer Brigade
- 278th Armored Cavalry Regiment
- HSC 230th Engineer Battalion
- 230th Combat Service Support Battalion
- 30th Troop Command
- 1174th Transportation Company

Non-Military and civilian users account for a small portion (approximately 5%) of the total training site utilization. Agencies and groups that utilize the VTS-M year-around include:

- Tennessee Bureau of Investigation
- Tennessee Highway Patrol
- Tennessee Department of Revenues
- Carroll and Gibson County Sheriff Departments
- Corrections Corps of America, and
- Tennessee Wildlife Resource Agency (TWRA)

Total training site utilization of the VTS-M for 2007 - 2016 is summarized in Figure 2.4 in person-days per month. The monthly data for three user groups (TNARNG/TNANG, Other Military, and Civilian) from fiscal years 2007 - 2016 are also presented in Table 2.3. Total training site usage has generally decreased in recent years from a high of 65,964 person-days in FY2013 to 36,690 in FY2016. The fluctuations in yearly total usage shown in Figure 2.4 are primarily due to the deployment and subsequent training schedules of local units.

Seasonal distribution of training activities can be seen in Figure 2.5. Training site use is generally dispersed throughout the year, with the bulk of training occurring in the spring and summer months. Particularly low usage generally occurs in December, due to reduced activities associated with the holidays.

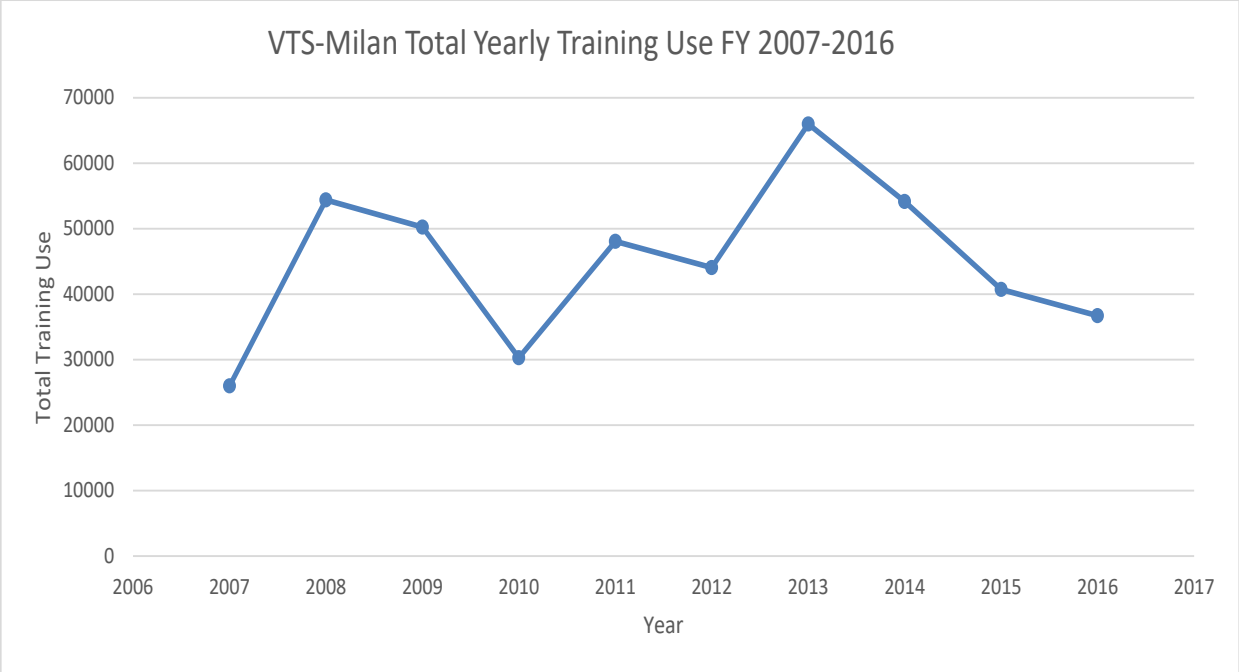

Figure 2.4: Total VTS-Milan yearly training use 2007 - 2016.

Table 2.3: Training site utilization by Tennessee National Guard, other military, civilian users, and undefined users FYs 2007-2016.

TY2007	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
TNARNG/TNANG	248	2423	798	651	2131	917	1397	265	4355	2756	1470	722	18133
Other Military	20	200	90	74	689	80	0	90	0	0	30	0	1273
Civilian	214	50	377	2306	155	209	409	62	2060	62	62	406	6372
Undefined	0	122	100	0	0	0	0	0	0	0	0	0	222
TOTALS	482	2795	1365	3031	2975	1206	1806	417	6415	2818	1562	1128	26000
TY2008	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOTAL**
TNARNG/TNANG	3039	4770	1126	3456	3921	773	3542	3279	11107	5163	1279	3626	45081
Other Military	0	0	0	0	0	0	0	0	0	0	0	0	0
Civilian	52	160	188	2620	48	610	85	204	478	1355	647	2764	9211
Undefined	0	0	80	0	0	0	0	0	0	0	0	0	80
TOTALS	3091	4930	1394	6076	3969	1383	3627	3483	11585	6518	1926	6390	54372
TY2009	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOTAL**
TNARNG/TNANG	858	1939	700	3560	4772	9252	7024	7700	525	5241	1659	710	43940
Other Military	0	0	0	0	0	394	0	0	0	0	0	0	394
Civilian	175	132	342	1874	1002	120	54	75	879	1238		24	5915
Undefined	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	1033	2071	1042	5434	5774	9766	7078	7775	1404	6479	1659	734	50249
TY2010	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOTAL**
TNARNG/TNANG	2545	3933	839	954	970	1437	1169	6831	452	1918	4306	719	26073
Other Military	0	0	23	0	41	0	516	0	0	0	0	0	580
Civilian	134	70	275	36	0	36	140	0	2338	0	12	508	3549
Undefined	0	0	0	0	0	0	0	0	0	0	60	11	71
TOTALS	2679	4003	1137	990	1011	1473	1825	6831	2790	1918	4378	1238	30273
TY2011	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOTAL**
TNARNG/TNANG	1187	4342	506	489	1622	3704	3948	15662	3537	1282	4263	745	41287
Other Military	0	0	0	0	0	72	0	0	22	0	0	0	94
Civilian	40	200	232	2250	0	211	148	160	2080	320	0	225	5866
Undefined	21	11	33	49	32	573	80	10	0	0	0	0	809
TOTALS	1248	4553	771	2788	1654	4560	4176	15832	5639	1602	4263	970	48056

Table 2.3, continued:

TY2012	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
TNARNG/TNANG	30	179	0	644	2073	3231	4197	5555	12232	7701	952	3017	39811
Other Military	0	0	0	0	0	29	0	0	0	37	0	0	66
Civilian	0	100	0	2220	0	0	144	0	640	0	200	845	4149
Undefined	0	0	0	0	0	0	0	0	0	0	0	0	0
TOTALS	30	279	0	2864	2073	3260	4341	5555	12872	7738	1152	3862	44026
TY2013	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOTAL**
TNARNG/TNANG	6393	4903	374	2474	1876	1806	3641	6785	15967	5289	5888	2875	58271
Other Military	0	0	0	0	0	0	0	0	0	0	10	10	20
Civilian	88	150	500	2400	0	225	1455	0	0	0	130	320	5268
Undefined	213	265	213	213	213	213	213	213	10	213	213	213	2405
TOTALS	6694	5318	1087	5087	2089	2244	5309	6998	15977	5502	6241	3418	65964
TY2014	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOTAL**
TNARNG/TNANG	0	3865	2170	963	5310	2072	7209	4384	7773	7214	808	3899	45667
Other Military	0	0	0	0	0	0	0	0	0	2845	0	0	2845
Civilian	230	8	50	1600	10	328	250	50	50	10	0	272	2858
Undefined	0	221	213	213	213	331	600	213	213	355	213	0	2785
TOTALS	230	4094	2433	2776	5533	2731	8059	4647	8036	10424	1021	4171	54155
TY2015	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOTAL**
TNARNG/TNANG	2665	2497	129	1952	5645	5226	2641	5403	6464	1652	158	642	35074
Other Military	0	0	0	0	0	0	0	0	609	0	90	0	699
Civilian	33	85	0	762	762	260	34	0	0	0	9	0	1945
Undefined	459	363	122	140	75	525	192	160	150	150	340	300	2976
TOTALS	3157	2945	251	2854	6482	6011	2867	5563	7223	1802	597	942	40694
TY2016	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOTAL**
TNARNG/TNANG	2824	2207		1396	2912	3934	6258	1378	9679	916	338	2364	34206
Other Military	0	0	0	0	0	0	0	0	0	0	0	0	0
Civilian	87	4	15	0	0	112	419	0	0	0	210	15	862
Undefined	100	100	0	0	204	404	276	206	0	82	50	200	1622
TOTALS	3011	2311	15	1396	3116	4450	6953	1584	9679	998	598	2579	36690

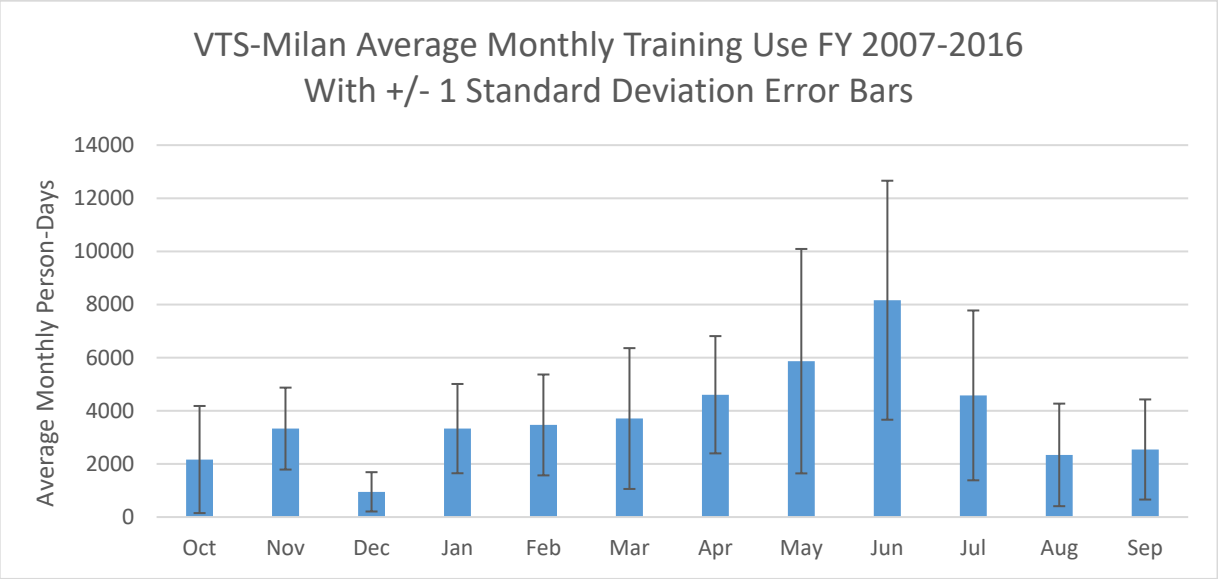

Figure 2.5: National Guard (TNARNG/TNANG) monthly use of VTS-C (average for 2007-2016).

A variety of training activities occur on the VTS-M throughout the year. Classroom instruction occurs in various buildings within the Cantonment. Field exercises are conducted throughout Training Areas A, B, C, I, and S, where appropriate training facilities are available. The types of training on VTS-M during 2019-2024 are expected to be similar to previous years, as shown in Table 2.4. Field exercises involve a wide variety of activities such as wheeled and tracked vehicle maneuvers, troop maneuvers, foot maneuvers, bivouacking, construction of fortifications, land navigation, emplacements and obstacles, and aircraft operations (rotary wing only).

Table 2.4: Types of Field Training on VTS-M.

Type of Training
Airborne, air assault operations
Lane Training Event using WTBD Task (Warrior Task Battle Drills)
AWQ, IWQ, and Crew served weapons on small arms ranges
Field artillery units doing collective training to include maneuver from one firing position to another
Field Training Exercise (FTX) and Command Post Exercise (CPX) operations which include setting up the Unit Headquarters in a field Tactical Operations Center
Military Police (MP) unit operations primarily route security and surveillance, company sized units
Land Navigation Course for OCS, MP, and others
Basic to Advanced classroom instruction
Tank and Bradley qualifications
Mounted Land Navigation Course – All unit types
Artillery Training and Familiarization
Grenade Launcher Training / Qualifications
Light Infantry Training – Primarily Company/Platoon Tactics
Urban Assault Course Training - Infiltration, breaching, and clearing operations
Live fire, practice, and laser ranges
Engineering training – armored vehicle launch bridge (AVLB) / dry span; high-low loading ramp; railcar tie down; synchronization ramp
Signal battalion training

Use of ranges and training area facilities is coordinated through the Facility Manager at least 45 days prior to training dates. Units request training areas based on their mission requirements, and training areas are assigned in the following order: (1) National Guard troop, (2) U.S. Army/Reserve Officers' Training Corps, (3) Others. Before training in the field, using units' Range Officers in Charge (OIC) and Safety Officers must review the VTS-M SOP and attend a safety briefing at VTS-M Range Control.

2.6 EFFECTS OF TRAINING ON NATURAL RESOURCES

Military training can have both negative effects on and positive benefits to natural resources. Maneuver damage is by far the largest negative effect on the natural resources at VTS-M. Maneuvering heavy tracked and wheeled vehicles across even the best-suited landscapes can cause damage to vegetation and soils. For this reason, soils at the VTS-M require timely land rehabilitation efforts at appropriate intervals; this is particularly important on the highly erodible soils of west Tennessee. Vegetation as well as soils can be damaged by regular use on areas such as trails, bivouac sites, and firing points. Wildlife populations can also be harmed by field equipment training, small arms firing, or by mission related wildfires.

The impact level of typical TNARNG training activities is given in Table 2.5. "Low" impact activities are those which generally will not disturb the vegetation or soil and will require no rehabilitation. "Medium" impact activities may cause some disturbance or change which may require minor rehabilitation or which may recover over time without aid. "High" impact activities typically cause significant change to the soils or vegetation of the area which will require timely attention to avoid or minimize long-term alteration of existing conditions. Some training activities may be conducted at different levels of disturbance.

Vehicle maneuvers, tracked and wheeled, have the potential to cause the greatest military related impact to the VTS-M ecosystem. Vehicles used by TNARNG include High Mobility Multipurpose Wheeled Vehicles ("humvees"), Abrams tanks, and Bradley fighting vehicles. Military vehicle training may involve single vehicle maneuvers up to platoon or squadron size elements. Soil compaction and erosion are the most probable results of vehicle maneuvers. Appropriate planning (avoiding steep slopes, highly erodible soil types, and wet soils) and preparation (gravelling of tank trails, etc.) can mitigate much substrate damage. Immediate repair of any damaged areas after training maneuvers ensures no net loss of training area.

Invasive pest plants (IPP) are one of the most immediate threats to native ecosystems in the southeastern U.S. These exotic species can reproduce prolifically and spread rampantly throughout an ecosystem, causing significant disruption to the natural system. They can be easily transported into new areas in the mud on vehicles. To minimize this threat, vehicles arriving at VTS-M should be washed thoroughly before leaving the Cantonment to enter the training areas.

Bivouacking – establishing a temporary encampment for the training unit – has impacts similar to civilian campgrounds. Soil compaction and trampling of vegetation increase runoff rates and may lead to higher erosion. There may also be a change in vegetation composition to more damage and disturbance tolerant species. During wet conditions, vehicles may create ruts if pulled off-road. Rotation of sites and careful site choice can minimize the damage caused by bivouacking.

Table 2.5: Military training and land use activities that may cause soil or vegetation disturbance.

Training Activities	Low Impact	Medium Impact	High Impact
Small unit infantry tactics	X		
Reconnaissance	X		
Terrain/map analysis	X		
Escape and evasion	X		
Infiltration	X		
Land navigation	X		
Patrolling	X		
Nuclear, Biological, Chemical training with simulated agents	X	X	X
Engineer reconnaissance	X		
Tactical bivouac occupation/displacement		X	X
Cold weather operations	X	X	X
Cover and concealment		X	
Field fortifications		X	X
Install/clear minefields			X
Construct obstacles			X
Breaching and clearing operations			X
Construct and maintain main supply routes	X	X	
Demolition training			X
Nonstandard fixed bridges		X	
Bridging and rafting operations		X	
Fording operations		X	
Mobility and countermobility			X
Weapons qualifications/familiarization		X	
Mechanized maneuvers (tracked)			X
Mechanized maneuvers (wheeled)			X
Artillery training (setup and firing)			X
Direct fire			X
Aerial operations	X		

The most effective way to minimize training effects to the soil and vegetation resources is to limit use of an area. This may be accomplished by declaring an area off-limits to certain training activities or by rotating high-impact activities through multiple training areas to allow time for recovery of the vegetation, both of which are practiced as needed on VTS-M. An additional asset for the protection of natural resources on training areas is the increasing use of simulators and simulations within the TNARNG. Various high-technology methods have been implemented at VTS-M to provide for increased safety, better use of available space, and reduced effects on natural resources. Expanded use of simulators and better equipment can reduce maneuver damage to land and soils, while improving training realism.

The greatest positive effect of the TNARNG mission on natural resources is the military presence. TNARNG land managers have instituted good land use practices such as reducing erosion and negative impacts on stream crossings and wetlands. Disturbances that significantly, and often permanently, change the landscape (for example, agricultural tillage, reduction of forest and wildlife habitat for development, and much recreational vehicle damage) are avoided on VTS-M, so that natural communities are relatively undisturbed and are left to return to their natural compositions. After training, the land is evaluated by training site personnel for any damage. If repair is needed, it is initiated at that time to ensure minimal erosion or loss of training land is occurring. If impacts are substantial, training is rotated to another site

until the first area has recovered and can be used again.

2.7 NATURAL RESOURCES NEEDED TO SUPPORT MILITARY MISSION

Due to the variety of units that utilize VTS-M, multiple environmental conditions are needed for training:

- Open woodland areas for bivouac
- Wooded maneuver areas for foot and vehicle traffic
- Open grassland maneuver areas
- Open grassland Engineer training areas
- Road networks
- Pull-off points along roads
- Firing ranges

Past discussions with the Training Site Manager indicated the current site conditions meet training needs, though training needs change over time. The facility is approximately 70% forested with a mix of forest types. Most stands are dominated by mature trees with a sparse to moderately dense understory. The remaining 30% consists of 690 acres of grassland which are concentrated in the northern B area, but a patchwork of smaller open areas breaks up the forest of A area.

Most vehicular operations are confined to the road and trail system. Additional unimproved roads may be desired in the future. The existing grasslands provide sufficient off-road training opportunities. Bivouac sites are sufficient and suitable. An existing open area (TA A-6) has been designated and prepared for Engineer training on heavy equipment and earth-moving operations. A second such training area has been proposed for the open area in TA B-3.

Dismounted (non-vehicular) training occurs throughout the site in a variety of ecotypes. The land navigation course does have areas of dense understory growth which could be thinned to improve accessibility. Modification of training areas may be needed in the future to support additional training simulator establishment.

VTS-M lacks a sufficient firing range complex. Development of a range complex in the A area with some impact area on MAAP has been proposed, though no timelines have been set. Currently all culturally and environmentally sensitive and/or restricted areas are clearly marked/posted as such and are included within Milan's training site SOP as formal guidance to customer/using units. Management, funding and operations are through the training command at the training site. Consequently, none of these issues present a limitation to training or proposed construction of future training ranges or facilities. When the range complex is completed, it may be necessary to develop new open grassland training areas to replace those lost to the range development. This will be revisited in future INRMP reviews.

The overall landscape of the VTS-M is suitable for current TNARNG training needs in west Tennessee. Any significant change in mission will require that the missionscape be reexamined. At this time, natural resources management planning will concentrate on maintaining the landscape in its current form and distribution but improving the habitat quality represented within the existing ecotypes.

2.8 NATURAL RESOURCES CONSTRAINTS ON MISSION/MISSION PLANNING

Certain features of the natural environment represent potential limitations on training activities. The most significant at VTS-M are wetlands, soil erosivity, and invasive species. The challenge is to protect these sensitive resources while still ensuring the full range of military training required by the mission. A

potential constraint is the possible presence of two federally listed bat species, which had likely acoustic detections recorded during a 2019 rare, threatened, and endangered (RTE) species survey. TNARNG is ensuring confirmation of these species presence will not impede the mission by addressing ESA requirements early in the process and working with all stakeholders, including Training Site Command and USFWS. Many sensitive areas can be identified prior to any training activity and incorporated into the ambiance of the activity in the form of safety, off-limits, or contaminated areas. This allows protection of the environment in conjunction with more realistic training scenarios.

2.8.1 Wetlands

The VTS-M includes 246 acres of wetlands, mostly associated with the creek systems in the north and northwest portions of TA A. Wetlands provide several important ecosystem functions; they store water and reduce flooding, filter sediment and impurities from water before it moves into the creek system, and provide habitat for organisms that break down those contaminants and remove them from the cycle. Wetlands are protected by law (the Clean Water Act), and filling and dredging activities are restricted by permitting requirements. Wetland soil conditions are also not conducive to vehicular training. For this reason, vehicles (tracked and wheeled) are restricted to existing roads or tank trails within the wetland areas on the VTS-M. Foot travel through wetland areas is not restricted; although efforts should be made to ensure there is no polluting of these areas with trash or foreign substances.

2.8.2 Soil Erosivity

Although slopes at VTS-M are generally low, the types of soils common on the site are extremely prone to erosion. Care must be taken with activities that will disturb the soil or vegetation, especially along slopes, including such projects as building roads, locating and scheduling training, and off-road maneuvers. Immediate reclamation of disturbed areas should be incorporated into all training and site management plans. Water control features should be included on all roads, trails, and firebreaks to minimize flow along and erosion of the surface, and all construction should be planned with consideration for protecting soils both during and after the building phase.

2.8.3 Invasive Species

Invasive pest plants are generally considered a problem for ecosystem health, but they may also impact training ability on the site. VTS-M has several small areas of kudzu infestation, which if allowed to spread unchecked could make training areas impassable to foot or vehicular travel. The carpet of kudzu vines also creates a high-risk situation, as the ground is completely hidden along with any hazards near the ground such as snakes, debris, or holes. A number of other invasive species also occur on VTS-M and may impact training through their dense, impassable growth and modification of natural communities. See Annex 3 for the invasive pest plant management plan.

2.9 GEOGRAPHIC INFORMATION SYSTEM (GIS) ASSETS

TNARNG Environmental supports a GIS Branch which is responsible for all Global Positioning System) GPS/GIS activities in support of the Environmental office mission, as well as Construction Facility Management Office (CFMO) and Integrated Training Area Management (ITAM). The GIS branch provides mapping, data mining, data storage and retrieval GPS, and information technology functions. Geospatial data must meet federal, DoD, Army, and NGB standards, including Federal Geographic Data Committee (FGDC) and Spatial Data Standards for Facilities, Infrastructure, and Environment (SDSFIE). All TNARNG sponsored projects will be incorporated into the VTS-M database which the GIS Branch maintains.

The VTS-M GIS database includes all facilities data, ITAM data, and environmental data, including but not limited to: roads, structures, infrastructure, fencing, utilities, cultural resources, and natural resources, as well as topographic maps, digital elevation models (DEM), Triangulated Irregular Network (TIN)s, and aerial photographic coverage of the full site. Currently the VTS-M database is incompletely populated, especially with environmental data. All environmental projects include gathering of GIS data for inclusion within the system. Additional needs will be programmed into the STEP system as they become apparent.

CHAPTER 3
PHYSICAL AND BIOTIC ENVIRONMENT

3.1 CLIMATE

The climate of Carroll and Gibson Counties is characterized by relatively mild winters, warm summers, and generally abundant rainfall. Weather patterns in western Tennessee, like the rest of the state, are influenced by pressure systems generally moving from northwest to southeast interacting with air masses from the Gulf of Mexico.

Temperature:
Weather records from Milan, Tennessee, cover the period 1930-2007. During that period, the annual mean temperature was 59.0 ºF. The winter average low is 29.3 ºF, and the average high is 49.9 ºF. Summer temperatures range from an average low of 65.9 ºF to an average high of 89.1 ºF. Spring and fall are very similar, with an average low of approximately 47 ºF and average highs of 70-72 ºF. The average daily temperature for each month is shown in Figure 3.1 (SRCC 2008).

Precipitation:
Average annual precipitation for Milan for the years 1930-2007 was 53.44 inches. Rainfall is evenly spread across the year; although the late summer to fall months are slightly drier (Figure 3.1). The region receives a small amount of snow – averaging 7 inches per year – but rarely experiences any accumulation (SRCC 2008). Thunderstorms are common in the summer months and occur on about 55 days in an average year (Moore et al. 1984).

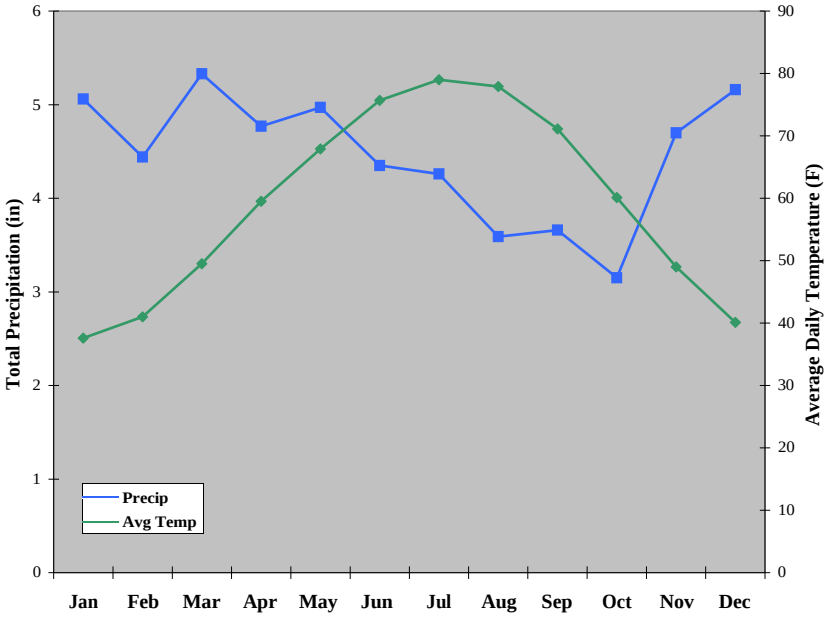

Figure 3.1: Mean daily temperature and mean monthly precipitation for Milan, Tennessee, 1930-2007 (data from SRCC 2008).

Relative Humidity
Relative humidity averages 60% at noon with an annual range of 56-65%. Overnight humidity levels are higher: the 6:00 A.M. readings range from 75-84% and average 80%. The highest relative humidity of the year occurs in the mornings of June through October with readings of 82-84%. The highest afternoon humidity typically occurs in December to February at 62-65% (NOAA 2005).

Wind
The prevailing wind direction in Memphis is south, although during January and February, the wind is typically from the north. The average annual wind speed is 9 miles per hour, and winds are strongest in the winter and spring (highest monthly average is March at 11 miles per hour) (NOAA 1998).

Climate and Training Exercises
Average annual precipitation is a very important factor in determining the ability of natural resources to recover from military maneuver training effects. The seasonal distribution of rainfall at VTS-M (over 53 inches per year on average occurring evenly across the seasons) coupled with a growing season which averages 215 days (Moore et al. 1984) allows vegetative cover to regenerate in a short period of time with minimal effort.

The regular rainfall also, however, results in wet soils during much of the year. Maneuver damage can be more extensive when soils are wet, and so training activity scheduling is very important in protecting the natural resources of VTS-M. Rainfall is lowest, and evaporation rates highest, in the summer and early fall months, which make those the ideal time for high impact training exercises. Damage to vegetation and soils can be decreased by scheduling training exercises during these months.

3.2 PHYSIOGRAPHY AND TOPOGRAPHY

The VTS-M lies within the East Gulf Coastal Plain section of the Coastal Plain physiographic province. The topography of the area around the training site is typically gently sloping to moderately steep and highly dissected by the creek systems (Moore et al. 1984). The training site and surrounding lands generally slope westward toward the Mississippi River Floodplain.

Elevations on the site range from 390 feet above mean sea level at the north end of area B to 580 feet at the southeast corner of TA A and 600 feet in TA S3 (Figure 3.2). Steep slopes (greater than 10%) cover approximately 30 to 40 percent of the site and limit training suitability in these areas.

3.3 GEOLOGY

3.3.1 Geologic Formations

The geology of central West Tennessee is dominated by thick sedimentary layers of sand, silt, and clay from the Quaternary period (Lose and Associates 1994). Stephenson (1998) further describes the sediment layers of the region. There is no native stone to be found on the training site. The exact depth to bedrock under VTS-M is not known; however, a test well near Jackson, TN, was drilled 1289 feet before stopping in sandy clay marl. It was estimated that rock (possibly limestone) would be encountered between 500 and 800 feet below that level (SRI 1995, cited in Stephenson 1998).

3.3.2 Seismicity

The VTS-M is located within the New Madrid Seismic Zone (NMSZ), the most seismically active zone

east of the Rocky Mountains. The NMSZ has produced damaging earthquakes in historical time

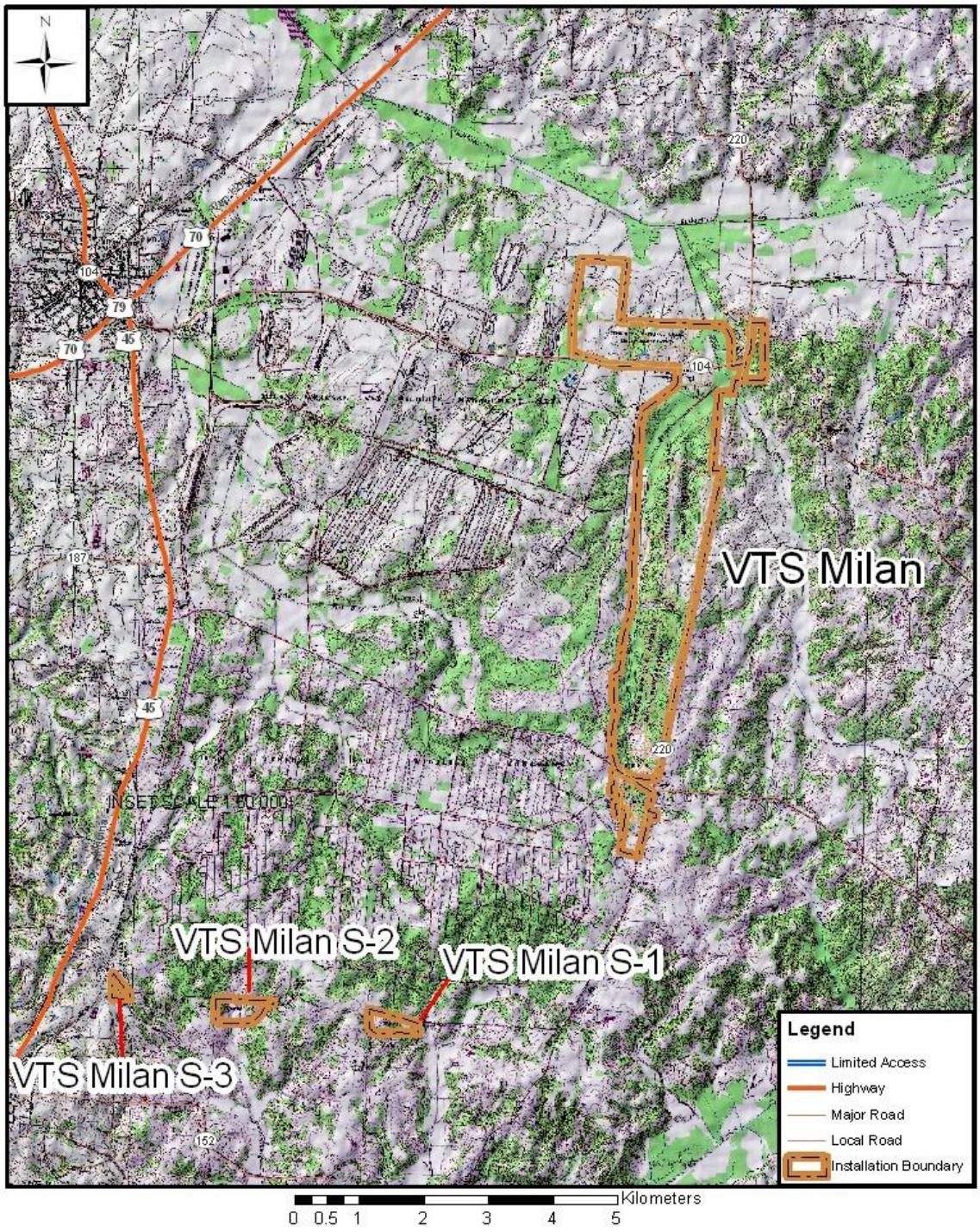

Figure 3.2: Topography of the VTS-M.

including at least three earthquakes estimated to have had moment magnitudes of 8.0 or greater on the Mercalli scale during the years from 1811 to 1812. An earthquake of magnitude 6.0 or larger is expected somewhere in the zone about every 70 years and could impact the training site.

3.3.3 Petroleum and Mineral Resources

Northern Carroll and Gibson Counties are producers of ball clay (Tennessee Division of Geology/U.S. Geological Survey, 2004). No oil, gas, or coal is produced in Carroll or Gibson Counties; testing during the 1980s failed to reveal any deposits. No mineral resources are produced from VTS-M.

3.4 SOILS

3.4.1 Soil Descriptions

The United States Department of Agriculture (USDA) Natural Resource Conservation Service (USDA-NRCS) (then named the Soil Conservation Service) completed a soil survey of Carroll County in 1984 (Moore et al. 1984) and Gibson county in 1994 (Jenkins 1994). Information that follows was taken from Moore et al. (1984), Jenkins (1994), Lose and Associates, Inc. (1994), and SAIC (2000).

Parent materials affect soil mineralogy, soil texture, and the internal drainage properties of soils. Soils at VTS-M are derived from alluvium (soil and weathered rock transported downhill by flowing water), loess (deposits of wind-blown silt), loamy sediments, and silty materials / underlying sandy and loamy sediments. Soils forming in loess deposits have higher silt content in the surface horizons.

The soils on VTS-M are mapped in three major soil associations (Table 3.1 and Figure 3.3): Waverly-Falaya-Collins Association, Lexington-Grenada-Loring Association, and Smithdale-Lexington-Providence Association. These soil associations are generalized categories of soil series and types that occur together in a geographical location. They are named for the dominant soils present, but several other similar soils may be part of an association. A total of ten soil series are found within the three associations on VTS-M. Slope and, in 2 cases, combination with additional soil series, further divides these ten series into the 24 soil types displayed in Table 3.1 and Figure 3.3.

The Waverly-Falaya-Collins association consists of level, poorly draining to moderately well-drained soils typically found on flood plains where slopes range from 0-2%. Waverly soils lie in low positions and are poorly drained silt loams. Falaya soils typically are found on small creek floodplains or near the channels of larger creeks. They are somewhat poorly drained silt loam. Collins soils lie along the upper reaches of tributaries and are moderately well drained silt loam. Calloway and Grenada soils are also a part of this association. Flooding and excess water are the primary limiting factors within this association.

The Lexington-Grenada-Loring association consists of well-drained and moderately well-drained soils on gently to strongly sloping broad upland areas (slopes range from 2-12%). Lexington soils are well drained silt loams with a silty-clay subsoil that are found at the height of the uplands. Grenada soils are moderately well-drained silt loams on lower ridges and side slopes. Loring soils lie between the Lexington and Grenada soils and are moderately well-drained silt loam. Grenada and Loring soils both include a fragipan in the lower subsoil. Minor soils within this association include Calloway, Collins, and Falaya. Slope and high erodibility are the primary limiting factors on this association.

The Smithdale-Lexington-Providence association consists of steep to gently sloping, well-drained to moderately well-drained soils on the dissected uplands of the region where slope ranges from 2-35%. Smithdale soils lie on the narrow ridgecrests and side slopes; they are well-drained sandy loam with a sandy clay loam subsoil. Lexington soils are well-drained silty clay loams with a silty-clay subsoil that are found on the broader ridgetops and side slopes. Providence soils are moderately well-drained silt loams located in saddles, slight depressions, and on uplands. Loring and Collins soils are also minor constituents of this association. Slope, high erodibility, and difficulty in revegetating are the primary limiting factors.

Soils adjacent to Johns Creek and Halls Branch are soils that are generally found on floodplains and are susceptible to periodic flooding. Drainage classes of bottomland soils range from poorly drained to moderately drained, with moderate permeability. Falaya and Waverly series soils are the only soils that are hydric or have hydric inclusions. Soils on the rest of the VTS-M are generally found on broad, high uplands on gently slopping topography. These upland soils are generally well drained and moderately well drained soils. The Grenada, Loring, and Providence soil series all have dense, brittle subsoil horizons, which interfere with drainage and root growth.

Table 3.1: Soil Types on VTS-M (from Moore 1984 and Jenkin 1994).

Soil symbol	Soil name	Acres
Ca	Calloway silt loam, 1 to 3 % slopes range to 5%	86.7
Co ^	**C**ollins silt loam, 0 to 2 % slopes	217.2
Fa *	Falaya silt loam, 0 to 2 % slopes	394.9
GrB	Grenada silt foam, 2 to 5 % slopes	41.7
GrC3	Grenada silt loam, 5 to 8 % slopes, severely eroded	68.8
LME3	Lexington, Smithdale and Providence, 12 to 30 % slopes, severely eroded	10.9
LeB	Lexington silt loam, 2 to 5 % slopes	514.0
LeB2 ^	Lexington silt loam, 2 to 5% slopes, eroded	35.6
LeC2	Lexington silt loam, 5 to 8 % slopes, eroded	123.4
LeD2	Lexington silt loam, 8 to 12 % slopes, eroded	211.2
LoB	Loring silt loam, 2 to 5 % slopes	84.0
LoB3	Loring silt loam, 2 to 5 % slopes, severely eroded	16.8
LoC3	Loring silt loam, 5 to 8 % slopes, severely eroded	103.1
LoD3	Loring silt loam, 8 to 12 % slopes, severely eroded	75.9
PrB2 ^	Providence silt loam, 2 to 5 %slopes, eroded	8.9
PrC3	Providence silt loam, 5 to 8 % slopes, severely eroded	4.7
SmD2	Smithdale fine sandy loam, 12 to 20 % slopes, eroded	98.8
SmE	Smithdale fine sandy loam, 12 to 20 % slopes	169.3
SmE3	Smithdale fine sandy loam, 12 to 20 % slopes, severely eroded	19.4
Ud	Udorthents loamy, 2 to35 % slopes	9.0
Us	Udorthents-Smithdale complex, 8 to 35 % slopes	31.6
Wf *	Waverly silt loam, 0 to 2 % slopes, frequently flooded	10.1
Wo *	Waverly silt loam, 0 to 2 % slopes, occasionally flooded	37.3
Wp *	Waverly silt loam, 0 to 2 %, ponded	44.1
	Total soil acreage	2417.4
Wa	Water	14.6
	Total Acreage	2432

* Indicates a hydric soil. ^ Indicates prime farmland soils.

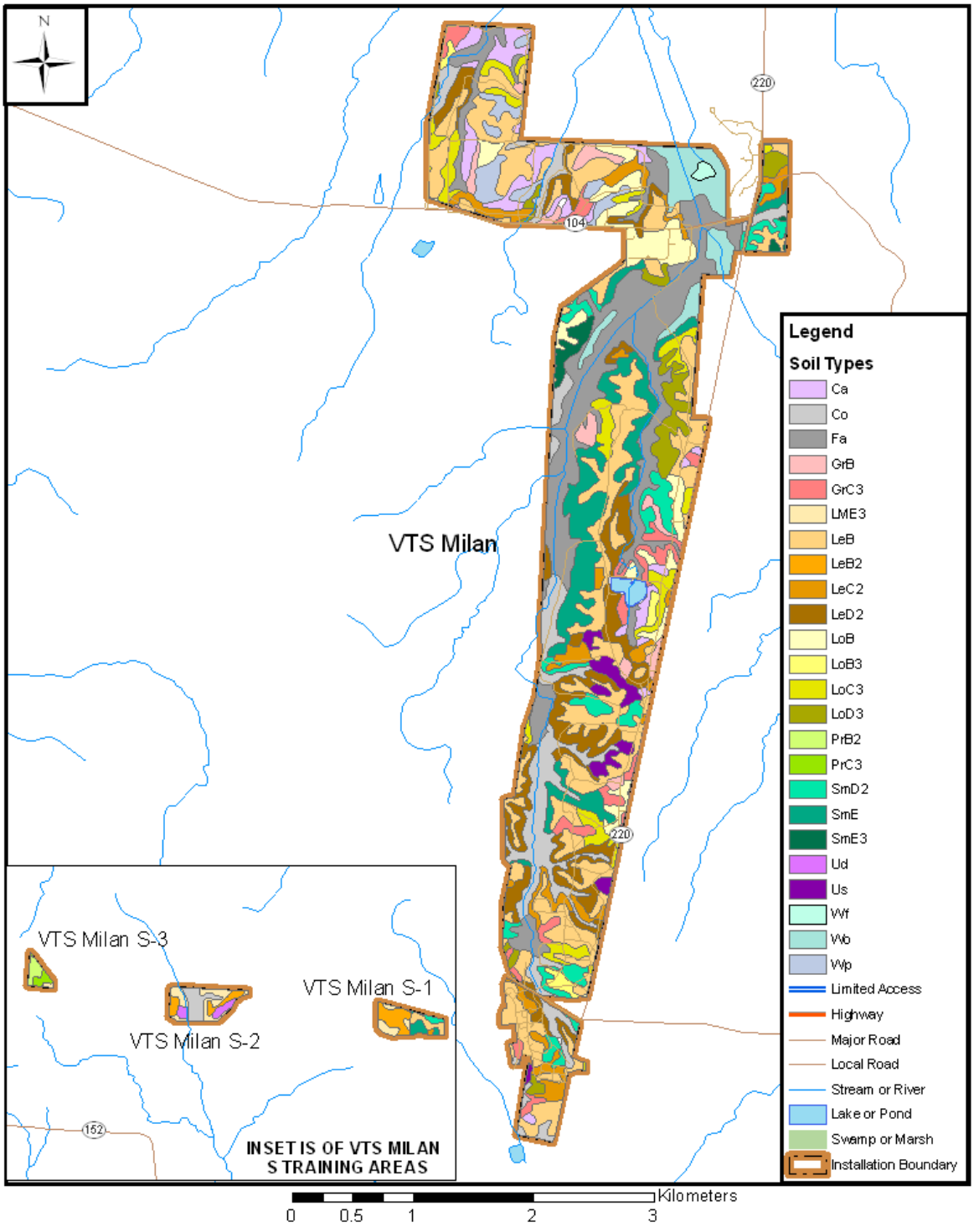

Figure 3.3: Soil types on the VTS-M.

3.4.2 Soil Erosion Potential

Soil erosion potential, or erosivity, is of particular importance in an area that is subject to the effects of armored vehicular training and other activities which will remove vegetative cover and disturb the soil surface. Soil erosion potential is principally influenced by rainfall (R), slope steepness and length (LS), soil texture (K), cover protecting the soil (C), and special practices (P) such as terracing or planting on the contour. Humans can control the C and P factors, while R, LS, and K are a function of the soil's geographic location, topography, and physical properties. The Universal Soil Loss Equation (USLE) (A=R*LS*K*C*P) uses these factors to estimate the average annual soil loss due to sheet and rill erosion for a given soil with specific management. At VTS-M, physical factors of the soil – texture, vegetative cover, and slope characteristics – influence the amount of erosion more than the other factors.

Interpretation of the data found in the soil survey reveals that soil erosion and compaction are the primary problems affecting the soil resources at the VTS-M site. The erosion index (EI) shows the soils potential for erosion (Table 3.2). The EI considers the effects of rainfall, erodibility, and slope, and it adjust the differences in soil erosion tolerance. The NRCS rates soils with EI greater than eight times the soils tolerance as highly erodible. The highly erodible land classification (Table 3.2; Figure 3.4) gives an indication of whether a soil has potential for being erodible or not.

On the VTS-M, 25% (593.3 acres) of the soils present meet the criteria of highly erodible lands (marked with red in Table 3.2), and 43% (1,034 acres) are potentially highly erodible. Only one-third (790.3 acres) of the soil on VTS-M is considered to be not highly erodible. Highly erodible lands can tolerate little disturbance. Land management activities as well as training activities which will disturb the soil or eliminate vegetation should be minimized on these soils. Where such activities cannot be avoided or relocated, plans for immediate reclamation and revegetation should be developed prior to the activity and implemented promptly after.

3.4.3 Prime Farmland

A prime farmland designation is given to an area if the soils present have the best combination of physical and chemical characteristics for producing food, feed, forage, fiber, or oilseed crops. Approximately 262 acres (11 percent) of VTS-M soils are recognized as prime farmland soils (see Table 3.1); however, they are not currently managed to produce crops, nor are they leased for agricultural production. The TNARNG utilizes the site for the primary purpose of military training, which takes precedence over agricultural land uses at this time.

Table 3.2: Soil Erosion Potential on VTS-M.

Symbol	Acreage	Slope (%)	LS Minimum	LS Maximum	T-Factor	K-Factor	Erosion Index (EI)	HEL Class
Ca	86.7	1-3	0.13	0.48	3	0.49	6.5-23.9	NHEL
Co	217.2	0-2	0.05	0.35	5	0.43	1.3-9.2	NHEL
Fa	394.9	0-2	0.05	0.35	5	0.43	1.3-9.2	NHEL
GrB	41.7	2-5	0.27	1.04	3	0.49	13.5-51.8	PHEL
GrC3	68.8	5-8	0.62	2.05	3	0.49	30.9-102.1	HEL
LME3	10.9	12-30	1.86	15.66	3	0.49	92.7-780.1	HEL
LeB	514.0	2-5	0.22	1.10	3	0.49	11.0-54.8	PHEL
LeB2	35.6	2-5	0.26	1.01	3	0.49	13.0-50.3	PHEL
LeC2	123.4	5-8	0.54	2.05	3	0.49	26.9-102.1	HEL
LeD2	211.2	8-12	0.99	3.70	3	0.49	49.3-184.3	HEL
LoB	84.0	2-5	0.27	1.10	3	0.49	13.5-54.8	PHEL
LoB3	16.8	2-5	0.32	1.10	3	0.49	15.9-54.8	PHEL
LoC3	103.1	5-8	0.52	2.05	3	0.49	25.9-102.1	HEL
LoD3	75.9	8-12	0.79	3.86	3	0.49	39.4-192.3	HEL
PrB2	8.9	2-5	0.27	1.00	3	0.49	13.5-49.8	PHEL
PrC3	4.7	5-8	0.78	1.64	5	0.49	23.3-49.0	PHEL
SmD2	98.9	8-12	0.83	4.02	5	0.28	14.2-68.7	PHEL
SmE	169.3	12-20	1.59	8.94	5	0.28	27.2-152.7	PHEL
SmE3	19.4	12-20	1.69	7.61	5	0.28	28.9-130.0	PHEL
Ud	9.0	2-35	0.28	15.85	5	0.28	4.8-270.7	PHEL
Us	31.6	8-35	0.88	14.69	5	0.28	15.0-150.9	PHEL
Wf	10.1	0-2	0.05	0.32	3	0.43	2.2-14.0	NHEL
Wo	37.3	0-2	0.05	0.35	3	0.43	2.2-15.3	NHEL
Wp	44.1	0-2	0.05	0.35	3	0.43	2.2-15.3	NHEL

LS = Topographic factor (length and steepness of slope) T = Tolerable soil loss (acres/year)
K = Soil erodibility factor EI = Erosion Index
HEL Class: HEL = highly erodible land; NHEL = not highly erodible land; PHEL = potentially highly erodible land

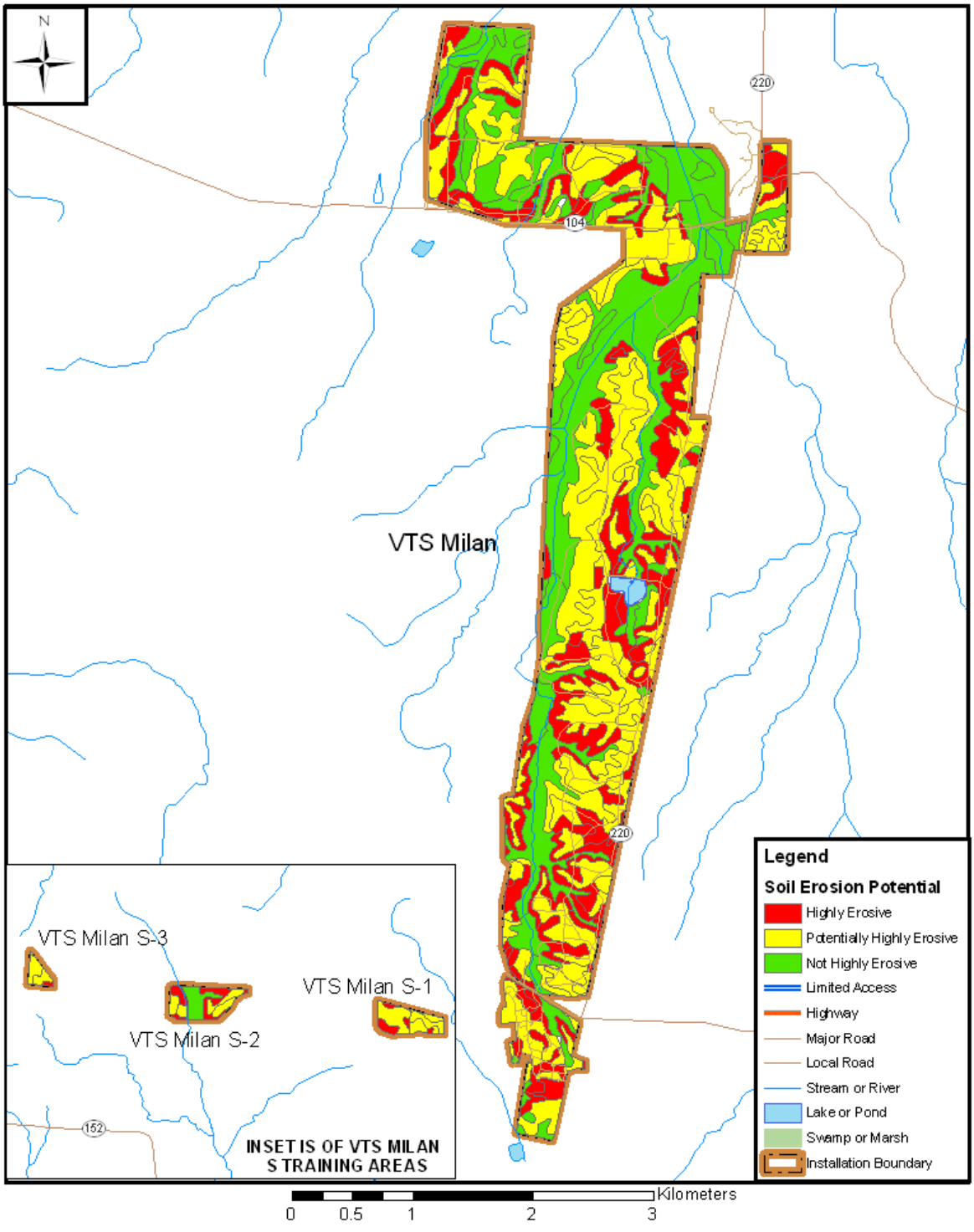

Figure 3.4: Soil erosion potential on the VTS-M.

3.5 WATER RESOURCES

3.5.1 Surface Water

There are two named perennial streams that flow on the VTS-M (Figure 3.5): Halls Branch and Johns Creek. Minkin et al. (1998) identified 18.4 miles of intermittent or flowing streams on the site. Most of these waterways, including sections of Halls Branch and Johns Creek, are dry during the late summer to early fall. There are also nine ponds totaling 14.6 acres on VTS-M, the majority being man-made. Most of the ponds are very small (less than 0.15 acres); the exception is 13-acre Walker Lake in training area A-6.

Halls Branch is a tributary to Johns Creek. It originates just southeast of the VTS-M and enters the training site across the eastern border of the cantonment area. Halls Branch flows northeast for approximately 2,000 feet from the VTS-M boundary and then turns northward and flows for over one mile, at which point it turns northeast briefly, exiting the training site onto the MAAP for approximately 1500 feet. Halls Branch reenters the training site and continues to flow northward near the western boundary for approximately a mile before turning to the northeast and joining Johns Creek in the northeast corner of training area A.

Johns Creek originates east of VTS-M. It enters the training site across the northeast boundary of training area A and flows approximately 1100 feet to its confluence with Halls Branch. Johns Creek then flows north across training area B and exits across the northern boundary. Approximately one mile beyond the VTS-M, Johns Creek joins the Rutherford Fork of the Obion River (in the South Fork Obion Hydrologic Unit #08010203) which discharges into the Mississippi River.

3.5.2 Ground Water

The VTS-M lies within the range of the west Tennessee tertiary aquifer system, which is the most prolific source of ground water in the state and is the primary source of drinking water for the city of Memphis. This aquifer system is made up of Quaternary and Tertiary age unconsolidated sand and gravel beds, separated by clays. Several formations that experience hydraulic interchange function together as one system. The Memphis sand and the Fort Pillow Sand are the two major water-bearing units in the Tertiary aquifer system (Brahana et al. 1986).

Groundwater in the western Tennessee area generally flows to the west, in the direction of regional dip of the underlying sands, and can also trend to the north because of topographic influences (Lose and Associates 1994).

Water quality within the Tertiary aquifer system is generally considered excellent and typically contains less than 200 milligrams per liter dissolved solids. Water from wells on the MAAP has been found to contain nitrate contamination (Brahana et al. 1986). Ground water contamination is monitored through a series of wells across the MAAP, including several on the VTS-M. Explosives compounds were detected in groundwater samples from the western portion of MAAP, as well as in three City of Milan drinking water supply wells, in 1991-92 (EPA 2000). The direction of groundwater flow in the area – the plume is moving northwest from the original point of detection – makes it unlikely that groundwater below VTS-M will be affected by this contamination. Additional monitoring and remediation efforts were initiated, and remediation via extraction, treatment, and discharge of the treated groundwater is still underway. At its first five-year review, this remediation was found to be functioning and in compliance (Arcadis G&M, Inc. 2005).

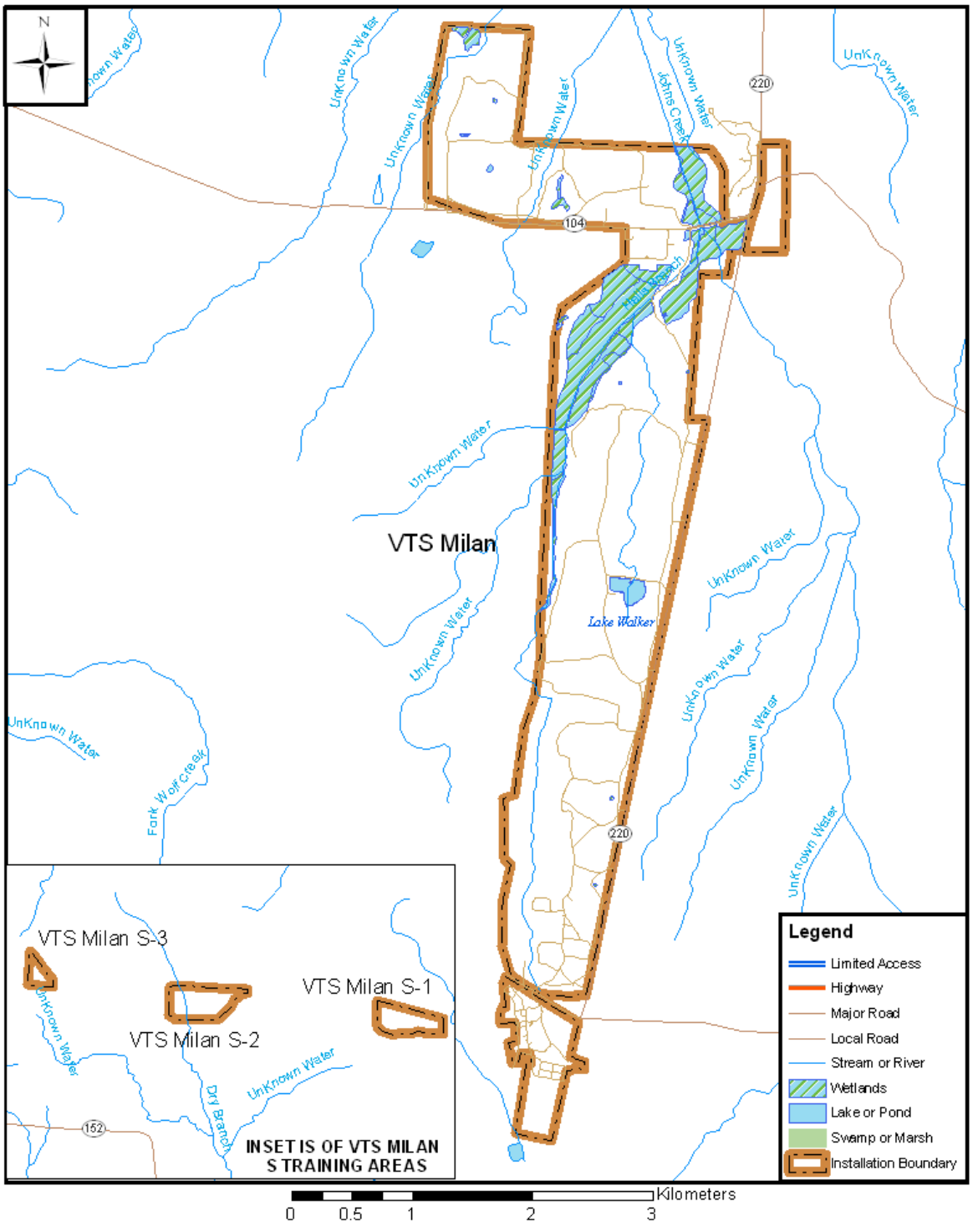

Figure 3.5: Surface water on the VTS-M.

3.5.3 Water Quality

Water quality parameters were first measured in Halls Branch, Johns Creek, and Walker Lake on VTS-M in December 1998 (low flow) and April 1999 (high flow) as part of a Natural Resources Aquatic Survey conducted by Science Applications International Corporation (SAIC 1999). Five stations were sampled (4 in Halls Branch, 1 each in Johns Creek and Walker Lake) for a variety of water quality parameters, including metals, nitrogen, sulfate, chloride, phosphate, alkalinity, dissolved and suspended solids, and fecal coliform.

The conclusion from this assessment was that the water quality in the surveyed creeks and pond was "generally good." The study found low concentrations of toxic metals, nutrients, anions, and fecal coliform, but there was a great deal of variation in many of the measured constituents over time and/or space. Complete results are available in the study report.

Although this initial assessment found generally good water quality, the State of Tennessee considers both Halls Branch and Johns Creek impaired. The designated use classifications (according to the TDEC Rules 1200-4-4, Use Classifications for Surface Waters) for both creeks include Fish and Aquatic Life, Recreation, Irrigation, and Livestock Watering and Wildlife. Both creeks are identified as impaired for one or more of these uses due to "nonpriority organics" from hazardous waste sources; they are in need of a Total Maximum Daily Load (TMDL) plans, but are of low priority currently (TDEC-WPC 2006b). Water quality issues in Johns Creek and Halls Branch may also result from sedimentation and row crop runoff, problems which affect the majority of the waterways on the South Fork of the Obion River (TDEC-WPC 2006a).

Further water quality analysis should be conducted to more completely characterize the surface water quality on the training site and to identify any changes from the initial survey. A water quality study project is currently in progress and this document will be updated when the results are available.

3.5.4 Water Supply and Wastewater Management

Potable Water
The MAAP provides drinking water to the training site, except for building I-200 and five field latrines, which are supplied with water from the Cedar Grove Water District.

Waste Water Treatment
Sewage treatment is provided by the MAAP, except for building I-200, which is on a septic system. A project is currently under way to tie VTS-M into the city of Milan sewer system.

3.6 WETLANDS

To meet the definition of "jurisdictional wetland" under Section 404 of the Clean Water Act, an area must exhibit three traits: (1) hydrophytic vegetation, (2) hydric soils, and (3) wetland hydrology. Areas that are periodically wet but do not meet all three criteria are not jurisdictional wetlands subject to Section 404 of the Clean Water Act. Areas that have been disturbed or that are classified as problem area wetlands, however, may not meet all three criteria due to man-induced alterations, but are still considered jurisdictional wetlands. Wetlands store water and minimize flooding. They also filter sediment, excess nutrients, and other impurities from water as it is stored. The aquatic vegetation found in wetlands protects shorelines from erosion and provides food and cover for wildlife. Wetlands provide habitat for micro- and macro-invertebrates that use or break down nutrients and contaminants.

A 1998 delineation of wetlands and other regulated waters was performed by Minkin et al. (1998) of the U.S. Army Engineer Waterways Experiment Station. To determine if an area would be considered a jurisdictional wetland under Section 404, this study applied the technical criteria for wetland delineation as described in the Corps of Engineers Wetlands Delineation Manual (Environmental Laboratory 1987) and the Code of Federal Regulations (33 CFR 329.11(a)(1)). They found that VTS-M contained approximately 245.9 acres of wetlands (10% of the training site property) mostly situated along the streams and drainageways of the site (Figure 3.5). The majority of the wetlands were forested with bottomland hardwood species dominating the overstory; 0.9 acres of wetland were shrub-dominated, and an additional 5.8 acres were emergent wetlands fringing the ponds and streams.

A 2012 wetland survey and delineation by URS located 20 wetland areas covering a total of 202.5 ac., nine non-jurisdictional and 11 jurisdictional. The majority of the wetlands were bottomland hardwood wetlands. Jurisdictional wetlands covered a total of 193.36 acres and non-jurisdictional wetlands totaled 9.4 acres. The reason for the discrepancy in total wetland acres between the 1998 and 2012 surveys is unclear. It is possible that long term weather patterns had caused the wetlands to contract, or changes in wetland survey methods reduced the area delineated as wetlands. Some areas delineated as wetlands by the 1998 survey were not determined to not be wetlands by the 2012 delineation/survey. The next iteration of the survey will aid in refining long-term wetland areas. Further characterization of these wetland areas, including the plants and animals they support, is needed.

3.7 VEGETATION

The VTS-M is part of the Southeastern Plains and Hills ecoregion within the Southeastern Plains. The natural vegetation is characterized as oak-hickory forest, which converts to oak-hickory-pine to the south (Griffith et al. 1997). Bailey classifies the ecosystem as the Eastern Broadleaf Forest (Continental) Province of the Hot Continental Division of the Humid Temperate Domain (1995). Vegetation on the training site is a mosaic of hardwood and mixed forests and grassland areas, heavily influenced by human action and by relatively minor changes of topography.

3.7.1 Vegetation Community Classification

Eleven plant communities were described in the Phase II natural resources survey by Science Applications International Corporation (SAIC 2000). Community delineation was based on the dominant plant species present, landform, soils, hydrologic condition, and land use. These community types were further refined by a vegetation community classification based on the National Vegetation Classification Standard (Dynamic Solutions 2006b). The Dynamic Solutions classification (Figure 3.6) identified communities to the level of floristic alliance, as described below.

3.7.1.1 Vegetated, Tree Dominated, Closed Tree Canopy, Evergreen

Juniperus virginiana Forest Alliance

Small, pure or nearly pure stands of eastern redcedar occur where it has colonized former openings on dry uplands. One such stand on VTS-M was created by regular mowing under a developing redcedar stand.

Pinus taeda Forest Alliance

Numerous loblolly pine plantations of various ages are found on VTS-M. They were established as pure stands, but a variety of species have invaded the understory and midstory, including red maple, sweetgum, American elm, slippery elm, eastern redcedar, black gum, black cherry, and southern red oak.

3.7.1.2 Vegetated, Tree Dominated, Closed Tree Canopy, Deciduous

Liquidambar styraciflua – Betula nigra/*Acer rubrum* Forest Alliance

This alliance is dominated by sweetgum and occupies moist soils along the creeks. River birch is a common sub-dominant species, and red maple is found in the understory and midstory. Boxelder, sycamore, ash, black gum, American elm, slippery elm, American holly, dogwood, and hackberry are common constituents. Much of this alliance on VTS-M has an herbaceous layer dominated by the invasive *Microstegium vimineum*, or Nepalese browntop.

Liquidambar styraciflua Forest Alliance

This alliance is also dominated by sweetgum, but it occupies somewhat drier sites than the previous alliance. Birch and red maple are less common, but oaks may be present, and other species include boxelder, sycamore, ash, blackgum, American elm, slippery elm, American holly, dogwood, and hackberry. Nepalese browntop and Japanese honeysuckle are both common in the understory.

Quercus alba – Quercus falcata – Carya spp. Forest Alliance

This is a diverse alliance occurring on dry upland sites, such as in Training Area C. White oak is the dominant species, but a variety of other oaks – southern red oak, black oak, post oak, and blackjack oak – are present. Other common canopy trees include shagbark, mockernut, pignut, and bitternut hickories, yellow-poplar, and red maple. The mid-story typically consists of dogwood, hackberry, sassafrass, American holly, and the elms. Poison ivy and Japanese honeysuckle are common in the understory.

Quercus falcata – Quercus velutina – Liquidambar styraciflua Forest Alliance

This extensive alliance is dominated by southern red and black oaks with a strong component of sweetgum and a variety of other upland hardwood species. It occupies the level to gently sloped "ridges" of the training site. White oak and post oak may also be present, depending on the dryness of the site.

Robinia pseudo-acacia Forest Alliance

One stand in the southern portion of the VTS-M is nearly pure black locust. This is typical for this shade intolerant species colonizing an open area. On all but the poorest of sites, the black locust stand is rapidly invaded by other hardwoods, shrubs, and forbs.

3.7.1.3 Vegetated, Tree Dominated, Closed Tree Canopy, Mixed Evergreen-Deciduous Pinus

taeda – Quercus (*alba, falcata, stellata*) Forest Alliance

This alliance is typically at least 50% loblolly pine with a variable mixture of oaks, eastern redcedar, and sweetgum. Southern red oak was almost always present. This community was generally found on the drier upland sites.

3.7.1.4 Vegetated, Herb Dominated, Herbaceous Vegetation, Perennial Graminoid Vegetation

Andropogon gerardii – Schizachyrium scoparium – Lespedeza cuneata Herbaceous Alliance

This alliance is found on portions of the training site where efforts have been made to reintroduce native grasses. Big and little bluestem have been very successful and share dominance with the previously established, invasive sericea lespedeza. Kobe lespedeza and partridge pea are also common constituents.

Bouteloua dactyloides Herbaceous Alliance

Buffalo grass was seeded into the M-203 firing range in Training Area B in an attempt to displace the non-native fescue with a low-growing, native warm season grass. Establishment of the buffalo grass has been somewhat successful and it shares space with yellow foxtail, green foxtail, kobe lespedeza, and partridge pea.

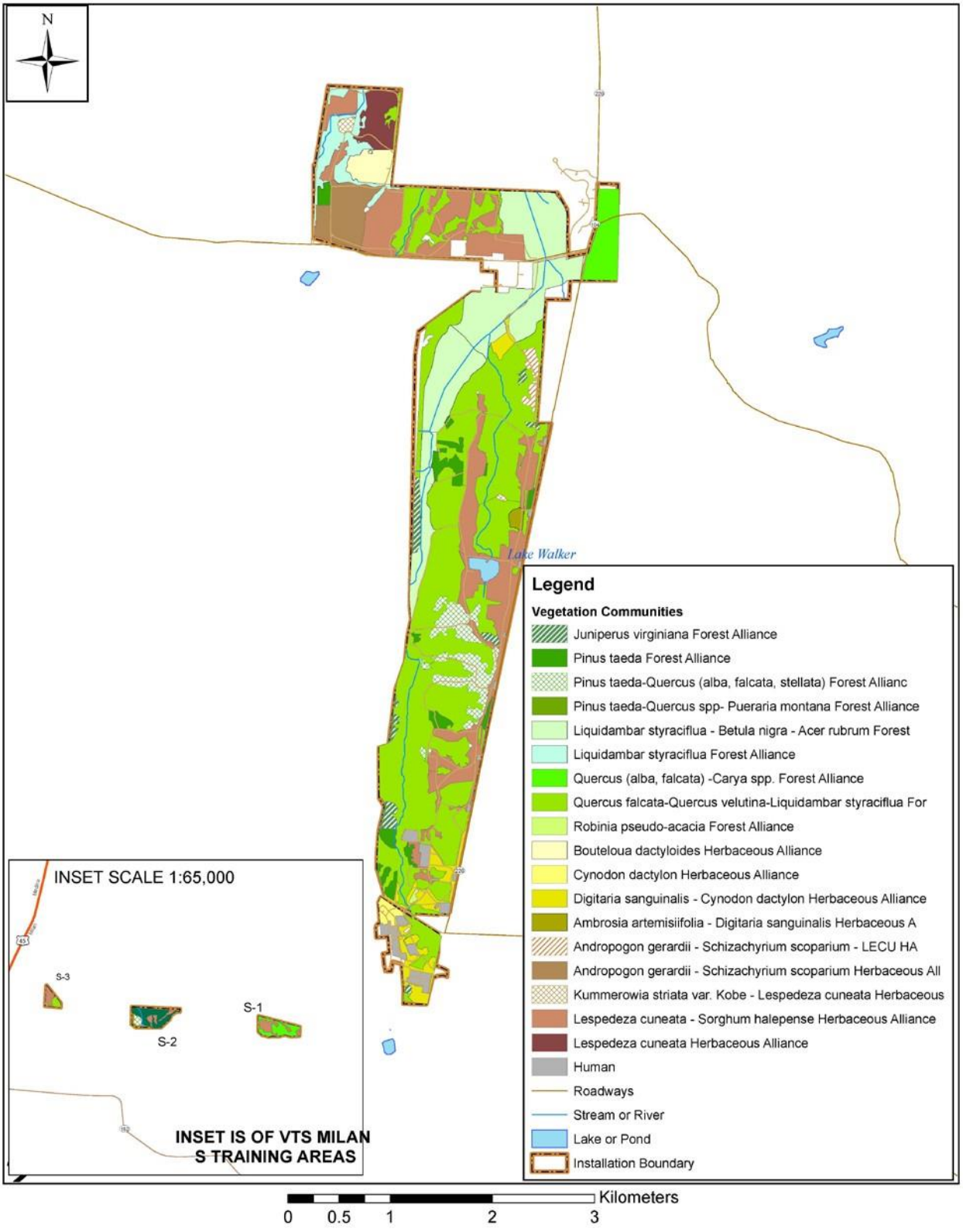

Figure 3.6: Vegetation communities on the VTS-M.

Cynodon dactylon Herbaceous Alliance

Bermudagrass dominates the heavily-maintained parts of the cantonment area where it was planted in most "lawn" settings for ease of care and suitability to the west Tennessee heat.

Digitaria sanguinalis – Cynodon dactylon Herbaceous Alliance

In places where the crabgrass has become well-established, it co-occurs with bermudagrass. This is common around the cantonment and those portions of training area A that are maintained with regular low mowing. A variety of "lawn" weeds such as Johnson grass, spotted spurge, green foxtail, and dandelion occur in this alliance.

Sorghum halepense – Cynodon dactylon Herbaceous Alliance

This alliance occurs in training area B. In addition to Johnson grass and bermudagrass, a variety of species were present, including foxtail, partridge pea, Maryland meadow beauty, kobe lespedeza, and white clover.

3.7.1.5 Vegetated, Herb Dominated, Herbaceous Vegetation, Perennial Forb Vegetation

Ambrosia artemisiifolia – Digitaria sanguinalis Herbaceous Alliance

This short-term community of annual ragweed and crabgrass was found in a small area that had been recently graded.

Kummerowia striata var. Kobe – *Lespedeza cuneata* Herbaceous Alliance

Kobe lespedeza dominates this alliance with sericea lespedeza as a lesser constituent. This alliance is found in a small area of training area B where it is maintained by periodic bush-hogging.

Lespedeza cuneata – Sorghum halepense Herbaceous Alliance

The exotic sericea lespedeza and Johnson grass are very common in openings throughout the training site. The invasive-dominated alliance also includes partridge pea, green and yellow foxtail, kobe lespedeza, white clover, fescue, self-heal, and dandelion. These areas are maintained by periodic bush-hogging.

Lespedeza cuneata Herbaceous Alliance

Sericea lespedeza is found throughout the VTS-M. It occurs as the dominant alliance in several openings in both training areas B and A. Partridge pea is a common constituent. These openings are maintained by periodic bush-hogging.

3.7.2 Forest Inventory and Management

3.7.2.1 Past Forestry Operations

MLAAP operates a forest management program which included the VTS-M land up until the establishment of the training site. A forest inventory was conducted for the TNARNG by Resource Consulting International, Ltd., in 1986 and a forest management plan was developed based on that inventory. Records indicate that Declaration of Timber Availability was produced to initiate a 1989 sale of 20,000 board feet of hardwood sawtimber from three acres along the major tank trails of training area A. There are no extant documents verifying that this sale took place; however, examination of the 1987 stand maps suggest that the sale was completed and the tank trails were subsequently widened. No further timber sales were conducted as a result of the 1987 forest management plan.

In 2003, a salvage harvest timber sale was conducted to dispose of storm-damaged timber on approximately 30 acres in training area A. The "emergency disposal" sale was conducted through the USACE and removed 420 tons of hardwood pulpwood and 1,220 tons of hardwood sawtimber.

3.7.2.2 Current Forest Inventory and Management

A forest inventory and a management plan were completed in 2006 by Thompson Engineering, Forest Management Group, and Aerostar Environmental Service via a contract through the U.S. Army Corps of Engineers, Mobile District. The training site was inventoried by training area, to ensure stand identification and management was compatible with other management activities on the training site. Stands were delineated through the use of aerial imagery and ground observations. Sample points were then taken in each stand (number of plots per stand was dependent on acreage of the stand) to collect the physical data needed to calculate timber volumes. The complete data for all forest stands is provided in the VTS-M Forest Management Plan (Thompson Engineering et al. 2006) and includes sawtimber and pulpwood volumes (apportioned by species/species groups), dominant and co-dominant species, average basal area and DBH, average number of snags per acre, minimum and maximum tree ages, general health assessment, and current condition of the stand.

The forest inventory determined that a total of 1,733 acres (70%) of VTS-M were covered in forests in April 2005. The forest stands are typically dominated by red oaks and white oaks, and yellow-poplar is a common co-dominant species in many of the stands. Pine, while a relatively common constituent in the stands, only dominates or co-dominates in two stands covering approximately 36 acres. Timber volumes are given in Table 3.3. The average DBH for the entire installation was 13 inches, and the average basal area was 93 square feet per acre. Most stands are 30-40 years old; although trees approaching 70 years in age are relatively common.

Table 3.3: Forest product volume summary for the VTS-M (from Thompson Engineering et al. 2006).

Timber Product	Per Acre		Installation Total	
	Tons	Board feet	Tons	Board feet
Sawtimber				
Pine	6.9	741.2	11,958	1,284,581
Pole	0.1	7.4	173	12,825
CNS	3.8	350.4	6,586	607,282
Cedar	0.8	59.3	1,386	102,773
Red Oak	19.9	1963.2	34,489	3,402,441
Hickory	1.6	155.4	2,773	269,325
White Oak	7.2	698.2	12,478	1,210,057
Ash	1	98.5	1,733	170,711
Poplar	5.2	583.7	9,012	1,011,616
Walnut	0.4	33.5	693	58,059
Misc. Hardwood	13.7	1319	23,744	2,285,972
Pulpwood				
Pine	0.2	0.1	347	173
Hardwood	20.9	7.7	36,222	13,345

The forest stands on VTS-M have been largely neglected for a number of years. There has been no planned management of the forests since the TNARNG took over management of the training site from Milan Army Ammunition Plan in 1988. A timber inventory was conducted and a forest management plan was prepared for the TNARNG in 1987; however, the management recommendations were never implemented. At that time, many of the dominant trees on the site were already considered "over-mature" from a timber management standpoint.

The forest inventory data was utilized to develop management prescriptions for each forest stand on VTS- M based on forest health and commercial timber production goals. Military requirements and goals were then incorporated into the final forest management plan for VTS-M presented in Annex 1. Timber harvests will be conducted on VTS-M for the purpose of opening up needed training areas and improving forest health. The initial forest health harvests will be thinning or small group selection; one area of up to approximately 150 acres will need to be clearcut to create new ranges at an undetermined time in the future, likely not during the life of this iteration of the INRMP.

The forest inventory and forest management plan for the previous ten year period was not used or implemented and will not be updated unless plans develop that will require their use. Forest data collection to support small harvest projects, required to support training or ecological needs, will be conducted in-house as needed.

3.7.3 Invasive Pest Plants

Non-native plants have become a significant part of most ecosystems in this age of extensive international travel and trade. Many of the species brought into a new environment remain uncommon, requiring human intervention to reproduce and/or spread. Certain species, however, become invasive: they reproduce prolifically and spread rampantly throughout an ecosystem, causing significant disruption to the natural system. Because the predators and diseases of exotic species are rarely transplanted with them, the invasive species lack natural control mechanisms. Invasive plants typically displace native species and change the species composition of a community. They can also change edaphic characteristics of the site by altering such factors as water use, shade, or flammability.

A number of invasive plant species can be found on VTS-M (Figure 3.7). A survey of the training site for invasive exotic species was completed in 2006 (Dynamic Solutions 2006a). Chief among the problem species are: privet (*Ligustrum* spp.), Japanese honeysuckle (*Lonicera japonica*), Nepalese browntop (*Microstegium vimineum*), sericea lespedeza (*Lespedeza cuneata*), and kudzu (*Pueraria montana*). An invasive species survey completed in 2013 (Boyd et. al. 2015) found 20 invasive species on VTS-M, with the most common species the same as those in the 2006 survey, with the addition of multi-flora rose. Boyd et. al. 2015 also found four species with more focused distributions that would provide a good opertunity for possible eradication (Ailanthus altissima, tree of heaven; Albizia julibrissin, mimosa; Euonymous fortuneii, winter creeper; and Kummerowia stipulacea, Korean clover). The full list of invasive exotic species found on the training site is given in Table 3.4. All of these species are listed as "severe threats" or "significant threats" on the Tennessee Exotic Pest Plant Council list. The TN- EPPC defines severe threat as an exotic plant species that possesses characteristics of invasive species and spreads easily in native plant communities and displaces native vegetation. Alternatively, a significant threat is a species which possesses the characteristics of invasive species but are not presently considered to spread as easily into native plant communities (TNEPPC 2004). All landowners are requested to control such plants if found growing on their property. In addition to impacting native communities and threatening rare or endangered plant species, these exotic pest plants can interfere with training activities. Privet and kudzu, in particular, can create dense, difficult-to-traverse stands which make an area unsuitable for mounted or dismounted maneuvers, while the thorns of multiflora rose make foot travel uncomfortable to impossible.

Complete eradication of these problem species is unlikely to be possible. In the case of small, recently established infestations – oriental bittersweet, air potato, and wooly mullein at VTS-M – rapid control efforts may eliminate the species from the site. For the more prevalent species, an achievable goal is to reduce their numbers and spatial extent and to limit their impacts on native species. Control of these species is typically a combination of manual/non-chemical efforts and application of herbicides. A detailed plan of attack against these invasive pest plants is presented in Annex 3, Invasive Pest Plant Control.

At VTS-M, the use of chemical herbicides must be planned carefully with regards to the waterways and extensive wetland areas. Care will be taken to avoid drift of herbicides onto surface water or wetlands. Chemical treatment within wetlands will be restricted to herbicides which are labeled for wetland or aquatic use.

Table 3.4: Invasive pest plant species found on VTS-M (from Dynamic Solutions 2006 and Boyd et. al. 2015).

Scientific Name	Common Name	TNEPPC Rank	Abundance at VTS-M
Ailanthus altissima	Tree-of-heaven	Severe threat	Present at isolated locations
Albizia julibrissin	Mimosa	Severe threat	Present at isolated locations
Alternanthera sessilis	Sessile joyweed	Severe threat	Sparse and less than 5% of plots
Bromus tectorum	Cheatgrass	Severe threat	Sparse and less than 5% of plots
Celastrus orbiculatus	Oriental bittersweet	Severe threat	Sparse at on isolated location
Cirsium arvense	Canada thistle	Significant threat	Present along edges & openings
Cirsium vulgare	Bull thistle	Significant threat	Scattered throughout in 25% plots
Dioscorea oppositifolia	Air potato	Severe threat	Sparse at isolated location
Elaeagnus umbellate	Autumn olive	Severe threat	Sparse to present
Euonymus fortunei	Wintercreeper	Severe threat	Present to dominant in several locations
Fallopia japonica	Japanese knotweed		One isolated location
Hypericum perforatum	Goatweed	Severe threat	Low concentrations in dispersed locations
Kummerowia stipulaceae	Korean clover	Severe threat	High concentrations in few locations
Lespedeza bicolor	Bicolor lespedeza	Severe threat	Scattered throughout, in 25% of plots
Lespedeza cuneata	Sericea	Severe threat	Present pervasively throughout
Ligustrum sinense or L. vulgare	Privet	Severe threat	Present to dominant throughout
Lonicera japonica	Japanese honeysuckle	Severe threat	Present pervasively throughout
Lonicera mackii, L. morrowii, L. x bella, or L. tatarica	Bush honeysuckle	Severe threat	Sparse in several locations
Microstegium vimineum	Nepalese browntop	Severe threat	Dominant throughout
Paulownia tomentosa	Princess tree	Severe threat	Present at isolated locations
Pueraria montana	Kudzu	Severe threat	Dominant at isolated locations
Rosa multiflora	Multiflora rose	Severe threat	Present throughout
Sorghum halepense	Johnson grass	Severe threat	Present throughout
Verbascum thapsus	Wooly mullein	Significant threat	Sparse at one isolated location
Vinca major	Large periwinkle	Significant threat	Sparse and less than 5% of plots
Vinca minor	Common periwinkle	Significant threat	Sparse at one isolated location

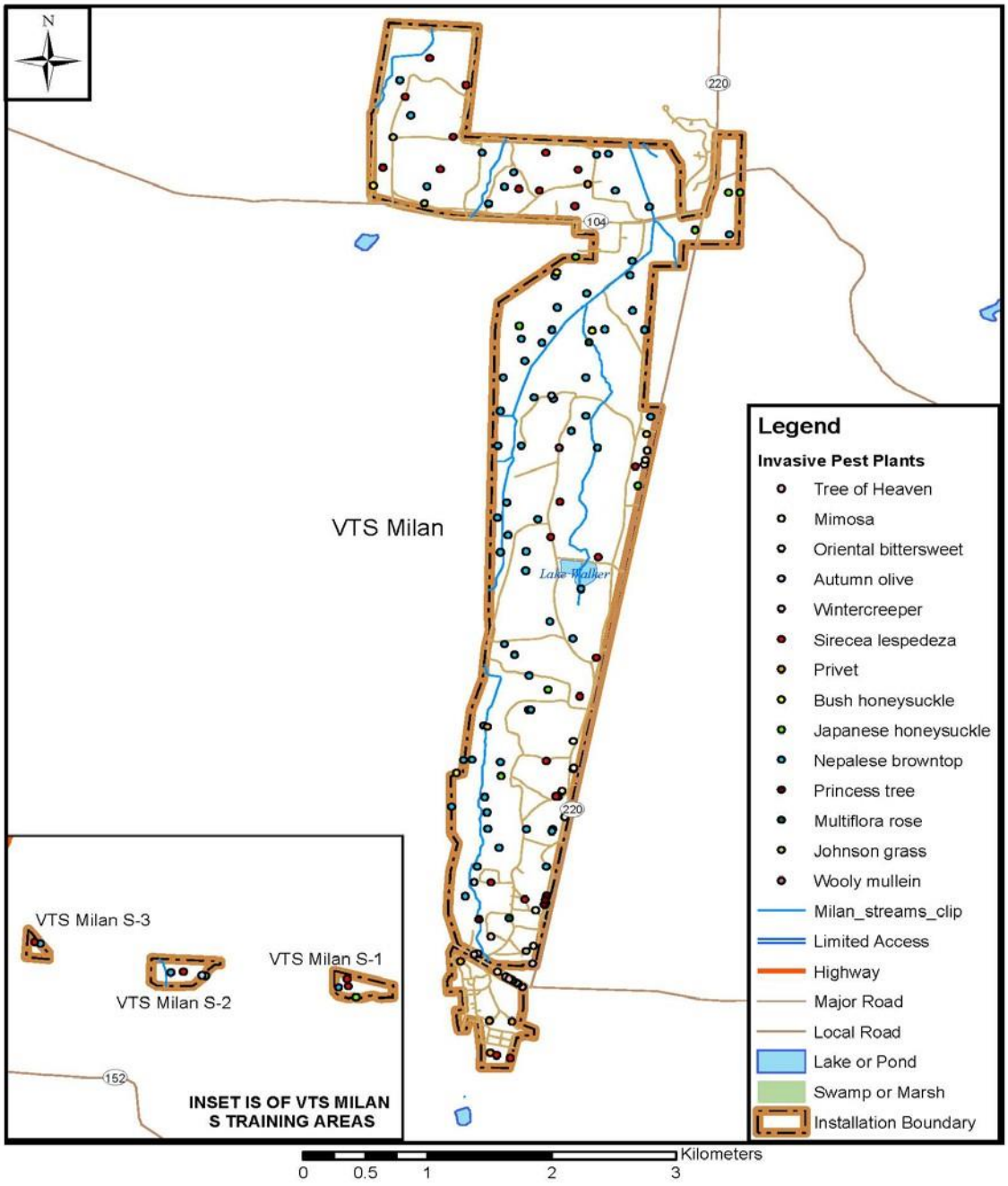

Figure 3.7: Invasive pest plant species identified on the VTS-M. (Point occurrences – large occurrences are not represented.)

3.8 FISH AND WILDLIFE

3.8.1 Migratory Birds

The migratory birds group is a category made up of species which move between at least two locations, typically one for breeding and one for overwintering. Protected species are identified in C.F.R. Title 50 Section 10.13. Songbirds, shorebirds, and waterfowl may fall into this category, with at least some populations that breed in the continental United States and spend their non-breeding months in the tropics. Past attention has centered on neotropical migrants, since this group has experienced steep rates of population decline. However, decreasing populations have also been observed in resident bird species, which do not migrate, and temperate-zone migrants, which only migrate within North America. It is DoD policy to promote and support a partnership role in the protection and conservation of migratory birds and their habitat by protecting vital habitat, enhancing biodiversity, and maintaining healthy and productive natural systems on DoD lands consistent with the military mission.

The VTS-M lies within reach of both the Mississippi flyway and a branch of the Atlantic flyway for migratory birds and contains a mixture of habitat types that support a diverse bird population. Historic avian planning level surveys identified 155 and 123 bird species (given in Appendix D) on VTS-M, of which 26 and 20 species identified were species of concern (AMEC 2008, and URS 2013 respectively). Of these species, four are not protected under the Migratory Bird Treaty Act: wild turkey and northern bobwhite are native species which are typically year-round residents of an area and do not migrate. These two species receive some protection under state gamebird regulations. European starling and house sparrow are nonnative species with no protection. A new bird PLS is in progress to allow for documentation of the current bird community and use, and allow comparison for change in the bird community and populations over time.

Six habitats on the training site were noted during the 2008 survey as being especially valuable to avian communities based on both the species richness observed and the uniqueness of the locations: the 13-acre Walker Lake in TA A-6, two small woodland ponds in TA A-9, a woodland pond in TA B-2, a pond and surrounding wetland in TA B-3, and a field/woodland interface in TA B-3 (AMEC 2008). URS 2013 identified the native prairie fields, hardwood tracts, mixed pine/hardwood stands, bottomland hardwood stands, the Hall's creek riparian zone, and Walker Lake as significant habitats.

The Migratory Bird Treaty Act (16 U.S.C. 703-711) provides protection for migratory birds. Under the Act, willful, knowing attempts to take, kill or remove migratory birds is unlawful unless authorized by the U.S. Fish and Wildlife Service. Feathers or other parts, nests, eggs, and products made from migratory birds are also covered by the Act. Take is defined as pursuing, hunting, shooting, poisoning, wounding, killing, capturing, trapping, or collecting. Migratory bird hunting regulations, established by the U.S. Fish and Wildlife Service, allow the taking, during designated seasons of ducks, geese, doves, rail, woodcock, and some other species. In addition, permits may be granted for various non-commercial activities involving migratory birds and some commercial activities involving captive-bred migratory birds. Misdemeanor or felony violations of the Act by individuals or organizations may result in significant fines or imprisonment. The DoD/MBTA rule (50 CFR 21) permits military Services to take migratory birds during military readiness activities (MRAs). If the military Service's take would cause a significant impact to a population of a migratory bird species, that Service is required to confer with the USFWS to establish measures to minimize the impacts.

Executive Order 13186 (10 January 2001), "Responsibilities of Federal Agencies to Protect Migratory Birds" requires each federal agency taking actions that have, or are likely to have, a measurable negative effect on migratory bird populations to develop and implement a MOU with the USFWS within two years that shall promote the conservation of migratory bird populations. An MOU between DoD and USFWS, signed 9/5/2014, guides management for conservation of migratory birds related to

potential impacts of non-readiness activities. It details approaches to implement for the avoidance or minimization of impacts to migratory birds when reasonably practicable.

3.8.2 Wildlife And Game Management

A comprehensive mammal survey conducted by AMEC Earth and Environmental, Inc. in 2009, identified 25 mammal species on the VTS-M. An Environmental Services Inc. (ESI) mammal and herpetile (reptile and amphibian) survey conducted in 2015 documented 23 non-bat mammals on VTS-C. These species combined with 6 bat species documented during bat studies indicate the presence of at least 31 total mammal species on the installation. See the mammal species list in Appendix D for more detail.

A herpetofauna survey was completed by URS in 2010 and identified 8 reptile and 8 amphibian species on the training site. A 2015 mammal and herptile survey conducted by ESI identified a total of 31 herptile species (2 salamander, 12 frog, 3 lizard, 9 snake, and 5 turtle species). See the VTS-M herpetile species list in Appendix D for more detail.

Game species known to occur on VTS-M include white-tailed deer (*Odocoileus virginianus*), wild turkey (*Meleagris gallopavo*), northern bobwhite quail (*Colinus virginianus*), dove (*Zenaida macroura*), wood duck (*Aix sponsa*), raccoon (*Procyon lotor*), cottontail rabbit (*Sylvilagus floridanus*), and squirrel (*Sciurus niger* and *S. carolinensis*). There are currently no management activities specific to these species, but rather management efforts focus on maintenance of general wildlife habitat quality. There is no hunting program on VTS-M due to its small size, linear shape, and the potential for interference with training. For this reason, game management does not take precedence over general wildlife habitat management.

3.8.3 Aquatic Species

An aquatic survey was conducted in 1998-1999 to determine the ichthyofauna and benthic macroinvertebrate fauna of the VTS-M (SAIC 1999). A summary of the results of this survey is presented below. A resurvey of aquatic habitats and species of VTS-M is currently being implemented and this document will be updated when results are available.

3.8.3.1 Fish

SAIC (1999) surveyed six collection sites in the two blueline streams (Halls Branch and Johns Creek) and Walker Lake in the winter of 1998 and spring of 1999. Thirteen species and one hybrid were represented in the 280 individual fish collected (see Appendix E for species list).

Relatively few fish (22 individuals) were collected from the four sampling points on Halls Branch, and almost all (21) came from the sampling point closest to the junction with Johns Creek. Six species were represented, but the creek chub (*Semotilus atromaculatus*) was by far the most common with a relative abundance of 52.4%. Significantly higher numbers of fish were collected at one sampling point on Johns Creek (112), representing seven species but dominated by the Tennessee shiner with a relative abundance of 63.4%. Walker Lake provided more fish than either creek: 146 individuals representing four species and one sunfish hybrid. Bluegill sunfish was the most common species (49.3% relative abundance).

Aquatic fauna on VTS-M is sparse due to the ephemeral nature of the stream system. Long reaches of Halls Branch routinely dry up during the summer, and even Johns Creek may lose continuity of flow during dry years, providing less than adequate year-round habitat. The smaller tributaries are distinctly intermittent, driven by precipitation events. Walker Lake does maintain a reasonable water level in most years, but the fish population is heavily influenced by past stocking efforts implemented by the facility manager.

3.8.3.2 Benthic Macroinvertebrates

The aquatic survey in 1998-1999 included sampling for benthic macroinvertebrate species at the same locations and periods as the fish survey. Details of the sampling methods and results can be found in SAIC (1999). The benthic macroinvertebrate communities exhibited low diversity and relatively few organisms. In general, the results indicated poor quality habitat and degraded conditions, primarily due to the intermittent streamflow, but also resulting from the physical characteristics of the streams: sand and silty substrate, few riffles, and steep eroded streambanks.

3.9 RARE, THREATENED, AND ENDANGERED SPECIES

3.9.1 Rare Plant Species at VTS-M

No federal or state listed plants have been found on site. Compass plant (*Silphium laciniatum*) is the only state-listed plant known within the Atwood or Spring Creek quadrangles in which the training site is located. A rare species survey completed in 2008 (SAIC 2008) looked specifically for compass plant but it was not found on site. This species prefers open, barrens-type sites; however, the regular mowing maintenance and dense fescue-lespedeza communities of most open areas on the training site probably exclude this plant.

3.9.2 Rare Animal Species at VTS-M

One federally-listed endangered species has been spotted on VTS-M: the interior least tern (Sternula antillarum athalassos) was sighted once during the recent avian planning level survey, briefly foraging in Walker Lake (AMEC 2008). Despite multiple repeat visits to the lake during the survey, this species was not seen again and is considered to have been a chance stopover from an individual outside of its usual territory, as in Tennessee the Interior Least tern is typically found in much closer proximity to the Mississippi River. The least tern has federal status of endangered in the interior portion of its range, including Tennessee. It also has state status as "endangered." Ten other species identified during the bird survey have state status as "deemed in need of management" (see Table 3.5).

A survey for rare species conducted in 2013 found no other federally or state listed animals (URS 2013). A rare, threatened, and endangered species is currently being conducted (2019). The acoustic bat survey portion of this project indicated the likely presence of gray and northern long-eared (NLEB) bats, though not confirmed with manual vetting of calls or captures in mist nets. This INRMP will be updated with final results of the 2019 RTE survey when available. The mammal and herpetofauna surveys initiated in 2008 looked specifically for listed species and found no indications of the four other state-listed species (all "deemed in need of management") found within the Atwood or Spring Creek quadrangles: barking treefrog (*Hyla gratiosa*), common shrew (*Sorex cinerus*), southeastern shrew (*Sorex longirostris*), and meadow jumping mouse (*Zapus hudsonius*).

Barking treefrog is known to occur on the neighboring MAAP, but was not identified on the VTS-M. The remaining state-listed species in these quadrangles is the firebelly darter, which has not been found in past aquatic surveys and is unlikely given the intermittent nature of most of the waterways on the training site.

3.10 CULTURAL RESOURCES

3.10.1 Paleoenvironment

During glacial retreat about 25,000 year before present (BP), a final mantle of wind-blown loess was deposited over most of western Tennessee. Spruce forests dominated during this time. After approximately 10,500 BP, the spruce forests were slowly replaced by sweet gum and cypress as temperatures increased. The gum-cypress forests were partially replaced by a mixed hardwood forest during cooler and wetter climatic conditions after about 8,500 BP.

Table 3.5: Rare plant and animal species found on or in the vicinity of the VTS-M.

	Scientific Name	Common Name	Habitat	State Status[1]	Federal Status[2]	Global Rank[3]
	Silphium laciniatum	Compass plant	Barrens	T		G5
†	*Accipiter striatus*	Sharp-shinned hawk	Forests, open woodlands	D		G5
†	*Ammodramus henslowii*	Henslow's sparrow	Open fields and meadows	D		G4
†	*Ardea alba*	Great egret	Marshes, swampy woods, ponds	D		G5
†	*Circus cyaneus*	Northern harrier	Marshes, meadows, grasslands; ground nester	D		G5
†	*Egretta caerulea*	Little blue heron	Bodies of calm shallow water	D		G5
†	*Haliaeetus leucocephalus*	Bald eagle	Areas close to large bodies of water	D		G5
†	*Ictinia mississippiensis*	Mississippi kite	Lowland and floodplain forests	D		G5
†	*Lanius ludovicianus*	Loggerhead shrike	Open country with scattered trees	D		G4
†	*Sphyrapicus varius*	Yellow-bellied sapsucker	Deciduous or mixed forest	D		G5
†	*Sternula antillarum athalassos*	Interior Least tern	Mississippi River sand bars and islands	E	E	G4T2Q
†	*Tyto alba*	Barn owl	Open and partly open country	D		G5
	Hyla gratiosa	Barking treefrog	Low wet woods and swamps with ephemeral pools	D		G5
	Sorex cinereus	Common shrew	Rich woodlands	D		G5
	Sorex longirostris	Southeastern shrew	Wet meadows, damp woods, uplands	D		G5
	Zapus hudsonius	Meadow jumping mouse	Open grassy fields near water bodies	D		G5
	Etheostoma pyrrhogaster	Firebelly darter	Sand and gravel bottomed pools of headwaters and creeks	D		G2G3
†	Documented at VTS-M					
[1]	State status codes:	(E) Endangered (T) Threatened (D) Deemed in need of management				
[2]	Federal status codes:	E – Listed federally as endangered				
[3]	Global rank:	G1 – extremely rare and critically imperiled G2 – very rare and imperiled G3 – very rare G4 – common G5 – very common				

Warmer and drier conditions of the mid-Holocene Hypsithermal prevailed from 7,000 to 3,000 BP in the mid-South and had dramatic effects on plant and animal communities. By the end of the Hypsithermal, oak-hickory forest had become established over much of the area. Conditions were essentially the same as today after this time, although there was a general increase in precipitation following the warmest period of the mid-Holocene. The area was characterized by climax oak-hickory forest cover in the loess hills and better-drained steam terraces and an extensive system of cypress-covered oxbow lakes and ponds along the meandering streams (TRC Garrow Associates, Inc. 1999).

3.10.2 Prehistoric Background

The earliest human occupation of the southeastern United States occurred in Paleoindian Period (ca. 11,500-9900 B.P.). Artifacts of this period have been found in west Tennessee, generally along major river systems; although they are more common further east along the Tennessee River basin. Evidence of occupation during the subsequent periods occurs in west Tennessee, becoming particularly notable with the Middle Woodland period (ca. 2000-1500 B.P.). The large Pinson Mounds complex, located approximately 35 miles from the VTS-M, is a ceremonial site from this period – possibly the largest such site in eastern North America between A.D. 1 and 200 – and finds from the area indicate a large population and active trade network. Mississippian populations had moved into the west Tennessee area by A.D. 800, and these societies dominated the waterways of the interior southeast until initial European contact in the 16th century (Stanyard et al. 1999).

3.10.3 Historic Overview

European settlement in this region began in 1820. Carroll County was created by the State Legislature in 1821, while Gibson County was formed in 1823. The area was unbroken forest with several major river drainages and had been hunting ground for the Chickasaw prior to purchase of the territory by Andrew Jackson. The middle and late 1820s saw rapid immigration and economic growth. Settlers cleared much of the ground for agriculture. Cotton was the principal cash crop, although tobacco was also produced for the market, and timber remained an important industry (TNGenNet 2008).

The Memphis & Louisville Railroad was completed through the northwest corner of Carroll County and across Gibson County in 1860, and the Nashville, Chattanooga, & St. Louis Railroad traversed the northern portion of Carroll County shortly after the Civil War. The Illinois Central Railroad ran through the middle of Gibson County south to Jackson, completed in 1873. The town of Milan, lying at the junction of the Memphis & Louisville and the Illinois Central, was established in 1853 and incorporated in 1867, but significant expansion did not begin until after the Civil War (TNGenNet 2008).

In 1940, the Department of the Army purchased over 28,000 acres of land from private landowners for the construction of a munition plant and storage facility. The Milan Ordnance Depot and Wolf Creek Ordnance Plant were operated by the Army until 1943, when operations were taken over by contractor. In 1963, the Tennessee Army National Guard began building a training facility on the eastern edge of the property. Since then, 2,470.36 acres have been transferred from the MAAP to the TNARNG for the VTS-M.

3.10.4 American Indian Resources and Tribes

Chickasaw, Choctaw, Kaskinampo / Coushatta, and Shawnee have aboriginal ties to the western Tennessee region, including the area surrounding the VTS-M. To date, no American Indian sacred

plant animal, or mineral gathering localities are known from the training site. However, all archaeological sites identified during cultural resources surveys are potential American Indian sacred sites.

The federally-recognized Chickasaw Nation of Oklahoma is located in southern Oklahoma.

Descendants of Choctaw Indians who avoided removal from Tennessee lands are federally recognized as the Jena Band of Choctaw in Louisiana and the Mississippi Band of Choctaw Indians in Mississippi. The Oklahoma Choctaw are federally recognized as the Choctaw Nation of Oklahoma.

Federally recognized tribes of the Coushatta are the Alabama-Quassarte Tribal Town of the Creek Nation of Oklahoma, the Coushatta Tribe of Louisiana, and the Alabama-Coushatta Tribe of Texas.

The Shawnee are represented by two federally-recognized groups, the Absentee Shawnee in Oklahoma and the Eastern Shawnee in Missouri.

No known traditional cultural properties have been previously identified on the VTS-M.

In 2003, TNARNG initiated tribal consultation with all federally recognized tribes which have ties to Tennessee and northwest Georgia. The list of tribes involved is presented in Appendix G. Consultations have occurred in 2003, 2004, and 2005.

3.10.5 Cultural Resources Identified on VTS-M

Several archaeological investigations have been conducted on the VTS-M. In 1999, TRC Garrow Associates Inc. conducted a Phase I cultural resources survey and historic building inventory for the site, although it covered only 600 acres that were deemed to have a high or moderate potential for containing archaeological sites, based on landform configuration, soil conditions, and proximity to fresh water (TRC Garrow Associates, Inc. 1999). Eleven sites were identified in this survey; all were associated with the historic period, including five cemeteries that were in use during the 19th and early 20th centuries. Five sites were identified as domestic residences from that same era, and the final site was an outbuilding from the 19th century.

Only the cemeteries were considered to potentially be eligible for the National Register of Historic Places (NRHP); the other six sites were deemed ineligible at that time. Further investigation of the cemeteries in 2006 resulted in a determination that they too are ineligible for the NRHP. The Tennessee State Historic Preservation Office (SHPO) has concurred with this determination. The cemeteries are maintained by training site staff with support from the Environmental Office in accordance with the facility SOP and the ICRMP. They are off-limits to training and have been enclosed with vinyl fencing to minimize the danger of accidental impact.

Another archaeological survey was conducted in 2004 over an additional 1,600 acres of the VTS-M. One previously unrecorded site was identified, but it had been disturbed in the past and was considered ineligible (Deter-Wolf 2004).

Phase I surveys have been conducted on 2200 acres of the VTS-M. No findings resulted in a recommendation for Phase II. Of the remaining 270 acres, approximately 120 acres lie within the Cantonment where long-term construction, maintenance, and training activities have compromised the archaeological integrity and rendered closer examination unnecessary. The remaining 150 acres will be surveyed prior to any ground disturbing activity (Stokes 2010).

The 1999 historic building inventory identified seven WWII era buildings on the training site that were determined to be eligible for the NRHP under criterion A. One of these buildings was demolished in 2005 following Section 106 consultation. Plans to demolish two other of the historic buildings have been proposed to make way for new construction that will better suit the TNARNG requirements. Consultation with the SHPO resulted in a Memorandum of Agreement defining mitigation actions for this demolition.

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CHAPTER 4
MANAGEMENT GOALS:
GOALS, OBJECTIVES, AND TASKS FOR NATURAL RESOURCES MANAGEMENT

4.1 MILITARY MISSION GOALS AND OBJECTIVES

VTS-M exists to provide a location and facilities for the training of Tennessee National Guardsmen. Ensuring the availability of mission-critical training land now and for the future is the primary objective of VTS-M management.

The following are military mission-related objectives that will be accomplished in cooperation with the natural resources management actions proposed in this VTS-M INRMP:

- Develop new range facilities
- Develop new open training areas to replace any lost to range development
- Thin vegetation in portions of the land navigation course and forested portions of training areas to improve accessibility
- Identify a site suitable for expansion of engineer training opportunities.
- Add unimproved roads and maneuver trails as needed in the future.

4.2 NATURAL RESOURCES GOALS AND OBJECTIVES

The ultimate goal of the TNARNG natural resources program is to maintain healthy natural ecosystems while training soldiers to meet the mission requirements. Training programs and land management are both long-term, ever-changing processes, and the goals and objectives presented here are intended to guide TNARNG activities for the foreseeable future. The projects list is scheduled five to ten years out, and will be updated annually as needed.

4.2.1 Ecosystem Management and the Maintenance of Biodiversity

In 1994, the Office of the Under Secretary of Defense for Environmental Security issued a memorandum to all forces in the DoD to implement Ecosystem Management on DoD lands. Ecosystem management blends multiple-use needs, provides a consistent framework to manage installations, and ensures that the integrity of the system of DoD lands remains intact. DoD Instruction 4715.03, "Natural Resources Conservation Program", implements policy, assigns responsibilities, and prescribes procedures for the integrated management of natural and cultural resources on property under DoD control.

Ecosystems are "explicit units of the earth that include all of the organisms, along with all components of the non-living environment within its boundaries" (Ecological Society of America 1996). The aim of "ecosystem management" is to manage the land for the health of the whole rather than for constituent pieces, such as game species, timber, or rare species. Maintaining the system as a functioning whole ensures the continuing ability of that system to meet future needs.

Ecosystem management is not easily planned or measured. Many functions of an ecosystem take place on scales far larger and longer than most human activity, and the boundaries of an ecosystem are not easily defined. For the purposes of this INRMP, the property line of the training site will function as a permeable border around a series of interconnected systems (forest, grassland, riparian) which make up a whole, which is itself part of a larger system. Management of the training site must focus on the training site, but must take into account the activities beyond the fenceline as well.

VTS-M has a variety of community types, including forest, grassland, riparian, and wetland areas, creating a high level of ecosystem diversity. The current patchwork of habitats has been created by the conjunction of past land use patterns, current military land use, and environmental gradients, and it may be drastically different from the environment found in the region prior to European settlement. None of the habitats found on the training site are regionally rare, although the extent of the wetland areas make this a significant community type. All of the ecosystems on the VTS-M will be managed via resource protection measures, the forest management plan, wildland fire management plan, and invasive pest plant control plan, to maintain or increase native biodiversity and to ensure that those systems continue to function fully.

Goal 1: Provide the ecosystem types needed for training.
Obj.1-1: Increase quantity and quality of mission-suitable habitats or "missionscape."
Projects:

- Identify natural resources characteristics needed for training on VTS-M through consultation with training site manager, training site commander, units, and trainers. Review and update missionscape statement annually.
- Determine appropriate acreage and locations for given mission habitats based on training needs and VTS-M characteristics. Create missionscape development plan.
- Develop and implement management actions to create, improve, or expand mission habitats in accordance with missionscape development plans as needed.

Goal 2: Maintain or improve ecosystem, habitat, and species diversity.
Obj. 1-2: Identify ecotypes present on the training site and maintain up to date information regarding those systems.
Projects:

- Repeat vegetation community planning level survey every 10 years.
- Repeat wetland survey using USACE formal delineation guidelines every 10 years.
- Repeat surface water quality assessment every 5 years.

Obj. 1-3: Characterize the species composition, ecosystem health, and wildlife use of the significant habitats on VTS-M.
Projects:

- Repeat Rare, Threatened, and Endangered Species (RTE) PLS every 5 years.
- Repeat bat survey every 5 years.
- Repeat bird survey every 5 years.
- Repeat aquatic fauna survey, including macroinvertebrate and vertebrate organisms, every 5 years.
- Repeat mammal and herpetofauna surveys every 10 years.

Obj. 1-4: Increase quantity of healthy and productive habitat.
Projects:

- Initiate conversion to native species to restore natural vegetation communities, especially in grassland areas, where there is no conflict with military training.
    - Identify locations for native species restoration annually.
    - Develop restoration plans as needed.
    - Implement restoration plan as possible.
- Institute prescribed fire regime for grassland and forest management in accordance with Annex 2 (see Section 4.2.8).
- Eliminate invasive exotic species where feasible (see Section 4.2.10).
- Implement measures of biodiversity to evaluate habitat health as feasible.

4.2.2 Rare, Threatened, and Endangered Species (RTE) Management

To date, one federally listed species, the interior least tern, has been sighted on the VTS-M, but its solitary sighting is presumed to be a unique incident. The acoustic bat survey portion of an RTE survey, currently in progress, indicates the likely presence of the gray bat (*Myotis griscesens*, federally endangered) and the northern long-eared bat (*Myotis septentrionalis*, federally threatened), and the possible presence of the Indiana bat (*Myotis sodalis*, federally endangered). The recorded calls have been identified by two auto-clasification programs, but have not yet been manually vetted by an acoustic bat identification expert to lend greater credence to their likely presence. These species have not been captured on VTS-Milan during several historic bat mist net surveys (AMEC, 2010; ESI, 2013; and APOGEE 2017). Following USFWS Tennessee Field Office coordination, TNARNG will pursue manual vetting of the recorded calls, install/create bat roost structures to concentrate any listed bats that may occur on site in known areas, and conduct mist net surveys in an effort to increase the likelihood of confirming the presence of listed bat species if they occur on site. If manual vetting and mist net survey efforts confirm the presence of a listed bat species, TNARNG will consider the species on site and consult with USFWS, and work with USFWS and TWRA to develop an Endangered Species Management Component (ESMC) for bats in the VTS-M INRMP. In the meantime, as a precaution against possible impacts to bats if present, prescribed burns, tree removal, and broadcast pesticide applications will be limited to the bat inactive season whenever possible.

Several state-species are known to occur within Carroll and Gibson Counties (see Section 3.9). At this time there is no need for a Rare Species Management Plan; however, ongoing surveillance will be continued to identify rare species on the facility. If any protected species are identified on the training site, a management program will be developed in cooperation with the USFWS and /or the TWRA.

Goal 1: Protect or enhance rare, threatened, and endangered species and their habitats where they occur on VTS-M.

Obj. 2-1: Pursue confirmation of possible listed species presence on VTS-M.

- Pursue manual vetting of recorded likely gray and NLEB bat calls.
- Install/create bat roost structures as funding is available.
- Conduct bat mist net surveys near installed roost structures and possible acoustic listed bat species recording locations as funding is available.
- Develop general ESMP for RTE bat species in cooperation with USFWS and TWRA if listed bat species presence is confirmed.

Obj. 2-2: Quantify and monitor populations of state and federal RTE species on VTS-M.
Projects:

- Perform a comprehensive survey for RTE species every 5 years.
- Incorporate Indiana bat survey protocol into regularly scheduled bat surveys (see Section 4.2.1) and request review by USFWS to ensure requirements are met.
- Radio-track listed bats during surveys to identify roosts/hibernacula when feasible.
- Develop management plan and monitoring protocol for any new species identified on VTS-M, as needed.
- Communicate regularly with TWRA & USFWS in regard to RTE species, their habitats, proposed species listings, and consultations on major projects.

Goal 2: Maintain or enhance native plant communities that could support listed species.

Obj. 2-3: Identify and manage native plant communities that could support RTE species which may occur on VTSM.

Projects:

- Develop community-based RTE habitat management plans as needed.
- Control invasive plants where impacting potential RTE habitats as needed.
- Monitor community health through long-term vegetation monitoring.

4.2.3 Reclamation/Mitigation

Reclamation and mitigation are a part of the everyday management of the training site, largely under the ITAM program. Guidance for minimizing and/or controlling erosion is provided in Section 5.1.2 (Table 5.1) and Section 5.1.3 (Table 5.2) of this document. These best management practices are applicable to all soil-disturbing actions on the VTS-M. There are currently no major reclamation or mitigation projects planned at VTS-M. If any become necessary, the information will be added to this INRMP.

4.2.4 Erosion Control and Soil Conservation

VTS-M has large areas of highly erodible soil (see Section 3.4). Vehicle traffic is kept to the roads where possible in these fragile areas; however, erosion problems do occasionally develop from the limited use of these areas, the heavier use of less sensitive sites, and/or natural forces. Erosion issues need to be identified and repaired as quickly as possible. Documentation of recurring problems will allow adjustments to training use to avoid such problem areas.

Goal 1: Prevent, identify, and minimize the development of erosion and sedimentation problems on VTS-M.

Obj. 4-1: Make information on erosion prevention and repair available to facility managers and users.

Projects:

- Develop erosion prevention and repair guide.
- Develop BMP training module.

Obj. 4-2: Identify and minimize potential erosion problems early on.

Projects:

- Monitor for potential erosion issues during regular site visits.
- Develop a reporting form for soldiers and staff.
- Place reporting form on ENV website for easy access.
- Develop and implement an erosion report tracking system.
- Conduct annual erosion surveys.

Goal 2: Identify and rehabilitate existing erosion problems.

Obj. 4-3: Repair identified/existing erosion issues.

Projects:

- Coordinate repair of erosion issues (typically facility responsibility) including plan development.
- Implement erosion control methods in plans.
- Revegetate erosion sites in accordance with plans.

Obj. 4-4: Reduce the number of erosion problems.

Projects:

- Prioritize erosion reports.
- Repair erosion problems according to priority list.
    - Environmental will provide guidance, recommendations, and assistance obtaining permits when required.

- Erosion repair is typically a CFMO or ITAM responsibility.

4.2.5 Watershed Management

The riparian ecosystem – the land adjacent to the streams and wetlands – is extensive on VTS-M, surrounding Johns Creek, Halls Branch, and the associated wetland areas. It consists primarily of mixed bottomland hardwood forests. Riparian areas serve as the interface between aquatic and terrestrial ecosystems. They serve as valuable wildlife habitat and corridors, promote streambank stabilization, trap sediments and nutrients, filter runoff water, and help to moderate flooding.

Limited military training activities occur within riparian areas at VTS-M. Stream crossings by vehicles are only permitted at designated bridged or culverted sites. Stream crossing by soldiers on foot is permitted anywhere along streams and through wetlands.

The TNARNG will maintain riparian habitats along streams by implementing at minimum a 50 foot riparian buffer zone on either side of every creek [also called a streamside management zone (SMZ)] in which vegetation and soil disturbance will be avoided. Authorization must be obtained before conducting maintenance or construction activities within an SMZ. Foot traffic through riparian areas is not regulated, but vehicles will be kept to established roads and trails. Where wetlands are present, a 50 foot riparian buffer zone will be established and marked with SMZ signs or Siebert stakes on all sides of the wetland.

The riparian habitat is variable in size. While the restricted-activity Streamside Management Zone is 50 feet on either side of the waterway, the actual riparian area typically extends much further beyond the streambank. All areas of bottomland hardwood forest should be considered to be within the riparian zone, and care should be taken to minimize impacts on water and habitat quality.

Riparian areas are particularly susceptible to invasion by exotic plant species. The bottomland forests around Johns Creek and Hall Branch are heavily infested with Nepalese browntop (*Microstegium vimineum*) and privet (*Ligustrum* sp.). These species drastically modify the habitat quality of the area and will require intensive efforts to control.

Goal 1: Improve water quality in the streams on VTS-M.
Obj. 5-1: Gather and maintain up to date information about existing riparian areas and their conditions.
Projects:

- Aquatic fauna surveys and water quality assessments every 5 years as noted in Section 4.2.1.
- Perform riparian habitat assessments to identify degraded riparian corridors.
- Develop and implement water resources monitoring protocol to assess water quality across the training site and at in-flow and out-flow points.

Obj. 5-2: Restore native vegetation in riparian corridors to improve filtering and other stream quality protection.
Projects:

- Utilize riparian habitat assessment information to prioritize restoration needs.
- Develop restoration plans for stream reaches in order of priority with appropriate native vegetation, as feasible.
- Implement restoration plans as feasible.
- Control invasive species in riparian communities as feasible.
- Monitor restoration areas to determine effects of management.

Goal 2: Protect shorelines and all riparian areas from potential erosion and degradation.
Obj. 5-3: Establish and enforce streamside management zones on all streams greater than 2 m wide.
Projects:

- Post and maintain signs identifying SMZs as needed.
- Check positioning/continuity of signs when feasible.
- Maintain SMZs during all timber harvests, construction, and other vegetation clearing activities.
- Educate troops, management staff, and others on the importance of SMZs, the limitations on activities therein, and the regulatory and permitting issues involved in riparian area activities through a SMZ training module.

4.2.6 Wetlands Protection

VTS-M has extensive wetland areas (over 200 acres), mostly associated with the northern portion of Halls Branch. This ecotype is of importance for its chemical and sediment filtration functions as well as providing habitat for many species. A 50-foot buffer zone will be established surrounding wetland areas on VTS-M. Limitations for use of the buffer zone will be the same as those for an SMZ: foot traffic unrestricted; vehicles restricted to existing roads; authorization required for soil-disturbing actions, including maintenance or construction efforts.

The Tennessee Department of Environment and Conservation, Division of Water Quality, and the Army Corps of Engineers protect wetlands by requiring permits to alter waters of the state. These permits require that activities be undertaken in such a way that impacts to streams or wetlands are avoided or mitigated. Wetland criteria are provided within the general Water Quality Standards, and Best Management Practices identified for Forestry and Agriculture are applicable to wetland ecosystems.

Goal 1: Maintain and improve wetland acreage, function, and value.
Obj. 6-1: Increase knowledge of existing wetlands and their conditions.
Projects:

- Wetland planning level surveys every 10 years as noted in Section 4.2.1.
- Conduct a floristic and faunal study of wetland habitats to identify unique features, if any.
- Develop protocol and implement regularly scheduled wetland condition monitoring as feasible.

Obj. 6-2: Establish and enforce buffer zones surrounding wetland areas.
Projects:

- Post and maintain signs identifying 50' buffers surrounding all wetlands as needed.
- Identify wetlands that require repair to the surrounding vegetative buffer or filter strips.
- Develop and implement repair plans as needed.
- Educate troops, management staff, and others on the importance of wetland buffers, the limitations on activities therein, and the regulatory and permitting issues involved in wetland area activities. Develop a wetland training module and make available for use by training sites.

4.2.7 Forest Management

Forest ecosystems occur on approximately 70% (1,733 acres) of the training site. The desired future condition of the forest at VTS-M is a range of forest types and ages, approximating natural habitat conditions and providing needed training opportunities. Timber production is not a primary goal of forest management on VTS-M, but timber harvest may be an appropriate method to achieve training needs, native species restoration, or forest health goals.

Many of the timber stands on VTS-M are mature in terms of timber production. Areas of the training site are too dense for effective training use. In other areas, the mature forest should be protected to maintain riparian and wetland quality, support ecosystem integrity, and provide for wildlife. A forest inventory and a timber management plan were completed in 2006. This information and training site plans were used to develop the overall management plan for forest resources in Annex I.

Goal 1: Provide optimum forestland training opportunities for TNARNG.
Obj. 7-1: Improve training areas by selected timber harvesting.
Projects:

- Consult with training site staff annually to determine the need for forestland training operations.
- Identify areas requiring alterations to the forest stands to meet training needs.
- Identify management practices to create desired training conditions, as needed.
- Implement timber management to support training, as needed.

Goal 2: Improve forest health and wildlife habitat through appropriate forest management techniques.
Obj. 7-2: Maintain forest inventory and other information needed for forest management planning.
Projects:

- Repeat forest inventory every 10 years.
- Conduct PLSs as noted in Section 4.2.1

Obj. 7-3: Improve forest health and habitat quality.
Projects:

- Review inventory and PLS data and update Forest Management Plan as needed.
- Perform Timber stand improvement activities as needed.
- Conduct required prescribed burning as needed and when feasible (Annex 2).
- Control invasive exotic species where needed (IAW Annex 3).
- Maintain appropriate stand conditions near waterways.
- Monitor changes to biodiversity and species composition through long-term vegetation monitoring.

4.2.8 Fire Management

Catastrophic wildfire is not a common threat to western Tennessee ecosystems, but must be taken into consideration. The Wildland Fire Management Plan (WFMP) for the VTS-M is found in Annex 2. It includes background information on wildland fire and fuels on the training site, fire suppression guidelines, and the prescribed burning plan. The existing road system at VTS-M provides the basis for a functional firebreak system; additional breaks may be needed. The natural ecosystems of VTS-M are not notably fire adapted, and so prescribed fire will be a relatively small component of forest management on the training site. It can however be an important tool for maintaining grasslands.

Goal 1: Minimize threats to property and personnel associated with wild and prescribed fire.
Obj. 8-1: Maintain sufficient firebreaks for protection of resources and personnel, and to prevent fire escape from the training site.
Projects:

- Identify additional firebreak locations needed through consultation with the training site as needed.
- Create firebreaks where needed, with consideration for erosion potential. (CFMO responsibility.)
- Develop and implement schedule of maintenance for firebreaks. (CFMO responsibility.

- Review and update WFMP annually, revise every 5 years.

Goal 2: Utilize prescribed fire as appropriate to maintain training area conditions and native ecosystems.
Obj. 8-2: Obtain necessary equipment and training.
Projects:

- Identify equipment needs and purchase, as needed.
- Annual FFT2 refresher training and pack tests as needed.
- Obtain basic training for new hires through the TN Division of Forestry as needed.

Obj. 8-3: Conduct prescribed burns annually, as appropriate and needed.
Projects:

- Annually identify areas in need of prescribed burning, in accordance with Annex 2.
- Conduct burns with authorized training site staff and outside support, as needed.
- Conduct post-burn evaluations to monitor efficacy of prescribed fire program.

Obj. 8-4: Implement shelterwood/burn methods to regenerate mixed oak stands on an experimental basis, as described in Annexes 1 and 2.
Projects:

- Identify suitable study site and develop study protocol when feasible.
- Implement shelterwood harvest, prescribed burn, and final harvest in accordance with protocol.
- Monitor regeneration.

4.2.9 Fish and Wildlife Management

Currently, there are no specific fish or wildlife management activities conducted at VTS-M. Ecosystem management focuses on maintaining or improving the system as a whole; therefore, TNARNG policy is to manage animal species through manipulation of their habitat. Appropriate treatment of the forest, grassland, and riparian ecosystems should benefit the species that utilize those habitats. However, further information about the species that are utilizing the training site will allow further enhancement of this plan for the benefit of wildlife species.

There is no open hunting at VTS-M due to concerns for security and the safety of the public and the soldiers. The potential for such a program was reviewed in 2011, and it was found to be untenable for the training site at that time. A hunting program may be reconsidered in the future if conditions change. The white-tail deer population may exceed the site's carrying capacity without control; TNARNG will work with the TWRA to determine if this is a problem, develop potential alternatives, and implement a solution if needed.

Fishing is allowed from the shores of Walker Lake. Given staffing limitations to manage access/program needs and the potential issues associated with Walker Lake's location in the down-range training areas, it is only safe to open the lake to current and retired military personnel, and those currently employed by the Military Department. A valid Tennessee fishing license is required, and all state regulations apply. The lake has been stocked with fish in the past by training site management. Routine stocking of the lake is not a facet of the natural resources management program.

Goal 1: Maintain healthy fish and wildlife populations through maintenance of healthy vegetative communities, habitats, and ecosystems.
Obj. 9-1: Maintain up to date data on wildlife at VTS-M.

Projects:

- Perform planning level surveys as noted in Section 4.2.1.
  - Bird survey every 5 years.
  - Bat survey every 5 years.
  - Mammal and herpetofauna survey every 10 years.
  - Aquatic fauna survey every 10 years.
- Conduct population counts for deer, turkey, beaver, or other species, as needed.

Obj. 9-2: Maintain a diverse landscape that provides appropriate habitats for all native wildlife.
Projects:

- Protect and maintain native species vegetative buffers around water sources, in accordance with SMZ protocol (see Section 4.2.5).
- Install and annually check/maintain nest boxes and predator guards for appropriate bird species.
- Convert grassland areas to native plant species where feasible.
- Monitor vegetation community condition through PLS. See Section 4.2.1.
- Implement vegetative community/habitat management actions as needed.
- Develop and make a wildlife training module available.

Obj. 9-3: Manage animal pests to protect training land availability, ecosystem health, and RTE species.
Projects:

- Consult with TWRA on species carrying capacity.
- Re-examine hunting program options if deer populations substantially exceed carrying capacity.
- Implement control efforts in cooperation with TWRA, MAAP, USDA Animal Damage Control, or contract if any animal population becomes a nuisance.

4.2.10 Pest Management

Pest management at VTS-M is directed by the TNARNG Integrated Pest Management Plan (IPMP) in accordance with AR 200-1. Integrated pest management is "a sustainable approach to managing pests by combining biological, cultural, physical, and chemical tools in a way that minimizes economic, health, and environmental risks" (DODI 4150.07).

According to DoD regulations and TNARNG policy, only DoD or State Certified Pesticide Applicators may apply any (restricted or general use) pesticide or herbicide to VTS-M property. The only exceptions to this rule are occasional small applications of specific ready-made general use pesticide applied on a "self- help" basis due to an immediate need for personal safety (e.g., wasp spray in the motor pool, fire ant bait beside the walkway), or ready-to-use roundup applications around buildings and motorpools (e.g. weeds in sidewalk cracks or motorpools). The person using the ready-to-use Roundup must first complete the 10-20 minute online training and sign an acknowledgement of understanding that is registered with the IPMC. Interior pest control on VTS-M is provided by a contracted pest control company.

Chemical vegetation control on VTS-M is largely conducted by employees who are state-certified in the right-of-way category. All chemical pesticide applications must be reported to the TNARNG Pest Management Coordinator (see Appendix G for forms).

A population of imported fire ants (*Solenopsis* spp.) is well established on VTS-M This is a highly aggressive ant, dominating the areas it infests and generally causing a decrease in insect and animal species diversity. It has a fierce sting which it will apply repeatedly to animals it encounters with minimal provocation. These stings are painful and can cause anaphylaxis in sensitive individuals.

Humans, domestic livestock, and wildlife are all susceptible to injury by red imported fire ants (Williams et al. 2001). The imported fire ant is the subject of a USDA quarantine which restricts the transport of soil, plants with soil and roots attached, grass sod, and similar materials.

The primary natural resources aspect of pest management is the control of invasive species. Nonnative species have the potential to degrade training land at VTS-M and impact the usability of the land for TNARNG purposes. A variety of invasive pest plants are of concern at VTS-M: common privet, Japanese honeysuckle, Nepalese browntop, sericea lespedeza, and kudzu are the most prevalent. These plants can out-compete native plant species, change water and nutrient cycling, and drastically change the ecosystem in which they occur. An invasive pest plant management plan is included in Annex 3.

Goal 1: Comply with the TNARNG Integrated Pest Management Plan.
Obj. 10-1: Implement the TNARNG IPMP.
Projects:

- Maintain certification records for pesticide applicators.
- Document and report all pesticide applications.
- Use IPM for all pest control activities.

Goal 2: Control animal and plant pests to achieve training and environmental objectives.
Obj. 10-2: Manage invasive plant species IAW Executive Order 13112 to protect the natural ecosystems of the training site and improve training facilities.
Projects:

- Resurvey and map invasive pest plant infestations every 5 years.
- Annual implementation of pest plant control IAW Annex 3 as funding allows.
- Identify species that may present a specific impediment to training, and create a training specific control plan.

Obj. 10-3: Control pest species for the safety and comfort of training site users.
Projects:

- Annually maintain and add to bat boxes and bird nest boxes for biological control of mosquitoes around buildings and bivouac sites.
- Ongoing observation for presence of imported fire ants; treat mounds IAW IPMP when needed.

4.2.11 Long-term Monitoring

The Environmental office initiated a vegetation monitoring protocol in 2002. In the fall of that year, plots were established at three TNARNG training sites (Catoosa, Milan, and Tullahoma) following the original Land Condition Trend Analysis (LCTA) line transect – point quadrat methodology. On examination of the original LCTA methodology, it was determined that the design was not consistent with current scientific methods utilized in eastern U.S. ecotypes and the project discontinued.

Vegetation monitoring is needed to track impacts and changes to the ecosystems and habitats of VTS-M. A comprehensive, scientifically valid long-term monitoring program is being developed for the VTS-M. Data collected through a vegetation monitoring program will be used to track impacts of various management activities on overall habitat health on the training site, especially in riparian systems, forest stands, and rare species habitat.

Goal 1: Use data collected from analyses of long-term vegetation plots to monitor effects of training activities and land management practices at VTS-M.
Obj. 11-1: Develop and implement a vegetation monitoring program.

Projects:

- Develop a vegetation monitoring protocol for VTS-M.
- Establish vegetation monitoring plots.
- Resample monitoring plots as appropriate IAW protocol.

4.2.12 Grounds Maintenance

Environmentally and economically beneficial landscaping practices can reduce maintenance costs while also providing wildlife habitat. Planting windbreaks around buildings, establishing forest, prairie, or wildflower areas, and reducing mowing are all ways to spend dwindling maintenance dollars more wisely, educate the public about the benefits of reduced maintenance, and become better stewards of the environment.

Goal 1: Maintain an attractive, functional landscape appropriate to TNARNG needs.
Obj. 12-1: Utilize regionally native plant species for all landscaping and restoration efforts when feasible.
Projects:

- Create a list of non-native plants to avoid and a list of native alternatives and their planting requirements for landscaping purposes.
- Use native shrubs, trees, and wildflowers for aesthetic plantings.
- Provide additional guidance for the training site maintenance staff on the importance of utilizing native species, as needed.

Obj. 12-2: Widen and enhance transition zones between maintained and natural areas where feasible.
Projects:

- Identify edges that can be modified without affecting training or safety.
- Develop and implement plans to create more graduated edges where feasible.

Obj. 12-3: Adjust maintenance schedules for protection of specific environmental values (e.g., breeding seasons of native birds).
Projects:

- Create list of values that may be impacted by grounds maintenance and determine appropriate schedule and process for their protection.
- Modify the grounds maintenance calendar in the INRMP to reflect these protection efforts.
- Provide training/guidance to the training site maintenance staff on these modifications.
- Avoid mowing grasslands April – September in areas where feasible.

4.2.13 Recreational Use Management

At VTS-M outdoor recreation is limited due to the primary mission of the training site and the danger it presents to public safety. Public access is restricted because of hazards related to training activities as well as on-going construction activities: small arms firing, convoy movement, training residue (e.g., fox holes and concertina wire), and training mechanisms (e.g., moving targets). All of these are potential hazards to outdoor recreationists on foot or in a vehicle. For this reason, public access to the training site is controlled by secured gates.

Due to the small size of the facility, training units typically need all or a large portion of the facility at their disposal. Therefore, it is not practicable to provide public access areas for recreation. At this time there is no regular recreational use of the training site by the public.

Any person entering the training site for any purpose prohibited by law or lawful regulation is trespassing. Criminal trespass is a Class C misdemeanor under TCA 39-14-405 and may be aggravated

criminal trespass under TCA 39-14-406 (Class B misdemeanor) if the person knows they do not have the property owner's effective consent to do so and they intend, know, or are reckless about whether their presence will cause fear for the safety of another. Trespass may endanger the life of the person entering the training site as well as potentially endangering Tennessee Army National Guardsmen and interfering with training. Tennessee Recreation Use Statutes (Liability of Land Owner to Person Using Land) are found in TCA 70-7-101 to 104.

4.2.14 Cultural Resources Management

TNARNG has an approved Integrated Cultural Resources Management Plan (ICRMP) for its Tennessee properties, including VTS-M, and has conducted numerous consultations with 20 American Indian tribes with an interest in TNARNG properties. The ICRMP addresses cultural resources management in more detail and provides procedures to consider the effects that natural resources activities might have on cultural resources.

Natural resources management activities proposed in the INRMP that may require Section 106, Section 110, or tribal consultation include ground-disturbing activities associated with land rehabilitation and maintenance (erosion control and rehabilitation of eroded areas and trails). Some military training activities, e.g., engineering training and other ground-disturbing activities, are considered "undertakings" that are required to be conducted in accordance with the ICRMP. Each activity conducted in accordance with the INRMP must be coordinated through the Environmental Office's Cultural Resources Manager and the ICRMP to ensure that they will comply with all applicable federal and state cultural resources requirements. In the event of an inadvertent discovery of cultural materials during a natural resources management activity, the guidelines in Standard Operating procedure #5 in the TNARNG ICRMP will be followed.

Goal 1: Avoid conflict with the cultural resources program.
Obj. 14-1: Conduct all natural resources activities in accordance with the requirements and restrictions in the ICRMP.
Projects:

- Provide all plans for natural resources actions to the cultural resources manager well in advance of start date to allow sufficient time for review and consultation with State Historic Preservation Office as needed.
- Protect cemeteries on the VTS-M in accordance with the license.
- Implement the TNARNG ICRMP standard operating procedure #5 for the inadvertent discovery of cultural materials, if necessary.

4.2.15 Geographic Information Systems

TNARNG Environmental has an extensive GIS database. It incorporates relatively complete training site information including all required SDS/FIE feature classes as required by National Guard Bureau. TNARNG Environmental GIS Branch meets or exceeds its CIP data calls required by NGB. Acquiring needed CIP data layers of SRP proponency is coordinated with SRP at TCC. All natural resources projects and contracts are coordinated with the GIS Branch to ensure that geographic data gathered meets these standards.

Goal 1: Maintain, update, and expand the GIS database to make accurate data available for training and management planning.
Objective 15-1: Maintain a constantly improving GIS.

- 15a) Identify the data layers captured and those still needed.
- 15b) Update older data layers and create new, as needed, or as information becomes available.

- 15c) Make data available for use through interactive web applications.
- 15d) Develop appropriate wording to be included in all Conservation contracts to ensure data is collected and presented in the correct format for the TNARNG GIS database.

4.2.16 Environmental Management Systems

The TNARNG Environmental office is in the process of developing an ISO 14001 program. When completed, the environmental management system (EMS) and International Standard Organization (ISO) 14001 standard will:

- Establish a mission-focused EMS within their purview;
- Comply with Executive Order (EO) 13148, 'Greening the Government';
- Conform to ISO 14001 per Department of Army and Army National Guard policy; and,
- Provide National Guard Bureau with information regarding specific requirements for implementation.

EMS implementation will encompass the entire TNARNG installation, including VTS-M. The EMS implementation requirements apply to all installation missions, facilities, tenants, contractors, and activities. The surrounding communities, regulators, and other interested parties will be notified of the installation's EMS efforts and encouraged to become participants in and/or contributors to the process.

4.2.17 Climate Change

Climate change is well established in the scientific literature and has the potential to effect the military mission and natural resources in a variety of ways. Predictions of its effects vary, but rising sea levels, shifts in normal weather patterns, and increased frequency of extreme weather events support its occurrence. In response, the President of the United States issued Executive Order (EO) 13653 "Preparing the U.S. For the Impacts of Climate Change" (2013) ordering all federal agencies to consider climate change in their future planning. The DoD responded to the EO with the 2014 Climate Change Adaptation Roadmap, which guides all DoD components to deal with climate change through adaptation to occurring and predicted changes, and through mitigation by reducing the military's greenhouse gas emissions. Executive Order 13693 "Planning for Federal Sustainability in the Next Decade" (2015) instructs federal agencies to prepare to be sustainable through various approaches that DoD components can implement.

All planning for climate change response on VTS-M must begin with consideration of the predicted changes. The 2014 National Climate Assessment predicts the following climate changes in the southeast United States (Carter et. al, 2014). The three major issues expected in the southeast are increased temperatures, reduced precipitation, and continued ocean rise. The Milan Tennessee area is expected to see increasing temperatures, with short term fluctuations due to natural variability. Average annual temperatures are expected to increases 4-8^{o}F by the end of the century, depending on the extent to which greenhouse gas emissions are reduced. It is expected that the number of days >95^{o}F will increase 20-30 days per year, the number of nights >75^{o}F will increase as well. The number of nights <32^{o}F are expected to decrease by 12-20 days per year on average. There is expected to be an increase in the frequency of extreme heat events.

Precipitation predictions are less certain than temperature predictions, but in general, there is expected to be a 2.5-5.0% decline in precipitation. The precipitation is expected to come in fewer, more extreme, rain events. There are expected to be fewer hurricanes with an increased percentage of them being of high intensity (category 4 & 5). The reduction in rain events and increased rapid runoff through flood events will likely reduce infiltration and aquifer recharge. While VTS-M is far from the ocean, rising salt water will likely compromise aquifers along the coast, forcing coastal populations to get fresh water from

aquifers farther inland.

The increased temperatures with longer periods between more extreme rain events will likely lead to more droughty conditions broken up by increased flood events and intensity. Increased hot droughty periods will likely lead to increased fire occurrence and more extreme fire behavior. Increased fire, heat, and reduced water may effect forest and plant community composition. These conditions could further lead to increased issues with invasive pest plants. Increased temperatures may lead to increased populations of insect and pathogens effecting both humans, and animal and plant communities. Erosion and resulting siltation will likely become more of an issue with increased flood events. Shorter wet periods and increased flooding/rapid runoff events will likely reduce water infiltration and aquifer recharge. Increased siltation and surface water temperatures could alter aquatic community health and species composition. Increased surface water temperatures could lead to increased algal blooms and disease causing agents, creating human health issues. Reduced water availability may threaten wetland condition and reduce acreage.

More research will be required to better predict the coming changes and prepare for them. The complexity of this issue and its potential outcomes will require careful development and implementation of a VTS-M plan over the next several years. Likely actions will include continued protection of riparian areas to shade surface waters and reduce erosion; gradual introduction of more drought resistant native plants with deep root systems to resist erosion and establish a large seed bank for response to the changing conditions; continued vegetation monitoring to track changes in plant communities and predict/respond to change; improve water use efficiency; initiate water recapture; and etc.

Goal 1: Develop and implement a climate change response plan.
Objective 17-1: Conduct necessary research to predict likely local influences of climate change.

- 17a) Review climate change predictions.

Objective 17-2: Develop and implement a climate change response plan

- 17b) Determine which changes TNARNG can practically affect through management actions.
- 17c) Identify functional approaches to manage for each aspect of change.
- 17d) Develop a climate change management plan to protect and manage natural resources.
- 17e) Implement the climate change management plan.

4.2.18 Pollinator Management

Pollinators are critical to the U.S. crop/food production, plant reproduction, and ecosystem health. Pollinator populations have declined precipitously over the previous decades due to loss of natural forage and other habitat factors, introduced mites and diseases, reduced genetic diversity, and exposure to pesticides. The President of the United States issued a Presidential Memorandum "Creating a Federal Strategy to Promote the Health of Honey Bees and Other Pollinators" (2014) in response to these substantial threats to U.S. food production and ecosystems. The Under Secretary of Defense then issued a memorandum "DoD Policy to Use Pollinator-Friendly Management Prescriptions" in response to the presidential memorandum. The Under Secretary's memorandum "expands DoD policy to use current best management practices, as appropriate, specifically to protect pollinators (e.g. bees, birds, bats, butterflies, moths) and their habitats, and establishes policy to coordinate with partners on pollinator issues". A later MOU between DoD and the Pollinator Partnership affirms DoD's responsibilities and commitment to support and undertake activities to conserve, protect and restore pollinators and their habitats as practicable on their lands within DoD mission and policies, and within federal laws and regulations.

Little is known about the pollinators using VTS-M at this time. More research and study is needed to

determine which pollinators currently use the site, the current pollinator habitat conditions, and best approaches to benefit and conserve pollinators. This research will be conducted over the next several years. Appropriate management practices that work in conjunction with mission needs and constraints will then be identified and incorporated into a pollinator management plan.

Goal 1: Determine pollinator use and habitat condition on site.
Objective 18-1: Conduct necessary research to identify pollinators using the site, and the condition of their habitat.

- 18a) Conduct a comprehensive survey of terrestrial macroinvertebrates.
- 18b) Survey pollinator habitat conditions on site.

Goal 2: Develop and implement a pollinator management plan.
Objective 18-2: Develop and implement a pollinator management plan.

- 18c) Identify specific issues with pollinator species composition and habitat conditions.
- 18d) Identify appropriate and practicable management approaches to address identified issues.
- 18e) Develop and implement a pollinator management plan.

4.3 NATURAL RESOURCES PROJECTS

4.3.1 Survey History

Effective management of natural resources is dependent on a solid understanding of current conditions and desired conditions. Current conditions are identified through baseline surveys which are repeated as needed as time, human use, or natural occurrence causes change in those conditions. Table 4.1 shows the planning level and other natural resources surveys which have been completed to date for VTS-M and the anticipated date of the next repetition, if required.

Table 4.1: Surveys completed at VTS-M.

Survey	Completed	Contractor	Next
Soil Survey of Carroll County, Tennessee	1984	USDA Soil Conservation Service	NA
Forest Inventory	2006	Resource Consulting International, Ltd.	2016
Forest Resources Management Plan	1987	Resource Consulting International, Ltd.	2005
Soil Survey of Gibson County, Tennessee	1994	USDA Soil Conservation Service	NA
Phase I Natural Resources Survey	1994	Lose and Associates, Inc.	NA
Delineation of Wetlands and Other Regulated Waters	1998	US Army Engineer Waterways Experiment Station	2009
Natural Resources Aquatic Survey	1999	Science Applications International Corporation (SAIC)	2019, Ongoing
Phase II Natural Resources Terrestrial Survey	2000	SAIC	NA
Butterfly and Insect Planning Level Survey	2005	Environmental Resource Management	2018
Terrestrial Macroinvertebrate PLS			2018, Ongoing
Vegetation Community Survey	2006	Dynamic Solutions, LLC	2019, Ongoing
Invasive Plant Species Survey	2006, and 2014	Dynamic Solutions, LLC, and University of Tennessee at Chattanooga Respectively	2021
Forest Inventory and Management Plan	2006	Thompson Engineering	2025

Rare, Threatened, and Endangered Plant and Animal Survey	2008	SAIC	2018, Ongoing
Avian Planning Level Survey	2008, 2013	AMEC Earth and Environmental, Inc., and URS Group, Inc. Respectively	2018, Ongoing
Herpetofauna Planning Level Survey	2010, and 2015	URS Group, Inc., and Environmental Services Inc. Respectively	2020
Mammal Planning Level Survey	2010, and 2015	AMEC Earth and Environmental, Inc., and Environmental Services	2020
Wetland Planning Level Survey	2011	URS Group, Inc.	2022
Bat Survey	2010, 2013, and 2017	AMEC in mammal survey, ESI, and Apogee Respectively	2021

4.3.2 Implementation of 2002-2019 INRMPs

One function of this Revised INRMP is to review the prior INRMP for "operation and effect" in accordance with the 2004 DoD Supplemental Guidance. As noted in Section 1.6, the format of the 2002- 2006 INRMP was found to be unwieldy and difficult to apply. In addition, the project lists provided in the first INRMP were not complete, relative to the extensive lists of goals and objectives outlined in that document. The initial INRMP's layout made it difficult to identify the objective which a given project supported. In general, the 2002-2006 INRMP was found to be ineffective in guiding actual land management efforts. The format of later INRMPs were updated to be more functional, but still had formatting weaknesses. The format of this INRMP has been updated to make the document more functional for land management purposes. It is hoped that many weaknesses of previous INRMPs have been eliminated in this iteration of the plan.

Despite the flaws in the first and subsequent INRMPs, natural resources management has progressed on VTS-M during the time since their implementation: a great deal of baseline information has been gathered through surveys, a good working relationship has been developed with USFWS, TWRA, and TDA, and the groundwork has been laid for a number of management actions which will be carried forward in this new INRMP. As an indicator of the current state of the program, the projects from earlier INRMPs have been incorporated into Table 4.2 with a description of the status of the projects. Some have been fully implemented, and others are in progress. A few were sidelined for budgetary or time reasons. Several ITAM projects are incomplete due to the transfer of monitoring duties from the Environmental Office to the ITAM Office, which lacked the personnel expertise needed to accomplish environmental monitoring at the time, and no longer has that responsibility. A number of these projects have been carried over with this revised INRMP and will be completed or implemented in the near future (see Table I-1 in Appendix I).

Table 4.2: Project Status from the 2002-20018 INRMPs.

Area	Project/Management Action	Status
Environmental		
Training Support	Develop Missionscape statement	Completed & On-going
	Develop and implement plan to achieve Missionscape	Completed, as need
	Clear vegetation to create maneuver corridors	Conducted as need by TC staff
	Clear vegetation to create more open maneuver land	Conducted as need by TC staff
	Notify the public in advance of large training site activities.	As Needed

Area	Project/Management Action	Status
	Post patrols at boundary to inform the public of training exercises in the area during each large training event	As Needed
	Include Training Site SOP revisions in INRMP revisions	Completed & On-going
	Review and update Missionscape	Completed & On-going
Ecosystem Management	Develop map & priority list of ecosystems	Completed & On-going
	Collect threat and training use details	Completed
Habitat Management	Identify threats to significant habitats	Completed
	Develop/implement protection plans significant habitats	Completed & On-going
	Post and maintain streamside management zones (SMZs) to implement 50 ft. buffer along streams	Completed
	Maintain SMZs during all timber harvest, construction, and other vegetation clearing activities	On-going
	Post wetland 50 ft. buffers (SMZs)	Completed
	Update training site SOP with information on SMZs	Completed
	SMZ training module	Completed
	Develop BMP training module	Completed
	Develop erosion prevention and repair guide	Completed
	Identify locations for native species restoration	On-going
	Develop and implement native species restoration plans as needed for aesthetic and downrange plantings	As needed, and as feasible
	Develop native planting guide	Completed
	Identify edges that can be modified without impacting training or safety	On-going
	Develop and implement edge conversion plan	Not done
	Create list of values impacted by grounds maintenance	Completed
	Modify maintenance calendar in INRMP to prevent impacts of grounds maintenance where feasible	Completed
	Monitor potential erosion issues during regular site visits	Informal On-going
	Develop erosion reporting form for soldiers and staff	Completed
	Post erosion reporting form on website	Completed
	Develop erosion report tracking system	Completed but fell out of use
	Develop, coordinate, and implement erosion repair plans as needed	As need
	Revegetate areas that are incapable of natural revegetation	Implemented as needed on-going basis
	Perform water quality monitoring & assessment	Completed 1999, and in process
	Vegetation community PLS	Completed 2006
	Conduct periodic wetland survey	Completed 2011
	Identify wetlands requiring repair of vegetative buffer or filter strips and implement repairs as needed	None needed to date
	Implement measures of biodiversity to evaluate habitat health	Conducted with aquatic species surveys, but not other species
	Wetland floristic study	Not done
	Wetland fauna study	Not done
	Wetland buffer zone vegetative assessment	Not done
	Wetland buffer training module	Not done
	Riparian habitat assessment	On-going
	Utilize riparian assessment to prioritize restoration needs	On-going
	Develop restoration plans for stream reaches by priority and implement as feasible	On-going

Area	Project/Management Action	Status
	Control invasive species in riparian communities as feasible	Conducted to some degree based on funding availability
Forestry	Conduct forest inventory	Completed 2007
	Consult with training site staff on forest management needs to improve training areas	On-going
	Identify and implement forest management practices to create desired training conditions as needed	On-going
	Maintain appropriate stand conditions near waterways	On-going
	Develop and update forest management plan	Completed 2007, Update as need
	Perform timber stand improvement activities	As need
	Annual timber ROA and RPTS system information	As need
	Enter VTS-M into forestry reserve accounting system	Completed
RTE Management	Rare, Threatened, and Endangered species PLS	Completed 2008 and in process
	Develop community-based management plans and monitoring protocols for RTE species detected	None detected yet
	Control invasive plants where impacting potential RTE habitats as needed	None needed yet
	Regular communications with TWRA & USFWS including consultation on major projects	On-going
	Manage American chestnut orchard	Complete
	Coordinate with TACF annually	Complete, project ended
	Annual orchard maintenance, seedling inventory, and blight testing	Complete, project ended
	Radio-track listed bats during surveys to ID roosts/hibernacula when feasible	No listed species captured so far
GIS	Obtain hardware, software, and plotter for GIS capability	Obtained/maintained by GIS
	Maintain GIS data layers	On-going
	Make GIS data available through interactive web applications	Complete and On-going
	GIS staff review contract wording for proper GIS formats	On-going
Wildlife Management	Conduct breeding and migratory bird survey	Completed 2008, 2013, In Progress
	Conduct mammal PLS	Completed 2010 & 2015
	Conduct bat PLS	Completed 2010, 2013, & 2017
	Incorporate USFWS Indiana bat survey protocol in bat PLS	Completed and On-going
	Conduct herpetofauna PLS	Completed 2010 & 2015
	Conduct terrestrial macroinvertebrate PLS	2005, & in progress
	Conduct aquatic fauna planning level survey (PLS)	2013, and In Progress
	Conduct population counts for deer, turkey, beaver and others as needed	None needed yet so monitored under other broader surveys
	Consult with TWRA on species carrying capacity and reexamine hunting program if populations exceed substantially	Not needed at this time
	Control species if reaches nuisance status	Not needed at this time
	Install and maintain wood duck nest and bat boxes	Installed but not maintained
	Develop wildlife training module	Complete
	Manage habitats for all native species	On-going

Area	Project/Management Action	Status
Pest	Develop/implement an Integrated Pest Management Plan	Completed & Updates On-going
	Aid staff in obtaining and maintaining pesticide applicator certifications	On-going
	Maintain pesticide applicator certification records	On-going
	Conduct an invasive pest plant species inventory and map (GIS) locations throughout the training site	Completed 2006, 2014
	Use IPM for all pest control activities	On-going
	Control or eradicate invasive exotic species of plants and animals	Intermittent efforts as funding allows.
	Install and maintain bat and bird boxes to aid in insect control	Installed but not maintained
	I.D. species that may impede training	On-going
	Develop training specific IPP control plan	Completed
	Conduct annual fire ant survey	Initially conducted but terminated as they are established everywhere
Outdoor Rec.	Consult with TWRA on Public Hunting Opportunities	Completed and Not Practicable
	Develop hunting and fishing program	Determined impracticable due to potential conflicts with training and safety issues
Wildland Fire Management	Develop and maintain/update a Fire Management Plan	Completed 2009, 2017
	Develop fire assistance MOA with MAAP & TDF	Verbal but no written agreement
	Meet with TC staff to identify areas in need of prescribed fire	On-going
	Develop and maintain fire breaks	System in place
	Identify additional fire break locations needed	On-going
	Implement prescribed fire to meet management needs	Intermittent Application But On-going
	Conduct annual refresher trainings	Completed in past but no longer training or staff fire activity
	Obtain basic training for new hires through TN Division of Forestry	Completed in past but no longer training or staff fire activity
	Identify and purchase needed equipment	Completed in past but no longer training or staff fire activity
	Shelterwood/burn study protocol	Not conducted
	Monitor effects of prescribed fire through post burn evaluation	Not conducted
Cultural Resources	Provide planned natural resource actions to CRM in time for review and consultation	On-going
	Protect cemeteries in accordance with license	On-going
	Implement ICRMP SOP #5 in case of inadvertent discovery of cultural materials	Not needed to date
ITAM		
LCTA	LCTA data (permanent vegetation monitoring plots) collection and analysis – natural resources	Initiated by ENV office, 2002, but shifted to an ITAM responsibility
	Erosion Surveys	Informal, annual. Reporting form developed in 2012

Area	Project/Management Action	Status
LRAM	Build and maintain check dams and other sedimentation control structures	On-going, as needed
	Control vegetation in maneuver corridors	Annual, On-going
	Clear vegetation to increase open maneuver land	On-going, as needed
	Revegetate areas that are incapable of natural revegetation	All portions of training site carry appropriate vegetative cover
	Construct and maintain fire breaks	As needed
	Maintain hard stands and hardened sites in maneuver areas on heavy-use firing points	On-going, as needed
	Maintain hard stands and hardened sites in maneuver areas on heavy-use equipment staging areas	On-going, as needed
	Create and maintain hardened sites designed to preclude excessive wind erosion for helicopter flight operations	Grass helipad is maintained as sufficient
	Obtain John Deere 458 small bulldozer	Not obtained – use blade attachment on skid steer
	Obtain skid steer loader with bucket, trencher, and backhoe	Obtained in 2007
	Obtain four John Deere Gator utility vehicles for fire suppression activities	Obtained and utilize water tank with pump on trailer - 2003
SRA (was EO in original INRMP)	Produce a Leader and Soldier Field Card, video, and environmental awareness poster for VTS-M	Soldier Field Card completed 2011
	Produce other environmental awareness materials	Not completed

CHAPTER 5
COORDINATION WITH THE INTEGRATED TRAINING AREA MANAGEMENT PROGRAM
GOALS, OBJECTIVES, AND TASKS FOR ITAM

5.1 THE ARMY SUSTAINABLE RANGE PROGRAM (SRP)

The Army Sustainable Range Program (SRP) was conceived and implemented to improve the way the Army constructs, manages, and uses ranges and maneuver training lands to ensure that current and future doctrinal requirements are met. As defined in AR 350-19, "The Army Sustainable Range Program", the goal of the SRP is to maximize the capability, availability, and accessibility of ranges and training lands to support training and test requirements. The military mission is supported by SRP through the integration of facilities management, environmental management, munitions management, and safety management (Department of Army 2005).

SRP also addresses the increasing problem of encroachment on military installations. Encroachment has the potential to affect the accessibility and capability of the Army's training assets. Because Army installations are located in regions that are increasingly urban and agricultural, the relatively natural landscapes found on these installations often become islands of biodiversity.

There are eight overall focus areas for the SRP that are designed to ensure the capability, availability and accessibility of Army training land (Department of Army 2005). These are:

1. Range Facilities
2. Range Operations
3. Range Maintenance
4. Encroachment
5. Environmental Responsibilities
6. Outreach
7. Integrated Management
8. Professional Development

Implementation of the TNARNG SRP program is the responsibility of Volunteer Training Site Command and the VTS-M Base Operations Supervisor.

5.2 Army Natural Resources Management and the ITAM Program are Complimentary

The Natural Resources and ITAM programs support maintaining or enhancing healthy natural ecosystems and landscapes for the purpose of ensuring maximum realistic long-term training opportunities for TNARNG soldiers. ITAM focuses on minimizing and repairing negative impacts caused by training activities. Natural Resources focuses on preventing, minimizing, and repairing impacts from all sources. Natural resource projects have the potential to unintentionally impact training and training opportunity, while ITAM projects have the potential to inadvertently impact natural resources and ecosystems. Given this interconnectedness and potential for impacts to the same overall agency goals, it is crucial that ITAM and Natural Resources coordinate on each other's work plans and INRMPs to prevent avoidable impacts to agency goals and natural resources.

The projects identified in Chapter 4 of this INRMP, Annual ITAM Work Plan, and guidance in the VTS-

M Standard Operating Procedures (SOP) are intended to improve the management and conservation of the natural resources on VTS-M to the benefit of realistic and continued training opportunity, as well as ecosystem health. Coordination on the INRMP and ITAM programmatic activities is required by the Army Sustainable Range Program (AR 350-19) and AR 200-1. An annual list of proposed ITAM projects is given in Appendix J. The goals and objectives described below support this required coordination.

5.3 Integrated Training Area Management

The ITAM program serves as a link between the requirements for use of Army ranges and training lands and Army Environmental programs. The ITAM Manager for TNARNG plans and executes the annual ITAM program budget, coordinates the programming of requirements, and the spending of funds with NGB and the Army. These actions provide the Base Operations Supervisors at TNARNG's training sites with the capabilities to manage and maintain training lands in support of military readiness. ITAM integrates training requirements with environmental requirements and environmental management practices. It establishes the policies and procedures to achieve optimum, sustainable use of training lands by implementing an adaptive land management program. There are four components of the ITAM program: Training Requirements Integration (TRI), Range and Training Land Assessment[1] (RTLA); Land Rehabilitation and Maintenance (LRAM); and Sustainable Range Awareness (SRA). TNARNG's ITAM program staff coordinate closely with Environmental Programs, but fall under the supervision of Volunteer Training Site Command.

5.3.1 *Training Requirements Integration*

Training Requirements Integration (TRI) is the planning and decision-support component of ITAM that supports integration of all requirements for land use with natural and cultural resources management. TRI integrates the installation requirements for use of land for training purposes and the range operations and training land management processes with the installation's Environmental Programs business processes and requirements. TRI functions to integrate requirements across programs in order to maintain quality training land, provide a safe training environment, and minimize avoidable impacts to natural and cultural resources.

Effective execution of the TRI function requires the involvement of, and coordination between Training, Environmental, and Facilities Management staff. Coordination is critical to effectively schedule and allocate activities across the training site according to the land's ability to support training events with minimum adverse environmental impacts.

Goal 1: Conduct regularly scheduled inter-program coordination between ITAM and Environmental Program staff to identify environmental permitting requirements and potential environmental impacts of ITAM projects.

Obj.1-1: Prevent unexpected environmental and training impacts through close coordination in advance of and during year of execution. Tasks:

- Meet each fiscal year to conduct general review of NGB- and Army-validated ITAM projects approved for execution in the following fiscal year. Purpose of this review is to identify any extraordinary NEPA or environmental permitting requirements that could potentially prevent project from being executed and completed during the fiscal year.
- Meet each fiscal year to conduct more detailed analysis of NEPA and environmental permitting requirements for ITAM projects that will be prioritized and funded in the following fiscal year based on NGB ITAM Funding Guidance. Also, discuss any "lessons learned" during project execution with goal of minimizing unnecessary barriers to successful project execution

- Conduct quarterly coordination meetings of the Sustainable Range Program (SRP) Working Group to track project status and identify and deconflict any issues arising from changing project requirements and priorities during year of execution.
- Conduct annual INRMP update coordination on Tasks proposed in implementation table.

Goal 2: Coordinate on major revisions of INRMPs and Training Site SOPs.
Obj. 1-2: Conduct inter-program reviews of INRMP and SOP revisions to identify potential cross-program impacts, deconflict program priorities, and minimize avoidable impacts to natural resources.
Projects:

- Coordinate on acceptable timelines to conduct INRMP and Training Site SOP revisions for Natural Resources, ITAM, and outside agencies.
- Review and provide input on INRMP and Training Site SOP revisions within coordinated timelines.

5.3.2 *Range and Training Land Assessment*

The RTLA component acquires data and assesses information to maximize the capability of the land to support live training activities. RTLA assessments may be qualitative or quantitative, formal or informal, as required to fulfill this role. The information from RTLA assessments is utilized by the TNARNG ITAM Manager and Training Site staff to identify areas needing maintenance, repair, or reconfiguration; ensure that environmental management considerations are part of the ITAM project prioritization process; determine the effectiveness of training land management projects; and recommend training load distribution so that training land can best support the training mission.

Due to the relatively small size and moderate usage of TNARNG's training sites relative to most Army installations, TNARNG is able to fulfill the functions of the RTLA component through informal qualitative monitoring of the condition of maneuver training assets carried out by training site staff as they conduct their daily tasks. Informal assessments involve ongoing observation of maneuver training assets and evaluation of their condition:

- Are maneuver trail surfaces, drainage, and right of ways in a condition to support safe training and minimize movement of sediment?
- Are there any areas of bare or compacted soil or visible erosion in the maneuver training areas?
- Is vegetation in forested and open maneuver areas too dense to support access and safe training?

Goal 1: Conduct regular, qualitative assessment of VTS Milan's maneuver training infrastructure, and utilize the resulting information to prioritize ITAM maintenance, repair, and reconfiguration projects.

Obj.1-1: Establish and maintain a level of qualitative monitoring of VTS-M's maneuver training infrastructure sufficient to identify training impediments and minimize avoidable impacts to natural resources.

Obj. 1-2: Utilize information on condition of maneuver training assets to establish annual ITAM funding priorities

5.3.3 *Land Rehabilitation and Maintenance*

The Land Rehabilitation and Maintenance (LRAM) component is a key enabler for sustaining realistic training conditions and supporting the personnel, weapon systems, vehicles, and the mission requirements for the units using the installation. Because erosion is one of the major factors negatively impacting the ability of maneuver training assets to support training requirements, LRAM activities also serve to mitigate the impacts of maneuver training on soil and water resources. The component uses cost-effective erosion control BMPs and preventative maneuver trail maintenance, resulting in reduced soil loss, decreased water runoff, and limited movement of sediment into surface waters.

Goal 1: Maintain maneuver training capability in the near- and long-term through maintenance, repair, and reconfiguration of maneuver training infrastructure.
Obj.1-1: Minimize negative impacts to sustained training capability by mitigating soil erosion and excessive water runoff caused by maneuver training activities.
Tasks:

- Coordinate execution of LRAM projects with TNARNG Environmental Program staff to identify and comply with pertinent federal, state, and local environmental laws, regulations, and permitting requirements during project execution.
- Repair maneuver training damage with potential to negatively impact training capability using standard land rehabilitation treatments and best management practices.
- Reseed with native species in areas where their use is effective, productive, and cost-efficient - with respect to the intended training use.

5.3.4 *Sustainable Range Awareness*

SRA provides a means to educate units utilizing TNARNG training sites on their responsibilities as stewards of training site capabilities through the development and distribution of educational materials. These materials communicate any environmental constraints particular to the training site, and are intended to minimize avoidable impacts to natural and cultural resources. At present, TNARNG ITAM program's primary SRA materials are "Soldier Field Cards" created for each training site and distributed to using units. Soldier Field Cards are designed and printed centrally by Department of the Army based on TNARNG input. They depict environmentally sensitive areas on their maps, provide information about sensitive natural resources, and provide information on hazardous flora and fauna.

Goal 1: Minimize avoidable impacts to training infrastructure and natural and cultural resources due to maneuver training activities.
Obj.1-1: Inform using units (soldiers and leadership) of any environmental constraints to training activities carried out at VTS Milan.
Tasks:

- Update the VTS-M field card that identifies environmental considerations and guidelines for military tenants utilizing its facilities and resources.
- Update training site SOP to clarify environmental constraints to training, limited access areas, and no-go areas.

5.4 ITAM Annual Workplan

The ITAM Annual Workplan is comprised of ITAM projects proposed by TNARNG that have been reviewed and validated by NGB and the Army. Execution of validated projects is contingent upon funding awarded by NGB and TNARNG priorities established during year of execution. Projects are

submitted for review in November, review and validation is usually completed by March, and funding is available for execution during the next fiscal year on 1 October. NGB-validated ITAM projects that may potentially be executed next fiscal year are added to Appendix J of this document during TNARNG's annual INRMP review process.

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CHAPTER 6
RESOURCE PROTECTION GUIDELINES

6.1 LAND MANAGEMENT GUIDELINES

The projects identified in chapters 4 and 5 are intended to improve the management and conservation of the natural resources on VTS-M. In addition to large-scale projects, however, appropriate care is necessary in the day-to-day operations and activities of the training site to ensure excessive damage is not inflicted through misuse or carelessness. The following sections provide guidance for the major activity categories occurring on VTS-M to ensure that TNARNG abides by all relevant laws and regulations, the intent of this INRMP, and good stewardship in its use and management of the training site's resources.

6.1.1 Training Operations

VTS-M exists for the purpose of training National Guardsmen, and that training does have environmental impacts. The following guidelines should be incorporated into all training activities:

Roads and Vehicles

- No new roads, maneuver trails, maneuver corridors, or training area access points may be created without approval of Range Control.
- Track vehicles are restricted to existing maneuver trails, hardened crossings, and designated maneuver corridors when moving between training areas.
- Cross-country maneuver of tracked and wheeled vehicles through forested areas without existing maneuver corridors must be pre-approved by Range Control.
- Bivouac sites and other training areas should be rotated to minimize impact on the soils and vegetation when feasible.
- Vehicles brought to VTS-M from off-site should be thoroughly washed upon arrival at the Cantonment of VTS-M before entering the training areas to minimize the spread of invasive species. Vehicles should also be washed prior to leaving post to prevent the spread of invasive species to off-post areas.

Plants and Animals

- Personnel will comply with State Game and Fish Laws.
- Interaction with wildlife should be avoided due to health and safety concerns.
- Do not disturb experimental exclosures or other wildlife management equipment or facilities.
- Do not cut vegetation 3 inches in diameter or larger, or any trees with protective coverings or special marks.

Streams and Wetlands

- Streamside Management Zones (SMZs) shall be identified around all water bodies. Perennial and intermittent streams will have an SMZ extending 50 feet to either side of the stream for a total width of 100 feet. There shall be an SMZ 50 feet wide surrounding all wetland areas.
- Avoid operating vehicles in SMZs.
- Vehicle crossings of riparian zones and streams will only be conducted at designated points.
- Spills will be immediately contained and reported according to the VTS-M Spill Prevention Control and Countermeasures (SPCC) Plan.
- Foot traffic is allowed in wetlands.

- Vehicular traffic is not allowed in wetlands except on established roads.
- There will be no dredging, filling, or dumping of material within wetland areas. Any exceptions have to be approved by the Environmental Office and required state and/or federal permits obtained before the activity takes place.

Wildfire Management

- Open burning is not allowed without a permit.
- Avoid spark-producing activities in dry weather.
- The use of tracer rounds will be suspended during periods of very high fire danger. The National Fire Rating System can also be accessed at http://www.wfas.us/ under "Fire Danger Rating."
- Accidental fires in training areas will be combated by the unit occupying the area, or the nearest unit to an unassigned area, immediately upon discovery.
- The discoverer of a fire will immediately notify VTS-M Range Control and his own immediate superior officer. The next higher headquarters will also be advised, and Range Control will immediately notify the TNARNG Environmental Office.
- Each succeeding commander in the chain of command will take action as appropriate to provide forces to extinguish or control fires pending arrival of firefighting specialists.
- Prescribed fires will be initiated by trained TNARNG, partner agency, or contract personnel. If the military mission requires an area of VTS-M to be burned, this information will be provided to the Natural Resources Manager so that the area can be integrated into the overall burn plan for the year. Guidelines and recommendations for using prescribed fire in natural resources management efforts at VTS-M may be found in Annex 2.

6.1.2 Land Rehabilitation and Maintenance (LRAM) and Construction

Activities which disturb the vegetation and soil can be particularly damaging to the environment if improper methods lead to erosion and sedimentation problems. Even actions intended to improve conditions, such as LRAM projects, can cause damage if not handled appropriately. LRAM and Construction are the two areas which routinely involve earth moving activities and are both subject to the following guidelines:

- Follow the Erosion Control Best Management Practices listed in Table 5.1.
    - Additional information on erosion control procedures is available in the Tennessee Erosion and Sediment Control Handbook (Price and Karesh 2002) available at http://www.state.tn.us/environment/wpc/sed_ero_controlhandbook/
- Schedule and perform land rehabilitation projects as soon as possible following disturbance, allowing sufficient time for soils to recover. Seed during optimum seeding periods for individual species. Seeding made in fall for winter cover should be mulched.
- Use temporary erosion control methods (such as cover crops) during rainy periods to protect the soil.
- Include all necessary rehabilitation work, best management practices, and associated costs in project proposals and construction contracts and specifications.
- Only native plant species will be used for landscaping and reclamation work, wherever feasible.
    - When planting native grasses, include non-persistent grasses that act as a cover crop for the first two or three years to minimize erosion before native species become established, for example: red top, timothy, winter wheat, and grain sorghum.
- Areas that fail to establish vegetative cover will be reseeded as soon as such areas are identified and weather permits.

- Present all construction or other ground-disturbing project plans to the Environmental Office for review as far in advance as possible: special permits are required when disturbing federal jurisdictional wetlands or perennial or intermittent streams and will take time to obtain.

Table 6.1: Erosion Control Best Management Practices (BMPs) for LRAM and Construction Projects. From the TDEC Erosion and Sediment Control Handbook (Price and Karesh 2002) (http://www.state.tn.us/environment/wpc/sed_ero_controlhandbook/)

1. **Construction Management Measures**
    a. Clearing and grubbing must be held to the minimum necessary for grading and equipment operation.
    b. Construction must be sequenced to minimize exposure time of cleared surface area. Grading activities must be avoided during periods of highly erosive rainfall.
    c. Construction must be staged or phased for larger projects. Areas of one phase must be stabilized before another phase can be initiated. Stabilization shall be accomplished by temporarily or permanently protecting the disturbed soil surface from rainfall impacts and runoff.
    d. Erosion and sediment control measures must be in place and functional before earth moving operations begin and must be properly constructed and maintained throughout the construction period.
    e. Regular maintenance is vital to the success of erosion and sediment control systems. All control measures shall be checked twice per week, 72 hours apart, before anticipated storm events, and after each rainfall. During prolonged rainfall, daily checking is necessary.
    f. Construction debris must be kept from entering any stream channel.
    g. Stockpiled soil shall be located far enough from streams or drainageways that runoff cannot carry sediment downstream.
    h. A specific individual shall be designated to be responsible for erosion and sediment controls on each project site.
    i. If the area to be disturbed is 1 acre or greater, a Tennessee Construction General Permit is required and a site-specific Storm Water Pollution Prevention Plan (SWPPP) must be developed. The Notice of Intent and SWPPP must be submitted to the State at least 30 days prior to any disturbance of the site. Land disturbing activities shall not start until written approval and Notice of Coverage is obtained from the TDEC Division of Water Pollution Control.

2. **Vegetative Controls**
    a. A buffer strip of vegetation at least as wide as the stream shall be left along any stream bank. On streams less than 25 feet wide, the buffer zone shall extend at least 25 feet back from the water's edge on both sides.
    b. Vegetation ground cover shall not be destroyed, removed, or disturbed more than 15 calendar days prior to grading.
    c. Temporary soil stabilization with appropriate annual vegetation (e.g., annual ryegrass) shall be applied on areas that will remain unfinished for more than 30 calendar days.
    d. Permanent soil stabilization with perennial vegetation shall be applied as soon as practicable after final grading.

3. **Structural Controls**
    a. Staked and entrenched straw bales and/or silt fence must be installed along the base of

all fills and cuts, on the downhill sides of stockpiled soil, and along stream banks in cleared areas to prevent transport of sediment into streams. Straw bales and/or silt fence may be removed at the beginning of the work day but must be replaced at the end of each work day.

b. All surface water flowing toward the construction area shall be diverted around the construction area to reduce erosion potential, using dikes, berms, channels, or sediment traps, as necessary. Temporary diversion channels must be lined to the expected high water level and protected by non-erodible material to minimize erosion. Clean rock, log, sandbag, or straw bale check dams shall be properly constructed to slow runoff and trap sediment.
c. Sediment basins and traps shall be properly designed according to the size of the disturbed or drainage areas. Water must be held in sediment basins until at least as clear as upstream water before it is discharged to surface waters. Water must be discharged through a pipe or lined channel so that the discharge does not cause erosion and sedimentation.
d. Streams shall not be used as transportation routes for equipment. Crossings must be limited to one point. A stabilized pad of clean and properly sized shot rock must be used at the crossing point.
e. All rocks shall be clean, hard rocks containing no sand, dust, or organic materials.

6.1.3 Facilities Management

Maintenance of an attractive, tidy facility is important; however, even activities in a heavily modified cantonment area can impact the environment. Mowing, landscaping, and pesticide use in the managed landscape should be undertaken with consideration for this impact.

- Only native species will be used for landscaping and replanting purposes without clearance from the Environmental Office. Native plants are better adapted to local conditions and generally require less fertilizer and herbicide/pesticide input. Use of natives also limits the spread of invasive, exotic species.
- Consider seasonal variables (e.g., timing and quantity of average rainfall, appropriate planting season) in planning and scheduling projects.
- Consider erosion factors when choosing sites for training, construction, or management activities.
- Always include appropriate surface restoration, fertilization, and seeding (or other revegetation practice) as the final stage of any project which disturbs the soil or vegetation.
- Apply BMPs (see Tables 5.1 and 5.2) to all TNARNG projects.
- Use biological control methods wherever feasible and economical. Only apply pesticides when effective biological or mechanical control methods cannot be found or are prohibitively expensive. See TNARNG Integrated Pest Management Plan for more information.
- Pesticides and herbicides can only be applied by certified applicators and must be reported to the Pest Management Coordinator (see section 5.1.8 for more information).
- Herbicides will be utilized to control weedy vegetation in the most time- and cost-effective manner. See Annex 3 for more information about invasive pest plant control.

6.1.4 Road Construction and Maintenance

Roads can be a significant source of sediment, as well as an on-going drain on funds, if poorly designed.

Proper placement, design, and construction can alleviate many of the problems associated with unpaved roads, even when utilized by heavy wheeled and track vehicles. The State Forestry Best Management Practices (Table 5.2) deal largely with road construction and should be applied to all road building activities on VTS-M.

Table 6.2: Forestry Best Management Practices (also apply to Construction and Rehabilitation of Tank Trails). From the Guide to Forestry Best Management Practices (Division of Forestry 2003) (http://www.state.tn.us/agriculture/forestry/BMPs.pdf)

1. **Access Road Location.** Access roads shall be designed and located to prevent sediment from entering the waters of the State as defined at Tennessee Code Annotated (T.C.A.) § 69-3-102. Methods to prevent sedimentation to streams include, but are not limited to, the following:
    a. Minimize the amount of road to be constructed using existing roads where practical.
    b. Locate roads as far from streams and lakes as possible and practical.
    c. Locate roads as far as practical from SMZ).
    d. Avoid or minimize stream crossings. If crossings are necessary, roads should cross streams as close to right angles as possible.
        1. When possible, locate crossings on the straightest section of streams and minimize disruption of normal stream flow.
        2. Design crossings such that disruption of movement of aquatic life is minimized.
        3. Where applicable, approaches to stream crossings should climb away from streams to minimize erosion during high water and should be graveled to prevent washing and rutting.
        4. Where practical, broad-based dips and wing ditch turnouts should be installed to turn water off roads before entering the stream.
        5. When fords are used:
            a. Fords should be located where stream banks are low.
            b. Fords should have a solid bottom; if not, use a pole ford or other appropriate cover. Cover should be removed after use.
        6. When culverts are used:
            a. Culvert size should accommodate the area to be drained.
            b. Installation of culverts should minimize disturbance of stream channels and avoid sloughing of stream banks.
        7. When bridges are used:
            a. Bridges should be located across narrow points on firm soils.
            b. Care should be taken to protect banks from sloughing when constructing and removing temporary bridges.
    e. Avoid sensitive areas that could interfere with drainage and cause soil compaction or erosion.

2. **Access Road Construction**. Access roads shall be constructed to prevent sediment from entering the waters of the State. Methods to prevent sedimentation include, but are not limited to, the following:
    a. To the extent possible, construct and revegetate new roads several weeks or longer in advance of logging/use.
    b. Avoid road construction during periods of wet weather.
    c. Construct roads on grades of 2 to 12 percent where possible. Runoff from roads should

not directly discharge into a stream channel. Runoff from stream crossings should be minimized. Control runoff from roads using techniques such as varying the slope of the road, crowing, outsloping, wing ditches, sediment traps, sediment control structures, broad-based dips, rolling dips, water bars and cross drain culverts and other measures recommended by the Department of Agriculture. Steeper grades are acceptable for short distances provided additional attention is given to water control/drainage structures.

d. When possible, trees and brush cleared for road corridors should be pushed to the downhill side of the road to assist in trapping sediment.
e. Avoid excessive soil disturbance during road construction.
f. Revegetate exposed soil in potential problem areas (i.e., culverts, stream crossing, fill areas).
g. In association with wetlands:
    1. Design the road fill with bridges, culverts, or other drainage structures to prevent the restriction of expected flood flows.
    2. Remove all temporary fills in their entirety and restore the area to its original elevation.

3. **Road Retirement.** Access roads shall be retired in such a way as to prevent sediment for entering the waters of the State. Methods to prevent sedimentation include, but are not limited to, the following:
    a. Water bars or other drainage structures should be constructed immediately after active logging/road use has ceased. If logging will be delayed for a substantial period of time, temporary drainage and erosion control structures should be constructed.
    b. Upon completion of logging/road use, remove temporary bridges, culverts, and pole fords; remove sediment and debris from dips, ditches, and culverts; and revegetate problem areas.
    c. Use lime, fertilizer, mulch, and/or seed when needed to prevent soil erosion. Amounts should be based on recommendations from the Department of Agriculture or the University of Tennessee Agricultural Extension Service.

4. **Streamside Management Zone (SMZ)** (see Section 5.1.5 below). Streamside management zones shall be designed and managed along perennial and intermittent streams, lakes, and impoundments to prevent sediment from entering waters of the State. Methods to prevent sedimentation to streams include, but are not limited to, the following:
    a. Establish SMZs along any stream or water body where the potential exists for the movement of sediment into stream or water body. The width of SMZs should be a minimum distance of 50 feet from the disturbed area to the stream for zero percent slop and 20 additional feet for each additional 10 percent of slope. This applies to both sides of the stream (total minimum width of 50 feet). In association with wetlands, establish SMZs at least 50 feet in width along both sides of all streams and open water (total minimum width of 100 feet).
    b. Do not remove any trees within an SMZ if such removal would result in soil potentially getting into the stream. If trees can be harvested without risk of soil loss, maintain 50 to 75 percent of the vegetation canopy shading a perennial stream.
    c. Avoid operating any harvesting equipment or vehicles within and SMZ. Whenever possible, timber harvested within an SMZ should be pulled or winched out.

6.1.5 Water Resources

The water resources on VTS-M include several different ecotypes: perennial and intermittent streams, the riparian areas surrounding the streams, and wetlands. While the characteristics of these sites can vary widely, they share the key factor of water and a significant role in the water cycle as well as being important habitats for many creatures. Protection of water resources is of the utmost importance, and they are habitats that can be easily damaged by accident or careless action. One of the simplest BMPs for protection of water resources is the establishment and use of SMZs.

Streamside management zones are buffer strips adjacent to perennial or intermittent streams or other bodies of water within which activities are limited in order to protect water quality. They shall be designated and managed to buffer water temperatures, prevent sediment and other pollutants from entering waters of the State, and provide travel corridors and habitat for wildlife. SMZs should be established along any stream (perennial or intermittent) or water body where the potential exists for the movement of sediment or pollutants into the stream or water body. Methods to prevent sedimentation to streams include, but are not limited to, the following:

- Establish SMZs along any stream (perennial or intermittent) or water body where the potential exists for the movement of sediment into the stream or water body.
- The width of the SMZ will be a minimum distance of 50 feet from the disturbed area to the stream for zero percent slope and 20 additional feet for each additional 10 percent of slope. This applies to both sides of the stream (total minimum width of 100 feet).
- In association with wetlands, establish SMZs at least 50 feet in width surrounding the wetland area.
- There shall be no digging for training purposes, forest management, or construction activities within an SMZ without prior review and permission from the Environmental Office. Certain activities may require a state or federal permit prior to initiation of activity.
- Do not remove any trees within an SMZ if such removal would result in soil potentially getting into stream. If trees can be harvested without risk of soil loss, maintain 50 to 75 percent of the vegetation canopy shading a perennial stream.
- Avoid operating any vehicles or other equipment within an SMZ.

In addition to protection of Streamside Management Zones, other actions and/or limitations are essential to maintain high water quality and habitat quality:

Streams and Riparian areas

- Training is allowed in riparian areas outside of the SMZ in accordance with guidelines for forestlands. Use extra caution to avoid causing sedimentation or other contamination of the associated waterway.
- Spills will be immediately contained and reported according to the VTS-M SPCC Plan.
- Dumping of any substance on the training site is not allowed.
- Minimize stream crossings. If regular fording of a creek or seasonal conveyance is necessary, hardened crossings provide more protection. Contact the Environmental Office prior to making any alterations to any stream crossing.
- Monitor for erosion problems along stream banks. Report any erosion, exposed soil, or stream bank collapse to the Environmental Office as soon as possible.
- Utilize native species for plantings to stabilize banks. Vegetative structures are preferable to riprap or concrete structures in most situations.
- Use Erosion Control BMPs during all LRAM projects, road construction and relocation, and maintenance (see Table 5.1).

- Any activity that will impact a stream or wetland must be presented to the Environmental Office well in advance of the planned action date: special permits are required when disturbing federal jurisdictional wetlands or perennial or intermittent streams, and these permits take time to obtain.

7 Wetlands

- Foot traffic is allowed in wetlands.
- Vehicular traffic is not allowed in wetlands except on established roads.
- Any non-foot traffic, training, or land management activity to be conducted within a wetland should be coordinated with the Environmental Office.
- There will be no dredging, filling, or dumping of any material within wetland areas. Any exceptions will have to be approved by the Environmental Office and required state and/or federal permits obtained.
- Only herbicides and pesticides labeled for wetland/surface water use will be applied within wetland boundaries (e.g., Rodeo, Aquamaster, Habitat, Accord).
- All EPA Pesticide General Permit requirements will be followed. There will be no application of pesticides over open water without an NPDES permit.
- Within the 50 foot wetland SMZ, foliar application of herbicides will be limited to products labeled for application to water because of the risk of drift. All other herbicide applications made within the SMZ area will be made via stem treatments (cut stump, basal bark, or stem injection).
- Any ground disturbing activities near wetland areas that might alter the hydrology of the system must be reviewed by the Environmental Office Conservation Branch before any work takes place.
- Implement Erosion and Sediment Controls in construction areas and maneuver areas, streambank stabilization methods, and forestry BMPs to minimize delivery of sediment and chemical pollutants to wetland areas.
- Present all construction plans to the Environmental Office for review as far in advance as possible: special permits are required when disturbing federal jurisdictional wetlands or perennial or intermittent streams and will take time to obtain.

6.1.6 Forestland Use

TNARNG manages VTS-M for multiple use, including military training, natural resources stewardship, and timber. To maintain the health and integrity of the forest ecosystem present, certain key factors should be observed:

- Tracked and wheeled vehicles are restricted to existing maneuver trails, hardened crossings, and designated maneuver corridors when moving between training areas. Transition from travel on trails to off-road maneuver should only occur at predesignated points. Cross-country maneuver through areas without existing maneuver corridors must be pre-approved by Range Control.
- Cross-country maneuver of tracked and wheeled vehicles through forested areas without existing maneuver corridors must be pre-approved by Range Control.
- Bivouac sites and other forested training areas should be rotated to minimize impact on the soils and vegetation when feasible. Site condition should be monitored semi-annually utilizing the existing long-term vegetation monitoring protocol or the RTLA methodology.
- Clearing or thinning of forest stands to improve or expand training areas will be coordinated through the TNARNG Environmental Office.
- Do not cut vegetation 3 inches in diameter or larger, or any trees with protective coverings or

special marks.

- Open burning is not allowed without a permit.
- Accidental fires in training areas will be combated by the unit occupying the area, or the nearest unit to an unassigned area immediately upon discovery. Contact Range Control immediately. See 5.1.1 Training Operations Guidelines for further wildfire information.
- Interaction with wildlife should be avoided due to health and safety concerns.
- Personnel using the area will comply with State Game and Fish Laws.
- Vehicles brought to VTS-M from off-site should be thoroughly washed upon arrival at the Cantonment of VTS-M before entering the training areas to minimize the spread of invasive species.

6.1.7 Grassland Use

The grasslands on VTS-M are principally managed, man-made grasslands (ranges); however, they can provide valuable habitat in addition to training opportunities. In order to improve the ecosystem value of the grassland area the following guidance should be applied to training and management activities:

- Reseed grassland areas with a native seed mix appropriate to the site and intended use when feasible. Use a non-native seed mix developed in cooperation with the Natural Resources section when necessary for soil retention and resiliency in situations where native seed mixes aren't suited to the need or situation. Discontinue the use of KY 31 tall fescue (*Schedonorus phoenix*) and the non-native lespedezas (Chinese or sericea lespedeza (*Lespedeza cuneata*), shrubby lespedeza (*L. bicolor*), and Korean or kobe lespedeza (*Kummerowia stipulacea*)) when possible.
- When feasible, experiment with using appropriate herbicides to kill non-native grasses and allowing the native species to reestablish from the seedbank, followed by spot spraying of undesirable non-native species that come back up. This will allow us to avoid having native grass seedings from becoming too dense, impacting native ground nesting bird breeding.
- Prescribed fire is a useful tool for maintaining grassland ecosystems. TNARNG will develop and implement a burning regime for management and hazard reduction purposes.
- Tracked and wheeled vehicles are restricted to existing maneuver trails, hardened crossings, and designated maneuver corridors when moving between training areas. Transition from travel on trails to off-road maneuver should only occur at predesignated points. Cross-country maneuver through areas without existing maneuver corridors must be pre-approved by Range Control.
- Avoid mowing open grasslands from April to September for the protection of nesting birds. Areas in which taller growth will not impeded training should be mowed in late March and then allowed to grow until November. Where grasslands must be maintained low cut, maintain 25-50 foot buffer strips along the forest edges which will only be mown every 3-5 years.
- Protect large, non-fragmented tracts of quality habitat which are required as territory for survival and maintenance of neotropical migratory birds when feasible.
- Vehicles brought to VTS-M from off-site should be thoroughly washed upon arrival at the Cantonment of VTS-M before entering the training areas to minimize the spread of invasive species. They should be washed prior to departing post to prevent the spread of invasive species to off-post destinations as well.

6.1.8 Pest Management

Pest management is an important part of maintaining facilities and protecting the health and safety of

personnel, as well as the integrity of natural ecosystems. TNARNG pest management activities are regulated by federal and state law and by DoD regulation. These restrictions and the management goals and guidelines for pest control on TNARNG facilities are presented in the Integrated Pest Management Plan.

- All applications of herbicide or pesticide on VTS-M must be by a State- or DOD-certified applicator.
- All applications of herbicide or pesticide must be reported to the TNARNG Pest Management Coordinator (see Appendix G for reporting forms and contact information).
- Use non-chemical control methods wherever feasible and economical. Only apply pesticides when effective biological or mechanical control methods cannot be found or are prohibitively expensive.
- Pesticides and herbicides should be applied at the time when they will be most effective against the pest in order to achieve maximum control for minimum application. See TNARNG Integrated Pest Management Plan for more information.
- Invasive plant species control will follow the methods and guidelines presented Annex 3.
- Only native species will be used in landscaping and in reclamation work.

Contractors who apply pesticides on VTS-M must:

- Show proof of liability insurance.
- Have State commercial certification and licensing in the category or categories of work to be performed.
- Use only EPA registered pesticides or herbicides that are on the "Approved Pesticide List" for use on TNARNG sites (see Appendix J).
- Furnish TNARNG personnel with legible copies of specimen labels and the Material Safety Data Sheets of all pesticides proposed for use.
- Furnish TNARNG personnel with the information required for pest management record keeping (see Appendix G for reporting format).
- Pesticides must be mixed, stored, and disposed of in accordance with Federal, State, and local regulations and with procedures established by the TNARNG.

6.1.9 RTE Monitoring and Protection

Currently, there are no known federally threatened or endangered species at VTS-M. Guidance for the protection of any RTE species discovered at VTS-M will be developed as needed.

6.1.10 Cultural Resources Management

The TNARNG Cultural Resources Management Policy is defined in the Integrated Cultural Resources Management Plan (ICRMP) for Tennessee. This ICRMP was developed with the input and comments from the TNARNG's associated Tribes, the TN/GA- State Historic Preservation Office (SHPO), in accordance with the applicable laws and regulations including the National Historic Preservation Act, DODI 4710.02, and ICRMP Standard Operating Procedure (SOP) #6 – Native American Consultation. The cultural resources manager should be informed of projects that have the potential to affect significant cultural resources, and will perform consultation with the appropriate parties in accordance with applicable federal, state, and local laws and regulations.

The following are key points in protection of cultural resources:

- The TNARNG will consult the Tennessee State Historic Preservation Office and participating Tribes so that known historic, archaeological, paleontological, and sacred sites may be

protected.

- Cemeteries will be protected and maintained through fencing and regular mowing.
- Prior to any ground disturbing undertakings, contact the Cultural Resources office (see "Contacts" at front of this plan) to verify that the site is clear of known cultural resources or if cultural resources are present to initiate Section 106 procedures in accordance with 36 CFR 800.
- In the event of Emergency Discovery of Archaeological Deposits, follow ICRMP SOP #5 – immediately stop all work and contact the Cultural Resources Office immediately. Work can resume once the area has been cleared by the CRM.
- Consultation with interested Tribes will follow procedures laid out in section 6 of DODI 4710-02 (in addition to any other applicable laws) to ensure that natural resources activities do not harm existing or discovered cultural resources.

6.2 MANAGEMENT SCHEDULE

Seasonality is an important factor in protecting natural resources. Certain activities should only be done at certain times of the year, and other actions have a higher probability of success in some months than in others. Table 5.3 provides a calendar for essential natural resources activities for VTS-M. This calendar will be revised as new needs are identified and further information is gathered.

Table 6.3: Natural Resources Calendar

Issue	January	February	March	April	May	June
Weed Control	Pre-emergent weed control on gravel lots and roads			Growth regulator on lawn/range area grasses	Contact herbicide on fencelines and other points of concern	
Revegetation				April 15 -> Plant native grass seed	Plant native grass seed	
					Plant warm season grasses	Plant warm season grasses
	Plant cool season grass		Plant cool season grass	Plant cool season grass	Experiment with herbicide application and native species reestablishment from seed bank.	
			Fertilize	Fertilize		
Erosion control	Erosion survey					
Wildlife	Wood-duck box survey					
Invasive Spp.	**Cut-stump** treatments of privet, princess tree, olives, individuals too large for foliar		**Basal bark** treat oriental bittersweet, tree of heaven, mimosa, sapling size individuals	**Basal bark** treat oriental bittersweet, tree of heaven, mimosa, sapling size individuals	**Basal bark** treat oriental bittersweet, tree of heaven, mimosa, sapling size individuals	**Foliar** treat deciduous plants; **Cut-stump** treat individuals too large for foliar spray

Table 6.3, continued:

Issue	July	August	September	October	November	December
Weed Control	Contact herbicide on fencelines and other points of concern					
Revegetation	Plant warm season grasses	Plant cool season grass Experiment with herbicide and seedbank re-vegetation Fertilize P&K		Fertilize P&K		
Erosion control	Erosion survey					
Wildlife	Bat box and Wood-duck box maintenance and repairs					
Invasive Spp.	**Foliar** treat deciduous plants; **Cut-stump** treat individuals too large for foliar spray	**Foliar** treat deciduous plants; **Cut-stump** treat individuals too large for foliar spray	**Foliar** treatments of honeysuckle and privet on warm days			**Foliar** treatments of honeysuckle and privet on warm days

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APPENDIX A

Environmental Assessment

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APPENDIX A

ENVIRONMENTAL ASSESSMENT

FOR

THE IMPLEMENTATION OF THE REVISED INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN

FOR THE VOLUNTEER TRAINING SITE – MILAN

TENNESSEE ARMY NATIONAL GUARD
CARROLL AND GIBSON COUNTIES, TENNESSEE

PREPARED BY
Tennessee Military Department
Environmental Office

November 2011

This Environmental Assessment (EA) evaluates the environmental effects of the Tennessee Army National Guard's proposed action to implement the revised Integrated Natural Resources Management Plan for the Volunteer Training Site – Milan in Carroll and Gibson Counties, Tennessee. This EA will facilitate the decision process regarding the proposed action and alternatives.

SECTION 1 PURPOSE AND NEED FOR THE PROPOSED ACTION summarizes the purpose of and need for the proposed action, provides relevant background information, and describes the scope of the EA.

SECTION 2 DESCRIPTION OF THE PROPOSED ACTION describes the proposed action.

SECTION 3 ALTERNATIVES CONSIDERED examines alternatives for implementing the proposed action.

SECTION 4 AFFECTED ENVIRONMENT describes the existing environmental and socioeconomic setting for each location considered.

SECTION 5 ENVIRONMENTAL CONSEQUENCES identifies potential environmental and socioeconomic effects of implementing the proposed action and alternatives, and identifies the mitigation measures proposed.

SECTION 6 COMPARISON OF ALTERNATIVES AND CONCLUSIONS compares and contrasts the alternative effects, and summarizes the significance of individual and expected cumulative effects for each of the alternatives.

SECTION 7 REFERENCES provides bibliographical information for cited sources.

SECTION 8 LIST OF PREPARERS identifies persons who prepared the document and their areas of expertise.

SECTION 9 AGENCIES AND INDIVIDUALS CONSULTED provides a listing of individuals and agencies consulted during preparation of the EA.

APPENDICES
A Agency Consultation Letters
B Public Comments and Responses (Final EA only)
C Newspaper Public Notice Affidavits (Final EA only)

ENVIRONMENTAL ASSESSMENT
FOR
IMPLENENTATION OF THE REVISED INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN, VOLUNTEER TRAINING SITE-MILAN TENNESSEE ARMY NATIONAL GUARD

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ACRONYMS AND ABBREVIATIONS

AR	Army Regulations
BMP	Best Management Practices
CEQ	Council on Environmental Quality
CESQG	Conditionally Exempt Small Quantity Generator
CFR	Code of Federal Regulations
CSMS	Combined Support Maintenance Facility
DA	Department of the Army
DBH	Diameter at Breast Height
DoD	Department of Defense
EA	Environmental Assessment
EIS	Environmental Impact Statement
EO	Executive Order
ESMC	Endangered Species Management Component
FIFRA	Federal Insecticide, Fungicide, and Rodenticide Act
FNSI	Finding of No Significant Impact
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IPP	Invasive Pest Plants
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NRHP	National Register of Historic Places
NWI	National Wetland Inventory
RTE	Rare, Threatened, or Endangered species
SHPO	State Historic Preservation Officer
SMZ	Streamside Management Zone
SPCC	Spill Prevention Control and Countermeasure
TA	Training Area
TMDL	Total Maximum Daily Load
TNARNG	Tennessee Army National Guard
USC	United States Code
USDA	United States Department of Agriculture
USPFO	United State Purchasing Fiscal Office
UTES	Unit Training Equipment Site
VTS-M	Volunteer Training Site – Milan

1.0 PURPOSE AND NEED FOR THE PROPOSED ACTION

1.1 INTRODUCTION

In 2001, the Tennessee Army National Guard (TNARNG) implemented an Integrated Natural Resources Management Plan (INRMP) for the purpose of guiding land management activities on the Volunteer Training Site – Milan (VTS-M) in Carroll and Gibson Counties, Tennessee, for the period 2002-2006. When the document was reviewed in 2005, it was determined that a full revision would be needed to guide future management due to the development of a forest management plan and the need for more comprehensive guidance. To that end, the TNARNG, in cooperation with the U.S. Fish and Wildlife Service, Cookeville Field Office, and the Tennessee Wildlife Resources Agency, began to develop a Revised INRMP for the VTS-M. Due to the addition to the plan of forestry and wildland fire operations which have the potential for significant environmental alteration and were not reviewed in the Environmental Assessment (EA) for the original INRMP, a new EA was deemed necessary. The purpose of this EA is to evaluate the impacts of implementing this Revised Integrated Natural Resources Management Plan.

This environmental assessment (EA) has been prepared in accordance with the National Environmental Policy Act (NEPA) and its implementing regulations as published by the Council on Environmental Quality (CEQ) (40 Code of Federal Regulations (CFR) 1500-1508) as well as 32 CFR 651, *Environmental Analysis of Army Actions*; National Guard Bureau (NGB) "All States" Memoranda on NEPA policy guidance; and the ARNG NEPA Handbook, October 2011. Collectively, these regulations and the guidance thereto establish a process by which the Department of the Army (DA) considers and documents the potential environmental and socioeconomic effects of proposed actions and alternatives and then invites comments of interested citizens and organizations prior to deciding on a final course of action. If the analysis presented in this EA indicates implementation of the proposed action would *not* result in significant environmental or socioeconomic impacts, then a Finding of No Significant Impact (FNSI) will be prepared. If a significant impact would result that cannot be mitigated, issuance of a notice to prepare an environmental impact statement (EIS) would be required. CEQ regulations specify that an EA should:

- briefly provide evidence and analysis for determining whether to prepare an EIS or a FNSI
- aid in an agency's compliance with NEPA when an EIS is unnecessary
- facilitate preparation of an EIS when one is necessary

This NEPA review assesses known, potential, and reasonably foreseeable environmental consequences related to strategies presented in this INRMP. However, this NEPA review does not comprehensively assess environmental effects of specific projects presented in this INRMP. Therefore, additional NEPA analysis could be required prior to the implementation of certain actions or projects (e.g., prescribed burning, timber harvests). Furthermore, because the plan will be modified over time, additional environmental analyses pursuant to NEPA may be required if new management measures are developed for the long-term (i.e., beyond five years).

1.2 PURPOSE AND NEED

The Sikes Act, as amended, states "the Secretary of each military department shall prepare and implement an integrated natural resources management plan for each military installation in the United States under the jurisdiction of the Secretary, unless the Secretary determines that the absence of significant natural resources on a particular installation makes preparation of such a plan inappropriate" (16 U.S. Code

(USC) 670a et seq.). The VTS-M consists of approximately 2400 acres and contains significant natural resources, including substantial timber resources and almost 250 acres of wetland. Therefore, the TNARNG has prepared an INRMP for the VTS-M as a means of ensuring compliance with the Sikes Act.

The purpose of the proposed action is to guide land management on VTS-M to provide for the effective, long-term management of the site's natural resources while allowing the training mission to proceed. Key features of this management program are to provide for the conservation and rehabilitation of natural resources including soil, water, vegetation, and wildlife resources and the maintenance of healthy, functional ecosystems to support military training.

The proposed action is needed in order to ensure natural resources are managed effectively on the VTS-M while allowing the training mission to be accomplished and to maintain compliance with the Sikes Act, as amended, Department of Defense (DoD) Instruction 4715.03 (Natural Resources Conservation Program), and Army Regulation (AR) 200-1 (Environmental Protection and Enhancement), and applicable ARNG and DoD guidance.

1.3 SCOPE OF THE DOCUMENT

Two courses of action are considered under this EA: The Proposed Action and the No Action Alternative. The Proposed Action evaluated in this EA would be for TNARNG to implement the Revised Integrated Natural Resources Management Plan for VTS-Milan. Management would include actions for the management of timber resources for forest health and training needs, maintenance of vegetation communities and wildlife habitat, protection of soil and water resources through erosion prevention and repair, and maintenance of other environmental values. The No Action Alternative considered under this EA would result in no new management plan implementation but a continuation of management according to the 2002-2006 INRMP for VTS-M.

2.0 DESCRIPTION OF THE PROPOSED ACTION (THE PREFERRED ALTERNATIVE)

The Proposed Action is to implement the Revised INRMP for the VTS-M to guide natural resources on that facility until the document is revised or supplanted. This action is designed to support the military mission by protecting and enhancing training lands (vegetation, soils, water quality, and wildlife) while providing quality conditions for training. This action would comply with the requirements of the Sikes Act and AR 200-1.

The Revised INRMP has been updated with recent survey data and streamlined to provide easy-to-understand guidance for training site managers, personnel, and users. The Revised INRMP also contains three recently developed specific management components: the forest management plan, the wildland fire management plan, and the invasive pest plant control plan.

The Revised INRMP identifies multiple natural resources management goals and the objectives and tasks that are necessary to accomplish those goals for integrated, sustainable land management at the VTS-M. It also outlines training and equipment needed to support natural resources goals. These goals, objectives, and tasks are identified in Chapter 4 of the Revised INRMP for the key resource areas defined by the Sikes Act:

- Ecosystem Management
- Rare, Threatened, and Endangered (RTE) Species

- Reclamation and Mitigation
- Erosion Control and Soil Conservation
- Watershed Management
- Wetlands Protection
- Forest Management
- Fire Management
- Fish and Wildlife Management
- Pest Management
- Grounds Maintenance
- Recreational Use Management
- Cultural Resources Management
- Geographic Information Systems:

The objectives and the tasks, or projects, associated with each of the objectives are presented in Table 4.3 of the Revised INRMP (p. 76 *et seq*.). Most of the actions proposed by the INRMP have low impact on the environment (e.g., surveys, monitoring, and environmental education for staff) or are distinctly beneficial to the environment (e.g., erosion control and rehabilitation, habitat restoration). Activities which involve more complex interactions with the environment include forest management, prescribed fire, and invasive species control.

Forestry

The forest management plan (see Annex 1 of the INRMP) presents a prioritized schedule of timber harvests for the improvement of forest health and quality and for the development of additional training situations. With the exception of a small area (less than 20 acres) scheduled to be clearcut as soon as possible for training use, all timber harvests will be thinning or group selection. The majority of the harvests will utilize small group selection (cut small areas less scattered throughout the stand) to encourage hardwood regeneration and create a patchwork of age classes to mimic a more natural forest condition. The cut areas will total no more than 30% of a stand's acreage. Certain stands will be subject to thinning from below – the small trees, pulpwood and small sawtimber, will be removed to make space for the current dominant trees to grow larger. Thinning from below will remove 30-50% of existing biomass typically, but will leave healthy sawtimber-size trees as well as space for increased regeneration.

The plan currently designates 340 acres to have some form of timber harvest in the next 12 years of management. Over several decades, approximately 1200 ac will be harvested utilizing small group selection and thinning; however, the exact schedule of those harvests will be subject to revision in accordance with routine re-inventory of forest resources (next scheduled for 2015). A buffer of at least 50 feet on each side of the creeks will be protected for maintenance of riparian qualities.

Wildland Fire

Prescribed fire (see Annex 2 of the INRMP) will be utilized on VTS-M for the purposes of reducing fuel load and wildfire threat, creating and maintaining training conditions, controlling invasive species, and to encourage oak regeneration. Riparian areas (50 foot buffer on either side of the waterway) will be protected from fire.

For the most part, fire will be used on the managed grasslands of the training site. These areas will be burned on a 2 year rotation. Forested areas may be burned on a longer rotation (typically 6 years for hardwood stands, 4 years for mixed pine/hardwood stands) as needed for fuel control or training area maintenance. The Cantonment area, the border along Highway 220, and the substantial wetland area in training area A-9 will not be burned.

Invasive Species Control

This revision of the INRMP provides more detailed instructions for the control of invasive pest plants (IPP) (see Annex 3 of the INRMP) than the original plan. A number of non-native plants have invaded the ecosystems of VTS-M and have altered conditions and biodiversity. Control of these problem species will involve the application of herbicides.

The principle species to be controlled on VTS-M are privet, Japanese honeysuckle, multiflora rose, Nepalese browntop, Canada thistle, sericea lespedeza, and Johnson grass. The training site does have a few small infestations of kudzu which need to be controlled before they expand. The chemicals to be used include glyphosate, Garlon 3A, Garlon 4, Arsenal, and Tordon (for kudzu). The most controlled methods of application will be used when feasible: cut stump treatment and stem injection. For small diameter trees or saplings, basal bark spray is the method of choice. Foliar spray will be used for species (e.g., honeysuckle, Nepal grass, and wintercreeper) which are not easily subject to the other methods and for resprouts of previously treated individuals. Methods will follow recommendations by Miller (2003).

All appropriate precautions will be taken to minimize the danger of drift of herbicide onto nontarget plants. The extensive creek and wetland system of VTS-M will also be protected from herbicide contamination: within 50 feet of water, only stem treatments will be used, and foliar treatments will be avoided in any situation where spray would be carried toward water. To minimize the risk of erosion issues from elimination of IPP near streams, dead vegetation will be left standing on creek banks wherever possible, and there will be no stump removal on creek banks or within the 50 foot streamside management zone (SMZ).

3.0 ALTERNATIVES CONSIDERED

3.1 ALTERNATIVES DEVELOPMENT

Alternatives were considered based on budget constraints, regulatory requirements, and the functionality of the action. A partial implementation alternative was examined but was discarded as incompatible with DoD and Sikes Act guidance: the INRMP is an integrated document incorporating a specified selection of topics which interact to ensure effective ecosystem management of the site. Elimination of any of those topics would result in a document that does not meet regulatory requirements and a program which is incomplete and ineffective. Therefore, only two alternatives are considered in this NEPA analysis: the Proposed Action and the No Action Alternative.

3.2 NO ACTION ALTERNATIVE

Under the No-Action Alternative, the VTS-M Revised INRMP would not be implemented, and current natural resources management practices would continue in accordance with the 2002-2006 INRMP. While this alternative would not result in significant adverse effects, it does not update goals, objectives and projects needed to effectively manage the natural resources on VTS Milan. Implementing the No Action Alternative would continue as is.

In accordance with regulations promulgated by the Council on Environmental Quality (CEQ), 40 CFR, Part 1500, Section 1502.14(d), a "No-Action" Alternative would not satisfy the purpose of or need for the

Proposed Action, this alternative is to provide a benchmark against which the effects of the Proposed Action can be evaluated.

Under the No Action alternative the following natural resource management practices would persist as directed by the original INRMP:

- Implementation of Best Management Practices (BMPs)
- Protection of wetlands and riparian areas
- Use of temporary erosion control methods during heavy troop training periods
- Implementation of erosion control projects, as funding becomes available
- Control of non-native invasive plant species and use of native species for revegetation where feasible
- Intermittent use of prescribed fire in grasslands to maintain training conditions

Management actions that would not be implemented under the No-Action Alternative include:

- Forest management actions (timber stand improvement, thinning, harvest, etc.)
- Prescribed fire management coordinated with timber management activities for ecosystem management
- An updated invasive pest plant control plan guided by a recent IPP survey and up-to-date control recommendations.
- Additional biological surveys to support or augment those completed in accordance with the original INRMP

4.0 AFFECTED ENVIRONMENT

4.1 LOCATION DESCRIPTION

The Volunteer Training Site – Milan is a 2,470 acre Tennessee Army National Guard training site located in the central part of West Tennessee, approximately 20 miles north of Jackson, Tennessee (see **Figures 2.1**, p.12, and **2.2**, p.13, of the INRMP main body). The majority of the training site lies in Carroll County, with three small satellite parcels located in Gibson County. The site is approximately 27,500 feet in length by approximately 4,500 feet in width, except for the B across the top which has a width of approximately 9,700 feet. The Milan Army Ammunition Plant (MAAP) borders the training site to the west, State Route 220 runs along the eastern boundary, and Highway 104 cuts through the site in the north, separating the A training areas from B areas.

The climate of Carroll and Gibson Counties is characterized by hot summers and cool winters, with precipitation averaging nearly 53" per year, spread relatively evenly through all seasons. The long growing season and plentiful rainfall combine to create a rich vegetative system dominated by mixed hardwood forest. Forests cover approximately 70% of the training site. Another 27% is managed grasslands on ranges and training areas. The remainder is the developed land of the cantonment area. The MAAP dominates the neighboring lands to the west and consists of a patchwork of grasslands, forested areas, agricultural fields, and open industrial sites. Lands to the east and north are predominantly open grassland and agricultural field.

4.2 LAND USE

VTS-Milan supports the TNARNG State and Federal missions. It provides military field training exercises for both armored and artillery units. This facility provides high quality, realistic training areas,

and is used to conduct small arms weapons training, command post exercises, field training exercises, and other training activities such as classroom work, familiarization with tank armaments, and simulated maneuvers.

4.2.1 Current VTS-M Land Use

VTS-Milan is located on Federally-owned property licensed to the Tennessee Army National Guard from the Mobile District of the U.S. Army Corps of Engineers. The training site is used for the training of troops to meet TNARNG's mission. Most of VTS-Milan utilization is by military units, including the Army National Guard, active U.S. Army, and U.S. Army Reserves. Local law enforcement and the Tennessee Emergency Management Agency also make use of VTS-Milan facilities. Training activities on VTS-Milan include field exercises and classroom training; field exercises comprise wheeled and tracked vehicle maneuvers, foot maneuvers, bivouacking, land navigation, equipment training, aircraft operations (rotary wing only), and small arms familiarization.

The training site consists of 18 training areas (TAs) and a Cantonment Area (see **Figure 2.3**, p.17, of the INRMP). The 120 acre Cantonment Area is located at the southern end of the training site. It contains 65 buildings, including training site headquarters, administrative buildings, Combined Support Maintenance Shop #2, supply buildings, classrooms, dining facilities, and barracks and latrine facilities to accommodate 740 soldiers. The small arms range (berm and baffle) is also considered a part of the cantonment.

The small arms range facilities include:

- 25-meter pistol range
- 25-meter rifle range
- 10-meter M-60 machine gun range

A 100-meter M2HB familiarization range (plastic bullets only) is located in training area A-9, and an M203 practice grenade launcher range (paint rounds) is located in training area B-3. Additional non-live fires ranges include a MILES tank and Bradley target acquisition laser ranges, a hand grenade qualification course, and a nuclear, biological, and chemical readiness range (gas chamber). Army aviation facilities include one non-controlled helipad. The nearest fuel point is the Jackson Metropolitan Airport.

The A and B training areas are designated heavy maneuver areas. Equipment used in these training areas includes M1A1 Abrams Main Battle Tanks and M3A2 Bradley Fighting vehicles. The C and S training areas are designated as light maneuver areas; mounted training is limited to non-track vehicles. Training Areas A and A4 are utilized for engineer training with digging positions and a water crossing on Walker Lake. Bivouac sites are designated in TAs A1, B2, and B3.

4.2.2 Off-Site Land Use

The land to the west of VTS-M is the federally owned, contractor-operated Milan Army Ammunition Plant. Portions of the MAAP are maintained as a State Wildlife Management Area. Property north, south, and east of the training site is primarily privately owned rural residential and agricultural land. The small town of Lavinia lies just to the east of the Cantonment Area along State Route 220.

4.3 AIR QUALITY

The ambient air quality in an area can be characterized in terms of whether it complies with the primary and secondary National Ambient Air Quality Standards (NAAQS). The Clean Air Act requires the

federal government to set NAAQS for pollutants considered harmful to public health and the environment. NAAQS are provided for seven criteria pollutants: carbon monoxide (CO), lead (Pb), nitrogen dioxide (NO_2), ozone (O_3), particulate matter with an aerodynamic size less than or equal to 10 micrometers (PM-10), particulate matter with an aerodynamic size less than or equal to 2.5 micrometers (PM-2.5), and sulfur dioxide (SO_2). Areas are designated as "attainment", "nonattainment", "maintenance", or "unclassified" with respect to the NAAQS. General air quality monitoring is conducted in areas of high population density and near major sources of air pollutant emissions. Rural areas are typically not considered in such monitoring.

Carroll and Gibson Counties are classified as attainment areas for all criteria pollutants. VTS-Milan has minor air pollution sources related to training activities, such as fugitive dust from the use of unpaved roads, vehicular emissions, and range firing. The portable asphalt plant in TA A-1 currently maintains an active Conditional Major Source air quality operating permit to cover its bag house and three diesel generators. Land management activities add minor amounts of particulate matter into the air from prescribed burning, mowing activities, and the use of construction equipment. There is no indication that activities on the VTS-Milan have any significant impacts on air quality in the surrounding area.

4.4 NOISE

Noise refers to sounds generated by on-site activities that could affect members of the TNARNG and the public. The EPA provides information on negative effects of noise, identifying indoor and outdoor noise limits that protect public health and welfare (e.g., hearing damage, sleep disturbance, and communications disruption). Noise levels below 65 decibels are generally considered to be acceptable in suitable living environments. The following information is taken primarily from the Statewide Operational Noise Management Plan completed for the TNARNG in 2006 (USACHPPM 2006).

Most of the surrounding lands near VTS-M are either military or rural residential properties and small farms. There are no concentrated residential developments within the range of the noise contours described in the 2006 TNARNG Operational Noise Plan. Noise sensitive receiver sites on the training site include barracks and other quarters and classrooms. Noise sensitive receiver sites close to VTS-M boundaries include residential homes along Highway 220.

Background noise levels within the VTS-M depend on the type and duration of activities on a given day and these noise sources are typically intermittent. Primary sources of noise include rotary-wing aircraft operations, maintenance operations, vehicular traffic, and small arms firing. Land management-related noise producing activities include seasonal mowing in the Cantonment and bushhogging in training areas.

Currently, VTS-M has few issues concerning noise; noise complaints are minimal and, at this time, encroachment pressures are negligible. Operational noise is contained fairly well within the installation boundary, and in those places where the noise does travel beyond the border, the existing land use is of very low density with few residences.

4.5 GEOLOGY AND SOILS

4.5.1 Physiography and Topography

The VTS-M lies within the physiographic region known as the East Gulf Coastal Plain. The topography of the region is gently sloping to moderately steep. The topography of the training site ranges from relatively flat with poor surface drainage in the southern portion to moderately rolling with defined stream

channels in the northern section. VTS-Milan slopes and drains to the west and north toward the Rutherford Fork of the Obion River. Elevation on the training site ranges from 390 feet above mean sea level at the north end of B area to 580 feet at the southeast corner of area A. Steep slopes (greater than 10%) cover approximately 30 to 40 percent of the training site.

4.5.2 Geologic Structure

Rock formations underlying the VTS-M are of the Tertiary period of the Cenozoic and consist of sand, silt, clay, and gravel. The surface formation in the region is the Gulf Coastal Plain Loess, consisting of gray to brown, clayey and sandy silt with thicknesses between 4 and 1,000 feet. Depth to bedrock is not known.

4.5.3 Soils

Teb soil series within three major soil associations are found on VTS-M (see **Figure 3.3**, p.34, and **Table 3.1**, p.33, of the INRMP), as described by the 1984 Carroll County soil survey (Moore et al. 1984) and the 1994 Gibson County soil survey (Jenkins 1994). Waverly-Falaya-Collins soils occur on the nearly level ground of floodplains and stream channels and range from poorly drained to moderately well drained. Flooding and excess water are typical limiting factors. The Lexington-Grenada-Loring association occurs on gently to strongly slopping upland areas and are typically well-drained. These soils are generally highly erodible and may contain a fragipan. Smithdale-Lexington-Providence soils are found on the steep to gently sloping uplands in areas that are highly dissected. They are well-drained and highly erodible and may present difficulties in revegetation.

Soil erosion potential can be a significant limiting factor on the VTS-M (see **Figure 3.4**, p.37, of the INRMP). Approximately 25% of the soil types at VTS-M meet the criteria for highly erodible land and an additional 43% are potentially highly erodible. Wetness and flooding are also limiting factors in the soils adjacent to Johns Creek and Halls Branch. The northwest corner of A area and eastern portion of B area contain wetland soils dominated by the Falaya and Waverly series, which are considered hydric.

4.6 WATER RESOURCES

4.6.1 Surface Water

The VTS-M lies in the Ruther Fork Obion watershed. The training site is drained by two named perennial streams (see **Figure 3.5**, p.34, of the INRMP), Johns Creek and its tributary Halls Branch, as well as numerous unnamed intermittent tributaries. With the exception of Johns Creek, all of these waterways are typically dry during the late summer to early fall, and John Creek has sections that may dry up in drought years. In total there are approximately 18.4 miles of intermittent or flowing stream on the site (Minkin et al. 1998). There are also nine ponds, most of which are smaller than 0.25 acre, except for the 13 acre Walker Lake in TA A-6.

A water quality survey conducted at VTS-M in 1998/99 reported the water quality in the surveyed creeks and ponds as "generally good" with low concentrations of toxic metals, nutrients, anions, and fecal coliform found (SAIC 1999). The State of Tennessee lists both Johns Creek and Halls Branch as impaired due to "nonpriority organics" from hazardous waste sources. Designated uses for both creeks are Fish and Aquatic Life, Recreation, Irrigation, and Livestock Watering and Wildlife.

4.6.2 Wetlands

A 1998 delineation of wetlands and other regulated waters was performed by Minkin et al. (1998). They found that VTS-M contained approximately 246 acres of wetlands, the majority located in the northern portion of the property associated with Halls Branch and Johns Creek (see **Figure 3.5**, p. 39, of the INRMP). The wetlands are predominantly forested, although small areas are scrub-shrub (0.9 ac) or emergent (5.8 ac) wetland.

4.6.3 Groundwater

Groundwater from the Tennessee Tertiary aquifer system is the principle source for drinking water in the region. Depth to groundwater ranges from 10 to 70 feet below the surface and generally flows to the west. Water quality from the Tertiary aquifer system is generally excellent; however, groundwater contamination in the area has been monitored since 1991 when explosives compounds were detected in samples from the western portion of the MAAP.

4.7 BIOLOGICAL RESOURCES

A number of surveys have been conducted to describe the natural resources at the VTS- Milan. Initial studies in 1994 and 2000 (both by SAIC) catalogued terrestrial features. Components of the ecosystem that have been further studied include aquatic life and water quality (SAIC 1999), insects (ERM 2005), invasive pest plant species (Dynamic Solutions 2006a), vegetation communities (Dynamic Solutions 2007b), forest stands (Thompson Engineering et al. 2007), rare, threatened and endangered species (SAIC 2008), birds (AMEC 2008), reptiles and amphibians (URS 2010), and mammals (AMEC 2010). The training site has a diverse assemblage of habitats and species.

4.7.1 Vegetation

The VTS-M is part of the Southeastern Plains and Hills ecoregion and is dominated by oak-hickory forests (Griffith et al. 1997). Eleven plant communities were described in the initial natural resources terrestrial survey in 2000. A 2006 vegetation community classification further refined these communities according to the National Vegetation Classification Standard (see **Figure 3.6**, p.42 of the INRMP). The training site is a patchwork of closed canopy forest (1,733 acres) – predominantly mixed oak but with significant areas of bottomland hardwood and smaller enclosures of mixed pine and oak – and open grasslands (683 acres) which are maintained for training purposes. The grasslands vary in species composition depending on location and management practices. Over 280 species of vascular plant have been identified on the VTS-M (see **Appendix E** of the INRMP), 39 of which are non-native species.

A forest inventory and assessment was conducted in 2005 preparatory to developing a forest management plan for the VTS-M. Stands were found to be in overall good condition but "overmature" by timber production standards. Red oaks and white oaks were the typical dominants, with yellow poplar a common co-dominant. Average DBH for the installation was 13 inches, and trees averaged 30-40 years old, but individuals approaching 70 years in age were common (Thompson Engineering et al. 2006).

4.7.2 Wildlife

A total of 211 animal species have been identified through the above-listed surveys (26 mammals, 9 amphibians, 6 reptiles, 14 fish, and 156 birds) (see **Appendix E** of the INRMP). With the exception of the non-native house sparrow, European starling, and rock pigeon and the resident wild turkey and northern bobwhite, all of the birds found on the training site are subject to the protections of the Migratory Bird Treaty Act.

A number of game species are included in the species list – white-tailed deer, raccoon, opossum, rabbit, squirrel, turkey, northern bobwhite, woodcock, and wood duck; however, at this time there is no hunting on the VTS-M. Fish are sparse in the creeks on the training site due to their ephemeral nature. Lake Walker has been stocked and is fished occasionally by personnel and soldiers.

4.7.3 Rare, Threatened, or Endangered Species

Searches for federal and state rare, threatened, and endangered (RTE) species were made during the 1999 terrestrial natural resources survey (SAIC 2000) and again in a focused RTE survey in 2006-7 (SAIC 2008). These surveys looked specifically for listed species known to occur within 5 miles of VTS-Milan (Table 4-1). The vertebrate species were also considered of interest in the later mammal and herpetofauna surveys; but no federal or state listed RTE species were identified during any of these surveys.

The bird survey completed in 2008 did identify ten species "Deemed in Need of Management" by the State of Tennessee on the training site (Table 4-1, marked with †). Of these, five had possible breeding status on the site – the common barn owl (*Tyto alba*) is known to have successfully nested in training are A-9 in the past. The Interior Least Tern (*Sternula antillarum athalassos*), a federally endangered species, was sighted one time around Lake Walker. This species is not otherwise known from Carroll or Gibson Counties, and despite repeated returns to this location the biologist did not note the species a second time. It is believed to have been a chance stopover from an individual ranging outside its usual territory.

4.8 CULTURAL RESOURCES

During the course of studies in 1999 and 2004, approximately 2,200 acres of the VTS-M have been subject to a Phase I archaeological survey. Twelve historic period sites have been identified, including five cemeteries in use in the 19th and early 20th centuries. Initial determinations found only the cemeteries had the potential to be eligible for the National Register of Historic Places (NRHP). Further investigation in 2006 led to the determination that the cemeteries were also ineligible for the NRHP.

In 1999 a historic building inventory identified seven WWII era buildings eligible for the NRHP. One of these buildings was demolished in 2005, following Section 106 consultation. Consultation has been completed on plans to demolish two more of these buildings to make way for more functional structures to meet TNARNG requirements.

The Chickasaw, Choctaw, Kaskinampo/Coushatta, and Shawnee have aboriginal ties to western Tennessee. Twenty tribes representing these Indian Nations have been included in the initial tribal consultation conducted by TNARNG in 2003, 2004, and 2005. To date, no known traditional cultural properties have been identified on the VTS-M.

Table 4-1. Rare plant and animal species found on or in the vicinity of the VTS-M.

	Scientific Name	Common Name	Habitat	State Status[1]	Federal Status[2]	Global Rank[3]
	Silphium laciniatum	Compass plant	Barrens	T		G5
†	*Accipiter striatus*	Sharp-shinned hawk	Forests, open woodlands	D		G5
†	*Ammodramus henslowii*	Henslow's sparrow	Open fields and meadows	D		G4
†	*Ardea alba*	Great egret	Marshes, swampy woods, ponds	D		G5
†	*Circus cyaneus*	Northern harrier	Marshes, meadows, grasslands; ground nester	D		G5
†	*Egretta caerulea*	Little blue heron	Bodies of calm shallow water	D		G5
†	*Haliaeetus leucocephalus*	Bald eagle	Areas close to large bodies of water	D		G5
†	*Ictinia mississippiensis*	Mississippi kite	Lowland and floodplain forests	D		G5
†	*Lanius ludovicianus*	Loggerhead shrike	Open country with scattered trees	D		G4
†	*Sphyrapicus varius*	Yellow-bellied sapsucker	Deciduous or mixed forest	D		G5
†	*Sternula antillarum athalassos*	Interior Least tern	Mississippi River sand bars and islands	E	E	G4T2Q
†	*Tyto alba*	Barn owl	Open and partly open country	D		G5
	Hyla gratiosa	Barking treefrog	Low wet woods and swamps with ephemeral pools	D		G5
	Sorex cinereus	Common shrew	Rich woodlands	D		G5
	Sorex longirostris	Southeastern shrew	Wet meadows, damp woods, uplands	D		G5
	Zapus hudsonius	Meadow jumping mouse	Open grassy fields near water bodies	D		G5
	Etheostoma pyrrhogaster	Firebelly darter	Sand and gravel bottomed pools of headwaters and creeks	D		G2G3

† Documented at VTS-M

[1] State status codes:
(E) Endangered
(T) Threatened
(D) Deemed in need of management

[2] Federal status codes:
E – Listed federally as endangered

[3] Global rank:
G1 – extremely rare and critically imperiled
G2 – very rare and imperiled
G3 – very rare
G4 – common
G5 – very common

4.9 SOCIOECONOMICS

Socioeconomics identifies and describes the basic attributes and resources associated with the human environment surrounding the VTS-M. This data is presented in order to provide an understanding of the socioeconomic forces that have shaped, and continue to shape, the area. Data have been collected from the U.S. Census Bureau (2010) and the U.S.D.A. Economic Research Service (2010). Among the 95 Tennessee counties, Gibson County is the 30th most populous county, and Carroll County is ranked 51st. Population change has been minor since 2000; although, Carroll County has experienced a slight decrease in population during that time period during which the state population increased by more than 10%. Both counties have a relatively low median household income and higher-than-state-average unemployment rate.

Table 4-2: Regional income data for Carroll and Gibson Counties, Tennessee (U.S. Census Bureau 2010).

	Total Population (2009 estimate)	Population % Change (2000-2009)	Persons per square mile (2000)	Median Household Income (2008)	Unemployment Rate (%) (2009) *
Carroll Co.	28,517	-3.3	49.2	36,091	16.1
Gibson Co.	49,468	2.7	79.9	36,782	14.8
Tennessee	6,296,254	10.7	138.0	43,610	10.5
U.S.	307,006,550	9.1	79.6	52,029	9.3

*Unemployment rate from the USDA Economic Research Service (2010)

Socioeconomic areas of discussion for the affected environment precluded from this discussion due to overall inapplicability include local housing, schools, medical facilities, service facilities, recreational facilities, and associated issues of health and safety. Implementation of the subject INRMP would not affect any of these areas outside the boundaries of the VTS-M.

4.10 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

Because children may suffer disproportionately from environmental health risks and safety risks, Executive Order (EO) 13045, Protection of Children from Environmental Health Risks and Safety Risks, was introduced on April 21, 1997. EO 13045 was intended to prioritize the identification and assessment of those risks that may affect children and to ensure that Federal agency policies, programs, activities, and standards address these risks. Currently, there are seldom children present at the VTS-M as visitors, no children reside at the installation, and no child care centers, schools, parks, or other concentrations of children exist on or near the installation.

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, dated 11 February 1994, was issued to focus attention of federal agencies on human health and environmental conditions in minority and low-income communities, and to ensure that potential disproportionately high and adverse human health or environmental effects on these communities are identified and addressed. Carroll and Gibson Counties, as shown in Table 4-2, have a minority population close to the state average. Poverty rates in both counties are slightly higher than the state rate. Neither county meets the definition of a minority area or a low-income area.

Table 4-3: 2008 Regional population by race for Carroll and Gibson Counties, Tennessee. Data from US Census Bureau (2010).

	All Individuals	% Persons Below Poverty Line (2008)	White (%)	African-American (%)	American Indian & Alaska Native (%)	Asian or Pacific Islander (%)	Two or More Races (%)	Hispanic or Latino[+] (%)
Carroll County	28,517	17.4	87.5	10.6	0.3	Z	1.3	1.6
Gibson County	49,469	17.1	79.7	19.0	0.2	Z	0.9	1.7
Tennessee	6,296,254	15.5	80.4	16.9	1.3	0.1	1.1	3.7
U.S.	304,059,724	13.2	79.8	12.8	1.0	4.5	1.7	15.4

[+] Persons of Hispanic or Latino origin may be of any race.

4.11 INFRASTRUCTURE

4.11.1 Transportation

Infrastructure resources include potable water supply, wastewater treatment, solid waste disposal, energy sources, and transportation systems (i.e., roads, railways, airports).

The VTS-M is accessible by public roads (see **Figure 2.2**, p. 13 of the INRMP): U.S. Highway 70 between Jackson and Huntingdon to State Route 220 to Lavinia. State Route 220 turns northward at Lavinia; access to the Cantonment and TA A-1 is west of that intersection off Arsenal Lane. Additional access to the Cantonment is south of that intersection off Spring Creek-Lavinia Road. State Route 220 runs north along the eastern boundary of the A area of the training site and intersects with State Route 104 which runs west along the southern boundary of the B training areas. The C areas are also accessed from 104 near the intersection with 220. The Cantonment is serviced by paved roads. Approximately 30 miles of roads, predominantly maintained gravel, are within the training site.

One non-controlled helipad serves TNARNG and TEMA needs on the site. The nearest fuel point is the Gibson County Airport six miles west of the MAAP. Commercial air passenger service is available at the Jackson Municipal Airport.

The MAAP is serviced by Louisville and Nashville Railroad (L&N) and Illinois Central-Gulf (ICG). The MAAP has the nearest rail spur that can be used for equipment deployment in case of a natural emergency.

4.11.2 Water and Wastewater

The MAAP provides drinking water to the majority of the training site. Building I-200 and five field latrines in Area A are supplied with water from the Cedar Grove Water District. Both suppliers access groundwater for water supply.

Water quality in the west Tennessee aquifers is generally considered excellent. However, contamination with explosives compounds was detected in wells across the MAAP in the early 1990s. The plume has moved generally north-northwest, and MAAP continues monitoring the plume while conducting remediation (EPA 2000).

Sewage treatment for most buildings is provided by the MAAP. Building I-200 and the UTES workbay have septic systems; five field latrines also have individual septic systems.

4.11.3 Solid Waste

Solid waste disposal for the training site is contracted. The waste is collected in dumpsters supplied by the contractor and hauled for disposal in a licensed landfill.

4.11.4 Energy

Electrical power is supplied by the MAAP, except for building I-200 which receives electrical service from the Milan Public Utilities District. Primary and secondary lines within the training site are in good repair and are not close to maximum limits.

A geothermal system provides heating/cooling in the barracks compound. Propane-fire heaters supply heat for all other climate-controlled buildings and are maintain for back-up in the barracks. A local commercial company provides the propane which is stored in aboveground tanks.

4.12 HAZARDOUS AND TOXIC MATERIALS/WASTES

4.12.1 Hazardous Materials and Hazardous Waste Management

The VTS-M manages hazardous materials and wastes in accordance with the Tennessee Army National Guard's Hazardous Material/Waste Management Plan. The training site is considered a conditionally exempt small quantity generator (CESQG). Most wastes generated at the training site are considered universal wastes and are managed as such. Examples include used oil, batteries, and fluorescent tubes. Used oil and batteries are generated at the Combined Service Maintenance Shop – West (CSMS) and at the Unit Training Equipment Site (UTES) #1workbay. Fluorescent lamps are generated throughout the training site but in a quantity of less than 10 per month.

The training site uses inventory control to maintain stocks of materials and products. Inventories on all products are kept up-to-date. The inventories include quantities, expiration dates of products, and storage locations. Extensions of expiration dates are requested through the Defense Logistics Agency system when required. The inventory control system ensures that product levels are not excessive and helps minimize wastes. The CSMS and UTES have hazardous material storage buildings. These buildings have built-in secondary containment.

4.12.2 Installation Restoration Program Sites

The Department of Defense developed the Installation Restoration Program (IRP) to identify, evaluate, and clean up contamination from past operations on military bases and to restore these areas for future use. There are no active IRP sites at VTS-M.

4.12.3 Underground and Aboveground Storage Tanks

The CSMS, located within the VTS-M Cantonment, manages one 10,000-gallon diesel (JP8) aboveground storage tank (AST) located in the motorpool directly north of the shop and the training site headquarters building. Additional ASTs sited at the CSMS include a 500-gallon diesel tank, a 500-gallon gasoline tank, and a 500-gallon used oil tank. Another 500-gallon used oil tank is located at the UTES #1 workbay in TA A-2. All tanks have secondary containment. Both facilities also maintain a variable

quantity of 55 gallon drums of POL products; all drums are stored in secondary containment. The CSMS and UTES #1 both have current, active Spill Prevention Control and Countermeasures (SPCC) Plans that specifically include actions to be taken in the event of a diesel or fuel spill.

One underground storage tank (UST) located adjacent to the Cantonment Area buildings has been emptied in place and is not in use. It was formerly utilized for heating oil storage. All other known USTs have been removed.

4.12.4 Pesticides

Weed control applications are made by on-site, state-certified personnel. Minimal amounts of herbicide are maintained on site and are handled in accordance with the Federal Insecticide, Fungicide, and Rodenticide Act (FIFRA), state and DoD regulations, and the product label. All interior pest control is conducted through contract with licensed pest control operators.

5.0 ENVIRONMENTAL CONSEQUENCES

This section identifies the potential positive and negative environmental, cultural, and socioeconomic effects, or impacts, of the identified alternatives on each of the technical issue areas presented in Section 4.0. In addition, this section identifies any mitigation measures that may be associated with each resource area that when implemented, would reduce the level of identified impacts.

Impacts are characterized as direct or indirect. A direct impact is caused by a proposed action and occurs at the same time and place, while an indirect impact is caused by a proposed action but occurs later in time or farther removed in distance but is still reasonably foreseeable.

In addition to indicating whether impacts are direct or indirect, the impact analyses included in this section distinguish between short- and long-term impacts. In this context, short- and long-term do not refer to any rigid time period but are determined on a case by case basis in terms of the environmentally significant consequences of the proposed action.

5.1 LAND USE

5.1.1 Effects of the Proposed Action

The Proposed Action would not significantly change the existing land uses at the VTS-M; the facility would continue to be utilized primarily for the training of TNARNG soldiers. Implementation of the INRMP would not result in a change of any acreage from its current status of developed or undeveloped. Approximately 25 acres of forestland would be cleared to create an open training area dominated by grasses and herbaceous species. Otherwise, the principle vegetation types would be maintained at the current ratio of forestland to grassland, and natural land would not be converted to developed land.

The implementation and integration of the proposed Revised INRMP into VTS-M environmental and training site management practices would directly supplement and facilitate land management and use for nearly all installation activities. It would allow for the successful completion of military operations while providing for the conservation of natural resources.

The proposed VTS-M INRMP includes strategies that, when implemented, would ensure long-term sustainability of the natural resources on which the TNARNG depends for training. Implementation of land management practices, as described in the INRMP, would improve the quality of existing lands and enhance land use potential. The management goals, objectives, and projects contained within the INRMP would allow for continuance and even improvements of the military training mission, foster increased cooperation with regulatory agencies, and would improve habitat and water quality throughout the site via implementation of BMPs and other measures outlined in the INRMP. Therefore, this action would have *major, long-term positive impacts* to VTS-M land use and management.

5.1.2 Effects of the No Action Alternative

Under the No Action alternative, current management policies and activities would continue with no further guidance from an up-to-date INRMP. Land management would be carried out as it was in the past; however, such efforts might not be conducted in the most appropriate or effective manner. Failure in these efforts could result in degradation of the natural resources of VTS-M over time and a decline in the ability of the land to support military training. As such, the No Action alternative could result in *long-term negative impacts* to VTS-M land use.

5.2 AIR QUALITY

5.2.1 Effects of the Proposed Action

The VTS-M has only minor source of air pollution related to training activities (fugitive dust from vehicular traffic and operation of the asphalt plant) and land management (mowing and prescribed burning). Carroll and Gibson Counties are attainment areas for air quality.

The Proposed Action would affect air quality slightly through implementation of prescribed burning included in the Wildland Fire Management Plan. Burning is conducted under the old management plan, but the revised INRMP provides for a more comprehensive schedule of prescribed fire for the improvement of training conditions, control of wildfire, and for experimentation in the regeneration of hardwood forest stands. The major effects of smoke on air quality are visibility reduction and respiratory impairment near the fire due to particulates. Smoke can impair general air quality in populated areas downwind from extensive burning. These effects are generally short-lived.

Although there might be an increase in prescribed burning under the Proposed Action, the implementation of this prescribed burning plan would result in a lowered risk for wildfire, thus reducing unplanned air quality impacts.

The guidelines and management practices provided in the INRMP would minimize the influence of VTS-M burning on regional air quality. All prescribed burning would be conducted in accordance with the TNARNG prescribed burn plan and would utilize the smoke management guidelines contained therein. Appropriate smoke management and careful timing of burns to avoid the worst nonattainment periods would minimize impacts by reducing smoke emissions, ensuring burning occurs during atmospheric conditions that favor smoke dispersion, and minimizing emissions during high-pollution seasons.

Timber harvest activities would result in short-term increased use of the gravel roads on the training site and would be expected to increase fugitive dust levels during harvest operations. Pollution levels caused by such activities are considered non-significant relative to that created by existing training activities.

Prescribed burning in accordance with the VTS-M INRMP may have short-term, minor effects on air, but the overall effect of the Proposed Action would be *no significant impact* on air quality.

5.2.2 Effects of the No Action Alternative

Prescribed burning has been taking place for the maintenance of training area conditions under the minimal guidance of the 2001 INRMP. Under the No Action alternative, this practice would continue and there would be *no significant effects* on air quality.

5.3 NOISE

5.3.1 Effects of the Proposed Action

No significant effects to area noise environments would be expected from implementation of the Proposed Action. Timber harvest activities would produce noise from vehicles and equipment, but these noises would be intermittent and would occur during daytime hours when sensitivity is lower. Noise levels generated by INRMP activities are also expected to be below the typical existing noise levels from military training. Timber harvest may have temporary, minor effects on noise conditions, but overall implementing the Proposed Action should have *no significant impact* on the noise environment.

5.3.2 Effects of the No Action Alternative

Under the No Action Alternative there would be *no effects* to the noise environment. Noise from military activities would remain at present levels.

5.4 GEOLOGY AND SOILS

5.4.1 Effects of the Proposed Action

Implementation of the Proposed Action will have no effects on the geology of the area, as no major changes or management programs regarding geological resources are proposed.

As a part of the natural resources management proposed, the TNARNG would take a proactive approach to prevent soil erosion and to repair existing erosion in an appropriate and timely manner. Actions which would benefit soil resources on the training site include cultivating a thorough understanding of and the appropriate use of BMPs for all soil-disturbing activities; implementing regular surveys and the development of a reporting and planning system for identifying erosion problems and their appropriate restoration; and enforcing streamside management zones for protection of riparian areas.

Certain actions proposed within the INRMP have the potential to cause detrimental effects on training site soils (e.g., timber harvest skid trails, development of fire breaks, and increased runoff due to vegetation thinning through timber harvest or invasive pest plant control). However, the adverse effects of such actions would be minimized by the appropriate use of BMPs as detailed in the INRMP.

Overall, the implementation of the proposed action would have a *long-term beneficial impact* on the soils of the training site, as implementing an effective soil conservation and erosion control program would reduce soil loss through the erosion process.

5.4.2 Effects of the No Action Alternative

Continuation of current management under the No Action alternative would have no effects on the geology of the site.

Under the No Action alternative, soil protection and rehabilitation measures to minimize soil erosion would still occur. Soil damage during training missions could be expected to continue at its present level, and soil damaged areas created during training missions would continue to be repaired as needed. However, current management strategies include reacting to erosion problems after they occur, rather than preemptively managing the soil resources to prevent impacts or minimize the extent of unavoidable impacts. Without the guidance and training provided for in the revised INRMP, erosion control and repair actions would follow old guidelines and utilize traditional methods which may not be the most appropriate for all circumstances. This would result in continuing soil loss through the erosion process and *minor, long-term negative impacts* to soils from the No Action alternative.

5.5 WATER RESOURCES

5.5.1 Effects of the Proposed Action

There could be minor, temporary negative impacts to water resources from implementation of the Proposed Action. Component activities such as logging, prescribed fire, and invasive species control can impact stream quality through the release of sediment or pollution with chemicals (pesticides, fuel, etc.) at the time of action. Utilization of BMPs in accordance with INRMP guidance will minimize any such pollution.

The overall effects of the Proposed Action on water resources and water quality would be positive. The enforcement and protection of streamside management zones will intercept sediment, fertilizer, pest control chemical residue, and other pollutants transported overland toward the creek system. Maintenance of the forest cover within these streamside management zones will also preserve a natural temperature regime in the surface waters. The application of erosion control actions, discussed in Geology and Soils, Section 5.4.1, will lessen the threat of sedimentation.

Implementation of the proposed action should have a *long-term, beneficial impact* on water resources.

5.5.2 Effects of the No Action Alternative

Under the No Action Alternative, wetlands and riparian areas would continue to be protected by the current standards of avoidance. This prevents significant damage to soils or water quality from current training activities, but does nothing to repair past damages or problems from non-training related causes. Under the guidance of the original INRMP, streamside management zones are little noted, and training and other activities may occur too close to the streams' banks. While there would be no timber management actions, standard training and land management activities under the old guidance would potentially contribute significant sediment and other pollutants to the creeks over the long-term.

Implementation of the No action alternative would have a *long-term detrimental impact* on water resources.

5.6 BIOLOGICAL RESOURCES

5.6.1 Effects of the Proposed Action

Overall, implementation of the Proposed Action would result in a wide variety of actions that will improve the health and stability of the natural ecosystems on VTS-M. Biological resources including vegetation and wildlife would benefit from these activities.

The USFWS were provided a letter of coordination for initiating this INRMP process. This agency is the primary federal agency for issues regarding fish and wildlife management and is the regulatory authority for the Endangered Species Act (ESA) of 1973 (16 USC 1531– 1534) and the Migratory Bird Treaty Act of 1918 (16 USC 703–711). Natural Resource/Environmental sent the USFWS a coordination letter notifying them of the TNARNG's intent to revise the INRMP and sent the agency a copy of the draft revised INRMP and EA for review and comment.

Vegetation

The forest management portion of the proposed plan would result in a short-term decrease in forest biomass but an improvement in overall forest health. The biomass would be replaced readily as existing advance regeneration and new seedlings grow into the newly created space. Control of invasive pest plants would also lead to an improvement in ecosystem health and a probable increase in biodiversity.

Wildlife

The positive impacts of the Proposed Action on wildlife species are numerous. Examples include habitat improvement through the removal of non-native plant species, maintenance of habitat corridors along creeks within the SMZs, increased mast production typically following forest thinning, and protection and improvement of aquatic habitat quality through maintenance of SMZs and erosion control efforts.

There could be some short term detrimental impacts resulting from certain actions proposed within the INRMP. There may be loss of individual animals to fire during prescribed burns. To minimize this threat, burns should not be conducted during breeding season for ground-nesting species and unburned patches of similar habitat should be left contiguous to burned areas to provide "escape zones" and short-term replacement habitat. There could be loss of habitat or habitat fragmentation resulting from timber harvests. However, since most harvests will be small group selections, overall habitat type will be retained and the resulting increase in heterogeneity of age classes will provide a greater diversity of resources for wildlife. The areas scheduled for a complete harvest and change of vegetation type are very small and will not impact wildlife habitat on a regional scale.

Rare, Threatened, and Endangered Species

There are no federally listed threatened or endangered species inhabiting or routinely utilizing the VTS-M. The eleven rare bird species found during biological surveys (10 deemed in need of management by the State of Tennessee and 1 federally listed but beyond its normal range) should experience positive effects due to improved habitat quality as a result of implementation of the Proposed Action. Guidance in the INRMP includes practices to protect nesting birds (e.g., not mowing during ground-nesting season, maintaining unburned cover adjacent to prescribed burn sites) that should minimize the impacts of any disturbance-causing activity.

Overall, implementation of the Proposed Action would have *significant, long-term positive effects* on the biological resources of VTS-M.

5.6.2 Effects of the No Action Alternative

Under the No Action Alternative, existing processes would continue for managing biological resources. There would be no timber harvests; existing stands would age and lose value. In addition, in the absence of openings created by thinning, prescribed fire, or natural phenomenon, there is a strong tendency for eastern mixed oak forests to experience a change in species composition to more shade tolerant species such as red maple. This change has substantial impacts on the wildlife of the forest, as maple does not provide the food source that the oaks and hickories provide.

Prescribed fire use under the No Action Alternative would continue to be directed solely by training needs and may not be effective in controlling fuel loads. This may make the forests of the training site more subject to a serious wildfire which could cause substantial damage to vegetation, wildlife, and man-made structures and equipment.

Under the No Action Alternative, the original INRMP will be followed. There would be no change in management practices for threatened or endangered species. In addition, there would be only patchy control of IPP and pest animals, and there would be no aquatic habitat improvement.

Overall, the No Action Alternative would have *long-term negative effects* on the biological resources of the VTS-M.

5.7 CULTURAL RESOURCES

5.7.1 Effects of the Proposed Action

Cultural resources would not be affected by the implementation of the Proposed Action. The VTS-M has been surveyed for historical and cultural resources. Identified cultural sites will be avoided by activities related to the implementation of the revised INRMP. Inadvertent discoveries would be handled in accordance with the TNARNG ICRMP for VTS-Milan.

There is concern over earth disturbance during timber harvest affecting unknown sites. However, the majority of the VTS-M has been subjected to a Phase I archaeological survey with minimal findings as detailed in Section 4.8. Approximately half of the unsurveyed area lies within the Cantonment, which was judged by the archaeological contractor to have been completely compromised by past construction and training activities (Deter-Wolf 2004). Any area that has not been subject to a Phase I survey will be thoroughly surveyed prior to initiating a timber sale or any soil-disturbing natural resource project. Those few areas which are suspected of containing significant cultural resources will not be subject to timber management activities. If previously unidentified archaeological deposits are discovered at any time during natural resources management activities, the protocol described in Section 5.1.10 of the INRMP will be strictly followed.

There would be *no significant impacts* on cultural resources as a result of the implementation of the Proposed Action.

5.7.2 Effects of the No Action Alternative

All cultural resources will continue to be protected. There would be *no effects* from the No Action Alternative.

5.8 SOCIOECONOMICS

5.8.1 Effects of the Proposed Action

Implementation of the Proposed Action should have minimal influence on the socioeconomic environment. Trends in population, housing, and income in the region would be expected to continue in their current patterns. Implementation of the INRMP will not create or eliminate any jobs in the region. There would, however, be a *minor positive effect* from timber sales proposed in the INRMP: 50% of the net proceeds of all DoD timber sales are returned to the county in which the site is located to support local schools and road funds.

5.8.2 Effects of the No Action Alternative

The No Action Alternative should have *no effect* on socioeconomics.

5.9 ENVIRONMENTAL JUSTICE AND PROTECTION OF CHILDREN

5.9.1 Effects of the Proposed Action

Implementation of the Proposed Action should not cause disproportionately high or adverse health effects that would impact minority or low-income populations in the communities surrounding the VTS-M. The Proposed Action should have *no effect* on environmental justice.

5.9.2 Effects of the No Action Alternative

Implementation of the No Action Alternative should have *no effect* on environmental justice.

5.10 INFRASTRUCTURE

5.10.1 Effects of the Proposed Action

Logging and other land management activities proposed in the revised INRMP will result in small, occasional, temporary increases in road use. This will be extremely minor relative to the typical military usage. The Proposed Action will have no impact on utility usage. There will be *no significant impacts* on infrastructure from implementation of the Proposed Action.

5.10.2 Effects of the No Action Alternative

Under the No Action Alternative, there will be no change to current land management. There should be *no effect* on infrastructure of the VTS-M.

5.11 HAZARDOUS AND TOXIC MATERIALS/WASTES

5.11.1 Effects of the Proposed Action

Implementation of the Proposed Action would result in *no significant effects* on hazardous and toxic materials/wastes. There may be a small increase in the use of herbicides on the site when the IPP control plan is implemented. These herbicides will be stored, handled, and disposed of in accordance with Federal and State law and the product label. There is a minimal risk for spills or releases of petroleum products during forest management activities from vehicles and machinery. This risk is not considered significant relative to the vehicle use on the training site during routine training activities. No other hazardous or toxic materials will be involved in the implementation of the revised INRMP.

5.11.2 Effects of the No Action Alternative

The No Action Alternative will result in no changes to current pesticide handling and so there will be *no impact* on hazardous and toxic materials/wastes.

5.12 MITIGATION MEASURES

Mitigation typically involves elimination, minimization, or compensation for impacts if unavoidable. Implementation of an INRMP to manage the natural resources of the VTS-M is a positive action that has few adverse effects. The INRMP itself provides the guidance, in the form of BMPs, necessary to conduct a variety of activities with the minimum of impact. With the implementation of the BMPs listed below, no mitigation measures will be necessary to reduce any adverse environmental impacts to below significant levels.

Table 5-1: Best Management Practices.

Air Quality	• Follow appropriate protocols and precautions for smoke management during prescribed burns to minimize impacts to air quality. • Do not burn during the summer when pollutant levels are at their highest.
Noise	• Limit heavy equipment activities (logging, etc.) to daytime hours.
Soils	• Use appropriate state Forestry BMPs to minimize soil loss due to timber harvest, prescribed fire/fire break construction and maintenance, and other ground-disturbing activities. • Schedule timber harvests, and any other ground-disturbing activity, when feasible, to avoid wet soils in order to minimize erosion and compaction effects from equipment access and moving logs.
Water Resources	• Use appropriate state Forestry BMPs to minimize stream sedimentation due to timber harvest, prescribed fire/fire break construction and maintenance, stream bank restoration, or other ground disturbing activities.
Biological Resources	• Provide wildlife "escape zones" of unburned or unharvested habitat contiguous to prescribed fire areas or timber harvests.
Cultural Resources	• Avoid archaeological sites with all actions. • Follow ICRMP standard operating procedures in case of any inadvertent find.

5.13 CUMULATIVE EFFECTS

Cumulative impacts are those which "result from the incremental impact of the proposed actions when added to other past, present, and reasonably foreseeable future actions, without regard to the agency (federal or non-federal) or individual who undertakes such other actions" (40 CFR 1508.7).

5.13.1 Effects of the Proposed Action

The Volunteer Training Site – Milan is a 2,470 acre Tennessee Army National Guard training site located in the central part of West Tennessee. The majority of the training site lies in Carroll County, with three small satellite parcels located in Gibson County. To the west is the Milan Army Ammunition Plant (MAAP), federally owned and contractor-operated. Portions of the MAAP are maintained as a State Wildlife Management Area.. Property north, south, and east of the training site is primarily privately owned rural residential and agricultural land. State Route 220 runs along the eastern boundary, and Highway 104 cuts through the site in the north, separating the A training areas from B areas. The small town of Lavinia lies just to the east of the Cantonment Area along State Route 220.

VTS-Milan supports the TNARNG State and Federal missions. It provides military field training exercises for both armored and artillery units. Training activities on VTS-Milan include field exercises and classroom training; field exercises comprise wheeled and tracked vehicle maneuvers, foot maneuvers, bivouacking, land navigation, equipment training, aircraft operations (rotary wing only), and small arms familiarization.

Implementation of the Proposed Action would provide *long-term positive cumulative effects*. Protection and management of natural resources within the training site would counter the habitat fragmentation typical of a predominantly agricultural region. Appropriate ecosystem management in accordance with the INRMP will provide a "safe haven" for forestland wildlife and rare species.

The restoration and rehabilitation efforts proposed in the Plan would repair the residual effects of past military training and earlier land use. The guidance provided in the INRMP will help to minimize potential effects of future military training activities and training facility development.

Management under the INRMP would dovetail well with the environmental management of the adjoining MAAP. The goals of natural resources management on the MAAP are closely aligned with those of the VTS-M: sustainability of lands for mission use; protection of resources; multiple use of land assets; recreational opportunities where compatible (MAAP 1998). The impact of these two plans together would provide ecosystem protection and management over a significant area totaling almost 25,000 acres. The MAAP harvests less than 50 acres per year of its timber stands (Stephenson per. comm.). Combined with the proposed timber harvests on the VTS-M, this would still be a non-significant impact on timber resources in the region.

5.13.2 Effects of the No Action Alternative

Under the No Action Alternative, the original 2002 INRMP would continue to guide natural resources management on the VTS-M. This alternative would have *no significant cumulative effects*. The guidance provided in the old INRMP would minimize negative impacts from future training activities and facility development, and the natural environment of the training site would be protected from commercial development. However, there would be no new management actions to contribute to regional environmental improvement efforts.

6.0 COMPARISON OF ALTERNATIVES AND CONCLUSIONS

The impacts of the Proposed Action and the No Action Alternative are compared in Table 6.1. Based on this analysis, the Proposed Action of implementing the revised INRMP for VTS-M is identified as the preferred alternative that would provide the greatest benefit to both the environment and the TNARNG training mission. Implementation of this preferred alternative is the most effective method to comply with the Sikes Act, Army Regulation 200-1, and DoD Instruction 4715.03. It also best enables the TNARNG to meet mission and training requirements at the VTS-M while enhancing the environment through integrated natural resources management.

Table 6.1: Comparison of Alternatives.

Resource Area	Proposed Action	No Action
Land Use	Long-term positive	Long-term negative
Air Quality	Temporary, minor, negative	No effect
Noise	Temporary, minor, negative	No effect
Geology and Soils	Long-term positive	Minor, long-term negative
Water Resources	Long-term positive	Long-term negative
Biological Resources	Long-term positive	Long-term negative
Cultural Resources	No effect	No effect
Socioeconomics	Minor positive	No effect
Environmental Justice	No effect	No effect
Infrastructure	No effect	No effect
Hazardous and Toxic Materials	No effect	No effect

Implementation of the Proposed Action would result in a comprehensive natural resources management strategy for the VTS-M. Implementation could result in some minor, temporary negative impacts; however, the overall effects would be of long-term benefit to the physical, cultural, and natural environment of the VTS-M. The projects and guidance from the revised INRMP, if implemented, would improve the overall training integration with natural resources management and would minimize potential negative environmental impacts from other TNARNG activities at VTS-M.

Upon completion of public review, a determination will be made about whether to prepare an EIS. If agency and/or public review does not reveal any significant impacts, a Final Environmental Assessment and a Finding of No Significant Impact will be prepared. Any public or agency comment received during the review period will be incorporated into the final document in an appropriate manner. If an EIS is required, this document would become the basis for scoping.

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Cultural Resources Manager

9.0 AGENCIES AND INDIVIDUALS CONSULTED

The following agencies and organizations were notified of the intent to prepare an EA for the implementation of the INRMP. They will again be notified of the availability of the revised INRMP and EA for public review. A copy of the form letters used for these purposes may be found in Appendix A. Comments and TNARNG response are included in Appendix B..

Organization	POC	Address
US Army Corps of Engineers, Mobile District		PO Box 2288 Mobile, Alabama 36628-0001
US Environmental Protection Agency, Region 4		Sam Nunn Atlanta Federal Center 61 Forsyth Street, SW Atlanta, Georgia 30303
US Fish and Wildlife Service, Cookeville Field Office	Lee Barclay, Field Supervisor	446 Neal Street Cookeville, Tennessee 38501
US Forest Service, Southern Region		1720 Peachtree Road, NW Atlanta, Georgia 30309
Natural Resources Conservation	James Woodall, District	Huntingdon Service Center

Organization	POC	Address
Service	Conservationist	630 High Street Huntingdon, TN 38344-1712
Tennessee Department of Environment and Conservation	Chuck Head, Senior Director, Land Resources and David Draughon, Senior Director, Water Resources	401 Church Street L&C Annex, 1st Floor Nashville, TN 37243
Tennessee Department of Environment and Conservation, Jackson Environmental Field Office	Rudy Collins	1625 Hollywood Drive Jackson, TN 38305
Tennessee Department of Environment and Conservation, Tennessee Historical Commission	E. Patrick McIntyre, Jr., SHPO	2941 Lebanon Road Nashville, TN 37243-0442
Tennessee Division of Forestry	Steven Scott, State Forester	P.O. Box 40627, Melrose Station Nashville, TN 37204
Tennessee Wildlife Resources Agency, Region 1 Office	Alan Peterson	200 Lowell Thomas Drive Jackson, TN 38301
Milan Army Ammunition Plant	Steve Stephenson, Natural Resources Manager	280 Highway 104 West, Suite 2 Milan, Tennessee 38358
Absentee Shawnee Tribe of Oklahoma	Scott Miller, Governor	2025 S. Gordon Cooper Shawnee, OK 74801
Alabama-Coushatta Tribe of Texas	Ronnie Thomas, Chairman	571 State Park Road 56 Livingston, Texas 77351
Alabama-Quassarte Tribal Town	Tarpie Yargee, Chief	PO Box 187 Wetumka, Oklahoma 74883
Cherokee Nation	Chad Smith, Principal Chief	PO Box 948 Tahlequah, Oklahoma 74465
Chickasaw Nation	Bill Anoatubby, Governor	PO Box 1548 Ada, Oklahoma 74820
Choctaw Nation of Oklahoma	Gregory E. Pyle, Chief	PO Drawer 1210 Durant, Oklahoma 74702
Coushatta Tribe of Louisiana	Kevin Sickey, Chairman	PO Box 818 Elton, Louisiana 70532
Eastern Band of Cherokee Indians	Michelle Hicks, Principal Chief	PO Box 455 Cherokee, North Carolina 28719
Eastern Shawnee Tribe of Oklahoma	Glenna J. Wallace, Chief	PO Box 350 Seneca, Missouri 64865
Jena Band of Choctaw	Christine Norris, Chief	PO Box 14 Jena, Louisiana 71342
Kialegee Tribal Town	Evelyn Bucktrot, Mekko	PO Box 332 Wetumka, Oklahoma 74883
Mississippi Band of Choctaw Indians	Phillip Martin, Chief	PO Box 6010, Choctaw Branch Choctaw, Mississippi 39350
Muscogee (Creek) Nation	A.D. Ellis, Principal Chief	PO Box 580 Okmulgee, Oklahoma 74447

Organization	POC	Address
Poarch Band of Creek Indians	Buford Rolon, Chairman	5811 Jack Springs Road Atmore, Alabama 36502
Quapaw Tribe of Oklahoma	John Berrey, Chairman	PO Box 765 Quapaw, Oklahoma 74363
Seminole Nation of Oklahoma	Kelly Haney, Chief	PO Box 1498 Wewoka, Oklahoma 74884
Seminole Tribe of Florida	Mitchell Cypress, Chairman	6300 Stirling Road Hollywood, Florida 33024
Thophthlocco Tribal Town	Vernon Yarholar, Mekko	PO Box 188 Okemah, Oklahoma 74859
Tunica-Biloxi Tribe of Louisiana	Earl Barbry, Sr., Chairman	PO Box 1589 Marksville, Louisiana 71351
United Keetoowah Band of Cherokee Indians in Oklahoma	George Wickliffe, Chief	PO Box 746 Tahlequah, Oklahoma 74465

Appendix A

Agency Consultation Letters

MILITARY DEPARTMENT OF TENNESSEE
OFFICE OF THE ADJUTANT GENERAL
HOUSTON BARRACKS
NASHVILLE
37204-1502

July 30, 2010

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....
....

Dear Sir:

The Tennessee Army National Guard (TNARNG) is in the process of preparing a revised Integrated Natural Resources Management Plan (INRMP) for the Volunteer Training Site – Milan in Carroll and Gibson Counties, Tennessee. This document will be a full revision of the original 2001 INRMP for the training site. The revision includes significant new information on forest management activities, wildland fire management, and invasive species control. The revised INRMP will guide natural resources and land management activities on the training site for the period 2011-2015.

It has been determined that an Environmental Assessment (EA) will be needed to review the impacts of implementing this revised plan to meet the requirements of the National Environmental Policy Act of 1969. The subject INRMP will be available shortly at http://www.tnmilitary.org/ (click on the "Environmental" link at the left). If you are unable to access the online document, a cd of the draft INRMP can be sent to you upon request.

If you have information or concerns that you wish to contribute to the preparation of this EA, please contact the undersigned by email (laura.lecher@tn.gov) or phone (731-783-3975). Correspondence should be addressed to Ms. Laura Lecher, Tennessee Army National Guard, JFHQ-TN-ENV, 3041 Sidco Drive, Nashville, Tennessee 37204.

When completed, the draft EA will be made available for agency and public review through the above-mentioned website and a physical copy made available at the Carroll County Library. A letter will be sent to interested agencies when this draft document is available for review.

Thank you for your consideration in this matter.

Sincerely,

Laura P. Lecher
Natural Resources Manager
Tennessee Military Department

MILITARY DEPARTMENT OF TENNESSEE
OFFICE OF THE ADJUTANT GENERAL
HOUSTON BARRACKS
NASHVILLE
37204-1502

..... 2010

...
...
...

Dear Sir:

This letter is to notify you of the availability for review of the final draft of the revised Integrated Natural Resources Management Plan (INRMP) and affiliated draft Environmental Assessment (EA) for the Tennessee Army National Guard (TNARNG) Volunteer Training Site – Milan in Carroll and Gibson Counties, Tennessee.

This document is a full revision of the original 2001 INRMP for the training site. The revision includes significant new information on forest management activities, wildland fire management, and invasive species control. An Environmental Assessment (Appendix A) was prepared in accordance with the National Environmental Policy Act for the proposed action of implementing the revised INRMP.

The Volunteer Training Site – Milan is located in west Tennessee, approximately 20 miles north of Jackson, Tennessee. The 2,470 acre site is devoted to the preparation of National Guardsmen for their military mission, including maneuver, range operations, equipment use, and other combat readiness training.

The natural resources of the site include extensive forestlands, 18.4 miles of streams, and nearly 250 acres of wetlands. The INRMP describes the baseline conditions of natural resources on the Volunteer Training Site – Milan and describes management programs and guidance allowing for the successful completion of the military mission while providing for the conservation of natural resources, preservation of rare and unique resources, and long-term sustainability of the training site. This revised INRMP will guide management activities on the training site from 2011-2015.

The final draft revised INRMP and draft EA will be available for public review from .... to .... and may be accessed at http://www.tnmilitary.org/ (click on the "Environmental" link at the left).

A hard copy of the document is also available for review at the Carroll County Library, 625 High Street, Huntingdon, Tennessee 38344 (call 731-986-1919 for library hours). A limited number of hard copies may be available to send out. If you require a paper copy of these documents or prefer an electronic copy on cd, please contact Laura Lecher at the address below.

Please provide your review comments by letter, email (laura.lecher@tn.gov), fax (731-783-3901), or phone (731-783-3975) prior to December 15, 2009. Correspondence should be addressed to Ms. Laura Lecher, Tennessee Army National Guard, JFHQ-TN-ENV, 3041 Sidco Drive, Nashville, Tennessee 37204.

Thank you for your consideration in this matter.

Sincerely,

Laura P. Lecher
Natural Resources Manager
Tennessee Military Department

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APPENDIX B

Finding of No Significant Impact

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FINAL FINDING OF NO SIGNIFICANT IMPACT (FNSI) FOR IMPLEMENTATION OF THE REVISED INTEGRATED NATURAL RESOURCES MANAGEMENT PLAN AT VOLUNTEER TRAINING SITE – MILAN, TENNESSEE

Introduction

In 2001 the Tennessee Army National Guard (TNARNG) in accordance with the Sikes Act Improvement Act (SAIA), 16 USC § 670a et seq., implemented an Integrated Natural Resources Management Plan (INRMP) for the purpose of guiding land management activities on Volunteer Training Site – Milan (VTS-M) for the period of 2001 - 2006. The VTS-M is owned by the U.S. Army Corps of Engineers, Mobile District, and licensed (#DACA01-3-89-272) for use to the TNARNG. The training site comprises 2,470.36 acres which were previously a part of the Milan Army Ammunition Plant (MAAP). When reviewed in 2005 for "operation and effect", in concert with the US Fish and Wildlife Service (USFWS) and Tennessee Wildlife Resources Agency (TWRA), TNARNG determined that a revision of the plan would be necessary to guide future management due to the addition of a. forest management plan and b. new wildland fire operations.

TNARNG has prepared an Environmental Assessment (EA) that evaluates and analyzes the potential environmental effects of implementing the revised INRMP for the VTS-M in Carroll and Gibson Counties, Tennessee. The TNARNG prepared the EA in accordance with the National Environmental Policy Act (NEPA) (42 USC § 4321 to 4370e), the Council on Environmental Quality Regulations for Implementing the Procedural Provisions of NEPA (CEQ Regulations, 40 CFR Parts 1500-1508), and *Environmental Analysis of Army Actions* (32 CFR 651).

1. Description of Proposed Action and Alternatives

Proposed Action

The Proposed Action is the TNARNG's Preferred Alternative. The TNARNG proposes to implement the revised INRMP for the period 2014-2019. The purpose of the Proposed Action is to ensure no general loss in the capability of the VTS-M to support the military training mission of the TNARNG by providing for long-term management of the site's natural resources. Implementation of the INRMP will provide for the conservation, rehabilitation, and sustainable use of natural resources on the installation, in accordance with the Sikes Act (as amended) and Army Regulations (AR) 200-1, *Environmental Protection and Enhancement.*

The proposed forest management plan and wildland fire operations have the potential for significant environmental alteration (and benefit). Since these were not reviewed in the EA for the original 2001 INRMP, a new EA was deemed necessary. The purpose of this EA is to evaluate the potential environmental impacts of implementing this revised VTS-M plan. The Proposed Action will enable TNARNG to accomplish its training mission while maintaining compliance with applicable environmental laws and regulations.

The TNARNG developed the VTS-M Forest Management Plan based on military needs and forest health goals. Individual forestry management prescriptions are provided for the forest stands occurring within each training area and are focused on actions that would improve training facilities or enhance the habitat quality and health of the forestry resources on VTS-M.

The TNARNG developed the Wildland Fire Management Plan (WFMP) developed in accordance with the 2002 Department of Army (DA) Wildland Fire Policy Guidance. It presents the standards by

which the VTS-Milan wildland fire control and prescribed burning programs will be conducted. This plan is especially linked to the Forest Management Plan and is in accordance with Army Regulation (AR) 420-90, 10 Sep 97, *Fire and Emergency Services* AR 200-1, 28 Sep 2007, *Environmental Protection and Enhancement*, DOD Instruction 6055.6, 10 Oct 00, DoD Fire and Emergency Services Program, and Army Memorandum, 04 Sep 2002, Army Wildland Fire Policy Guidance.

Alternatives Considered.

Under the No Action Alternative, the 2001 INRMP would continue to provide guidance for natural resources management on VTS-M. However, there would be no provision for timber management and harvest activities, and guidance on wildland fire control would be minimal.
The overall goal is to provide for effective natural resources management on the VTS-M. The revised INRMP is an integrated document designed to meet regulatory requirements and provide an effective management program. Any partial implementation option would be ineffectual and other alternatives would not be beneficial to the VTS-M. Therefore, no other Alternative Actions were considered.

2. Environmental Analysis

The EA assesses potential effects on land use, air quality, noise, water resources, geology and soils, biological resources, cultural resources, hazardous materials and hazardous wastes, and socioeconomics (including environmental justice and protection of children). Based upon the analysis contained in the EA, TNARNG has determined that implementation of the revised INRMP would not have an impact on noise, cultural resources, environmental justice, infrastructure, or hazardous materials and wastes. The implementation of the revised INRMP could have a minor, temporary adverse impact on air quality through the increased use of prescribed burning for fuel control and vegetation management. The Proposed Action would have a minor positive effect on socioeconomics and long-term beneficial effects on land use, geology and soils, water resources, and biological resources at VTS-M.

Based upon the analysis contained in the EA, TNARNG determined that the known and potential impacts of the Proposed Action on the physical, cultural, and natural environment will be of a positive nature. Implementation of the TNARNG's revised VTS-M INRMP will result in improved management of natural resources at the training site. No mitigation measures will be required for implementation of the revised INRMP's projects at VTS-M.

The Draft INRMP was sent to TWRA and USFWS in November of 2013 for Review. The USFWS letter of reply was dated December 16, 2013. The letter stated that USFWS is pleased with TNARNG efforts in the proposed actions of the Milan INRMP and support the initiatives set forth to support natural resource for potential impacts from military training. In addition they are pleased with TNARNG's monitoring and implementation of avoidance measures that are effective at conserving federal trust resources while still enabling military training activities.
TWRA's reply was dated December 3, 2013 the letter stated that TWRA has reviewed the Milan INRMP and support the document in all aspects.

Mitigation. No mitigation measures will be necessary to reduce any adverse environmental effects to below significant levels.

3. Regulations

The Proposed Action will not violate NEPA, the CEQ Regulations, 32 CFR 651, or any other Federal, State, or local environmental regulations.

4. Commitment to Implementation

The National Guard Bureau (NGB) and TNARNG affirm their commitment to implement this EA in accordance with NEPA. Implementation of the Proposed Action is dependent on funding. The TNARNG and the NGB's Environmental Programs, Training, and Installations Divisions will ensure that adequate funds are requested in future years' budgets to achieve the goals and objectives set forth in this EA.

5. Public Review and Comment

The draft INRMP and EA were made available for public review and comment from 3 August 2009 to 30 November 2011 and 1 November 2012 to16 December 2012. TNARNG received no comments.

The final INRMP, EA and draft FNSI were made available for public review and comment for 30 days on 27 February 2014 to 29 March 2014. Copies were available to be reviewed at the Carroll County Library in Huntingdon, TN, or on-line at http://www.tnmilitary.org/Environmental/2011-2015body.pdf. Copies were also able by mail. No comments were received during this time.

6. Draft Finding of No Significant Impact (FNSI)

After careful review of the EA, I have concluded that implementation of the Proposed Action would not generate significant controversy or have a significant impact on the quality of the human or natural environment. This analysis fulfills the requirements of NEPA and the CEQ Regulations. An Environmental Impact Statement will not be prepared, and the National Guard Bureau will issue this Finding of No Significant Impact.

4 Apr 14
Date

Michael C. Ahn
Colonel, US Army
Chief, Environmental
Programs Division

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APPENDIX C

Agency Correspondence

Public Comment

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MILITARY DEPARTMENT OF TENNESSEE
Environmental Division
Houston Barracks
P.O. Box 41502
Nashville, Tennessee 37204-1502

May 9, 2019

Robbie Sykes
Supervisory Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
446 Neal Street
Cookeville, TN 38501

Mr. Sykes,

The Tennessee Army National Guard (TNARNG) is in the process of revising and updating the Integrated Natural Resource Management Plan (INRMP) for Volunteer Training Site - Milan (VTS-M), located in Carroll and Gibson Counties, Tennessee. The Sikes Act and Army Regulation 200-1 require TNARNG to develop an INRMP for each of its Training sites. The INRMP must be revised or updated every five years to ensure it remains current and relevant to managing the site under planed and existing uses and conditions. The original VTS-M INRMP covered the period 2002-2006. This third revision or update of the INRMP will cover the years 2019-2023. We hope to have the INRMP completed by September 28, 2019.

I am contacting you to inform you of this revision or update effort and request your agencies participation in the process. The US Fish and Wildlife Service and Tennessee Wildlife Resource Agency are important cooperators in our task of appropriately managing TNARNG lands and are required signatories of the plan. Your input and contributions will be greatly appreciated in this revision. I expect to have the first draft of the new INRMP to you in early June 2019.

The previous version of the INRMP was only planned to operate through April 2019. No significant changes in the intended use of the VTS-M have occurred during the life of its current INRMP. No significant changes are expected before the completion of the new INRMP. TNARNG would like your agencies concurrence that it is acceptable to continue operating under the current INRMP until the new INRMP is completed.

Please contact me with any questions or comments at (615) 313-0945 or brian.e.knapp.nfg@mail.mil. Your participation, insights, and comments in the revision of the VTS-M INRMP will be greatly appreciated.

Sincerely,

Brian E Knapp

Brian Knapp
Natural Resource Manager
Tennessee Army National Guard
JFHQ-TN-FMO-ENV
3041 Sidco Drive
Nashville, TN 37204

MILITARY DEPARTMENT OF TENNESSEE
Environmental Division
Houston Barracks
P.O. Box 41502
Nashville, Tennessee 37204-1502

May 9, 2019

Jason Maxedon
Region 1 Wildlife Manager
Tennessee Wildlife Resources Agency
200 Lowell Thomas Drive
Jackson, TN 38301

Mr. Maxedon,

The Tennessee Army National Guard (TNARNG) is in the process of revising and updating the Integrated Natural Resource Management Plan (INRMP) for Volunteer Training Site - Milan (VTS-M), located in Carroll and Gibson Counties, Tennessee. The Sikes Act and Army Regulation 200-1 require TNARNG to develop an INRMP for each of its Training sites. The INRMP must be revised or updated every five years to ensure it remains current and relevant to managing the site under planed and existing uses and conditions. The original VTS-M INRMP covered the period 2002-2006. This third revision or update of the INRMP will cover the years 2019-2023. We hope to have the INRMP completed by September 28, 2019.

I am contacting you to inform you of this revision or update effort and request your agencies participation in the process. The Tennessee Wildlife Resource Agency and USFWS are important cooperators in our task of appropriately managing TNARNG lands and are required signatories of the plan. Your input and contributions will be greatly appreciated in this revision. I expect to have the first draft of the new INRMP to you in early June 2019.

The previous version of the INRMP was only planned to operate through April 2019. No significant changes in the intended use of the VTS-M have occurred during the life of its current INRMP. No significant changes are expected before the completion of the new INRMP. TNARNG would like your agencies concurrence that it is acceptable to continue operating under the current INRMP until the new INRMP is completed.

Please contact me with any questions or comments at (615) 313-0945 or brian.e.knapp.nfg@mail.mil. Your participation, insights, and comments in the revision of the VTS-M INRMP will be greatly appreciated.

Sincerely,

Brian E Knapp

Brian Knapp
Natural Resource Manager
Tennessee Army National Guard
JFHQ-TN-FMO-ENV
3041 Sidco Drive
Nashville, TN 37204

From: Robbie Sykes
To: Knapp, Brian E NFG NG TNARNG (US)
Cc: Dustin Boles
Subject: [Non-DoD Source] RE: [EXTERNAL] VTS-Milan INRMP Update Participation Request
Date: Friday, May 31, 2019 12:25:20 PM

Brian,

The U.S. Fish and Wildlife Service - Tennessee Ecological Services Field Office has reviewed your request to continue operating the Volunteer Training Site - Milan (VTS-M) under the current Integrated Natural Resource Management Plan (INRMP) until the new INRMP is updated. You have indicated in your May 9, 2019 letter that the new draft INRMP is expected to be ready for review in June 2019, and the final INRMP completed in September 2019. There are no anticipated significant changes to the intended use at VTS-M before the new INRMP is completed.

We concur that it is acceptable to continue operating VTS-M under the current INRMP until the new INRMP is updated, and we look forward to working with you throughout the process.

Sincerely,

Robbie Sykes
Supervisory Fish and Wildlife Biologist
U.S. Fish and Wildlife Service
446 Neal Street
Cookeville, TN 38501
(tele. 931/525-4979)

-----Original Message-----
From: Knapp, Brian E NFG NG TNARNG (US) <brian.e.knapp.nfg@mail.mil>
Sent: Thursday, May 9, 2019 12:02 PM
To: Robbie Sykes <robbie_sykes@fws.gov>
Subject: [EXTERNAL] VTS-Milan INRMP Update Participation Request

Hi Robbie,

The Tennessee Army National Guard is revising the Integrated Natural Resource Management Plan (INRMP) for Volunteer Training Site - Milan and would like to request USFWS's participation. TNARNG would also like USFWS's concurrence that it is acceptable to continue operating the site under the current INRMP until the new INRMP is updated, as there will be no significant changes to the sites use until after the new INRMP is completed. I have attached a formal letter requesting these things. I look forward to working with you and hope to hear back from you very soon.

Sincerely,

Brian Knapp

Brian Knapp
Natural Resource Manager

JFHQ-TN-FMO-ENV
3041 Sidco Dr.
Nashville, TN 37204-1502

Office: 615-313-0945
Cell: 615-339-5814

From: Jason Maxedon
To: Knapp, Brian E NFG NG TNARNG (US)
Cc: Patrick Lemons; Daniel Stanfield; Kirk Miles
Subject: [Non-DoD Source] RE: TWRA Participation Request
Date: Thursday, May 9, 2019 12:45:18 PM

Mr. Knapp,

TWRA concurs to continue operation if the plan is the same as we previously agreed to.

Thank you,

Jason

-----Original Message-----
From: Knapp, Brian E NFG NG TNARNG (US) [mailto:brian.e.knapp.nfg@mail.mil]
Sent: Thursday, May 9, 2019 12:33 PM
To: Jason Maxedon
Cc: Patrick Lemons; Daniel Stanfield
Subject: RE: TWRA Participation Request

Mr. Maxedon,
Thanks for your quick response. Can you please send me a statement that TWRA concurs it is OK to continue operating under the current INRMP until we complete the new updated INRMP?

I will send both Mr. Stansfield and Mr. Lemons a copy of the draft INRMP for review and comment as soon as I get it completed (hopefully in the next month). I may need to conduct a scoping meeting at VTS-Milan during the next month or so as well. I will send you all invitations to attend and descriptions of what will be discussed so you can decide if you wish to attend. I look forward to working with you all.

Have a fantastic day.

Brian

Brian Knapp
Natural Resource Manager
JFHQ-TN-FMO-ENV
3041 Sidco Dr.
Nashville, TN 37204-1502

Office: 615-313-0945
Cell: 615-339-5814

-----Original Message-----
From: Jason Maxedon [mailto:Jason.Maxedon@tn.gov]
Sent: Thursday, May 9, 2019 12:14 PM
To: Knapp, Brian E NFG NG TNARNG (US) <brian.e.knapp.nfg@mail.mil>
Cc: Patrick Lemons <Patrick.Lemons@tn.gov>; Daniel Stanfield <Daniel.Stanfield@tn.gov>
Subject: [Non-DoD Source] RE: TWRA Participation Request

Mr. Knapp,

We would be glad to assist with the plan. I am going to ask that one of our Lands Management Managers - Patrick

Lemons and Game Species Managers - Daniel Stanfield assist you with this. Please copy them on any future correspondence.

Thank you,

Jason

Jason Maxedon
Region 1 Wildlife Program Manager
Certified Wildlife Biologist ®
Tennessee Wildlife Resources Agency
200 Lowell Thomas Drive
Jackson, TN 38301
731-423-5730 (office)
731-423-6483 (fax)

-----Original Message-----
From: Knapp, Brian E NFG NG TNARNG (US) [mailto:brian.e.knapp.nfg@mail.mil]
Sent: Thursday, May 9, 2019 11:58 AM
To: Jason Maxedon
Subject: TWRA Participation Request

Mr. Maxedon,

The Tennessee Army National Guard is revising the Integrated Natural Resource Management Plan (INRMP) for Volunteer Training Site - Milan and would like to request TWRA's participation. TNARNG would also like TWRA's concurrence that it is acceptable to continue operating the site under the current INRMP until the new INRMP is updated, as there will be no significant changes to the sites use until after the new INRMP is completed. I have attached a formal letter requesting these things. I look forward to working with you and hope to hear back from you very soon.

Sincerely,

Brian Knapp

Brian Knapp
Natural Resource Manager
JFHQ-TN-FMO-ENV
3041 Sidco Dr.
Nashville, TN 37204-1502

Office: 615-313-0945
Cell: 615-339-5814

United States Department of the Interior

FISH AND WILDLIFE SERVICE
Tennessee ES Office
446 Neal Street
Cookeville, Tennessee 38501

August 29, 2019

Mr. Brian Knapp
Natural Resource Manager
Tennessee Army National Guard
3041 Sidco Drive
Nashville, Tennessee 37204

Subject: FWS# 2019-CPA-0508. Tennessee Army National Guard – 2019 Update of the Integrated Natural Resources Management Plan for the Volunteer Training Site in Milan, Gibson County, Tennessee.

Dear Mr. Knapp:

U.S. Fish and Wildlife Service (Service) personnel have reviewed your correspondence dated August 12, 2019, regarding the update to the Integrated Natural Resource Management Plan (INRMP) for the Volunteer Training Site (VTS) in Milan, Gibson County, Tennessee. The INRMP provides guidance on the management and protection of natural resources at the VTS and is prepared in accordance with the Sikes Act, as amended (16 U.S.C. 670a et seq.). Included in this document are management objectives for rare, threatened, and endangered species. The Service offers the following comments in response to your request for recommendations regarding the INRMP update.

Recent acoustic survey efforts have confirmed likely presence of the gray bat (*Myotis grisescens*) and northern long-eared bat (*Myotis septentrionalis*) at the VTS. Furthermore, surveys efforts have indicated possible presence of the Indiana bat (*Myotis sodalis*). Although these species have not been captured during historic mist netting surveys, there is potential for these species to occupy the site and further analysis is warranted. In consideration of the survey results, the INRMP states that the Tennessee Army National Guard (TNARNG) intends to pursue manual vetting of the recorded calls, install/create bat roost structures, and conduct mist netting surveys. If presence of a listed bat is confirmed, the TNARNG would coordinate with the Service and the Tennessee Wildlife Resources Agency to develop an Endangered Species Management Plan for the VTS. These objectives align with our discussions that occurred on August 7, 2019, regarding the INRMP, and we believe these are the appropriate steps moving forward. We do recommend that any future survey plans be reviewed by the Service prior to initiation to ensure they are completed in accordance with the most recent range-wide survey guidelines.

The Service commends the TNARNG staff for taking the appropriate measures to ensure federally protected bat species are protected at the VTS. We have no concerns or further comments at this time. If you have any questions, please contact Dustin Boles at 931/525-4984, or by email at *dustin_boles@fws.gov*.

Sincerely,

Robert E. Sykes for

Virgil Lee Andrews, Jr.
Field Supervisor

From:	Patrick Lemons
To:	Knapp, Brian E NFG NG TNARNG (US)
Cc:	Jason Maxedon
Subject:	[Non-DoD Source] Re: Milan INRMP
Date:	Monday, September 9, 2019 1:15:25 PM
Attachments:	Milan INRMP.docx

_____

Brian,

Thanks for the opportunity to review the plan for VTS Milan. Overall I think it was well put together. I made some general comments below and also attached those in a word document.

Thanks

Patrick Lemons

TWRA Wildlife Manager 3

731 423-5729 Office

731 697-5200 Cell

Native Grass Plantings

We no longer plant native warm season grasses. We found that planted stands become too dense overtime and actually exclude use by ground nesting birds. In fact we are now using soil active herbicides (like Arsenal) to reclaim areas that we planted in NWSG several years ago.

Instead of planting our preferred method now is to use a glyphosate herbicide to kill the unwanted vegetation and allow the native grasses and forbs in the seed bank to come back. Follow up spot spraying unwanted vegetation is normal after the original herbicide treatment. The additional herbicide expense is more than covered by the savings in seed purchases and planting cost.

Exotics

I applaud your focus on eradication and exclusion of exotic plants. In 6.1.1 you mention washing vehicles prior to entering the training grounds (a good idea). You may also consider washing vehicles prior to leaving the INTWR to prohibit moving exotics off site.

Maintenance Mowing

I may have missed it but did not see mention of your mowing dates. We try to preclude any maintenance mowing until after July 1 and try to push mowing into August. The past couple of wet summers we have seen week old quail and turkey broods in late August.

Prescribed Fire

I was glad to see that the document recommends the use of prescribed fire. I did not find mention goals or prescriptions of goals except "field maintenance" so I have provided some guidance: In recent years we have shifted much of our burning to growing season burns (probably 80%). This time frame is August to late October. The benefits we see include increased forbs and herbaceous plants in fields that had been grass dominated, and increased bare ground the following spring. Growing season burns create brood cover, which we believe is the most limiting factor for quail and turkeys. Ideally growing season burn units should linear since they are used as travel corridors between habitats. Growing season burn blocks than 50 acres or less since there will be little cover on the block over winter. A reduction in tree encroachment in fields is another plus.

Wood duck boxes

If boxes are not being maintained they are likely not beneficial for wood ducks. Additionally if your boxes do not have predator guards they may actually be a sink to the population. A yearly box check is simple and would including replacing bedding material and predator guard adjustment or installation.

From: Knapp, Brian E NFG NG TNARNG (US) <brian.e.knapp.nfg@mail.mil>
Sent: Thursday, September 5, 2019 7:34:00 AM
To: Patrick Lemons <Patrick.Lemons@tn.gov>
Subject: [EXTERNAL] RE: Milan INRMP

*** This is an EXTERNAL email. Please exercise caution. DO NOT open attachments or click links from unknown senders or unexpected email - STS-Security. ***

Hi Patrick,

I appreciate the update and the help on this. I look forward to seeing your comments.

Have a great day.

Brian

Brian Knapp
Natural Resource Manager
JFHQ-TN-FMO-ENV
3041 Sidco Dr.
Nashville, TN 37204-1502

Office: 615-313-0945
Cell: 615-339-5814

-----Original Message-----
From: Patrick Lemons [Caution-mailto:Patrick.Lemons@tn.gov < Caution-mailto:Patrick.Lemons@tn.gov >]
Sent: Wednesday, September 4, 2019 4:49 PM
To: Knapp, Brian E NFG NG TNARNG (US) <brian.e.knapp.nfg@mail.mil>
Subject: [Non-DoD Source] Milan INRMP

Hello Brian,

Patrick Lemons here. I am a Manager 3 in Region 1 and one of the guys Jason has asked to look over the document. I have not done so yet, but will take a look at it tomorrow. I worked in Canada last week, but security protocols would not allow me access doc on a hotel internet connection. You will hear from me tomorrow.

I am sorry for the delay,

Patrick

Native Grass Plantings

We no longer plant native warm season grasses. We found that planted stands become too dense overtime and actually exclude use by ground nesting birds. In fact we are now using soil active herbicides (like Arsenal) to reclaim areas that we planted in NWSG several years ago.

Instead of planting our preferred method now is to use glyphosate herbicide to kill the unwanted vegetation and allow the native grasses and forbs in the seed bank to come back. Follow up spot spraying unwanted vegetation is normal after the original herbicide treatment. The additional herbicide expense is more than covered by the savings in seed purchases and planting cost.

Exotics

I applaud your focus on eradication and exclusion of exotic plants. In 6.1.1 you mention washing vehicles prior to entering the training grounds (a good idea). You may also consider washing vehicles prior to leaving the INTWR to prohibit moving exotics off site

Maintenance Mowing

I may have missed it but did not see mention of your mowing dates. We try to preclude any maintenance mowing until after July 1 and really try to push mowing into August. The past couple of wet summers we have seen week old quail and turkey broods in late August.

Prescribed Fire

I was glad to see that the document recommends the use of prescribed fire. I did not find mention goals or prescriptions of goals except "field maintenance" so I have provided some guidance: In recent years we have shifted much of our burning to growing season burns (probably 80%). This time frame is August to late October. The benefits we see include increased forbs and herbaceous plants in fields that had been grass dominated, and increased bare ground the following spring. Growing season burns create brood cover, which we believe is the most limiting factor for quail and turkeys. Ideally growing season burn units should linear since they are used as travel corridors between habitats. Burn blocks may be smaller than 50 acres or less since there will be little cover on the block over winter. A reduction in tree encroachment in fields is another plus.

Wood duck boxes

If boxes are not being maintained they are likely not beneficial for wood ducks. Additionally if your boxes do not have predator guards they may actually be a sink to the population. A yearly box check is simple and would including replacing bedding material and predator guard adjustment or installation.

From: Knapp, Brian E NFG NG TNARNG (US)
To: "Patrick Lemons"; "Jason Maxedon"
Subject: VTS-Milan INRMP
Date: Thursday, October 3, 2019 2:01:00 PM
Attachments: Milan INRMP 2.docx

Gentlemen,

I really appreciate your participation and comments on the VTS-Milan INRMP update. They were extremely helpful and informative. We are running out of time for me to get the final draft to the National Guard Bureau for review. Unfortunately that means we will not be able to meet you at VTS-Milan to discuss your recommendations before I send the revised version up to NGB for comment. Perhaps we can meet there with the USFWS staff and tour the VTS so you can get to know the site and see what we are doing with it a little later. I am attaching the word document of your comments with a description of the adjustments made based on them in red below each subject area.

I will send you the final version for review/signature after I receive NGB comments and make more adjustments based on their comments. I will also send along a list of their comments and the modifications I make based on them so you will know what has changed since you last saw the document. Again, your participation is greatly appreciated.

Have a fantastic day.

Brian

Brian Knapp
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Nashville, TN 37204-1502

Office: 615-313-0945
Cell: 615-339-5814

From: Knapp, Brian E NFG NG TNARNG (US)
To: Dustin Boles; "Robbie Sykes"; "Andrews, Lee"
Subject: VTS-Milan INRMP
Date: Thursday, October 3, 2019 2:27:00 PM

Gentlemen,

I really appreciate your participation and comments on the VTS-Milan INRMP update. Your suggestions on a good approach for moving forward in regard to the acoustic likely detections of listed bats and seeking confirmation on their presence were very helpful and have been incorporated into the document. We are running out of time for me to get the final draft to the National Guard Bureau for review. Unfortunately that means we will not be able to meet you at VTS-Milan to discuss your recommendations further before I send the revised version up to NGB for comment. Perhaps we can meet there with the TWRA staff and tour the VTS so you can get to know the site and see what we are doing with it a little later.

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Have a fantastic day.

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From: Lee Andrews
To: Knapp, Brian E NFG NG TNARNG (US)
Cc: Dustin Boles; Robbie Sykes
Subject: [Non-DoD Source] Re: [EXTERNAL] VTS-Milan INRMP
Date: Thursday, October 3, 2019 2:35:40 PM

Thanks. We'll keep an eye out for it.

Sent from my iPhone

> On Oct 3, 2019, at 2:27 PM, Knapp, Brian E NFG NG TNARNG (US) <brian.e.knapp.nfg@mail.mil> wrote:
>
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> I really appreciate your participation and comments on the VTS-Milan INRMP update. Your suggestions on a good approach for moving forward in regard to the acoustic likely detections of listed bats and seeking confirmation on their presence were very helpful and have been incorporated into the document. We are running out of time for me to get the final draft to the National Guard Bureau for review. Unfortunately that means we will not be able to meet you at VTS-Milan to discuss your recommendations further before I send the revised version up to NGB for comment. Perhaps we can meet there with the TWRA staff and tour the VTS so you can get to know the site and see what we are doing with it a little later.
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> Have a fantastic day.
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>
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> Brian Knapp
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> Nashville, TN 37204-1502
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>

APPENDIX D

Annotated Summary of Key Legislation Related to Natural Resources Management

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United States Code

Sikes Act, as amended; 16 U.S.C. 670(a) et seq.	Authorizes military installations to carry out programs for the conservation and rehabilitation of natural resources. Requires preparation and implementation of Integrated Natural Resources Management Plans for all military installations in U.S. except those lacking significant natural resources.
National Environmental Policy Act of 1969 (NEPA), as amended; P.L.91-190, 42 U.S.C. 4321 et seq.	Requires Federal agencies to utilize a systematic approach when assessing environmental impacts of government activities. NEPA proposes an interdisciplinary approach in a decision-making process designed to identify unacceptable or unnecessary impacts to the environment.
Leases: Non-excess Property of Military Departments, 10 U.S.C. 2667, as amended	Authorizes DoD to lease to commercial enterprises Federal land that is not currently needed for Public use. Covers agricultural outleasing programs.
Federal Land Use Policy and Management Act, 43 U.S.C. 1701-1782	Requires management of public lands to protect the quality of scientific, scenic, historical, ecological, environmental, and archaeological resources and values; as well as to preserve and protect certain lands in their natural condition for fish and wildlife habitat. This act also requires consideration of commodity production such as timbering.
Clean Air Act, 42 U.S.C. 7401-7671q, July 14, 1955, as amended	This Act, as amended, is known as the Clean Air Act of 1990. The amendments made in 1990 established the core of the clean air program. The primary objective is to establish Federal standards for air pollutants. It is designed to improve air quality in areas of the country which do not meet Federal standards and to prevent significant deterioration in areas where air quality exceeds those standards.
Federal Water Pollution Control Act (Clean Water Act), 33 U.S.C. 1251-1387	The Clean Water Act is a comprehensive statute aimed at restoring and maintaining the chemical, physical, and biological integrity of the nation's waters. Primary authority for the implementation and enforcement rests with the U.S. Environmental Protection Agency (USEPA).
Migratory Bird Treaty Act 16 U.S.C. 703-712	The Migratory Bird Treaty Act implements various treaties and for the protection of migratory birds. Under the Act, taking, killing, or possessing migratory birds is unlawful.
Endangered Species Act of 1973, as amended; P.L. 93-205, 16 U.S.C.1531 et seq.	Protects threatened, endangered, and candidate species of fish, wildlife, and plants and their designated critical habitats. Under this law, no Federal action is allowed to jeopardize the continued existence of an endangered or threatened species. The Endangered Species Act also requires consultation with the USFWS and the National Marine Fisheries Service and the preparation of a biological assessment when such species are present in an area that is affected by government activities.
National Historic Preservation Act; 16 U.S.C. 470 et seq.	Requires Federal agencies to take account of the effect of any federally assisted undertaking or licensing on any district, site, building, structure, or object that is included in or eligible for inclusion in the National Register of Historic Places (NRHP).

	Provides for the nomination, identification (through listing on the National Register), and protection of historical and cultural properties of significance.
Federal Noxious Weed Act of 1974; 7 U.S.C. 2801-2814	The Act provides for the control and management of non-indigenous weeds that injure or have the potential to injure the interests of agriculture and commerce, wildlife resources, or the public health.
Sale of certain interests in land; logs; 10 U.S.C. 2665	Authorizes sale of forest products and reimbursement of the costs of management of forest resources.
Federal Insecticide, Fungicide, and Rodenticide Act, as amended (FIFRA);	Controls pesticide distribution, sale, and use. Requires licensing/certification for commercial applications and for sales of pesticides.
Archaeological and Historical Preservation Act of 1974; 16 U.S.C. 469 et seq.	Provides for the preservation of historical and archaeological data which might otherwise be lost or destroyed as a result of alteration of the terrain caused by any Federal construction project or federally licensed activity or program.
Archaeological Resources Protection Act of 1979; (16 U.S.C. 470 et seq.) 32 CFR 22 and 229	Protects archeological resources and sites on public lands and Indian lands.

Federal Public Laws and Executive Orders

National Defense Authorization Act of 1989, Public Law (P.L.) 101-189; Volunteer Partnership Cost-Share Program	Amends two acts and establishes volunteer and partnership programs for natural and cultural resources management on DoD lands.
Defense Appropriations Act of 1991, P.L. 101-511; Legacy Resource Management Program	Establishes a program for the stewardship of biological, geophysical, cultural, and historic resources on DoD lands.
Executive Order (EO) 11988, Floodplain Management	Provides direction regarding actions of Federal agencies in floodplains, and requires permits from state and Federal review agencies for any construction within a 100-year floodplain.
EO 11990, Protection of Wetlands	Requires Federal agencies to avoid undertaking or providing assistance for new construction located in wetlands unless there is no practicable alternative, and all practicable measures to minimize harm to wetlands has been implemented.
EO 11514, Protection and Enhancement of Environmental Quality	Federal agencies shall initiate measures needed to direct their policies, plans, and programs to meet national environmental goals. They shall monitor, evaluate, and control agency activities to protect and enhance the quality of the environment.
EO 11593, Protection and Enhancement of the Cultural Environment	All Federal agencies are required to locate, identify, and record all cultural and natural resources. Cultural resources include sites of archaeological, historical, or architectural significance. Natural resources include the presence of endangered species, critical habitat, and areas of special biological significance.

EO 11990, Protection of Wetlands	Each Agency shall take action to minimize the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands in carrying out the agency's responsibilities.
EO 11987, Exotic Organisms	Agencies shall restrict the introduction of exotic species into the natural ecosystems on lands and waters that they administer.
EO 12088, Federal Compliance With Pollution Control Standards.	This EO delegates responsibility to the head of each executive agency for ensuring that all necessary actions are taken for the prevention, control, and abatement of environmental pollution. This order gives the Environmental Protection Agency authority to conduct reviews and inspections to monitor Federal facility compliance with pollution control standards.
EO 12898, Environmental Justice	This EO requires certain Federal agencies, including the DoD, to the greatest extent practicable permitted by law, to make environmental justice part of their missions by identifying and addressing disproportionately high and adverse health or environmental effects on minority and low-income populations.
EO 13112, Exotic and Invasive Species	This EO strives to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.
EO 13045, Protection of Children from Environmental Health and Safety Risks	This EO makes it a high priority to identify and assess environmental health and safety risks that may disproportionately affect children. It also directs agencies to ensure that policies, programs, activities, and standards address such risks if identified.
EO 13007, Indian Sacred Sites	Directs protection of Indian sacred sites Federal lands and guarantees access to and ceremonial use of Indian sacred sites on Federal lands by Indian religious practioners.
EO 13175, Consultation and Coordination with Indian Tribal Governments	Establishes requirement of and process for Nation-to-Nation consultation with Indian tribal governments with regards to the development of Federal policies that have tribal implications.

DoD Policy, Directives and Instructions

DoD Directive 4700.4, Natural Resources Management Program	Requires that the ARNG implement and maintain a balanced and integrated program for the management of natural resources.
DoD Directive 4715.1, Environmental Security	Establishes policy for protecting, preserving, and (when required) restoring and enhancing the quality of the environment. This directive also ensures that environmental factors are integrated into DoD decision-making processes that may impact the environment, and are given appropriate consideration along with other relevant factors.
DoD Annotated Policy on Indian Tribes and Alaska Natives	Establishes DoD American Indian and Alaska Native Policy for interacting and working with federally recognized American Indian and Alaska Native governments (hereinafter referred to as "tribes"). It defines: protected tribal resources, tribal rights, and Indian lands.
DoDI 4715.03, Natural Resources Conservation Program	Implements policy, assigns responsibility, and prescribes procedures under *DoD Directive* 4715.1 for the integrated management of natural and cultural resources on property under DoD control.

Army Instructions and Directives

DoDD DoDD 5105.77: National Guard Bureau (NGB)	Establishes policy for and defines the organization and management, responsibilities and functions, relationships, and authorities of the Chief, NGB, and: Establishes the NGB as a joint activity of the Department of Defense.
AR 200-1, Environmental Protection and Enhancement	As of 28 August 2007, this document supersedes all previous iterations of AR 200-1, AR 200-3, AR 200-4, and AR 200-5. Provides policies, standards and procedures for the following resource areas: NEPA, Natural Resources Management, Cultural Resources Management, Natural Resource Damage Assessment (NRDA), Real Property Acquisition, Outgrant and Disposal Transactions, Environmental Agreements, Environmental Compliance Assessments, Environmental Quality Control Committee (EQCC), Army Environmental Training Program, Installation/State Environmental Training Plans, ITAM, and Pest Management Program
AR 350-19, The Army Sustainable Range Program (superceded AR 210-21)	Assigns responsibilities and provides policy and guidance for managing and operating U.S. Army ranges and training lands to support their long-term viability and utility to meet the National defense mission.
HQDA INRMP Policy Memorandum (21 March 1997), Army Goals and Implementing Guidance for Natural Resources Planning Level Surveys (PLS) and Integrated Natural Resources Management Plan (INRMP)	Provides guidance to ensure that natural resource conservation measures and Army activities on mission land are integrated and are consistent with Federal stewardship requirements.
DA Memorandum (25 May 2006), Army Guidance for the Implementation of the Sikes Act Improvement Act	Implement DoD guidance on the requirement, development, coordination, and review of Integrated Natural Resources Management Plans on Army installations.

Tennessee State Code

Tennessee Water Quality Control Act of 1977; TCA 69-3-101 et seq.	Establishes the Tennessee Water Quality Control Board to establish standards for various uses of the waters of the state.
Tennessee Insecticide, Fungicide, and Rodenticide Act; *TCA 43-8-101 et seq.*	Controls pesticide distribution, sale, and use in Tennessee.
Tennessee Hazardous Substances Act; *TCA 68-131-101 et seq.*	Defines, establishes regulations for the handling of, and sets penalties for the mishandling of hazardous substances in the state of Tennessee.
Tennessee Air Quality Act; TCA 68-201-202 et seq.	Establishes an Air Pollution Control Board to create and maintain rules and regulations for the purpose of protecting Tennessee's air

	quality.
Tennessee Safe Drinking Water Act of 1983; *TCA 68-221-701 et seq.*	Defines the duties and responsibilities of the Tennessee Water Quality Board and the Commissioner of the Tennessee Department of Environment and Conservation with regards to protection of the drinking water supply of the state of Tennessee. Also identifies prohibited acts and defines penalties and legal processes for prosecuting violations thereof.
Fish and Wildlife Regulations; TCS 70-4-101	Establishes rules and regulations for hunting, fishing, and protection of wildlife.
Nongame Species Regulations; TCA 70-8-104	Gives the executive director of the Tennessee Wildlife Resources Agency the responsibility for establishing regulations to protect non-game species.
Tennessee Archaeological Statutes; TCA 11-6-101 et seq.	Establishes a state Division of Archaeology and defines its role in research on and protection of archaeological features, sites, and artifacts in the state of Tennessee.

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APPENDIX E

Plant and Animal Species Found on the VTS-Milan

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PLANT SPECIES

Growth Form: F = fern G = grass/graminoid H = herb
S = shrub T = tree V = vine

Federal Status abbreviations:
LE = listed as endangered
LT = listed as threatened

State Status abbreviations:
E = state listed as endangered
T = state listed as threatened
SC = special concern species

Scientific name in all capitals indicates species introduced to the U.S.; in bold indicates the species is included on the TN-EPPC 2004 list of Invasive Exotic Pest Plants in Tennessee.

Scientific Name	Common Name	Growth Form	Fed Status	TN Status
Asplenium platyneuron	ebony spleenwort	F		
Asplenium resiliens	blackstem spleenwort	F		
Athyrium filix-femina	common ladyfern	F		
Onoclea sensibilis	sensitive fern	F		
Polystichum acrostichoides	Christmas fern	F		
Andropogon gerardii	big bluestem	G		
Andropogon virginicus	broomsedge bluestem	G		
Arundinaria gigantea	giant cane	G		
Bouteloua curtipendula	sideoats grama	G		
Bouteloua dactyloides	buffalograss	G		
Carex plantaginea	plantainleaf sedle	G		
Carex sp.	sedge	G		
Carex vulpinoidea	fox sedge	G		
Chasmanthium latifolium	indian woodoats	G		
CYNODON DACTYLON	bermudagrass	G		
Cyperus esculentus	yellow nutsedge	G		
Cyperus pseudovegetus	marsh flatsedge	G		
Dichanthelium clandestinum	deertongue	G		
Dichanthelium scoparium	velvet panicum	G		
Dichanthelium sphaerocarpon	roundseed panicgrass	G		
Digitaria sanguinalis	hairy crabgrass	G		
Eleocharis obtusa	blunt spikerush	G		
Eleocharis sp.	spikerush	G		
ELEUSINE INDICA	Indian goosegrass	G		
Elymus virginicus	Virginia wildrye	G		
Eragrostis sp.	lovegrass	G		
Festuca sp.	fescue	G		
Glyceria sp.	mannagrass	G		
Glyceria striata	fowl mannagrass	G		
Juncus acuminatus	tapertip rush	G		
Juncus sp.	rush	G		

Scientific Name	Common Name	Growth Form	Fed Status	TN Status
Leersia oryzoides	rice cutgrass	G		
LOLIUM PERENNE	perennial ryegrass	G		
MICROSTEGIUM VIMINEUM	Nepalese browntop	G		
Paspalum sp.	crowngrass	G		
POA ANNUA	annual bluegrass	G		
SCHEDONORUS PHOENIX	tall fescue	G		
Schizachyrium scoparium	little bluestem	G		
Scirpus cyperinus	woolgrass	G		
Scirpus sp.	bulrush	G		
Setaria sp.	bristlegrass	G		
SETARIA VIRIDIS	green bristlegrass	G		
SORGHUM HALEPENSE	Johnsongrass	G		
Achillea millefolium	common yarrow	H		
Acorus calamus	calamus	H		
Ageratina altissima var. altissima	white snakeroot	H		
Agrimonia parviflora	harvestlice	H		
Agrimonia sp.	agrimony	H		
ALLIARIA PETIOLATA	garlic mustard	H		
Amaranthus retroflexus	redroot amaranth	H		
Ambrosia artemisiifolia	annual ragweed	H		
Ambrosia trifida	great ragweed	H		
Ammannia coccinea	valley redstem	H		
Antennaria sp.	pussytoes	H		
Apocynum cannabinum	indianhemp	H		
Arisaema dracontium	green dragon	H		
Arisaema triphyllum	jack-in-the-pulpit	H		
Asclepias amplexicaulis	clasping milkweed	H		
Asclepias syriaca	common milkweed	H		
Asclepias tuberosa	butterfly milkweed	H		
Aster sp.	aster	H		
Aureolaria virginica	downy yellow false foxglove	H		
Bidens sp.	beggartick	H		
Bidens vulgata	big devils beggartick	H		
Boehmeria cylindrica	smallspike false nettle	H		
Botrychium dissectum	cutleaf grapefern	H		
Botrychium virginianum	rattlesnake fern	H		
Cardamine concatenata	cutleaf toothwort	H		
Cassia marilandica	Maryland senna	H		
Chamaecrista fasciculata	partridge pea	H		
Chamaecrista nictitans	sensitive partridge pea	H		
Chamaesyce maculata	spotted sandmat	H		
Cirsium altissimum	tall thistle	H		
CIRSIUM ARVENSE	Canada thistle	H		
Claytonia virginica	Virginia springbeauty	H		
COMMELINA COMMUNIS	Asiatic dayflower	H		
Commelina virginica	Virginia dayflower	H		
Coreopsis major	greater tickseed	H		
Coreopsis tinctoria	golden tickseed	H		

Scientific Name	Common Name	Growth Form	Fed Status	TN Status
Corydalis flavula	yellow fumewort	H		
DAUCUS CAROTA	Queen Anne's lace	H		
Desmanthus illinoensis	Illinois bundleflower	H		
Desmodium nudiflorum	nakedflower ticktrefoil	H		
Desmodium sp.	ticktrefoil	H		
Diodia teres	poorjoe	H		
Diodia virginiana	Virginia buttonweed	H		
Erigeron annuus	eastern daisy fleabane	H		
Erigeron strigosus	prairie fleabane	H		
Eryngium prostratum	creeping eryngo	H		
Eupatorium capillifolium	dogfennel	H		
Eupatorium perfoliatum	common boneset	H		
Eupatorium sp.	thoroughwort	H		
Euphorbia corollata	flowering spurge	H		
Fragaria vesca	woodland strawberry	H		
Galium aparine	stickywilly	H		
Galium circaezans	licorice bedstraw	H		
Galium triflorum	fragrant bedstraw	H		
Helenium amarum	yellowdicks	H		
Helenium flexuosum	purplehead sneezeweed	H		
Helianthemum sp.	frostweed	H		
Helianthus sp.	sunflower	H		
Hibiscus moscheutos	crimsoneyed rosemallow	H		
Hieracium sp.	hawkweed	H		
Houstonia longifolia	longleaf summer bluet	H		
Houstonia sp.	bluet	H		
Hypericum perforatum	common St. Johnswort	H		
Impatiens capensis	jewelweed	H		
KUMMEROWIA STRIATA	Japanese clover	H		
Lechea sp.	pinweed	H		
LESPEDEZA CUNEATA	sericea lespedeza	H		
Lespedeza procumbens	trailing lespedeza	H		
Lespedeza sp.	lespedeza	H		
Liatris spicata	dense blazing star	H		
Lobelia sp.	lobelia	H		
Ludwigia palustris	marsh seedbox	H		
Lycopodium digitatum	fan clubmoss	H		
Maianthemum racemosum ssp. Racemosum	feathery false lily of the valley	H		
Manfreda virginica	false aloe	H		
Mimulus ringens	Allegheny monkeyflower	H		
NASTURTIUM OFFICINALE	watercress	H		
Oenothera biennis	common evening primrose	H		
Oxalis sp.	woodsorrel	H		
Oxalis stricta	common yellow oxalis	H		
Phytolacca americana	American pokeweed	H		
Plantago aristata	largebracted plantain	H		
PLANTAGO LANCEOLATA	narrowleaf plantain	H		
PLANTAGO MAJOR	common plantain	H		

Scientific Name	Common Name	Growth Form	Fed Status	TN Status
Plantago virginica	Virginia plantain	H		
Podophyllum peltatum	mayapple	H		
Polygala cruciata	drumheads	H		
Polygala curtissii	Curtiss' milkwort	H		
Polygala nutallii	Nutall's milkwort	H		E
Polygala sanguinea	purple milkwort	H		
Polygonum hydropiperoides	swamp smartweed	H		
POLYGONUM ORIENTALE	kiss me over the garden gate	H		
Polygonum pennsylvanicum	Pennsylvania smartweed	H		
POLYGONUM PERSICARIA	spotted ladysthumb	H		
Polygonum virginianum	jumpseed	H		
Potentilla canadensis	dwarf cinquefoil	H		
Prenanthes sp.	rattlesnakeroot	H		
Prunella vulgaris	common selfheal	H		
Pycnanthemum incanum	hoary mountainmint	H		
Pycnanthemum tenuifolium	narrowleaf mountainmint	H		
RAPHANUS RAPHANISTRUM	wild radish	H		
Rhexia mariana	Maryland meadowbeauty	H		
Rhexia mariana var. mariana	Maryland meadowbeauty	H		
Rhexia virginica	handsome harry	H		
Rudbeckia hirta	blackeyed Susan	H		
Rumex altissimus	pale dock	H		
Sagittaria latifolia	broadleaf arrowhead	H		
Sanicula sp.	sanicle	H		
Solanum carolinense	Carolina horsenettle	H		
Solidago gigantea	giant goldenrod	H		
Solidago sp.	goldenrod	H		
STELLARIA MEDIA	common chickweed	H		
Stylosanthes biflora	sidebeak pencilflower	H		
Symphyotrichum prenanthoides	crookedstem aster	H		
TARAXACUM OFFICINALE	common dandelion	H		
Tiarella coridifolia	heartleaf foamflower	H		
Tipularia discolor	crippled cranefly	H		
Tradescantia subaspera	zigzag spiderwort	H		
TRIFOLIUM PRATENSE	red clover	H		
TRIFOLIUM REPENS	white clover	H		
Triodanis perfoliata	clasping Venus' looking-glass	H		
Typha latifolia	broadleaf cattail	H		
VERBASCUM THAPSUS	commun mullein	H		
Verbena hastata	swamp verbena	H		
Verbesina virginica	white bcrownbeard	H		
Vernonia gigantea	giant ironweed	H		
Viola sp.	violet	H		
Hypericum sp.	St. Johnswort	H/S		
Asimina triloba	pawpaw	S		
Cephalanthus occidentalis	common buttonbush	S		
Chimaphila maculata	striped prince's pine	S		

Scientific Name	Common Name	Growth Form	Fed Status	TN Status
Corylus americana	American hazelnut	S		
ELAEAGNUS UMBELLATA	autumn olive	S		
Frangula caroliniana	Carolina buckthorn	S		
Hydrangea arborescens	wild hydrangea	S		
Ilex decidua	possumhaw	S		
Ilex verticillata	common winterberry	S		
LIGUSTRUM VULGARE	European privet	S		
Rhus copallinum	winged sumac	S		
Rhus glabra	smooth sumace	S		
Rhus typhina	staghorn sumac	S		
Rosa palustris	swamp rose	S		
Rubus allegheniensis	Allegheny blackberry	S		
Rubus idaeus	American red raspberry	S		
Rubus occidentalis	black raspberry	S		
Sambucus nigra ssp. canadensis	American black elderberry	S		
Symphoricarpos orbiculatus	coralberry	S		
Vaccinium arboreum	farkleberry	S		
Vaccinium corymbosum	highbush blueberry	S		
Vaccinium stamineum	deerberry	S		
Yucca flaccida	weak-leaf yucca	S		
Acer negundo	boxelder	T		
Acer rubrum	red maple	T		
Acer saccharinum	silver maple	T		
Acer saccharum	sugar maple	T		
AILANTHUS ALTISSIMA	tree-of-heaven	T		
ALBIZIA JULIBRISSIN	silktree	T		
Alnus serrulata	hazel alder	T		
Aralia spinosa	devil's walkingstick	T		
Betula nigra	river birch	T		
Carpinus caroliniana	American hornbeam	T		
Carya alba	mockernut hickory	T		
Carya cordiformis	bitternut hickory	T		
Carya glabra	pignut hickory	T		
Carya illinoensis	pecan	T		
Carya laciniosa	shellbark hickory	T		
Carya ovata	shagbark hickory	T		
Catalpa speciosa	northern catalpa	T		
Celtis laevigata	sugarberry	T		
Celtis occidentalis	common hackberry	T		
Cercis canadensis	eastern redbud	T		
Cornus florida	flowering dogwood	T		
Diospyros virginiana	common persimmon	T		
Fagus grandifolia	American beech	T		
Fraxinus americana	white ash	T		
Fraxinus pennsylvanica	green ash	T		
Gleditsia triacanthos	honeylocust	T		
Ilex opaca	American holly	T		
Juglans cinerea	butternut	T		T

Scientific Name	Common Name	Growth Form	Fed Status	TN Status
Juglans nigra	black walnut	T		
Juniperus virginiana	eastern redcedar	T		
Liquidambar styraciflua	sweetgum	T		
Liriodendron tulipifera	tuliptree	T		
Maclura pomifera	osage orange	T		
Morus rubra	red mulberry	T		
Nyssa sylvatica	blackgum	T		
PAULOWNIA TOMENTOSA	princesstree	T		
Pinus taeda	loblolly pine	T		
Pinus virginica	Virginia pine	T		
Platanus occidentalis	American sycamore	T		
Populus deltoides	eastern cottonwood	T		
Prunus serotina	black cherry	T		
Quercus alba	white oak	T		
Quercus falcata	southern red oak	T		
Quercus imbricaria	shingle oak	T		
Quercus michauxii	swamp chestnut oak	T		
Quercus nigra	water oak	T		
Quercus pagoda	cherrybark oak	T		
Quercus phellos	willow oak	T		
Quercus prinus	chestnut oak	T		
Quercus shumardii	Shumard's oak	T		
Quercus stellata	post oak	T		
Quercus velutina	black oak	T		
Robinia pseudoacacia	black locust	T		
Salix nigra	black willow	T		
Sassafras albidum	sassafras	T		
Tilia americana	American basswood	T		
Ulmus alata	winged elm	T		
Ulmus americana	American elm	T		
Ulmus rubra	slippery elm	T		
Viburnum prunifolium	blackhaw	T		
Amphicarpaea bracteata	American hogpeanut	V		
Bignonia capreolata	crossvine	V		
Campsis radicans	trumpet creeper	V		
CELASTRUS ORBICULATUS	oriental bittersweet	V		
Clematis virginiana	devil's darning needles	V		
DIOSCOREA OPPOSITIFOLIA	Chinese yam	V		
EUONYMUS FORTUNEI	wintercreeper	V		
LATHYRUS LATIFOLIUS	perennial pea	V		
LONICERA JAPONICA	Japanese honeysuckle	V		
LONICERA sp. (bush)	bush honeysuckle	V		
Parthenocissus quinquefolia	Virginia creeper	V		
Passiflora incarnata	purple passionflower	V		
PUERARIA MONTANA	kudzu	V		
ROSA MULTIFLORA	multiflora rose	V		
Rosa setigera	climbing rose	V		
Smilax bona-nox	saw greenbrier	V		

Scientific Name	Common Name	Growth Form	Fed Status	TN Status
Smilax glauca	cat greenbrier	V		
Smilax rotundifolia	roundleaf greenbrier	V		
Toxicodendron radicans	eastern poison ivy	V		
VINCA MINOR	common periwinkle	V		
Vitis palmata	catbird grape	V		
Vitis riparia	riverbank grape	V		
Vitis rotundifolia	muscadine	V		

VERTEBRATE SPECIES

Federal Status abbreviations:
LE = listed as endangered
LT = listed as threatened
PS = listed as threatened or endangered in a portion of native range (none are protected within GA)

State Status abbreviations:
E = state listed as endangered
D = deemed in need of management
SC = special concern species

Amphibians

Common Name	*Scientific Name*	Fed status	State status
American toad	*Bufo americanus*		
bird-voice treefrog	*Hyla avivoca*		
chorus frog	*Pseudoacris sp.*		
cricket frog	*Acris sp.*		
gray tree frog	*Hyla versicolor*		
bullfrog	*Rana catesbeiana*		
northern leopard frog	*Rana pipiens*		
southern leopard frog	*Rana sphenocephala*		
wood frog	*Rana sylvatica*		

Reptiles

Common Name	*Scientific Name*	Fed status	State status
southern black racer	*Coluber constrictor priapus*		
kingsnake	*Lampropeltis getula*		
ring-necked snake	*Diadophis punctatus*		
ground skink	*Scincella lateralis*		
red-eared slider	*Trachemys scripta elegans*		
eastern box turtle	*Terrapene carolina carolina*		

Fish

Common Name	*Scientific Name*	Fed status	State status
Blackspotted topminnow	*Fundulus olivaceus*		
Bluegill sunfish	*Lepomis macrochirus*		
Bluntnose minnow	*Pimephales notatus*		
Chain pickerel	*Esox niger*		
Creek chub	*Semotilus atromaculatus*		
Grass carp	*Ctenopharyngodon idella*		
Green sunfish	*Lepomis cyanellus*		
Ohio lamprey	*Ichthyomyzon bdellium*		
Largemouth bass	*Micropterus salmoides*		
Mosquitofish	*Gambusia affinis*		

Redear sunfish	*Lepomis microlophus*
Spotted sunfish	*Lepomis punctatus*
Sunfish hybrid	*Lepomis microlophus / L. macrochirus*
Tennessee shiner	*Notropis leuciodus*

Birds

Common Name	***Scientific Name***	**Fed status**	**State status**
Cooper's Hawk	*Accipiter cooperii*		
Sharp-shinned Hawk	*Accipiter striatus*	PS	D
Spotted Sandpiper	*Actitis macularius*		
Red-winged Blackbird	*Agelaius phoeniceus*		
Wood Duck	*Aix sponsa*		
Henslow's Sparrow	*Ammodramus henslowii*		D
Grasshopper Sparrow	*Ammodramus savannarum*	PS	
Green-winged Teal	*Anas crecca*		
Blue-winged Teal	*Anas discors*		
Mallard	*Anas platyrhynchos*		
Ruby-throated Hummingbird	*Archilochus colubris*		
Great Egret	*Ardea alba*		D
Great Blue Heron	*Ardea herodias*		
Tufted Titmouse	*Baeolophus bicolor*		
Cedar Waxwing	*Bombycilla cedrorum*		
Canada Goose	*Branta canadensis*		
Great Horned Owl	*Bubo virginianus*		
Red-tailed Hawk	*Buteo jamaicensis*		
Red-shouldered Hawk	*Buteo lineatus*		
Broad-winged Hawk	*Buteo platypterus*	PS	
Green Heron	*Butorides virescens*		
Sanderling	*Calidris alba*		
White-rumped Sandpiper	*Calidris fuscicollis*		
Western Sandpiper	*Calidris mauri*		
Least Sandpiper	*Calidris minutilla*		
Semipalmated Sandpiper	*Calidris pusilla*		
Chuck-will's-widow	*Caprimulgus carolinensis*		
Northern Cardinal	*Cardinalis cardinalis*		
American Goldfinch	*Carduelis tristis*		
House Finch	*Carpodacus mexicanus*		
Turkey Vulture	*Cathartes aura*		
Hermit Thrush	*Catharus guttatus*		
Gray-cheeked Thrush	*Catharus minimus*		
Swainson's Thrush	*Catharus ustulatus*		
Brown Creeper	*Certhia americana*		
Belted Kingfisher	*Ceryle alcyon*		
Chimney Swift	*Chaetura pelagica*		
Killdeer	*Charadrius vociferus*		
Common Nighthawk	*Chordeiles minor*		
Northern Harrier	*Circus cyaneus*		D
Yellow-billed Cuckoo	*Coccyzus americanus*	PS	

Common Name	*Scientific Name*	Fed status	State status
Black-billed Cuckoo	*Coccyzus erythrophthalmus*		
Northern Flicker	*Colaptes auratus*		
Northern Bobwhite	*Colinus virginianus*		
Rock Dove	*Columba livia*		
Eastern Wood-Pewee	*Contopus virens*		
Black Vulture	*Coragyps atratus*		
American Crow	*Corvus brachyrhynchos*		
Blue Jay	*Cyanocitta cristata*		
Bay-breasted Warbler	*Dendroica castanea*		
Yellow-rumped Warbler	*Dendroica coronata*		
Prairie Warbler	*Dendroica discolor*		
Yellow-throated Warbler	*Dendroica dominica*		
Magnolia Warbler	*Dendroica magnolia*		
Palm Warbler	*Dendroica palmarum*		
Chestnut-sided Warbler	*Dendroica pensylvanica*		
Yellow Warbler	*Dendroica petechia*		
Pine Warbler	*Dendroica pinus*		
Blackpoll Warbler	*Dendroica striata*		
Cape May Warbler	*Dendroica tigrina*		
Black-throated Green Warbler	*Dendroica virens*		
Pileated Woodpecker	*Dryocopus pileatus*		
Gray Catbird	*Dumetella carolinensis*		
Little Blue Heron	*Egretta caerulea*		D
Least Flycatcher	*Empidonax minimus*		
Acadian Flycatcher	*Empidonax virescens*		
Rusty Blackbird	*Euphagus carolinus*		
American Kestrel	*Falco sparverius*		
Wilson's Snipe	*Gallinago delicata*		
Common Yellowthroat	*Geothlypis trichas*		
Bald Eagle (Immature)	*Haliaeetus leucocephalus*		D
Barn Swallow	*Hirundo rustica*		
Wood Thrush	*Hylocichla mustelina*		
Yellow-breasted Chat	*Icteria virens*		
Baltimore Oriole	*Icterus galbula*		
Orchard Oriole	*Icterus spurius*		
Mississippi Kite	*Ictinia mississippiensis*		D
Dark-eyed Junco	*Junco hyemalis*		
Loggerhead Shrike	*Lanius ludovicianus*	PS	D
Ring-billed Gull	*Larus delawarensis*		
Eastern Screech-owl	*Megascops asio*		
Red-bellied Woodpecker	*Melanerpes carolinus*		
Red-headed Woodpecker	*Melanerpes erythrocephalus*		
Wild Turkey	*Meleagris gallapavo*		
Swamp Sparrow	*Melospiza georgiana*		
Song Sparrow	*Melospiza melodia*		
Northern Mockingbird	*Mimus polyglottos*		
Black-and-white Warbler	*Mniotilta varia*		
Brown-headed Cowbird	*Molothrus ater*		

Common Name	*Scientific Name*	Fed status	State status
Great Crested Flycatcher	*Myiarchus crinitus*		
Kentucky Warbler	*Oporomis formosus*		
Northern Parula	*Parula americana*		
House Sparrow	*Passer domesticus*		
Fox Sparrow	*Passerella iliaca*		
Blue Grosbeak	*Passerina caerulea*		
Indigo Bunting	*Passerina cyanea*		
Rose-breasted Grosbeak	*Pheucticus ludovicianus*		
Downy Woodpecker	*Picoides pubescens*		
Hairy Woodpecker	*Picoides villosus*		
Eastern Towhee	*Pipilo erythrophthalmus*		
Scarlet Tanager	*Piranga olivacea*		
Summer Tanager	*Piranga rubra*		
Carolina Chickadee	*Poecile carolinensis*		
Blue-gray Gnatcatcher	*Polioptila caerulea*		
Purple Martin	*Progne subis*		
Prothonotary Warbler	*Protonotoria citrea*		
Common Grackle	*Quiscalus quiscula*		
King Rail	*Rallus elegans*		
Ruby-crowned Kinglet	*Regulus calendula*		
Golden-crowned Kinglet	*Regulus satrapa*		
Eastern Phoebe	*Sayornis phoebe*		
American Woodcock	*Scolopax minor*		
Louisiana Waterthrush	*Seiurus motacilla*		
American Redstart	*Setophaga ruticilla*		
Eastern Bluebird	*Sialia sialis*		
White-breasted Nuthatch	*Sitta carolinensis*		
Yellow-bellied Sapsucker	*Sphyrapicus varius*		D
Dickcissel	*Spiza americana*		
Chipping Sparrow	*Spizella passerina*		
Field Sparrow	*Spizella pusilla*		
Northern Rough-winged Swallow	*Stelgidopteryx serripennis*		
Least Tern	*Sternula antillarum*	PS - E	E
Barred Owl	*Strix varia*		
Eastern Meadowlark	*Sturnella magna*		
European Starling	*Sturnus vulgaris*		
Tree Swallow	*Tachycineta bicolor*		
Bewick's wren	*Thryomanes bewickii*		E
Carolina Wren	*Thryothorus ludovicianus*		
Brown Thrasher	*Toxostoma rufum*		
Lesser Yellowlegs	*Tringa flavipes*		
Solitary Sandpiper	*Tringa solitaria*		
House Wren	*Troglodytes aedon*		
Winter Wren	*Troglodytes troglodytes*		
American Robin	*Turdus migratorius*		
Eastern Kingbird	*Tyrannus tyrannus*		
Barn Owl	*Tyto alba*		D
Orange-crowned Warbler	*Vermivora celata*		

Common Name	*Scientific Name*	Fed status	State status
Tennessee Warbler	*Vermivora peregrina*		
Blue-winged Warbler	*Vermivora pinus*		
Yellow-throated Vireo	*Vireo flavifrons*		
Warbling Vireo	*Vireo gilvus*		
White-eyed Vireo	*Vireo griseus*		
Red-eyed Vireo	*Vireo olivaceus*		
Philadelphia Vireo	*Vireo philadelphicus*		
Blue-headed Vireo	*Vireo solitarius*		
Canada Warbler	*Wilsonia canadensis*		
Hooded Warbler	*Wilsonia citrina*		
Wilson's Warbler	*Wilsonia pusilla*		
Mourning Dove	*Zenaida macroura*		
White-throated Sparrow	*Zonotrichia albicollis*		

Mammals

Common Name	*Scientific Name*	Fed status	State status
Evening bat	*Nyctecius humeralis*		
Red bat	*Lasiurus borealis*		
Tricolor bat (eastern pipistrelle)	*Perimyotis subflavus*		
White-tail deer	*Odocoileus virginianus*		
Coyote	*Canis latrans*		
Gray fox	*Urocyon cinereoargenteus*		
Red fox	*Vulpes vulpes*		
Bobcat	*Lynx rufus*		
Striped skunk	*Mephitis mephitis*		
North American river otter	*Lontra canadensis*		
Raccoon	*Procyon lotor*		
Virginia opossum	*Didelphis virginiana*		
Eastern cottontail	*Sylvilagus floridanus*		
Swamp rabbit	*Sylvilagus aquaticus*		
Beaver	*Castor canadensis*		
Pine/woodland vole	*Microtus pinetorum*		
Golden mouse	*Ochrotomys nuttalli*		
Cotton mouse	*Peromyscus gossypinus*		
White-footed mouse	*Peromyscus leucopus*		
Eastern harvest mouse	*Reithrodontomys humulis*		
Gray squirrel	*Sciurus carolinensis*		
Fox squirrel	*Sciurus niger*		
Southern flying squirrel	*Glaucomys volans*		
Southern short-tailed shrew	*Blarina carolinensis*		
Least shrew	*Cryptotis parva*		
Eastern mole	*Scalopus aquaticus*		

APPENDIX F

American Indian Tribes Consulted by Tennessee Army National Guard

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Absentee Shawnee Tribe of Oklahoma

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APPENDIX G

Pest Management at VTS-Milan:

General Information

List of Approved Pesticide Chemicals for Use on VTS-M

Format for Reporting Pesticide/Herbicide Applications

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GENERAL PEST MANAGEMENT INFORMATION

- Pest management activities on TNARNG properties are guided by the TNARNG Integrated Pest Management Plan.

- Only certified applicators may apply any herbicide or pesticide (general use or restricted use) on TNARNG facilities. Applicator must have either a DoD Pesticide Applicator Certification or a Tennessee Commercial Applicator Certification for the appropriate category of pesticide.

- All pesticide/herbicide applications made by contractor or TNARNG staff will be reported to the Pest Management Coordinator (PMC). The reporting form to be used is included in this Appendix. Contact information for the PMC is located at the bottom of the form.

- Control of pests of facilities (e.g., termites, spiders, mice) is handled through contract by the training site maintenance office. Contract exterminators may only apply the approved pesticides listed in Table G.1 for use on pest plants and Table G.2 for use on animal pests. Contract exterminators will fill out a reporting form (Figure G.1) completely for each chemical utilized on a visit. The training site will submit a copy of this form to the PMC (see bottom of reporting form for contact information). If, in the future, any VTS-M personnel should receive either DoD or state certification and apply pesticides at the facility, they must also fill out the reporting form (Figure G.1) and submit it to the PMC.

- In certain situations, a non-certified person may apply a pesticide on a self-help basis for personal protection on a job site. The following limitations apply to self-help pesticide applications:

  - Self-help applications will include only those products listed in Table G.3. Applications of these products must be reported to the PMC annually.

  - Self-help applications are for personal safety and comfort within the workplace and as such will be made only to small areas. Applications to an entire building or armory do not qualify as self-help. If a large portion of the facility requires treatment, a contracted pesticide applicator is needed.

  - Food preparation areas are NOT treated with self-help applications. Kitchens and related areas require professional treatment.

  For more information on self-help applications, contact the PMC.

Table G.1: Herbicides for use on pest plants on Tennessee Army National Guard properties

Pesticide Trade Name	Pesticide Active Ingredient(s)	% Active Ingredient(s)	Target Pest(s)
2,4-D amine	2,4-D	46.8	weeds
2,4-D amine salt	2,4-D (dimethylamine salt)	46.8	broadleaf weeds
2,4-D LV 4 Ester	2,4-D (Isooctyl ester)	67.2	broadleaf weeds
Accord SP	Glyphosate	41	weeds
Aquashade	Acid Blue 9 Acid Yellow 23	23.63 2.39	aquatic weeds
Arsenal RR	Imazapyr	27.6	weeds
Banvel + 2,4-D	Dicamba 2,4-D	12.4 35.7	weeds
Cutless 50W	Flurprimidol	50	grass growth regulation
Cutrine Ultra Algaecide	Copper	9	algae
Embark	Mefluidide	28	grass growth regulation
Enforcer Weed Killer	Glyphosate	41	weeds
Escort XP	Metsulfuron methyl	60	weeds
Garlon 3a	Triclopyr	44.4	woody weeds
Garlon 4 Ultra	Triclopyr	60.45	woody and broadleaf weeds
Gly-4	Glyphosate	41	weeds
Gordon's Pro Turf & Orn Barrier	Dychlobenil	4	weeds
Gordon's Superbrush (Trimec 937)	2, 4-D ester 2, 4-DP-p ester Dicamba	32.45 15.90 5.38	broadleaf weeds
Habitat	Imazapyr	28.7	aquatic weeds
Hyvar X-L	Bromacil	21.9	All vegetation
Krovar IDF	Bromacil Diuron	40 40	All vegetation
Milestone VM	Aminopyralid	40.6	Broadleaf weeds
MSMA	Monosodium methanearsonate	47.6	grasses
Oust XP	Sulfometuron	75	All vegetation
Outrider	Sulfosulfuron	75	weeds
Pennant Magnum	S-Metolachlor	83.7	grasses
Plateau	Imazipic-ammonium	23.6	cool season grasses
Poast	Sethoxydim	18	grasses
Pramitol 25E	Prometon	25	All vegetation
Primo	Cimectacarb	12	grass growth regulation
Quickpro	Glyphosate Diquat dibromide	73.3 2.9	weeds
Reward	Diquat dibromide	37.3	aquatic weeds

Pesticide Trade Name	Pesticide Active Ingredient(s)	% Active Ingredient(s)	Target Pest(s)
Rodeo	Glyphosate	53.8	aquatic weeds
Roundup Pro	Glyphosate	41	weeds
Sahara DG	Imazapyr Diuron	7.78 62.22	weeds
Sonar AS	Fluoridone	41.7	aquatic weeds
Spike 80DF	Tebuthiuron	80	All vegetation
Spraykil SK-13	Tebuthiuron Diuron	1 3	All vegetation
Surflan A.S.	Oryzalin	40.4	weeds
Tordon K	Picloram	24.4	broadleaf weeds
Trimec Plus	Dicamba , MSMA ,2,4-D mecoprop-p	1.46, 18 5.83, 2.93	broadleaf weeds
Velpar L	Hexazinone	25	weeds

Generic formulations of identical chemical composition may be substituted for these approved pesticides.

Table G.3: Products approved for use under the self-help program on TNARNG properties. For more information, see the Integrated Pest Management Plan or contact the Pest Management Coordinator.

Product description	Brand name examples	Active ingredient (s)
Cockroach bait station	Combat Quick Kill	Fipronil
Ant bait station	MaxForce Ant Bait	Fipronil
Ant bait	Advance Dual Choice Amdro Fire Ant Bait	N-ethyl perfluorooctane sulfonamide
	Amdro Fire Ant Bait	Hydramethylnon
Aerosol insecticide	Kill Zone House & Garden Insect Killer Formula 3	D-trans Allethrin, 0.15%, and Resmethrin, 0.2%
	PT 565 Plus XLO	Pyrethrin
Wasp spray	PT 515 Wasp Freeze and Hornet Killer	pyrethrin, allethrin, d-phenothrin, or resmethrin
	Wasp Stopper II Plus	
Boric acid (roach killer)	Roach Kill	boric acid
Roach trap	Mr. Sticky	NA
Rodent glue trap	Victor Holdfast	NA
Spring mouse trap	NA	NA
Fly swatter	NA	NA
Indoor Fly Catcher, cylindrical sticky trap	NA	NA
Insect Fly Catcher, sticky strips	NA	NA

Pest Control Treatment Record

(Have the contractor fill this form out or provide a printed receipt providing all information.)

Site:_____ Treatment Date:_____

Location of Treatment:_____

Type of Pest Problem:_____

Indicators of Pest Problem:_____
(What did you observe and where? Number of pests seen, signs of damage,…)

Chemical Pesticide/Herbicide Application
Pest control contractors must be state-certified for commercial application – include copy of certification if not on file with contract.

Pesticide/Herbicide Trade Name:_____

EPA Registration Number:_____

Active Ingredient(s) and % Concentration: _____ _____%

_____ _____%

_____ _____%

Quantity of Concentrate Used (if applicable):_____

Quantity of Finished Pesticide Applied:_____

% Active Ingredient as Applied:_____%

Size of Treated Area: _____

Application Rate:_____

Applicator Name:_____ Certification #_____

Man Hours Used:_____ Category(s)_____

Pest Control Company:_____ License #_____

Maintain copies of this form on site.
Send copies quarterly to: TNARNG Milan Training Site
Attn: Melissa Bell
3041 Sidco Dr.
Nashville, TN 37204
Or Fax: (615)313-0766

For more information call: (615)313-0603 or email: melissa.bell@tn.gov

Figure G.1: Pest control treatment record

APPENDIX H

Annual Review of the INRMP

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INRMP ANNUAL REPORT

To:

From:

Subject: ARNG Annual Report on Implementation Status of the Integrated Natural Resource Management Plan (INRMP)

Date:

Reporting Period:
(Period report covers, i.e. 1 May 06 – 1 May 07.)

Annual Coordination Meeting: *(Identify the date and attendees of annual coordination. Indicate if this correspondence will be used in lieu of 'face-to-face' meetings. Use the following headers to document review findings)*

Program Overview: *(Short paragraph addressing the goals and objectives of the plan, the status of the mission requirements relative to the current plan and the issue of "no net loss" to training.)*

Current Implementation Status: *(List all projects for the current reporting period, those completed or on-going, and those that were planned but not initiated. Also indicate if any projects were rescheduled and the proposed new timeline. If a table is already available, paste in or submit as separate sheet and reference here.)*

Proposed Implementation: *(List all projects and actions planned for the next reporting period. If a table is already available, paste in or submit as a separate sheet and reference here.)*

Installation Personnel: *(List by title natural and cultural resource management personnel involved with implementation of the INRMP.)*

USFWS Regional Office Contact Information: *(Enter Point of Contact and contact information.)*

USFWS Field Office Contact Information: *(Enter Point of Contact and contact information.)*

State Fish and Game Agency Contact Information: *(Enter Point of Contact and contact information as applicable. Include all agencies or division involved.)*

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APPENDIX I

Upcoming INRMP Natural Resources Projects

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Upcoming Natural Resources Projects for INRMP

Many natural resources and training site improvement projects are planned for the upcoming years. Most are identified either in Chapter Four of this plan or in the ITAM 5-year plan. Table I-1 (Appendix I) lists the projects from this INRMP, sorted according to management sphere (ecosystem management, endangered species, wetlands, etc.), goal, and objective.

An estimated cost is provided for projects which are expected to involve any expenditure beyond manpower. Some projects are expected to be developed/planned and funds requested when the need is identified by evaluations and other observations. Status Tool for the Environmental Program (STEP) project numbers associated with projects that are recurring or already planned and funds requested are provided. An N/A in the STEP column indicates that the project is to be accomplished in-house and doesn't require additional funds, or no project needs have been identified at this time. While most of these projects have been entered into the appropriate budget system (STEP or other) implementation is of course subject to funding availability. The anticipated method of conducting the work is given as either contract (C) or in-house (IH). The "proponent" is identified in accordance with the Sustainable Range/Installation Environmental Activities Matrix as either the Environmental office (ENV), Facilities (FAC), or the ITAM program. In certain cases, two entities are identified. For these projects, it is anticipated that funding will be provided by one source, but that the other proponent will provide subject matter expertise. "SITE" represents work to be done by the training site staff itself, rather than funding.

Table I-1: VTS-M natural resource goals, objectives, targets and predicted implementation years for each management sphere.

Management Area	Projects. Structural Organization: Goals in Blue, supporting Objectives in Green, and their supporting targets in Black		Project Origin[1]	Year	Est. Cost& Method[2]	Proponent[3]	Status	STEP Project Number
1. Ecosystem Management	**Goal 1**	**Provide the ecosystem types needed for training.**						
	1-1	**Manage for mission-suitable habitats or "missionscape".**						
	1a	Missionscape statement review and update	R	Annual	IH	ENV	Ongoing	N/A
	1b	Missionscape plan development	R	2021	IH	ENV	Ongoing	N/A
	1c	Develop and implement mgmt. actions to improve mission habitats.	R	As need	IH	ENV		As need
	Goal 2	**Maintain or improve ecosystem, habitat, and species diversity.**						
	1-2	**Identify ecotypes present on the training site and maintain up to date information regarding those systems.**						
	1d	Vegetation community planning level survey every 10 years	R	2022	C $40,000	ENV	2006	TNONG190004
	1e	Wetland survey to include quality assessment every 10 years	R	2022	C $58,000	ENV	2012	TNONG160007
	1f	Surface water quality assessment every 5 years	R	2019	C $48,000	ENV		TNONG190003
	1-3	**Characterize the species composition, ecosystem health, and wildlife use of the significant habitats on VTS-M.**						
	1g	RTE planning level survey (PLS) every 5 years.	R	2019	C $96,600	ENV		TNONG180001
	1h	Bat PLS survey every 5 years.	R	2021	C $80,000	ENV	2017	TNONG160010
	1i	Avian PLS every 5 years.	R	2018	C $37,500	ENV	In prog.	TNONG160005
	1j	Insect baseline survey then every 5 years.	N	2018	C $38,000	ENV	In prog.	TNONG160002
	1k	Aquatic fauna PLS every 5 years.	R	2019	C $50,000	ENV		TNONG190003
	1l	Mammal survey every 10 years	R	2020	C $25,000	ENV	2015	TNONG160004
	1m	Herpetofauna survey every 10 years	R	2020	C $35,000	ENV	2015	TNONG160004
	1-4	**Increase quantity of healthy and productive habitats for ecosystem health and wildlife.**						
	1r	Eliminate invasive exotic species where feasible.	R	Ongoing	IH	ENV	In prog.	TNONG160011
	1s	Implement conservation/restoration of natural vegetation communities where no training conflict.	R	Where Feasible				As need
	1t	Identify locations for native species restoration	N	2022	IH	ENV		N/A
	1u	Develop restoration plan	N	2023	IH	ENV		N/A

[1] Whether the project appeared in the earlier INRMP: N = new to this INRMP; C = carried over from previous INRMP; R = repeat of past survey.
[2] Probable method of conducting project: C = contract; IH = in-house; OA = Outside Agency. Cost is estimate only and is not guarantee of available funding.
[3] Party responsible for funding and/or conduct of action: ENV = environmental office; FAC = facilities maintenance funds; ITAM = training funds; SITE = training site staff.

Management Area	Projects. Structural Organization: Goals in Blue, supporting Objectives in Green, and their supporting targets in Black		Project Origin[1]	Year	Est. Cost& Method[2]	Proponent[3]	Status	STEP Project Number
	1v	Implement restoration plan when feasible	N	As Feasible	IH	ENV		As need
	1w	Institute prescribed fire regime to meet management needs	R	As Feasible	OA or C	ENV		TNONG180002
	1x	Implement measures of biodiversity to evaluate habitat health	R	As feasible	IH	ENV		N/A
2. RTE Management	**Goal 1**	**Protect rare, threatened, and endangered species and their habitats where they occur on VTS-M**						
	2-1	**Pursue confirmation of possible listed bat species presence on VTS-M**						
	2a	Pursue manual vetting of recorded likely gray and NLEB bat calls	N	When feasible	C	ENV		Need
	2b	Install/create bat roost structures	N	When feasible	IH	ENV		Need
	2c	Conduct bat mist net survey	R	When feasible	C	ENV		TNONG160010
	2d	Develop ESMP with USFWS & TWRA coordination	R	As Need	IH & OA	ENV		N/A
	2-2	**Quantify and monitor populations of state and federal RTE species on VTS-M**						
	2e	Perform comprehensive RTE species Surveys every 5 years.	N	2019	C	ENV	In prog.	TNONG180001
	2f	Incorporate USFWS Indian bat survey protocol into bat surveys every 5 years. (same as Target 1h)	N	2021	C	ENV		TNONG160010
	2g	Radio-track listed bats during surveys to identify roosts/hibernacula when feasible.	R	When feasible	C	ENV		N/A
	2h	Develop management plans and monitoring protocols for new RTE species detected on VTS-M	R	As Need	IH & OA	ENV		N/A
	2i	Regular communication with TWRA & USFWS, including consultation on major projects.	R	As need	IH & OA	ENV		NA
	Goal 2	**Maintain or enhance native plant communities that could support listed species.**						
	2-3	**Identify and manage native plant communities that could support RTE species which may occur on VTS-M.**						
	2j	Develop community-based RTE habitat mgmt. plans as needed.	N	As needed	IH	ENV		N/A
	2k	Control invasive plants where impacting potential RTE habitats as needed.	N	As needed	IH	ENV	In prog.	TNONG160011
	2l	Monitor community health through long-term vegetation monitoring (in conjunction with 1d)	N	2023	C & IH	ENV		See Target 1d

Management Area	Projects. Structural Organization: Goals in Blue, supporting Objectives in Green, and their supporting targets in Black		Project Origin[1]	Year	Est. Cost& Method[2]	Proponent[3]	Status	STEP Project Number
3. Reclamation / Mitigation	**No projects at this time.**							
4. Erosion control	**Goal 1**	**Prevent, identify, and minimize the development of erosion and sedimentation problems on VTS-M.**						
	4-1	**Make information on erosion prevention and repair available to facility managers and users.**						
	4b	Develop erosion prevention and repair guide	N	2012	IH $2,000	ENV		Complete
	4a	Develop BMP training module	N	2013	IH $1,000	ENV		Complete
	4-2	**Identify and minimize potential erosion problems early on**						
	4c	Monitor for potential erosion issues during regular site visits	R	Ongoing		ENV		N/A
	4d	Develop reporting form for soldiers and staff	N	2019	IH	ENV		N/A
	4e	Place reporting form on ENV website for easy access	N	2019	IH	ENV		N/A
	4f	Erosion report tracking system	N	2019	IH	ENV		N/A
	4g	Annual erosion surveys	R	Annual	IH	ENV/SITE		N/A
	Goal 2	**Identify and rehabilitate existing erosion problems.**						
	4-3	**Repair identified/existing erosion issues.**						
	4h	Coordinate repair of erosion issues (typically facility responsibility) including plan development	R	Ongoing		ENV/Site		N/A
	4i	Implement erosion control methods in plan	R	As Needed		ENV/Site		N/A
	4j	Revegetate erosion sites in accordance with plan	R	As Needed		ENV/Site		As Need
	4-4	**Reduce the number of erosion problems.**						
	4k	Prioritize new erosion reports.	N	Ongoing	IH	ENV	In process	N/A
	4i	Repair erosion problems in order of priority list.	N	Ongoing	IH/C	ENV		As Need
5. Watershed Management	**Goal 1**	**Improve water quality in streams on VTS-M.**						
	5-1	**Gather and maintain up to date information about existing riparian areas and their conditions.**						
	5a	Conduct vegetation community and aquatic fauna surveys as noted in Section 4.2.1	1d & 1k	2022 & 2020		ENV		See Targets 1d & 1k
	5b	Perform riparian habitat assessments as part of regular erosion surveys as noted in Section 4.2.4	4g	Annual	IH	ENV		TNONG160009
	5c	Implement water quality monitoring every 5 years	1f	2020	C	ENV		TNONG190003
	5d	Develop and implement plans for improving stream habitat as needed	As Need		IH	ENV		N/A
	5-2	**Restore native vegetation in riparian corridors to improve filtering and other stream quality protection.**						

Management Area	Projects. Structural Organization: Goals in Blue, supporting Objectives in Green, and their supporting targets in Black		Project Origin[1]	Year	Est. Cost& Method[2]	Proponent[3]	Status	STEP Project Number
	5e	Utilize riparian habitat assessment information to prioritize restoration needs.	N	2019	IH $5,000	ENV		TNONG160009
	5f	Restore degraded buffers with appropriate native vegetation, as needed	R	As needed		ENV		N/A
	5g	Repair erosion and sedimentation problems as identified, in accordance with Section 4.2.4	R	As needed		ENV		N/A
	5h	Control invasive species in the riparian communities	R	Ongoing	Funds Available	ENV		TNONG160011
	5i	Monitor riparian ecosystems to determine effects of management (Section 4.2.11)	1d, R	2022		ENV		See Target 1d
	5-3	**Protect shorelines of streams and all riparian areas from potential causes of erosion.**						
	5j	Restrict all vehicular traffic in SMZ	R	Ongoing	IH	ENV		N/A
	5k	Post SMZs and maintain biennially	N	2019	IH $5,000	ENV	Ongoing	TNONG180004
	5l	Maintain SMZs during timber harvest and clearing	N	As need	IH	ENV		N/A
	5m	SMZ training module	N	20121	IH $1,000	ENV		Complete
6. Wetlands Protection	**Goal 1**	**Manage for healthy resilient wetlands with no net loss of acreage, function, or values.**						
	6-1	**Improve knowledge of existing wetlands and their conditions.**						
	6a	Wetland surveys to include assessment of quality every 10 years as noted in Section 4.2.1.	1e	2022		ENV		See Target 1e
	6b	Wetland floristic study	1d	2022		ENV		See Target 1d
	6c	Wetland fauna study	1k	2020		ENV		See Target 1k
	6-2	**Implement and enforce buffer areas around wetlands.**						
	6d	Post signs identifying 50’ buffer zones	R	2019	IH $3,000	ENV		TNONG180004
	6e	Identify areas around wetlands requiring vegetative buffer or filter strip for protection	R	Ongoing		ENV		N/A
	6f	Buffer zone vegetative/compliance assessment	N	2019	IH	ENV		N/A
	6g	Wetland buffer training module	C	2019	IH	ENV		N/A
7. Forest Management	**Goal 1**	**Provide optimum forestland training opportunities for TNARNG.**						
	7-1	**Improve training areas by selected timber harvesting techniques.**						
	7a	Consult with training site staff	C	Annual	IH	ENV		N/A
	7b	Identify appropriate management practices to create desired training conditions, as needed.	R	As needed	IH/COE	ENV		N/A
	7c	Implement timber management to support training, as needed.	R	As needed	IH/COE	ENV		N/A
	Goal 2	**Manage for forest health, and habitats of RTE, wildlife, and native plant species and communities.**						
	7-2	**Maintain needed forest information.**						

Management Area	Projects. Structural Organization: Goals in Blue, supporting Objectives in Green, and their supporting targets in Black		Project Origin[1]	Year	Est. Cost& Method[2]	Proponent[3]	Status	STEP Project Number
	7d	Repeat forest inventory every 10 years.	R	2024	C $54,000	ENV		TN255160001
	7e	Conduct PLSs as noted in Section 4.2.1	R	Ongoing	Variable	ENV		See Targets 1d-1m
	7-3	**Improve forest health and habitat quality.**						
	7f	Review inventory and PLS data and update forest management plan	R	As needed	C	ENV		N/A, Program On Hold
	7g	Perform timber stand improvement activities.	R	As need	C	ENV		N/A
	7h	Conduct prescribed burning when feasible	R	When feasible	C	ENV		See Target 8f
	7i	Control invasive exotic species where needed IAW Annex 3	R	As need	IH/C	ENV		N/A
	7j	Maintain appropriate stand conditions near waterways	R	As need	IH	ENV		N/A
	7k	Monitor changes to biodiversity and species composition through long-term vegetation monitoring	1d	2022		ENV		See Target 1d
8. Fire Management	**Goal 1**	**Control and minimize threats to property and personnel associated with wild and prescribed fire.**						
	8-1	**Ensure effective fire break system.**						
	8a	ID additional fire break needed	C	2018	IH & C	ENV, FAC		In Progress
	8b	Create firebreaks where and when needed	C	Ongoing	IH	ENV, FAC		N/A
	8c	Maintain firebreaks as needed.	C	Ongoing	FAC	ENV, FAC		N/A
	8-2	**Implement prescribed fire program.**						
	8d	Obtain required training for TNARNG personnel	C	Annual	IH & Partners	ENV, FAC		N/A
	8e	Obtain equipment required for prescribed burning	C	Annual	IH	ENV		N/A
	8f	Coordinate with TDA FS or others for burn boss and to conduct prescribed burns when needed.	C	As need	IH & C	ENV		TN255180001
	8g	Conduct post-burn evaluations and monitoring	C	Annual	IH	ENV		N/A
	8h	Review and update WFMP annually, revise every 5 years	C	Annual & 2022	C $47,000	ENV		TNONG160001
9. Fish & Wildlife Management	**Goal 1**	**Maintain fish and wildlife populations through maintenance of healthy vegetative communities, habitats, and ecosystems.**						
	9-1	**Gain updated and complete data on wildlife use of VTS-M.**						
	9a	Perform PLSs for species groups as outlined in Section 4.2.1.	C	Ongoing	IH & C	ENV		See Targets 1g-1m
	9-2	**Manage habitats for all native species.**						
	9b	Maintain SMZs and wetland buffers	R	Ongoing	IH	ENV		See Target 6d

Management Area	Projects. Structural Organization: Goals in Blue, supporting Objectives in Green, and their supporting targets in Black		Project Origin[1]	Year	Est. Cost& Method[2]	Proponent[3]	Status	STEP Project Number
	9c	Install nest boxes and maintain annually as needed	R	As need	IH	ENV		N/A
	9d	Restore grasslands to native plants where feasible. See Section 4.2.1.	R	Where feasible	IH	ENV		N/A
	9e	Monitor vegetation community condition through PLS. See Section 4.2.1.	1d	2022	C	ENV		See Target 1d
	9f	Implement vegetative community/habitat management actions as needed.	R	As need	IH	ENV		N/A
	9g	Wildlife training module	C	2013	IH $1,000	ENV		Completed
	9-3	**Manage animal pests to protect training land availability, ecosystem health, and RTE species.**						
	9h	Conduct population counts for deer, beaver, feral hog or other species as needed.	R	As need	IH	ENV		N/A
	9i	Consult with TWRA on species carrying capacity	R	As need	IH	ENV		N/A
	9j	Implement population control when needed	R	As need	Out agency & C	ENV		N/A
10. Pest Management	**Goal 1**	**Ensure pest management on VTS-M accomplishes the intent and requirements of the TNARNG IPMP.**						
	10-1	**Implement the TNARNG IPMP**						
	10a	Accomplish required pesticide application reporting.	N	Quarterly	FAC	ENV		N/A
	10b	Review program to ensure legal compliance.	N	Annual	IH	ENV		N/A
	10c	Review program for proper IPMP procedures are followed.	N	Annual	IH	ENV		N/A
	Goal 2	**Control animal and plant pests as needed to achieve training and environmental objectives.**						
	10-2	**Control IPP for ecosystem health.**						
	10d	Invasive pest plant survey every 5 years	R	2012	C $35,000	ENV		TNONG160006
	10e	Implement appropriate pest plant control plans	R	As need	IH/C	ENV		N/A
	10f	Monitor IPP change through long-term vegetation monitoring	C	2022	C	ENV		See Target 10d
	10-3	**Control pest species for training area improvement.**						
	10g	Identify problem IPPs and develop control plans	R	As need	IH	ENV		N/A
	10h	Implement control plans.	R	As need	FAC	ENV/FAC		N/A
	10i	Monitor IPP change through long-term vegetation monitoring	C	2022	C	ENV		See Target 10d
	10-4	**Control pests for training site user safety and comfort.**						
	10j	Install and maintain bat boxes and bird nest boxes	C	Annual	IH	ENV		N/A
	10k	Annual fire ant survey	N	Annual	IH	ENV		N/A
	10l	Control pest animal populations as needed.	R	Ongoing	FAC	ENV		N/A

Management Area	Projects. Structural Organization: Goals in Blue, supporting Objectives in Green, and their supporting targets in Black		Project Origin[1]	Year	Est. Cost& Method[2]	Proponent[3]	Status	STEP Project Number
	10-5	**Control pest animals for the protection of natural communities and RTE species and to minimize loss of training land.**						
	10m	Monitor pest animal impacts through vegetation surveys	R	2022	C	ENV		See Targets 1d & 10d
	10n	Implement control of pest animals as needed.	R	As need	OA	FAC		As need
11. Long-term Monitoring	**Goal 1**	**Use analyses of data collected through long-term vegetation plots to monitor effects of training and land management activities on VTS-M.**						
	11-1	**Develop and implement a vegetation monitoring program.**						
	11a	Develop vegetation monitoring protocol	C	2023	C	ITAM		N/A
	11b	Establish permanent vegetation monitoring plots	C	2024	IH	ITAM		N/A
	11c	Resample monitoring plots as appropriate	C	As need	IH	ITAM		N/A
12. Grounds Maintenance	**Goal 1**	**Apply environmentally beneficial grounds maintenance techniques to maintain an attractive and functional landscape that meets training and other TNARNG needs.**						
	12-1	**Utilize regionally native species for plantings whenever feasible.**						
	12a	Use native grasses to seed exposed soils when compatible with area use	R	Ongoing	IH	ENV		As need
	12b	Use native shrubs, trees, and wildflowers for aesthetic plantings	R	Ongoing	IH	ENV		As need
	12c	Develop native planting guide	N	2011	IH $500	ENV	Complete	Complete
	12-2	**Broaden the transition zone between maintained and natural areas.**						
	12d	Survey for transition areas needing improvement	C	Ongoing	IH	ENV		N/A
	12e	Develop and implement plans to improve transition zones where needed	C	Ongoing	IH	ENV		As need
	12-3	**Adjust maintenance schedule to benefit environment.**						
	12f	Create list of values impacted by ground maintenance and determine appropriate scheduling.	C	2022	IH	ENV		N/A
	12g	Modify maintenance calendar in INRMP to achieve needed protections.	C	2022	IH	ENV		N/A
13. Recreational Use Management	**No outdoor recreation permitted in down-range areas of VTS-M at this time.**							
14. Cultural Resources	**All aspects defined in TNARNG ICRMP.**							
15. GIS	**Goal 1**	**Maintain, update, and expand the GIS database to make accurate data available for training and management planning.**						

Management Area	Projects. Structural Organization: Goals in Blue, supporting Objectives in Green, and their supporting targets in Black		Project Origin[1]	Year	Est. Cost& Method[2]	Proponent[3]	Status	STEP Project Number
	15-1	**Maintain constantly improving GIS.**						
	15a	Identify the data layers captured and still needed.	C	Ongoing	IH	ENV		N/A
	15b	Update or create data layers as needed.	C	Ongoing	IH	ENV		N/A
	15c	Make data available through interactive web applications.	C	Ongoing	IH	ENV		Complete
	15d	Review contract wording as needed	C	As need	IH	ENV		As need
16. EMS	**EMS in development.**							
17. Climate Change	**Goal 1**	**Develop and implement a climate change response plan.**						
	17-1	**Conduct necessary research to predict likely local influences of climate change.**						
	17a	Review climate change predictions.	N	2022	IH	ENV		N/A
	17-2	**Develop and implement a climate change response plan**						
	17b	Determine which changes TNARNG can practically affect through management actions.	N	2022	IH	ENV		N/A
	17c	Identify functional approaches to manage change.	N	2022	IH	ENV		N/A
	17d	Develop a climate change management plan	N	2022	IH	ENV		N/A
	17e	Implement the climate change management plan.	N	2023	IH	ENV		As need
18. Pollinator Management	**Goal 1**	**Determine pollinator use and habitat condition on site.**						
	18-1	**Conduct necessary research to identify pollinators using the site, and the condition of their habitat.**						
	18a	Conduct a comprehensive survey of terrestrial macroinvertebrates.	N	2018	C $109,000	ENV		See Target 1j
	18b	Survey pollinator habitat conditions on site.	N	2022	IH			N/A & 1j
	Goal 2	**Develop and implement a pollinator management plan.**						
	18-2	**Develop and implement a pollinator management plan.**						
	18c	Identify specific issues with pollinator species composition and habitat conditions.	N	2022	IH	ENV		N/A
	18d	Identify appropriate and practicable management approaches to address identified issues.	N	2022	IH	ENV		N/A
	18e	Develop/implement pollinator management plan.	N	2023	IH	ENV		N/A

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APPENDIX J

Natural Resources Projects In Support of ITAM

and the

FY20 ITAM Annual Workplan

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Future INRMP Projects in support of ITAM, and the FY20 ITAM Annual Workplan

Integrated Training Area Management as executed by TNARNG has 5 focus areas:

1. Maintenance, Repair, and Reconfiguration of maneuver trails, including trail surfaces, ditches/drainage infrastructure, and rights of way (LRAM).
2. Maintenance, Repair, and Reconfiguration of off-road maneuver capability in the training areas, including repair of vehicle ruts and areas of bare or compacted soil, maintenance of vegetation impeding mounted and dismounted maneuver (mowing of open areas or targeted thinning of understory in forested areas), and, where possible, minimization of erosive overland flow of run-off (LRAM).
3. Qualitative monitoring of the condition of maneuver training assets through ongoing observation and condition evaluation (RTLA).
4. Minimizing avoidable impacts to training infrastructure and natural and cultural resources through production and distribution of maps and soldier field cards that communicate, among other messages, any environmental constraints to training, including limited-use and "no go" areas (SRA).
5. Regular communication and coordination with Environmental Programs and other stakeholders within TNARNG to synchronize and deconflict execution of multiple programs, including coordination on specific projects as well as on higher-level business processes and internal program guidance (TRI).

TNARNG's ITAM program is funded by the Department of the Army through National Guard Bureau. Program requirements are based on annual NGB and Army review and validation of individual projects falling within the ITAM area of responsibility collected from across all three TNARNG SRP-recognized training sites, and program guidance requires that ITAM funds only be used on validated projects. The TNARNG ITAM program is not fully funded relative to validated requirements. Historically, annual funding is 50-60% of validated requirements, and annual funding for the following fiscal year is typically not known until Q4 of the prior fiscal year. As a result, final prioritization of projects for execution does not occur until immediately prior to the start of the fiscal year, and are still subject to reprioritization or formulation of new projects during year of execution, as the amount of damage to which training infrastructure is subject is highly dependent upon conditions (primarily soil moisture content) at the time a training exercise occurs.

Projects validated for the TNARNG ITAM program at VTS Milan in FY20 are included in Table J-1. Tasks carried out as part of or in support of the ITAM program or INRMP Goals and Objectives, but not requiring individual validation (i.e., carried out as part of the day-to-day responsibilities of ITAM or Environmental Programs staff) are included in Table J-2.

Table J-1. Annual ITAM Work Plan projects.

Program	Project Title	Status	Cost
ITAM	Creation of ~ 4 ac. Bivouac Site in TA C – North Hill	Validated	$21,931.60
ITAM	Creation of ~ 4 ac. Bivouac Sit in TA C – South Hill	Validated	$21,931.60
ITAM	Maneuver Damage Repair on ~ 24 ac. In TA A-6	Validated	$7,686.26
ITAM	Maneuver Damage Repair on ~ 3 ac. In Central TA B-3	Validated	$3,603.44

Table J-2: VTS-M ITAM coordination and projects, goals, objectives, targets, and predicted implementation years.

Management Area	Structural Organization: Goals in Blue, supporting Objectives in Green, and their supporting targets in Black		Project Origin[1]	Year	Est. Cost& Method[2]	Stakeholders[3]	Status
1. Training Requirements Integration & NR Coordination	**Goal 1**	**Conduct annual and regularly scheduled inter-program coordination.**					
	1-1	**Prevent unexpected training and environmental impacts through coordination.**					
	1a	Annual review and input on validated ITAM projects to identify extraordinary NEPA or environmental permitting requirements.	N	Annual	IH	ITAM, ENV	Ongoing
	1b	Annual more detailed review of ITAM workplan projects that will be prioritized and funded during this fiscal year.	N	Annual	IH	ITAM, ENV	Ongoing
	1c	Quarterly coordination meetings (SRP working group).	N	Quarterly	IH	ITAM, ENV	Ongoing
	1d	Annual INRMP update coordination on proposed projects in implementation table.	N	Annual	IH	ITAM, ENV	Ongoing
	Goal 2	**Coordinate on major revisions of Training Site SOPs and INRMPs.**					
	1-2	**Conduct inter-program reviews of Training Site SOPs and INRMPs to identify potential cross program impacts, deconflict program priorities, and minimize avoidable impacts to natural resources.**					
	1e	Coordinate on acceptable timelines to conduct TC SOP and INRMP revisions for ITAM, NR and outside agencies.	N	2019	IH	ITAM, ENV	2019
	1f	Review and provide input on INRMP and Training Site SOP revisions within coordinated timelines.	N	2019	IH	ITAM, ENV	2019
2. Range & Training Land Assessment (RTLA)	**Goal 1**	**Establish and maintain a level of qualitative monitoring of training infrastructure, and utilize resulting information to prioritize ITAM maintenance, repair, and reconfiguration projects.**					
	2-1	**Establish and maintain a level of qualitative monitoring of maneuver training infrastructure sufficient to identify training impediments and minimize avoidable impacts to natural resources.**					
	2-2	**Utilize information on condition of maneuver training assets to establish annual ITAM funding priorities.**					
3. Land Rehabilitation and	**Goal 1**	**Maintain maneuver training capability in the near and long-term through maintenance, repair and reconfiguration of maneuver training infrastructure.**					
	3-1	**Minimize negative impacts to sustained training capability by mitigating soil erosion and excessive water runoff caused by**					

[1] Whether the project appeared in the earlier INRMP: N = new to this INRMP; C = carried over from previous INRMP; R = repeat of past survey.
[2] Probable method of conducting project: C = contract; IH = in-house; OA = Outside Agency. Cost is estimate only and is not guarantee of available funding.
[3] Party responsible for funding and/or conduct of action: ENV = environmental office; FAC = facilities maintenance funds; ITAM = training funds; SITE = training site staff.

Management Area	Structural Organization: Goals in Blue, supporting Objectives in Green, and their supporting targets in Black		Project Origin[1]	Year	Est. Cost& Method[2]	Stakeholders[3]	Status
Maintenance (LRAM)		**maneuver training activities.**					
	3a	Coordinate execution of LRAM projects with TNARNG Environmental staff to identify and comply with pertinent federal, state, and local environmental laws, regulations and permitting requirements.	R	Ongoing	IH	ITAM, Site	Ongoing
	3b	Repair maneuver training damage with potential to negatively impact training capability using standard land rehabilitation treatments and BMPs. (Chapter 6).	R	As need	IH	ITAM, Site	Ongoing
	3c	Reseed with native species in areas where they would be effective, productive, and cost-efficient-with respect to intended training use.	R	As feasible	IH	ITAM	As feasible
4. Sustainable Range Awareness (SRA)	**Goal 1**	**Minimize avoidable impacts to training infrastructure and natural and cultural resources due to maneuver training activities.**					
	4-1	**Inform using units (soldiers and leadership) of any environmental constraints to training activities at VTS-Milan.**					
	4a	Update the VTS-M field card that identifies environmental considerations and guidelines for units using its facilities and resources.	R	As needed	IH	ITAM	Complete
	4b	Update training site SOP to clarify environmental constraints to training, limited access areas, and no-go areas.	C	As needed	IH	ITAM	As needed

Annex 1

FOREST MANAGEMENT PLAN
VOLUNTEER TRAINING SITE - MILAN

TABLE OF CONTENTS

1.0 INTRODUCTION

The forestlands (1,735 acres) of the VTS-Milan (VTS-M) were inventoried in 2005, and this management plan was developed based on military needs and forest health goals. It presents the recommended forestry management prescriptions for the forest stands occurring within the Cantonment Area and each of the 18 training areas that comprise the VTS-M (see Figure A1.1). Details of timber volumes and other stand characteristics are available in the Forest Inventory (Thompson Engineering 2006).

Individual forestry management prescriptions are provided for the forest stands occurring within each training area. The forest management prescriptions are focused on actions that would improve training facilities or enhance the habitat quality and health of the forestry resources on VTS-M. The use of prescribed fire is also addressed for each forest stand. Recommendations for prescribed burning within forest stands are almost always restricted to burns to reduce excessive accumulations of fuels to reduce wildfire risks and, in most cases, would be conducted infrequently on a 6-year rotation, unless otherwise specified. Annex 2 provides more details on the prescribed burning program at the VTS-M.

2.0 FOREST INVENTORY

The forest inventory for the VTS-M was conducted in April 2005 by the Forest Management Group, Inc., based in Hattiesburg, Mississippi. The forest inventory was developed using the established training areas and Cantonment Area to serve as the basic forestry management units. Figure A1.1 shows the locations of the Cantonment Area and the 18 training areas that make up the VTS-M.

The forest resources occurring within the forestry management units were inventoried. Each management unit was subdivided as appropriate into individual forest stands based on the sharing of common characteristics that served to define each stand. Among the parameters considered to delineate the forest stands were species composition, age, size, and condition. Delineation of the stands was accomplished by both the use of aerial imagery and ground observations of the different timber types and ages. A consistent forest stand numbering system was used throughout the inventory to identify each stand based on the major land features and forest types that characterized each stand.

The forest inventory provides the volumes of sawtimber (in tons and board feet) and pulpwood (in tons and cords) that was available within each stand at the time the inventory was performed in April 2005. The sawtimber is apportioned between pine, pine poles, CNS (chip-n-saw: pine timber that can yield both 2x4s and chips), red oak, white oak, hickory, poplar, cedar, ash, walnut, and miscellaneous hardwood (i.e., all other hardwood species that may be present). The pulpwood is apportioned between pine and hardwoods. The timber volume data is presented on both a per acre basis and as a total per stand for each product class.

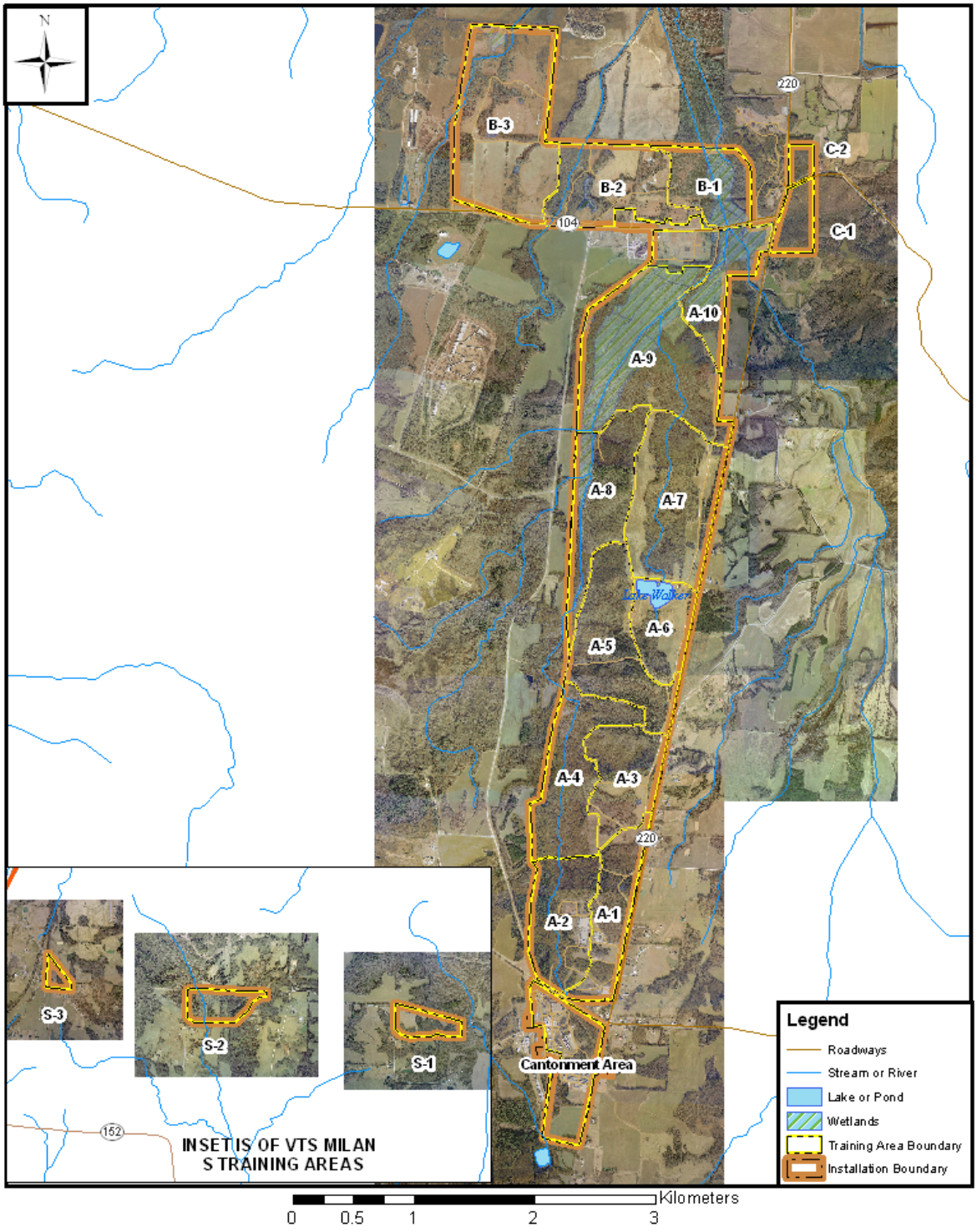

Figure A1.1: Training areas as used for forest stand delineation on the VTS-M.

The forest inventory also provides supplementary information to better understand the major characteristics of each stand. That information includes:

- Dominant and co-dominant tree species occurring within each stand
- Average basal area and DBH of trees within each stand on a per acre basis
- Average number of snags per acre
- The minimum and maximum age of the trees
- A general assessment of the overall health of the stand
- An evaluation of the current condition of the stand
- General remarks on other major characteristics of the stand where appropriate and useful.

The forest inventory determined that a total of 1,735 acres (70%) of VTS-M was covered in forests. Table A1.1 presents summary volume data for the inventoried timber products on a per acre basis and for the entire installation.

Table A1.1: Forest Product Volume Summary for VTS-M Based on the April 2005 Forest Inventory (from Thompson Engineering, et al. 2006)

Timber Product	Per Acre		Installation Total	
	Tons	Board feet	Tons	Board feet
Sawtimber				
Pine	6.9	741.2	11,958	1,284,581
Pole	0.1	7.4	173	12,825
CNS	3.8	350.4	6,586	607,282
Cedar	0.8	59.3	1,386	102,773
Red Oak	19.9	1963.2	34,489	3,402,441
Hickory	1.6	155.4	2,773	269,325
White Oak	7.2	698.2	12,478	1,210,057
Ash	1	98.5	1,733	170,711
Poplar	5.2	583.7	9,012	1,011,616
Walnut	0.4	33.5	693	58,059
Misc. Hardwood	13.7	1319	23,744	2,285,972
Total	60.6	6010	105,025	10,415,642
Pulpwood				
Pine	0.2	0.1	347	173
Hardwood	20.9	7.7	36,222	13,345

The forest inventory also revealed that the overall average diameter at breast height (DBH) of trees on the entire installation was 13 inches and that the installation had an average basal area of 93 square feet per acre. The forest stands on VTS-M are typically dominated by red oaks and white oaks, with yellow poplar being a common co-dominant species in many stands. Pine was a dominant or co-dominant species in only two stands (totaling approximately 36 acres) across the entire installation. Most stands were characterized by intermediate aged trees between 30-40 years old, with the oldest individuals approaching 70 years in age. The Tennessee Division of Forestry recommends rotation lengths of 80-100 years for hardwood stands in west Tennessee. Thus, the stands on the VTS-M have not generally reached harvesting age, although individual trees may be over mature. A number of stands show signs of past hot fires which caused damage to some of the trunks.

Army guidance requires all installations with a forestry program to keep their forest inventories current (i.e. approximate 10+ year interval) when such forests are essential to the mission and/or capable of commercial use. Since the existing forest inventory for VTS-M was conducted in April 2005, the forest resources should be re-inventoried approximately every 10 or more years. The inventory intensity should be appropriate at that time to reflect the planned use of the forest and for monitoring the long-term health and sustainability of the forest. In addition to determining the volume of merchantable forest products available on the installation next time, the inventory should be directed at evaluating the overall health and characteristics of the forest community and at assessing the effectiveness of the forest management prescriptions that have been implemented during the intervening 10+-year period.

3.0 FOREST MANAGEMENT GUIDELINES

Based on the results of the 2005 forest inventory, the health of most of the forest stands on the training site is judged to be good to excellent, although a number of the stands showed signs of having experienced past fires that caused some damage to the trunks. They are predominantly mixed hardwood stands with a minor pine component.

VTS-M forests will be managed on approximately an 80 year rotation. Forest management for the training site will consist of both even-aged and uneven-aged techniques for improving forest health, modifying stands to meet objectives, and regenerating stands when needed.

Generally no more than 60 acres per year will be harvested on the training site. The priority for harvesting will be:

1. Mission needs
2. Fire damaged stands
3. Oldest stands

Final harvests will generally be large group selection cuts (2-3 acres) up to small clearcuts (no more than 10 acres) as dictated by topography, accessibility, stand characteristics. Openings of at least 2 acres are needed to encourage oak regeneration. Openings will be placed at sites containing sufficient advance regeneration of appropriate size (>4' tall oak seedlings or sprouts) when possible. No more than 30% of a stand acreage will fall within the cleared areas. The remainder of the stand may be lightly thinned at the same time to release desirable hardwood species.

Some stands will require pre-commercial thinning or mid-story removal to encourage advance regeneration of desirable species. This will be done as funding allows, on no more than 60 acres per year. The shelterwood-burn method of regeneration will be applied experimentally as feasible (see Annex 2 of the INRMP).

In all harvest activities, pre-commercial or commercial, there will be no timber removal within 100 feet of creeks. For aesthetics, as well as noise and dust control, a 100 ft buffer will also be maintained along property boundaries except for the 20 ft security line of site clearing required along the fence-line itself.

3.1 Forest Management Objectives

The individual forestry management recommendations were based upon a consideration of the following broad management objectives developed for the overall forest community occurring on VTS-M:

- Provide appropriate vegetation cover for training needs as determined by mission requirements.

- Maintain a healthy forest ecosystem appropriate to the region through even and uneven aged management techniques. Forest values to be protected or improved are:
  - Soil conservation and stream quality protection
  - Wildlife habitat
  - Biodiversity
  - Timber and forest products

- Control invasive pest plants (IPP) for the health of the forest.

- Use prescribed fire only as necessary for fuel reduction or to meet military mission needs, unless deemed appropriate for regeneration efforts. Hardwood stands should be burned no more often than every six years.
  - The shelterwood-burn method of hardwood regeneration may be experimentally applied to a stand within Training Area A-9 on a 5-year test case to determine the potential of this method to produce a regenerated oak-dominated forest while enhancing the military mission (see Annex 2).

3.2 Timber Harvest Operations

The periodic harvesting of timber is a primary tool used for managing forestry resources. The principle purpose of the forest management program on the VTS-M is to support the military mission and ecosystem management goals, while optimizing the forest resource and its associated forest products and benefits. Timber harvest decisions are not to be directed solely to generate revenue.

Timber harvests must be consistent with the military mission and comply with federal laws and policies, including avoiding adverse impacts on sensitive species and cultural resources. Prerequisites for timber harvests include the following:

- A current and approved Forest Management Plan that is normally included in an INRMP
- Current MOU with appropriate USACE district (Mobile for VTS-Milan, per AR 405-90)
- National Environmental Policy Act (NEPA) documentation
- Comply with applicable laws
- Be a fiscally sound investment
- Capable of ecosystem sustainability
- Comply with installation safety restrictions
- Consider potential effects on significant archaeological resources and historic properties

The process for conducting a timber sale on VTS-M will start several months prior to harvest time:

- A stand-specific harvest plan will be developed in accordance with this plan (January)
- A Record of Environmental Consideration (REC) will be prepared for the harvest plan to satisfy NEPA requirements
- The harvest plan and REC will be sent to the TN State Historic Preservation Office (SHPO) for consideration (before March 1)
- The harvest plan and REC must be submitted to the National Guard Bureau (NGB) and Mobile USACE District with a Timber Report of Availability (ROA) (by May 30 prior to the fiscal year in which the harvest is planned)

3.3 Pest Management

Trees are susceptible to periodic infestations of insects and fungi that have the potential to result in serious damage to an installation's forest resources and overall landscape. This can result in the diminishment of the quality of the training landscape, economic loss of potential merchantable timber,

modification of habitat conditions within the forest ecosystem that could influence wildlife populations, and an increased risk of wildfire. While such infestations are a natural phenomenon, actions may be required on occasion to prevent the spread of the infecting vector and/or remove damaged and diseased trees.

The U.S. Forest Service (USFS) is responsible for protecting forests from insects and disease in cooperation with the owners of forest lands. The Department of Defense (DoD) and the U.S. Department of Agriculture entered into a Memorandum of Agreement (MOA) in 1990 to conduct forest insect and disease suppression on lands administered by the DoD. Under the MOA, the USFS provides technical assistance and funds to provide foliage protection, reduce specific insect and disease populations, reduce risk of artificial spread to noninfested areas, and to prevent tree mortality.

Army installations may receive funds from the USFS for forest pest suppression projects under the terms of the MOA. Installations wanting to receive pest management funding should have a biological assessment of the forest resources in question conducted by the local USFS staff. The biological assessment should recommend the type of technical assistance required and management actions that could be pursued to address the pest problem. This could include population monitoring, surveys, biological evaluations, determination of trends and projected damage, and consideration of environmental and economic impacts. Approximately one year is required before funds are received for approved requests. The USFS funds are provided to the installations through Army channels to the proponent organizations for distribution to the appropriate installations. In the case of the TNARNG, pest management funds are received from the NGB.

3.4 Salvage of Disaster Damaged Trees

Natural weather phenomena such as tornadoes and ice storms can have a severe impact on forests. For example, large swaths of trees can be uprooted and/or their trunks broken above the ground by tornadoes, while large ice storms can create extensive alterations in the forest canopy by damaging limbs and small branches. If the damage to trees is significant and widespread, individual trees can be weakened and become more susceptible to disease and parasites in the years following the weather event. That damage can reduce growth rates and possibly even result in the death of individual trees.

If the damaged trees represent a significant economic loss or if the physical aftermath creates a safety hazard, impediment to training, or threat of insect infestation, it may prove prudent to undertake salvage operations in an attempt to recover as much of the lost volume and value of the damaged timber as possible. Salvage actions must be pursued relatively quickly following the disaster to prevent the deterioration in the quality of the damaged wood so as to recover as much economic value as possible. Even though prompt action is needed, the environmental evaluation requirements are typically not waived. In the event a salvage harvest is deemed necessary, TNARNG will coordinate with the U.S. Army Corps of Engineers (USACE) to conduct the necessary environmental review and emergency harvest procedures.

4.0 ENVIRONMENTAL CONSIDERATIONS IN FOREST MANAGEMENT

All timber sales must be consistent with all applicable environmental laws and regulations. Experience has shown that cultural resources (i.e., historic and/or archaeological) and endangered and threatened species issues have the greatest potential to affect forestry management operations, including timber sales.

4.1 Cultural Resources

Forest management activities must not negatively impact cultural resources on the VTS-M. Several aspects of timber management have the potential to affect cultural resources, including timber harvest operations, site preparation and planting, and prescribed fire. Phase I surveys have been conducted for the majority of the VTS-M. Seven historic-era archaeological sites and five cemeteries were identified. All of these sites were deemed ineligible for the National Register of Historic Places. Several historic buildings are located on the training site; however, no forest management activities will be conducted in the vicinity of these buildings. These sites are identified in the TNARNG GIS database and will be incorporated into forest management planning. All efforts will be made to minimize any impacts on known cultural resources.

The known archaeological sites will be excluded from ground-disturbing activities unless full consultation with the Tennessee SHPO has been conducted for the project. Such activities include, but are not limited to, the construction of plowed fire breaks (see Annex 2 for the "no plow zones"), the use of dozers or other heavy equipment to clear stumps and logging slash, and the use of mechanical planting equipment. The cemeteries are surrounded by fencing and will be further protected from damage during forestry activities by maintaining a 50 foot no-harvest buffer zone surrounding them. In the event of an inadvertent discovery of cultural materials, the guidelines in Standard Operating procedure #5 in the TNARNG ICRMP will be followed.

This plan will be submitted for review by the Tennessee SHPO prior to implementation. In addition, the SHPO will be contacted for comments on the annual report of timber availability submitted each year for timber sale planning. Other forestry projects which have the potential to impact known cultural resources on the VTS-M will be coordinated with the SHPO as appropriate.

4.2 Sensitive Species

Chapter 3 of the INRMP contains information on sensitive species occurring on the installation. The VTS-M has no known resident federal- or state-listed threatened or endangered species (the endangered interior least tern was sighted once during an avian baseline survey, but there is no evidence that this species routinely utilizes any habitat on the training site, which is outside its expected range). However, several bird species "deemed in need of management" by the State of Tennessee have been identified on the training site (Table 3.5). Of these are species, the sharp-shinned hawk and yellow-bellied sapsucker, as upland forest birds, are most likely to be impacted by forest management activities; however, the nature of the timber harvests planned (typically small group selection rather than large-scale clearing) and the distribution of the harvests over time and space should ensure that habitat for these birds continues to be available on the site. The protection of waterways and wetland areas during timber management activities should support the water birds and lowland forest species.

If any federally listed species are found to be regularly utilizing the VTS-M, consultation with the USFWS will be initiated to ensure that further forest management and other natural resources activities will not negatively impact the species. Efforts will also be made to protect any state-listed threatened or endangered species that may be found on the training site through coordination with the Tennessee Wildlife Resources Agency (TWRA) and the Tennessee Natural Heritage Program.

4.3 Forestry Best Management Practices

Protection of watersheds and water quality during forest management activities can be a significant concern. Forestry practices can generate nonpoint source (NPS) pollution including sediment, organic matter, pesticides, nutrients, and elevated water temperatures. Removal of or damage to vegetative cover

can increase runoff and erosion particularly on steeper terrain. Halls Branch runs northward through the western side of the "A" area of the VST-M, draining all of the A training areas, and joins Johns Creek near the conjunction of the A, B, and C areas. Other tributaries to Johns Creek drain training areas B2 and B3. The prevalence of stream drainages across the site, coupled with the highly erosive nature of the soils, result in a high potential for sedimentation problems resulting from any activity which disturbs the soil surface or impacts the vegetation cover.

Forestry Best Management Practices (BMPs) have been developed to reduce the adverse effects of forest operations on ecosystems and to protect water quality. A BMP is a practice or combination of practices considered to be the most effective means of preventing or reducing the amount of pollution by nonpoint sources to a level compatible with water quality goals and protecting fish and wildlife populations and habitats. BMPs will be applied to all timber management activities on the VTS-M.

The Tennessee Division of Forestry has adopted BMPs for forestry operations to prevent the impairment of water quality in the State's streams. The Tennessee BMPs are offered as nonregulatory guidelines to be used during the construction of roads, log landings, and skid trails to minimize the environmental impact of forest management activities. The BMPs are summarized in Table A1.2 and are available in manual form at http://www.state.tn.us/agriculture/forestry/bmpmanual.html. Although the BMPs are offered as guidelines, the State of Tennessee has firm expectations that appropriate BMPs will be employed in all forestry operations. Under the Tennessee Water Quality Control Act as amended in 2000, the Tennessee Department of Environment and Conservation has the power to issue a stop work order if a timber harvesting operation is determined to pollute waters of the State because a logger failed or refused to implement BMPs.

Table A1.2: Forestry Best Management Practices for VTS-M. (From Guide to Forestry Best Management Practices in Tennessee. 2003. Tennessee Department of Agriculture, Division of Forestry.)

Forestry Practice	Activity / Resource	BMP
Forest Roads	Locating Roads	Use soil surveys and topographic maps to develop plan.
		Use existing roads to minimize length of road construction.
		Locate roads as far from water bodies as possible.
		Avoid locating roads at confluence of streams.
		Avoid building roads in streamside management zones and sensitive areas.
		Avoid or minimize stream crossings. When that is not possible, crossings should be constructed at right angles.
		Locate roads on upper slopes near ridge crests to promote drainage, but avoid tops of ridges.
		Fit roads to topography by following natural contours and keep grade between 2 and 12 percent. Avoid road sections with 0 percent grade.
	Constructing Roads	Complete construction several weeks in advance of use by logging traffic to allow road bed time to settle.
		Avoid construction during wet weather.
		Construct grades on 2 to 12 percent slopes where possible. Steeper slopes should be used for only short distances where adequate drainage structures are provided.
		Runoff from roads should not directly discharge into streams.
		Minimize runoff at stream crossings.
		Control drainage from roads by using appropriate design techniques: varying grades, crowning, outsloping, wing ditches, sediment control structures, broad-based dips, water bars, water

Forestry Practice	Activity / Resource	BMP
		turnouts, and/or cross-drain culverts.
		Push cleared trees and brush to downhill side of roads to assist in trapping sediment.
		Maximize sunlight exposure to road surface.
		Minimize road width, right-of-way, and stream crossings to minimize soil disturbance.
		Revegetate exposed soils in potential problem areas that could generate sediment.
	Road Retirement	Construct water bars or other drainage structures immediately after active logging has ceased.
		If logging will be delayed, construct temporary drainage and erosion control structures.
		Remove temporary bridges, culverts, and pole fords.
		Remove sediment and debris from dips, ditches, and culverts.
		Use mulch and/or see with lime and fertilizer to prevent soil erosion.
Streamside Management Zones (SMZs)	Perennial and Intermittent Streams	Streamside Management Zone (SMZ) planning should be done before beginning timber harvest.
		Mark SMZ boundary prior to harvest.
		SMZ width should be a minimum of 50 feet between disturbed area and top bank, with 20 additional feet for each additional 10% of slope. This applies to both sides of the stream.
		If trees are harvested in SMZ, maintain 50 percent canopy cover.
		Do not use stream channels as roadways for equipment.
		Avoid equipment operation within SMZ; harvested trees should be cabled or winched out.
	Ephemeral Streams or Wet Weather Conveyances	Avoid skidding within drains during wet conditions.
		Avoid locating roads in drains except when necessary for crossings.
		Do not empty road runoff into drains.
		Minimize soil exposure and compaction to protect ground vegetation.
	Sensitive Areas	Avoid skidding in these areas.
		Avoid locating roads in these areas.
		Do not empty road runoff into drains.
		Minimize soil exposure and compaction to protect ground vegetation.
Stream Crossings	Crossings	Avoid or minimize stream crossings. When that is not possible, crossing should be constructed at right angles to the stream.
		Locate crossings on straightest stream sections.
		Avoid locating crossings at confluences of streams.
		Design to minimize disruption of movement of aquatic life.
		Approaches should be graveled and should rise away from streams to minimize erosion.
		Install broad-based dips and wing ditch turnouts to turn water off roads before entering stream.
	Fords	Use fords for haul roads only, not for skid trails.
		Locate fords where stream banks are low.
		Fords should have a solid bottom.
		Where necessary, use gravel to establish low water crossing.
	Culverts	Permanent culverts should be sized to accommodate the area to be drained.
		Temporary culverts may be smaller, but must be removed after

Forestry Practice	Activity / Resource	BMP
		completion of logging.
		Install culverts in a manner that minimizes disturbance of stream. Stabilize fill material with riprap and/or vegetation.
		Inspect culverts periodically to ensure they are free of blockages.
		Install culverts on grade with bottom of channel to allow movement of aquatic life.
	Bridges	Locate bridges across narrow points of stream and on firm soils.
		Protect banks from sloughing during construction.
		Remove temporary bridges.
		Do not cover bridges with soil.
		Use temporary bridges for skid trails to prevent equipment and logs from entering stream channels.
Log Landings	Log Landings	Locate landings outside of SMZs and away from streams and sensitive areas.
		Slope landings 2-5 percent to allow for drainage.
		Prevent debris and fuels/lubricants from being washed by runoff into streams.
		Revegetate landings after use if they pose a potential water quality problem.
		Install drainage and sediment control structures to divert runoff.
Skid Trails	Skid Trails	Minimize number of skid trails by using existing trails.
		Locate skid trails on slope 2 to 30 percent. Steeper slopes can be used for short distances if water control/drainage structures are provided.
		Runoff from skid trails should not discharge into a stream.
		Control runoff by varying trail grade, water bars, wing ditches, and/or sediment control structures.
		Prevent runoff associated with stream crossings.
		Avoid skidding across streams, drains, and sensitive areas.
		Use culverts or temporary crossing structures.
		Do not use fords to skid across streams.
		Do not operated equipment in streams.
		Avoid skidding directly up or down hill, but follow contours or “zigzag” if possible.
		Use low ground pressure tires on skidders when available and concentrate skidding as much as possible on a few primary skid trails to minimize site disturbance and soil compaction.
		After completing logging, remove temporary bridges and culverts, sediment and debris from dips, ditches, and culverts, and revegetate problem areas.
		Use mulch and/or see with appropriate amounts of lime and fertilizer when needed to prevent soil erosion.
		Avoid ruts that risk channeling water into a stream.
Logging Debris	Disposition of Debris	Trees should not be felled in or across streams.
		Pull treetops far enough from waterways to prevent them from being washed in during high water.
		Do not drag trees and tops through a stream channel.
		Do not remove stumps and roots from stream banks.
Servicing and Maintaining Equipment	Oils and Fuels	Prevent oil and fuel spills. If a spill occurs, clean up all spilled materials and contaminated soils and dispose of both properly. Notify Tennessee Department of Environment and Conservation of spill incident.
Site Preparation for	Mechanical	Choose site preparation method that will expose and disturb as

Forestry Practice	Activity / Resource	BMP
Tree Planting		little bare soil as possible.
		Establish SMZs to minimize sediment entering streams.
		Carry out all mechanical site preparation operations and tree planting along the contour of the land.
		Slopes over 30 percent should be hand planted and should not be subjected to mechanical site preparation.
	Chemical	Favor chemical methods to control undesirable vegetation over mechanical methods on steep slopes and erodible soils.
		Follow all EPA label instructions.
		Never apply pesticides directly to water except when registered for application over water.
		Establish SMZ to minimize chemicals entering streams.
		Avoid use of chemicals in or near sensitive areas.
		Consider weather conditions and equipment capabilities to avoid herbicide drift.
		Calibrate spray equipment to apply chemicals uniformly and in correct quantities.
		Prevent chemical leaks from equipment and check equipment.
		Mix and load chemicals outside of SMZs and sensitive areas.
		Rinse spray equipment and discharge rinse water only in areas that are part of the application site. Never rinse tanks or sprayers in or near streams.
		Dispose of chemical containers according to label instructions.
Prescribed Fire	Preparation	Locate windrows well away from drains to prevent materials from being washed into streams.
		Construct fire lines on the contour in advance of prescribed burning.
		Plow fire lines only as deep and wide as necessary to control the spread of the prescribed fire to minimize soil disturbance.
		Construct water bars and wing ditches at appropriate intervals on firelines to turn water into adjacent undisturbed areas.
Fertilization	Application and Clean Up	Determine appropriate amounts and types of fertilizer needed before application.
		Consider weather conditions and equipment capabilities to avoid drift into SMZs.
		Conduct all on-site fertilizer handling away from waterbodies, wells, ditches, and sensitive areas.
		Clean up and/pr contain all fertilizer spills immediately.
		Dispose of fertilizer containers and/or excess fertilizer according to applicable governmental regulations and label requirements.

4.4 Monitoring and Inspections

Monitoring is a key element in ecosystem management. Army forest managers are required to balance increasing demands for resource use, such as military training, forest product sales, biodiversity conservation, and, where applicable, recreational use of military lands. The VTS-M forestry program should be periodically monitored to: (1) assess whether or not forest management objectives are being met; and (2) detect trends in forest health and condition in response to the forest management actions proposed in this plan.

Forestry program monitoring on the VTS-M will include:

- The progress of each timber sale will be monitored to ensure that the harvest is being conducted in accordance with the terms of the contract. Monitoring will be coordinated with the USACE's Mobile District if the timber sale is administered by the USACE. At the conclusion of the timber harvest, a final inspection of the site will be conducted jointly by the USACE and the TNARNG to assure the cut was conducted in accordance with the contract stipulations to allow release of the buyers' bond.

- Effective management requires feedback on the results of the management activities. The necessary assessment may be conducted specifically for the forestry program or as a part of another program area. The VTS-M forests should be monitored to assess:

  - Whether the overall condition of the forest is meeting military mission requirements
  - The effects of training activities on forest resources
  - Response to forest management activities
  - Wildlife habitat quality
  - Influence of forest management on sensitive species
  - Impacts on cultural resources
  - Erosion problems related to timber management practices and the success of repair efforts
  - Any areas affected by disease or insect infestations (particularly southern pine beetles during summer months)
  - Storm or other natural damage
  - Invasive pest plant problems
  - Fuel loads on the forest floor and the risk for wildfires
  - Areas for inclusion in future timber ROAs

- The baseline forest inventory was conducted for VTS-M in 2005. Forest resources should be re-inventoried every 10 or more years. If that work is to be accomplished by contract, adequate advance time should be allowed to prepare the scope of work and to award the contract by that time frame. The next inventory should include a specific task requiring a comparison of the current forest condition with the results of the 2005 inventory to determine the direction the installation's forest is headed; how effective management measures have been in assuring a quality forest is provided; and identifying adjustments in the long-term management goals in the installation's forest management program.

5.0 MANAGEMENT PRESCRIPTIONS

A total of 26 individual forest stands have been designated on VTS-M. These stands have been further divided into 45 management units. Stand designations indicate site (M), training area (a06), stand (01), and unit (a): Ma0601(a).

Final harvests will generally be large group selection cuts (2-3 acres) up to small clearcuts (no more than 10 acres) as dictated by topography, accessibility, and stand characteristics. Openings of at least 2 acres are needed to encourage oak regeneration. Preference will be given to sites containing sufficient advance regeneration of appropriate size (>4' tall oak seedlings or sprouts) when marking timber to harvest.

Some stands will require pre-commercial thinning or mid-story removal to encourage advance regeneration of desirable species. This will be done as funding allows, on no more than 60 acres per year.

The shelterwood-burn method of regeneration will be applied experimentally as feasible (see Annex 2). Traditional shelterwood harvest may also be utilized experimentally to ascertain the effectiveness at obtaining oak regeneration.

In all harvest activities, pre-commercial or commercial, there will be no timber removal within 100 feet of creeks. A 100' buffer will also be maintained along property boundaries except for the 20' line of site clearing required along the fence-line itself.

5.1 Cantonment Area

The 121 acre Cantonment Area is the management center for the VTS-M and contains most of the building infrastructure for the installation. A single 36.31 acre forest stand occurs on this area, but it is divided into three separate components.

Stand Description

Stand cc0101 is a mature upland pine and hardwood forest. The stand is dominated by red oak and poplar, with a mix of hickory, white oak, and walnut. Ages of the trees range from 30 to 70 years old. Some of the oaks and poplars are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is excellent and does not show signs of having experienced past hot fires.

Forest Management Prescription

Stand cc0101. This stand will not be subject to harvesting unless training site development or forest pest management requires. The stand functions as an important buffer along a portion of the training site boundary and so harvesting should be avoided.

Prescribed burning may be done once every 6 years for fuel reduction if necessary. Due to the proximity of installation buildings, any prescribed burn must be conducted with extreme care.

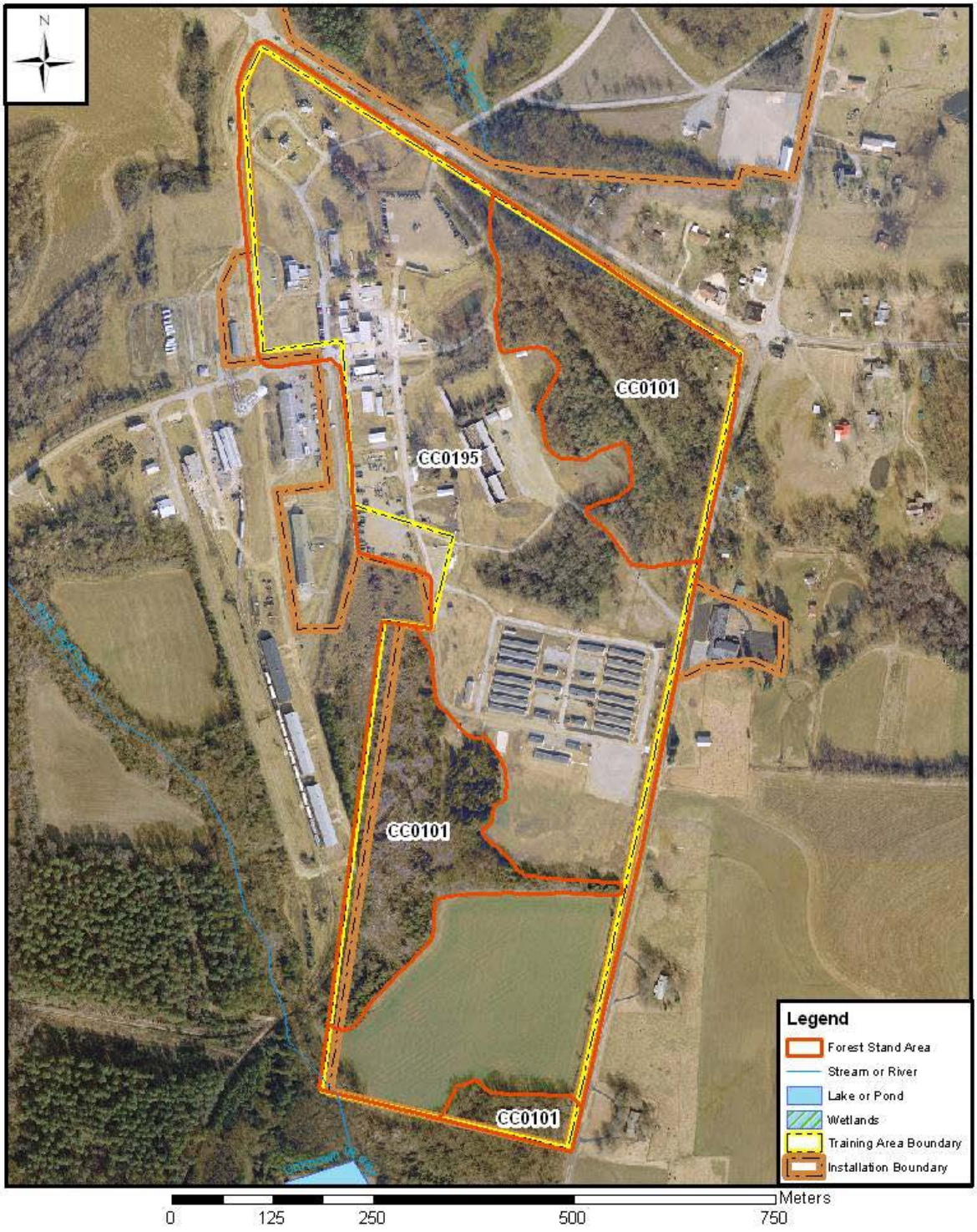

Figure A1.2: Forest stands in the Cantonment Area of the VTS-M.

5.2 Training Area A-1

Training Area A-1 is an elongated 112-acre area located along the installation's eastern boundary. The southern portion of the area contains some infrastructure buildings and a number of graveled roads crisscross the area. Almost half of the area is designated as being in an open condition. A single 65.54-acre fragmented forest stand divided between six separate units occurs on the training area.

Stand Description

Stand ma0101 is a mature upland pine and hardwood forest dominated by red oaks and white oaks, with a mix of hickory, poplar, walnut, and a few pines. The trees range in age from 30 to 70 years old. Some of the oaks and poplars are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is good.

Forest Management Prescription

Stand ma0101. Sections (a), (b), (c), and (e) of this stand will be left alone due to their small size or to function as a boundary line buffer. Sections (d) (30 ac) and (f) (15 ac) will be subject to small group selections to create a patchwork of age classes. No more than 30% of the section acreage will be harvested in groups. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. The remainder of each section may be lightly thinned to release desirable hardwood trees. The two sections will not be harvested in the same year.

Prescribed burning may be done no more often than every 6 years as needed for fuel reduction. Efforts will be made to ensure a cool burn to minimize the potential for damage to the hardwoods.

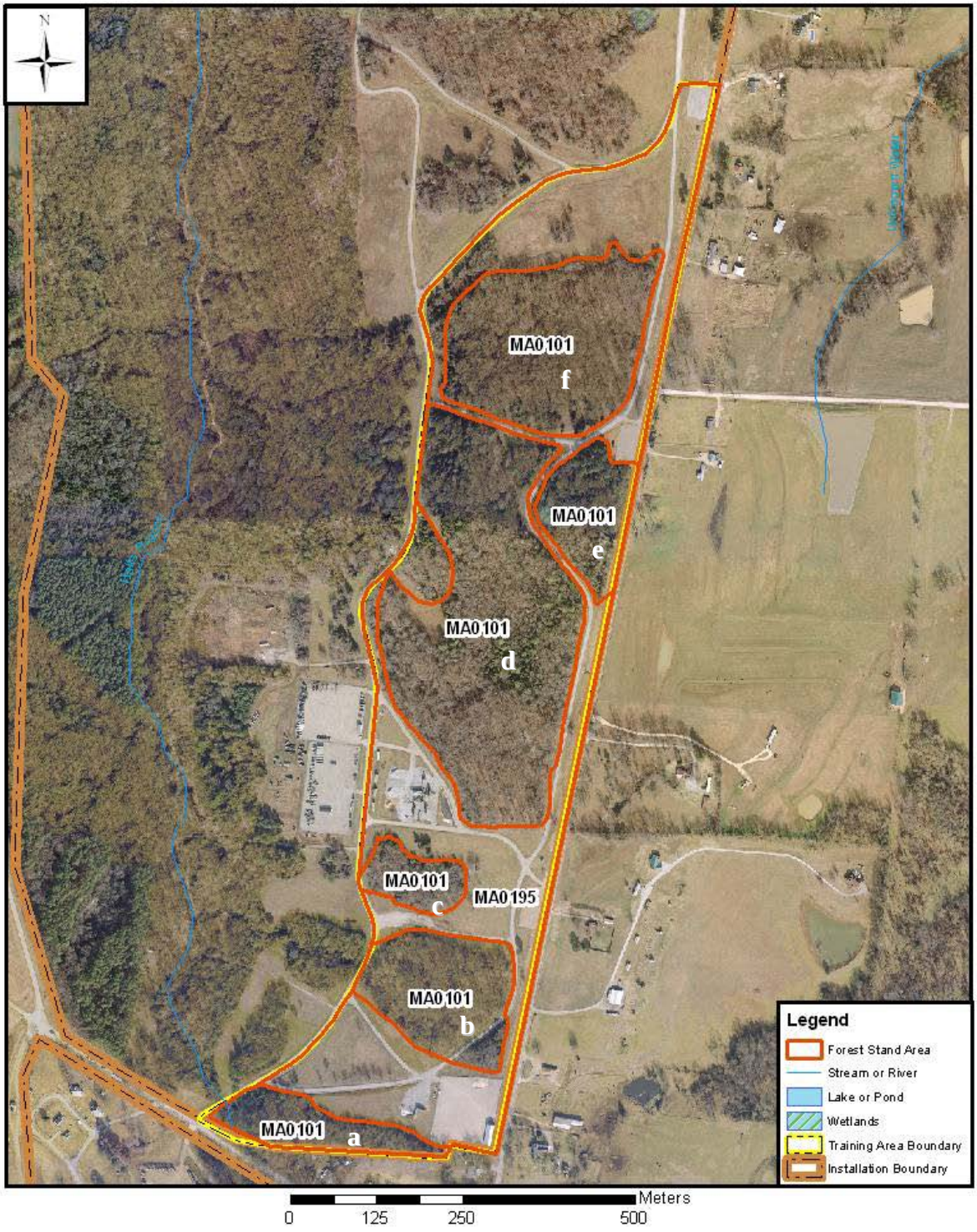

Figure A1.3: Forest stands in Training Area A-1.

5.3 Training Area A-2

Training Area A-2 is 133 acres in size. Most of the area is forested, with only two open areas occurring within the area. Two forest stands make up the majority of the site.

Stand Descriptions

Stand ma0201 is a contiguous 81.28-acre mature upland pine and hardwood forest. The stand is dominated by red oak and white oak with a mix of hickory, poplar, walnut, and a few pines. The trees range in age from 15 to 60 years old. Some of the oaks and poplar are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is good.

Stand ma0202 is a dense over-mature 40- to 45-year old pine stand that appears never to have been thinned. This 29.95-acre stand is separated into three units. The stand appears to be an old field that was planted but has not been thinned to keep the stand healthy. The pines have been dying due to overcrowding.

Forest Management Prescriptions

Stand ma0201. Sections (a) (38 ac west of the Halls Branch) and (b) (43 ac) will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of the section acreage will be harvested in groups. The remainder of each section may be lightly thinned to release desirable hardwood trees. The two sections will not be harvested in the same year. Section (a) will not be harvested until after stand Ma0202 is thinned so that the same access trail can be utilized.

Prescribed burning can be done once every 6 years for fuel reduction.

Stand ma0202. The three sections of this stand will be harvested. All mature pine will be cut; hardwoods will be retained. Natural regeneration underneath the residual hardwoods will create a two-age stand.

No burning should be performed before the thinning is done. Depending on the species distribution of the regeneration, a prescribed burn may be conducted 3-5 years following harvest to eliminate less desirable species (e.g., yellow poplar and maple). If the predominant regeneration is pine, this burn will not be conducted.

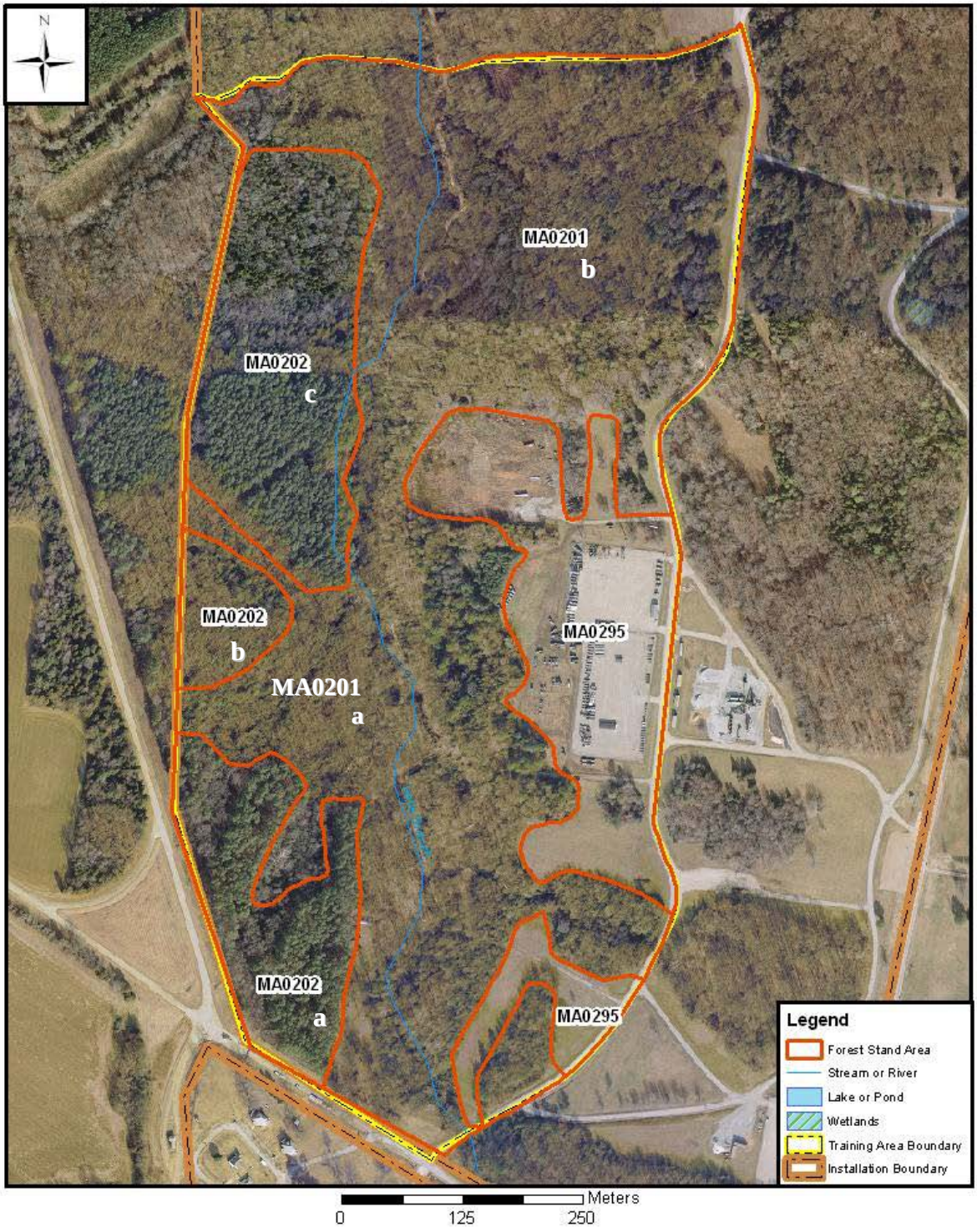

Figure A1.4: Forest stands in Training Area A-2.

5.4 Training Area A-3

The 116-acre Training Area A-3 supports a single 85.36-acre forest stand. The stand is divided into three units by gravel roads and associated open areas that parallel the roads.

Stand Description

Stand ma0301 is a mature upland pine and hardwood forest. The stand is dominated by red oaks and white oaks, with a mix of hickory, poplar, walnut, and a few pines. The trees range in age from 30 to 70 years old. Some of the oaks and poplar are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is good but will decline in the next ten years without some type of management.

Forest Management Prescription

Stand ma0301. Sections (a) (16 ac) and (b) (54 ac) will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of the section acreage will be harvested in groups. The remainder of each section may be lightly thinned to release desirable hardwood trees. The two sections will not be harvested in the same year.

Section (c) will not be harvested as it provides an important buffer along the property boundary.

Prescribed burning can be done once every 6 years for fuel reduction.

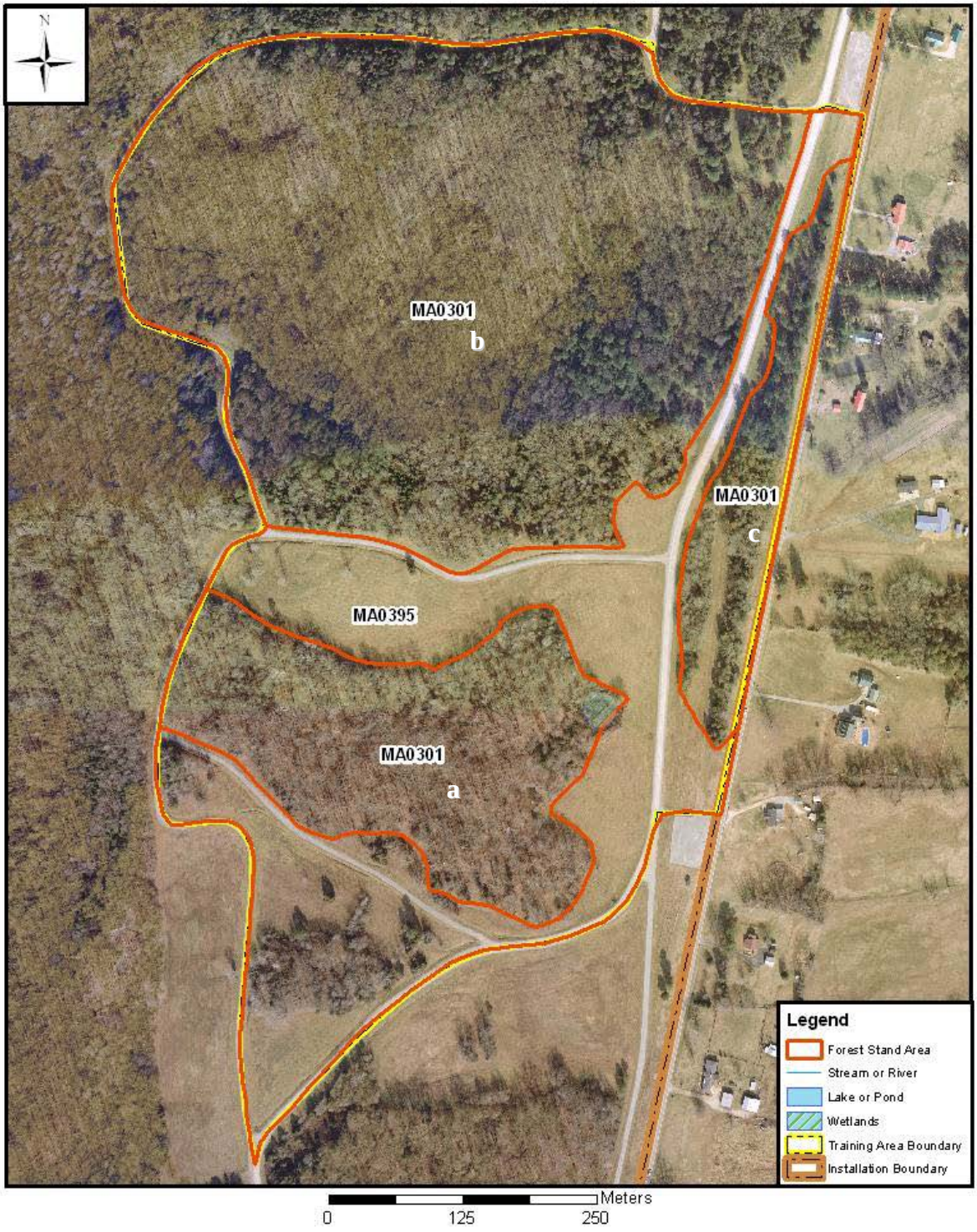

Figure A1.5: Forest stands in Training Area A-3.

5.5 Training Area A-4

The 165-acre Training Area A-4 is almost completely forested. A relatively small open field occurs along its southeastern periphery. A single 158.10-acre contiguous forest stand covers most of the area.

Stand Description

Stand ma0401 is a mature upland pine and hardwood forest. The stand is dominated by red oaks and white oaks, with a mix of hickory, poplar, walnut, and a few pines. The ages range from 20 to 60 years old. The overall health of the stand is excellent.

Forest Management Prescription

Stand ma0401. Section (a) (west of Halls Branch) will not be harvested due to accessibility issues and because it functions as a boundary buffer and riparian habitat. Section (b) (75 ac) will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of the section acreage will be harvested in groups. The remainder of each section may be lightly thinned to release desirable hardwood trees.

Prescribed burning can be done once every 6 years for fuel reduction.

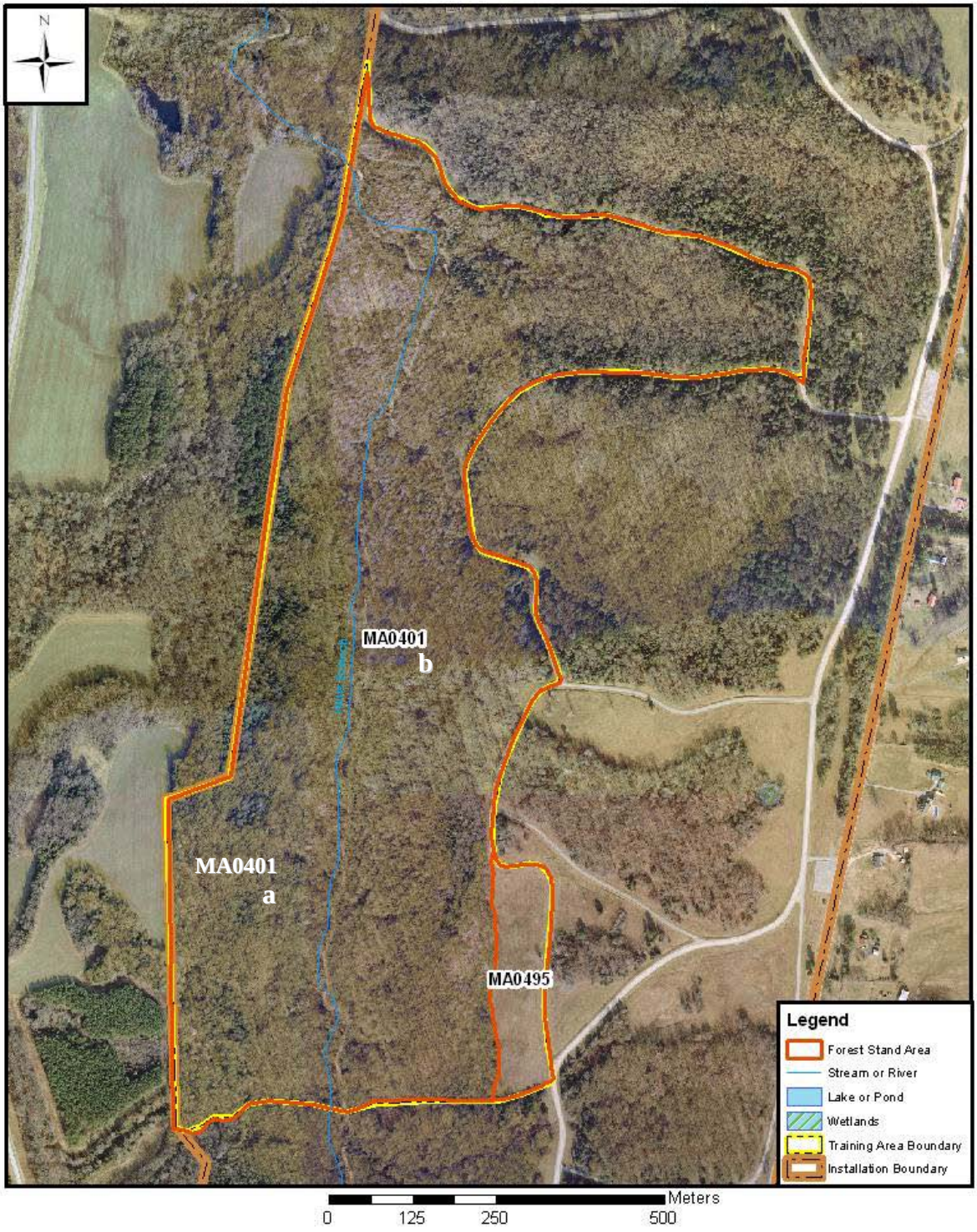

Figure A1.6: Forest stands in Training Area A-4.

5.6 Training Area A-5

Training Area A-5 is 173 acres in size. Most of this area is forested, with small open areas associated with the gravel roads that occur along its eastern boundary. Three forested stands were delineated for this area.

Stand Descriptions

Stand ma0501 is a contiguous 132.03-acre mature pine and hardwood forest that covers much of the training area. The stand is dominated by red oaks and white oaks, with a mix of hickory, poplar, walnut, and pine. The trees range in age from 30 to 75 years old. Some of the oaks are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is good.

Stand ma0502 is an elongated 14.63-acre young poplar and sweet gum stand occurring along the area's western boundary. This stand developed on part of an old road bed. This stand is of excellent health and ages range from 10 to 20 years old. The terrain is relatively flat and is part of the Halls Branch floodplain. The stand consists mainly of pulpwood size trees, with a few trees starting to reach the sawtimber size.

Stand ma05CC is a 14.46-acre clearcut area (salvage logged in 2003 following a tornado) that is in the process of site preparation for a new open training area.

Forest Management Prescriptions

Stand ma0501. Sections (a) (58 ac) and (b) (55 ac) will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of the section acreage will be harvested in groups. The remainder of each section may be lightly thinned to release desirable hardwood trees. The two sections will not be harvested in the same year.

Prescribed burning can be done once every 6 years for fuel reduction.

Stand ma0502. Stand ma0502 will be thinned from below with only the small pulpwood removed, leaving the larger sawtimber trees to grow. This will allow the sawtimber to remain growing at an acceptable rate. Due to the small size of this stand, the harvest will have to be conducted in conjunction with another stand to be economically feasible.

Prescribed burning should not be undertaken on this stand.

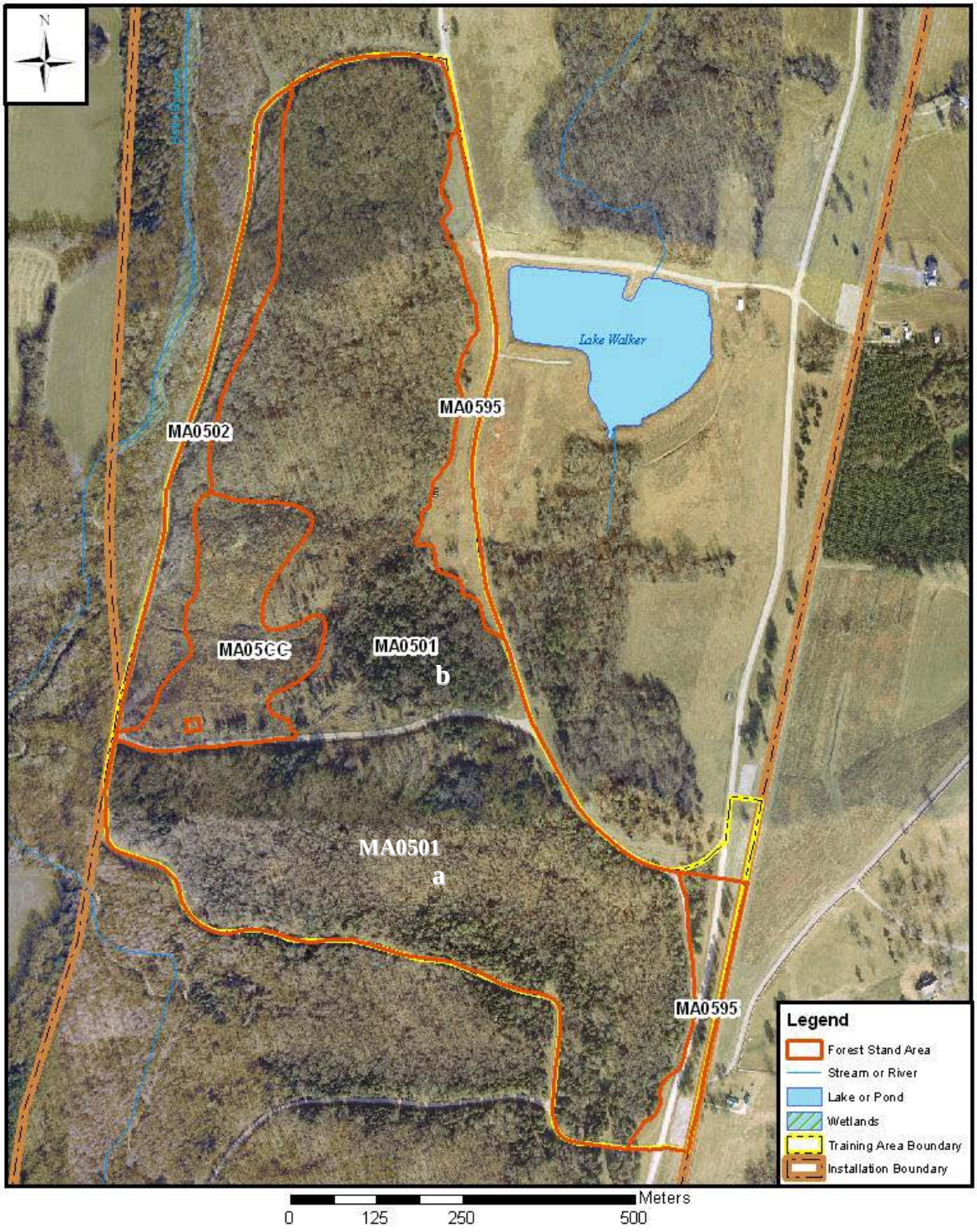

Figure A1.7: Forest stands in Training Area A-5.

5.7 Training Area A-6

Training Area A-6 is 91 acres in size. The area contains a sizable pond and a considerable amount of open lands. A single 32.04-acre forest stand occurs within the training area. The forest stand is divided into a small eastern unit, and a much larger western unit.

Stand Description

Stand ma0601 is a mature upland pine and hardwood forest. The stand is dominated by red oaks, with a mix of hickory, white oak, poplar, walnut, and a few pines. Tree ages range from 40 to 70 years old. The overall health of the stand is excellent for the pine, but poor for the hardwoods due to very hot past fires. The stand will only decline more in next five years without some type of management. Most of the cedars have been blown down by a past tornado.

Forest Management Prescription

Stand ma0601. Section (a) includes a 15 acre section which will be clearcut and planted to grass for training purposes. The remainder of section (a) (17 ac) will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of the section acreage will be harvested in groups.

Section (b) will not be harvested as it functions as a property boundary buffer.

Prescribed burning may be done once every 6 years for fuel reduction.

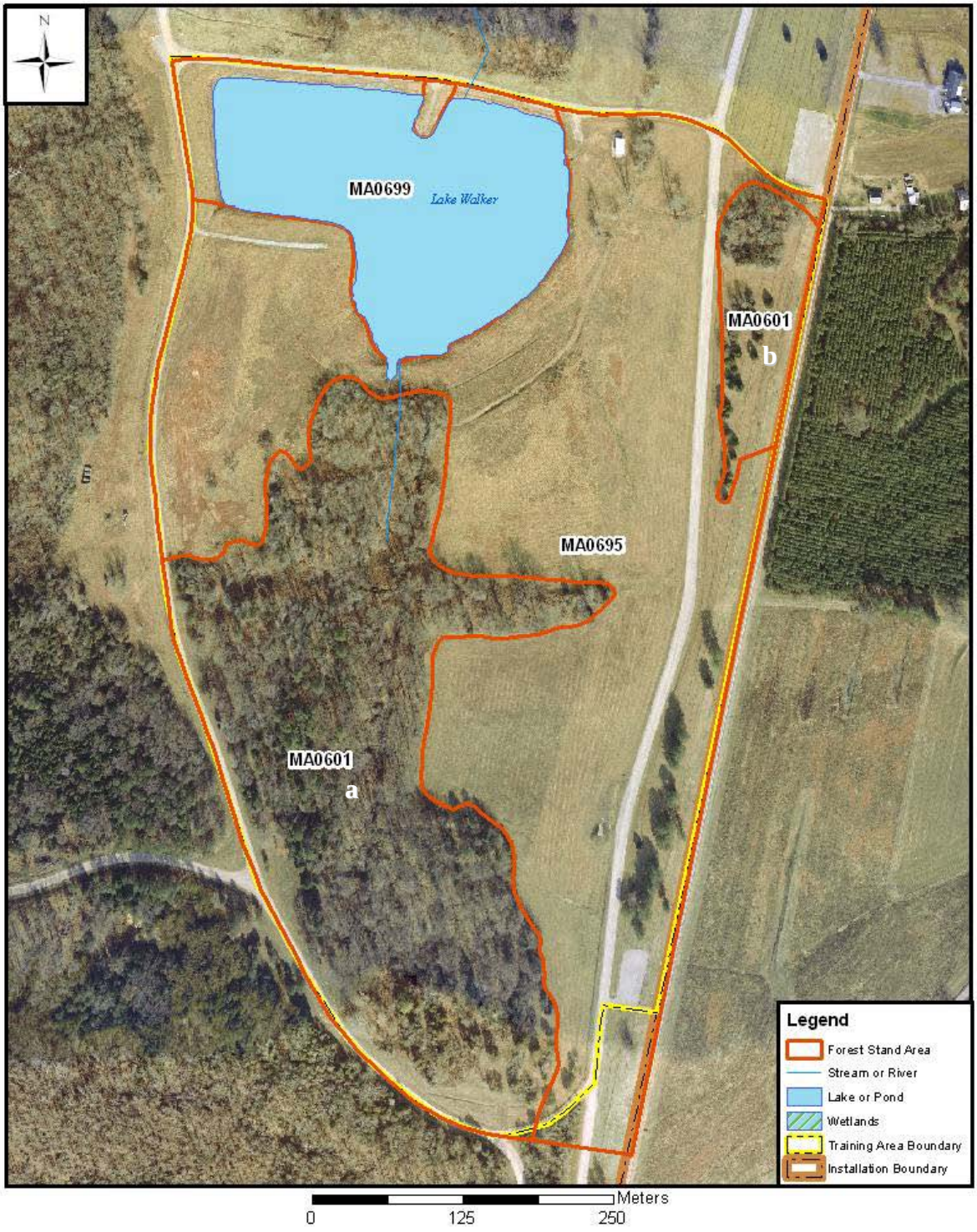

Figure A1.8: Forest stands in Training Area A-6.

5.8 Training Area A-7

At 222 acres, Training Area A-7 is the third largest training area comprising VTS-M. The eastern and western boundaries of the area are defined by graveled roads and the associated open areas that parallel these roads. A single 141.07-acre forest stand is located within the area. Most of the forested stand occurs within a contiguous block. A unit of the stand is separated from the larger block and occurs as a small strip of forested land situated between Highway 220 and an installation north-south oriented road.

Stand Description

Stand ma0701 is a mature upland pine and hardwood forest. The stand is dominated by red oaks and white oaks, with a mix of hickory, poplar, walnut, and a very few pines. The trees range in age from 40 to 70 years old. Some of the oaks and poplars are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is good, but the stand shows some signs of fire damage.

Forest Management Prescription

Stand ma0701. Sections (a) (32 ac) and (b) (62 ac) will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. Where possible, fire-damaged trees will be removed to improve overall stand health. No more than 30% of the section acreage will be harvested in groups. The remainder of each section may be lightly thinned to release desirable hardwood trees. The two sections will not be harvested in the same year.

Section (c) (next to the road) will not be harvested as it functions as a property boundary buffer.

Prescribed burning can be done once every 6 years for fuel reduction.

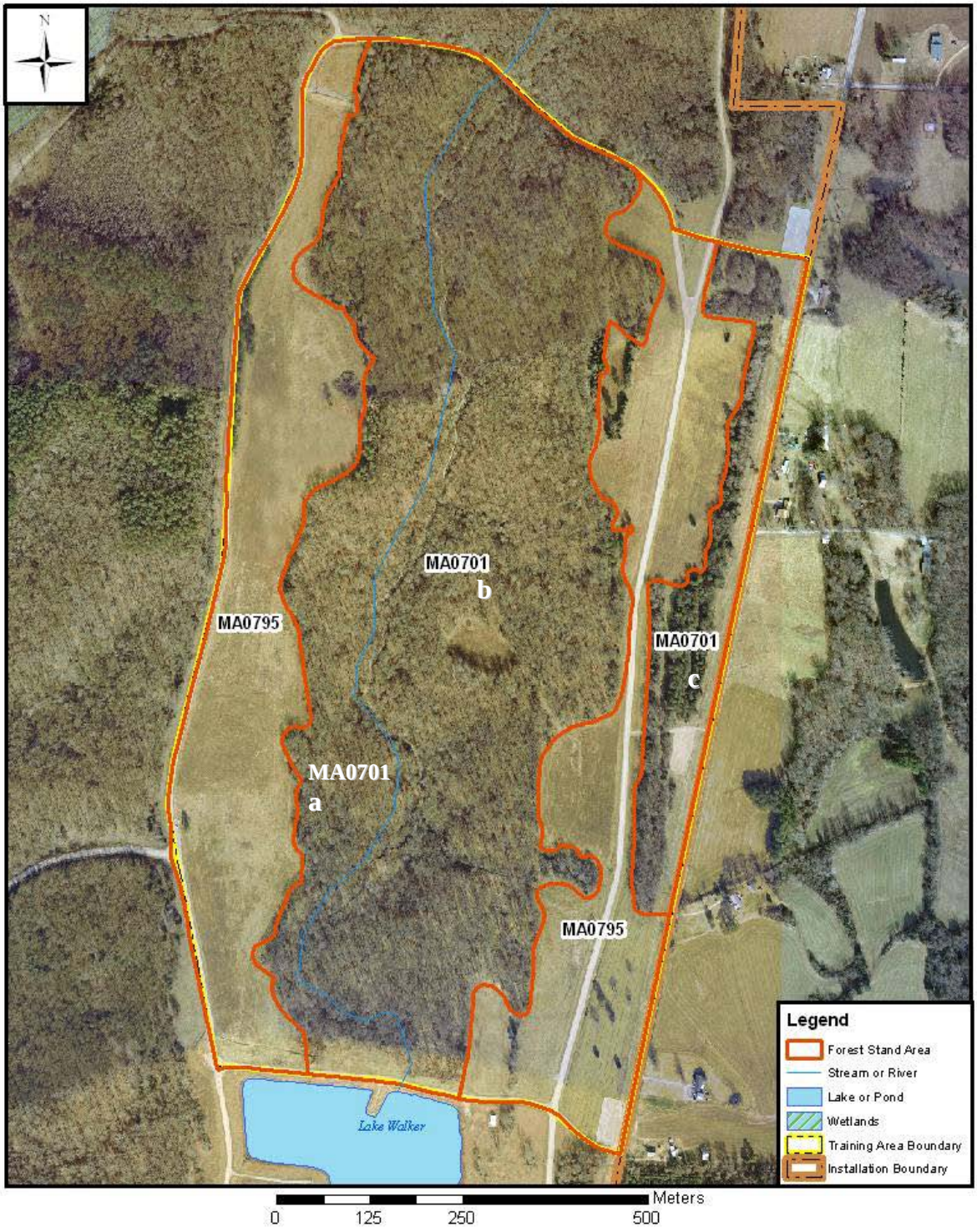

Figure A1.9: Forest stands in Training Area A-7.

5.9 Training Area A-8

Training Area A-8 is an elongated 165-acre site that is forested over its entire area. Three forest stands make up this area.

Stand Descriptions

Stand ma0801 is a 63.95-acre mature upland pine and hardwood forest that is separated into two blocks. The stand is dominated by red oaks and white oaks, with a mix of hickory, poplar, walnut, and a very few pines. The trees range from 30 to 60 years in age. Some of the oaks and poplar are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is good but will only decline in next 10 years without some type of management. This area shows signs of fire damage which has allowed erosion of soil and major damage to the hardwood species.

Stand ma0802 is a 70.35-acre immature sawtimber stand of sweet gum, poplar, black cherry and other miscellaneous timber. This stand occurs along the training areas western boundary and appears to be an old abandoned field. There are a few pine scattered in the 10- to 25-year old stand.

Stand ma0803 is a 30.27-acre mature upland pine and hardwood forest that is situated between the two blocks comprising stand ma0801. Stand ma0803 is dominated by pine, with a mix of oaks, hickory, poplar, and walnut. The trees range from 30 to 60 years in age. Some of the oaks and poplar are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is excellent. This area shows signs of fire damage.

Forest Management Prescriptions

Stand ma0801. Sections (a) (35 ac) and (b) (18 ac) will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. Where possible, fire-damaged trees will be removed to improve overall stand health. No more than 30% of the section acreage will be harvested in groups. The remainder of each section may be lightly thinned to release desirable hardwood trees. The two sections will not be harvested in the same year.

Prescribed burning can be accomplished once every 6 years for fuel reduction.

Stand ma0802. Stand ma0802 will not be harvested due to its proximity to Halls Branch and associated wetlands. Prescribed burning may be done once every 6 years for fuel reduction.

Stand ma0803. This stand will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of the section acreage will be harvested in groups. The remainder of each section may be lightly thinned to release desirable hardwood trees.

Prescribed burning may be done once every 6 years for fuel reduction.

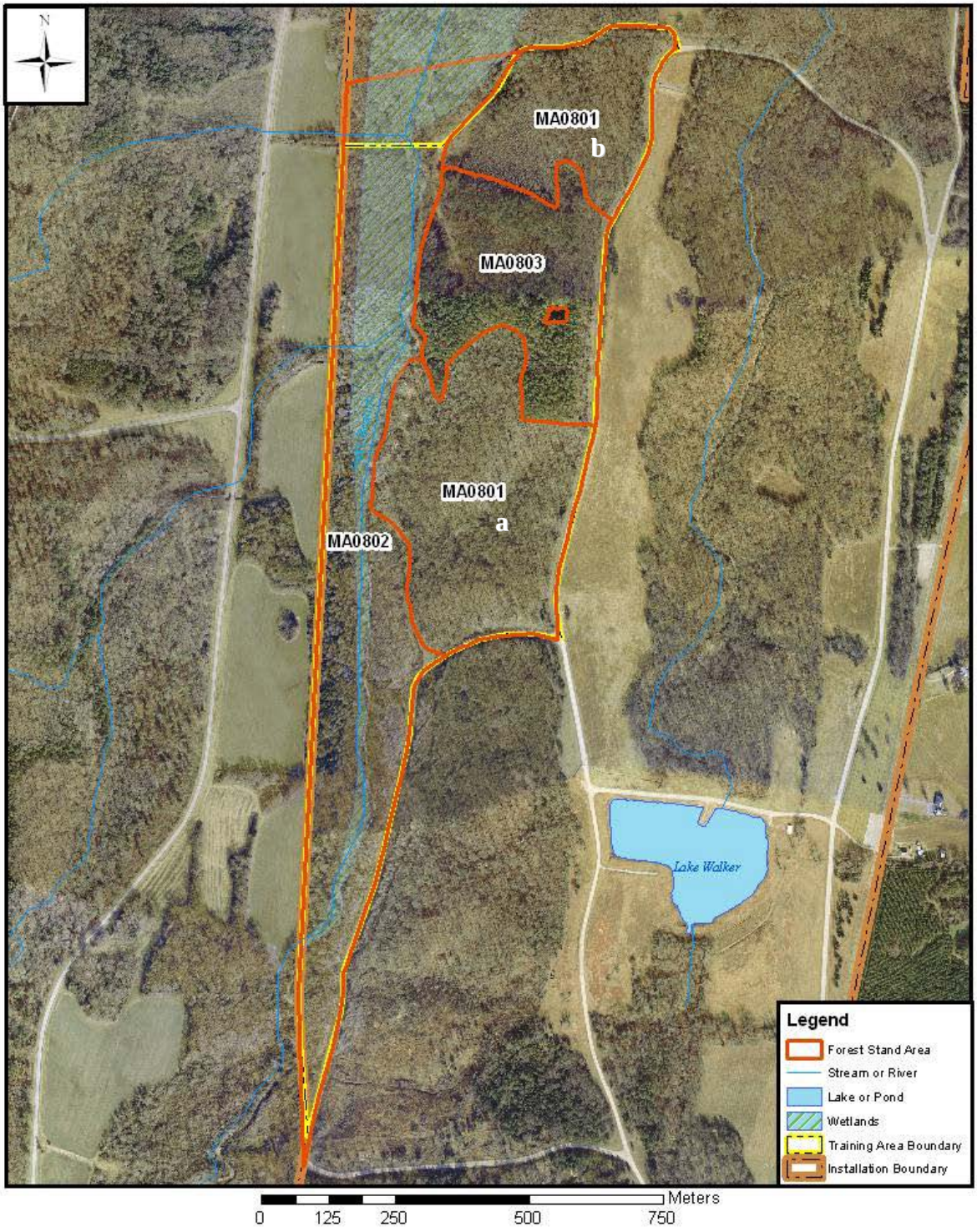

Figure A1.10: Forest stands in Training Area A-8.

5.10 Training Area A-9

Training Area A-9 is the second largest training unit at VTS-M. This 300-acre area is mostly forested. Four small open areas associated with ranges and/or roads are scattered along the area's southern and eastern boundaries. The training area supports two large and contiguous forest stands.

Stand Description

Stand ma0901 is a 111.60-acre mature upland pine and hardwood forest dominated by red oaks and white oaks, with a mix of hickory, poplar, walnut, and a few pines. Tree ages range from 30 to 80 years old. Some of the oaks and poplars are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is poor. There is good hardwood regeneration present. Most of the large hardwoods are culls due to rot and hollows in the trees.

Stand ma0902 is 171.69-acre immature sawtimber stand of sweet gum, poplar, black cherry and other miscellaneous hardwood timber. This area appears to have been an old abandoned field and is located on either side of Halls Branch. There are a few pine scattered in the 10- to 25-year old stand. This is one of the wetter stands on VTS-M and is in excellent health. Prescribed burning can be done once every 6 years for fuel reduction.

Forest Management Prescriptions

Stand ma0901. Sections (a) (41 ac) and (b) (45 ac) will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of the section acreage will be harvested in groups. The remainder of each section may be lightly thinned to release desirable hardwood trees. The two sections will not be harvested in the same year.

Stand ma0902. Stand ma0902 will be thinned from below with only the small pulpwood to be removed, leaving the larger sawtimber trees to grow. This will allow the sawtimber to remain growing at an acceptable rate. The stand will be divided into three sections to be thinned in different years in order to meet the 60 acres per year guideline. Most of this stand is wetland, and so harvesting time and methods will be limited to those which will not significantly impact wetland soils. As with all other harvests, 100 foot non-harvested buffers will be maintained on either side of all creeks.

Prescribed burning should not be conducted before the thinning; thereafter, the stand can be burned once every 6 years for fuel reduction only.

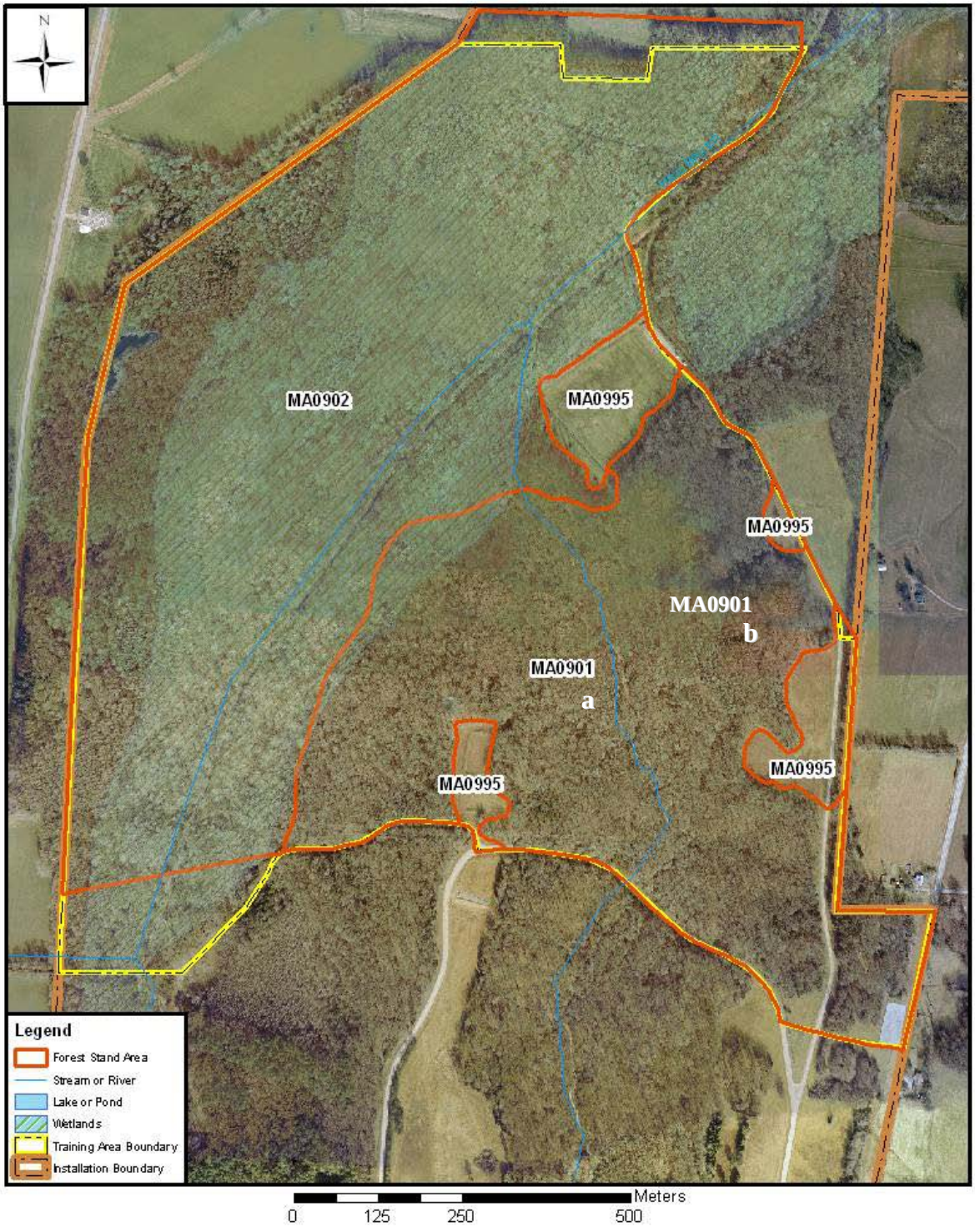

Figure A1.11: Forest stands in Training Area A-9.

5.11 Training Area A-10

Training Area A-10 is the northernmost of the "A" training areas located on the main installation. This 126-acre area contains a small open area on its southern boundary and a larger open field to the northwest. The remainder of the stand supports a single 84.01-acre forest stand occurring in a contiguous block.

Stand Description

Stand ma1001 is an immature sawtimber stand of sweet gum, poplar, black cherry and other miscellaneous hardwood timber. This area appears to be an old abandoned field. There are a few pines scattered in the 10- to 25-year old stand. This is one of the wetter stands on the installation and is in excellent health.

Forest Management Prescription

Stand ma1001. This stand will be thinned from below with only the small pulpwood to be removed, leaving the larger sawtimber trees to grow. This will allow the sawtimber to remain growing at an acceptable rate. The stand will be divided into two sections to be thinned in different years in order to meet the 60 acres per year guideline. Most of this stand is wetland, and so harvesting time and methods will be limited to those which will not significantly impact wetland soils. As with all other harvests, 100 foot non-harvested buffers will be maintained on either side of all creeks, and a minimum 100 foot non-harvested buffer will be retained along the property boundary.

Prescribed burning should not be conducted before the thinning; thereafter, the stand can be burned once every 6 years for fuel reduction only.

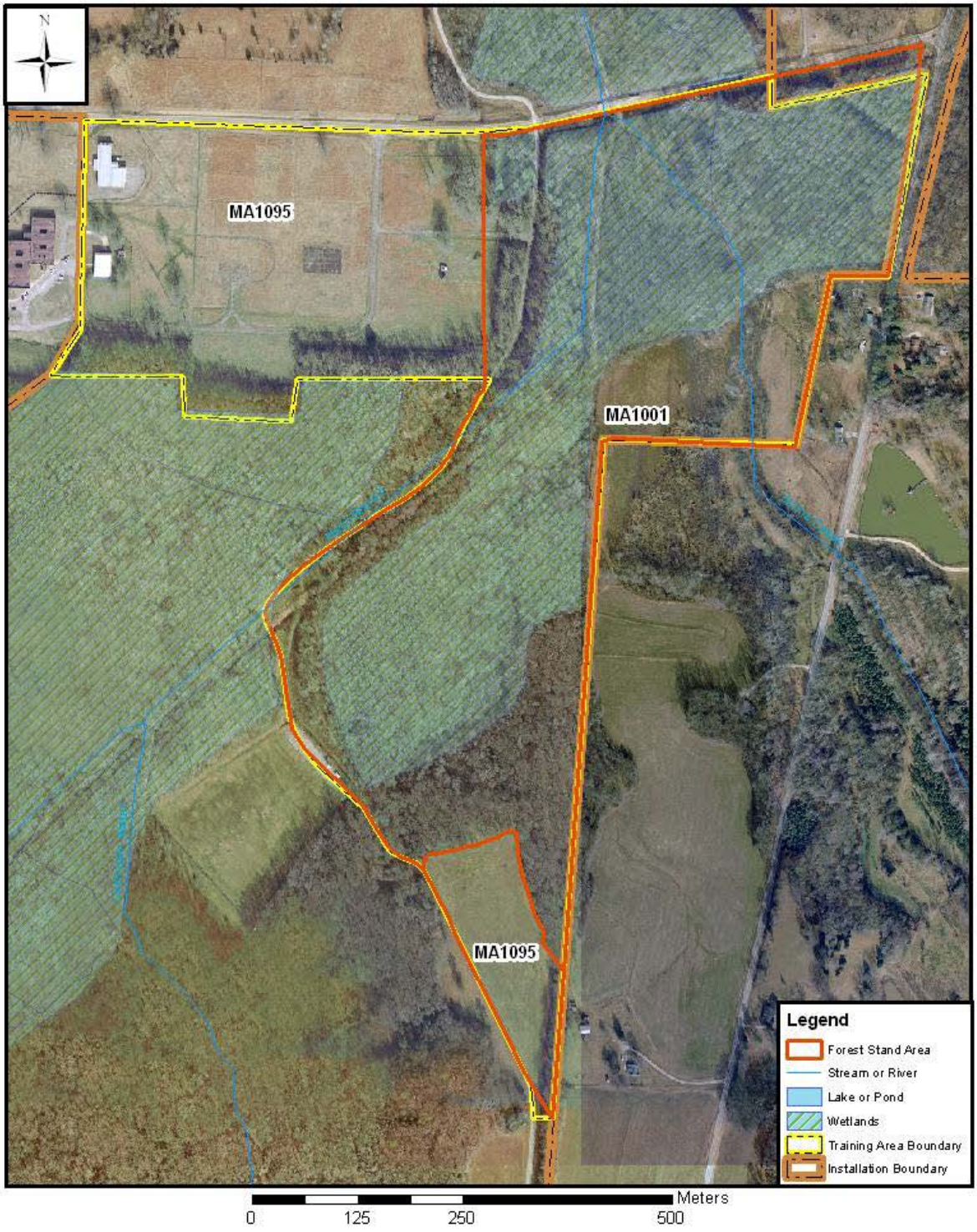

Figure A1.12: Forest stands in Training Area A-10.

5.12 Training Area B-1

Training Area B-1 is 96 acres in size. It western boundary contains scattered small open areas associated with a graveled road. The area supports a single 89.65-acre stand occurring in a single block.

Stand Description

Stand mb0101 is an immature sawtimber stand of sweet gum, poplar, black cherry and other miscellaneous hardwood timber. This area is low and has wet spots most of the year. There are a few large red oaks scattered in the 10- to 25-year old stand, with all being in excellent health.

Forest Management Prescription

Stand mb0101. Sections (a) (28 ac) and (b) (60 ac) will be thinned from below with only the small pulpwood to be removed, leaving the larger sawtimber trees to grow. This will allow the sawtimber to remain growing at an acceptable rate. Most of this stand is wetland, and so harvesting time and methods will be limited to those which will not significantly impact wetland soils. As with all other harvests, 100 foot non-harvested buffers will be maintained on either side of all creeks, and a minimum 100 foot non-harvested buffer will be retained along the property boundary.

Prescribed burning can be done once every 6years for fuel reduction only. No burning should be undertaken before thinning is completed.

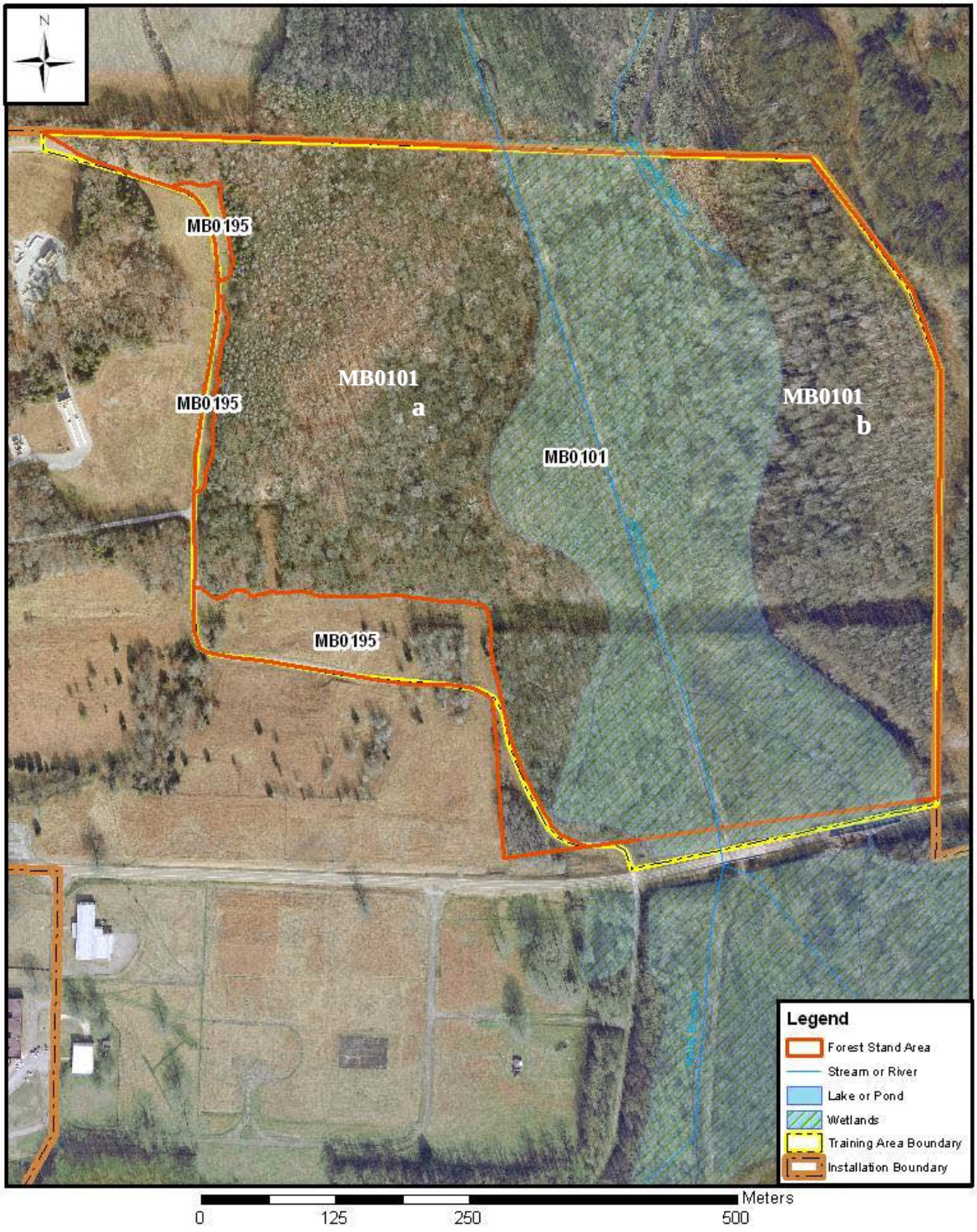

Figure A1.13: Forest stands in Training Area B-1.

5.13 Training Area B-2

The 164-acre Training Area B-2 is almost equally divided between open fields and forested areas. The open areas are divided between nine different fields of varying sizes, some of which are associated with gravel roads that run along the training areas boundaries. The single 77.83-acre forest stand occurring on this training area is highly elongated, with much of it being associated with the drains occurring within the stand.

Stand Description

Stand mb0201 is a mature upland pine and hardwood forest. The stand is dominated by red oaks and white oaks, with a mix of hickory, poplar, walnut, and a few pines. The trees range in age from 30 to 60 years old. Some of the oaks and poplars are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is poor. Most of the large hardwoods are culls due to rot and hollows in the trees, most likely caused by past burning. This stand is oddly shaped, being located in the drains and other areas within the training area that are not used as fields.

Forest Management Prescription

Stand mb0201. At this time there will be no harvest of this stand. Prescribed burning can be done once every 6 years for fuel reduction only.

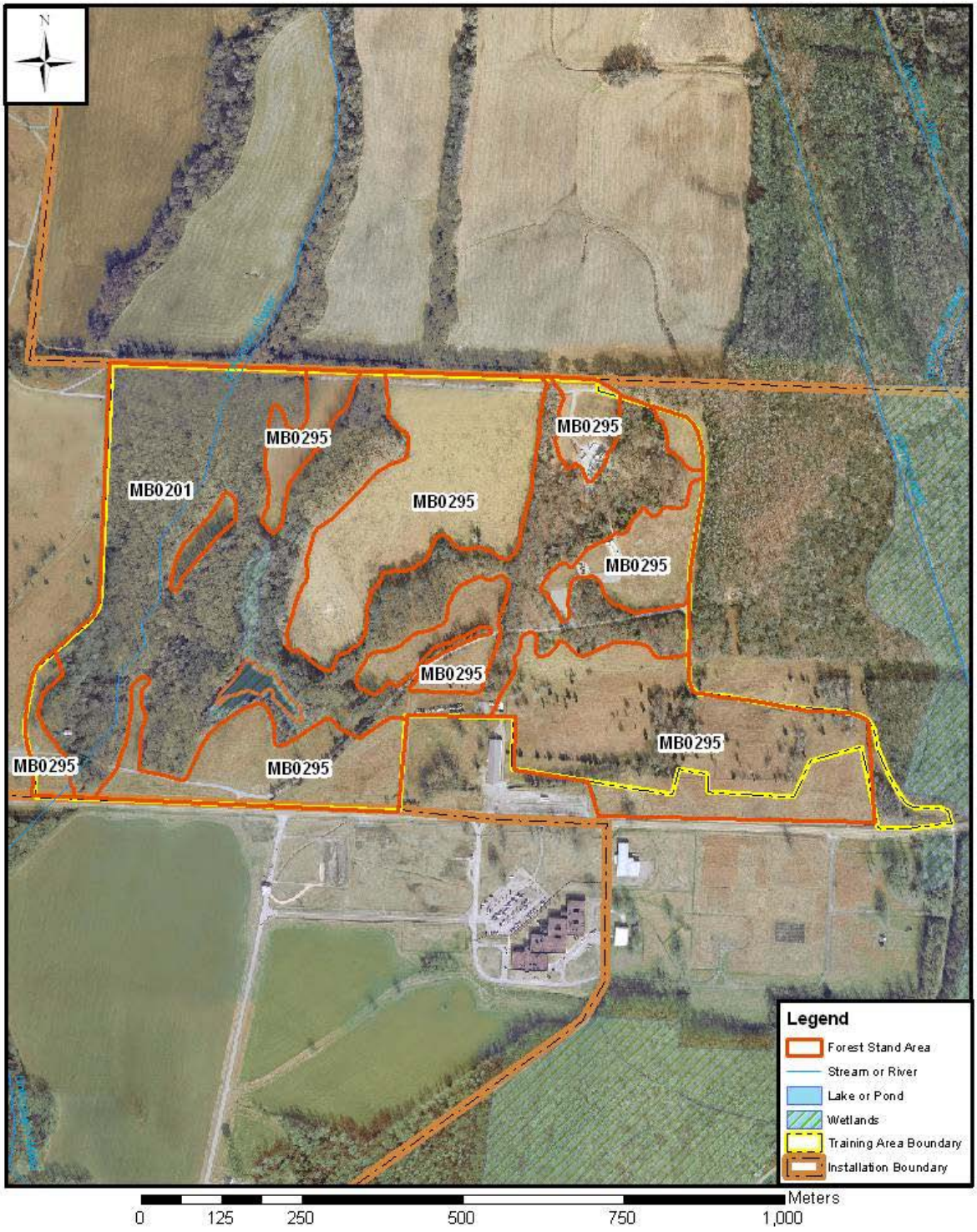

Figure A1.14: Forest stands in Training Area B-2.

5.14 Training Area B-3

At 303 acres, Training Area B-3 is the largest training area on VTS-M. Two thirds of the area is characterized as grasslands that are divided between at least four major open fields. A single 93.93-acre forest stand occurs on the site. The forest stand is greatly elongated and oddly shaped and forms the boundaries separating the fields from one another and/or is associated with the drains occurring on the site.

Stand Description

Stand mb0301 is a mature upland pine and hardwood forest. The stand is dominated by red oaks and white oaks, with a mix of hickory, poplar, walnut, and a few pines. The trees range in age from 30 to 60 years old. Some of the oaks and poplars are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is poor. Most of the large hardwoods are culls due to rot and hollows in the trees most likely caused by past burning. This stand is largely located within the drains and other areas within the training area that are not used as fields.

Forest Management Prescription

Stand mb0301. At this time there will be no harvest of this stand. Prescribed burning can be done once every 6 years for fuel reduction only.

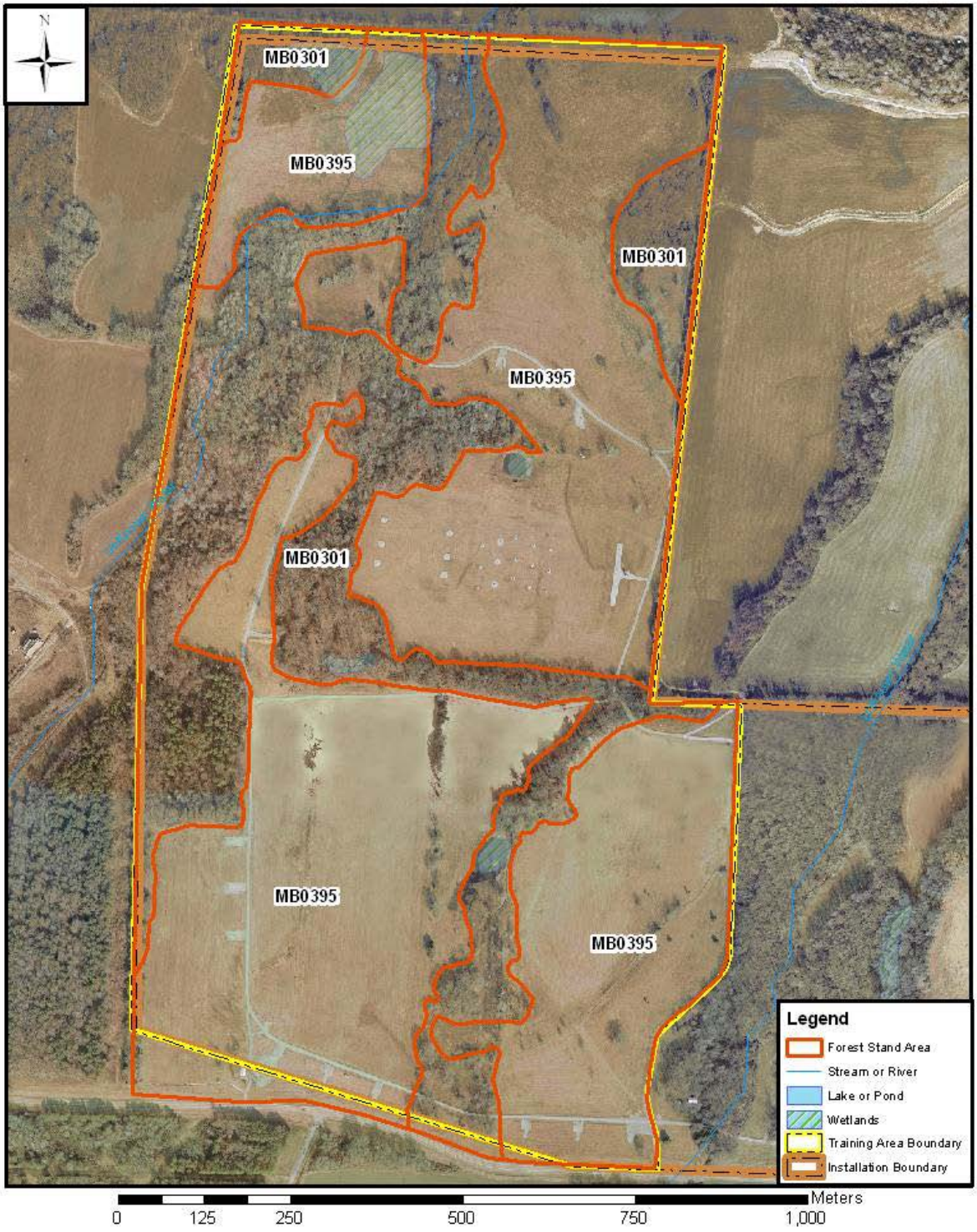

Figure A1.15: Forest stands in Training Area B-3.

5.15 Training Area C-1

Training Area C-1 is 42.04 acres in size and is covered by a single forest stand.

Stand Description

Stand mc0101 is a mature upland pine and hardwood forest that is dominated by red oaks and poplars, with a mix of hickory, white oak, and walnut. The ages of the trees range from 30 to 60 years old. Some of the oaks and poplars are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is excellent, and does not show signs of past hot fires.

Forest Management Prescription

Stand mc0101. Sections (a) (17 ac) and (b) (15 ac) will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of the section acreage will be harvested in groups. The remainder of each section may be lightly thinned to release desirable hardwood trees. The two sections will not be harvested in the same year

Prescribed burning can be done once every 6 years for fuel reduction only.

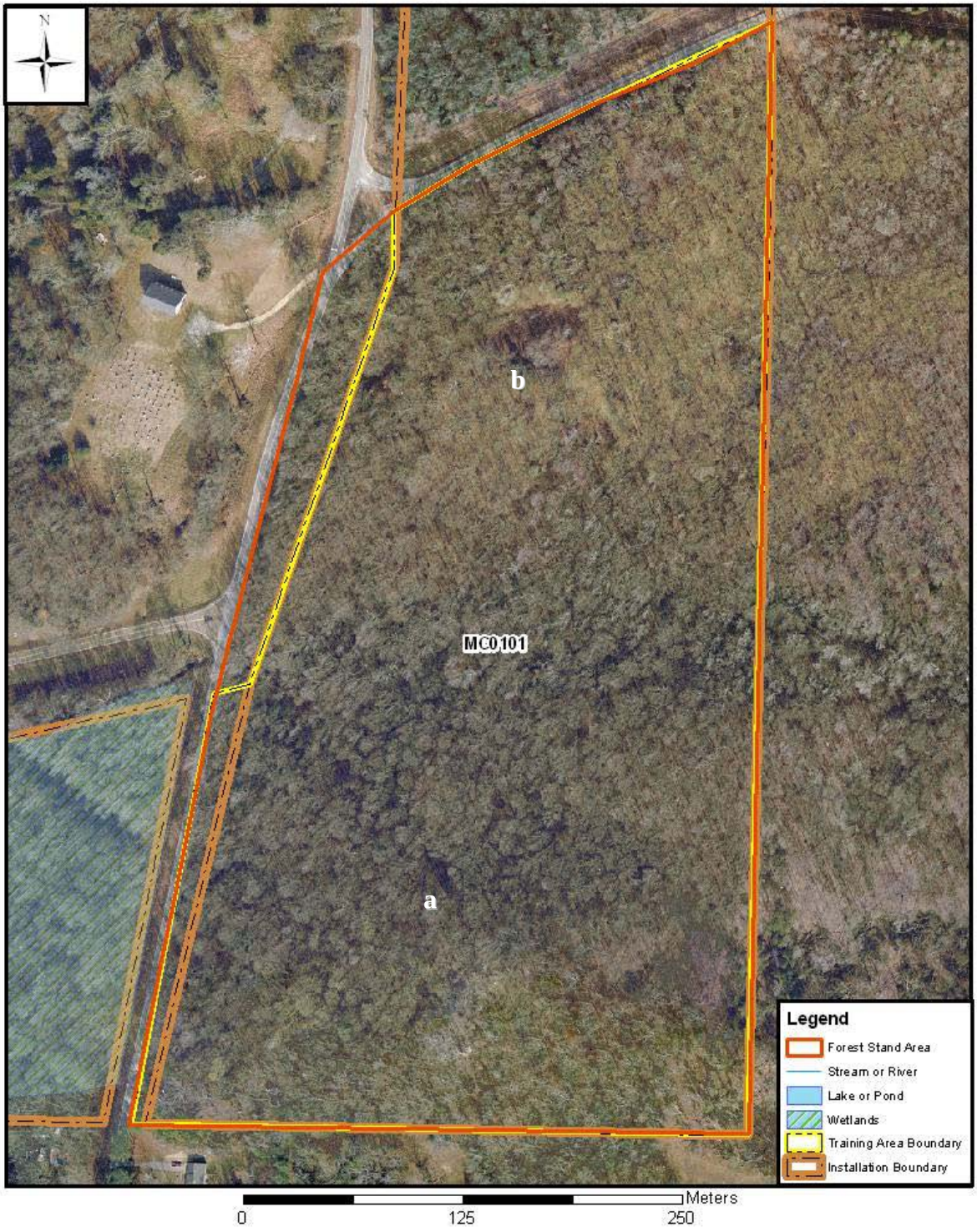

Figure A1.16: Forest stands in Training Area C-1.

5.16 Training Area C-2

Training Area C-2 is 14.46 acres in size and supports a single forest stand over the entire area.

Stand Description

Stand mc0201 is a mature upland pine and hardwood forest. The stand is dominated by red oaks and poplars, with a mix of hickory, white oak, and walnut. The trees range in age from 30 to 60 years old. Some of the oaks and poplars are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is excellent and does not show signs of past hot fires.

Forest Management Prescription

Stand mc0201. This stand will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of the acreage will be harvested in groups. The remainder of the stand may be lightly thinned to release desirable hardwood trees.

Prescribed burning can be done once every 6 years for fuel reduction only.

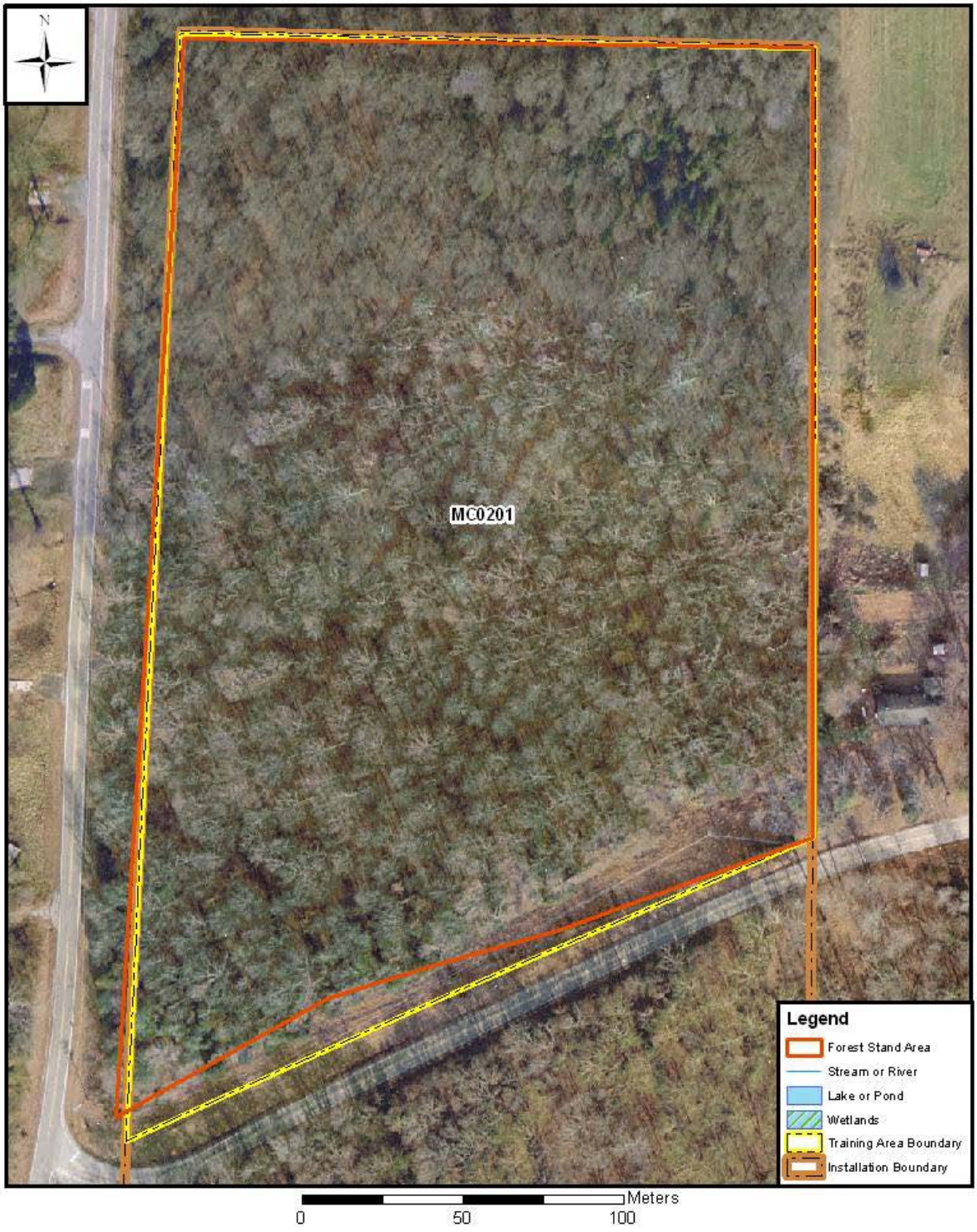

Figure A1.17: Forest stands in Training Area C-2.

5.17 Training Area S-1

Training Area S-1 is a 49-acre tract that is completely separated from the main installation lands. The area supports a single 33.03-acre irregularly shaped forest stand that is intermixed with three open fields of varying size.

Stand Description

Stand ms0101 is a mature upland pine and hardwood forest, dominated by red oaks and white oaks, with a mix of hickory, poplar, and walnut. The trees range from 20 to 50 years in age. Some of the oaks and poplars are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is good to poor, and shows signs of past wind damage.

Forest Management Prescription

Stand ms0101. The central section of this stand (approximately 13 ac) will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of a section acreage will be harvested in groups. The remainder of the stand may be lightly thinned to release desirable hardwood trees.

All forest areas along the boundary of the training area will not be harvested.

Prescribed burning can be done once every 6 years for fuel reduction only.

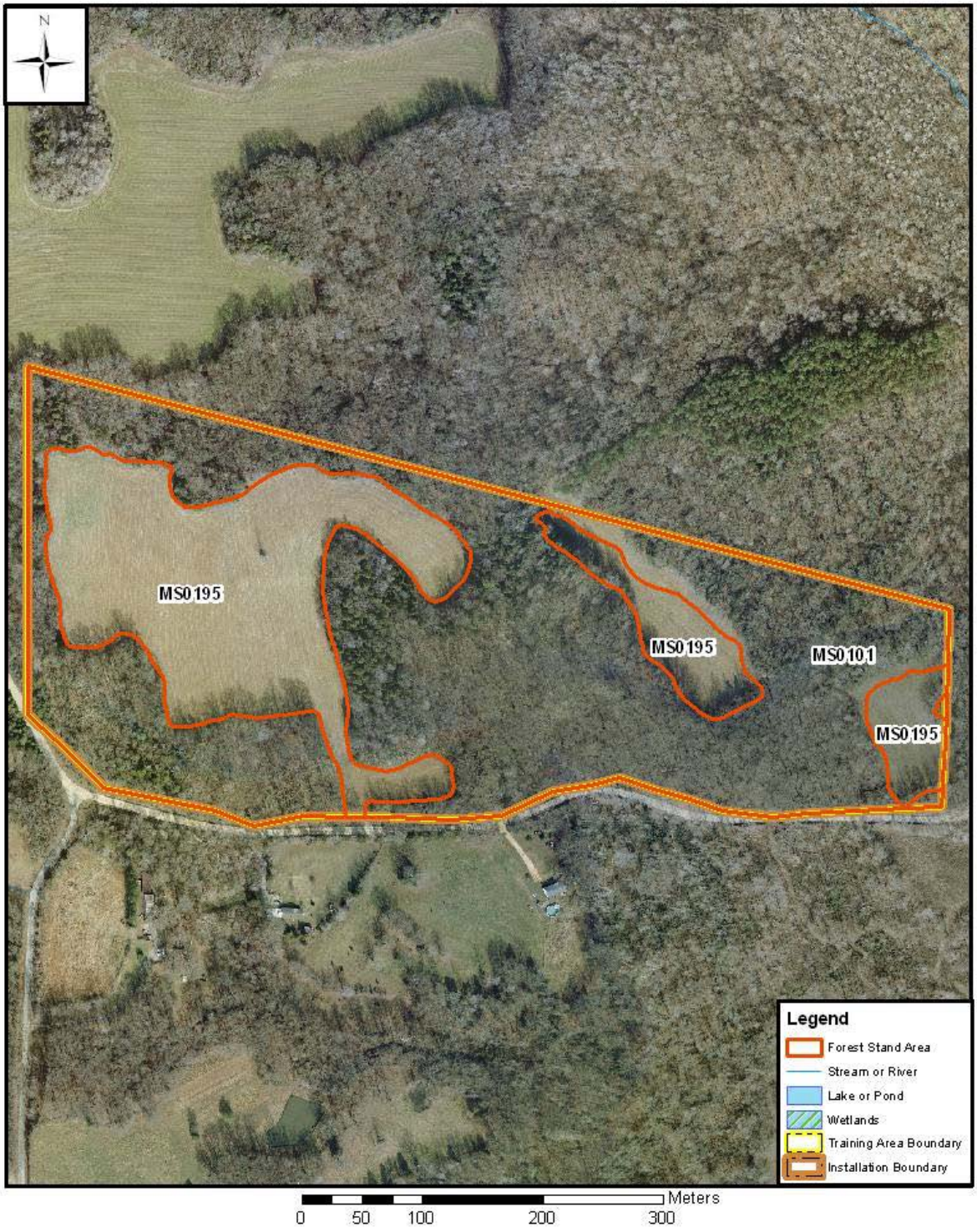

Figure A1.18: Forest stands in Training Area S-1.

5.18 Training Area S-2

Training Area S-2 is 64 acres in size and is also separated from the main installation lands. The area is comprised of two forest stands that surround a small and irregularly shaped open field that snakes its way throughout the forest areas.

Stand Descriptions

Stand ms0201 is a 49.09-acre mature upland pine and hardwood forest. The stand is dominated by red oaks and white oaks, with a mix of hickory, poplar, and walnut. The trees range in age from 20 to 50 years old. Some of the oaks and poplars are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is good to poor. This stand shows signs of past wind damage. This stand occurs on a former home site, with an abandoned curbed water well still being present.

Stand ms0202 is an old 6.44-acre dirt pit that has been planted with loblolly pine. This stand is in good to excellent health, but needs some type of thinning to keep it healthy.

Forest Management Prescriptions

Stand ms0201. The central portion of this stand (approximately 31 ac) will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of a section acreage will be harvested in groups. The remainder of the stand may be lightly thinned to release desirable hardwood trees. As with all other harvests, 100 foot non-harvested buffers will be maintained on either side of all creeks, and a minimum 100 foot non-harvested buffer will be retained along the property boundary.

Prescribed burning can be done once every 6 years for fuel reduction only.

Stand ms0202. This stand will be thinned by removing all trees that are 14 inches DBH and smaller. This will allow room for the remaining trees to grow. A minimum 50 foot non-harvested buffer will be retained along the property boundary.

Prescribed burning can be done once every 6 years for fuel reduction only. No burning should be accomplished before the thinning is completed due to the very heavy accumulation of fuels.

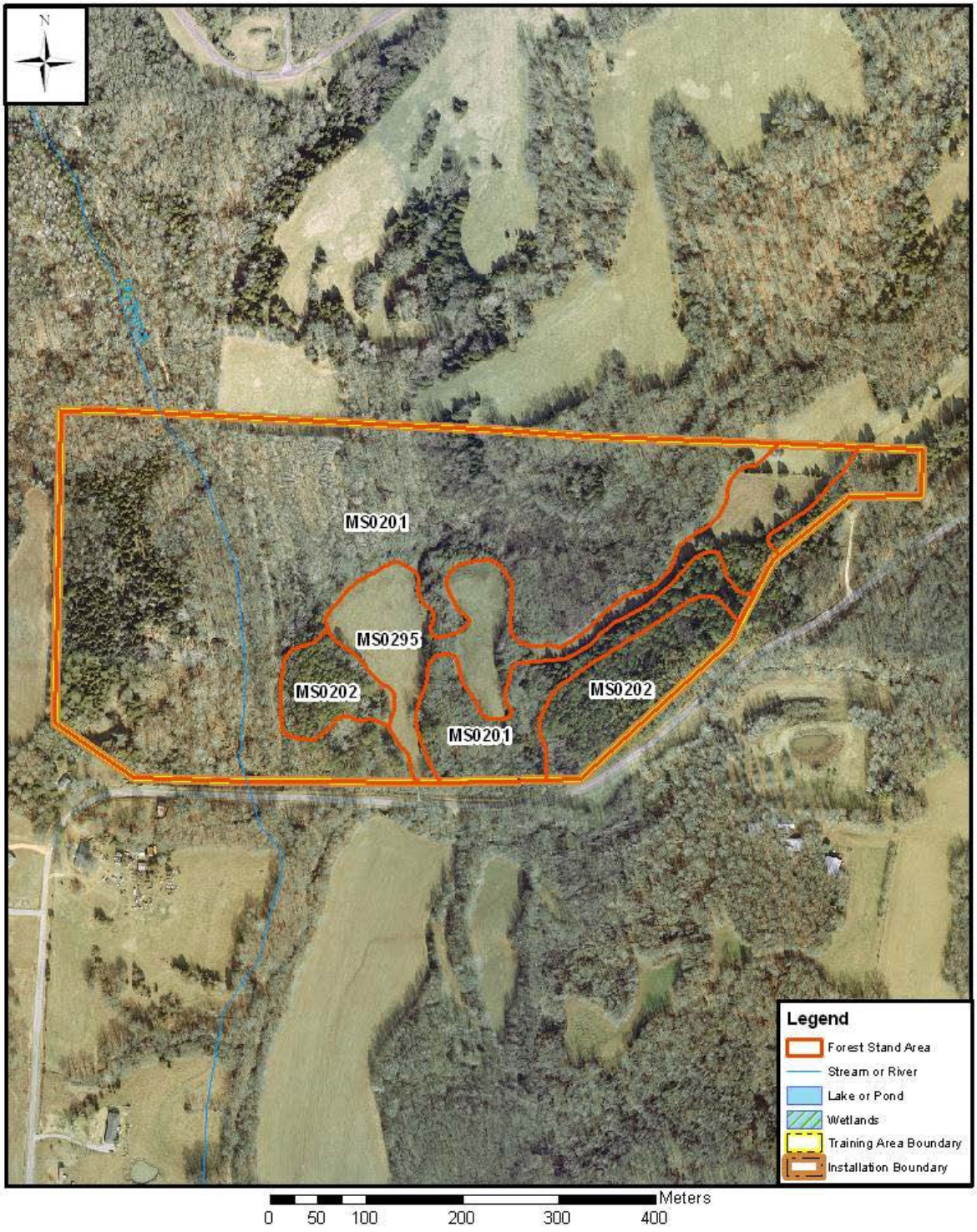

Figure A1.19: Forest stands in Training Area S-2.

5.19 Training Area S-3

Training Area S-3 is a small (16 acres) area that is isolated from the main installation lands. This area is dominated by an open field on its western size, but does support a single 5.87-acre forest stand.

Stand Description

Stand ms0301 is a mature upland pine and hardwood forest dominated by red oak and white oak, with a mix of hickory, poplar, and walnut. The trees range in age from 20 to 50 years old. Some of the oaks and poplars are considered oversized for sawmills, due to the DBH being larger than 30 inches. The overall health of the stand is poor to good. Due to small size of stand, any management actions should be combined with operations in the forest stands comprising the nearby Training Areas S-1 and S-2.

Forest Management Prescription

Stand ms0301. This stand will be subject to small group selections to create a patchwork of age classes. Areas to be harvested will be chosen on the basis of advance regeneration and seed tree quality. No more than 30% of the acreage will be harvested in groups. The remainder of the stand may be lightly thinned to release desirable hardwood trees. A minimum 100 foot non-harvested buffer will be retained along the property boundary.

Prescribed burning can be done once every 6years for fuel reduction only.

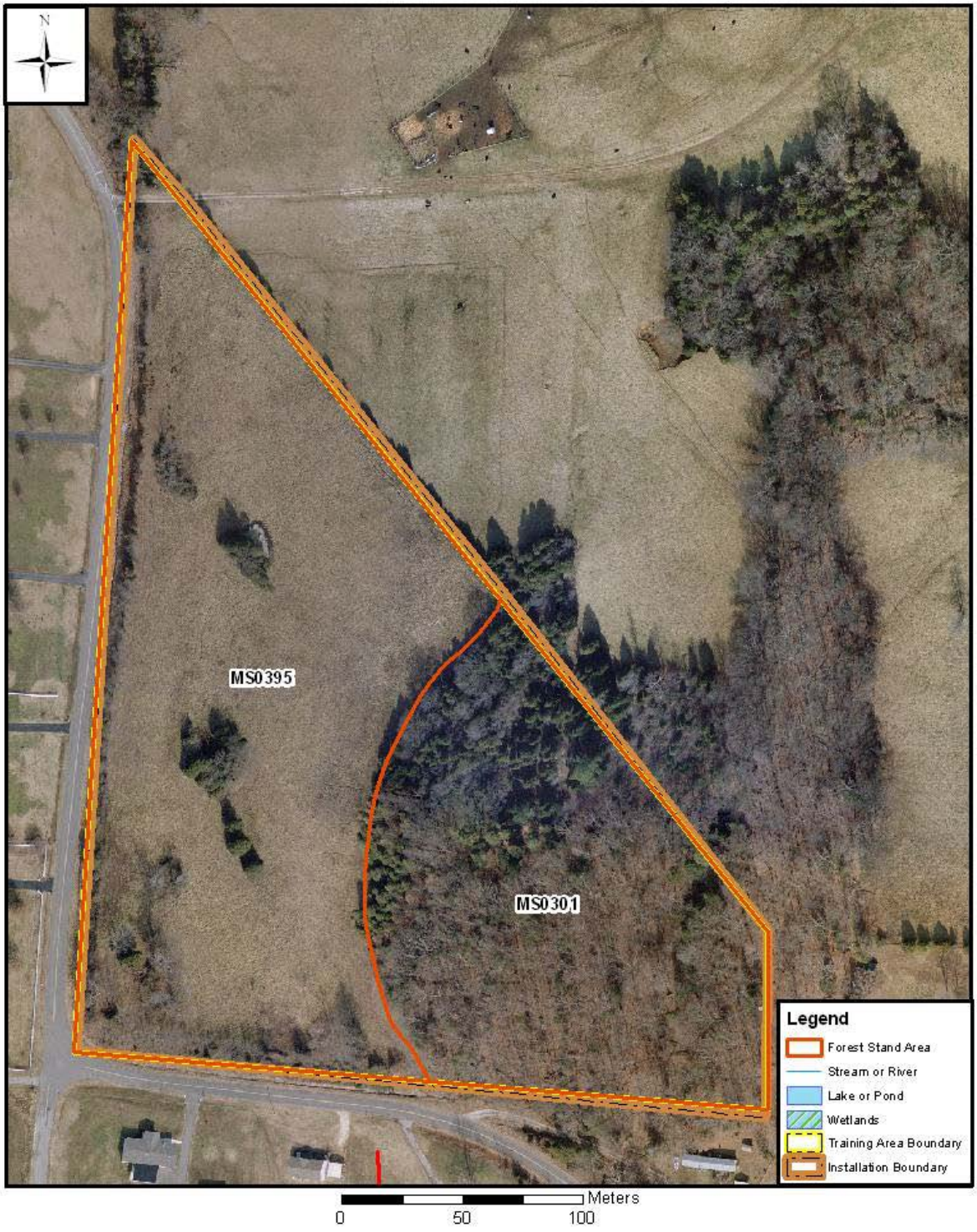

Figure A1.20: Forest stands in Training Area S-3.

6.0 IMPLEMENTATION SCHEDULE

A total of 26 individual forest stands have been designated on VTS-M. These stands have been further divided into 45 management units. Stand designations indicate site (M), training area (a06), stand (01), and unit (a): Ma0601(a).

Generally, stands totaling less than 60 acres will be harvested in any one year. This figure indicates total stand acreage; actual cleared acres will be much lower for group selection cuts. The harvest acreage may include multiple units in one stand, units in more than one stand, or a single unit.

Table A1.3 lists stands in order of the priority of treatment for the first 12 years of management. This schedule is subject to change based on military mission needs and updated forest inventory data. Completed timber harvest actions are tracked on a spreadsheet maintained in the natural resource forestry folder and by the environmental program GIS system. A resurvey of the VTS-M forest stands is scheduled for a 10+ year interval. This plan and the harvest priority will be revised as dictated by the results of the new inventory.

Table A1.3: Timber stand harvest priority for VTS-M.

Training Area	Stand &Section	Acres	Primary Management Action
A-6	Ma0601 (a)	32	Clearcut 15 ac for training / group select 17 ac
A-2	Ma0202 (a) Ma0202 (b) Ma0202 (c)	8.5 2.5 13	Harvest mature pine; retain hardwoods.
A-9	Ma0901 (a)	41	Group selection and thin
A-3	Ma0301 (a)	16	Group selection and thin
S-2 A-5	Ms0202 Ma0502	7 15	Thin below 14” Thin small pulpwood
C-1	Mc0101 (a)	17	Group selection and thin
A-9	Ma0901 (b)	45	Group selection and thin
A-3	Ma0301 (b)	54	Group selection and thin
S-1 S-3	Ms0101 Ms0301	13 16	Group selection and thin
C-1	Mc0101 (b)	15	Group selection and thin
S-2	Ms0201	30	Group selection and thin
C-2	Mc0201	15	Group selection and thin

Annex 2

Wildland Fire Management Plan

VTS-Milan

Tennessee Army National Guard

Prepared By

Anchor Point Group

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March 2018

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MG Jeffery H. Holmes
The Adjutant General, TNARNG _____ **Signature** _____ **Date**

Table of Contents

1.0 INTRODUCTION

This Wildland Fire Management Plan (WFMP) has been developed in accordance with the 2002 Department of Army (DA) Wildland Fire Policy Guidance. It presents the standards by which the VTS-Milan (VTS-M) wildland fire control and prescribed burning programs will be conducted. This plan is a component of the Integrated Natural Resources Management Plan (INRMP) for the training site (Annex 2) and is especially linked to the Forest Management Plan annex to the INRMP.

This plan shall be in compliance with:

- Army Regulation (AR) 420-1, 02 Dec 08, Fire and Emergency Services
- AR 200-1, 13 Dec 2007, Environmental Protection and Enhancement
- DOD Instruction 6055.6, 3 Oct 2019, DoD Fire and Emergency Services Program
- Army Memorandum, 04 Sep 2002, Army Wildland Fire Policy Guidance

1.1 Goals and Objectives

Fire management policy for VTS-M was developed to support the following goals:

- Provide for the safety of fighters, assigned personnel and the public on every wildland fire activity.

- Reduce wildfire potential on the training site and suppress undesired wildfires to protect lives, property, and natural and cultural resources in a cost-effective manner.

- Utilize prescribed fire to maintain and improve the usability of the training site to support all aspects of the military mission.

- Utilize prescribed fire to effectively protect and enhance valuable natural resources and to implement ecosystem management goals and objectives.

1.2 Key Definitions

Backfiring. A tactic associated with indirect attack, intentionally setting fire to fuels inside the control line to slow, knock down, or contain a rapidly spreading fire. Backfiring provides a wide defense perimeter and may be further employed to change the force of the convection column. Backfiring makes possible a strategy of locating control lines at places where the fire can be fought on the firefighter's terms. Except for rare circumstance meeting specified criteria, backfiring is executed on a command decision made through line channels of authority**.**

Contingency Plan. The portion of a prescribed fire plan, incident action plan, or implementation plan that identifies possible but unlikely events and the contingency resources needed to mitigate those events.

Contingency Resources. Planned and identified fire suppression personnel and equipment that mitigate possible but unlikely events that exceed or are expected to exceed holding resource capabilities.

Fuelbreak. A natural or manmade change in fuel characteristics which affects fire behavior so that fires burning into them can be more readily controlled.

Incident Command System (ICS). A standardized on-scene emergency management concept specifically designed to allow its user(s) to adopt an integrated organizational structure equal to the complexity and demands of single or multiple incidents, without being hindered by jurisdictional boundaries.

Operational Period. The period of time scheduled for execution of a given set of tactical actions as specified in the Incident Action Plan. Operational Periods can be of various lengths, although usually not over 24 hours.

Prescribed Fire. Controlled, purposeful application of fire to wildland fuels in either their natural or modified state, under specified environmental conditions which allow the fire to be confined to a predetermined area and produce the fire behavior and fire characteristics required to attain planned fire treatment and resource management objectives. Any fire intentionally ignited by management actions in accordance with applicable laws, policies and regulations to meet specific objectives.

Unified Command. In ICS, unified command is a unified team effort which allows all agencies with jurisdictional responsibility for the incident, either geographical or functional, to manage an incident by establishing a common set of incident objectives and strategies. This is accomplished without losing or abdicating authority, responsibility, or accountability.

Wildland. An area in which development is essentially nonexistent, except for roads, railroads, power lines and similar transportation facilities. Structures, if any, are widely scattered.

Wildland Fire. Any non-structure fire occurring in the wildland that is not meeting management objectives and thus requires a suppression response.

Wildfire. An unplanned, unwanted wildland fire, including unauthorized human caused fires, naturally occurring wildland fires, and escaped prescribed fires, where the objective is to put out the fire.

1.3 Location and Physical Features

VTS-M consists of 2,480 acres in the central part of west Tennessee in Carroll and Gibson Counties. The main portion of the installation (A, B, and C training areas) lies in Carroll County, with three small parcels (S training areas) located in Gibson County.

The closest towns are Lavinia to the east, Milan to the northwest, and Humboldt to the west. Jackson, TN, is approximately 20 miles to the south on Interstate 40. State Highway 220 forms the eastern boundary of the main portion of the training site, and Highway 104 separates the A area from the B area. Immediately to the west of VTS-M is the Milan Army Ammunition Plant, a 22,000 acre DoD property.

The VTS-M consists of 18 training areas, separated into the 4 compartments (A, B, C, and S) and a small cantonment at the southern tip of the main installation.

Topographic change is small across the training site, with elevations ranging from 390 ft. above sea level along the creek system to 600 ft. A significant wetland area lies in the northwest portion of area A surrounding the Halls Branch drainage, which runs north-south through most of area A. Johns Creek runs across the eastern side of area B and into A. Several small ponds are scattered around the B area, and one large one, Walker Lake, occupies 13 acres near the middle of area A. Soils, as typical for western Tennessee, are highly erodible on most of the training site.

Approximately 1,735 acres (approximately 70%) of the VTS-M are forested, principally with mixed hardwood species. Managed grasslands – ranges and maneuver lands – cover about 683 acres of the training site. There is no unexploded ordinance on the VTS-M.

2.0 PROGRAM OVERVIEW

2.1 Organizational Structure and Responsibilities

The wildland fire program on VTS-M will operate in accordance with DA Memo (4 Sep 2002), "Army Wildland Fire Policy Guidance," and the DA "Sustainable Range/Installation Environmental Activities Matrix" (2 Sep 2005) for funding. The Adjutant General (TAG) as commander of the TNARNG is directly responsible for the operation and maintenance of the Volunteer Training Sites, including implementation of this WFMP. TAG delegates fire-related duties among environmental and training site staffs.

The Wildland Fire Program Manager for the TNARNG is the Natural Resources Manager (NRM) in the Environmental Office at 3041 Sidco Dr., Nashville, TN 37204. The NRM is responsible for preparing and maintaining this WFMP. The NRM also ensures that state employed firefighters are trained to at least National Wildfire Coordinating Group (NWCG) Firefighter type 2 (FF2) standards, and federal employees to at least NWCG FF2 or DoD FF1 standards. The NRM maintains training and certification records, and schedules training for all TNARNG personnel as needed. DoD certified wildland fire fighters should also register their training and certifications in the DoD Fire and Emergency Services Certification Program website found at **http://www.dodffcert.com/CertResponse.aspx**, which is maintained by HQ Civil Engineering Support in compliance with Assistant Chief of Staff for Installation Management (ACISM) guidance.

VTS-M Range Control is responsible for coordinating the immediate wildland fire control response on the training site. Initial wildfire response will be conducted only by authorized and qualified TNARNG and partner agency personnel. Qualifications are defined by NWCG as described in PMS-310-1 (https://www.nwcg.gov/sites/default/files/publications/pms310-1.pdf) and by NFPA (https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1051). Milan Army Ammunition Plant (MLAAP) has three volunteer fire departments (VFDs) on-site. MLAAP will be the first agency notified and to respond in the event of wildfire, structure fire or prescribed fire escape and that they will request support from partner agencies if needed. A unified command will be set up between MLAAP and any authorized and qualified VTS-M personnel when MLAAP is called in to help control a wildland fire. Tennessee Division of Forestry is also available to assist with fire management. If Tennessee Division of Forestry is requested, Unified Command structure will be modified as needed.

Prescribed fire activities on the VTS-M are cooperative actions conducted by authorized and qualified training site personnel, cooperating/partner agencies, contractors, and the Environmental Office. Assistance and backup support are provided by the MLAAP Fire Department and Tennessee Division of Forestry in accordance with the yet to be developed formal Memorandums of Agreement. Environmental personnel that have authorization and current NWCG qualifications for their position will participate in prescribed burns conducted for ecosystem management goals.

2.2 Interagency Cooperation and Mutual Aid Agreements

A formal signed Memorandum of Agreement (MOA) will be developed with the MLAAP, which is

located on the west flank of the training site. The MOA will clarify MLAAP response and roles for structure fires, wildfires and prescribed fires. Tennessee Division of Forestry will need to be in the MOA with MLAAP or in a separate MOA

2.3 Personnel

VTS-M Range Control is responsible for coordinating the immediate wildland fire control response on the training site. Initial wildfire response will be conducted only by authorized and qualified TNARNG and partner agency personnel. Qualifications are defined by NWCG as described in PMS-310-1 (https://www.nwcg.gov/sites/default/files/publications/pms310-1.pdf) and by NFPA (https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1051). MLAAP will be the first agency notified and to respond in the event of wildfire, structure fire or prescribed fire escape and that they will request support from partner agencies if needed. Prescribed burning will be conducted by contract or with assistance from partner agencies when available. Additional firefighters may be requested from their cooperators by partner agencies. Signed MOAs will be completed to support fire management needs.

2.4 Available Equipment

The VTS-M maintains a cache of fire equipment for wildland fire suppression and prescribed burning (Table A2.1). In addition, personal protective equipment (PPE) conforming to National Fire Protection Act (NFPA) 1977 (Standard on Protective Clothing and Equipment for Wildland Fire Fighting) is maintained for all authorized and qualified personnel on site. Each firefighter is outfitted with:

- Nomex pants
- Nomex shirt
- Firefighting helmet
- Leather gloves
- Goggles
- Fire shelter
- Pack for gear
- Leather boots are required but are provided by the individuals.

Table A2. 1 Available Fire Equipment at VTS-M

Fire rake	4
Pulaski axe	5
Shovels	5
Drip cans	4
5 gal Backpack sprayer - metal	0
Trailer-type pressure washer 300 gal + 25’ hose	1
40 gal water tank mounted on a gator	1
D-7 dozer	1
120-G grader	1
Water distribution trailer (5500 gal)	1
Gyro-track with brush grinder	1
6400 JD tractor (200 gal water tank available for mounting	2

Back hoe	1
Track hoe	1
Polaris UTV	2
8’ bush hog	1
10’ bush hog	1
15’ bush hog	2
20’ bush hog	1

2.5 Funding Requirements

The funding responsibilities for wildland fire are defined in the DA Sustainable Range/ Installation Environmental Activities Matrix (2 Sep 2005). Wildland fire expenses are primarily the responsibility of the Facilities/Real Property Division. Funding for WFMP implementation, wildland fire prevention, fuels management for hazard reduction, wildland fire suppression, prescribed burning, firebreak construction and maintenance, and other wildland fire management is an installation operations and maintenance responsibility.

Integrated Training Area Management (ITAM) is permitted to conduct vegetation control for the improvement of training land. Prescribed fire is sometimes one of the methods implemented to accomplish that vegetation control. However, ITAM funds are not available specifically for any fire management purposes.

Environmental funds may be utilized for prescribed burning that has a specific ecosystem management or rare, threatened, and endangered species management objective as presented in the INRMP and for wildland fire management activities conducted for the purpose of compliance with environmental laws and regulations. Forestry reserve account funds may be requested for fire-related projects that will improve forest health or timber management concerns on the facility.

The funds available will be used to continue the training of the on-site resources and maintain a cache of personal protective equipment and wildfire tools. The VTS-M personnel should use appropriate management response in all incidents which will maintain a cost-efficient program.

2.6 Public Relations

A public relations plan will be developed to address wildfires and prescribed fires. The Objective of the plan is to coordinate roles, responsibilities, procedures and messages with cooperating agencies. Plans should be developed to promote and explain the use of prescribed fire. In the instance, a wildfire or prescribed fire could negatively impact neighbors, advanced planning of messages will help managers deal with potential issues. Plans should consider who will be the Public Information Officer, what media outlets to reach, potential liability, what information is appropriate to share with the public what will occur in the event of a serious accident or fatality. As a minimum, the plan should be developed by Training Site Command, VTS-M, the Public Affairs Office, TDF and Terry Volunteer Fire Department. Other local fire agencies should be consulted as appropriate.

For prescribed fires, appropriate county agencies will be informed to ensure that the burn operation complies with all local government fire regulations. A burn permit must be requested from the Tennessee Division of Forestry, Carroll County Office. The MLAAP Fire Department will be informed of the planned prescribed burn and their assistance requested as needed for meeting burn plan requirements and objectives. The Terry Volunteer Fire Department, which serves the rural Lavinia

community adjacent to VTS-M, will be included in the burn planning phase and included in notifications. Local law enforcement agencies will be included in the burn planning phase, so they can identify potential traffic concerns. The following list identifies the agencies and organizations that should be notified of a prescribed burn operation:

TN Division of Forestry	731-986-5550
Milan Army Ammunition Plant	731-686-6416
Terry Volunteer Fire Department	731-987-3780
Gibson County Sheriff Department	731-855-0277
Carroll County Sheriff and Fire Dispatch	731-986-8947
Tennessee Highway Patrol	615-251-5175
MLAAP Fire and Security Dispatch	731-686-6565
Carroll County Fire Department Chief	731-415-5943

A news release will be used to inform the public of the planned burn so that the adjacent property owners will understand what is happening when they see smoke on the day of the burn. Lastly, plans will be made to place temporary signage along Highways 220 and 104 on the day of the burn to inform motorists of potential smoke resulting from the burn.

2.7 Environmental Review

This Integrated Wildland Fire Management Plan is incorporated as an annex to the Revised Integrated Natural Resources Management Plan for the VTS-M. Therefore, it is included in the Environmental Assessment of the effects of implementation of the Revised INRMP which has been prepared in accordance with the National Environmental Policy Act of 1969.

3.0 SAFETY AND EMERGENCY OPERATIONS

All wildfire emergency operations go through Range Control and will be coordinated through 911 dispatch. The Range Control Officer will function as the Incident Commander for initial attack by authorized and qualified firefighters for small scale fire suppression. MLAAP Fire Department will be notified via 911 and will respond and assume command. If a wildfire is beyond the capabilities of the on-site staff, Incident Command will be turned over to the Tennessee Division of Forestry.

The on-site Incident Commander will ensure all firefighter and public safety precautions are taken and are the highest priority in all operations. Except in the event of a threat to human life, no wildland fire situation will require placing firefighter or equipment in extreme danger.

Before fire suppression engagement the Incident Commander will go over the plan of operation with all personnel directly participating and ensure all personnel have at least the minimum PPE and training required.

VTS-M Range Control is responsible for coordinating the immediate wildland fire control response on the training site. Initial wildfire response will be conducted only by authorized and qualified TNARNG and partner agency personnel. Qualifications are defined by NWCG as described in PMS-310-1 (https://www.nwcg.gov/sites/default/files/publications/pms310-1.pdf) and by NFPA (https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1051). MLAAP will be the first agency notified and to respond in the event of wildfire, structure fire or prescribed fire escape and that they will request support from partner agencies

if needed. Firefighters will be issued and carry an Incident Response Pocket Guide (PMS-461) when on fires. In addition, they will be provided Wildland Fire Incident Management Field Guide (PMS-210). Each firefighter will be knowledgeable and review the 10 Standard Fire Orders and the 18 Watchout situations. No emergency situation will be approached without the proper safety mitigations in place with the use of Lookouts, Communications, Escape Routes and Safety Zones (LCES). All firefighters will participate in an Annual Fire Refresher (RT-130), any additional NWCG refreshers required based on position, and locally required training. RT-130 curricula are available at https://www.nifc.gov/wfstar/index.html

All safety gear will comply with NFPA 1977 Standard on Protective Clothing and Equipment for Wildland Fire Fighting. This standard specifies the minimum design, performance, testing, and certification requirements for items of wildland fire fighting protective clothing and equipment, including protective garments, helmets, gloves, footwear, goggles, chain saw protectors, and load carrying equipment.

3.1 Risk Assessment Process

Safety of TNARNG personnel, firefighters, civilians, and neighbors is of paramount importance in all wildland fire actions. Risk assessment for all emergency response situations will follow the five step process outlined below. Situational awareness must be maintained throughout the changeable conditions of a wildland fire activity and re-assessment conducted whenever there is a significant alteration of circumstances.

3.1.1 The Risk Management Process

Safety of TNARNG personnel, firefighters, civilians, and neighbors is of paramount importance in all wildland fire actions. Risk assessment for all emergency response situations will follow the five step process outlined in the NWCG Incident Response Pocket Guide[1]. Situational awareness must be maintained throughout the changeable conditions of a wildland fire activity and re-assessment conducted whenever there is a significant alteration of circumstances.

Step 1. Situational Awareness

- Gather information
  - Objective(s)
  - Previous fire behavior
  - Communication
  - Weather forecast
  - Who's in charge?
- Any local factors
  - Scout the fire/incident

Step 2. Hazard Assessment

- Estimate potential fire behavior hazards
  - Look Up / Down / Around indicators
- Identify tactical hazards
  - Watch Outs
- What other safety hazards exist?
- Consider severity vs. probability

[1] PMS-461/NFES 1077

Step 3. Hazard Control

- Firefighting Orders and LCES Checklist – MANDATORY
  - Anchor point
  - Downhill checklist (if applicable)
- What other controls are necessary?

Step 4. Decision Point

- Are controls in place for identified hazards?
  - NO: Reassess situation YES: Next question
- Are selected tactics based on expected fire behavior?
  - NO: Reassess situation YES: Next question
- Have instructions been given and understood?
  - NO: Reassess situation YES: Initiate action

Step 5: Evaluate

- Personnel: Low experience level with local factors?
  - Distracted from primary tasks?
  - Fatigue or stress reaction?
  - Hazardous attitude?
- The Situation: What is changing?
  - Are strategy and tactics working?

3.1.2 Prescribed Burning Risk Assessment

The Risk Management Process will also be applied during prescribed fire activities. Suggested prescribed burning parameters should not be exceeded without careful evaluation based on review of previous fire behavior, burn objectives, available resources and review of current science that indicates a valid justification. Rationale for deviation from these parameters will be documented in an approved and signed Prescribed Fire Burn plan.

Prescribed burning will NOT be conducted under any of the following conditions:

- A predicted temperature greater than 85º F
- A predicted wind speed greater than 18 mph at the 20' level
- A predicted relative humidity less than 25%
- An atmosphere with Red Flag conditions issued by TDF or USDA-FS
- Go/No Go check list not mitigated
- Lack of qualified personnel or equipment available to manage the prescribed burn
- Any burn objective is not being met
- Any Prescribed Fire plan requirement that is not being met.

3.1.3 Fire Danger Rating and Burning Index

Fire danger rating is a classification based on the Burning Index and is available from the National Weather Service fire weather system http://www.weather.gov/meg/?n=fireweather . Fire danger rating will be checked daily prior to training operations during fire season. It provides guidance of importance for prescribed burn activities and for military training. Prescribed burns will generally be

conducted at low or moderate fire danger rating. Pyrotechnic devices and live fire training will be limited in accordance with the recommendations in (Table A2.2).

Table A2. 2 Fire Danger Rating Guide

Fire Danger Rating and Color Code	Burning Index (BI)	Description	Recommended Military Considerations
(1) Low (Green)	0-20	Fuels do not ignite readily from small firebrands. Most prescribed burns are conducted in this range.	None.
(2) Moderate (Blue)	21-40	Fires are not likely to become serious and control is relatively easy. Fires burning in these conditions generally represent the limit of control for direct attack methods.	None.
(3) High (Yellow)	41-60	Fires may become serious and their control difficult unless they are attacked successfully while small. Machine methods are usually necessary or indirect attack should be used.	Recommend firing pyrotechnics into open drums; altering firing times to hours with lower fire danger.
(4) Very High (Orange)	61-79	Fires start easily from all causes and, immediately after ignition, spread rapidly and increase quickly in intensity. The prospects for direct control by any means are poor at this intensity.	No pyrotechnics or tracer rounds allowed, except with written authorization from Range Control.
(5) Extreme (Red)	80+	Fires start quickly, spread furiously, and burn intensely. All fires are potentially serious. The heat load on people within 30 feet of the fire is dangerous.	No pyrotechnics or tracer rounds allowed.

3.2 Personnel Training and Certification

Training will adhere to the standards set by NWCG as described in PMS-310-1 (https://www.nwcg.gov/sites/default/files/publications/pms310-1.pdf). All firefighters need to obtain the basic Firefighter Type 2 (FFT2) qualifications (S130/190 classes) and will need to attend an annual fireline safety refresher provided on-site or off. (Annual Fire Refresher (RT-130) curricula is available at https://www.nifc.gov/wfstar/index.html.)

The Natural Resource Manager (NRM) for TNARNG, is responsible for maintaining and tracking the training records for VTS-M personnel in accordance with DOD direction to follow NWCG procedures. DoD wildland fire fighters should register their certifications in the DoD Fire and Emergency Services Certification Program website found **http://www.dodffcert.com/CertResponse.aspx**. The NRM will keep track of the training being offered close to the installation and inform training site personnel of its availability.

3.3 Physical Fitness Standards

NWCG standards require all wildland firefighters at FFT2 position to meet the arduous fitness level. All personnel engaged in wildland fire activities will meet the requirements established for their positions in NWCG PMS 310-1. The field test will be administered annually by the Natural Resources Manager

and/or the Environmental Program Manager according to the standards in NWCG Work Capacity Test Administrator's Guide[2]. Newly assigned personnel with fire suppression or prescribed fire duties will be NWCG qualified for their position, including a current fitness test.

4.0 FIRE FACTORS

4.1 Fire History

No significant wildfires have occurred on the training site in the past 25 years. Most wildfires have been associated with military activities such as firing blanks or tracer rounds, or pyrotechnics. Each fire has been less than one acre in size and has been extinguished by on-site staff or the MLAAP Fire Department.

4.2 Mission Considerations

The mission of the VTS-M is to support unit requirements for maneuver, range operations, equipment use, and other combat readiness training. Over 90% of training site utilization is by military users, including armored cavalry, artillery, and engineer units. All training activities involve field-training exercises. Tracked and wheeled vehicle training represents a major component of the training program and includes on- and off-road movement through the installation's forested areas. In addition, bivouac, dismounted infantry, and land navigation also occur on the installation. Five active live fire ranges are located on the VTS-M (Figure A2.1).

This WFMP supports the military mission of the VTS-M by providing for timely wildfire response, thus minimizing training downtime and facility loss to wildfires. The prescribed burn program provides a cost-effective method of maintaining and expanding open training areas such as ranges and controls fuel buildup to minimize wildfire intensity.

Potential negative impacts of the wildland fire program include smoke impacts and interruption of training activities. Care in scheduling burns to accommodate the training calendar will minimize all effects on training activities. Wildfire control downrange will require a range shutdown, which could lead to loss of training time. Smoke management will be addressed through the guidelines provided in this plan.

[2] https://www.nwcg.gov/publications/307

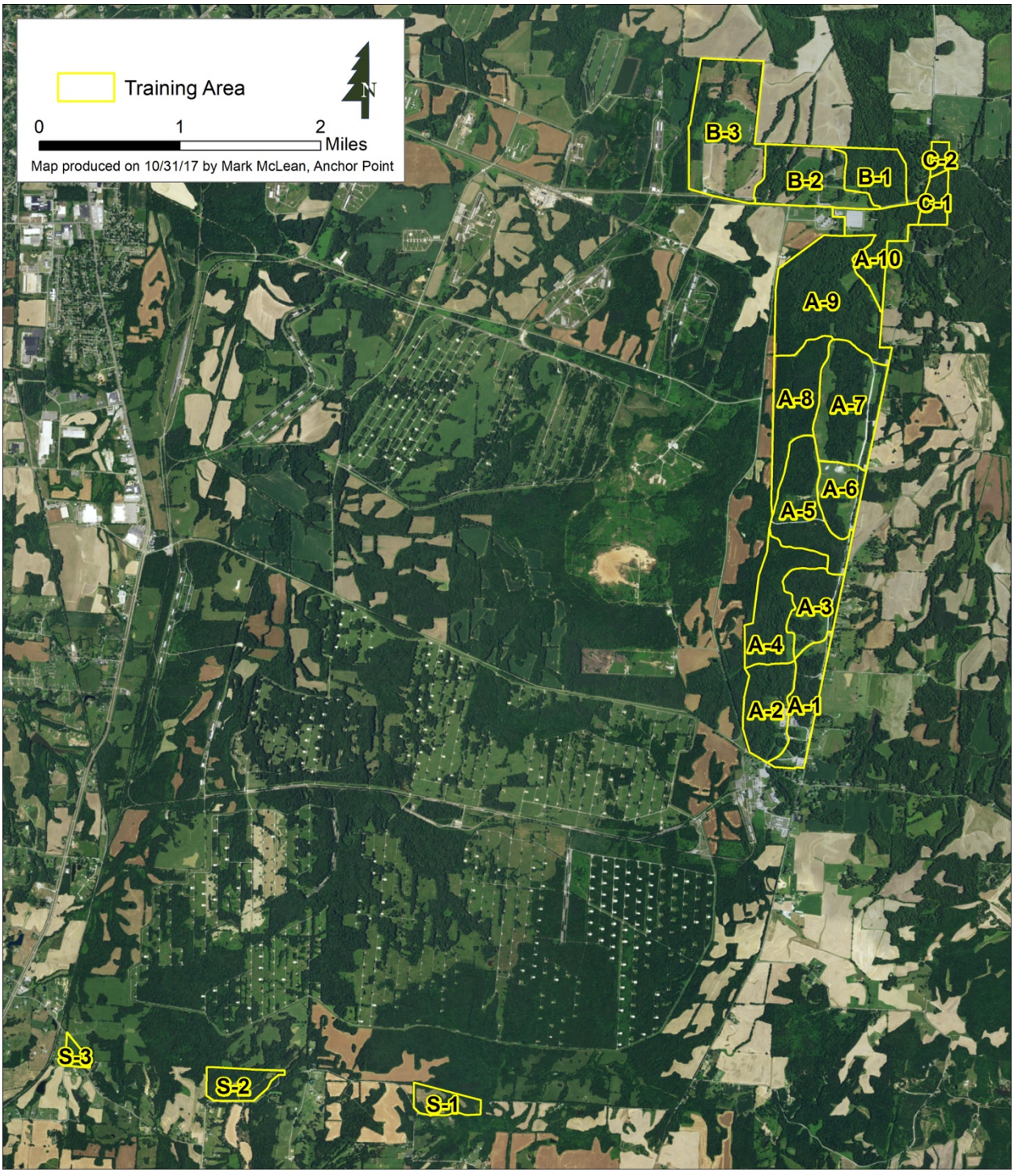

Figure A2.1 Training areas VTS-S

4.3 Natural and Cultural Resources Considerations

Fire management may have beneficial or negative impacts on both the natural and cultural resources of a site, and both can represent constraints on the fire program, especially prescribed burning.

4.3.1 Cultural Resources

Development of firebreaks is the greatest fire-related threat to Cultural Resources on VTS-M. No new permanent firebreaks (off existing roads and trails) will be developed without consultation with the Tennessee State Historic Preservation Officer (SHPO). Temporary plow line firebreaks may be constructed in those portions of the training site which have been surveyed and identified as free of significant archaeological or historical resources. Routinely mowed fuel breaks may be effective in areas where soil disturbance is not allowed.

A Phase I survey of VTS-M conducted in 1999 found no archaeological sites eligible for the NRHP. Five cemeteries are located on the training site, two in the cantonment area and one each in TA A4, TA A5, and TA A10. These cemeteries as well as other potentially significant sites are considered "no plow/no burn" zones and are included on Figure A2.2 with the natural resources sites that are also protected from the fire plow. Fire control in "no plow" zones will depend on existing firebreaks or methods that do not disturb the soil. Prior to any prescribed burn, at-risk cemeteries will be protected by a fire line placed outside its perimeter fence.

4.3.2 Natural Resources

The VTS-M contains 18.4 miles of intermittent or perennial streams. To protect water quality, the 50 foot Streamside Management Zone on each side of these streams will be a no-plow zone. Firebreaks within riparian corridors must be designed in coordination with the Natural Resource Manager and will be outside of the 50 foot SMZ (Figure A2.2). Prescribed burning within riparian areas will be limited and subject to careful planning to ensure streambanks are not denuded of vegetation.

Similar limitations will be implemented around the multiple ponds on the VTS-M. Most of these small, man-made impoundments are located in the northern portion of the A area and in B area. A 50 foot buffer will surround each pond, representing a no-plow zone.

The training site includes a substantial acreage (245 acres) designated as wetland, generally associated with the two major creeks in the northwest portion of A and eastern portion of B areas. The bottomland hardwood communities are very susceptible to damage by fire. In addition, the wet soils are subject to compaction and rutting. Wetland areas will be surrounded by a 50' SMZ buffer and the entire wetland area in addition to the buffer will be a no-plow zone. Prescribed burns may be deemed necessary to control fuel loading in wetland areas. These burns will be planned to minimize long-term impact and will be controlled with plow lines located outside of the wetland or with hand lines, or mowed line when soil conditions allow if a fire break is needed within the wetland boundaries.

The soils on the VTS-M are extremely prone to erosion. In order to minimize erosion problems on firebreaks, water control structures to manage surface water movement will be installed during firebreak construction. Permanent firelines will have water control structures maintained. Temporary firelines will be rehabilitated as soon as practicable after any fire. Existing barriers such as roads and trails will be used whenever possible to reduce the need for fireline construction and to minimize resource impacts.

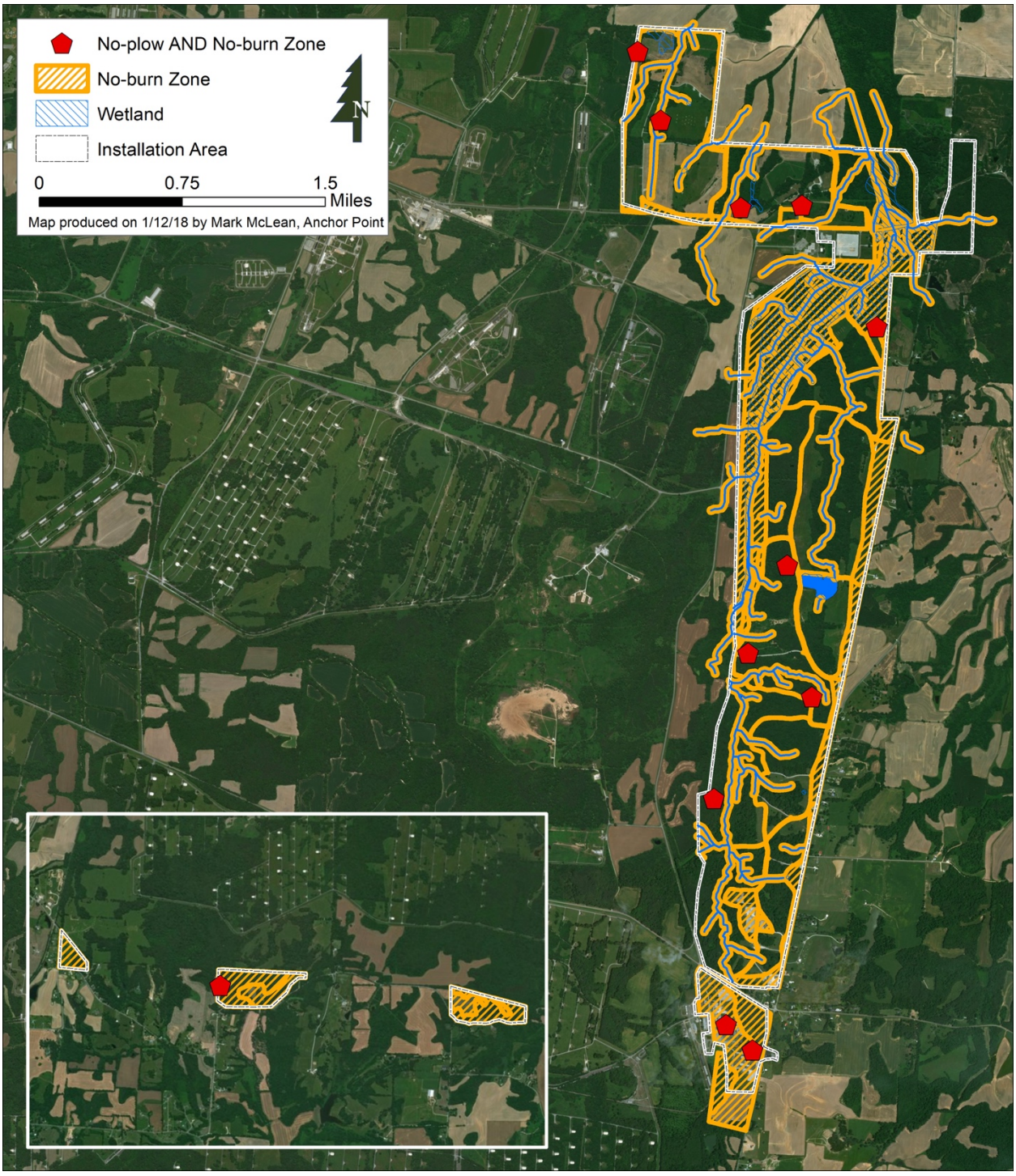

Figure A2. 1 No-Plow Zones on VTS-M due to significant natural and/or cultural

4.4 Fire Regime

The fire regime classification system is used to characterize frequency and intensity of a fire within landscapes based on interactions between vegetation dynamics, fire spread, fire effects, and spatial context. Fire Regimes consider the frequency that the fire visits the landscape, the type of pattern created, and ecological effects. Fire Regimes are based on historical fire data. The following natural fire regimes are arranged along a temporal gradient, from the most frequent to the least frequent fire return interval. The definitions below (Table A2.3) are from the General Technical Report, Rocky Mountain Research Station #87 (GTR-RMRS-87).

Table A2. 3 Fire Regime Categories

Fire Regime I	0-35 years	Low Severity
Fire Regime II	0-35 years	Stand Replacement
Fire Regime III	35-100+ years	Mixed Severity
Fire Regime IV	35-100+ years	Stand Replacement
Fire Regime V	200+ years	Stand Replacement

Plant communities of VTS-M fall into two Fire regimes;

Fire Regime I: Fires in the under-story fire regime generally do not kill the dominant vegetation or substantially change its structure. Approximately 80 percent or more of the above ground dominant vegetation survives fire. The under-story fire regime occurs primarily in southern pine and oak-hickory forests, including the oak-hickory forest types found at VTS-M. Fire is a natural maintenance disturbance for these types of stands, and is used to maintain and regenerate oak-hickory for timber stand improvement and wildlife stand improvement concerns.

Fire Regime II: This regime is known as the frequent replacement group. It is primarily for grasslands and shrub lands where fires typically replace greater than 75 percent of the stand. This regime covers short and tall grass ecosystems and eastern red cedar stands like those found on the VTS-M. It should be noted that due to lack of fire eastern red cedar has become much more prevalent than what is considered historic. In order to return areas with dense cedar stands to Fire Regime II, hand or mechanical tree thinning will be needed. Trees removed will need to be pile burned or removed from the site. Routine prescribed burns can then help manage cedar regeneration.

4.5 Fuel Types

VTS-M consists of 2,480 acres, of which approximately 70% is forested with hardwood, pine and eastern red cedar forests. The rest of the area is short and tall grass.

Fuel models are used to predict fire behavior outcomes. Previous version of the WFMP utilized 13 Fuel Models. The fuel model system has been updated and now includes 40 models. Some objectives for updating the fuel models included a need to improve the accuracy of fire behavior predictions outside of the severe period of the fire season, such as during a prescribed fire and to increase the number of fuel models applicable in high-humidity areas. Both of these factors will be beneficial for managing wildland

fires at VTS-M. (Additional details are in Scott, J. and Burgan, R. (2005)[3].

In the context of fire behavior modeling, "fuel models" are a set of numbers that describe fuels in terms that the fire behavior modeling equations can use directly. There are seven characteristics used to categorize fuel models:

- Fuel Loading
- Size and Shape
- Compactness
- Horizontal Continuity
- Vertical Arrangement
- Moisture Content
- Chemical Content

Approximately 1,700 acres of VTS-M is in the timber litter group. The fuel under most forest stands consists of light to moderate loading of fuel, most of which is compacted on the ground (see Figure A2.9). Fuels of this type are found throughout the Piedmont and Upper Coastal Plain regions of the Southeast. In dense pine stands, the predominant fuel is the matted pine needles. In upland hardwoods, it is compacted hardwood leaves. The amount of brush will vary from almost non-existent to almost solid brush, especially if there is little over-story. This fuel type will generally consist of grasses, pine needles, deciduous shrubs, small saplings, pinecones, twigs and branches. Fires in this fuel type will generally be of low intensity and slow spreading. The surface fuel is compacted and dries out very slowly. Consequently, much of it will not be available. Shrubs and small saplings tend to be more readily available and will add to the intensity where they are present. Most fires will be of rather low intensity and easy to control except during droughts when a larger percent of the fuel will be available. Firefighters can be surprised when this happens if they are not alert because of the increased intensity and rapid spread of the fire.

Each of the major fuel types present in the study area are described below, in terms of the characteristics that coincide with that fuel model.

Grass Fuel Type Models (GR)

The primary carrier of fire in the GR fuel models is grass. Grass fuels can vary from heavily grazed grass stubble or sparse natural grass to dense grass more than 6 feet tall. Fire behavior varies from moderate spread rate and low flame length in the sparse grass to extreme spread rate and flame length in the tall grass models (Table A2.3 and 4).

All GR fuel models are dynamic, meaning that their live herbaceous fuel load shifts from live to dead as a function of live herbaceous moisture content. The effect of live herbaceous moisture content on spread rate and intensity is strong.

GR1 (Mowed areas)

The primary carrier of fire in GR1 is sparse grass, though small amounts of fine dead fuel may be present. The grass in GR1 is generally short, either naturally or by grazing, and may be sparse or discontinuous. The moisture of extinction of GR1 is indicative of a dry climate fuelbed, but GR1 may also be applied in high-extinction moisture fuelbeds because in both cases predicted spread rate and flame length are low compared to other GR models. This would include mowed and maintained grass areas.

[3] Scott, J.H. and R. Burgan. 2005. Standard Fire Behavior Fuel Models: A Comprehensive Set for Use with Rothermel's Surface Fire Spread Model, United States Department of Agriculture Forest Service, RMRS-GTR-153.

GR3 (unmowed grass)
Description: The primary carrier of fire in GR3 is continuous, coarse, humid-climate grass. Grass and herb fuel load is relatively light; fuelbed depth is about 2 feet. Shrubs are not present in significant quantity to affect fire behavior.

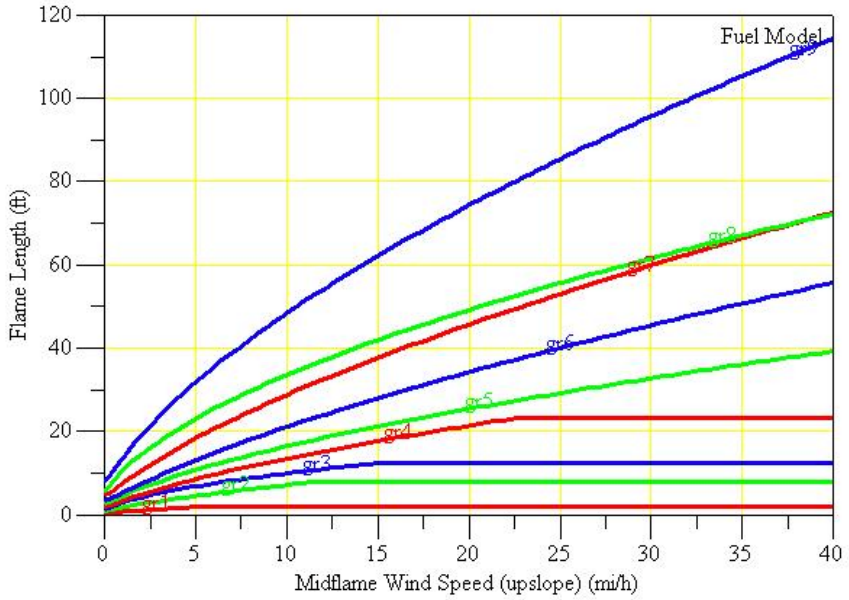

Figure A2. 2 Modeled flame lengths for GR fuel models

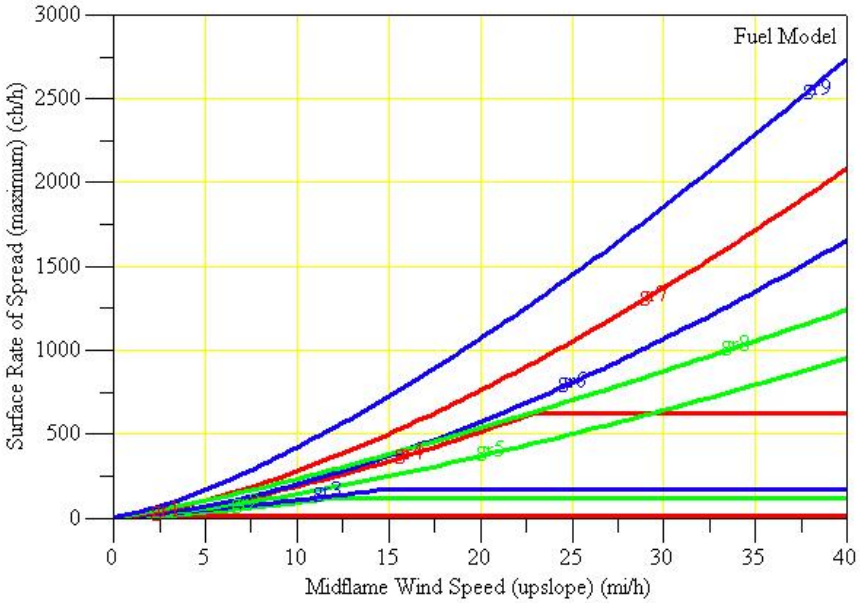

Figure A2. 3 Modeled rates of spread for GR fuel models

Timber Litter Fuel Type Models (TL)
The primary carrier of fire in the TL fuel models is dead and down woody fuel. Live fuel, if present, has little effect on fire behavior (Table A2.5 and 6).

TL1 (Bottomland Forests)
The primary carrier of fire in TL1 is compact forest litter. Light to moderate load, fuels 1 to 2 inches deep. May be used to represent a recently burned forest. Spread rate is very low; flame length very low.

TL2 (Upland Forests)
The primary carrier of fire in TL2 is broadleaf (hardwood) litter. Low load, compact broadleaf litter. Spread rate is very low; flame length very low. This is the most common fuel on VTS-M.

TL3 (Pine Forests)
The primary carrier of fire in TL3 is moderate load conifer litter, light load of coarse fuels. Spread rate is very low; flame length low.

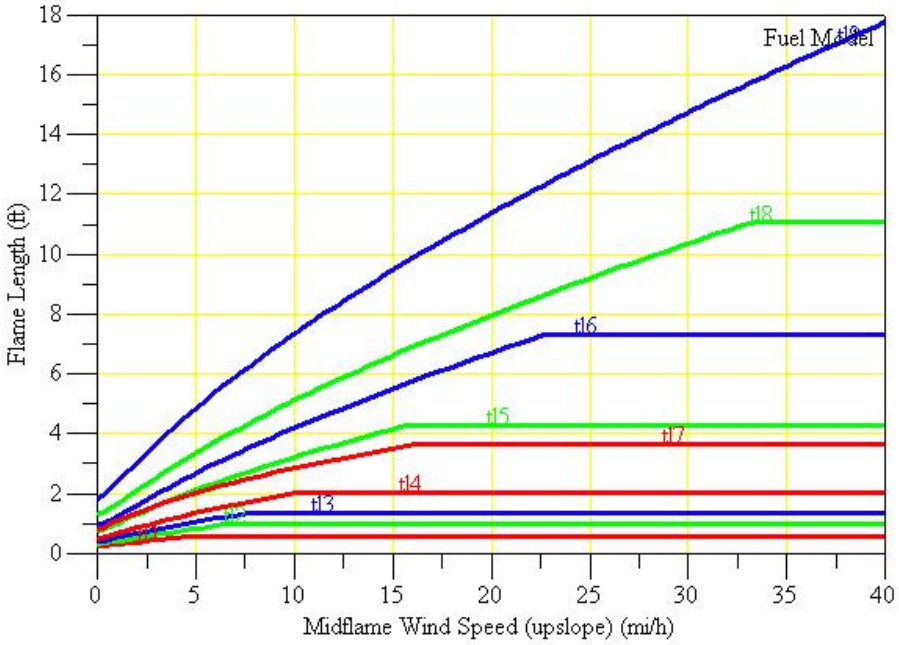

Figure A2. 4 Modeled flame lengths for TL fuel models

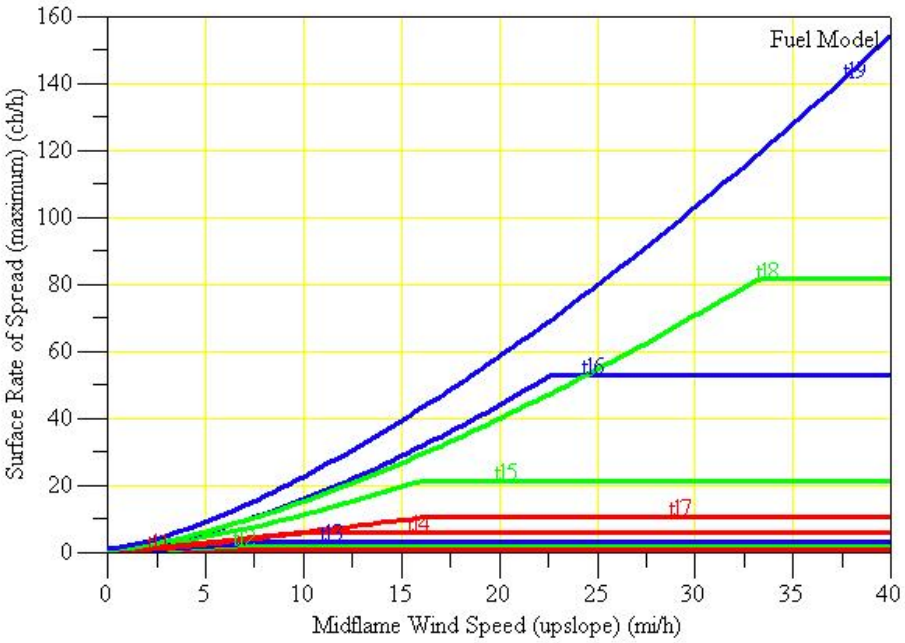

Figure A2. 5 Modeled rate of spread for TL fuel models

Timber-Understory Fuel Type Models (TU)
The primary carrier of fire in the TU fuel models is forest litter in combination with herbaceous or shrub fuels. TU1 and TU3 contain live herbaceous load and are dynamic, meaning that their live herbaceous fuel load is allocated between live and dead as a function of live herbaceous moisture content. The effect of live herbaceous moisture content on spread rate and intensity is strong and depends on the relative amount of grass and shrub load in the fuel model (Table A2.7 and 8).

TU4 (Eastern Red Cedar)
The primary carrier of fire in TU4 is short conifer trees with grass or moss understory. Spread rate is moderate; flame length moderate. This model is used for estimating Eastern Red Cedar fire behavior. The effect of live herbaceous moisture content on spread rate and intensity is strong and depends on the relative amount of grass and shrub load in the fuel model.

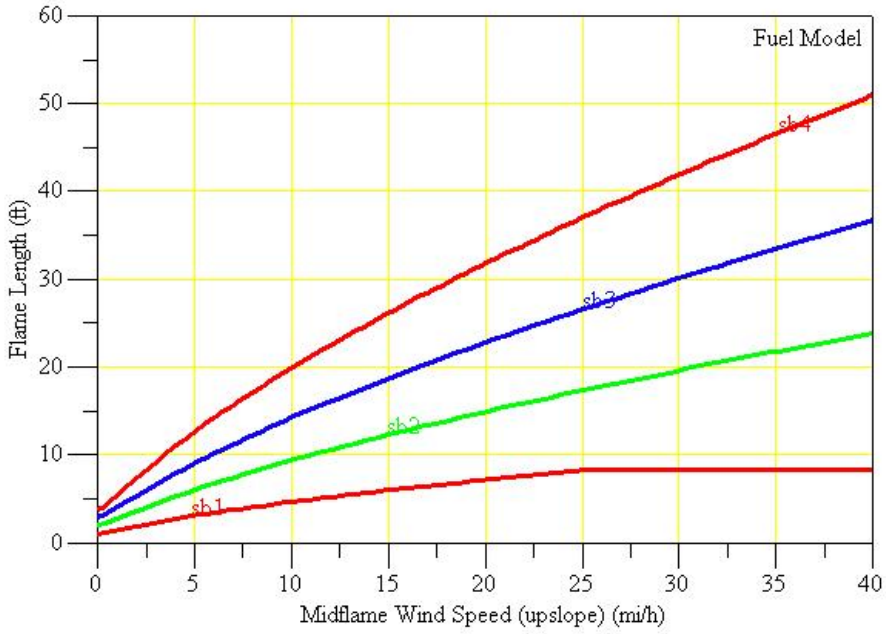

Figure A2. 6 Modeled flame lengths for SB fuel models.

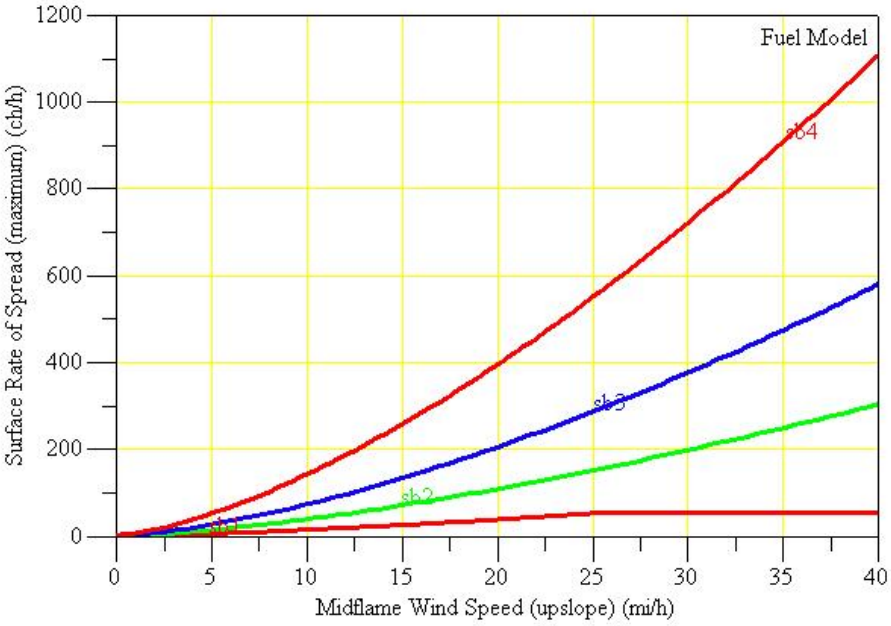

Figure A2. 7 Modeled rates of spread for SB fuel models.

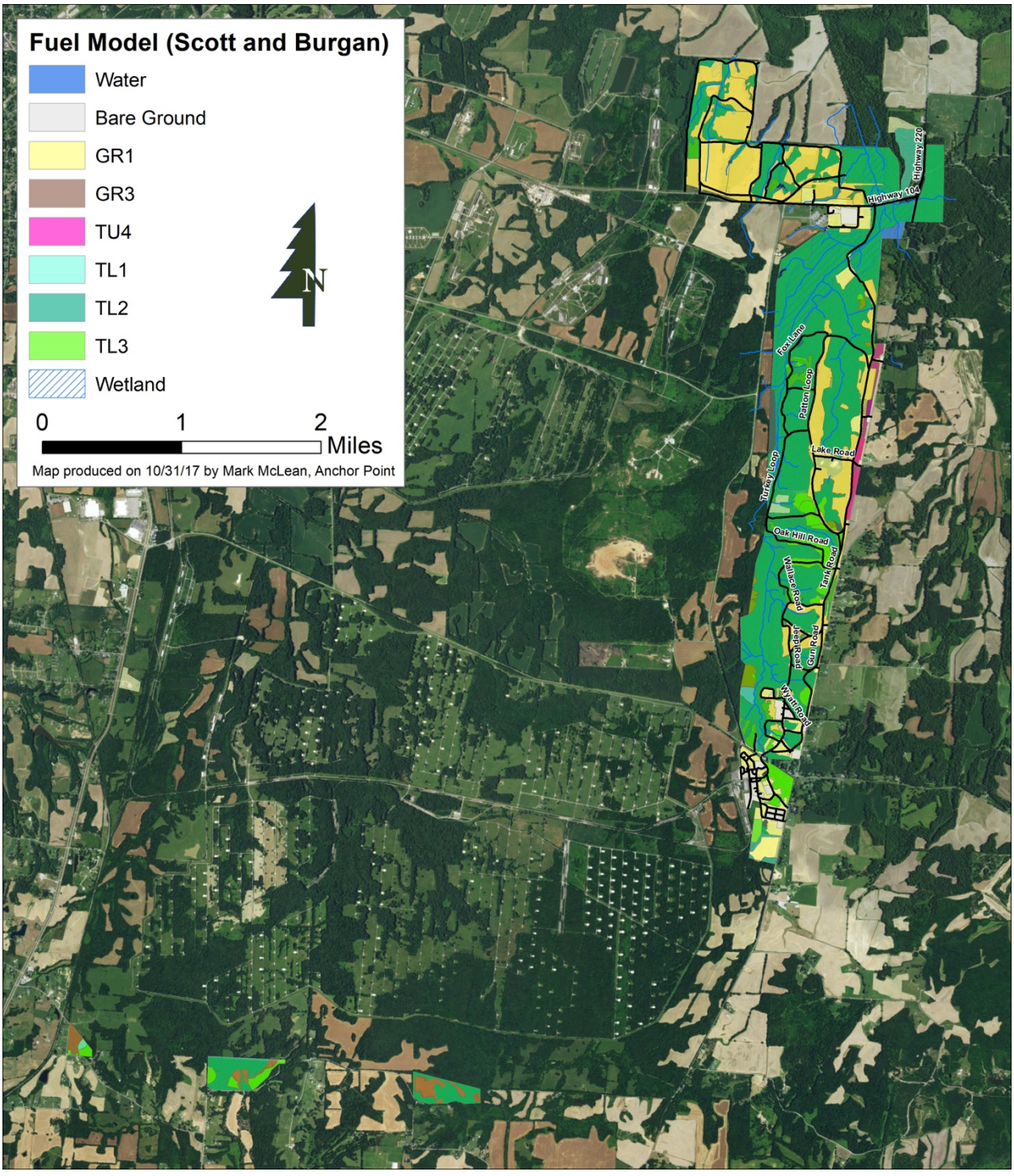

Figure A2. 8 Fuel Types on VTS-M

5.0 WILDLAND FIRE CONTROL

Due to its small size, the VTS-M is not subdivided into fire management zones. Wildfire in all areas outside the Cantonment (where structural firefighters would almost always be needed) will be addressed similarly with the objectives of:

- Preserving firefighter and other human safety
- Protecting real property
- Containing all fires within the training site boundaries
- Protecting significant natural and cultural resources
- Suppressing or using wildland fire in accordance with military and environmental needs

5.1 Suppression and Prevention

Wildfire prevention encompasses all of the following activities. Permanent staff will be briefed on the fire danger rating each day. Each visiting unit will be briefed prior to the start of any exercises on the fire potential for that day and any restrictions on use of pyrotechnics and/or tracers. (See Table A2.2 Fire Danger Rating for limitations).

Fuel breaks will be maintained on all boundaries where feasible and along existing roads. These breaks in vegetation will reduce fire intensity as a fire approaches existing roads or boundaries. This will increase the likely hood of success for suppressing a wildland fire. Boundary maintenance will reduce possibility of wild land fire entering or leaving the facility. Mowed fuel breaks will be used in areas where soil disturbance is not allowed. Fire personnel should be aware that fires can cross fuel breaks and spotting may occur across fuel breaks.

- Structures and other properties of value will be surveyed for risk of exposure to wildland fire.
- Firewise practices will be implemented around structures in wildland areas.
- Burn Safe Tennessee website has useful information on this and other wildfire prevention information.
- Flammable materials stored adjacent to structures will be removed.
- Facility construction will be evaluated for risk of embers entering the structure. Grasses will be mowed around structures.
- New construction design should consider wildland fire risk.

5.2 Detection

All personnel using or working on VTS-M are responsible for detecting and reporting wildfires. All wildfires must be reported to Range Control.
In the event of a wildfire these steps will be followed;

1. All assigned personnel and visiting units will report wildfire to Range Control.
2. Range Control notifies 911 who notifies Milan Army Ammunition Plant (MLAAP).
3. Only authorized and qualified VTS-M firefighters will respond to wildland fires on the training site.
4. Range Control assigns authorized and qualified VTS-M and/or unit personnel to start initial attack.
5. MLAAP Fire Department responds.
6. Unified Command is established with MLAAP and Range Control Officer.

7. Training Site Command, and the Natural Resources Manager and/or Environmental Department is notified.
8. If fire exceeds or it is anticipated that fire suppression needs exceed onsite capabilities, Carroll County Fire Department is requested. Fire department will request additional resources through their normal channels and agreements.
9. Unified Command Structure is modified in accordance with MOA's, and personnel capabilities based on incident complexity. (As formal agreements are completed this procedure may change)
10. At no time will the wildland firefighting assets be used for fighting vehicle, fuel, or structure fires without approval from the Installation Commander or the Range Officer.

Under normal circumstances, immediate suppression will be the goal of wildland fire response on VTS-M. Occasionally, an accidental fire may be managed to burn the entirety of a range or said burn unit which is scheduled for prescribed burning in that FY. The unit burn plan should be reviewed to ensure objectives of the prescribed burn will be met before committing to this strategy. Backfiring using existing control lines will be considered in these situations. In some situations, current and predicted fire behavior, environmental conditions and available resources may dictate that allowing a fire to burn to a preexisting control line or similar barrier is the safest and best suppression strategy.

5.3 Dispatch Procedures

VTS-M Range Control is responsible for coordinating the immediate wildland fire control response on the training site. Initial wildfire response will be conducted only by authorized and qualified TNARNG and partner agency personnel. Qualifications are defined by NWCG as described in PMS-310-1 (https://www.nwcg.gov/sites/default/files/publications/pms310-1.pdf) and by NFPA (https://www.nfpa.org/codes-and-standards/all-codes-and-standards/list-of-codes-and-standards/detail?code=1051). MLAAP will be the first agency notified and to respond in the event of wildfire, structure fire or prescribed fire escape and that they will request support from partner agencies if needed. Verbal agreements with MLAAP regarding firefighting exist. These arrangements will be formalized into a Memorandum of Agreement defining responsibilities of both parties. The MLAAP has three volunteer fire departments on-site. A unified command will be set up with the MLAAP, and any qualified VTS-M personnel. Unified Command can be expanded if necessary to incorporate Tennessee Division of Forestry. Dispatch protocols may change with a formal MOA.

5.4 Communications Plan

Range Control and municipal authorities are not able to communicate on Range Control's radios, therefore cell phones are the best means of communication. It is critical to provide an updated cell phone list to local agencies. There is cellular phone signal throughout most of VTS-M.

- VTS-M Range Control Cellular number (615) 426-5935

5.5 Extended Attack Procedures

If a fire cannot be contained in the first operational period, the Tennessee Division of Forestry will be requested to manage the incident. The Memorandum of Agreement will be reviewed to clarify procedures, cost management, responsibilities and authorities of signatories.

5.6 Rehabilitation Needs and Procedures

The Natural Resource Manager (NRM) for TNARNG should evaluate all burned locations and suggest any site rehabilitation measures that may be needed. Rehabilitation cost responsibility for wildfires would depend on what started the fire, the objectives of the rehabilitation, and what is being rehabilitated. For example, If the fire was naturally caused and the damage was to an environmental resource, environmental funds would need to be used, however, if the fire was started by ranges/training and the damage was to training lands Installation Operations and Maintenance would be responsible.

5.7 Records, Reports, and Monitoring

Firefighters will complete a fire report and turn it into Range Control after every fire. A standard form will be developed for the report. These fire reports should be filed in a permanent record and include:

- Incident name
- Date and Time
- Incident Commander
- Location
- Size in Acres
- Fuel Type
- Fire Cause (if known)
- Names of responders and position
- Equipment assigned to incident by ID number and type
- Brief description of the events
- Any other items identified by cooperating agencies
    - Include all field logs, communication records, images, records of property damages,

- Document the After-Action-Review in the fire record:
    - What did we set out to do (what was planned)?
    - What actually happened?
    - Why did it happen that way?
    - What strategies, tactics and procedures should be sustained? What can be improved?

The Range Control Officer will forward copies of these wildfire reports to the Natural Resource Manager for TNARNG who is responsible for maintaining fire records for all wildfires.

6.0 PRESCRIBED FIRE MANAGEMENT

Prescribed fire can be used as a land management tool at VTS-M. Based on the fuel types on the installation, prescribed fire should be used selectively and under a limited set of circumstances. The sensitivity of hardwoods and eastern red cedar to fire necessitates that the burner be experienced in conducting prescribed burns in these forest communities. The following overall burning guidelines were considered in developing the prescribed fire objectives and the recommended prescribed burn program for VTS-M.

- Prescribed burns should be directed at reducing excessive fuel loads and should consume only the top layer of litter matter when burning under any type timber.

- Open fields should be burned clean to topsoil, but not so hot as to burn the grass roots.
- If burning is done in hardwood stands, the fire should be done 2-6 days after good rainfall and when relative humidity is 40 to 50%.
- Eastern red cedar stands should be burned after a thinning and harvested tress removed or piles burned to reduce available fuel for a broadcast burn.
- Prescribed burns should be directed at reducing excessive fuel loads and maintaining a desired stocking level within forest stands.
- Open fields should be burned but not so hot as to burn the grass roots. To prevent erosion and to reduce program costs, 100 % consumption of all grassland fuels is not necessary.
- Any pile burn is for burning vegetation grown on the site. Nothing other than vegetation is allowed to be burned. Tennessee Department of Environment and Conservation, and Division of Forestry have information on what can be burned in piles.

6.1 Objectives

The following are the primary objectives for the prescribed burning program at VTS-M which are described in more detail below:

- Reduce fuel load and wildfire threat.
- Utilize prescribed fire, as appropriate, to create and maintain conditions as required by the military mission.
- Utilize prescribed fire, as appropriate, to aid in control of invasive plant species.
- Utilize prescribed fire, as appropriate, to aid in maintaining healthy grassland and forest communities, and improve the health of forest resources on VTS-M.

6.1.1 Reduce fuel load and wildfire threat.

Fire management activities should concentrate on preventing, managing, and controlling wildfires that originate on the installation, as well as fires that may encroach onto the installation from neighboring properties.

- Grasslands can be burned on a 2-year rotation. The upland hardwood forests should be burned on a 5- to 7-year interval to reduce fuel loads while minimizing damage to the timber. Typically burns should be conducted in mid-winter (December – February) under conditions that will produce the coolest fires possible. Planners should carefully evaluate the objective and the more frequent burning could damage or stress the trees. Burn plans should be developed to meet desired objectives for each site. Planners should carefully review objectives, desired outcomes, outcomes of previous burns and review the latest fire science for each specific burn plan developed. Fire effects on forests on VTS-M will be monitored and future burn prescriptions adjusted as necessary to meet future objectives that meet training needs and maintain a healthy forest ecosystem.

In order to achieve prescribed fire objectives of regenerating plant communities' individual unit burn plans must consider plant community compositions and the desired fire effects for both training and the plant communities. INRMP Section 3.7.1 Vegetation Cover describes the vegetative communities that occur. Ecologists familiar with these plant communities should be consulted while developing burn plans for these areas.

6.1.2 Create and maintain conditions required by the military mission.

Some aspects of the military mission demand conditions other than the closed canopy, mixed hardwood forests native to the training site. Open areas and grasslands may be effectively managed by prescribed burning to control woody species encroachment and to rejuvenate herbaceous and graminoid species. Areas subject to higher fire danger (target sites, ranges) also require more thorough control of fuel loads to minimize wildfire threat.

- Substantial portions of Training Areas B-2 and B-3, as well as portions of Training Areas A- 2, A-3, A-6, A-7, and A-9, support open grasslands. This vegetative condition is important for the conduct of specific types of military training, and prescribed fire can be a cost- effective method of maintenance. The grassland areas should be selectively burned on a rotational basis on a two-year schedule. Above-ground biomass should be burned clean to topsoil, but the fire should not be so hot as to burn the grass roots. Burning should take place between late October and late April before spring green-up and the establishment of nests by ground nesting birds. Larger grassed areas should be subdivided into smaller manageable units that are burned separately to promote habitat patchiness and to provide a refuge for wildlife displaced from other areas that are burned. No burning should be allowed between July and September when native plants of particular interest are flowering and developing seeds.

- New clearings for military training are proposed for Training Areas A-5 and A-6. Prescribed fire should be applied 1 to 2 years after clearing the timber to reduce fuel and encourage the establishment of native grasses and should be repeated on a 2-year rotation. Burns should take place between late October and late April, as above. If fescue is found to be infesting the sites, burns should be conducted in late April according to the guidance in 6.1.4 below.

- Prescribed fire will be applied to create openings within upland hardwood forests for bivouac training and other military training missions. The areas should be mechanically cleared, and fire applied to eliminate slash materials. Thereafter, prescribed burns should be accomplished on a 2-year cycle during spring following the grassland guidelines.

6.1.3 Aid in the control of invasive species.

Prescribed fire may be used in combination with mechanical and herbicidal methods to control invasive species that are problematic on VTS-M, including common privet, Japanese honeysuckle, and Chinese lespedeza. Care will be taken to avoid the use of prescribed fire in those locations where fire could stimulate the spread of other invasive plant species.

6.1.4 Aid in the maintenance of healthy forest and grassland communities.

Prescribed fire can aid in controlling introduced tall fescue grass when properly applied. It can further benefit introduced native warm season grasses. Properly planned applications of prescribed fire can help to establish and maintain the health of grassland communities.

The results of recent research indicate that low intensity backing fire in mature hardwood stands would probably have little adverse effect on the existing timber and could be used in combination with established forestry management methods to favor regeneration of oaks and oak-pine mixtures over less desirable hardwood species that are particularly sensitive to the effects of fire. Under this approach, an initial shelterwood harvest is made to remove roughly half of the basal area of the overstory in a

hardwood stand near the end of its rotation. Logging slash must be kept away from the bases of the residual oaks that are not harvested to minimize damage from fires.

The initial partial harvest is followed by a 3- to 5-year waiting period during which time undesirable species such as yellow-poplar will dominate the advance regeneration pool of young trees. At the end of the waiting period, a relatively hot growing-season prescribed fire is conducted that topkills the seedlings and frees the oaks to replace the fire-sensitive species that are killed. The 3- to 5-year waiting period provides the shelterwood overstory trees that remain from the initial harvest sufficient time to recover from the shock of the logging operations before they are shocked again by the burn. If compatible with mission needs, an experimental application of this method will be applied to an appropriate stand in training area A-9.

Burn Planners should review the latest literature during development of site specific plans

6.2 Constraints

In addition to minimizing damage to the hardwood timber, prescribed fire on VTS-M must be conducted cautiously with concern for two other major limitations on burning on the training site:

6.2.1 Protection of the waterways.

The VTS-M has two named streams and numerous tributaries dissecting its training areas. Johns Creek and Halls Branch are both identified by the State of Tennessee as impaired. Soils in the region are highly erodible, and sedimentation is a significant factor in water quality issues throughout much of west Tennessee. It is essential that efforts be made to minimize the risk of erosion and sedimentation. Along the banks of Johns Creek, Halls Branch, and their major tributaries, a 50 foot buffer (or streamside management zone) will be maintained within which vegetation and soils should not be disturbed. This 50’ buffer is a “no plow zone” (Figure A2.2); firebreaks should be established further than 50 feet from the stream bank as needed. All efforts should be made also to avoid burning within the buffer zone in order to minimize loss of vegetation cover.

Erosion control on firebreaks is also a concern in order to minimize the potential for sedimentation into these creeks. Water control structures to manage surface water movement will be installed during firebreak construction. Permanent fire lines will have water control structures maintained. Temporary firelines will be rehabilitated as soon as practicable after any fire. Existing barriers such as roads and trails will be used whenever possible to reduce the need for fire line construction and to minimize resource impacts.

6.2.2 Protection of sensitive species.

No federal or state-listed threatened, endangered, or sensitive plant species have been identified on the VTS-M. If any of the federally listed species are identified on the VTS-M, this plan will be revised to ensure sufficient protection. (the endangered interior least tern was sighted once during an avian baseline survey, but there is no evidence that this species routinely utilizes any habitat on the training site, which is outside its expected range).

However, several bird species “deemed in need of management” by the State of Tennessee have been identified on the training site. Scheduling of prescribed burns will take into account breeding season, and efforts will be made to minimize impact on breeding habitat.

In addition, suitable habitat for two plant species of concern to the State of Tennessee (compass plant (Silphium laciniatum) and ear-leaved false foxglove (Agalinas auriculata)) is present in portions of the installation's grasslands, although neither plant has been found on the training site to date. Both of these plants would benefit from the use of fire to manage the grasslands.

6.2.3 Safety Hazards.

There are safety factors that need to be considered and/or mitigated prior to and during prescribed burns.

- **Smoke sensitive areas/roads –**
  - Area-T (Admin Building located at 2280 Hwy 104 West Milan TN 38358)
  - Area-I (Maintenance Shop located next to National Guard Training Center)
  - AREA-J (Employee hub for MLAAP contracted employees, located off Hwy 104 West Milan, TN)
- **Troops down range –** if troops are down range, we recommend that they be completely out of the burn unit, and that any access to or near the burn unit be restricted until the burn is completed.

- **Heavy fuels –** if areas of heavy fuel are identified before the burn is initiated, you can mitigate by scattering the fuel in the surrounding area, remove the fuel, pretreat the fuels with water or foam, or by putting a firebreak around the fuels. If areas of heavy fuels are identified after the burn is initiated, you can mitigate by holding up burn operations until the heavy fuels burn down and have someone patrol the "green" side of the firebreak for any spot fires. If access is available, you can also wet down the heavy fuels with an engine or some type of suitable water source.

- **Areas w/o functional firebreaks –** we highly recommend firebreaks being installed before initiating any prescribed burn. In some areas access with a dozer is not feasible or even possible to install firebreaks, other options would be to install a wet line with an engine, or to install a firebreak by hand (Hand line).

6.3 Smoke Management and Air Quality

The U.S. Environmental Protection Agency (EPA) monitors specific air quality parameters to determine if a particular area is in attainment with the National Ambient Air Quality Standards (NAAQS). The parameters of interest are ozone, particulate matter, carbon monoxide, sulfur dioxide, nitrogen oxides, and lead. Smoke produced by wildfires contains a number of these pollutants.

The Tennessee Department of Environment and Conservation's (TDEC) Division of Air Pollution Control is responsible for protecting the State's air quality. TDEC has developed regulations governing open burning, which is defined as any burning event that generates combustion products that are emitted directly into the open atmosphere without passing through an open stack. Prescribed burns are a type of open burning; however, TDEC regulations specifically exempt prescribed open burns of forests and grasslands performed in connection with land management activities from having to receive permits issued by TDEC. As a result, TDEC places no special requirements on the conduct of prescribed burns, other than directing burners to obtain Burn Permits from the TDA Division of Forestry and complying with local burn regulations and ordinances.

As a precaution to ensure full compliance with TDEC open burn regulations, the area to be burned should be visually inspected prior to the burn to assure that no items that are prohibited from open burning have been abandoned within the site (e.g., tires, oils, paints, vinyl siding, treated wood, etc.). If these materials are present, they will be removed before burning. Each burn plan will identify strategies

to assist in reducing the amount of smoke generated during the burn. Of equal importance, burns will be conducted when conditions minimize the amount of smoke produced.

Although it is not required in order to obtain a TDF burn permit, the TDEC Division of Air Pollution Control should be contacted prior to conducting a prescribed burn to ensure that the burn site is not located within a declared Air Pollution Episode (e.g., air pollution alert, warning, or emergency). If some form of Air Pollution Episode has been declared, the prescribed burn will be postponed until conditions improve. All questions on air quality issues should be directed to the Division of Air Pollution Control (1-888-891-8332).

Atmospheric conditions should be favorable for smoke to rise into the upper air and away from smoke- sensitive areas such as highways, airports, and urban areas. There are several smoke-sensitive areas at VTS-M that will warrant consideration during the conduct of every prescribed burn:

- **Roads –**
    - No burning in TA-A with a due West wind for fear of smoking out Highway 220.
    - No burning in TA-B with a due North wind for fear of smoking and causing obscuration on Highway 104. These roads could be affected if atmospheric conditions, particularly in the evening following a burn, resulted in the smoke settling to the lowest elevations of their valleys.

- Scattered along the roads surrounding the VTS-M are a number of rural residences. The heaviest Wildland Urban Interface is along Hwy 220, on the east side of the training site. All burn activities should consider the potential effects of smoke dispersion on the residents located within these areas.

- To mitigate areas from being smoked in, the burn would need to be conducted on a day with good smoke dispersion, mixing height, and transport winds that will carry the smoke in a favorable direction.

Local law enforcement personnel will be informed in advance of a prescribed burn and a determination will be made about possible need for an officer to be assigned manage traffic movement in case smoke impedes visibility on the roads. Temporary signs will be posted during prescribed burns to inform motorists of potential smoke hazard issues.

Although prescribed burns are not regulated by the EPD, to avoid potential air quality compliance problems, the area to be burned should be visually inspected prior to the burn to assure that no items that are prohibited from open burning have been abandoned within the site (i.e., tires, oils, paints, vinyl siding, treated woods, etc.). Should such materials be present, they should be removed prior to burning.

6.4 Use of Fire Breaks

Fire breaks can consist of established roads, logging trails, cleared lanes used for the sole purpose of controlled burns, utility rights-of-way, and watercourses. Ideally, fire breaks should be capable of supporting groundcover to guard against erosion when not being used to contain fires. Prior to the conduct of a prescribed burn, the fire breaks should be inspected to ensure that they are in the proper condition to contain the fire. Following the burn, the fire breaks should be inspected again to determine if any remedial measures are needed to prevent erosion and other problems from developing.

To ensure that fire breaks are available when needed, a regular maintenance program must be pursued to maintain the fire breaks in a cleared and open condition, with a minimum of undergrowth and low hanging limbs. The best maintenance scenario exists when the fire breaks serve dual or multiple purposes (i.e., roads, utility rights-of-way, etc.). In such situations, it is possible to distribute maintenance costs to other installation activities instead of having to assign the total costs to the prescribed fire program.

Permanent firebreaks will be constructed with appropriate erosion control features to manage surface water runoff. Those not utilized as maneuver and tank trails can be maintained in a grassed condition to the extent allowed by the available sunlight penetrating the forest canopy. With the exception of periodic brush hogging, the vegetative cover on these firebreaks will only be disturbed when necessary during the conduct of prescribed burns or in preventing the spread of wildfire. Temporary fire breaks will be cut, as needed, prior to prescribed burns or during wildfire control, in accordance with the no-plow zones (Figure A2.2). These fire breaks will be reclaimed and revegetated as soon as possible following the fire.

6.5 Training and Crew Requirements

Prescribed fire personnel will follow the training set forth in the PMS-310-1 (http://www.nwcg.gov/pms/docs/docs.htm). At a minimum, the following positions should be filled during operations:

- Prescribed Fire Crew Members (VTS-M personnel with FFT2 training)
- Prescribed Fire Burn Boss (1, 2, or 3) depending on complexity

6.6 Burn Plans

A site-specific burn plan is developed for each prescribed burn on the VTS-M, containing the elements listed in the Interagency Prescribed Fire Plan (NWCG PMS 484-1) and the Interagency Prescribed Fire Planning and Implementation Guide (NWCG PMS 484.[4]). Pile burns also require approved burn plans.

The 2017 Elements are;

- Element 1: Signature Page
- Element 2: Agency Administrator Ignition Authorization and Prescribed Fire Go/No Go Checklist
- Element 2A. Agency Administrator Ignition Authorization
- Element 2B. Prescribed Fire Go/No-Go Checklist
- Element 3: Complexity Analysis Summary and Final Complexity
- Element 4: Description of Prescribed Fire Area
    - Physical Description.
    - Vegetation and Fuels Description
    - Description of Values
    - Maps
- Element 5: Objectives
- Element6: Funding
- Element7: Prescription
- Element 8: Scheduling

[4] https://www.nwcg.gov/sites/default/files/publications/pms484.pdf

- Element 9: Pre-burn Considerations and Weather
  - A. Considerations.
  - B. Method and Frequency for Obtaining Weather and Smoke Management Forecast(s):
  - C. Notifications
- Element10: Briefing
- Element 11: Organization and Equipment
- Element12: Communication
- Element 13: Public & Personnel Safety, Medical
  - Safety Hazards and Mitigation
  - Emergency Medical Procedures, Emergency Evacuation Methods, and Emergency Facilities
- Element 14: Test Fire
- Element15: Ignition Plan
- Element 16: Holding Plan
- Element17: Contingency Plan
- Element 18: Wildfire Declaration
- Element 19: Smoke Management and Air Quality
- Element 20: Monitoring
- Element 21: Post-burn Activities.
- Prescribed Fire Plan Appendices

6.7 Notification

Agencies and individuals who may play a role in the prescribed burn or may be affected by the burn will be notified prior to the ignition of a prescribed fire. The MOA will address specific requirements of those partners.

When involved with any prescribed fire activity VTS-M personnel will always consult in advance with MLAAP. Permits are required from the Tennessee Department of Agriculture (TDA) Division of Forestry TDF will issue a burn permit from the Carroll county office: 731-986-5550, or through online application process at https://agriculture.tn.gov/OnlineBurnPermitPublic/default.aspx (See Section 2.6 for a complete list of agency contacts.)

- Carroll County 911 Dispatch will be notified of location of burn, prior to ignition. 731-986-8947
- Carroll County Fire Department will be contacted at 731-415-5943.
- Local law enforcement agencies will be notified so that they can plan for smoke-induced traffic duties, as needed.
  - Gibson County Sheriff Department 731-855-0277
  - Carroll County Sheriff Department 731-986-8947
  - Tennessee Highway Patrol 615-251-5175
- Temporary signs may be placed along Highway 220 to inform motorists of potential visibility hazards from smoke resulting from the burn.
- A news release may be utilized to inform the public if the planned burn is extensive or located close to the property line.
- The surrounding public should be made aware of any possible smoke issues that may arise and could cause any health issues.

Public Affairs Office should be notified at least a month prior to burning so that they can generate News releases and other public messages to be sent to local media outlets.

- Newspaper
- Radio
- Local Internet Sites

6.8 Contingencies for an Escaped Burn

Prior to any prescribed burn, a small test fire will be ignited to confirm that the fire will behave in the desired manner.

However, if after conducting a successful test fire and igniting the main burn any of the following conditions develop, burning will be stopped and the fire will be plowed under:

- Fire behavior is erratic
- Fire is difficult to control
- Wind shifts or other unforeseen weather conditions develop
- Weather conditions move outside the prescription range
- Smoke is not dispersing as predicted
- Public road or other sensitive area becomes smoked-in
- Burn does not comply with all laws, regulations, and standards
- Large fuels are igniting and burning
- There are not enough personnel to mop-up before dark and the likelihood exists that smoke will settle in a smoke-sensitive area overnight
- Any criteria identified in the specific unit prescribed burn plan require an escape declaration.

Under any of these conditions, Range Control will be notified that contingency actions are being taken. If the contingency actions are successful at bringing the project back within the scope of the Prescribed Fire Plan, the project may continue. If contingency actions are not successful by the end of the next burning period, the prescribed fire will be converted to a wildfire, an Incident Commander will be designated and assistance will be requested from cooperators in accordance with the MOA. The burn can be declared a wildfire by the Burn Boss at any time if their assessment is the declaration is necessary.

6.9 Monitoring

Three types of post fire monitoring should be conducted to determine if fire management activities are reaching the stated objectives: post operational report, post fire effects monitoring, and burn program objective monitoring.

6.9.1 Post operational reports

Are an important written record of the burn, enabling future staff to learn from previous activities. They will be completed during and immediately following a prescribed fire activity to address the effectiveness of the overall burn process – the plan, implementation, personnel, and effectiveness at meeting objectives. The post-operational report will include:

- Burn unit information
- Burn dates
- Forecasted weather conditions
- On-site burn day weather conditions
- Crew assignments

- Burn schedule
- Fire narrative
- Immediate post burn effects
- Comparison of post burn effects with unit fire management objective
- Notes and recommendations.

Within this report, several questions should be answered:

- Were the fuel conditions within plan guidelines and were guidelines appropriate?
- Did the burn stay within planned parameters?
- Were the fire lines installed as planned and were they adequate?
- Was the equipment in the plan available and appropriate, effective?
- Were the crew number, training, and assignments appropriate?
- Did the crew understand what they were doing, desired fire behavior and effects?
- Was the rate of spread and flame length as predicted in the plan?
- Were public interactions satisfactory?
- What ignition techniques were used?
- What was the weather during the burn, were pre burn and post burn forecasts accurate
- What were Smoke impacts on VTS-M and neighbors
- What was the duration of mop up?
- Did post fire checks find unanticipated hot spots or problems?

To answer some of these questions, during the burn, a designated crewmember will be assigned to record fire behavior. This may include flame length, flame height, rates of spread, ongoing fire weather readings. It is highly recommended that a NWCG qualified Fire Effects Monitor (FEMO) be assigned to the fire for data collection. Post fire estimates of fire intensity (scorch height and class, char, understory burn severity, and litter consumption), should be recorded after each burn to determine if burn specific fire management objectives were met. Permanent transects with photo points may be established to monitor and measure tree densities and plant composition. Observations of rare species reaction to fire management will be noted.

6.9.2 Fire effects monitoring

Conducted via a post-burn evaluation of the physical effects of the fire. This monitoring should include data collected during and immediately following the fire, as well as during the first growing season following the fire. Parameters to be evaluated will include tree mortality, mid-story kill, pine bark beetle or other pest infestation, erosion problems, and whether overall burn objectives were met. These evaluations are completed and filed with the burn plan.

6.9.3 Burn program objective monitoring

Will be conducted over a longer time scale in conjunction with the review of INRMP objectives and achievements.

6.10 Prescriptions

The prescriptions below describe the preferred environmental conditions for a burn. Some deviation from these prescriptions in response to specific objectives will be possible on the recommendation of an

experienced burn boss, such as the GFC District Forester. The general prescription for prescribed burning in the open grassland areas of VTS-M is presented in Table A2.4, the prescription for burning the hardwood forest habitat is presented in Table A2.5, and the prescription for burning the pine forest habitat is presented in Table A2.6.

Table A2. 4 Prescription for controlled burns in grasslands, fields, and forest openings

Stand Description:	Overstory	None to scattered trees
	Understory	Grasses and small brush
	Fuels	GR1, GR3
	Topography	Gentle rolling hills to flat
Weather Range	Surface wind (dir./speed)	West, South at 5 – 8 mph
	Transport wind (dir./speed)	Greater than 5 mph
	Mixing height	Greater than 500 m
	Stagnation index	0 – 3 daytime
	Relative humidity	35 – 55 %
	Temperature	High 70°F Low 30°F
	Start time	9:30 am (or as soon as permit allows)

Table A2. 5 Prescription for controlled burns in upland hardwoods.

Stand Description:	Overstory	Closed canopy mature hardwood stands
	Understory	Open, small areas of brush
	Fuels	TL2
	Topography	Gentle rolling hills
Weather Range	Surface wind (dir./speed)	West, South at 5 – 10 mph
	Transport wind (dir./speed)	Greater than 5 mph
	Mixing height	Greater than 500 m
	Stagnation index	0 – 3 daytime
	Relative humidity	40 – 55 %
	Temperature	High 70°F Low 30°F
	Start time	9:30 am (or as soon as permit allows)

Table A2. 6 Prescription for controlled burns in TA A-2 pine stands.

Stand Description:	Overstory	Closed canopy mature stands
	Understory	Open, small areas of brush
	Fuels	TL1, TL3
	Topography	Gentle rolling hills
Weather Range	Surface wind (dir./speed)	West, South at 5 – 10 mph
	Transport wind (dir./speed)	Greater than 5 mph
	Mixing height	Greater than 500 m
	Stagnation index	0 – 3 daytime
	Relative humidity	40 – 55 %
	Temperature	High 70°F Low 30°F
	Start time	9:30 am (or as soon as permit allows)

6.11 Schedule

The planned prescribed fire management actions for VTS-M are presented in Tables A2.7. Recommended fire frequency is depicted for all burn units in Figure A2.10. The prescribed fire management measures and their recommended frequency of occurrence are based on the objectives identified in Section 6.1 and correlate to the forest management prescriptions described in the forest management plan (Annex 1 of the INRMP).

Table A2. 7 Burn schedules

	2YR	Acres	4YR	Acres	6YR	Acres	Total Acres
2018	A6-2 A7-2 A9-2 A10-1 B2-1 B2-3 B2-4 B2-5 B3-2 B3-4	47 39 5 5 34 3 22 4 36 19	B3-6	15	B3-7	59	249
2019	A7-3 A9-1 A9-3 B2-2 B3-1 B3-3	23 3 7 5 92 38	B3-5	8	A6-1 B2-7	28 74	278

2020	A6-2 A7-2 A9-2 A10-1 B2-1 B2-3 B2-4 B2-5 B3-2 B3-4	47 39 5 5 34 3 22 4 36 19			A5-2 B3-8	89 10	274
2021	A7-3 A9-1 A9-3 B2-2 B3-1 B3-3	23 3 7 5 92 38			A7-1	123	291
2022	A6-2 A7-2 A9-2 A10-1 B2-1 B2-3 B2-4 B2-5 B3-2 B3-4	47 39 5 5 34 3 22 4 36 19	B3-6	15	A5-1 A8-2	66 26	282
2023	A7-3 A9-1 A9-3 B2-2 B3-1 B3-3	23 3 7 5 92 38	B3-5	8	A8-1 A9-4	29 92	297
2024	A6-2 A7-2 A9-2 A10-1 B2-1 B2-3 B2-4 B2-5 B3-2 B3-4	47 39 5 5 34 3 22 4 36 19			B3-7	59	234
2025	A7-3 A9-1 A9-3 B2-2 B3-1 B3-3	23 3 7 5 92 38			A6-1 B2-7	28 74	270
2026	A6-2 A7-2 A9-2 A10-1 B2-1 B2-3 B2-4 B2-5 B3-2 B3-4	47 39 5 5 34 3 22 4 36 19	B3-6	15	A5-2 B3-8	89 10	328

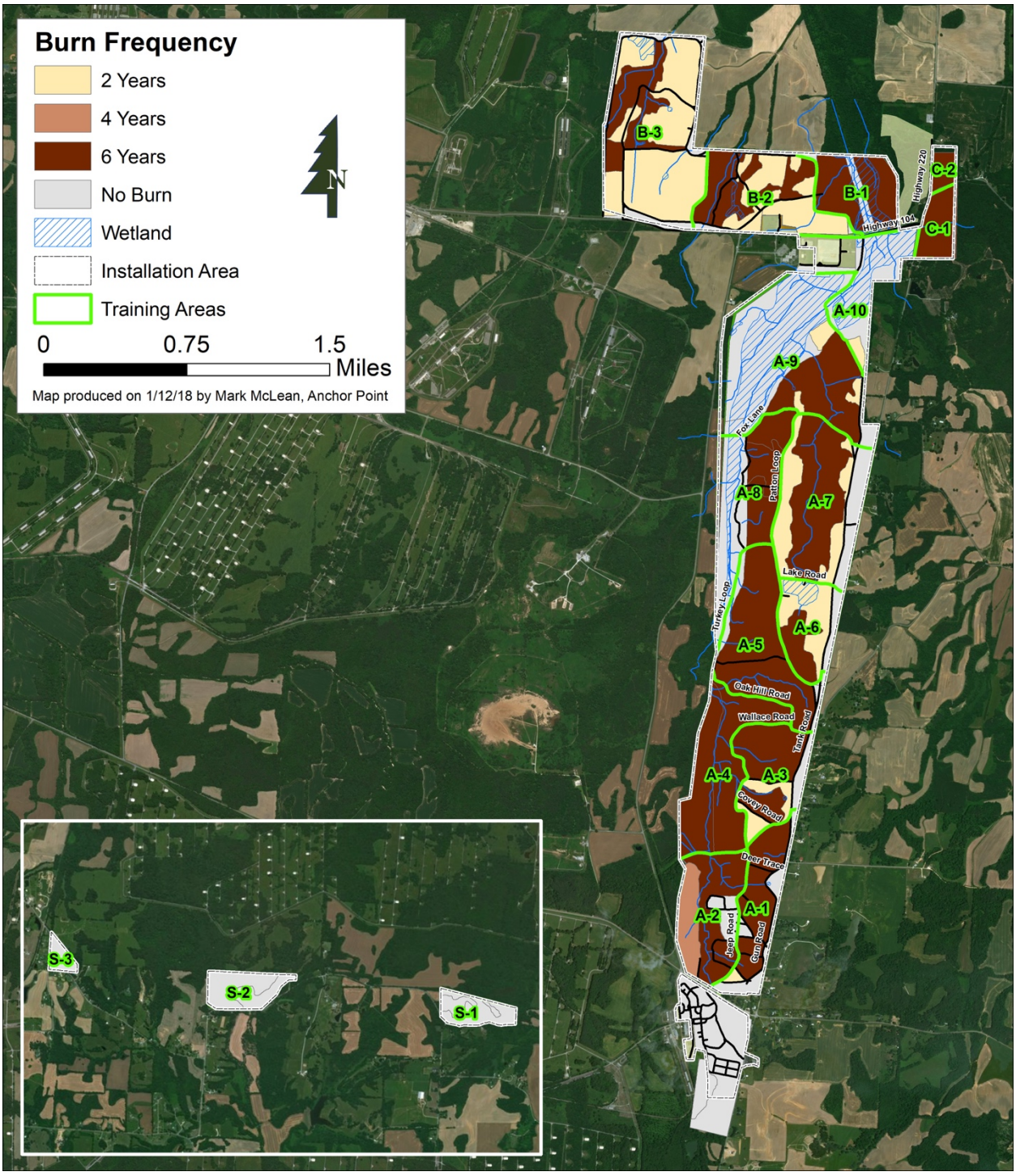

Figure A2. 9 Prescribed burn frequency for burn units

7.0 Attachments

7.1 Reference Materials

Department of Army Memorandum. 4 Sep 2002, Army Wildland Fire Policy Guidance.

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PMS 307, Work Capacity Test Administrator's Guide (March 2003)

PMS 310-1, Wildland Fire Qualification System Guide (January 2006) PMS https://www.nwcg.gov/sites/default/files/publications/pms461.pdf

PMS 410-1, Appendix B, Fire Behavior (April 2006)

PMS 424, Prescribed Fire Complexity Rating System Guide (January 2004)

Incident Response Pocket Guide, PMS 461, https://www.nwcg.gov/sites/default/files/publications/pms461.pdf

Schmidt, K.M., J.P. Menakis, C.C. Hardy, W.J. Hann, and D.L. Bunnell. 2002. Development of coarse-scale spatial data for wildland fire and fuel management. Gen. Tech. Rep. RMRS-GTR-87. USDA Forest Service, Rocky Mountain Research Station.

Scott, J. and Burgan, R. (2005). Standard fire behavior fuel models: a comprehensive set for use with Rothermel's surface fire spread model. USDA Forest Service, Rocky Mountain Research Station, General Technical Report RMRS-GTR-153, 72 pp.

TRC Garrow and Science Applications International Corporation. 2002. Integrated Cultural Resources Management Plan and Environmental Assessment of the Implementation of the Plan, Milan Training Center, TNARNG, 2002-2006. Prepared for the TNARNG.

Thompson Engineering, Forest Management Group, and Aerostar Environmental Services. 2006. Volunteer Training Site – Milan Forest Management Plan. Prepared for the TNARNG.

Weather Information:
Spot Weather Forecast, http://spot.nws.noaa.gov/cgi-bin/spot/spotmon?site=ffc
General Forecast, http://www.srh.noaa.gov/ffc/html/firewx.shtml
West Tennessee Fire Weather, http://www.weather.gov/meg/fireweather

7.2 Prescribed Burn Plan Template

TNARNG PRESCRIBED FIRE PLAN

Facility:_____

Training Area:_____ Burn Unit Number/Name:_____

Fuel Type:_____ Acres:_____

Burn Permit #: _____

Fire Planner(s):

Name:_____

Title:_____

Signature: _____ Date:_____

Name:_____

Title:_____

Signature: _____ Date:_____

Burn Boss:

Name:_____

Title:_____

Signature: _____ Date:_____

Complexity Rating:_____(Low, Moderate, High)

Approved By:

Signature: _____ Date:_____

A. Pre-Burn Go/No Go Checklist

	YES	NO
Has the area (inside and outside the unit) experience unusual drought conditions or does it contain above-normal fuel loadings which were not considered in the prescription development? If YES, go to question below. If NO, continue with Section B.		
If YES, have appropriate changes been made to plans for ignition, holding, mop-up, and patrol? If YES, continue with Section B. If NO, **stop** and consult Fire Manager.		

B. Prior to Crew Briefing:

- ☐ Fire Unit is as described in plan
- ☐ Copy of burn plan is on site
- ☐ Certified Burn Boss present; Permit obtained (#_____)
- ☐ Required number personnel present, with required PPE
- ☐ Weather forecast obtained & within prescription; Long-range forecast checked for chance of severe weather
- ☐ Official & neighbor notifications complete
- ☐ Required equipment for holding, weather monitoring, ignition, & suppression is on-site & functioning
- ☐ Crew has reviewed equipment
- ☐ Planned ignition & containment methods are appropriate for current & predicted conditions
- ☐ Planned contingencies & mop-ups are appropriate for current & predicted conditions
- ☐ List of emergency phone numbers are in each vehicle
- ☐ Off-site contingency resources are operational and available

C. Crew Briefing:

- ☐ Prescribed Fire Objectives
- ☐ Burn Unit size & boundaries
- ☐ Burn unit hazards & safety issues
- ☐ Expected weather & fire behavior
- ☐ Organization of crew & assignments
- ☐ Methods of ignition, holding, mop-up, communications
- ☐ Contact with the public; Traffic concerns
- ☐ Safety & medical plan
- ☐ Location of back-up equipment, supplies, & water
- ☐ Contingencies for escaped prescribed fire
- ☐ Contingencies for medical emergency

D. Prior to Ignition:

- ☐ On-site weather and fuel conditions are within prescription & consistent with forecast
- ☐ Test burn conducted; fire & smoke behavior within prescribed parameters.

Burn Boss:_____ **Date:**_____

1. Burn Objectives

_____

_____

2. Location and Physical Description (Attach map)

A. Site_____ **Training Area**_____

B. Size_____

C. Topography / Slope_____

D. Project Boundary_____

E. Complexity_____

3. Vegetation / Fuels Description

A. On-site Fuels

Vegetation Types	Fuel Models	% of Unit Area	% Slope	Aspect

B. Adjacent Fuels

Vegetation Types	Fuel Models	% of Unit Area	% Slope	Aspect

4. Description of Unique Features

A. Natural:_____

B. Cultural:_____

5. Special considerations (fences, power poles, …)**:**

_____

_____

_____

_____

6. Prescription

A. Environmental Prescription:_____

_____

B. Fire Behavior Prescription:_____

_____

7. Fuel and Weather Prescription (acceptable ranges)

Fuel Parameters	**Prescription MIN/MAX**	**Forecast* MIN/MAX**	**Test Fire**	**Rx Burn**
1-Hour Fuel Moisture (%)				
10-Hour Fuel Moisture (%)				
100-Hour Fuel Moisture (%)				
Live Fuel Moisture (%)				
Other (e.g., KBDI, live/dead ratio…)				
Weather Parameters				
Air Temperature (ºF)				
Relative Humidity (%)				
Days Since Rain				
20 ft. Wind Speed (mph)				
Wind Direction(s)				
Midflame Windspeed (mph)				
Atmospheric Mixing Height (ft.)				
Atmospheric Stability				
Rate of Spread				
Flame Length (ft.)				
Scorch Height (ft.)				
Probability of Ignition				

*Attach weather forecast.

8. Scheduling

A. Ignition Timeframe / Season(s):_____

B. Projected Duration:_____

C. Constraints:_____

9. Pre-burn Considerations and Weather

A. On-site Considerations:_____

B. Off-site Considerations:

C. Method & Frequency for Obtaining Weather and Smoke Management Information:

D. Notifications (List all agencies and neighbors):

Name	Date	Method	Contact Information
Public		Press Release	
Public		Road Signs	
TN Division of Forestry		Phone	731-986-5550
Milan Army Ammunition Plant		Phone	731-686-6416
Terry Volunteer Fire Department		Phone	731-987-3780
Gibson County Sheriff Department		Phone	731-855-0277
Carroll County Sheriff and Fire Dispatch		Phone	731-986-8947
Tennessee Highway Patrol		Phone	615-251-5175
MLAAP Fire and Security Dispatch		Phone	731-686-6565
Carroll County Fire Department Chief		Phone	731-415-5943

10. Ignition Plan

A. Firing Methods (including Techniques, Sequences, and Patterns)**:**

B. Devices:

C. Ignition Staffing:

11. Holding Plan

A. General Procedures:

B. Critical Holding Points:

C. Minimum Organization or Capabilities Needed:

12. Contingency Plan

A. Trigger Points:_____

_____

B. Actions Needed:_____

_____

C. Additional Resources and Maximum Response Time:_____

_____

D. Secondary Control Lines:_____

_____

E. Backup Water Supply:_____

13. Crew Organization

- **Burn Boss:**
- **Ignition Boss:**
  - **Ignition:**
  - **Ignition:**
- **Holding Boss:**
  - **Holding:**
  - **Holding:**
  - **Holding:**
- **Monitor:**

14. Equipment

Equipment Item	Quantity	Source

15. Fire Details

Ignition Time_____ **Fire Declared Out**_____

Narrative_____

_____

_____

7.3 Post Burn Evaluation

1. **Site**_____ **Training Area**_____
   Burn Date_____
   Evaluation Date_____(immediately following burn)
   Re-evaluation Date_____(follow-up as needed)

2. **Amount litter left** (immediately after burn)_____**(inches)**

3. **Understory vegetation consumed**_____**(%)**

4. **Scorch: % of Area with Crown Scorch**
   <1/3_____ **1/3 – 2/3**_____ **2/3+**_____

5. **Any spotting / slopovers?** (immediately after burn)

_____

_____

_____

6. **Tree Damage (insects, disease, mortality)?**_____

_____

7. **Understory kill of undesired vegetation (% top-killed)**_____

8. **Any smoke management violations?** (immediately after burn)

_____

_____

_____

9. **Any escapes?** (immediately after burn)

_____

_____

_____

10. Any complaints? (immediately after burn)

_____

_____

_____

11. Adverse effects?

_____

_____

_____

12. Any restoration needed?

_____

_____

_____

13. Were objectives met (results)?

_____

_____

_____

_____

Immediate Evaluation By:_____ **Date:**_____

Recommendations for future evaluation:

_____

_____

_____

_____

Follow-up Evaluation By:_____ **Date:**_____

7.4 After-Action Review

What did we set out to do?

What actually happened?

Why did it happen?

What are we going to do next time?

Which activities should be sustained?

What can be improved?

Annex 3

INVASIVE PEST PLANT CONTROL

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TABLE OF CONTENTS

1.0 INTRODUCTION

1.1 Background

Like most regions of the world today, the VTS-M suffers from infestations of invasive exotic pest plants. These pest species are causing significant changes to the natural vegetation communities and wildlife found on the site which, in turn, impacts the suitability and sustainability of the facility for military mission training. They are found throughout the training site, in open areas along roadsides and on the ranges, in the forest understory, and all along the creek banks. The most extensive problem species on the VTS-M are privet, Japanese honeysuckle, multiflora rose, Nepalese browntop, Canada thistle, sericea lespedeza, and Johnson grass. Kudzu is present in smaller quantities, but its typical high rate of spread makes this species a high priority for control. A variety of other invasive species are found in isolated occurrences across the site (Table A3.1). Figure A3.1 shows locations of small invasive occurrences; the more extensive populations are not depicted. The infestation information included here is based on the 2006 invasive plant species survey by Dynamic Solutions.

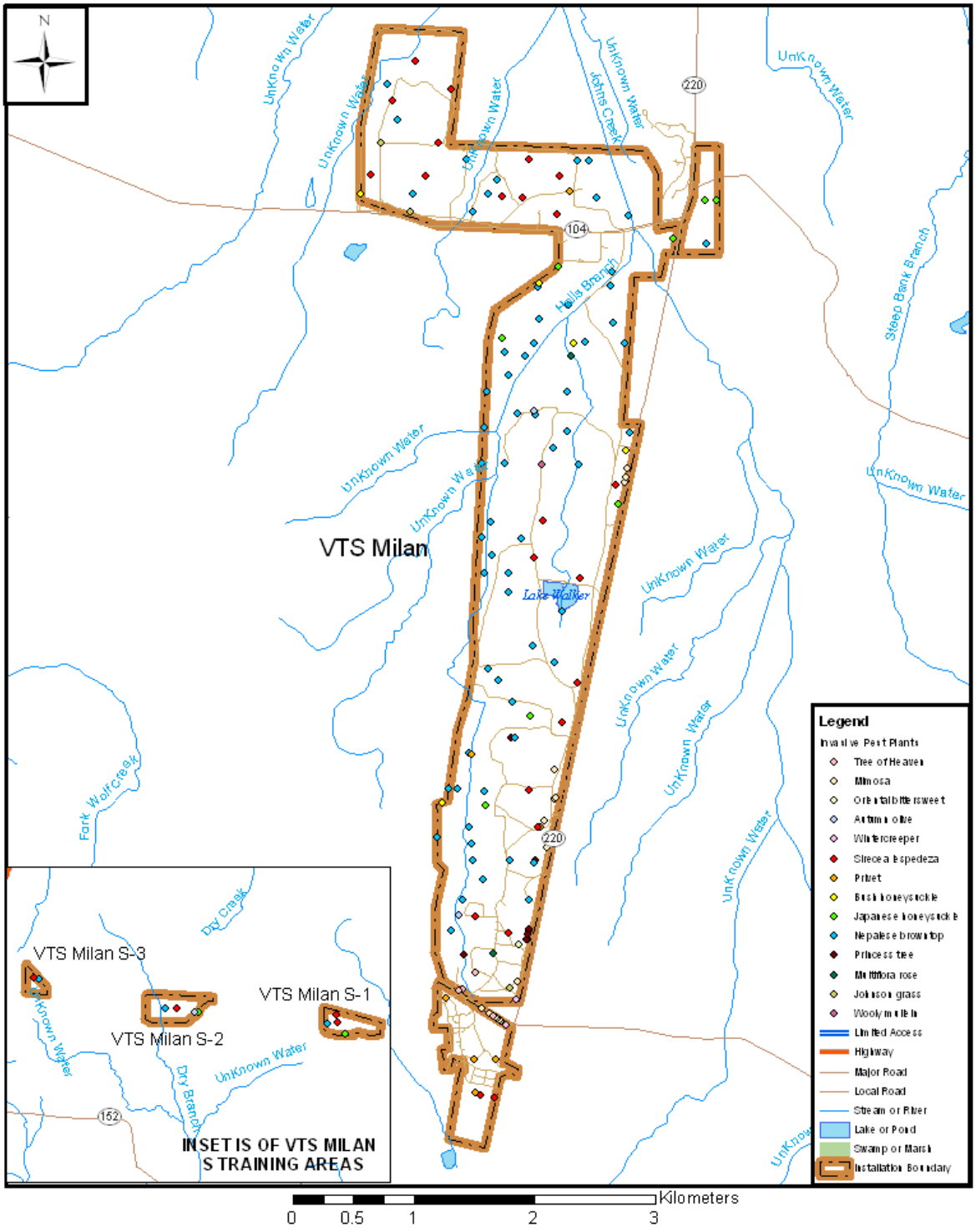


Figure A3.1: Invasive exotic plant occurrences on the VTS-Milan (small groups and individual plants; extensive infestations are not represented). From Dynamic Solutions (2006).

This annex provides more detailed information on each of these problem species, including recommended methods of control. It also outlines the plan of attack for controlling these species on the training site, to be implemented as funding allows. It is important to note that complete eradication of widespread invasive plant species is nearly impossible and is cost-prohibitive. Small, confined occurrences may be completely eliminated by prompt, decisive action; however, with well-established populations the only feasible goal is to contain and thin the infestation and hopefully prevent it from spreading further. Both eradication and control will take multiple years of repeated treatment to achieve.

The control plan on VTS-M will be a two-tiered approach: first, small occurrences (oriental bittersweet, air-potato, tree-of-heaven, mimosa, wintercreeper, princess tree, wooly mullein, periwinkle, autumn olive) will be identified and treated on a training area-by-training area basis, and second, the larger infestations (kudzu, privet, Japanese and bush honeysuckle, Nepalese browntop, multiflora rose, Johnson grass, sericea lespedeza, Canada thistle) will be treated on a species basis in manageable sections. The spatial occurrence of the invasive species is described in more detail below. Control methods will typically be a combination of mechanical (cutting, mowing) and chemical (herbicide) and will follow US Forest Service and TN Exotic Pest Plant Council (TN-EPPC) control recommendations (Miller 2003; TN-EPPC 1997).

1.2 Objectives

The objective of this plan is to provide effective control of invasive exotic pest plants on the VTS-M, limiting the areas infected by exotics and allowing the native vegetation communities to reestablish themselves.

Important guidelines for the control program:

- Eradication and suppression efforts will be coordinated and scheduled to avoid interference with training events;
- There should be no detrimental environmental impact resulting from this control effort;
- Limited vegetation removal may occur but will not be done in a manner destructive to the stability of stream banks, soil, or the ecosystem present;
- Only herbicides labeled for application to water will be applied within 50 feet of any recognized waterway;
- Small or new infestations should be treated with the intent of complete eradication.

1.3 Species Targeted for Suppression

Invasive plant species are successful invaders because they generally grow rapidly, create large amounts of seed, and are thus positioned ecologically to exploit the greater amount of light found on the edges of man-made and natural openings as well as all disturbed areas. The roads and openings of the forested and woodland portion of the VTS-M have provided many places for invasive plant species to seed into and dominate.

The Tennessee Exotic Pest Plant Council (TN-EPPC) has developed a list of invasive plants and ranked them according to the threat that they pose. TN-EPPC recommends that Rank 1 and Rank 2 species be controlled and managed in the early stages of detection when possible. The classification of each invasive plant species observed at VTS-M is noted in Table A3.1 below, which summarizes the invasive species observed at the VTS-C site during the 2006 invasive species survey. The table is organized alphabetically by species observed. Abundance of the invasive species in the aggregation was coded Dominant, greater than 50%, Present, 10 to 50 %, and Sparse, less than 10%.

Table A3.1: Invasive exotic plant species observed on VTS-Milan (from Dynamic Solutions 2006).

Scientific Name	Common Name	TEPPC Ranking	Abundance at VTS-M
Ailanthus altissima	tree of heaven	Rank 1: Severe Threat	Present at isolated locations in TA-A2 and A5.
Albizia julibrissin	mimosa	Rank 1: Severe Threat	Present at isolated locations in TA-A1, A3, A5, A7, A8, B2, B3, and the Cantonment.
Celastrus orbiculata	oriental bittersweet	Rank 1: Severe Threat	Sparse at one isolated location in TA-A1.
Cirsium arvense	Canada thistle	Rank 2 -- Significant Threat	Present along edges and in openings in TA-A3, A5, A6, A7, A8, B2, B3, and S.
Dioscorea oppositifolia	Air potato, Chinese yam	Rank 1: Severe Threat	Sparse at one isolated location in the Cantonment
Elaeagnus umbellata	autumn olive	Rank 1: Severe Threat	Sparse but observed in TA-A2, A3, A9, C1, and S2. Present in the southern part of TA-B2 and B3
Euonymus fortunei	wintercreeper	Rank 1: Severe Threat	Present at one isolated location in TA-A1. Dominant in several locations in wooded area on eastern side of the Cantonment.
Lespedeza cuneata	sericea lespedeza	Rank 1: Severe Threat	Present pervasively in TA-A, B, C, S, and the Cantonment
Ligustrum sinense &/or Ligustrum vulgare	privet	Rank 1: Severe Threat	Sparse to present in TA-A3, A4, A5, A6, A7, A8, A9, A10, B, C1, and S. Pervasively present to dominant in TA-A1, A2, and less heavily developed portions of the Cantonment.
Lonicera japonica	Japanese honeysuckle	Rank 1: Severe Threat	Present pervasively in all training areas. Dominant in sunny edges of roads and openings.
Lonicera maackii, Lonicera morrowii, Lonicera x bella, &/or Lonicera tatarica	bush honeysuckle	Rank 1: Severe Threat	Sparse in TA-A4, A7, A8, A9, AND B
Microstegium vimineum	Japanese grass; microstegium	Rank 1: Severe Threat	Dominant in forested and shaded areas in all training areas and the Cantonment.
Paulownia tomentosa	princess tree, royal paulownia	Rank 1: Severe Threat	Present at isolated locations in TA-A1, A2, A3, A4, and B3.
Pueraria montana	kudzu	Rank 1: Severe Threat	Dominant at isolated locations in TA-A10, TA-C1, TA-S2, and Cantonment. Present in isolated population in TA-B3.

Scientific Name	Common Name	TEPPC Ranking	Abundance at VTS-M
Rosa multiflora	multiflora rose	Rank 1: Severe Threat	Present in TA- A2, A4, A6, A8, B, S and the Cantonment.
Sorghum halepense	Johnson Grass	Rank 1: Severe Threat	Present in open sunny places in TA-A1, A2, A3, A4, A5, A6, A7, B1, B2, B3, and the Cantonment
Verbascum thapsus	wooly mullein	Rank 2 -- Significant Threat	Sparse at one isolated location in TA-A7
Vinca minor	common periwinkle	Rank 2 -- Significant Threat	Sparse at one isolated location in the TA-A2

2.0 CONTROL PLAN

2.1 Small Infestations

The species which occur in small patches in only a few locations will be treated first, with the goal of completely eradicating these species on VTS-M:

Oriental bittersweet occurs in one location in training area A-1, while Chinese yam was found on one site in the Cantonment. Both are small occurrences but have the potential to spread rapidly. They will be treated with a foliar spray of Garlon 3A or Garlon 4 in July to October. Any vines that are too tall for foliar application will be cut and the stump treated with Garlon 4. Chinese yam fruits will be collected and burned.

Tree-of-heaven and mimosa will be treated at the same time. A crew will travel the road system and trails of the training site during the late summer or mid-winter and treat all individuals of these species that they encounter. Tree-of-heaven has previously been found in training areas A-2 and A-5, but mimosa occurs in training areas A-1, A-3, A-5, A-7, A-8, B-2, and B-3, as well as the Cantonment. Large trees will be stem-injected or felled and the stump treated with Garlon 3A. Saplings will be basal-bark treated with Garlon 4. The following summer, a crew will return to treat all sprouts and seedlings with a foliar spray of Garlon 4.

Princess tree, bush honeysuckle, and autumn olive occurrences will be treated at the same time. Princess tree has been noted in training areas A-1, A-2, A-3, A-4, and B-3. Bush honeysuckles were found in training areas A-4, A-7, A-8, and A-9. Autumn olive occurs sparsely in A-2, A-3, A-9, C-1, and S-2 and is common in B-2 and B-3. Large trees will be stem injected or cut-stump treated with Arsenal AC or a glyphosate herbicide. Saplings will be basal bark treated with Garlon 4. The following summer, the crew will treat all sprouts and seedlings with a foliar spray of Garlon 4.

Wooly mullein has been found in multiple locations in training areas A-7 and B-2. It will be treated by hand pulling in May-June. Flowering plants will be bagged for disposal; immature plants will be dispersed on a surface on which they cannot re-root. These areas will be scouted and treated annually for several years until the seed bank is exhausted.

Wintercreeper occurs at one location in A-1 and in several patches in the eastern portion of the Cantonment. Common periwinkle occurs at one location in training area A-2. Both of these vines will be treated in late summer to fall with a foliar application of Garlon 4. This will be repeated annually for

several years. In August, prior to spraying, the patch should be inspected and all vertical climbing stems and any visible flowering stems will be cut to minimize fruit development.

2.2 Extensive Infestations

A number of invasive species have become thoroughly established on the VTS-C and are unlikely to ever be completely removed. The goal of this program is to bring those infestations under control, reducing the numbers of exotic plants, rehabilitating native communities that have been affected, and limiting further spread of the invasives. The principle species are kudzu, privet, Japanese honeysuckle, Nepalese browntop, and an open-areas conglomeration of sericea lespedeza, Canada thistle, and Johnson grass.

For each of these species, the control effort will be intensive and require several years of effort. It would be most efficient to have a firm commitment of manpower and funding for at least 3 years' work prior to initiating any control efforts. A single year of effort without follow-up will have little long-term impact on the invasive species and will represent wasted effort and money.

In addition to the control efforts, it will be necessary to be prepared with a plan for reestablishing native vegetation once the invasives have been cleared. Native species restoration plans will be developed individually for areas requiring such. Restoration efforts will utilize all native species and will involve a minimum of soil disturbance.

2.2.1 Kudzu

Kudzu infestation on the VTS-M is limited to a few relatively small areas in training areas A-10, C-1, S-2, and the Cantonment. This fast-growing vine can be very difficult to eliminate because of an extensive root system that can repeatedly re-sprout following top-kill. Areas which are largely devoid of desirable plant species due to the kudzu will be treated with a foliar spray of Tordon K (2% solution) or Escort (3-4 oz per acre). Patches which still retain desirable species will be treated with Transline (0.5% solution). Either of these treatments will be made in July-September. In areas where the kudzu infestation has completely hidden the ground surface and made traverse hazardous, it may be necessary to controlled burn the site in the spring prior to treating in the summer.

2.2.2 Privet

Privet occurs in virtually every training area on the VTS-M and the Cantonment. It is found within a wide range of environmental conditions from wet lowlands along the creeks and up onto the drier upland portions of the site. It is particularly common along roadsides and forest edges; although it can be found quite a distance into closed canopy stands in some places. Privet is most dominant in training areas A-1, A-2, and the Cantonment.

Treatment will begin at the less heavily infested northern end of the training site in training areas B and C and then work southward. Roadsides, forest/field boundaries, forest openings, and creek banks will be treated. Individuals less than 5" dbh will be treated with a basal bark spray of Garlon 4. Larger stems will be cut and immediately stump treated with Arsenal AC. This process will be repeated in manageable chunks moving south through the A training areas and then to the S areas. This effort should be conducted in winter. The following late summer, a return visit will be made to treated areas to foliar spray sprouts with Arsenal.

The same program will need to be repeated each winter for several years.

If there are areas of infestation in which little to no desirable vegetation remains, at least 50 feet beyond any creek banks and more than 50 feet from any skullcap management group boundary, a brush cutter or similar equipment may be used to mow down the privet while leaving any other trees and shrubs standing, as possible. This should be conducted in summer when the ground is dry but before seed set. This will be followed up in the fall with broadcast foliar application of Arsenal AC to the sprouts.

2.2.3 Nepalese browntop

Nepalese browntop occurs in low-lying and moist, shaded areas throughout the VTS-M. It dominates the understory in most of the bottomland forests on the site. Management will be concentrated along the creeks and drainages, beginning at the southern end of the training site and moving northward.

Treatment will consist of foliar application of herbicide: glyphosate where there is little desirable vegetation mixed with the Nepalese browntop. Vantage or Select 2EC (grass-specific post emergent herbicide) will be applied in locations where native herbaceous vegetation is still present. Treatment will be made in early June, with a second application in late July to ensure complete kill. Care will be taken to avoid drift onto the waterways. Infestations on shorelines will be treated with a glyphosate herbicide labeled for aquatic use. Sites will be inspected the following June for new germination. Complete removal will require several years to exhaust the seedbank.

Areas that are accessible and also sufficiently dry may be treated without chemicals by mowing in August. This method requires careful timing to remove the flowers before seed set but late enough to negate the possibility of new flower development. This method will also require several years of repeat treatments to exhaust the seedbank.

Areas that were heavily infested with Nepalese browntop will need to be reseeded or planted with native species to minimize the available space for re-invasion.

2.2.4 Japanese honeysuckle

Japanese honeysuckle is also present throughout the training site, and is especially dominant along sunny roadsides and forest/field edges. The first stage of control will be to treat infestations along roads. Foliar spray with Garlon 3A will be conducted in the late fall. Areas will be checked the following summer to determine the need for retreatment. Additional infestations of honeysuckle that are documented during the course of other work will be treated the following winter.

2.2.5 Open areas complex

Most open fields and roadsides around the training site are infested with some combination of sericea lespedeza, Johnson grass, and Canada thistle. Control of these species will be undertaken in combination with an effort to restore native grasses where feasible on the training site. Small arms ranges and lawns are typically not appropriate locations for native warm season grasses, due to their tall growth form. Such areas will be maintained with the existing mixtures of fescue, bermudagrass, crabgrass, and similar species. Canada thistle will be spot treated with Garlon 3A when found in these areas. Johnsongrass clumps will be spot treated with glyphosate or Arsenal when found.

Less manicured open areas such as the tank range impact area may be treated for invasive pest plants in preparation for reseeding native warm season grasses (NWSG). The standard site preparation for conversion to NWSG involves a combination of herbicide treatments, mowing, and burning prior to sowing the NWSG seed. Glyphosate or triclopyr herbicides in conjunction with Plateau herbicide are used to control fescue and should control the other exotic species in these areas. Establishment of native

grasses requires several years of effort before a good stand is present. Repeated area treatments and spot treatments may be required during this time to control the exotic plant species.

2.3 Environmental Precautions

The VTS-M heavily dissected by Johns Creek and Halls Branch and their tributaries. The two named creeks are both identified as impaired by the State of Tennessee. Protecting stream habitat from both chemical pollutants and sedimentation is of utmost importance.

- There will be no herbicide applications to water unless the chemical is labeled for aquatic use
- Within 25 feet of water, only stem treatments will be used to minimize risk of drift
- Foliar treatments will be avoided in any situation where the spray would be carried toward water
- At all times, care will be taken to minimize drift to desirable vegetation
- Where possible, dead vegetation will be left standing on the creek banks
- There will be no stump removal on creek banks
- Where creek banks are more than 50% invasive species, revegetation and bank stabilization will be conducted immediately following IPP control

All label requirements will be followed, as will state and DoD pesticide regulations. Only state or DoD certified applicators will apply herbicides for IPP control. Non-certified personnel may help with non-chemical aspects of control, but will be briefed on pesticide safety prior to initiating work.

In 2011 the State of Tennessee adopted the EPA requirement for a general National Pollutant Discharge Elimination System (NPDES) permit for application of pesticides into waters of the state. Applications that typically fall under this requirement include mosquito and flying insect control, weed and algae control, animal pest control, and forest canopy pest control. Applications that do not reach waters of the United States do not require a permit. TNARNG natural resources management rarely requires application of pesticide products to surface water. All efforts will be made to avoid contamination of waters of the state with intentional or accidental pesticide application. If a situation does require an application to or above waters of the state, the appropriate permit will be obtained through the Tennessee Department of Environment and Conservation.

2.4 Personal Protective Equipment (PPE)

Personnel who handle and/or apply pesticides are required to wear personal protective equipment and clothing designated on the herbicide label IAW the Federal Insecticide, Fungicide, and Rodenticide Act (40 CFR 162), Occupational Safety and Health Standards (29 CFR 1910), and DOD Directive 4150.07. Such protective devices include masks, respirators, gloves, goggles, and protective clothing necessary for the pest management operations being conducted and the pesticides used. All personnel involved in pesticide operations will utilize, at minimum, the PPE required by the product label.

2.5 Treatment Methods

2.5.1 Cut stump

The cut stump method is a method used for trees and woody shrubs greater than 5” dbh. The tree is cut down, leaving a stump 2 to 6 inches high (excessive stump height can limit the effectiveness of this method). The appropriate herbicide solution is applied to the outer 20% of the freshly cut surface within a few minutes, if possible. (After 2 hours, a basal bark treatment with penetrant will have to be applied.)

Apply the appropriate herbicide to the outer 20% of the stump's cut surface. All stems coming from the base or roots of the plant should be cut and treated at the same time.

The cut stump method is most effective when the plant is actively growing but not during the first flush of spring growth. Therefore, cut stump treatments may be initiated in May and continue through the summer. Cut stump can also be applied during the dormant season.

2.5.2 Stem injection

Stem injection is another method for use on large trees and shrubs. Incision cuts are made downward into the stem, and herbicide is applied into the cut. With hard to control species, the cuts should completely frill the stem. There is less physical effort required for this method as opposed to completely cutting down the tree, but it leaves a dead snag standing, which may or may not be acceptable, depending on the situation.

Like cut stump, stem injection is most effective in late winter or throughout the summer. It should not be utilized during the heavy spring sap flow.

2.5.3 Basal bark spray

The basal bark method is a recommended method for controlling young trees with smooth bark (generally individuals under 5" dbh). A 6 to 12 inch band of herbicide is applied around the circumference of the tree trunk approximately one foot above ground level. The width of the sprayed band depends on the size of the tree and the species' susceptibility to the herbicide. Ester formulations of pesticides are most effective due to their ability to readily pass through tree bark. Esters are volatile and care must be taken to follow the label – avoid ester formulations on hot days because vapor drift can injure nontarget plants. A chemical penetrant should be included in the herbicide mixture.

Basal bark applications are usually made in late winter and early spring, when leaves do not interfere with trunk access. This method is effective during the summer, but much more difficult.

2.5.4 Foliar spray

The foliar spray method can be used for all target species not in close proximity to environmentally sensitive areas. This method is most effective in areas where there is a low density of desirable vegetation. Care must be taken to use appropriate spray equipment with sufficient droplet size to minimize drift to nontarget plants. Handheld sprayers can only treat plants up to about 6' in height. Leaves should be wet thoroughly but not to the point that herbicide runs off and impacts non-target species. Air temperature should be above 65ºF to ensure absorption of herbicides.

Foliar sprays should not be used on windy days. Care must be taken to minimize threat to surrounding nontarget vegetation and other sensitive sites (riparian areas).

The foliar spray method only works when the plant has full or near full leaf cover and is most effective from mid-summer to late fall, depending on the target species' life cycle. Evergreen or semi-evergreen species like privet and honeysuckle can be treated in the late fall to winter as long as they retain a significant portion of their leaf cover.

2.6 Herbicides

Table A4.2 reflects the recommended herbicide and standard concentration to use per plant species and the primary method of control. These recommendations must be corroborated with the concentrations approved on each product label. **The label is the law.**

Table A4.2: Herbicide concentrations for use on VTS-C invasive pest plants.

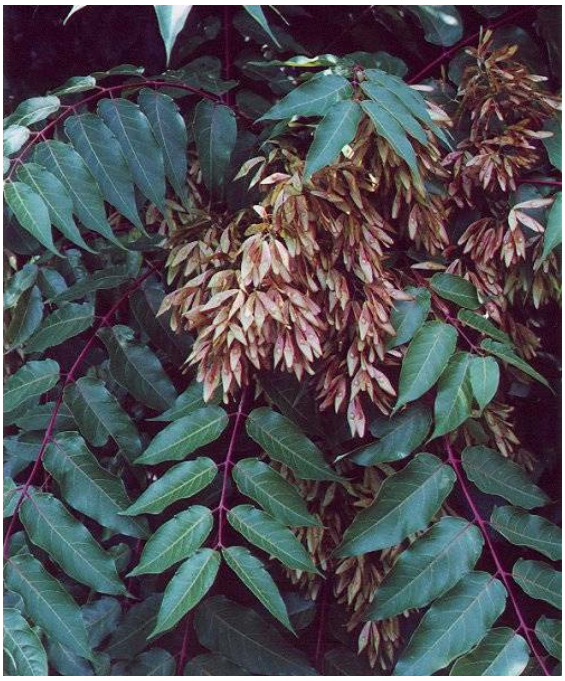
Species	Season	Method	Chemical	Concentration	Additive
Autumn olive	Summer	Foliar	Arsenal AC	1%	Surfactant
	Mid-winter/Summer	Basal bark	Garlon 4	20%	Basal oil + penetrant
	Fall/winter	Cut stump	Glyphosate	20%	Surfactant
Bush honeysuckle	Late summer/fall	Foliar	Glyphosate	2%	Surfactant
	Fall/winter	Basal bark	Garlon 4	2%	Basal oil + penetrant
	Fall/winter	Cut stump	Arsenal AC	10%	Surfactant
Canada thistle	Summer (pre-flower)	Foliar	Garlon 3a	2%	Surfactant
Johnsongrass	Summer	Foliar	Arsenal	Label	Surfactant
Japanese honeysuckle	Late fall	Foliar	Garlon 3A	5%	Surfactant
Kudzu	Summer/fall	Foliar	Tordon K	2%	Surfactant
	Sumer/fall	Foliar	Escort	3-4 oz/acre	Surfactant
	Summer	Cut stump	Garlon 4	4%	Surfactant
Nepalese browntop	June & July	Foliar	Glyphosate	2%	Surfactant
	June & July	Foliar	Sethoxydim	Label	Surfactant
	June & July		Clethodim	Label	
Mimosa	Fall/winter	Cut stump	Garlon 3A	Label	
	Fall/winter	Basal bark	Garlon 4	20%	Basal oil + penetrant
	Summer	Sprout – Foliar	Garlon 4	2%	Surfactant
Multiflora rose	April-June	Foliar	Arsenal AC	1%	surfactant
	Fall/winter	Cut stump	Arsenal AC	10%	
	Summer/winter	Basal bark	Garlon 4	20%	Basal oil + penetrant
Oriental bittersweet	Summer	Foliar	Garlon 4 or Garlon 3A	3%	Surfactant
	Fall/winter	Basal bark	Garlon 4	20%	Basal oil + penetrant
	Fall/winter	Cut stump	Garlon 4	4%	Surfactant
Periwinkle	July-October	Foliar	Garlon 4	4%	Surfactant
Princess tree	Fall/winter	Cut stump	Glyphosate	Label	
	Fall/winter	Basal bark	Garlon 4	20%	Basal oil + penetrant
	Summer	Sprout – Foliar	Garlon 4	2%	Surfactant
Privet	Fall/winter	Cut stump	Arsenal AC	10%	Surfactant
	Fall/winter	Basal bark	Garlon 4	20%	Basal oil + penetrant
	Summer	Sprout – Foliar	Arsenal AC	1%	Surfactant

Species	Season	Method	Chemical	Concentration	Additive
Sericea lespedeza	Summer	Foliar	Garlon 4 or Glyphosate	2% 2%	Surfactant
Tree-of-heaven	Fall/winter	Cut stump	Garlon 3A	Label	
	Fall/winter	Basal bark	Garlon 4	20%	Basal oil + penetrant
	Summer	Sprout – Foliar	Garlon 4	2%	Surfactant
Wintercreeper	August	Hand cut	N/A	N/A	N/A
	Summer/fall	Foliar	Garlon 4	4%	Surfactant
Wooly mullein	May-June	Hand pull	N/A	N/A	N/A

3.0 INVASIVE SPECIES DETAILS

Ailanthus altissima (tree of heaven)

- Description: Tree of heaven is a rapidly growing small tree but can reach up to 80 feet in height and 6 feet in diameter. It has pinnately compound leaves that are 1-4 feet in length with 10-41 leaflets. Tree of heaven resembles the sumacs and hickories, but is easily recognized by the glandular, notched base on each leaflet. It is extremely tolerant of poor soil conditions and has been known to grow even in cement cracks. It cannot grow in shaded conditions but thrives in disturbed forests or edges. Dense clonal thickets displace native species and can rapidly take over fields and meadows.



- Specific Control Prescription: Small trees may be effectively controlled by hand pulling. Pulling may be done any season. Moist soil facilitates pulling. During growing season, re-inspect pulled sites in 30 days for regrowth from unpulled roots.

  Larger trees should be cut at the stump during the growing season. Treat the cut stump immediately with Garlon 3A. As a follow-up when and if stump sprouting occurs, apply Garlon 4 in a 2% solution of herbicide and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray drift damage to non-target species.

Present in Training Area	
3	

Albizia julibrissin (mimosa)

- Description: Mimosa is a small tree that is 10 to 50 feet in height, often having multiple trunks. It has delicate looking bi-pinnately compound leaves that resemble ferns. Mimosa has very showy, pink flowers that are fragrant, giving way to small, flat bean-pod like fruits. Mimosa invades any type of disturbed habitat. It is commonly found in old fields, stream banks, and roadsides. Once established, mimosa is difficult to control due to the long-lived seeds and its ability to re-sprout vigorously.

- Specific Control Prescription: Small trees may be effectively controlled by hand pulling any time of year. Areas where pulling has been done should be re-inspected during the growing season after 30 days to look for sprouts.

  Larger trees should be cut at the stump. Treat the cut stump immediately with Garlon 3A, mixed in accordance with the label.

  As a follow-up when and if stump sprouting occurs, apply Garlon 4 in a 2% solution of herbicide and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray drift damage to non-target species.

Present in Training Area	
2	**3**
7	**9**
Cantonment	

Celastrus orbiculata (oriental bittersweet)

- Description: Oriental bittersweet is a deciduous, climbing, woody vine that can grow to lengths of 60 ft. The alternate, elliptical leaves are light green in color. Small, inconspicuous, axillary flowers give way to round green fruit which ripen and split to reveal showy scarlet berries that persist into winter. It closely resembles American bittersweet (*Celastrus scandens*) but can be distinguished because American bittersweet has flowers and fruits in terminals rather than axillary along the stem. Oriental bittersweet is commonly found through the southern Appalachians in old house sites, fields, and road edges. Some shade tolerance allows it to also grow in open forests. Prolific vine growth allows it to encircle trees and girdle them. It also can completely cover other vegetation and shade, out-compete and kill even large trees. It can be dispersed widely and quickly due to the berries being eaten and spread by birds.

- Specific Control Prescription: Treat this species as soon as is feasible. Treating it before the fruit falls off of the vines in the fall will minimize retreatment due to restricted seed fall. Cut climbing or trailing vines as close to the root collar as possible. Cut the stem 2 inches above ground level. Immediately apply a 4% solution of Garlon 4 to the cross-section of the stem. This procedure is effective at low temperatures.

  The following summer foliar treat all sprouts with a 3% solution of Garlon 3A or Garlon 4. Bag for disposal or burn all seeds, to reduce the spread of seeds.

Present in Training Area
A

C*irsium arvense (*Canada thistle)

- Description: Canada thistle is a tall, erect, spiny herbaceous plant that grows to 4 feet tall. It has an extensive creeping rootstock. The leaves are lance-shaped, irregularly lobed with very prickly margins. The stems are ridged and hairy. The flowers are purple to white and can be up to .5 inch in diameter. The small seeds, called achenes, are 1 to 1.5 inches long and have a feathery structure attached to the base, which lets them float through the air. Canada thistle can invade a variety of open habitats including prairies, savannas, fields, pastures, wet meadows, and open forests. It forms dense stands, which can shade out and displace native vegetation. Once established it spreads rapidly and is difficult to remove.

- Specific Control Prescription: Canada thistle control can be achieved through hand cutting, mowing, and controlled burning, and chemical means, depending on the level of infestation and the type of area being managed. Due to its perennial nature, entire plants must be killed in order to prevent regrowth from rootstock. Hand cutting of individual plants or mowing of larger infestations should be conducted prior to seed set and must be repeated until the starch reserves in the roots are exhausted. Because early season burning of Canada thistle can stimulate its growth and flowering, controlled burns should be carried out late in the growing season for best effect.

In natural areas where Canada thistle is interspersed with desirable native plants, utilize a targeted application of a 2% solution of Garlon 3A with surfactant. For extensive infestations in disturbed areas with little desirable vegetation, broad application of this type herbicide may be the most effective method. Repeated applications are usually necessary due to the long life of seeds stored in the soil.

Present in Training Area	
3	**4**
5	**7**

***Elaeagnus umbellata* (autumn olive)**

- Description: Autumn olive is a deciduous shrub from 3 to 20 feet in height. Autumn olive is easily recognized by the silvery, dotted underside of the leaves. Small, yellowish flowers or red, juicy fruits are abundant and occur on clusters near the stems. Autumn olive invades old fields, woodland edges, and other disturbed areas. Autumn olive can form a dense shrub layer that displaces native species and closes open areas. Autumn olive is native to China and Japan and was introduced into America in 1830. Since then it has been widely planted for wildlife habitat, mine reclamation, and shelterbelts.

- Specific Control Prescription: Small plants may be may be effectively controlled by hand pulling any season. Plants should be pulled as soon as they are large enough to grasp, but before they produce seeds. Seedlings are best pulled after a rain when the soil is loose. The entire root must be removed since broken fragments may re-sprout. These species are well attached to the soil by their roots and are likely to require mechanical assistance in pulling with tools once they are larger than approximately .25 inches at the root collar.

Larger or un-pullable plants are most easily treated by cutting at ground level with saws. Cutting is most effective when trees have begun to flower to prevent seed production. Cutting during winter and follow-up spraying of resulting tender sprouts in spring and mid-summer is likely to provide effective control. Treat the cut stump immediately with a glyphosate 20% solution applied to the outer 20% of the cut stump.

Follow-up with a foliar application to sprouts of a 1% solution of Arsenal AC plus surfactant. If possible, bag seeds for disposal.

Present in Training Area	
A	**B**
C	**S**

Euonymus fortunei (wintercreeper)

- Description: Wintercreeper, also known as climbing euonymus, is an evergreen, clinging vine. It can form a dense groundcover or shrub to 3 feet in height, or climb 40-70 foot high vertical surfaces with the aid of aerial roots. Dark green, shiny, egg-shaped leaves, from 1 - 2 1/2 inches long, with toothed margins and silvery veins, occur in pairs along the stems. Stems are narrow, minutely warty, and have abundant rootlets or trailing roots. Clusters of inconspicuous green-white flowers are produced on a long stalk from June to July and are followed in the autumn by pinkish to red capsules that split open to expose seeds adorned with a fleshy orange seed coat, or aril.

- Specific Control Prescription: For small populations, like those observed in TA-A1, individual vines should be pulled up by the roots or cut off at ground level and removed from the area. Follow-up with a foliar application to resprouts: a 4% concentration of Garlon 4 with a surfactant is reported to be effective. Treatment should be in late winter when most native vegetation is dormant and prior to the emergence of spring wildflowers.

Present in Training Area	
3	**5**
9	**10**
Cantonment	

***Lespedeza cuneata* (sericea lespedeza)**

- Description: Sericea lespedeza is an upright semi-woody forb, 3 to 6 feet in height with one to many slender stems. It has thin, alternate, abundant, three-parted leaves. Flowers are small and whitish-yellow. It is an extremely aggressive invader of open areas, out competing native vegetation. Once it is established is very difficult to remove due to the seed bank, which can remain viable for decades. Native to Asia and introduced into the Unites States in the late 1800s, sericea lespedeza has been widely planted for wildlife habitat, erosion control, and mine reclamation.

- Specific Control Prescription: The best control of lespedeza combines both mechanical and chemical treatments. Hand pulling is impractical due to its extensive perennial root system, but mowing plants at the flower bud stage for two to three consecutive years can significantly reduce the vigor of stands as well as control further spread. Mowing followed by an herbicide treatment is likely the most effective option for the successful control.

  Herbicide should be applied in mid- to late-summer, July through September. Apply Garlon 4 as a 2% solution. Note that lespedeza and Johnson grass were observed to be growing together and any treatment of one will harm or benefit the other, so plan accordingly.

Present in Training Area	
2	**3**
5	**7**
Cantonment	

***Ligustrum sinense &/or Ligustrum vulgare* (privet)**

- Description: Privet is a thick, semi-evergreen shrub to 30 feet in height. Trunks usually occur as multiple stems with many long, leafy branches attached at near right angles. Leaves are opposite, oval and .5 to 1.5 inches long. White flowers are very abundant and occur at the end of branches in clusters. Fruits ripen to a dark purple to black color and persist into winter. Although several species occur, they are hard to distinguish. It commonly forms dense thickets in the fields or in the understory of forests. It shades and out-competes many native species and, once established, is very difficult to remove.

- Specific Control Prescription: Privet has leaves throughout the year in Tennessee and thus can be identified and treated at any time during the year. Small plants may be may be effectively controlled by hand pulling. Plants should be pulled as soon as they are large enough to grasp, but before they produce seeds. Seedlings are best pulled after a rain when the soil is loose. The entire root must be removed since broken fragments may re-sprout. Smaller shrubs are usually easy to pull; larger individuals are likely to require mechanical assistance in pulling.

  Mowing or other mechanical reduction of plant mass is effective for providing safer spraying access but is not an effective control by itself**.** Foliar Spraying can be effective for large thickets of privet where risk to non-target species is minimal. Timing applications for late fall or early spring when many native species are dormant will help minimize damage to non-target species. Generally foliar herbicides offer better control in warmer weather, as plants are growing faster, but privet keeps its leaves which can make it easier to locate when most other plants don not have leaves. To spray, apply a 1% solution of Arsenal AC plus a surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce spray-drift damage to non-target species.

Present in Training Area	
1	**2**
3	**4**
5	**6**
7	**8**
9	**10**
Cantonment	

  Larger or un-pullable plants require cutting at ground level with saws. Cutting is most effective when plants have begun to flower to prevent seed production. Re-sprouting is common after treatment. Cutting is an initial control measure, and success will require either an herbicidal control or repeated cutting of re-sprouts.

  Treat the cut stump immediately with Arsenal AC applying a 10% solution of herbicide and water to the cut stump. As a follow-up when and if stump sprouting occurs, apply a 1% solution of Arsenal AC plus a surfactant as a foliar spray.

***Lonicera japonica* (Japanese honeysuckle)**

- Description: Japanese honeysuckle is a perennial vine that climbs by twisting its stems around vertical structures, including limbs and trunks of shrubs and small trees. Leaves are oblong to oval, sometimes lobed, have short stalks, and occur in pairs along the stem. In Tennessee, Japanese honeysuckle leaves often remain attached through the winter. Flowers are tubular, with five fused petals, white to pink, turning yellow with age, very fragrant, and occur in pairs along the stem at leaf junctures. Stems and leaves are sometimes covered with fine, soft hairs. Japanese honeysuckle blooms from late April through July and sometimes into October. Small black fruits are produced in autumn, each containing 2-3 oval to oblong, dark brown seeds about 1/4 inch across.

- Specific Control Prescription: Mowing and fire are effective at reducing the aboveground mass of plant material, but require herbicide follow-up for effective control of honeysuckle.

  Foliar spraying with a 5% solution of Garlon 3A is may be effective for controlling Japanese honeysuckle. Timing applications for late fall or early spring when many native species are dormant will help minimize damage to non-target species. Generally foliar herbicides offer better control in warmer weather, as plants are growing faster, but honeysuckle keeps its leaves, which can make it easier to locate when most other plants do not have leaves.

Present in Training Area	
1	**2**
3	**4**
5	**6**
7	**8**
9	**10**
Cantonment	

***Lonicera maackii, Lonicera morrowii, Lonicera x bella, &/or Lonicera tatarica* (bush honeysuckle)**

- Description: Exotic bush honeysuckles are upright, generally deciduous shrubs that range from 6 to 15 feet in height. The 1-2 ½ inch, egg-shaped leaves are opposite along the stem and short-stalked. Older stems are often hollow. Pairs of fragrant, tubular flowers less than an inch long are borne along the stem in the leaf axils. Flower color varies from creamy white to pink or crimson. Flowering generally occurs from early to late spring, but varies for each species and cultivar. The fruits are red to orange, many-seeded berries.

- Specific Control Prescription: Small plants may be may be effectively controlled by hand pulling. Plants should be pulled as soon as they are large enough to grasp, but before they produce seeds. Seedlings are best pulled after a rain when the soil is loose. The entire root must be removed since broken fragments may re-sprout. Smaller bush honeysuckles are usually easy to pull; larger individuals are likely to require mechanical assistance in pulling with tools.

  Mowing or other mechanical reduction of plant mass is effective for providing safer spraying access but is not an effective control by itself**.** Foliar sprays may be effective on dense, low growing stands. Apply a 2% solution of glyphosate plus a non-ionic surfactant to thoroughly wet all leaves.

  Larger plants may be cut at ground level and stump treated with 10% Arsenal AC with a surfactant. Or small stems may be treated by basal bark spray of 2% Garlon 4.

Present in Training Area	
A	**B**

***Microstegium vimineum* (Japanese grass, Nepalese browntop)**

- Description: Japanese grass, also known as Nepalese browntop and other names is an annual plant. It has a sprawling habit and grows slowly through the summer months, ultimately reaching heights of 2 to 3 1/2 ft. (6-10 dm.). The leaves are pale green, lance-shaped, asymmetrical, 1-3 in. (3-8 cm.) long, and have a distinctive shiny midrib. Slender stalks of tiny flowers are produced in late summer (August - September). The fruits or achenes mature soon after flowering and the plant dies back completely by late fall.

- Specific Control Prescription: Mow plants as close to the ground as possible using a weedeater or similar grass-cutting tool. Treatments should be made when plants are in flower and before seeds are produced. Treatments made earlier may result in plants producing new seed heads in the axils of lower leaves.

  Herbicide treatments should be made late in the growing season (June-July) but before the plants set seed. Treatments made earlier in the growing season may allow a second cohort of plants to produce seeds. Apply a 2% solution of glyphosate and water plus a 0.5% non-ionic surfactant to thoroughly wet all foliage. Do not spray to the point of runoff. Ambient air temperature should be above 65°F to ensure translocation of the herbicide to the roots. Do not apply if rainfall is expected within two hours following application. Additional treatments are likely to be necessary to exhaust the supply of seed in the soil.

Present in Training Area	
1	2
3	4
5	6
7	8
9	10
Cantonment	

An alternative chemical treatment is to use the grass killer clethodim (Select). Apply 12 oz/ac of Select plus a crop oil concentrate according to the label. Do not spray to the point of runoff. Ambient air temperature should be above 65°F. Do not apply if rainfall is expected within one hour following application.

***Paulownia tomentosa* (Princess tree, royal paulownia)**

- Description: Princess tree, also known as royal paulownia or empress tree, is a small to medium sized tree that may reach 30-60 feet in height. The bark is rough, gray-brown, and interlaced with shiny, smooth areas. Stems are olive-brown to dark brown, hairy and markedly flattened at the nodes (where stems and branches meet). Leaves are large, broadly oval to heart-shaped, or sometimes shallowly three-lobed, and noticeably hairy on the lower leaf surfaces. They are arranged in pairs along the stem. Conspicuous upright clusters of showy, pale violet, fragrant flowers open in the spring. The fruit is a dry brown capsule with four compartments that may contain several thousand tiny winged seeds. Capsules mature in autumn when they open to release the seeds and then remain attached all winter, providing a handy identification aid.

- Specific Control Prescription: Princess tree can be controlled using a variety of mechanical and chemical controls. Hand pulling may be effective for young seedlings. Plants should be pulled as soon as they are large enough to grasp. Seedlings are best pulled after a rain when the soil is loose. The entire root must be removed since broken fragments may resprout. Trees can be cut at ground level with power or manual saws. Cutting is most effective when trees have begun to flower to prevent seed production. Because Princess tree spreads by suckering, resprouts are common after cutting. Cutting should be considered an initial control measure that will require either repeated cutting of resprouts or an herbicide treatment.

Princess tree seedlings and small trees can be controlled by applying a 2% solution of Garlon 4 and water plus a 0.5% non-ionic surfactant to thoroughly wet all leaves. Use a low pressure and coarse spray pattern to reduce damage from spray drift on non-target species.

Present in Training Area	
3	**7**
9	**10**
Cantonment	

The cut stump method can be used with a glyphosate herbicide; see label for concentration. Basal bark applications are also effective on small saplings; utilize Garlon 4 in a 20% solution plus basal oil and penetrant. Girdling is effective on large trees where the use of herbicides is impractical. Using a hatchet, make a cut through the bark encircling the base of the tree, approximately six inches above the ground. Be sure that the cut goes well below the bark. This method will kill the top of the tree but resprouts are common and may require a follow-up treatment with a foliar herbicide.

***Pueraria montana* (kudzu)**

- Description: Kudzu is a climbing, semi-woody, perennial vine in the pea family. Deciduous leaves are alternate and compound, with three broad leaflets up to 4 inches across. Leaflets may be entire or deeply 2-3 lobed with hairy margins. Individual flowers, about 1/2 inch long, are purple, highly fragrant and borne in long hanging clusters. Flowering occurs in late summer and is soon followed by production of brown, hairy, flattened, seed pods, each of which contains three to ten hard seeds.

- Specific Control Prescription: For successful long-term control of kudzu, the extensive root system must be destroyed. Any remaining root crowns can lead to reinfestation of an area. Mechanical methods involve cutting vines just above ground level and destroying all cut material. Close mowing every month for two growing seasons or repeated cultivation may be effective. Cut kudzu can be fed to livestock, burned or enclosed in plastic bags and sent to a landfill.

  If feasible, cutting should be followed with immediate application of 4% Garlon 4 to cut stems. Re-treatment the following year will almost certainly be necessary.

  Alternatively, foliar treatments of Tordon K (if no desirable vegetation remains) or Escort (if desirable vegetation is present) may be made during the growing season. However, foliar applications are not as effective at destroying the root system, and more repeated applications will be necessary.

Present in Training Area	
A	**B**
C	**S**
Cantonment	

***Rosa multiflora* (multiflora rose)**

- Description: Multiflora rose is a thorny, perennial shrub with arching stems (canes), and leaves divided into five to eleven sharply toothed leaflets. The base of each leaf stalk bears a pair of fringed bracts. Beginning in May or June, clusters of showy, fragrant, white to pink flowers appear, each about an inch across. Small bright red fruits, or rose hips, develop during the summer, becoming leathery, and remain on the plant through the winter.

- Specific Control Prescription:
  Mowing/Cutting is appropriate for small initial populations or environmentally sensitive areas where herbicides cannot be used. Repeated mowing or cutting will control the spread of multiflora rose but will not eradicate it. Stems should be cut at least once per growing season as close to ground level as possible. Hand cutting of established clumps is difficult and time consuming due to the long arching stems and prolific thorns.

Three methods using herbicides are practical for different plant situations. Foliar spray is appropriate for large thickets of multi-flora rose where risk to non-target species is minimal. It is most effective during April to June, around the flowering period. Apply a 1% solution of Arsenal AC thoroughly wetting all leaves. Use a low pressure and coarse spray pattern to reduce spray drift damage to non-target species.

If non-target plants are in close proximity, a 4% solution of glyphosate can be applied May through October to avoid soil contamination.

The cut stump method should be considered when treating individual bushes or where the presence of desirable species precludes foliar application. This treatment remains effective at low temperatures as long as the ground is not frozen. Horizontally cut multiflora rose stems at or near ground level. Immediately apply a 10% solution of Arsenal AC to the cut stump making sure to cover the entire surface.

Present in Training Area	
	2
3	**4**
Cantonment	

The basal bark method is effective throughout the year as long as the ground is not frozen. Apply a mixture of 20% Garlon 4 plus basal oil to the bark of the shrub to a height of 30-38 cm (12-15 in) from the ground. Thorough wetting is necessary for good control; spray until run-off is noticeable at the ground line.

***Sorghum halepense* (Johnson grass)**

- Description: Johnson grass grows as tall as six feet and is a rhizomatous perennial grass that invades open areas throughout the United States. The two-foot long, lanceolate leaves are arranged alternately along a stout, hairless, somewhat upward branching stem. Flowers occur in a loose, spreading, purplish panicle. Johnson grass is adapted to a wide variety of habitats including open forests, old fields, ditches, and wetlands. It spreads aggressively and can form dense colonies, displacing native vegetation and restricting tree seedling establishment.

- Specific Control Prescription: Johnson grass reproduces through rhizomes and seeds. It cannot be controlled simply by mowing or cutting. It is recommended that mowing followed by herbicide treatment, several times during the growing season for several seasons, utilizing Arsenal and a surfactant as directed on the label.

Present in Training Area	
1	**2**
3	**5**
9	**10**

***Verbascum thapsus (*wooly mullein)**

- Description: Wooly or common mullein is an erect herb. First year mullein plants are low-growing rosettes of bluish gray-green, feltlike leaves that range from 4-12 inches in length and 1-5 inches in width. Mature flowering plants are produced the second year, and grow to 5 to 10 feet in height, including the conspicuous flowering stalk. The five-petaled yellow flowers are arranged in a leafy spike and bloom a few at a time from June-August. Leaves alternate along the flowering stalks and are much larger toward the base of the plant. The tiny seeds are pitted and rough with wavy ridges and deep grooves and can germinate after lying dormant in the soil for several decades.

- Specific Control Prescription: Common mullein can be very difficult to eradicate. There are a variety of management methods available, depending on the particular situation. Because mullein seedling emergence is dependent on the presence of bare ground, sowing sites with early successional native grasses or other plants may decrease seed germination and the chance of successful emergence of mullein seedlings.

  Mullein plants are easily hand pulled on loose soils due to relatively shallow tap roots. This is an extremely effective method of reducing populations and seed productivity, especially if plant is pulled before seed set. If blooms or seed capsules are present, reproductive structures should be removed, bagged, and properly disposed of in a sanitary landfill. Care should be taken, however, to minimize soil disturbance since loose soil will facilitate mullein seed germination.

Present in Training Area	
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***Vinca minor* (common periwinkle)**

- Description: Common periwinkle, a common invader throughout most of the United States, is an evergreen to semi-evergreen, trailing vine that reaches length up to 3 feet. The stems are slender, somewhat woody and green in color. The opposite, glossy leaves are approximately 1 inch long and narrowly elliptical in shape. Some varieties have variegated leaf colors. Flowers are violet to blue (possibly white) in color, 1 inch wide, and 5-petaled. Common periwinkle invades open to shady forests, often around former plantings at old homesites. It forms dense and extensive mats along forest floors that exclude native vegetation. It is native to Europe and was first introduced into America in the 1700s as an ornamental. It is still commonly sold as an ornamental ground cover.

- Specific Control Prescription: Periwinkle can be removed by digging, raising the runners with a rake, and mowing the plants. All of the plant must be removed.

  Alternatively, it can be controlled with a late summer foliar treatment of 4% Garlon 4 with surfactant. Cutting any climbing vines and flowering stalks prior to spraying will minimize seed production.

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