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 land on this training site for the goal that no net loss of training land result from training or natural resources management activities. 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 for the next five years (2011-2015); it is a revision of the original VTS-M INRMP which covered the period 2002-2006.

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 this first INRMP determined that significant revision of its format and information were needed to make it more useful, and in 2005 the cooperating agencies were informed of the decision to conduct a revision and invited to participate. Significant work on the revision was postponed until 2008 when cooperating agencies and other interested parties met to discuss the INRMP and appropriate modifications. Contributions from cooperators have been incorporated into this plan, and the agencies have had multiple opportunities to review draft versions of the INRMP. Thus, the formal five-year review was conducted in conjunction with the revision process, and the spirit of the interagency cooperative effort has been honored. Documentation of the agency interactions is included in Appendix B.

This Revised INRMP for VTS-M will serve guide TNARNG activities on the training site for the years 2011-2015. 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, in 2015, 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 another 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 foci of projects and management activities on VTS-M.

1.2 MANAGEMENT PHILOSOPHY

As stated above, 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.

Department of Defense (DOD) Instruction 4715.3 directs that DOD land management incorporate ecosystem management, biodiversity conservation, and multiple use management. 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 higher headquarters for the TNARNG. Three Directorates are involved in the management of natural resources: the Director of Environmental Programs (NGB-ARE), the Director of Engineering (NGB-ARI), and the Director of Operations, Training and Readiness (NGB-ART). They work together to implement the Integrated Training Area Management (ITAM) Program.

The Natural Resources Manager at NGB-ARE is responsible for reviewing the INRMP and advising the Environmental Office before formally submitting the plan to the U.S. Fish and Wildlife Service, the Tennessee Wildlife Resources Agency, the State Historic Preservation Office and other state agencies. The Environmental Directorate 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.

NGB-ARI provides policy guidance and resources to create, sustain, and operate facilities that support the Army National Guard. The Engineering Directorate coordinates proposed construction projects with

NGB-ART and NGB-ARE and provides design and construction support, as well as environmental management that is directly related to property maintenance (e.g., grounds maintenance, pest control).

NGB-ART is responsible for training and training site support to include sustainable range management. The Integrated Training Area Management (ITAM) program is run by NGB-ART, but must be coordinated with NGB-ARE and NGB-ARI 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, and other features, 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; by 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 ITAM, 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 being compiled in the TNARNG Environmental library and are available for review by all personnel involved in natural resources management. This library is being digitized and should be available through the TNARNG CFMO website (https://home.tn.ngb.army.mil/fmo/Environmental) in FY2010.

1.5 ENVIRONMENTAL REVIEW (NEPA COMPLIANCE)

The National Environmental Policy Act (NEPA) was created to identify environmental concerns with human activities and resolve them to the best degree possible at early stages of project development. The levels of NEPA are recognized:

1. If the proposed action meets a categorical exclusion in AR 200-2, a Record of Environmental Consideration (REC) document is prepared for the project, and the project may proceed as planned. These are the most commonly prepared documents.

2. An Environmental Assessment (EA) may be required when the conditions for a Categorical Exclusion are not met. This often happens when extensive new military exercises, major construction, or land acquisition is planned; when the planned action involves a large area; or when wetlands or endangered species may be involved. A Finding of No Significant Impact (FNSI) is required for the action to proceed as planned. Environmental Assessments are comprehensive documents that describe a proposed action and the alternatives to the action. A 30-day review period is provided for public comment.

3. If more study is needed or a Finding of No Significant Impact cannot be prepared, an Environmental Impact Statement (EIS) must be written. These can be lengthy documents that require significant time to prepare.

The TNARNG uses NEPA to ensure its activities are properly planned, coordinated and documented. The TNARNG provides NEPA documentation for proposed unit projects at VTS-M that are beyond the existing level of documentation developed by the TNARNG for the training site. This additional NEPA documentation can then be used for identification of potential problems or impacts on the natural resources of the VTS-M.

An Environmental Assessment was written to review the implementation of the original INRMP. Another EA was prepared to analyze the impact of the forest management plan for the VTS-M. Therefore, the Record of Environmental Consideration for this plan determined that all relevant impacts from implementation of this revised INRMP have been addressed. This REC and the FNSIs for the earlier EAs are included in Appendix A. The original EAs are available upon request.

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 those sections of the document for which planning level surveys had recently been completed. A contract was initiated to provide the updated section in late FY04. The cooperating agencies were informed of this decision to revise in 2005 and requested to contribute to the revision process; there was no opposition to this proposal. The agencies were notified by letter in early 2008 that further work was to be done on this revision (see documentation in Appendix B). TWRA and MAAP representatives attended a meeting in May 2008 to discuss the INRMP revision (the USFWS contact was unavailable for the meeting). In addition, a draft of this document was sent to the agencies for comment prior to any other non-TNARNG review. Thus, the cooperating agencies have reviewed the document and contributed to the new iteration in accordance with the DoD Supplemental Guidance (2004) and the NGB Interim Guidance (2005) which define the process for review for operation and effect.

This INRMP is living document and is effective for the five year period 2011-2015. It was developed in cooperation with the USFWS Cookeville, TN, Field Office, and the TWRA. Those agencies have approved the document, as has the Regional Office of the USFWS. It was subjected to public review to satisfy the Sikes Act requirements. Public comments were reviewed by the cooperating agencies and incorporated into the final document where appropriate. Public comments 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 will be 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, in 2015, 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 projects identified in each section 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 Chapter 4, Table 4.3, 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) and the ITAM five-year plan. 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
    - Conservation Biologist
    - Cultural Resources Manager
    - Compliance Manager and Staff
    - GIS Manager and Staff

- Part-time Staff: Nine M-Day personnel

- 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
- Sustainable Range Program 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
- 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, 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.

Operations and Maintenance Environmental Funds:
Environmental funds are a special category of Operations and Maintenance (O&M) funds and are controlled by the Status Tool for Environmental Program (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 Reserve Account. 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 Reserve Account. Funds from the Reserve 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 4715.3). 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 was previously a part of the Milan Army Ammunition Plant (MAAP). An additional 54 acres may be obtained from 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 Milan Army Ammunition Plant (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 28,719, and 49,257 for Gibson County (Table 2.1). Unemployment rates in these counties are somewhat 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 (2008 estimate)*	Median Household Income (2007 estimate)**	% Persons Below the Poverty Line (2007 estimate)**	Unemployment Rate (%) (2008)***
Carroll Co.	28,719	$36,886	19.1	8.9
Gibson Co.	49,257	$34,601	16.5	9.3
Tennessee	6,214,888	$42389	15.8	6.4

*U.S. Census Bureau (2009) **U.S. Census Bureau (2009) ***USDA Economic Research Service (2008)

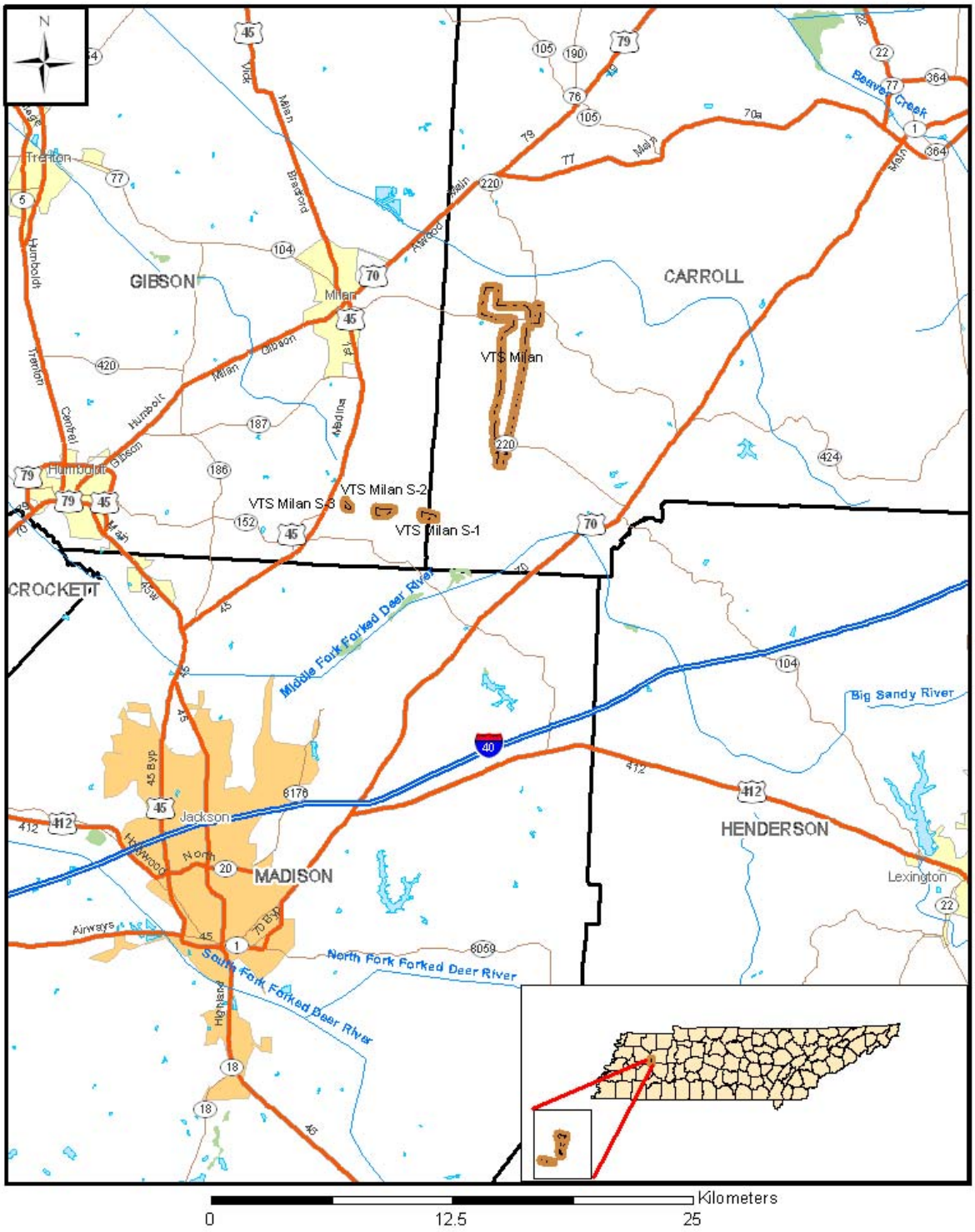

Figure 2.1: Location of the Volunteer Training Site – Milan.

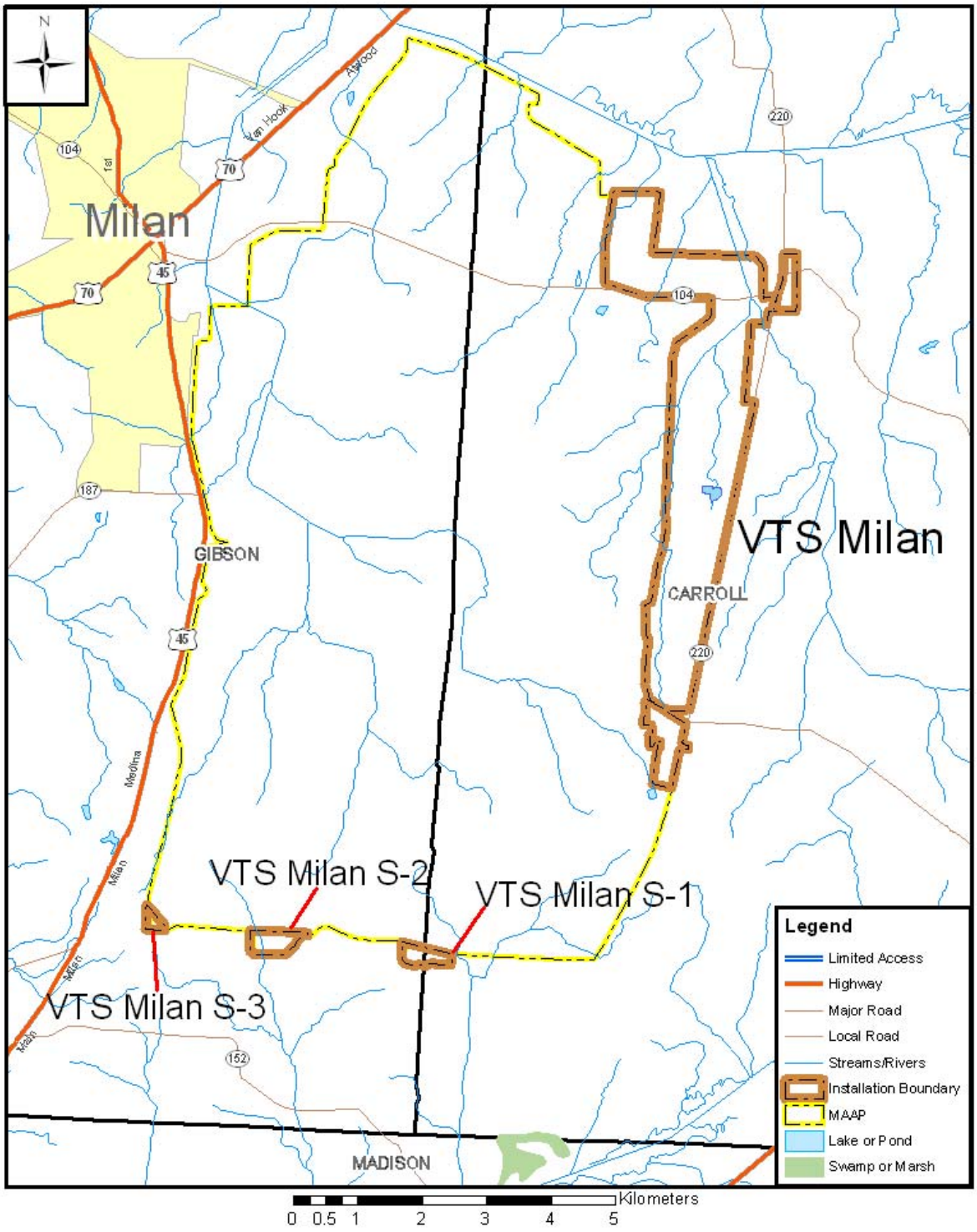

Figure 2.2: Local surroundings and overall facility layout of the VTS-Milan.

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 another installations.

The installation has undergone numerous name changes since 1940, including Milan Arsenal, Milan Ordnance Plant, and its present name of Milan Army Ammunition Plant (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. 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. 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 (L&N) and Illinois Central-Gulf (ICG). 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 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 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

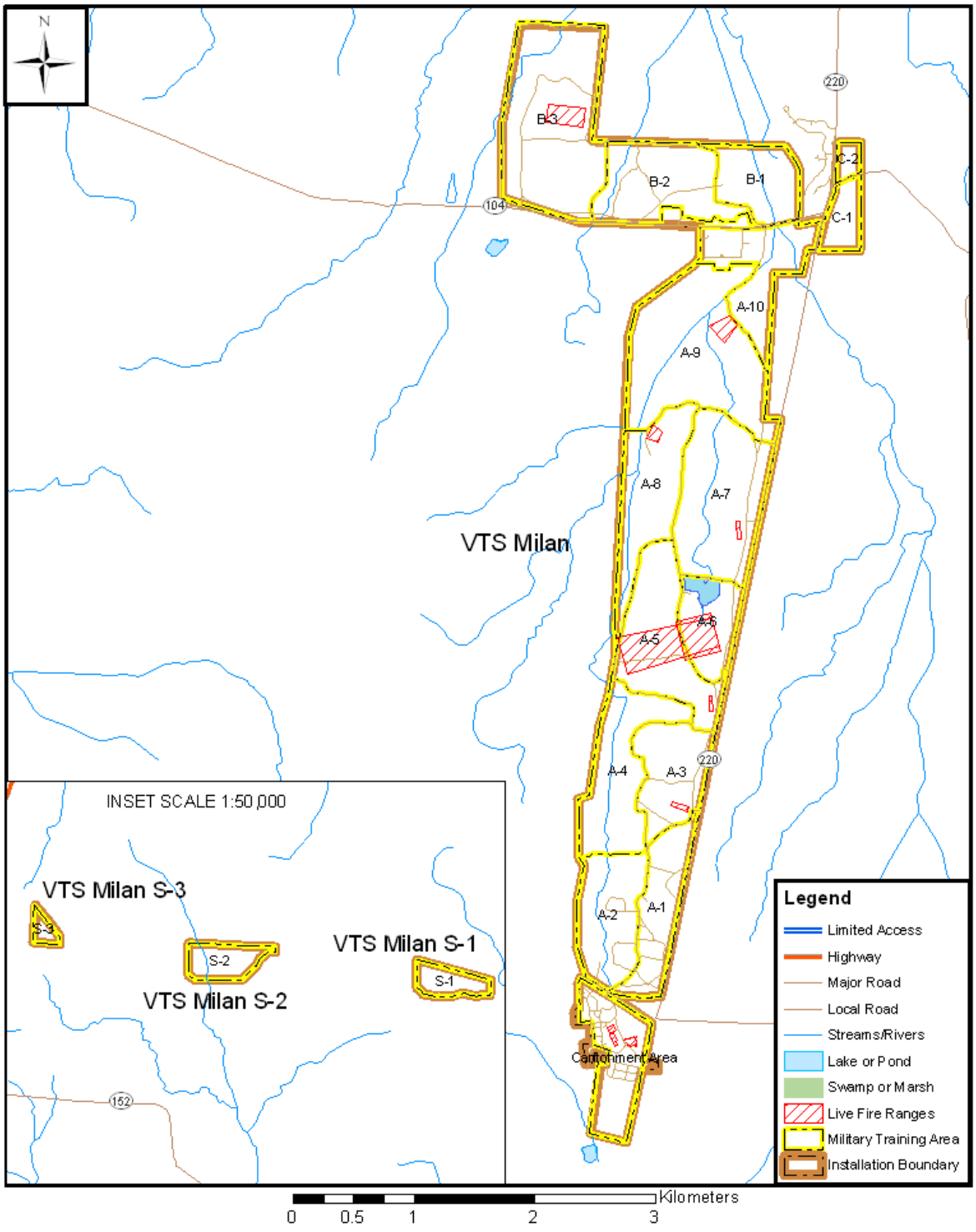

Figure 2.3: VTS-Milan training areas and ranges.

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 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 for the VTS-M for 1998-2000 and 2002-2006 is summarized in Figure 2.4 in man-days per month. The monthly data for three user groups (TNARNG/TNANG, Other Military, and Civilian) from fiscal years 1998-2000 and 2002-2006 are also presented in Table 2.2. Average training site usage has generally decreased in recent years from a high of 44,797 man-days in FY2002 to only 16,144 in FY2006. It rebounded substantially in 2008-9 but is expected to decrease again in FY2010. The fluctuations in usage are primarily due to the deployment schedule of local units.

Seasonal distribution of training activities can be seen in Figure 2.5. Training site use is generally well dispersed across the year, with the bulk of training occurring in the spring and summer months and particularly low usage in December and January. The sharp spikes on Figure 2.5 in June and August represent unusually high TNARNG activity in June 2002 and August 2004. June 2002 represents high usage during Homeland Security training in response to the events of September 11, 2001. The high usage in August 2004 was associated with pre-mobilization activities.

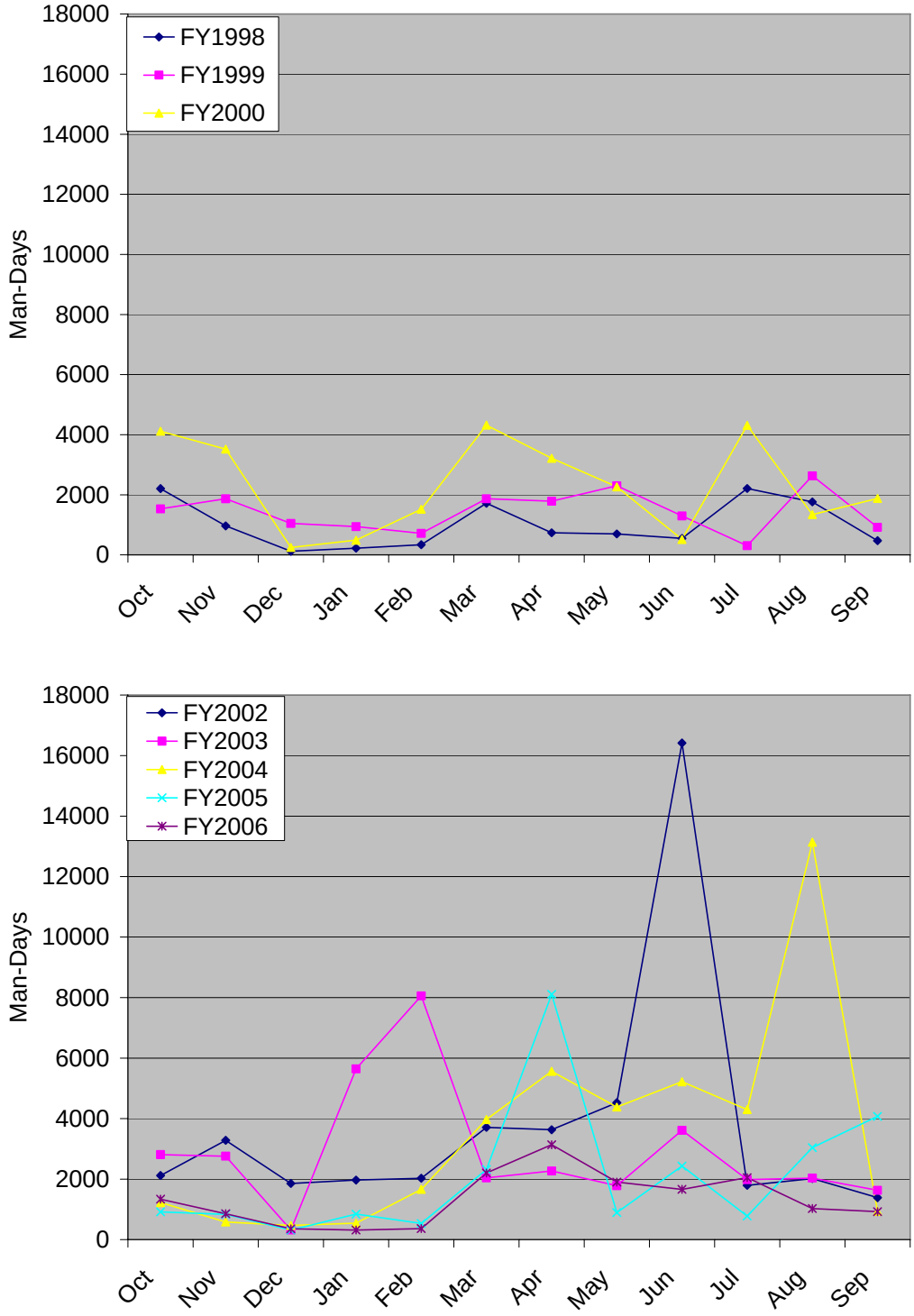

Figure 2.4: Total training site use 1998-2000 and 2002-2006.

Table 2.3: Training site utilization (in man-days) by National Guard, other military, and civilian users, 1998-2000 and 2002-2006.

TY1998	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
TNARNG/TNANG	2,205	965	120	223	337	1,405	685	669	549	1,876	1,766	475	11,275
Other Military	0	0	0	0	0	315	50	0	0	314	0	0	679
Civilian	0	0	0	0	3	0	0	27	0	20	0	0	50
TOTALS	2,205	965	120	223	340	1,720	735	696	549	2,210	1,766	475	12,004
TY1999	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
TNARNG/TNANG	1,533	1,271	750	235	300	1,595	1,438	2,200	1,040	308	2,597	321	13,588
Other Military	0	600	300	706	415	275	300	100	260	0	32	600	3588
Civilian	0	0	0	0	0	0	50	0	0	0	0	0	50
TOTALS	1,533	1,871	1,050	941	715	1,870	1,788	2,300	1,300	308	2,629	921	17,226
TY2000	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
TNARNG/TNANG	3,914	3,061	195	491	1,439	2,611	3,143	2,154	513	4,310	682	919	23,432
Other Military	200	355	50	0	78	1710	74	114	0	0	660	960	4201
Civilian	0	105	0	0	0	0	0	0	0	0	0	0	105
TOTALS	4,114	3,521	245	491	1,517	4,321	3,217	2,268	513	4,310	1,342	1,879	27,738
TY2001 unavailable													
TY2002	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
TNARNG/TNANG	1,961	2,472	1,603	1,704	1,862	3,384	3,473	4,383	16,221	1,768	2,000	1,242	42,075
Other Military	13	658	130	249	166	328	160	145	140	26	70	126	2,211
Civilian	145	150	125	15	0	0	0	0	56	0	0	20	511
TOTALS	2,119	3,82	1,858	1,968	2,028	3,712	3,633	4,528	16,417	1,794	2,020	1,388	44,797
TY2003	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
TNARNG/TNANG	2,571	1,994	130	496	3,936	1,896	2,054	1,770	3,481	1,823	1,786	1,592	23,529
Other Military	90	767	192	5,150	4,120	145	216	17	68	162	248	40	11,215
Civilian	150	0	0	0	0	0	0	0	64	0	0	0	214
TOTALS	2,811	2,761	322	5,646	8,056	2,041	2,270	1,787	3,613	1,985	2,034	1,632	34,958

TY2004	OCT	NOV	DEC	JAN	FEB	MAR	APR	MAY	JUN	JUL	AUG	SEP	TOTAL
TNARNG/TNANG	1,068	216	90	214	972	2,756	2,512	3,844	2,303	3,430	12,551	553	30,509
Other Military	24	380	380	330	690	1,115	3,052	440	652	868	290	230	8,651
Civilian	135	0	0	0	0	100	0	100	2,267	0	95	150	2,847
TOTALS	1,227	596	470	544	1,662	3,971	5,564	4,384	5,222	4,298	13,136	933	42,007
TY2005	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOTAL**
TNARNG/TNANG	681	259	240	601	331	1,704	647	818	419	732	2,629	838	9,889
Other Military	240	368	80	88	203	471	685	77	1,824	49	277	72	4,444
Civilian	0	213	0	155	0	145	6,779	0	190	0	135	3,167	10,784
TOTALS	921	840	320	844	534	2,320	8,111	895	2,433	781	3,041	4,077	25,117
TY2006	**OCT**	**NOV**	**DEC**	**JAN**	**FEB**	**MAR**	**APR**	**MAY**	**JUN**	**JUL**	**AUG**	**SEP**	**TOTAL**
TNARNG/TNANG	597	736	321	268	330	825	3,114	1,787	640	2,030	821	372	11,841
Other Military	14	90	36	36	36	1,377	24	89	211	21	122	210	2,266
Civilian	726	30	0	15	0	0	0	28	810	0	84	344	2,037
TOTALS	1,337	856	357	319	366	2202	3,138	1,904	1,661	2,051	1,027	926	16,144

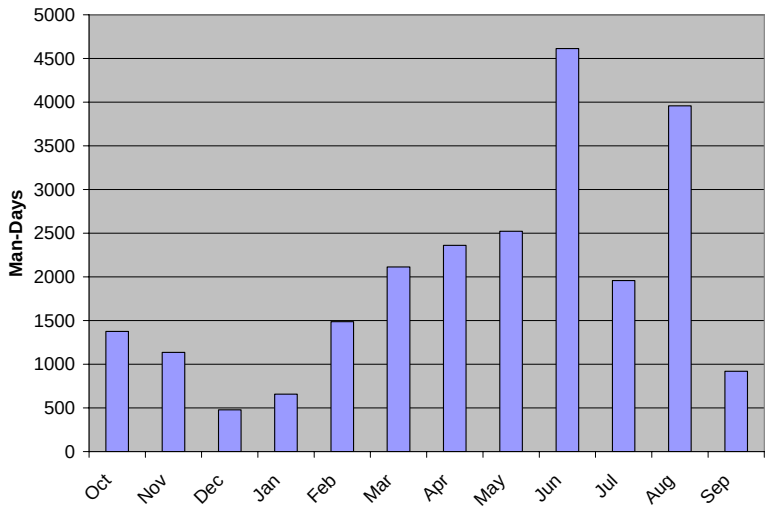

Figure 2.5: National Guard (TNARNG/TNANG) monthly use of VTS-C (average for 2002-2006).

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 2010-2014 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/ROTC, (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.

Five basic management techniques can be used to minimize military training effects to the soil and vegetation resources: (1) limit total use; (2) redistribute use; (3) modify kinds of uses; (4) alter the behavior of use; and (5) manipulate the natural resources for increased durability. These will be discussed throughout the management plan. One example of modifying the kind of use is the use of simulators and simulations at VTS-M. Various high-technology methods have been implemented at VTS-M to provide for increased safety, better use of available space, and reduced effects of noise on natural resources by eliminating the need for live-fire in certain situations. Expanded use of simulators and better equipment can reduce maneuver damage to land and soils, while improving training realism.

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.

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		

Bivouacking 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.

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
- Road networks
- Pull-off points along roads
- Firing ranges

The Environmental Office is working with VTS-M personnel to develop a more comprehensive description of the desired "missionscape" for the training site. With a detailed picture of the end goals, the natural resources management program can be more effectively shaped to meet those goals.

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. 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 GPS/GIS activities in support of the Environmental office mission, as well CFMO and ITAM. The GIS branch provides mapping, data mining, data storage and retrieval, GPS, and information technology functions. 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), TINs, 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).

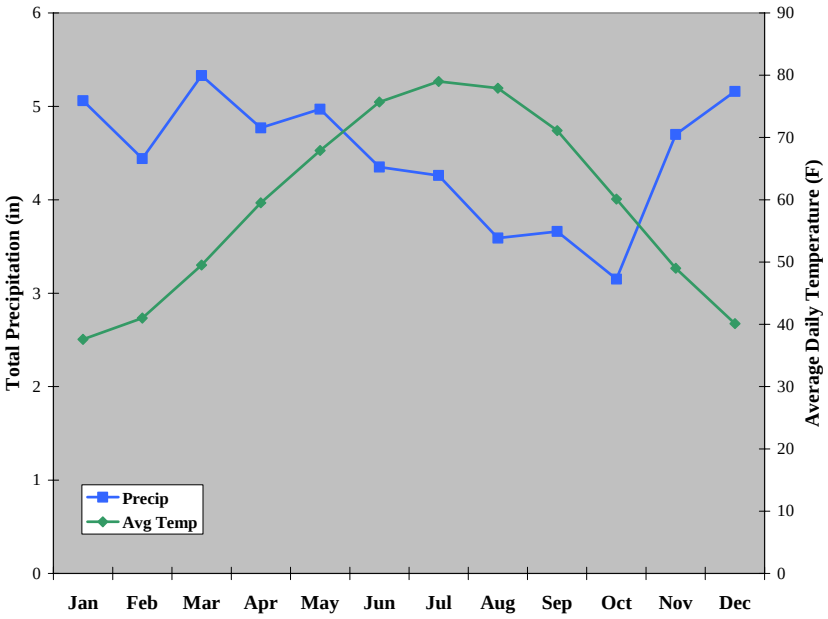

Figure 3.1: Mean daily temperature and mean monthly precipitation for Milan, Tennessee, 1930-2007 (data from SRCC 2008).

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

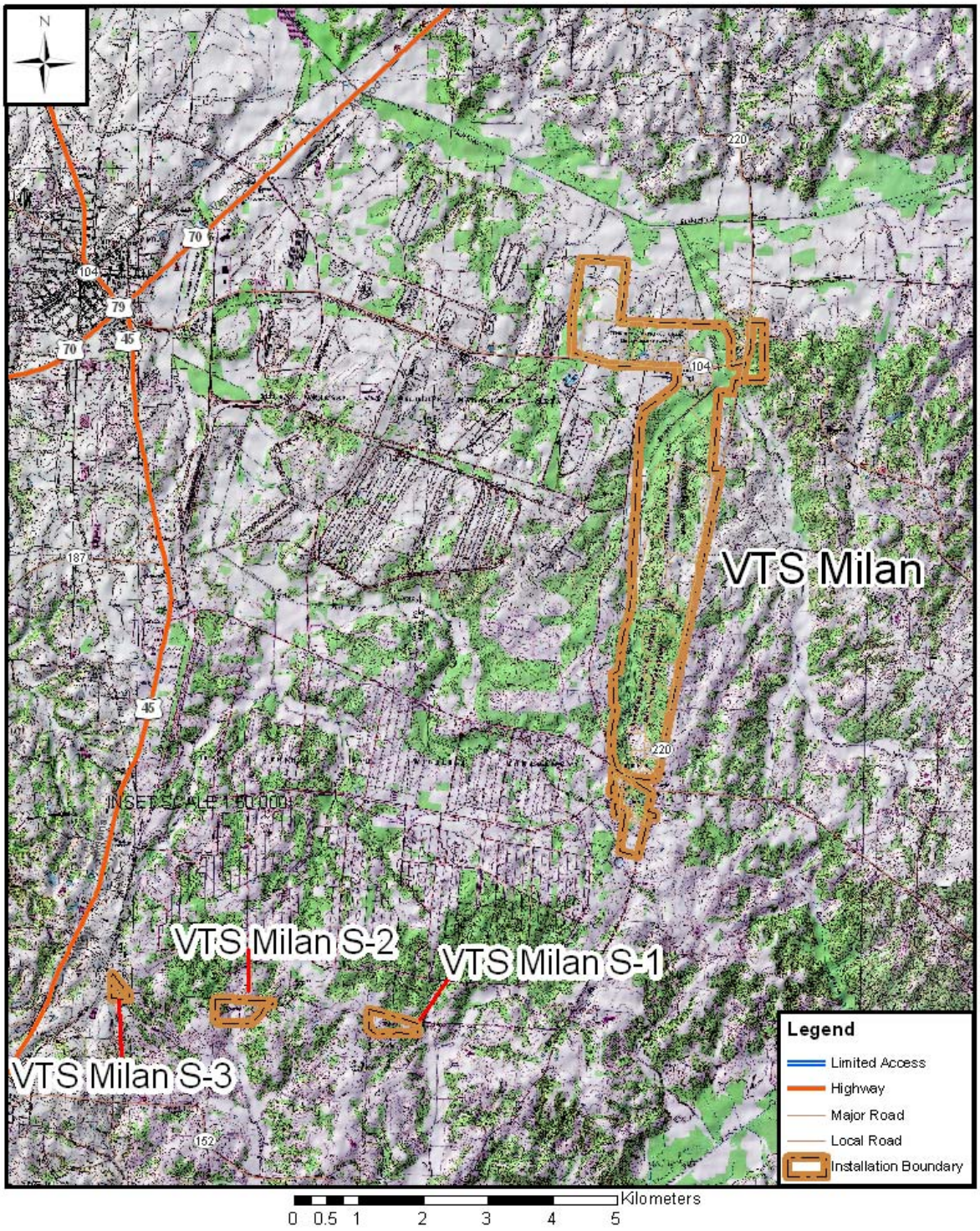

Figure 3.2: Topography of the VTS-Milan.

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-Milan (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.

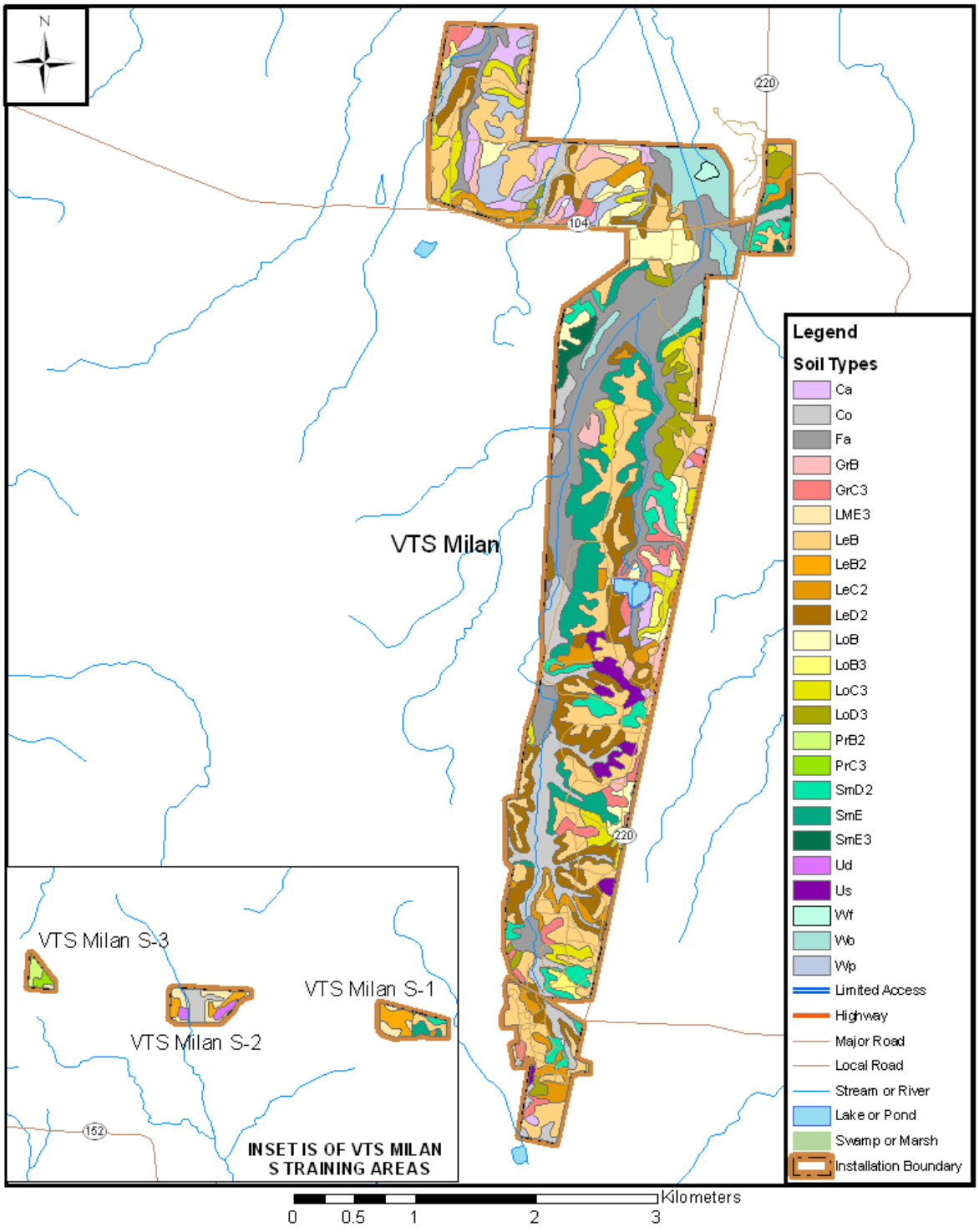

Figure 3.3: Soil types on the VTS-Milan.

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-Milan.

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

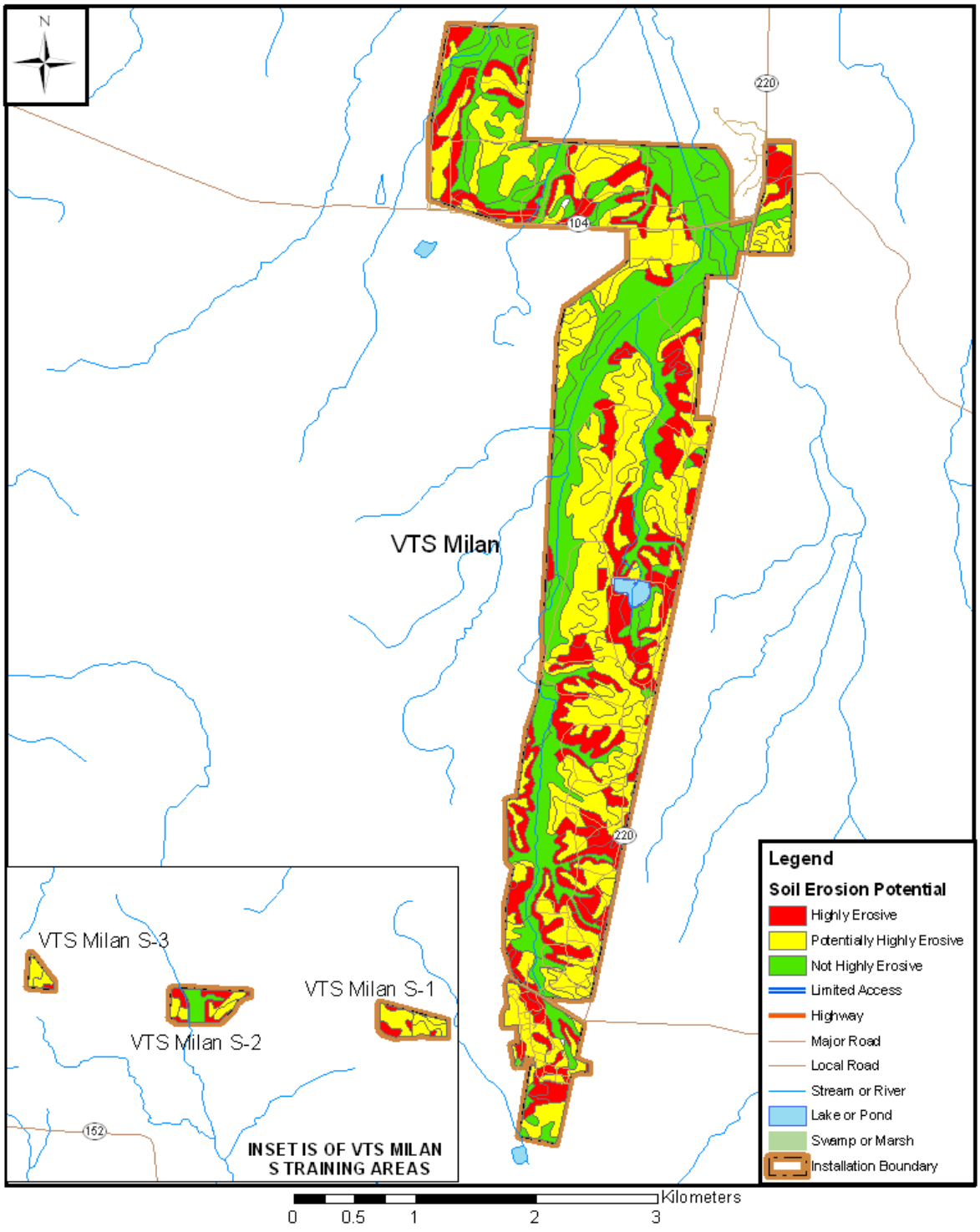

Figure 3.4: Soil erosion potential on the VTS-Milan.

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).

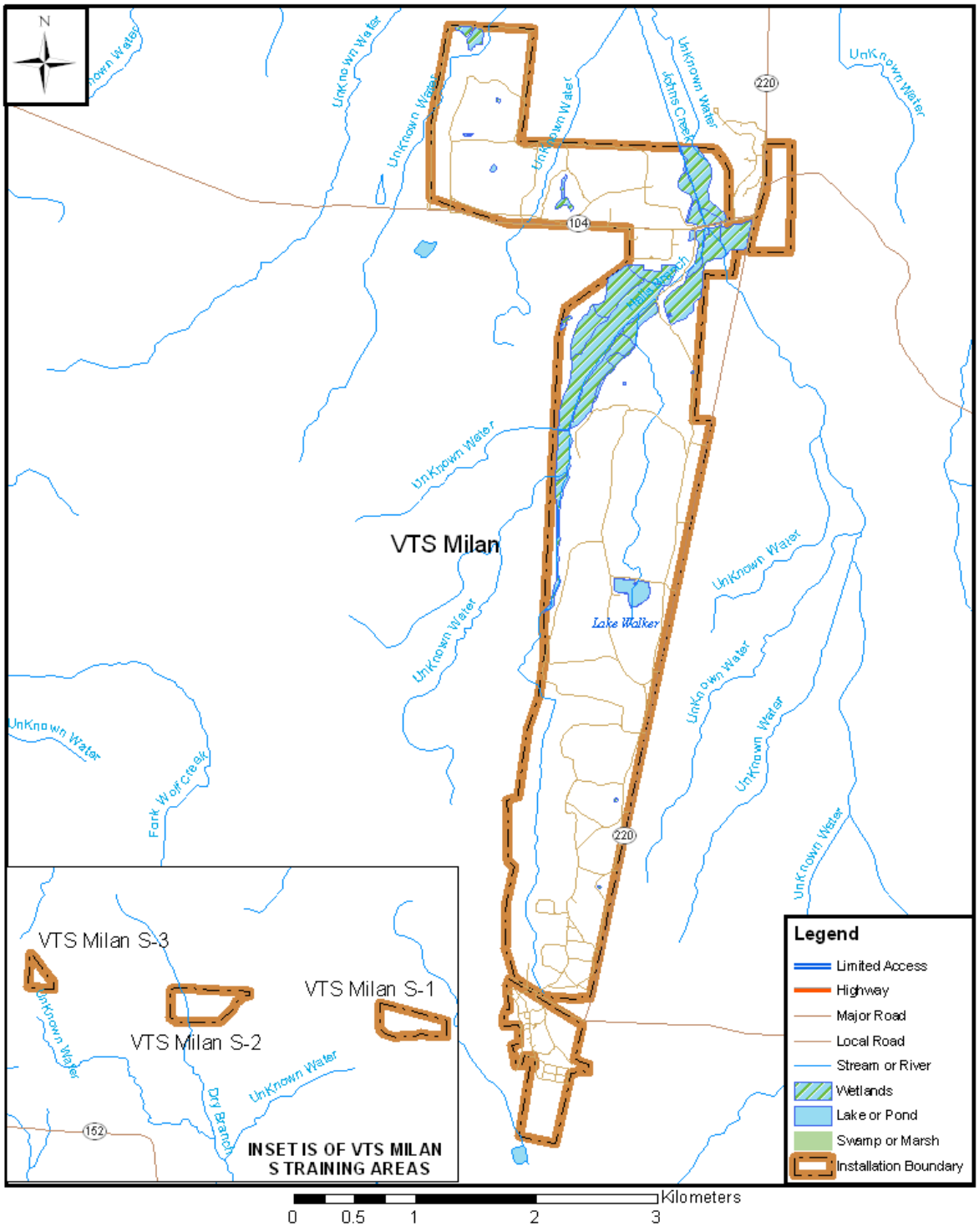

Figure 3.5: Surface water on the VTS-Milan.

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 scheduled for FY11, subject to funding availability.

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.

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.

Further characterization of these wetland areas, including the plants and animals they support, is needed. A wetland survey is scheduled for FY10, subject to funding availability, to verify the 1998 boundaries and to gather additional information on these areas.

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.

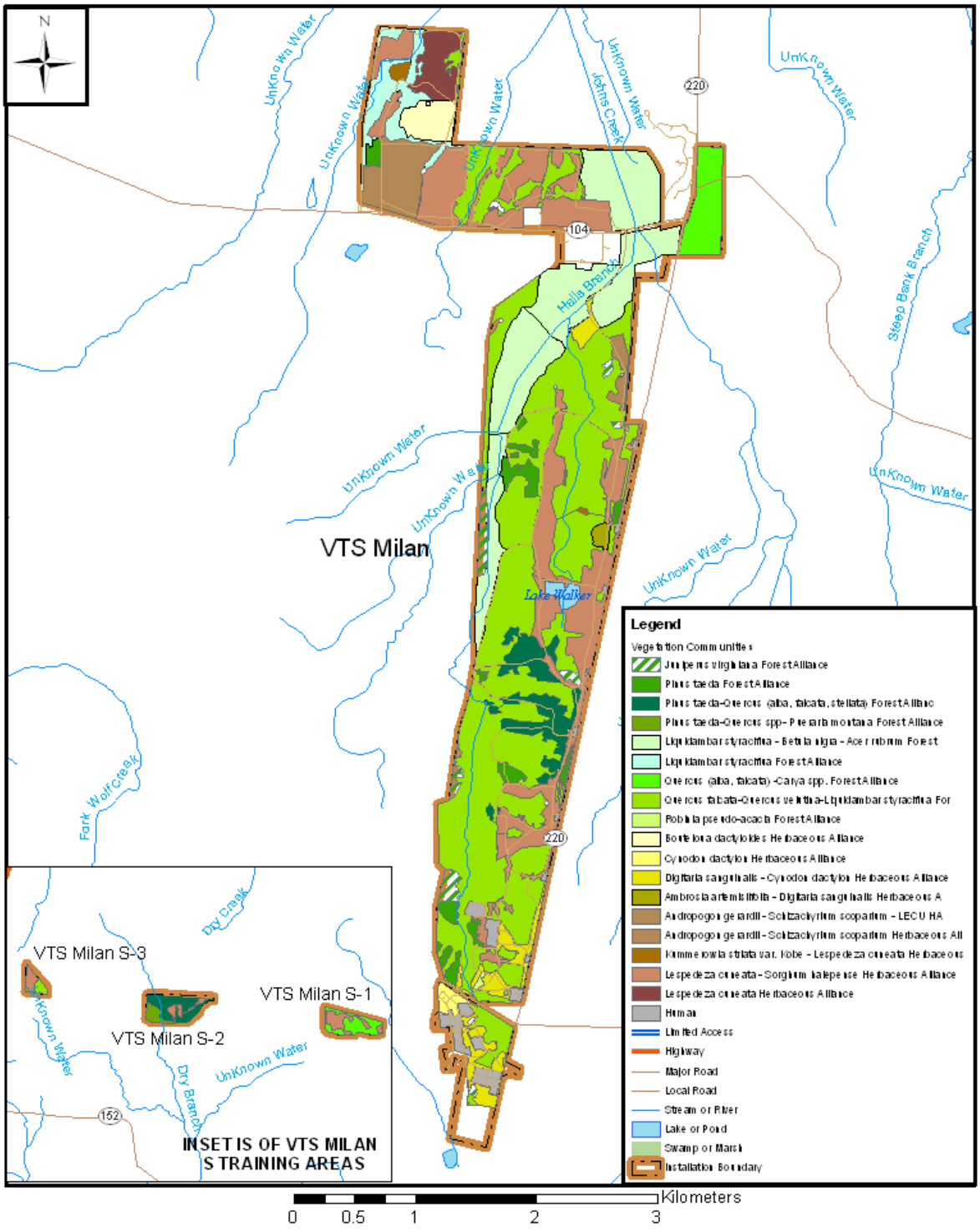

Figure 3.6: Vegetation communities on the VTS-Milan.

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-Milan 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-Milan (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-Milan 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. Many of the dominant trees on the site are considered "over-mature" from a timber management standpoint and are larger than desired by lumber mills. Without management, there will be a loss of economic value as the older trees deteriorate in quality while continuing to sequester the majority of resources away from younger, smaller trees entering their prime.

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. During the 2011-2015 period, all forest health harvests will be thinnings; three small areas (less than 25 acres total) will be clearcut to create new training areas.

The forest management plan covers a ten year period and will be reviewed and revised as needed during that time in conjunction with the INRMP review process. The forest inventory should be repeated in 2015 to provide updated information for the next ten-year planning cycle.

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 invasives 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*). 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 (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.

Table 3.4: Invasive pest plant species found on VTS-Milan (from Dynamic Solutions 2006).

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
Celastrus orbiculatus	Oriental bittersweet	Severe threat	Sparse at on isolated location
Cirsium arvense	Canada thistle	Significant threat	Present along edges & openings
Dioscorea oppositifolia	Air potato	Severe threat	Sparse at one isolated location
Elaeagnus umbellate	Autumn olive	Severe threat	Sparse to present
Euonymus fortunei	Wintercreeper	Severe threat	Present to dominant in several locations
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 minor	Common periwinkle	Significant threat	Sparse at one isolated location

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.

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.

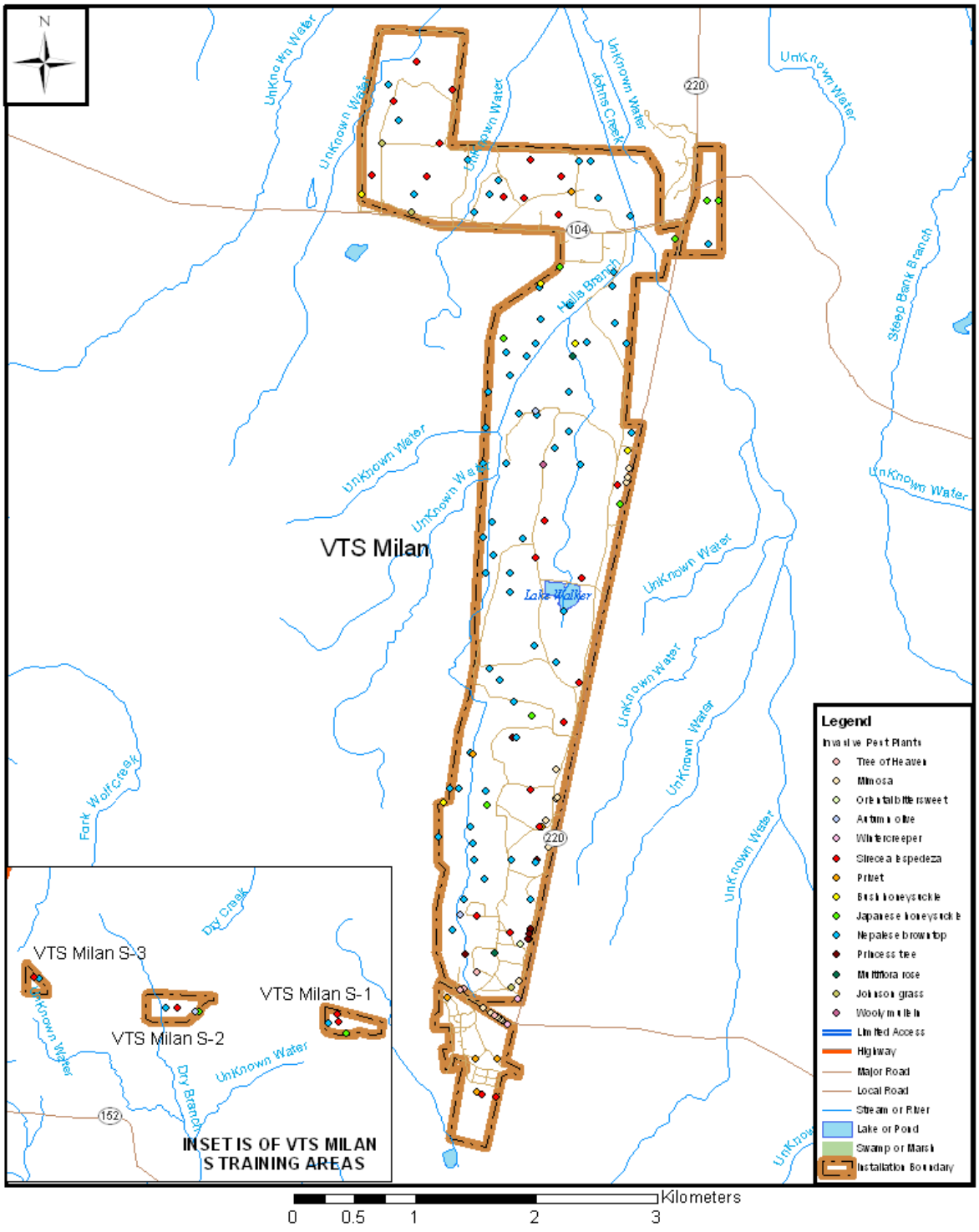

Figure 3.7: Invasive pest plant species identified on the VTS-Milan. (Point occurrences – large occurrences are not represented.)

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. A recent avian planning level survey identified 155 bird species on the VTS-M (AMEC 2008). Of these five 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, house sparrow, and rock pigeon are nonnative species with no protection.

Six habitats on the training site were noted during the 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).

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.

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. If any measurable negative effects on migratory bird populations at VTS-M are identified, the TNARNG will develop a MOU with the USFWS within two years.

3.8.2 Wildlife and Game Management

Data on the wildlife utilizing the training site are limited at this time. The 1999 Phase II Natural Resources survey identified some species occurring on VTS-M which are listed in Appendix E (SAIC 2000). White-tailed deer, fox squirrel, gray squirrel, raccoon, eastern mole, striped skunk, and eastern cottontail rabbit are common fauna on VTS-M. The eastern box turtle, southern black racer, and American toad were also observed during the 1999 survey. Further details on mammals and herpetofauna will be available following completion of two planning level surveys initiated in 2008, and current management practices will be altered, if needed, to suit species identified in these surveys.

Wildlife 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 habitat quality. There is no hunting program on VTS-Milan 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 is scheduled for FY2011, subject to funding availability.

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-Milan 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 stocking.

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 2005 rare species survey 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-Milan: 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

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				

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 2005-2006 found no other federally or state listed animals (SAIC 2008). 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.

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-Milan, 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-Milan.

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 the training site 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).

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.

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

4.1 MILITARY MISSION GOALS AND OBJECTIVES

VTS-Milan 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-Milan management.

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

- Develop new range facilities
- Create additional open training and maneuver areas
- Reclaim road and bivouac area in Training Area C
- Ensure there is no net loss of training land due to environmental and/or natural resources management issues
- Develop plan to avoid training limitations due to encroachment.

In order to meet the training development goals, a number of management tasks will be important:

- Identify the needs for training
- Meet with unit HQ training personnel to develop a list of training requirements and needs
- Work with the training site commander and training site manager to develop projects to be incorporated into the INRMP and ITAM project lists
- Develop a yearly task list for the five year plan
- Develop STEP projects and investigate other sources of funding
- Develop a database to track progress
- On-going evaluation to determine if the process is working and if goals and objectives are being met.

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. Neither training nor land management follows a tidy, five year program. Some of these projects and goals will extend beyond the five-year scope of this document. These long-term objectives and the over-arching goal of environmental health and military mission sustainability will guide future iterations of the INRMP. The heart of TNARNG management on VTS-M is to ensure that military activities on the training site do not destroy the environment and also that environmental issues are managed without unnecessary disruption of the training mission.

4.2.1 Ecosystem Management and Maintenance of Biodiversity

In 1994, the Office of the Under Secretary of Defense for Environmental Security issued a memorandum to all forces in the Department of Defense (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 4715.3, "Environmental 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 a 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, especially via 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.

Goals:

- Maintain or improve ecosystem and habitat diversity.
- Maintain or improve species diversity.
- Protect unique communities.

Objective 1-1: <u>Characterize the species composition, ecosystem health, and wildlife use of the communities on VTS-M.</u>

Task 1: Conduct a small mammal survey (initiated in 2008, results anticipated in 2010).

Task 2: Conduct a herpetofauna survey (initiated in 2008, results anticipated in 2010).

Task 3: Conduct an aquatic survey fauna survey (scheduled for 2011, subject to funding availability).

Task 4: Conduct a planning level insect survey (scheduled for 2013, subject to funding availability).

Objective 1-2: <u>Manage for ecosystem health, wildlife, and improved habitat quality.</u>

Task 1: Eliminate invasive exotic species where feasible.

Task 2: Initiate conversion to native species, especially in grassland areas, where compatible with military training.

Task 3: Institute prescribed fire regime for grassland and forest management, where appropriate, incorporating training site needs, nesting bird protection, and historic fire regime.

Task4: Develop a monitoring program to track overall ecosystem health, including vegetation monitoring, water quality monitoring, wildlife and bird monitoring, and other components deemed significant.

Objective 1-5: Manage for mission-suitable habitats or "missionscape".

Task 1: Identify natural resources characteristics needed for training activities on VTS-M through consultation with training site manager, training site commander, units, and trainers.

Task 2: Determine appropriate acreage and locations for given mission habitats based on training needs and VTS-M characteristics.

Task 3: Develop and implement management actions to create, improve, or expand mission habitats.

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. No federally or state listed threatened or endangered species have been found inhabiting the training site. Several state-listed 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 training site. 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.

In FY2009, a project was initiated in cooperation with the American Chestnut Foundation (TACF) and with funding from the DoD Legacy Program. Approximately 2.5 acres in training area B-2 was used to develop an American chestnut test orchard. Hybrid chestnut seeds from TACF's breeding program were planted in the spring of 2009. The seedlings will be grown for 5-7 years, under TNARNG management, and then will be inoculated with the chestnut blight, the invasive fungus that decimated native American chestnut populations in the early 20th century. Those trees showing significant resistance to the blight will be maintained and utilized in further breeding trials.

Goals:

- Maintain accurate information about rare species status on the training site
- Maintain native plant communities that might support state and federal rare, threatened, or endangered species
- Cooperate with the US Fish & Wildlife Service and the Tennessee Wildlife Resources Agency.
- Ensure that VTS-M remains in compliance with the Endangered Species Act

Objective 2-1: Quantify and monitor populations of state and federal RTE species and the communities that support them on VTS-M.

Task 1: Perform a comprehensive survey for RTE species every ten (10) years. Survey was completed in 2008; re-survey is scheduled for 2017. Further management actions will be determined by the results of the next survey.

Objective 2-2: Manage American chestnut orchard.

Task 1: Annual maintenance: water and fertilize seedlings as needed; maintain fence and mow field as needed; survey/measure seedlings annually.

Task 2: Plant additional seeds/seedlings as appropriate.

Task 3: Coordinate with TACF for blight resistance testing.

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-Milan. 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.

Goals:

- Keep topsoil in its place.
- Minimize the development of erosion and sedimentation problems on the training land.
- Rehabilitate existing erosion problems.

Objective 4-1: Identify and rehabilitate degraded and eroding training land

Task 1: Establish regular surveys of training areas to identify and prioritize degraded or eroded areas requiring rehabilitation.

Task 2: Develop a reporting form for TNARNG soldiers and training site personnel to report erosion problems identified during other daily activities. Install reporting form on webpage for easy access for all personnel.

Task 3: Repair erosion problems as identified. Areas degraded by military training and/or other land use will be returned to pre-training conditions where at all possible. The rehabilitation effort will use locally native species and will identify and eliminate the underlying cause of the erosion where possible.

Task 4: Develop an “erosion guide” for VTS-M that identifies areas experiencing repeated erosion following training and gives guidance in appropriate repair, including suggested native species for revegetation.

Task 5: Develop training for soldiers, commanders, and planners in Best Management Practices and their applicability to TNARNG actions to diminish the risk of erosion problems developing from future activities.

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. For much of the year, the natural water table level makes the area too wet for vehicle or troop movement. Stream crossings by vehicles and troops on foot are only permitted at designated bridged or culverted sites.

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 on all sides of the wetland.

The riparian habitat is variable in size. While the restricted-activity Streamside Management Zone is 50-foot 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 Halls 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.

Goals:

- Minimize nutrient and sediment inputs from watersheds.
- Minimize non-point source pollution in watersheds through use of Best Management Practices.
- Understand the ecosystem dynamics and stressors within the watersheds.
- Retain/rehabilitate vegetative buffers on waterways.
- Incorporate watershed management concerns into training and land management planning.
- Improve water quality in the streams on VTS-M.

Objective 5-1: Improve knowledge of existing riparian areas and their conditions.

Task 1: Conduct aquatic fauna planning level survey (scheduled for 2011, subject to funding availability).

Task 2: Establish regular surveys of streams to identify and prioritize degraded or eroded areas requiring rehabilitation as part of training site-wide erosion surveys (see Section 4.2.4).

Task 3: Develop and implement monitoring protocol for water resources to assess water quality across the training site and at in-flow and out-flow points to the site.

Objective 5-2: Improve buffering quality of the riparian areas.

Task 1: Perform riparian habitat assessments to identify degraded riparian corridors and prioritize restoration efforts.

Task 2: Restore degraded buffers with appropriate native vegetation.

Task 3: Repair erosion and sedimentation problems as identified. Guidelines in the Tennessee Erosion and Sediment Control Handbook will be followed (see Section 5.1.2). Native vegetation will used for all revegetation along creeks. Permits may be required for streambank or streambed alteration.

Task 4: Control invasive species in the riparian communities to allow native species to re-establish.

Task 5: Monitor riparian ecosystems to determine effects of management through the long-term vegetation monitoring program, the RTLA program, and repeated surveys.

Objective 5-3: Implement and enforce effective buffers in riparian areas.

Task 1: Post signs identifying Streamside Management Zones.

Task 2: Update Training Site SOP with guidance specific to riparian areas as needed.

Task 3: Educate troops, management staff, and others on the importance of SMZs, the limitations to their use, and any regulatory or permitting issues involved with activities within riparian corridors.

4.2.6 Wetlands Protection

VTS-M has extensive wetland areas (245.9 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 maintenance or construction efforts.

The Tennessee Department of Environment and Conservation, Division of Water Pollution Control, 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.

Goals:

- Minimize operational impact of the military mission on wetlands.
- Maintain functional, healthy wetlands that are resilient to minor, inadvertent encroachments and impacts.
- Manage for no net loss of wetland acreage, function, or value.

Objective 6-1: Improve knowledge of existing wetlands and their conditions.

Task 1: A resurvey of the wetland areas of VTS-M is scheduled for FY10, subject to funding availability. The results of this survey will be compared to the original wetland delineation from 1998 to determine changes to size and shape of the wetland areas.

Task 2: Develop protocol for and implement regularly scheduled wetland condition monitoring.

Task 3: Conduct a floristic study of wetland habitats. Significant flora will be subjected to an appropriate monitoring protocol.

Task 4: Conduct a faunal study of wetland use. Significant fauna will be subjected to an appropriate monitoring protocol.

Objective 6-2: Implement and enforce effective buffers around wetlands areas.

Task 1: Post signs identifying wetland buffers.

Task 2: Identify areas surrounding wetlands that require a vegetative buffer or filterstrip (or repair thereof) for protection.

Task 3: Update Training Site SOP with guidance specific to wetland areas as needed.

Task 4: Educate troops, management staff, and others on the importance of buffers, the limitations to their use, and any regulatory or permitting issues involved with activities in the vicinity of wetlands.

Objective 6-3: Protect wetlands from pollutants and other degradation.

Task 1: Identify sources of pollution (non-point and point sources).

Task 2: Meet regulatory requirements for all sources.

Task 3: Implement additional protection or monitoring if needed.

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.

Currently, many of the stands on VTS-M are overmature in terms of timber production, and many of the trees are at or beyond the maximum size many mills will accept. 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. 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 1.

Goals:

- Provide optimum forestland training opportunities for TNARNG.
- Improve forest health and wildlife habitat through appropriate forest management techniques.
- Manage for native forest species appropriate to the region.
- Derive some income for the Forestry Reserve Account and local municipalities through appropriate timber sales.

Objective 7-1: Maintain forest inventory and other information needed for forest management planning.

Task 1: Repeat forest inventory in FY2015.

Objective 7-2: Improve training areas and forest health and habitat quality by selected timber harvesting.

Task 1: Implement forest management plan annually.

Task 2: Monitor effects through long-term vegetation monitoring program, RTLA program, and repeat surveys.

Task 3: Modify forest management plan, as needed, in response to monitoring results or if training requirements change.

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 be an important tool for maintaining grassland areas, however.

Goals:

- Minimize threat of wildfire to the training site.
- Maintain fire breaks to control wildfire or prescribed fire.
- Utilize prescribed fire as appropriate to maintain training area conditions.
- Utilize prescribed fire as appropriate to maintain native ecosystems.
- Utilize prescribe fire experimentally to regenerate mixed oak stands.

Objective 8-1: Ensure sufficient firebreaks for protection of VTS-M resources and to prevent fire escape from the training site.

Task 1: Identify additional firebreak locations needed.

Task 2: Create firebreaks where needed, with consideration for erosion potential and threatened species protection.

Task 3: Develop schedule of maintenance for firebreaks.

Objective 8-2: Perform prescribed burning as appropriate for training and ecosystem management needs in accordance with the Wildland Fire Management Plan.

Task 1: Maintain trained TNARNG personnel for prescribed burning and wildland fire fighting.

Task 2: Coordinate with TN Division of Forestry or other organization to provide expertise TNARNG lacks, when needed.

Task 3: Obtain and maintain equipment needed for prescribed burning.

Task 4: Implement prescribed fire program in Annex 2 for fuel reduction, training area development, and ecosystem management.

Task 5: Conduct postburn evaluations to monitor efficacy of prescribed fire program.

Objective 8-3: Implement shelterwood/burn method to regenerate mixed oak stands on an experimental basis, as described in Annex 2.

Task 1: Identify suitable site and develop study protocol.

Task 2: Conduct shelterwood harvest.

Task 3: Conduct prescribed burn 3-5 years following harvest.

Task 4: Monitor regeneration.

Task 5: Harvest residual overstory if regeneration sufficient.

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 for the safety of the public and the soldiers. 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 and to carry out a solution. Fishing is allowed from the shores of Walker Lake and is open to the public on days specified by the Facility Manager. A valid Tennessee fishing license is required.

Goals:

- Limit negative impacts on wildlife or wildlife management by training activities or land management.
- Improve wildlife habitat where possible through management of native communities and use of native species.
- Determine carrying capacity of the training site for white-tailed deer and maintain population at that level.

Objective 9-1: Collect and maintain updated and complete data on wildlife use of VTS-M.
See Section 4.2.1, Objective 1-1 for planning level surveys.

Objective 9-2: Manage habitats for all native species, not just game.
Task 1: Maintain native species vegetative buffers around water sources.

Task 2: Install nest boxes for appropriate bird species.

Task 3: Modify edges between habitats to create less sharp, more gradual change (see Section 4.2.11, Objective 11-2).

Task 4: Convert grassland areas to native plant species where feasible.

Objective 9-3: Determine the necessity/feasibility of a hunting program for VTS-M.
Task 1: Gather information about game animals (white-tailed deer, wild turkey, other game birds, small game) on the training site and in the region.

Task 2: Consult with TWRA about the carrying capacity of the training site and whether additional population control is needed for any game species.

Task 3: Consult with TWRA about the potential need for additional public hunting opportunities in Carroll County and the suitability of VTS-M to fill that need.

Task 4: Consult with the Training Office and training site personnel to determine if the military mission can be coordinated with limited public hunting access.

Task 5: Develop a hunting program if deemed feasible and desirable.

Objective 9-5: Develop training for TNARNG soldiers and personnel on protection of wildlife species.

Task 1: Identify important and useful information for soldiers to know.

Task 2: Develop and present training materials.

4.2.10 Pest Management

Pest Management at VTS-M is directed by the TNARNG Integrated Pest Management Plan (IPMP). Integrated Pest Management utilizes "targeted, sustainable (effective, economical, environmentally sound) methods including education, habitat modification, biological control, genetic control, cultural control, mechanical control, physical control, regulatory control, and where necessary, the judicious use of least-hazardous pesticides" to prevent pests from causing "unacceptable damage to operations, people, property, materiel, or the environment" (DODI 4150.7).

According to DoD regulation 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 exception to this rule is occasional small application of ready-made general use pesticides applied on a "self-help" basis due to an immediate need for personal safety (e.g., wasp spray in the motorpool, fire ant bait beside the walkway). Interior pest control on VTS-M is provided by contracted pest control company. Chemical vegetation control on VTS-M is largely conducted by employees who are state-certified in the turf and ornamental and right-of-way categories. All chemical pesticide applications must be reported to the TNARNG Pest Management Coordinator.

VTS-M has a growing infestation of the imported fire ant (*Solenopsis* spp.). This is a highly aggressive ant, dominating the areas it infests and generally causing a decrease in insect 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. A program is underway to identify the locations of the fire ants on VTS-M and apply baits in order to control their numbers.

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 Guard 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.

Goals:

- Implement Integrated Pest Management according to the TNARNG Integrated Pest Management Plan (IPMP)
- Minimize the use of chemical pesticides and herbicides while achieving needed control.
- Ensure compliance with all legislation, regulations, and guidelines for pest management.
- Control and/or eradicate invasive species on the installation.

Objective 10-1: Control invasive species (IAW Executive Order 13112, "Invasive Species") to protect the natural ecosystems of the training site and for improvement of training areas.

Task 1: Implement IPP control in accordance with Annex 3, beginning with small populations with a high-probability for control and those invasive species threatening significant habitats on the training site.

Task 2: Implement long-term efforts to limit serious infestations such as privet, sericea lespedeza, and Nepalese browntop.

Task 3: Identify problem plant species that may interfere with certain training activities (e.g., thorny species, dense brush, excessive growth around target zones) and implement controls in accordance with Annex 3.

Task 4: Monitor results or change via long-term vegetation monitoring program, RTLA, and repeat surveys.

Objective 10-2: Control pest species for safety and comfort of training site users.

Task 1: Install and maintain bat boxes and bird nest boxes for biological control of mosquitoes around buildings and bivouac sites.

Task 2: Control the imported fire ant population through the application of baits to mounds or broadcast across heavily infested areas.

4.2.11 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.

Goals:

- Maintain an attractive, functional landscape appropriate to TNARNG needs.
- Minimize the disconnect between "maintained" and "natural" landscapes.
- Decrease the use of chemical pesticides and herbicides.

Objective 11-1: Utilize regionally native plant species for all landscaping and restoration efforts if feasible.

Task 1: Create a list of non-native plants to avoid and a list of native alternatives and their planting requirements for landscaping purposes.

Task 2: Develop a guidance for TNARNG maintenance and revegetation to utilize only native species wherever feasible.

Objective 11-2: Identify areas where the "edge" between maintained and natural can be blurred and adjust grounds maintenance activities to produce a less sharp division.

Task 1: Survey the training site for appropriate boundaries between natural and maintained landscapes.

Task 2: Develop and implement a program to create more graduated edges. Ensure that changes to the vegetation structure will not affect training or safety.

Objective 11-3: Adjust maintenance schedules for protection of specific environmental values (e.g., rare plant growing seasons, breeding season of ground nesting birds, etc.)

Task 1: Create list of values that may be impacted by grounds maintenance and determine appropriate scheduling and processes for their protection.

Task 2: Develop a "calendar" of maintenance and management activities for the training site.

4.2.12 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: smalls 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.

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 lives of 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.

Goals:

- Determine the viability and desirability of a hunting program at VTS-M in consultation with the TWRA (see section 4.2.9, Fish and Wildlife Management).
- Identify and develop any other potential recreational use that will not interfere with training or result in hazardous situations for the public or TNARNG personnel.

4.2.13 Cultural Resources Management

TNARNG has an approved Integrated Cultural Resources Management Plan (ICRMP) for its Tennessee properties, including VTS-M, and has conducted three 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 or 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.

Goals:

- Manage cultural resources in support of the military training mission.
- Identify conflicts between cultural resources management and the training mission. Reconcile conflicts by ensuring continuance of the military mission while protecting cultural resources.
- Avoid impacts to historic, prehistoric, and archaeological resources on VTS-M in accordance with cultural resources laws and regulations.
- Maintain good relations with the American Indian tribes that have interest in TNARNG lands.

Objective 13-1: Adhere to guidelines presented in the TNARNG Integrated Cultural Resources Management Plan (ICRMP) for VTS-M.

Objective 13-2: Ensure that potential cultural resources sites are identified and are avoided during all natural resources management activities.

Objective 13-3: Ensure that sites of prehistoric or historic significance which are encountered during natural resources management activities are properly reported, protected, and evaluated as required by state and federal regulations.

Objective 13-4: Protect cemeteries on the VTS-M in accordance with the license.

4.2.14 Geographic Information Systems

TNARNG Environmental has an extensive GIS program. It incorporates training site information including road systems, utility features, training areas, vegetative cover, and aerial photography. Currently the VTS-M database is incompletely populated, especially with environmental data. GIS data will be collected in conjunction with all surveys conducted in accordance with this INRMP. Additional needs will be programmed into the STEP system as they become apparent.

Goals:

- Continue to expand and validate the information contained in the GIS database.
- Utilize the data for training and management planning and for reporting purposes.

4.2.15 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 (DA) and Army National Guard (ARNG) policy; and
- provide National Guard Bureau (NGB) 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.

4.3 SUSTAINABLE RANGE PROGRAM (SRP)

The Sustainable Range Program (SRP) was conceived and implemented to improve the way the Army designs, manages, and uses ranges 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 land to support training and testing requirements. The military mission is supported by the SRP through the integration of facilities management, environmental management, munitions management, and safety management to efficiently manage and maximize the capability, availability, and accessibility of ranges and training land to support training and testing requirements (Department of Army 2005).

The SRP gives attention to the increasing problem of encroachment on areas surrounding military installations. Encroachment has the potential to affect the accessibility and capability of the Army and the way the military trains. Because Army installations are located in regions that are increasingly urban and agricultural, the relatively natural landscapes found on these installations become islands of biodiversity.

There are eight overall objectives/core areas for the SRP that are designed to ensure the 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

The SRP program is the responsibility of the Training Site Commander. This program is closely tied to natural resources management and should be conducted in accordance with the standards put forward in this INRMP. The Army's two components of the Sustainable Range Program are the Range and Training Land Program (RTLP) and Integrated Training Area Management (ITAM).

4.3.1 Range and Training Lands Program (RTLP)

The Range and Training Lands Program (RTLP) provides centralized management and prioritization for planning, programming, design and construction activities for live-fire training ranges and maneuver training lands. The RTLP process was developed to assist installations in the integration of mission support, environmental stewardship, and their economic feasibility (Department of Army 2005). In addition, the RTLP identifies the needs for range projects and training land requirements for live-fire ranges and maneuver area. The RTLP establishes how Army ranges are managed and maintained to support the mission requirements of each installation.

4.3.2 Integrated Training Area Management (ITAM)

The ITAM program serves as a link between the RTLP and Natural Resources Management. ITAM provides range officers with the capabilities to manage and maintain training lands and support mission readiness and the Mission Essential Task List (METL). ITAM integrates the mission requirements derived from the RTLP with environmental requirements and environmental management

practices and establishes the policies and procedures to achieve optimum, sustainable use of training and testing lands by implementing a uniform land management program.

The ITAM program is a management and decision-making process that integrates army training and other mission requirements for land use with sound natural resource management practices. There are four components of the ITAM program: Range and Training Land Assessment[1] (RTLA); Land Rehabilitation and Maintenance (LRAM); Sustainable Range Awareness (SRA); and Training Resources Integration (TRI)

4.3.2.1 Range and Training Land Assessment

RTLA is a management procedure that inventories and monitors land conditions. It incorporates relational database and GIS technologies into the land use decision process. RTLA collects physical and biological resources data from training land in order to relate land conditions to training and testing activities. These data provide the information to effectively manage land use and natural and cultural resources. It is the natural resources data collection and analysis component of the ITAM Program and is used as a standard base for inventory and monitoring on Department of Defense owned/managed properties (CEMML 1999). The intent of RTLA is to acquire essential natural resource baseline information that is needed to effectively manage training lands. RTLA surveys inventory plants and animals and describe the condition of the soils. The information obtained from RTLA surveys may be integrated with standard data elements from ancillary components of ITAM (for example, cultural resources surveys, forest surveys, wetlands surveys, endangered species surveys, and water quality monitoring), satellite imagery, and aerial photography to portray a total picture of the natural and cultural resources of the training site. GIS is used to integrate all natural/cultural resources data and graphically display the relationships between individual resource components.

Goal:

- To establish and maintain a monitoring system on VTS-M's training areas that will serve as an early warning system for the integrity of the training site's ecosystems.

Tasks:

1. Establish special use plots as necessary on VTS-M.
2. Establish control plots as necessary on VTS-M.
3. Conduct inventories of vegetation, wildlife, and effects of training on RTLA plots.
4. Conduct short-term (every year) and long-term (every 3-5 years) monitoring of plots.
5. Utilize data to determine carrying capacity of training areas.
6. Utilize data to track changes in the training site's ecosystems.

4.3.2.2 Land Rehabilitation and Maintenance

LRAM is a preventive and corrective land rehabilitation and maintenance procedure that reduces the long-term impacts of training and testing on an installation. It mitigates training and testing effects by combining preventive and corrective land rehabilitation, repair, and/or maintenance practices. It includes training area redesign and/or reconfiguration to meet training requirements. LRAM is an active component of the ITAM program that is designed to restore and maintain soil, vegetation, and water resources for long-term sustainable use and training realism. The program uses cost-effective technologies such as revegetation and erosion control techniques to reduce soil loss, control water runoff, and protect soil productivity and riparian areas (adjacent to water and wetlands). A key element in the

[1] The Range and Training Land Assessment was formerly known as the Land Condition Trend Analysis (LCTA).

LRAM program is the watershed or drainage basin approach to land rehabilitation. This approach ensures that land rehabilitation projects address actual land degradation problems, not just the symptoms.

Goals:

- To protect, maintain, and improve soil, water, and air quality by providing adequate vegetative cover on all soils and maintaining appropriate drainage structures.
- To ensure "no net loss" of training lands for military maneuver training.

Tasks:

1. Comply with all federal, state, and local laws and regulations pertaining to soil stabilization and water and air quality.
2. Provide adequate protection of natural resources by implementing best management practices.
3. Improve surface water quality by reducing sediment concentrations in streams and drainages on VTS-M.
4. Apply land rehabilitation treatment measures following troop training within the next optimum seeding period (spring or fall).
5. Reseed with native species in areas where they would be effective, productive, and cost-efficient.

4.3.2.3 Sustainable Range Awareness

SRA provides a means to educate land users on their environmental stewardship responsibilities. It provides for the development and distribution of educational materials to land users. These materials relate the principles of land stewardship and the practices of reducing training and/or testing impacts. Environmental Outreach also includes information provided to environmental professionals concerning operational requirements. The purpose of SRA is to prevent unnecessary damage to the environment and in particular, training lands, by providing information to all site users.

The SRA program should focus on all land users to include soldiers, leaders, DA civilians, and the local community who may use training lands for recreational purposes. Sustainable Range Awareness is designed to improve their understanding of the effects of their mission, training, or activity on the natural resources of the VTS-M.

Goals:

- To create in those who use VTS-M a conservation ethic that will minimize damage to training lands and natural resources.
- To develop and implement a public education program to increase public awareness and acceptance of ecosystem management.

Tasks:

1. Develop the VTS-M field card that identifies environmental considerations and guidelines for military tenants utilizing the facilities and resources at VTS-M.
2. Develop other awareness materials for use on VTS-M.
3. Provide public service announcements to inform the public of events occurring on VTS-M.

4.3.2.4 Training Resources Integration

TRI is the decision-support procedure that integrates all requirements for land use with natural and cultural resources management processes. TRI integrates the installation training and testing requirements for land use derived from the Range and Training Land Program (RTLP); the range operations and training land management processes; and the installation training readiness requirements

with the installation's natural resources conditions. Siting military missions (and other land uses) in areas best capable of supporting the activities is the main goal of TRI. TRI relies heavily on GIS and RTLA to determine land capabilities and includes rotation of training lands as well as scheduling lands according to their "carrying capacity" to support specific missions. TRI also includes those restrictions required to maintain quality training land, provide a safe training environment, and protect significant natural resources. When areas cannot be placed "off-limits" or signage cannot be used, the SRA program will serve to educate the training site users about site limitations.

TRI requires the involvement of and coordination between the POTO, Environmental, and Facilities staffs. The ITAM/TRI Committee, formed by the Adjutant General will serve as the mechanism to bring all the key players together. Coordination must take place for management to effectively schedule and properly allocate activities according to the land's ability to support training events with minimum environmental effects.

Goal:

- To ensure the sustainability of training lands for essential support of the military mission and environmental law compliance.
- To provide guidance to users of VTS-M regarding their conduct while on TNARNG property.

Tasks:

1. Determine the training land carrying capacity at the time a training event will occur.
2. Plan and distribute activities such as military training, rehabilitation of training damage, rare species habitat management, and natural resources management to minimize conflicts with each other.
3. Update the VTS-M Standard Operating Procedures (SOP), especially the environmental section.

4.4 LONG-TERM VEGETATION MONITORING

The goal of long-term monitoring is to track changes to the land resulting from training activities or other forces. RTLA, under the ITAM program, is one form of monitoring which should be implemented at VTS-M. Additionally, 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 (now RTLA) methodology utilized in 2002, it was determined that this design was not consistent with current scientific methods utilized in the eastern U.S. ecotypes. A plot quadrat approach is more in keeping with vegetation measurement and monitoring in the southeastern U.S. in current scientific literature. An initial sampling was made on eight rectangular plots at VTS-M located at the starting end of the original LCTA transects. The plot design was a nested, rectangular quadrat system closely related to the methodology employed by Christensen and Peet (1984).

Of the nine plots sampled at VTS-Milan, four were identified as "Control Plots" (CCP), representing typical vegetation conditions on the training site. The other five were "Special Use Plots" (CSUP) and were located in areas directly impacted by TNARNG activities on a routine basis. Two of the special use plots were located in training area B; one on the M203 range and the other next to a pull-in. In training area A, one plot was located on the machine gun range, another within the TOC, and the third on the bivouac site near the pond. All MSUPs were grassland areas. The control plots were located in wooded areas through training area A: two in hardwood areas, one in a redcedar woodland, and one in a pine stand.

Further modification of this design is needed to ensure thorough coverage of the site and statistical validity, and a larger sample size is essential to fully characterize the training site. A major project in FY2011 will be to develop a vegetation monitoring protocol and statistical analysis plan for VTS-M. Plots will be distributed in a stratified random manner in order to sample all vegetation types and most major areas of the training site. All plot locations will be recorded with GPS and marked for permanent resampling. While the initial data collection will be related to vegetation diversity and growth, the design will be adaptable to the sampling of other environmental characteristics.

4.5 NATURAL RESOURCES PROJECTS

4.5.1 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-Milan.

Survey	Completed	Contractor	Next
Soil Survey of Carroll County, Tennessee	1984	USDA Soil Conservation Service	NA
Forest Inventory	1986	Resource Consulting International, Ltd.	Done
Forest Resources Management Plan	1987	Resource Consulting International, Ltd.	Done
Soil Survey of Gibson County, Tennessee	1994	USDA Soil Conservation Service	NA
Phase I Natural Resource Survey	1994	Lose and Associates, Inc.	NA
Delineation of Wetlands and Other Regulated Waters	1998	US Army Engineer Waterways Experiment Station	2009
Natural Resource Aquatic Survey	1999	Science Applications International Corporation (SAIC)	2011
Phase II Natural Resource Terrestrial Survey	2000	SAIC	NA
Butterfly and Insect PLS	2005	Environmental Resource Management	2015
Vegetation Community Survey	2006	Dynamic Solutions	2016
Invasive Plant Species Survey	2006	Dynamic Solutions	2011
Forest Inventory and Management Plan	2006	Thompson Engineering	2015
Rare, Threatened, and Endangered Plant and Animal Survey	2008	SAIC	2013
Avian PLS	2008	AMEC Earth & Environmental, Inc.	2013
Herpetofauna PLS	Expected 2010	URS Group, Inc.	2014
Mammal PLS	Expected 2010	AMEC Earth & Environmental, Inc.	2015

4.5.2 Implementation of INRMP 2002-2006

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, and the layout made it difficult to identify the objective which a given project supported. In general, the previous INRMP was found to be ineffective in guiding actual land management efforts. It is hoped that many of its weaknesses have been eliminated in this iteration of the plan.

Despite the flaws in the first INRMP, natural resources management has progressed on VTS-M during the time since its implementation: a great deal of basic information has been gathered through planning level surveys, 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 the original INRMP have been incorporated into Table 4.2 with a description of the status of that project. 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 during this period of monitoring duties from the Environmental Office to the ITAM Office, which lacks the personnel expertise needed to accomplish environmental monitoring. A number of these projects have been carried over with this revised INRMP and will be completed or implemented during the next five years (see Table 4.3).

Table 4.2: Project Status from 2002-2006 INRMP.

Area	Project/Management Action	Status
Environmental		
Ecosystem Management	Monitor natural resources/vegetation.	Scheduled for 2011.
	Conduct erosion surveys.	Informal, annual. Formal process to be developed in 2010.
	Planning level floristics survey.	Complete 2007.
	Small mammal trapping and audio planning level survey.	Initiated 2008.
	Invasive exotic plant planning level survey.	Complete 2006.
	Conduct surveys of bird species.	Complete 2008
	Introduce prescribed fire to approximately 300 ac of grassland per year.	Prescribed burning conducted intermittently – regular schedule to be implemented in FY10.
	Introduce prescribed fire to pine plantations.	Prescribed burning conducted intermittently – regular schedule to be implemented in FY10.
	Monitor effects of prescribed fire through post burn evaluations.	Not conducted.
	Clear vegetation to create maneuver corridors.	Conducted as needed by Training Site staff.
	Clear vegetation to create more open maneuver land.	Conducted as needed by Training Site staff.
	Revegetate areas that are incapable of natural revegetation.	All portions of training site carry appropriate vegetative cover.
	Construct and maintain fire breaks.	As needed.
	Conduct detailed forest inventory.	Complete 2006.
	Develop forest management prescriptions based on forest inventory.	Complete 2007.
	Designate a minimum of 25-feet on either side of	Initiated 2008.

Area	Project/Management Action	Status
	streams as streamside management zones. Mark with SEIBER stakes where needed.	
	Establish a 50-foot buffer zone on all sides of wetlands. Mark with SEIBER stakes where needed.	Initiated 2008 – marking with signs.
	Replace riparian vegetation that is impacted by construction/maintenance activities at 3:1.	N/A at this time.
	Conduct planning level wetlands survey.	Programmed for 2010.
	Conduct water quality monitoring of Halls Branch and Johns Creek.	Programmed for 2011.
	Build wood duck boxes, place adjacent to emergent wetlands, and maintain yearly.	Initiated 2004.
	Certify and maintain certification of pesticide applicators.	On-going.
	Eradicate invasive pest plants using prescribed fire, cutting, and herbicidal controls.	Intermittent efforts as funding allows.
	Update and implement the pest management plan.	In-progress.
	Notify the public in advance of large training site activities	As needed.
	Post patrols at the boundary to inform the public of training exercises in the area during each training event	As needed.
	Include Training Site SOP revisions in annual revisions of INRMP	Not performed.
ITAM		
LCTA	LCTA data collection – natural resources	Initiated by ENV office, 2002, but sidelined by funding changes.
	Erosion surveys	Informal, annual. Formal process to be developed in 2010.
	Obtain hardware, software, & plotter for GIS capability	Obtained and maintained by ENV office.
	Maintain GIS data layers	On-going.
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 area 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 4 250-gallon fire suppression truck insert units for fire suppression activities	Obtained and utilize water tank with pump on trailer – 2003.

Area	Project/Management Action	Status
	Obtain 4 John Deere Gator utility vehicles for fire suppression activities	Obtained 2 Gators in 2004.
EO	Produce a Leader and Soldier Field Card, video, and environmental awareness poster for VTS-M.	Not completed.
	Produce other environmental awareness materials	None produced.

4.5.3 Natural Resources Projects for INRMP 2011-2015

Many natural resources and training site improvement projects are planned for the years 2011-2015. Most are identified either in Chapter Four of this plan or else in the Integrated Training Area Management (ITAM) 5-year plan. Table 4.3 lists all of these projects, listed according to management sphere (training, ecosystem management, endangered species, wetlands, etc.) and objective.

An estimated cost is provided for projects which are expected to involve any expenditure beyond manpower. Most of these projects have been entered into the appropriate budget system; however, implementation is 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, 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 4.3: VTS-M Projects for 2011-2015.

Management Area	Page #	Project (Objectives in Blue)	New?[1]	Year	Est. Cost & Method[2]	Proponent[3]	Status	Actual Cost
Ecosystem Management	56	Characterize natural communities.						
		Vegetation community survey	R	2006 2016	C $45,000 C $50,000	ENV ENV	Complete	$77,625 sw
		Bird survey	C	2006 2013	C $40,000 C $50,000	ENV	Complete	$108,983 sw
		Small mammal survey	N	2008 2015	C $35,000	ENV	In-prog	$53,338 ms
		Herpetofauna survey	N	2008 2014	C $35,000	ENV	In-prog	$66,742 ms
		Aquatic fauna survey	R	2011	C $60,000	ENV		
		Insect survey	C	2013	C $40,000	ENV		
	57	Manage for ecosystem health & habitat quality						
		Eliminate invasive exotic species	C	Annual	IH/C $10,000 / yr	FAC		
		Initiate conversion to native species	C	2011-13	IH/C $15,000 / yr	ENV, FAC		
		Institute prescribed fire for management	C	per plan	IH/C vary	ENV, SITE		
		Develop long-term monitoring program for eco. mgmt.	C	2011	IH $5000	ENV		
		Monitor biodiversity via long-term plots & resurvey	C	2012	IH	ENV		
	57	Manage for "missionscape"						
		ID natural resources needed for mission	N	2011	IH	ENV, SITE,		
		Determine needed acreage and locations	N	2011	IH	SITE		
		Develop & implement plan to achieve missionscape	N	2012	IH/C vary	SITE, ITAM		
RTE	59	Manage all state & federal RTE species & the communities that support them						
		Comprehensive survey	C	2017	C $35,000	ENV		
		Manage American chestnut orchard						
		Maintain seedlings and orchard.	N	Annual	IH	ENV		
		Plant new seeds as appropriate	N	2011-15	IH	ENV		

[1] New? – 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. 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	Page #	Project (Objectives in Blue)	New?[1]	Year	Est. Cost & Method[2]	Proponent[3]	Status	Actual Cost
		Coordinate with TACF for blight resistance testing.	N	2015	IH	ENV		
Erosion control	60	Identify & rehab degraded training lands						
		Regular surveys for erosion or damage	C	Annual	IH	SITE, ENV		
		Develop erosion reporting form for webpage	N	2010	IH $1000	ENV		
		Develop project tracking system	N	2010	IH	ENV		
		Repair erosion problems ASAP	C	per need	IH vary	ITAM, SITE		
		Develop erosion repair guide	N	2011	IH $2000	ENV		
		BMP training for TNARNG	C	2011	IH $1000	ENV		
Watershed Management	62	Increase knowledge of riparian areas & conditions						
		Aquatic fauna planning level survey	R	2011	C $75,000	ENV		
		Establish regular stream erosion survey	N	Annual	IH	ENV, SITE		
		Initiate water quality monitoring.	C	2012	IH $1000 per year	ENV		
	62	Improve riparian buffers						
		Riparian habitat assessments	N	2011	IH $5000	ENV		
		Restore degraded buffers	N	2011-13	IH $5000 per year	ITAM, FAC		
		Repair erosion / sedimentation problems	C	per need	IH/C vary	ITAM, FAC		
		Control IPP in riparian areas	C	2012-13	IH $10,000 per year	FAC		
		Monitor via long-term plots & resurvey	C	2012	IH	ENV		
	62	Enforce buffer areas						
		Post signs around SMZs	N	2009-10	IH $1000	SITE, ENV	In-prog	
		Update Training Site SOP, RE:SMZs	C	2010	IH	SITE, ENV		
		SMZ training for TNARNG	C	2010	IH $500	ENV		
Wetlands Protection	63	Increase knowledge of wetlands & conditions						
		Wetland planning level survey	R	2011	C $50,000	ENV		
		Wetland flora survey	N	2013	C $25,000	ENV		
		Wetland fauna survey	N	2013	C $25,000	ENV		
	63	Enforce buffer areas						
		Post signs around wetland boundaries	C	2012	IH $1000	SITE, ENV		
		Identify buffer needs	N	2012	IH	ENV		
		Update training site SOP, RE:wetlands	C	2012	IH	ENV, SITE		
		Wetland buffer training for TNARNG	C	2012	IH $2000	ENV		
	63	Protect wetlands from pollutants and other degradation						
		Identify sources of pollution	N	2012	IH	ENV		
		Meet regulatory requirements	N	per need	IH	ENV, SITE		

Management Area	Page #	Project (Objectives in Blue)	New?[1]	Year	Est. Cost & Method[2]	Proponent[3]	Status	Actual Cost
		Implement additional protection, if needed	N	per need	IH	ENV, SITE		
Forest Management	64	Maintain needed forest information						
		Repeat forest inventory when needed	R	2015	C $35,000	ENV		
	64	Improve training areas and forest health via forest management plan						
		Conduct timber harvests	C	Annual	IH/USACE	SITE, ENV		
		Monitor changes via long-term plots & resurveys	C	2012	IH	ENV		
		Modify Forest Management Plan as needed	C	per need	IH	ENV		
Fire Management	65	Ensure effective firebreak system						
		ID additional firebreak locations needed	C	2011	IH	ENV, FAC		
		Create new firebreaks	C	per need	IH vary	FAC, ITAM		
		Develop schedule of firebreak maintenance	C	2011	IH	FAC		
		Maintain firebreaks	C	Annual	IH vary	FAC		
	66	Utilize prescribed fire, as appropriate						
		Fire training for ENV & SITE personnel	C	Annual	C $10,000 per year	ENV, FAC		
		Obtain needed equipment	C	2008-10	IH vary	ENV, FAC		
		Develop fire plan (WFMP)	C	2008	IH	ENV	Complete	NGB contract
		Develop burn protocol (within WFMP)	C	2008	IH	ENV	Complete	NGB contract
		Implement shelterwood/burn experiment for hardwood regeneration						
		Identify suitable site and develop study protocol	N	2011	IH			
		Conduct shelterwood harvest	N	2011	IH/USACE			
		Conduct prescribed burn 3-5 years following harvest	N	2015	IH			
		Monitor regeneration	N	2014-20	IH			
		Harvest residual overstory if regeneration sufficient	N	per need	IH/USACE			
Fish & Wildlife Management	67	Manage habitats for native species						
		Maintain native spp around water sources	N	2012	IH $10,000	ENV, SITE		
		Develop habitat linkages	N	2013	IH $25,000	ENV		
		Install and maintain nest boxes	C	2009	IH $1000	ENV, SITE	On-going	
		Convert grassland areas to NWSG, where feasible	C	2012-14	IH $50,000	ENV, FAC		
	67	Evaluate need for hunting program						
		Gather info about game animals in region & on site	N	2012	IH	ENV		
		Consult with TWRA RE: carrying capacity & hunting opportunities	N	2012	IH	ENV		
		Consult with Training RE: coordination	N	2012	IH	ENV		
		Develop hunting program if feasible & desirable	N	2013	IH	ENV, SITE		
	67	Train TNARNG on protection of wildlife						
		ID significant information	N	2012	IH	ENV		

Management Area	Page #	Project (Objectives in Blue)	New?[1]	Year	Est. Cost & Method[2]	Proponent[3]	Status	Actual Cost
		Develop training materials	N	2012	IH $1000	ENV		
Pest Management	69	Control IPP for ecosystem health and training area improvement						
		Baseline survey of IPP	C	2005 2011	C $20,000 C $20,000	ENV ENV	Complete	$65,717 sw
		Implement IPP control IAW Annex 3	C	Annual	IH $12,000	ENV		
		ID additional problem species interfering with training activities & implement appropriate control	C	Annual	IH $6,000	SITE		
		Monitor results via long-term plots & resurvey	N	Annual	IH	ENV		
	69	Control pests for TNARNG safety & comfort						
		Install bat boxes & bird nest boxes	N	2008	IH $1000	ENV, FAC	Complete	
		Maintain boxes	N	Annual	IH $500 / yr	ENV, FAC		
		Control imported fire ant population	N	Annual	IH/C vary	FAC		
Grounds Maintenance	70	Utilize regionally native species for all planting						
		Create list of non-native plants to avoid	N	2010	IH $500	ENV		
		Create guidelines with native spp to use instead	N	2010	IH $500	ENV		
		Establish TNARNG policy to utilize only native spp.	N	2010	IH	ENV		
	70	Blur the “edge” between maintained and natural areas						
		Survey for “edges”	N	2013	IH $2500	ENV		
		Develop plan to make edges more gradual	N	2013	IH $1000	ENV		
		Apply changes over time	N	2013-14	IH vary	ENV, FAC		
	70	Adjust maintenance schedules to benefit environment						
		Create list of values impacted by grounds maintenance	N	2012	IH	ENV		
		Determine appropriate scheduling	N	2012	IH	ENV, FAC		
		Create & distribute “calendar” of activities	N	2012	IH $1000	ENV		
Cultural Resources	N/A	Projects are defined in the TNARNG ICRMP for GA						

CHAPTER 5
RESOURCE PROTECTION GUIDELINES

5.1 LAND MANAGEMENT GUIDELINES

The projects identified in the previous chapter 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.

5.1.1 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

- Only existing roads and trails will be utilized. No new entrances will be made into any training area or range without the approval of VTS-M Range Control.
- Track vehicles are restricted to trails and hardened crossings when authorized to move between training areas.
- Vehicular use of forest stands is limited to roads as much as possible, except for special training areas. Bivouac sites and other training areas should be rotated to minimize impact on the soils and vegetation.
- 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.

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 food plots, experimental exclosures, or other wildlife management equipment or facilities.
- Trees will not be cut without prior approval of the Environmental Office and the VTS Commander. Brush and small vegetation may be used for camouflage and training barricades. Upon completion of the exercise, camouflage and trail barricades will be properly policed.

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.
- Road 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 fire fighting specialists.
- Prescribed fires will be initiated by trained TNARNG 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.

5.1.2 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 5.1: 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 activites 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.

5.1.3 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 Best Management Practices (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 manor. See Annex 3 for more information about invasive pest plant control.

5.1.4 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 5.2: 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 streamside management zones (SMZs).
    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 25 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.

5.1.5 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 Streamside Management Zones (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 Spill Prevention Control and Countermeasures (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.

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). Within 50 feet of any wetland boundary, foliar application of herbicides will be limited to those 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.

5.1.6 Forestland Use

TNARNG manages forest stands for multiple uses: training, habitat, watershed protection, and timber. To maintain the health and integrity of the forest ecosystem certain key factors should be observed:

- Only existing roads and trails will be utilized. No new entrances will be made into any training area or range without the approval of VTS Range Control.
- Vehicular use of forest stands is limited to roads as much as possible, except for special training areas (e.g., bivouac sites, designated training points).
- Bivouac sites and other forested training areas should be rotated to minimize impact on the soils and vegetation. 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.
- Trees will not be cut without prior approval of the Environmental Office and the VTS Commander. Brush and small vegetation may be used for camouflage and training barricades. Upon completion of exercise, camouflage, and trail barricades will be properly policed.
- 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.

5.1.7 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:

- Avoid use of non-native species for reseeding grassland areas. Utilize a native mix appropriate to the site and intended use. In particular, 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*).
- Prescribed fire is a useful tool for maintaining grassland ecosystems. TNARNG will develop and implement a burning regime for management and hazard reduction purposes.
- Existing roads and trails will be utilized whenever possible. No new entrances will be made into any training area or range without the approval of VTS 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.
- 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.

5.1.8 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.

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5.1.9 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.

5.1.10 Cultural Resources Management

The TNARNG Cultural Resources Management Policy is defined in the Integrated Cultural Resources Management Plan (ICRMP) for Tennessee. The following are key points in protection of cultural resources:

- The TNARNG will consult the Tennessee State Historic Preservation Office so that known historic, archaeological, and paleontological sites may be avoided.
- Cemeteries will be protected and maintained through fencing.
- For ground disturbing undertakings (ICRMP SOP #5)
  - Prior to any ground disturbance, contact the Cultural Resources office (see "Contacts" at front of this plan) to verify that the site is clear of known cultural resources.
  - The avoidance or mitigation of adverse impacts to NRHP eligible sites shall be proactively incorporated into the design and planning process rather than deferred until archaeological deposits may be discovered during actual construction.
  - All machine aided excavations or other earth moving projects shall be designed to avoid damage to archaeological sites or other historic properties that may be eligible for inclusion to the NRHP.
  - Until such time as the TN-SHPO has determined an archaeological site to be not eligible or has concurred with a recommendation that an archaeological site is not eligible, any newly discovered sites will be treated as potentially eligible and will be avoided whenever possible.
- In the event of Emergency Discovery of Archaeological Deposits (ICRMP SOP #6)
  - Contact the Cultural Resources Office immediately. Stop all work at the site.
  - Archaeological deposits which are newly discovered in the construction of any undertaking shall be evaluated for their NRHP eligibility.

  - Until such time a the TN-SHPO has determined an archaeological site to be not eligible or has concurred with a recommendation that an archaeological site is not eligible, any newly discovered sites will be treated as potentially eligible and will be avoided whenever possible.
  - Nothing in Section 106 or other federal regulations requires TNARNG to stop work on an undertaking. However, if the SHPO indicates that the property is significant, then TNARNG shall make reasonable efforts to minimize harm to the property.
- Treatment of Human Remains and Funerary/Sacred Objects (ICRMP SOP #8)
  - No Native American human remains, funerary objects, or sacred objects from VTS-M will be knowingly kept in government possession without initiating consultation.
  - Consultation regarding the disposition of Native American human remains, funerary objects, or sacred objects shall be initiated as soon as feasible.

5.2 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 5.3: Natural Resources Calendar

Issue	January	February	March	April	May	June
RTE						
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		Plant cool season grass	Plant cool season grass Fertilize	April 15 -> Plant native grass seed Plant cool season grass Fertilize	Plant native grass seed Plant warm season grasses	Plant warm season grasses
Erosion control		Erosion survey				
Wildlife						
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 5.3, continued:

Issue	July	August	September	October	November	December
RTE						
Weed Control		Contact herbicide on fencelines and other points of concern				
Revegetation	Plant warm season grasses	Plant cool season grass	Fertilize P&K	Fertilize P&K		
Erosion control		Erosion survey				
Wildlife						
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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