Integrated Natural Resources Management Plan (INRMP) Barnes Air National Guard

2019

Prepared for:

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SIGNATURE PAGE

The Barnes Air National Guard Base (ANGB) Integrated Natural Resources Management Plan (INRMP) has been prepared for the 104th Fighter Wing (104 FW) to manage significant natural resources in support of the military mission. Significant natural resources include the presence of state-listed species, and the presence of Waters of the United States including wetlands. The Barnes ANGB INRMP meets the intent of the Sikes Act (16 US Code [USC] § 670a–670l, 74 Stat. 1052).

To the extent that resources permit, the US Fish and Wildlife Service (USFWS), Massachusetts Division of Fisheries and Wildlife (MassWildlife), and the Massachusetts Air National Guard (MAANG) by signature of their agency representative, do hereby enter into a cooperative agreement for the conservation, protection, and management of natural resources present on Barnes ANGB. The agreement may be modified and amended by mutual agreement of the authorized representatives of the 3 agencies. This agreement will become effective upon the date of the last signatory and shall continue in full force for a period of 5 years or until terminated by written notice to the other parties, in whole or in part, by any of the parties signing the agreement.

By their signatures below, or an enclosed letter of concurrence, all parties grant their concurrence with and acceptance of the following document.

Approving Officials:

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DIRECTOR

9/30/2019
Date

ANNUAL REVIEW DOCUMENTS

This page is used to certify the annual review and coordination of the Barnes ANGB INRMP.

With the signature below, this document acknowledges that the annual review and coordination of the INRMP has occurred for the specified year.

Year: 2020

[ ]	Date
Barnes ANGB	
[ ]	Date
US Fish and Wildlife Service	
[ ]	Date
Massachusetts Division of Fisheries and Wildlife	

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Year: 2021

[ ]	Date
Barnes ANGB	
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Year: 2022

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[ ] Barnes ANGB		Date
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[ ] Massachusetts Division of Fisheries and Wildlife		Date

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Year: 2024

[ ]	Date
Barnes ANGB	
[ ]	Date
US Fish and Wildlife Service	
[ ]	Date
Massachusetts Division of Fisheries and Wildlife	

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DOCUMENT CONTROL

Record of Review –In accordance with the Sikes Act, Department of Defense Instruction (DoDI) 4715.03, *Natural Resources Conservation Program*, Department of Defense Manual (DoDM) 4715.03, *INRMP Implementation Manual*, and Air Force Instruction (AFI) 32-7064, *Natural Resources Management*, an INRMP is required to be reviewed annually to ensure plans and projects remain current, and every 5 years for operation and effect. Annual reviews and updates are accomplished through annual meetings led by the base Environmental Manager (EM) and attended by the USFWS, the MassWildlife, and, if required, the National Oceanic and Atmospheric Administration, National Marine Fisheries Service (NOAA NMFS). During the annual meetings, actions taken over the previous year are discussed and actions to be taken over the coming year are discussed and agreed to. The meeting is followed up in writing for concurrence by the EM and the representatives from the USFWS and the MassWildlife. As part of the annual and 5-year reviews, the EM shall hold meetings with internal stakeholders to ensure all personnel and tenants are informed of INRMP requirements.

ACRONYMS

°F	degrees Fahrenheit
104 FW	104th Fighter Wing
ACA	Airspace Control Authority
AFI	Air Force Instruction
AFPAM	Air Force Pamphlet
ANG	Air National Guard
ANGB	Air National Guard Base
AOC	area of concern
ASE	aerospace support equipment
BA	Biological Assessment
BASH	Bird/Wildlife Aircraft Strike Hazard
BGEPA	Bald and Golden Eagle Protection Act
BHWG	Bird Hazard Working Group
CAPS	Cooperative Agricultural Pest Survey
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CMR	Commonwealth of Massachusetts Regulation
CWA	Clean Water Act
DEPARC	Defense Environmental Programs Annual Report to Congress
DoD	Department of Defense
DoDI	Department of Defense Instruction
DoDM	Department of Defense Manual
DUSD	Deputy Under Secretary of Defense
EA	Environmental Assessment
EIAP	Environmental Impact Analysis Process
EIS	Environmental Impact Statement
EM	Environmental Manager
EO	Executive Order
ERP	Environmental Restoration Program
ESA	Endangered Species Act
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FY	Fiscal Year
GIS	Geographic Information Systems
IICEP	Interagency and Intergovernmental Coordination for Environmental Planning
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
IPMC	Installation Pest Management Coordinator
MAANG	Massachusetts Air National Guard
MassDEP	Massachusetts Department of Environmental Protection
MBTA	Migratory Bird Treaty Act
MassWildlife	Massachusetts Division of Fish and Wildlife
MESA	Massachusetts Endangered Species Act
MOA	Memorandums of Agreement
MOU	Memorandums of Understanding
NAAQS	National Ambient Air Quality Standards

NEPA	National Environmental Policy Act
NGB	National Guard Bureau
NMFS	National Marine Fisheries Service
NOAA	National Oceanic and Atmospheric Administration
NRCS	Natural Resources Conservation Service
NRHP	National Register of Historic Places
OPR	Office of Primary Responsibility
PAA	primary assigned aircraft
PIF	Partners in Flight
SWAP	State Wildlife Action Plan
SWPPP	Storm Water Pollution Prevention Plan
UFC	Unified Facilities Criteria
US EPA	US Environmental Protection Agency
USACE	US Army Corps of Engineers
USAF	US Air Force
USC	US Code
USDA	US Department of Agriculture
USDA-WS	US Department of Agriculture – Wildlife Services
USFS	US Forest Service
USFWS	US Fish and Wildlife Service
UST	underground storage tank
WAP	Wildlife Action Plan
WS	Wildlife Service

1.0 EXECUTIVE SUMMARY

The Sikes Act Improvement Act of 1997, 16 USC § 670a et seq., as amended, (herein referred to as the Sikes Act) requires federal military installations with significant natural resources to develop a long-range INRMP and implement cooperative agreements with other agencies. The Sikes Act is implemented through Department of Defense (DoD) and US Air Force (USAF) Instructions and Manuals. The conservation measures discussed in the INRMP help manage water resources, reduce bird/wildlife aircraft strike hazard (BASH) risk, manage federal and state-listed species, and sustain natural resources. The Barnes ANGB INRMP is intended to be in support of and consistent with the intent of the Sikes Act.

The Barnes ANGB INRMP is the primary guidance document and tool for managing natural resources. Barnes ANGB is composed of approximately 190 acres broken into 2 parcels. The natural resources management on Barnes ANGB must be conducted in a way that provides for sustainable land use, complies with applicable environmental laws and regulations, real estate leases and licenses, and provides for no net loss in the capability to support the military mission. This INRMP provides a structure and plan to manage natural resources more effectively and ensure that Barnes ANGB remain available to support the MAANG military mission into the future.

Specific goals in the Barnes ANGB INRMP are supported by its objectives and work plans, as well as management strategies and specific actions. Goals and objectives are listed in **Section 8**, and projects are summarized in **Section 9**. The Barnes ANGB INRMP provides a description of the installation, the military mission, the environment on the installation, and specific plans and strategies for natural resource management designed for sustainable military operations. The implementation of the Barnes ANGB INRMP will ensure the successful accomplishment of the military mission while promoting adaptive management that sustains ecosystem and biological integrity, and provides for multiple uses of natural resources.

2.0 GENERAL INFORMATION

2.1 Purpose and Scope

This INRMP is the primary guidance document and tool for natural resource management at Barnes ANGB that provides for sustainable, healthy ecosystems, complies with applicable environmental laws and regulations, real estate leases and licenses, and provides for “no net loss” in the capability of installation lands to support the military mission. The Installation Commander can use this INRMP to manage natural resources more effectively to ensure that installation lands remain available and in good condition to support the installation’s military mission over the long term.

The Barnes ANGB INRMP is consistent with the Sikes Act as required by the DoD, USAF, and the National Guard Bureau (NGB). A multiple-use approach is implemented to allow for the presence of mission-oriented activities, as well as protecting environmental quality through the efficient management of natural resources.

2.2 Management Philosophy

2.2.1 Ecosystem Management

Natural resources at Barnes ANGB are managed with an ecosystem management approach as directed by AFI 32-7064 and DoDI 4715.03. Ecosystem management is defined as management to conserve major ecological services and restore natural resources while meeting the socioeconomic, political, and cultural needs of current and future generations. The goal of ecosystem management on military lands is to ensure that military lands support present and future test and training requirements while conserving, improving, and enhancing ecosystem integrity. The ecosystem management program for Barnes ANGB incorporates these elements as described in **Table 1**.

Biodiversity is the degree of variation of life within a given ecosystem, region, or even the entire planet. The DoD's challenge is to manage for biodiversity in a way that supports the military mission. Specific management practices identified in the Barnes ANGB INRMP have been developed to enhance and maintain biological diversity within the installation's ecosystems. Ecosystem management includes biodiversity conservation and invasive species control as integral parts of ecosystem management. Air National Guard (ANG) installations maintain or reestablish viable populations of all native species when practical and consistent with the military mission. ANG installations also identify the presence of exotic and invasive species, and implement programs to control and/or eradicate those species. Finally, when feasible, ANG installations develop joint control strategies with other federal, state, and local cooperating agencies and adjacent landowners to increase the effectiveness of control measures and for the benefits illustrated in **Figure 1**.

Table 1. Elements and Principles of Ecosystem Management	
DoDI 4715.03 Elements	
1	Avoid single-species management and implement an ecosystem-based multiple species management approach, insofar as that is consistent with the requirements of the Endangered Species Act (ESA)
2	Use an adaptive management approach to manage natural resources such as climate change
3	Evaluate and engage in the formation of local or regional partnerships that benefit the goals and objectives of the INRMP
4	Use the best available scientific information in decision-making and adaptive management techniques in natural resource management
5	Foster long-term sustainability of ecosystem services
AFI 32-7064 Principles	
1	Maintain or restore native ecosystem types across their natural range
2	Maintain or restore ecological processes such as wildland fire and other disturbance regimes where practical and consistent with the military mission
3	Maintain or restore the hydrological processes in streams, floodplains, and wetlands when feasible
4	Use regional approaches to implement ecosystem management on an installation by collaboration with other DoD components as well as other federal, state and local agencies, and adjoining property owners
5	Provide for outdoor recreation, agricultural production, harvesting of forest products, and other practical utilization of the land and its resources, provided that such use does not inflict long-term ecosystem damage or negatively impact the ANG mission

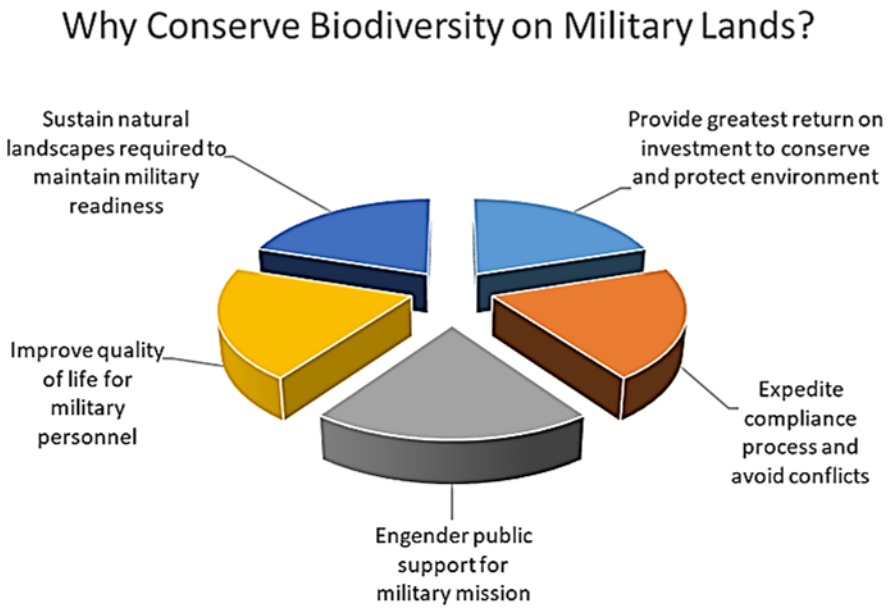

Figure 1. Why conserve biodiversity on Military Lands
**Adapted from Keystone Center, 1996.*

2.3 Authority

2.3.1 Natural Resources Law, Regulations & Policy

The ANG, USFWS, and MassWildlife determined an INRMP was required for Barnes ANGB due to the presence of significant natural resources thereby necessitating conservation and management.

DoDI 4715.03, *Natural Resources Conservation Program*, identifies the DoD policies and procedures concerning natural resources management and INRMP reviews, public comment, and endangered species consultation. INRMPs are required to be jointly reviewed by the USFWS, state fish and wildlife agency, and ANG installation for operation and effect on a regular basis, but not less often than every 5 years. Minor updates and continued implementation of an existing INRMP do not require need for public comment. Major revisions to an INRMP require an opportunity for public review. The degree of endangered species consultation when updating or revising an INRMP depends upon specific projects identified in the INRMP and the amount of past consultation. Most updates and revisions will not require formal consultation. ESA Section 7 consultation is required for INRMPs that contain projects that may affect federally-listed species or designated critical habitat. The need for such consultation should become apparent during the review for operation and effect, and implemented if necessary as part of an INRMP revision.

2.3.2 National Environmental Policy Act Compliance

The Environmental Impact Analysis Process (EIAP) is the process by which federal agencies facilitate compliance with environmental regulations. The primary legislation affecting these agencies' decision-making process is the National Environmental Policy Act of 1969 (NEPA; 42 USC § 4321 *et seq*.). NEPA requires that any organization using federal monies, proposing work on federal lands, or requiring a federal permit consider potential environmental consequences of proposed actions. The law's intent is to protect, restore, or enhance the environment through well-informed decisions.

The Council on Environmental Quality (CEQ) was established under NEPA for the purpose of implementing and overseeing federal policies as they relate to this process. The adoption of an INRMP can be considered a major federal action as defined by Section 1508.18 of the CEQ regulations. This requires an analysis of potential environmental impacts for the implementation of an INRMP, although a complete Environmental Assessment (EA) is not necessarily required as individual actions and projects undergo their own NEPA analysis.

CEQ regulations require intergovernmental notifications prior to making any detailed statement of environmental impacts. Through the Interagency and Intergovernmental Coordination for Environmental Planning (IICEP) process, Barnes ANGB notifies relevant federal, state, and local agencies and allows them sufficient time to make known their environmental concerns specific to a Proposed Action. Comments and concerns submitted by these agencies during the IICEP process are subsequently incorporated into the analysis of potential environmental impacts. This coordination fulfills requirements under Executive Order (EO) 12372, *Intergovernmental Review of Federal Programs*, and AFI 32-7061, *Environmental Impact Analysis Process*. Furthermore, public participation in decision making on new proposals is required. Consideration of the views and information of all interested persons promotes open communication and enables better decision-making. Agencies, organizations, and members of the public with a potential interest in

the Proposed Action, including minority, low-income, disadvantaged, and Native American groups, are urged to participate.

The EIAP for the implementation of Barnes ANGB's 2014 INRMP was conducted in accordance with NEPA, CEQ *Regulations for Implementing the Procedural Provisions of the National Environmental Policy Act* (40 Code of Federal Regulations [CFR] § 1500-1508), and 32 CFR Part 989. The EIAP and decision-making process for the Proposed Action (implementation of the 2014 Barnes ANGB INRMP) involved an examination of all environmental issues pertinent to the action proposed. Impact evaluations of the 2014 Barnes ANGB INRMP determined that no significant environmental impacts would result from implementation of the Proposed Action or any identified alternative. This determination was based on thorough review and analysis of existing resource information, and coordination with knowledgeable, responsible personnel from Barnes ANGB and other relevant local, state, and federal agencies. The EIAP for the implementation of the 2014 Barnes ANGB INRMP does not include an analysis of effects for individual actions or projects. Individual actions or projects that have the potential to impact the environment will be analyzed separately in accordance with the NEPA process. A new EIAP is not required for this INRMP update.

If a future action or project has the potential to impact the environment, federal agencies facilitate compliance with environmental regulations through the Environmental Impact Analysis Process (EIAP). EIAP identifies a proposed action's potential environmental impacts along with how those impacts can be mitigated. The primary legislation affecting these agencies' decision-making process is the National Environmental Policy Act of 1969 (NEPA; 42 USC § 4321 et seq.). NEPA requires that any organization using federal monies, proposing work on federal lands or requiring a federal permit consider potential environmental consequences of proposed actions. The law's intent is to protect, restore, or enhance the environment through well informed decisions. Air National Guard (ANG) installations initiate EIAP by completing Air Force (AF) Form 813 through ANG Readiness Center's (ANGRC's) online NEPA Tool. The ANGRC reviews the Form 813 and associated information to determine if the proposed action requires a categorical exclusion (CATEX), environmental assessment (EA), or environmental impact statement (EIS).

2.3.3 Responsibilities

The updated Barnes ANGB INRMP has been organized to ensure the implementation of year-round, cost-effective management projects that meet the requirements of the installation. Various personnel and organizations within the ANG are responsible for the implementation of this INRMP are described in the following subsections.

2.3.3.1 Installation Commander

The Installation Commander oversees the installation and is responsible for ensuring the goals and objectives of the INRMP are implemented to the fullest extent practicable based on funding and manpower availability. The Installation Commander is the official signatory for the Barnes ANGB INRMP.

2.3.3.2 Base Civil Engineer

The Base Civil Engineer (CE) plans, budgets, approves, and oversees all maintenance and construction activities performed on the installation. All maintenance and construction-related projects or management activities proposed in this INRMP should be approved by the Base CE to

ensure that funding is available and these projects are complementary to the installation's comprehensive planning processes.

2.3.3.3 ANG NGB/A4AM Natural Resources Program Manager

The ANG NGB/A4AM Natural Resources Program Manager (ANG NR Program Manager) is the technical point of contact on all natural resource related activities for the ANG. The ANG NR Program Manager tracks DoD and USAF policies and approves funding for projects identified as a priority in the Barnes ANGB INRMP. The development of projects included in the INRMP and any deviations from those projects will be submitted to the ANG NR Program Manager for review. Decisions resulting from those reviews will be a cooperative effort between the ANG NR Program Manager and the EM and/or the installation's Natural Resources Manager, when applicable.

2.3.3.4 Environmental Manager

The EM plans, budgets, approves, and oversees all environmental activities performed on the installation and is responsible for ensuring that activities associated with the implementation of this INRMP adhere to applicable federal, state, local, and USAF environmental regulations and guidelines. Projects proposed in the Barnes ANGB INRMP are reviewed by the EM and the ANG NR Program Manager. The EM should independently review deviation from the projects proposed in this INRMP. Persons responsible for implementation of the INRMP are required to attend the Civil Engineer Corps Officers School (CECOS) DoD Natural Resources Compliance course (http://www.netc.navy.mil/centers/csfe/cecos/CourseDetail2.htm#tab25).

2.3.3.5 Pest Management Coordinator

The Installation Pest Management Coordinator (IPMC) is responsible for the protection of real estate, control of potential disease vectors or animals of other medical importance, control of undesirable or nuisance plants and animals (including insects), and prevention of damage to natural resources. Pest management personnel utilize Integrated Pest Management (IPM) approaches and are responsible for the implementation of the IPM Plan. The IPMC is also responsible for coordinating with USDA-WS for all depredation activities, regarding required permitting, and for permit clarification, when required, while keeping the INRMP Working Group appraised of proposed modifications or changes to permits as they occur or are proposed.

2.3.3.6 Flight Safety Office

The Barnes ANGB Flight Safety Office is responsible for development, implementation, and management of the Barnes ANGB BASH Program. The Flight Safety Office also ensures that bird/wildlife strikes resulting from aircraft assigned to transient units at Barnes ANGB are accurately documented and reported to the EM and the USAF BASH Team. In addition, the Flight Safety Office participates in the Barnes ANGB Bird Hazard Working Group (BHWG), which conducts meetings to evaluate and refine strategies for the reduction of BASH risk on Barnes ANGB. The Flight Safety Office is responsible for coordinating with and providing required information on BASH activities with the EM.

2.3.3.7 Wing Safety Office

The Wing Safety Office is responsible for implementing all activities presented in this INRMP that pertain to the BASH Reduction Program. The Wing Safety Office also ensures that bird/wildlife strikes that occur with aircraft assigned to units at Barnes ANGB are accurately documented and reported to the USAF BASH Team. In addition, the Wing Safety Office ensures that the BHWG conducts meetings on the reduction of the BASH threat on the installation.

2.3.3.8 Airfield Management

Airfield Management is responsible for ensuring that the airfield is acceptable and appropriate for flight activity.

2.3.3.9 US Department of Agriculture – Wildlife Services

US Department of Agriculture – Wildlife Services (USDA-WS) is responsible for monitoring hazardous wildlife that have the potential to create an aircraft strike hazard. USDA-WS personnel support activities that pertain to the BASH Program and are responsible for wildlife depredation requirements within the airfield, as well as dispersal/harassment, capture and translocation, trapping and removal, surveillance and monitoring, and depredation permit acquisition.

2.3.3.10 Operations and Maintenance

Operations and Maintenance personnel are responsible for all grounds maintenance activities on the installation. In addition, this office will ensure completion of the habitat management protocols established in this INRMP taking into account mission requirements, natural resource management goals, and regulatory compliance requirements. The Operations and Maintenance personnel will also periodically review grounds maintenance equipment to determine if new or additional equipment is needed for the proper maintenance of the installation's landscapes.

2.3.3.11 Legal Office

The Legal Office is responsible for ensuring the implementation of the management objectives contained within the Barnes ANGB INRMP meet all regulatory and statutory requirements that pertain to natural resources management. The Legal Office will review any future natural resources management proposals and alert the Installation Commander and EM should there be any regulatory conflicts or shortfalls. In addition, the Legal Office will keep participating INRMP parties informed of any new statutes or regulations that might affect natural resources management.

2.3.3.12 Public Affairs Office

The Public Affairs Office is responsible for the coordination of public access for events at Barnes ANGB. The Public Affairs Office serves as the point of contact to interface between the Installation Commander and civilian groups interested in the installations for environmental, educational, or other purposes.

2.3.3.13 US Fish and Wildlife Service

The USFWS is a signatory of the INRMP and provides input regarding natural resource projects and operational component plans. The USFWS alerts the EM whenever new species added to the federal threatened and endangered species lists have the potential for inhabiting Barnes ANGB. In

addition, the USFWS, when feasible, will support ANG wildlife and vegetation surveys conducted at the Barnes ANGB.

2.3.3.14 Massachusetts Division of Fisheries and Wildlife

The MassWildlife is a signatory of the INRMP and provides input regarding natural resource projects and operational component plans. The MassWildlife alerts the EM whenever new species added to the state threatened and endangered species lists have the potential for inhabiting Barnes ANGB. In addition, the MassWildlife, when feasible, will support ANG wildlife and vegetation surveys conducted at the Barnes ANGB.

2.4 Integration with Other Plans

By its nature, an INRMP is multidisciplinary and provides the summary for natural resources at a specific installation. As a result, information from an INRMP is incorporated into other plans and other plans are written to support the INRMP. The Barnes ANGB INRMP plans include the following:

- BASH Management Plan – provides summary of the BASH program on Barnes ANGB, including techniques, processes, responsibilities, and management recommendations (MAANG 2018).
- Integrated Pest Management Plan (IPM Plan) – plan for management of pest species, including nuisance wildlife and invasive species, to minimize impact to mission, natural resources, and the environment (ANG 2018).
- Integrated Cultural Resources Management Plan (ICRMP) – plan that outlines installation policies and procedures for the protection, management, and preservation of cultural resources including historic properties, and for integrating cultural resources management into the overall base planning process (MAANG 2010).
- Cultural Resources Survey – A Cultural Resources Survey of the 104th Fighter Wing (104 FW) was conducted in August 2007. One site, the Barnes Native American Site, was identified and determined to be potentially eligible for listing on the National Register of Historic Places (NRHP). No potential historic districts were defined, no cultural landscapes identified and no buildings are eligible for listing on the NRHP (MAANG 2007b).
- Installation Master Plan – plan that provides ongoing master planning of the installation in support of the mission (MAANG 2007c).

In addition, this INRMP is also integrated with the following plans from other agencies.

- Massachusetts State Wildlife Action Plan (SWAP). The DOD and the ANG encourage support of state WAPs as part of a comprehensive installation natural resources program. Consequently, Barnes ANGB should consult frequently with the regional MassWildlife office to determine areas where the installation can participate in future wildlife conservation partnerships with the MassWildlife or other cooperating agencies. The 2015 updated SWAP provides Massachusetts decision-makers with important tools for restoring and maintaining critical habitats and populations of the state's species of conservation and management concern (MassWildlife 2015). The INRMP supports the WAP's primary goal of preserving wildlife habitat.
- Wildlife Hazard Assessment for Westfield-Barnes Municipal Airport – Barnes ANGB personnel will continue to work with airport personnel on BASH reduction efforts (USDA 2010).

3.0 INSTALLATION OVERVIEW

3.1 Location and Area

The 104 FW of the MAANG is located in Westfield, Massachusetts, on the Westfield-Barnes Municipal Airport. Barnes ANGB comprises 2 separate lease holdings on the northwest (main cantonment area) and northeast (munitions area) portions of Westfield-Barnes Airport (**Figure 4**). The installation occupies approximately 190 acres, located on the 2 parcels at the airport. Barnes ANGB is 5 miles north of downtown Westfield, in Hampden County, Massachusetts (**Figure 3**).

Figure 2. Barnes ANGB Regional Map

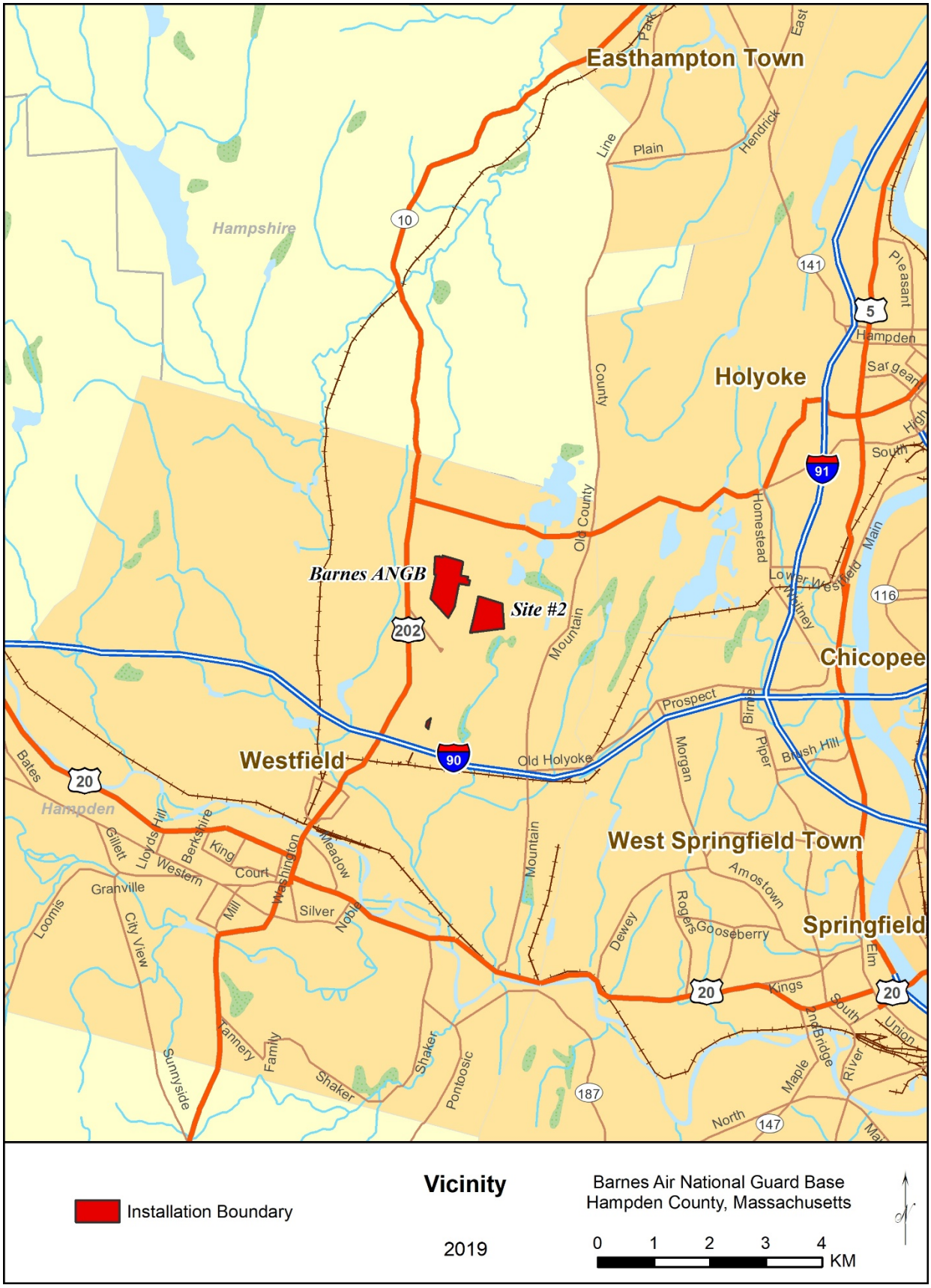

Figure 3. Barnes ANGB Vicinity Map

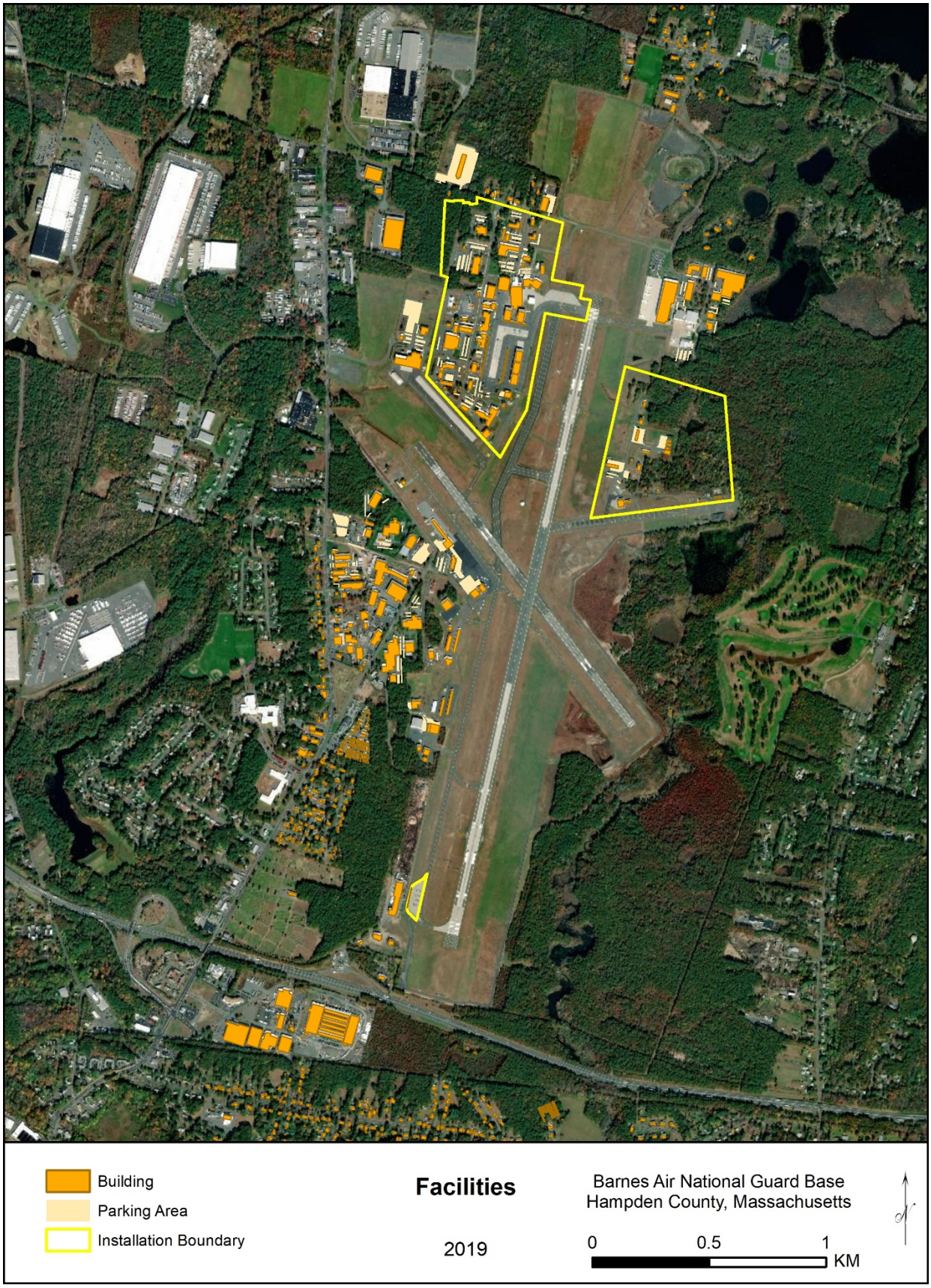

Figure 4. Barnes ANGB Facilities Map

3.2 Installation History

In early 1947, the Barnes Municipal Airport leased a parcel of land in the unused northwest corner of the airport to the newly founded MAANG. In April 1947, the Base was activated as the 104th TFG with its first fighter plane, a P-47 Republic Thunderbolt. By 1951, the 104th had grown in stature, prominence, and size, with the re-placement of the P-47 Thunderbolts with the P-51 Mustangs. The P-51 Mustangs were then replaced by the F-94 Starfire. The year 1957 saw the arrival of the F-84H Sabrejets which had been the top fighter of the Korean War. These remained in the 104th inventory until they were replaced by the F-84F Thunder-streak in 1965. The F-84 was on board until the arrival of the F-100 Supersabres in 1971. The aging Supersabres were replaced in 1979 by the A-10 Thunderbolt II, thus completing the cycle from Thunderbolt I (P-47) to Thunderbolt II (A-10). The 104 FW currently flies and maintains 18 F-15 Eagle (and 2 back-up aircraft) aircraft in support of its mission.

Military operations in which the 104 FW participated include Operation Desert Storm in 1991 and Operation Restore Hope in 1992. In 1995 the 104 FW deployed for 6 weeks to Operation Deny Flight and Deliberate Force, flying combat missions for the first time in the unit's history. In 1999 members of the 104 FW were activated per a Presidential Selective Recall to deploy in support of NATO operations in Kosovo. Beginning in January 2003 the wing deployed approximately 500 personnel in support of Operation Iraqi Freedom to an undisclosed location in Southwest Asia and to other locations within the same region. In 1999 the 104 FW participated in Operations Allied Force and Noble Anvil, and has been participating in Operations Noble Eagle, Enduring Freedom, and Iraqi Freedom from 2001 to present day (MAANG 2011).

3.3 Military Missions

The ANG mission is two-fold with federal and state components. The federal mission is to maintain well-trained, well-equipped units available for prompt mobilization during war and to provide assistance during national emergencies (e.g. natural disasters or civil disturbances). During peacetime, combat-ready units and support units are assigned to USAF major commands to carry out missions compatible with training, mobilization readiness, humanitarian, and contingency operations. When units are not mobilized, they report to the Governor of their respective state. The state mission is to provide protection of life, property, and preserve peace, order, and public safety.

The current mission of the 104 FW is to provide highly trained personnel and mission-ready equipment for dedicated service to the community, the state, and the nation; protecting life and property and preserving peace, order, and public safety. The 104 FW currently flies and maintains 21 primary assigned aircraft (PAA) (F-15 fighter aircraft) to support its fighter mission and Airspace Control Authority (ACA).

The main support operations performed at the 104 FW include aircraft fueling, aircraft deicing, aircraft maintenance, aerospace support equipment (ASE) maintenance, ground vehicle maintenance, fueling of ground vehicles, and facilities maintenance. These operations involve activities such as corrosion control, non-destructive inspection, fuel cell maintenance, engine maintenance, hydraulics, and wheel and tire maintenance. There are currently no tenant organizations on Barnes ANGB. As part of their mission, the USAF, ANG, and MAANG have chosen to be national leaders in environmental and natural resources stewardship both now and in the future. The vitality of natural resources must be ensured to achieve their military mission.

3.4 Surrounding Communities

Barnes ANGB is surrounded by the towns/cities of Granville, Russell, Montgomery, Southampton, Holyoke, West Springfield, Agawam, and Southwick. There is currently no accelerated development around the installation and encroachment is not an issue at this time.

3.5 Local and Regional Natural Areas

Located 9 miles from Barnes ANGB is the 227-acre Westfield Wildlife Management Area managed by MassWildlife. Hampton Ponds State Park is located 2 miles away in the City of Westfield and offers water-based recreation and picnicking. The Granville State Forest, a Massachusetts state park, is located in the towns of Granville and Tolland, 22 miles south of Westfield. This northern hardwood-conifer forest is 2,246 acres, and is adjacent to the Connecticut's 9,152-acre Tunxis State Forest (DCR 2012). Westfield sits in the foothills of the Berkshires, a highland geologic region composed of northern hardwoods and conifers, wetlands, wet meadows, marshes, fens, swamps, bogs, and rivers (Berkshires 2012).

4.0 PHYSICAL ENVIRONMENT

4.1 Climate

The climate of this region is known for its variability. Temperatures can fluctuate extensively on both a daily and seasonal basis while precipitation is fairly evenly distributed with no major seasonal changes. The climate is generally influenced by 3 different types of air masses: cool/dry continental air, warm/moist air either streaming up from the Gulf of Mexico or from the warm Gulf Stream current that occurs in the offshore regions of the East Coast of North America, or cool/moist air from the North Atlantic. The interaction between and rapid change from one air mass to another often leads to sudden swings in temperature and the extent of cloud cover and precipitation (MAANG 2011). Average temperatures in the southwestern Massachusetts region generally range from the mid to upper 20s (degrees Fahrenheit [ºF]) in the winter months to mid to upper 70s (ºF) in the summer months. Diurnal temperature ranges are generally between 20-30 ºF but can be greater, particularly during the summer months and periods of dry conditions. The region generally experiences between 5 and 15 days a year with a maximum temperature higher than 90 ºF, and between 5 and 15 days a year with subzero temperatures (NCDC 2010).

Average annual precipitation for Westfield is 48.39 inches. There is little variability in month to month averages, with a minimum of 2.83 inches for February and a maximum of 4.75 for October (NCDC 2010). It should be noted that while there is not much fluctuation evident in the monthly averages, the observed actual monthly totals often do vary greatly depending on timing and strength of weather patterns and individual storm systems. Snow is not uncommon during the winter months in southwestern Massachusetts. At least 1 inch of snowfall is observed on an average of 20-30 days per year. Snowfall totals can vary greatly from year-to-year, but the region receives an average 60-80 inches annually (MAANG 2011). The prevailing wind direction for the region is from the west. It becomes more southwesterly during the summer and more northwesterly in the winter. However, local topography can greatly influence prevailing wind speed and direction.

Climate Change

Department of Defense Instruction (DODI) 4715.03 requires the INRMP to assess the potential impacts of climate change on natural resources and to adaptively manage such resources to minimize adverse mission impacts. In August 2001, Massachusetts joined the other New England states and the Eastern Canadian provinces to unveil a regional Climate Change Action Plan. This regional plan was designed to reduce greenhouse gas emissions to 1990 levels by the year 2010, with a further 10% reduction by 2020. The region exceeded its 2010 target and in 2015 had already exceeded the 2020 target with a 10.4% reduction. A 2017 update to the regional plan includes a regional reduction marker to reduce regional GHG emissions by at least 35 to 45% below 1990 levels by 2030 (Coalition of Northeastern Governors 2017). The Massachusetts State Sustainability Program, established by EO 438, calls on state agencies to incorporate environmentally sustainable practices into their daily operations. The Plan identifies a number of actions relating to state government that are specifically designed to be consistent with the goals of EO 438. Implementation of these actions will be overseen by the State Sustainability Program which include developing and maintaining a greenhouse gas inventory for state facilities and fleets and improving energy efficiency for existing buildings.

4.2 Landforms

Barnes ANGB is located within Hampden County, bounded to the west by Berkshire Hills and to the east by the low hills of the Worcester Plateau. The primary topographic feature in the area is the Connecticut River and its associated level floodplains and gently sloping terraces. The installation is predominantly flat with an elevation of approximately 260 feet above mean sea level. The greatest relief exists along the eastern portion of the installation where the elevation drops off to a small pond and a marshy area (MAANG 2011).

4.3 Geology and Soils

Barnes ANGB lies within the Hartford Basin, a large Mesozoic structure filled with Triassic and Jurassic sediments and basalts in the Connecticut River Valley. The Mesozoic sediments were mostly formed on land, with some being “fluvial” or formed in rivers, and other layers are “lacustrine” or formed in lakes. Lava flows poured across the land from enormous volcanic fissures, now represented by dikes. There are 3 large lava flows in the Hartford basin (MAANG 2011).

There are 3 predominant soil types found on Barnes ANGB: Hinckley loamy sand, Windsor loamy sand, and a soil type referred to as Urban Land (**Figure 6**).

The Hinckley series consists of very deep excessively drained soils formed in glaciofluvial sand and gravel derived principally from granite, gneiss, and schist. They are nearly level through very steep soils on terraces, outwash plains, and deltas with slopes ranging from 0-8% on the installation, although in some places the slope can range from 8-25% (MAANG 2011). Permeability of this soil is very rapid, while available water capacity is very low. The hazard of erosion of this soil is slight. This soil has few limitations to most urban uses in areas with slopes generally less than 8% (NRCS 2019).

Windsor loamy sand is a very deep, nearly level, excessively drained soil with a dark brown loamy sand surface layer, with slopes ranging from 0-8% on the installation. The subsoil is typically about 16 inches thick with yellowish brown loamy sand in the upper part and yellowish brown sand in the lower part. The substratum is very pale brown sand to a depth of 60 inches or

more. A management concern for this soil is moisture stress to vegetation caused by the limited available water capacity. This soil has no major limitations for building site development and for local roads and streets (NRCS 2019).

Urban land exists in dense developments and encompasses any large area completely covered by impervious surfaces such as asphalt, concrete, or rooftop. These lands are typically so altered by man or obscured by urban works that identification of soils is not possible. Much of the cantonment area is categorized as urban land soils (NRCS 2019).

4.4 Hydrology

The Westfield-Barnes Airport and Barnes ANGB lie within 3 drainage basins. The Connecticut Lowland basin drains to the Connecticut River approximately 4 miles east of the Westfield-Barnes Airport. The Westfield River sub-basin, which includes most of the City of Westfield, drains to the Westfield River approximately 1.5 miles south of Barnes ANGB. The Manhan River sub-basin drains to the Manhan River approximately 2 miles northwest of the airport. Surface water drainage at Barnes ANGB is influenced by a topographic high point, serving as a watershed divide that runs north-south along Runway 02/20. The west side of the airport (including the 104 FW west parcel) predominantly flows west toward Arm Brook. The east side of the airport (including the 104 FW east parcel) flows east toward Pond Brook (MAANG 2011). Both Arm Brook and Pond Brook flow south and discharge into the Westfield River, eventually joining the Connecticut River.

Barnes ANGB overlies the Barnes Aquifer, recognized as one of Massachusetts' most important regional groundwater supplies. The aquifer is more than 12 miles long and is the primary source of potable water for the surrounding communities, including the towns of Easthampton, Holyoke, Southampton, and Westfield (MAANG 2011).

There are numerous ponds and 2 streams adjacent to Barnes ANGB (**Figure 7**). Ponds include Buck Pond, Round Pond, Doe Pond, Horse Pond, Long Pond, and Pequot Pond to the northeast, Chapin Pond to the east, and an unnamed pond to the southwest. Arm Brook stream is present to the west of the Base and Pond Brook stream is present to the west of the Munitions Complex. It should be noted that all storm water runoff is discharged into the ground via several retention ponds located throughout the base.

Surface water flow direction on the airport is dictated by a topographic high that acts as a watershed divide running approximately north south along the airport's major runway. Surface water flow on the western side of the divide, which includes the Main Base, is predominantly southwest towards Arm Brook. East of the watershed divide, where the Base Munitions Maintenance Complex is located, surface water flow is southeast towards Pond Brook. Both Arm Brook and Pond Brook flow south and discharge into the Westfield River, which is located approximately 3 miles south of the Base. The Westfield River flows in an easterly direction and eventually discharges to the Connecticut River. The Connecticut River ultimately discharges into the Long Island Sound. Storm water from Barnes ANG Base does not directly drain into navigable waters.

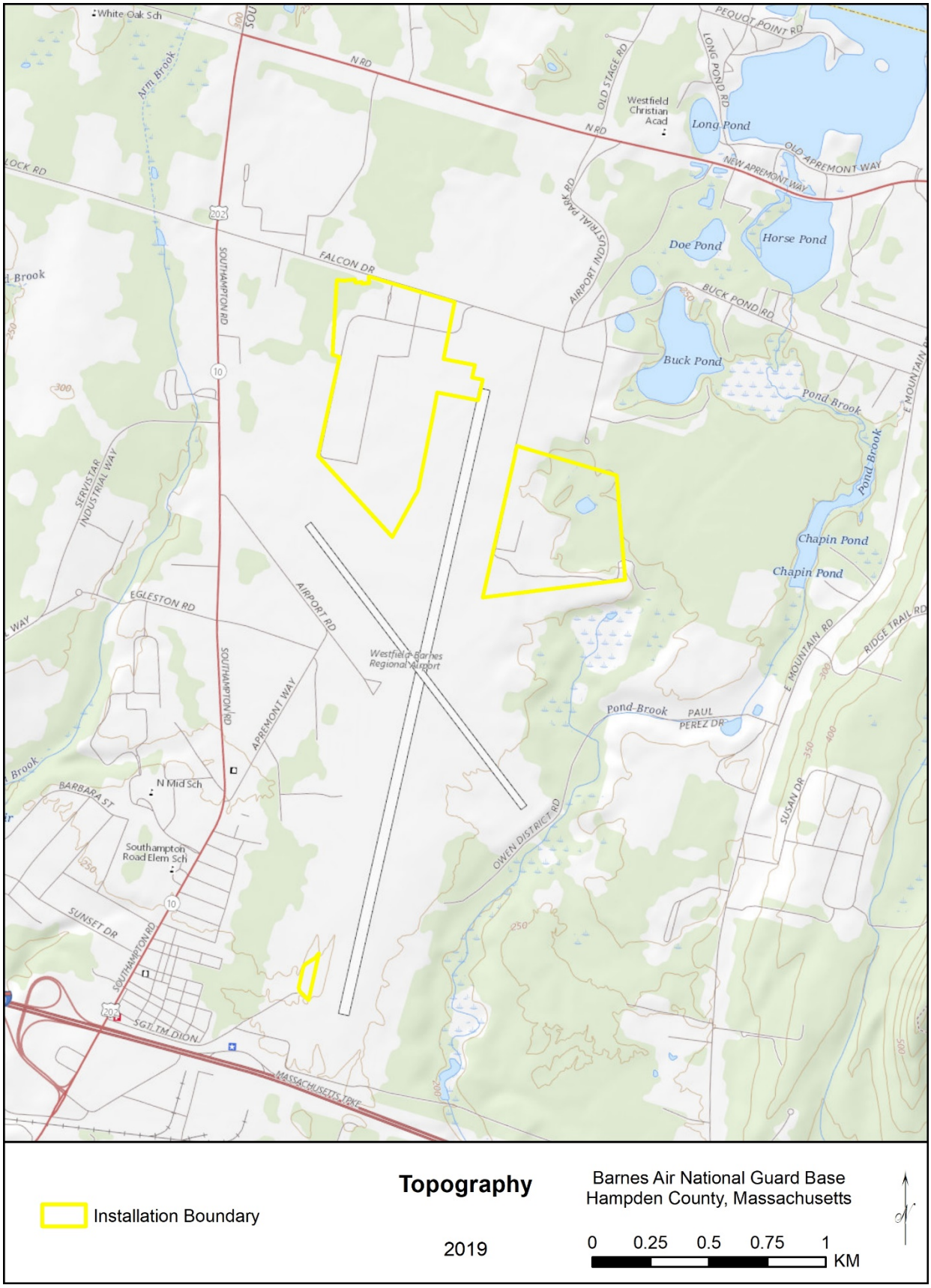

Figure 5. Barnes ANGB Topography Map

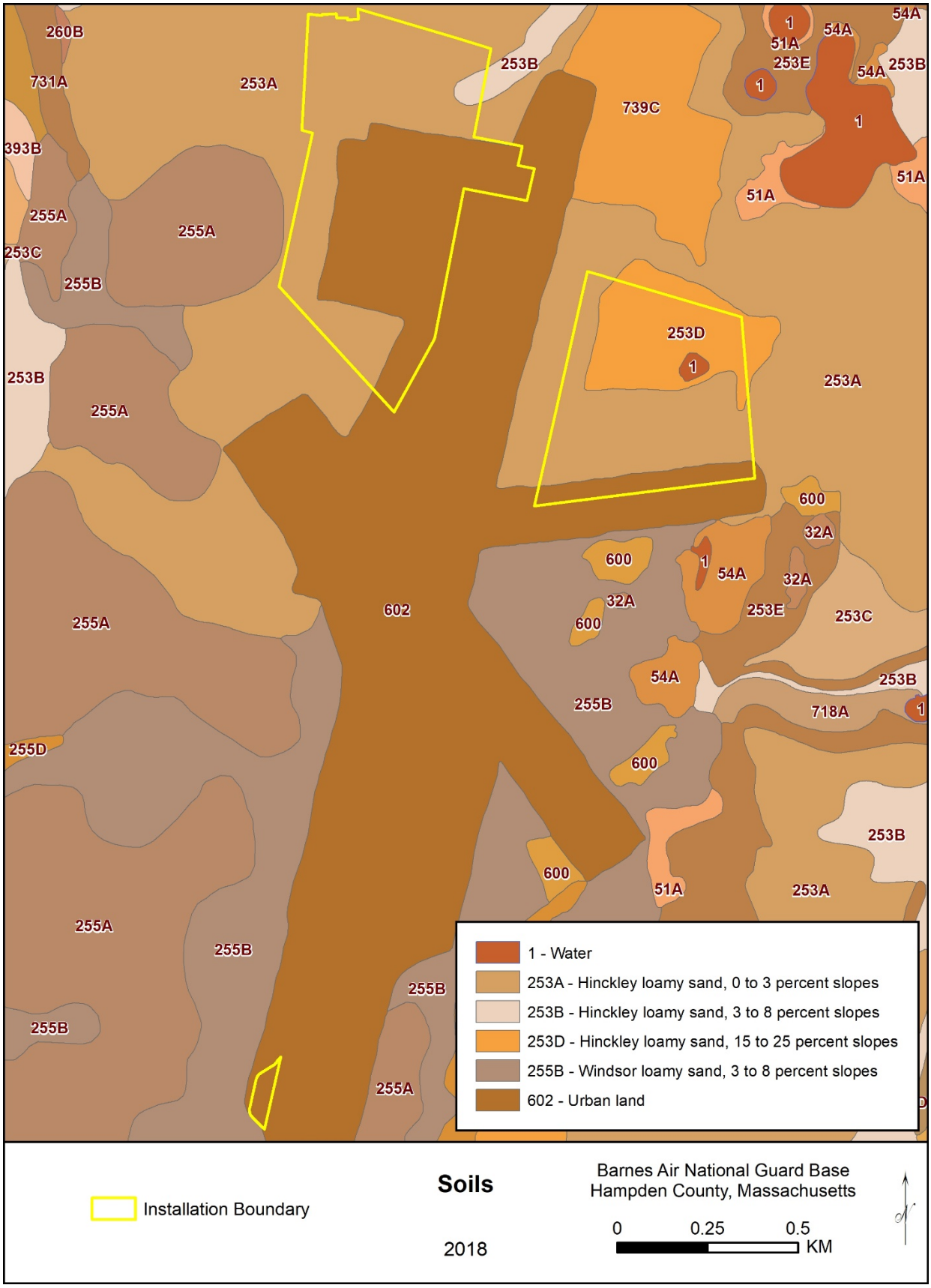

Figure 6. Barnes ANGB Soils Map

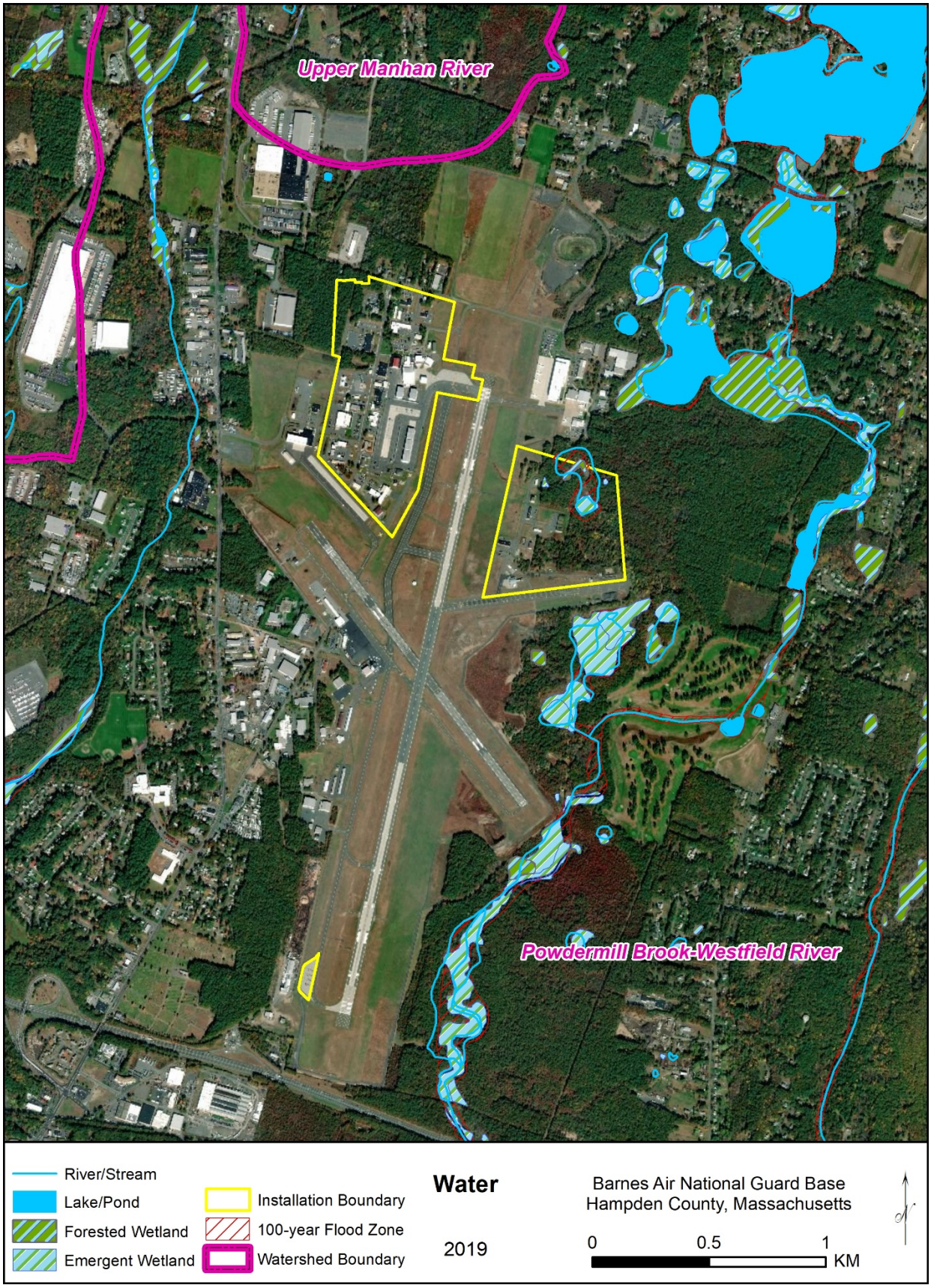

Figure 7. Barnes ANGB Water Resources Map

5.0 ECOSYSTEMS AND THE BIOTIC ENVIRONMENT

5.1 Ecosystem Classification

Barnes ANGB is located in the Connecticut River Valley Level IV Ecoregion. The borders of this region are easily defined by bedrock geology. It has rich soils, a mild climate and low rolling topography. The valley floor is primarily cropland and built land. Central hardwoods and transition hardwood forests cover the ridges. Barnes ANGB is located within the Eastern Broadleaf Forest (Oceanic) Province. This province is characterized by deciduous forest dominated by tall broadleaf trees. Lower layers of small trees and shrubs are sparse.

5.2 Vegetation

5.2.1 Historic Vegetative Cover

Massachusetts is one of the most heavily forested states in the nation. Massachusetts' forests are covered by 5 major forest types: northern hardwoods, oak/hickory, white and red pine, mixed oak/white pine, and elm/ash/red maple. At the time of European settlement oaks dominated the forest cover. Woodlands were most common in the early 19th century on poor agricultural lands such as mountains, swamps, and dry sand plains. The use of land for agricultural purposes peaked between 1830 and 1885 and declined through the 20th century (Hall et al. 2002). In the late 19th century the landscape was dominated by young forest cover but throughout the 20th century timber volumes increased.

5.2.2 Current Vegetative Cover

A vegetation survey completed for Barnes ANGB in 2015 documented the presence and extent of vegetative communities and other land cover (MAANG 2015a). The survey concluded that Barnes ANGB was comprised of 2 natural vegetative communities and 3 developed vegetative communities (**Table 2**). Natural communities are based on US National Vegetation Classification (NVC) categories and include temperate forest (Inland Pitch Pine - Oak Forest) and shrub and grassland wetland (Calcareous Bulrush Marsh). These communities occur primarily in the 2 wooded areas in the northwest and southeast portions of the facility. The primary management recommendation is to provide protection, appropriate to the activity, around the wetland areas within the forests. The developed vegetation communities include turf lawn and maintained landscaping areas around buildings (Lawn, Garden, & Recreational Vegetation), other mowed/maintained fields (Other Developed Vegetation), and ditches (Developed Wetland Vegetation).

Table 2. Land Cover and Vegetative Community Classifications on Barnes ANGB

Land Cover	NVC Formation	NVC Association	Acres
Forest & Woodland	Cool Temperate Forest	Inland Pitch Pine - Oak Forest (CEGL006290 *Pinus rigida - Quercus (velutina, prinus) Forest*)	42
Shrub and Herb Vegetation	Temperate to Polar Freshwater Marsh, Wet Meadow & Shrubland	Calcareous Bulrush Marsh (CEGL006358 *Schoenoplectus acutus - Carex lasiocarpa* Herbaceous Vegetation)	1
Developed Vegetation	Lawn, Garden, & Recreational Vegetation	N/A	44
	Other Developed Vegetation	N/A	19
	Developed Wetland Vegetation	N/A	1
Bare Ground		N/A	6
Impervious		N/A	76
Water		N/A	1
		Total Acres	**190**

Source: NVC http://usnvc.org, FGDC 2015, MAANG 2015a

No rare plants have been documented on the installation. A total of 10 invasive plant species have been documented on Barnes ANGB (**Table 3, Table 8**). See **Section 7.8.2** for more about invasive species.

There are 42 acres of forest land on Barnes ANGB but there is no formal management program in place. Forest lands will be managed with the overall goal of supporting the installation ecosystem and resources. The eastern parcel of Barnes ANGB could contain marketable timber in the future, once the trees mature. This area should be reevaluated after sufficient time (i.e., at least 15 years) has passed by a certified forester (MAANG 2015a). This area also provides wildlife habitat not found elsewhere on Barnes ANGB but contiguous with surrounding natural vegetation.

Forest Land on Barnes AN

Upland habitats at Barnes ANGB included mixed hardwood forest dominated by white oak (*Quercus alba*), mockernut hickory (*Carya tomentosa*), pin cherry (*Prunus pennsylvanica*), amur

616 honeysuckle (*Lonicera maackii)*, and southern arrow-wood (*Viburnum dentatum*).There are areas
617 where pitch pine (*Pinus rigida*) occurs as scattered components or as a co-dominant. The
618 perimeter areas of the installation consist of stands of evergreen and deciduous trees. The most
619 common trees in the area include oak (*Quercus* spp.), beech (*Fagus grandifolia*), birch (*Betula*
620 spp.), hickory (*Carya* spp.), walnut (*Juglans* spp.), maple (*Acer* spp.), elm (*Ulmus* spp.) and ash
621 (*Fraxinus* spp.) **Table 3** lists all vascular plant species found at Barnes ANGB.
622

Table 3. Plant Species Identified at Barnes ANGB

Scientific Name	Common Name	Scientific Name	Common Name
Ferns and Allies			
Dryopteris cristata	crested woodfern	*Osmundastrum cinnamomeum*	cinnamon fern
Lycopodium obscurum	ground pine	*Polytrichum commune*	haircap moss
Onoclea sensibilis	sensitive fern	*Pteridium aquilinum*	bracken fern
Osmunda regalis	royal fern		
Grasses, Sedges, and Rushes			
Carex pensylvanica	Pennsylvania sedge	*Phleum pratense*	timothy
Carex stricta	tussock sedge	*Phragmites australis*[i]	common reed[i]
Dulichium arundinaceum	three-way sedge	*Scirpus cyperinus*	woolgrass
Glyceria septentrionalis	floating mannagrass	*Scirpus pedicellatus*	stalked bulrush
Juncus effusus	soft rush	*Sparganium androcladum*	branched bur-reed
Juncus tenuis	slender rush	*Typha latifolia*	cattail
Leersia oryzoides	rice cutgrass		
Forbs			
Achillea millefolium	common yarrow	*Liatris scariosa* var. *novae-angliae*	New England blazing star
Alisma subcordatum	American water plantain	*Lotus corniculatus*	birdsfoot trefoil
Ambrosia artemisiifolia	common ragweed	*Lupinus perennis*	wild lupine
Aralia nudicaulis	sarsaparilla	*Lycopus virginicus*	bugleweed
Arctium minus	lesser burdock	*Maianthemum canadense*	canada mayflower
Asclepias syriaca	common milkweed	*Melampyrum lineare*	cow wheat
Calystegia sepium	hedge false bindweed	*Monotropa uniflora*	indian pipe
Centaurea stoebe	spotted knapweed[i]	*Nuttallanthus canadensis*	blue toadflax
Chimaphila maculata	striped wintergreen	*Nymphaea odorata*	fragrant water-lily
Coronilla varia	crown vetch[i]	*Oxalis* c.f. *europaea*	wood sorrel
Cypripedium sp.	orchid	*Penthorum sedoides*	ditch stonecrop
Bidens frondosa	devil's beggartick	*Persicaria sagittata*	arrowleaf tearthumb
Dianthus armeria	deptford pink	*Phytolacca americana*	pokeweed
Equisetum arvense	field horsetail	*Pilea pumila*	clearweed
Erigeron annuus	daisy fleabane	*Polygonum hydropiperoides*	mild water-pepper
Euthamia graminifolia	flat-top goldentop	*Potentilla norvegica*	rough cinquefoil
Galium mollugo	false baby's breath	*Rubus hispidus*	swamp dewberry
Hieracium sp.	hawkweed	*Rudbeckia hirta*	black-eyed susan
Hypericum perforatum	St. John's wort	*Rumex crispus*	curly dock
Impatiens capensis	common jewelweed	*Sericocarpus asteroides*	toothed white-topped-aster

Table 3. Plant Species Identified at Barnes ANGB			
Scientific Name	**Common Name**	**Scientific Name**	**Common Name**
Forbs Cont.			
Sisymbrium officinale	hedge mustard	*Symplocarpus foetidus*	skunk cabbage
Solidago canadensis	Canada goldenrod	*Trifolium arvense*	rabbit's foot clover
Solidago rugosa	rough goldenrod	*Trifolium hybridum*	alsike clover
Sonchus arvensis	field sowthistle	*Verbascum thapsus*	common mullein
Trees, Shrubs, and Woody Vines			
Acer platanoides	Norway maple[i]	*Populus balsamifera*	balsam poplar
Acer rubrum	red maple	*Populus deltoides*	eastern cottonwood
Acer saccharum	sugar maple	*Populus grandidentata*	bigtooth aspen
Ailanthus altissima	tree of heaven[i]	*Populus tremuloides*	quaking aspen
Alnus incana	gray alder	*Prunus serotina*	black cherry
Alnus serrulata	smooth alder	*Quercus alba*	white oak
Amelanchier sp.	shadbush	*Quercus ilicifolia*	scrub oak
Betula papyrifera	paper birch	*Quercus palustris*	pin oak
Betula populifolia	gray birch	*Quercus rubra*	red oak
Castanea dentata	American chestnut	*Rhamnus cathartica*	common buckthorn[i]
Celastrus orbiculatus	asiatic bittersweet[i]	*Rhus copallinum*	winged sumac
Cephalanthus occidentalis	buttonbush	*Rhus typhina*	staghorn sumac
Chamaecrista fasciculata	partridge pea	*Rosa multiflora*	multiflora rose[i]
Comptonia peregrina	sweet-fern	*Rubus allegheniensis*	allegheny blackberry
Cornus alterniflora	alternate-leaf dogwood	*Rubus idaeus*	common red raspberry
Corylus cornuta	beaked hazelnut	*Salix discolor*	pussy willow
Elaeagnus umbellata	autumn olive[i]	*Spiraea alba*	white meadowsweet
Fraxinus nigra	black ash	*Spiraea latifolia*	broadleaf meadowsweet
Fraxinus pensylvanica	green ash	*Toxicodendron radicans*	poison ivy
Gaultheria procumbens	teaberry	*Tsuga canadensis*	eastern hemlock
Hamamelis virginiana	American witch-hazel	*Ulmus americana*	American elm
Ilex verticillata	winterberry holly	*Vaccinium angustifolium*	late low-bush blueberry
Juniperus virginiana	eastern red-cedar	*Vaccinium corymbosum*	highbush blueberry
Kalmia latifolia	mountain laurel	*Vaccinium palladium*	early low-bush blueberry
Lonicera morrowii	morrow's honeysuckle	*Viburnum acerifolium*	maple-leaf viburnum
Lysimachia quadrifolia	whorled loosestrife	*Viburnum dentatum*	southern arrowwood
Parthenocissus quinquefolia	Virginia creeper	*Vitis* c.f. *aestivalis*	summer grape
Pinus rigida	pitch pine	*Vitis riparia*	riverbank grape
Pinus strobus	eastern white pine		

Source: MAANG 2015a
[i] = invasive species

5.3 Fish and Wildlife

No formal wildlife surveys have occurred on Barnes ANGB. Lists of faunal species having potential to occur on the installation have been derived from state and county information, BASH

627 site visits, and from agency personnel involved in the development of this INRMP. Species with
628 an asterisk (*) have been observed on base.
629
630 Wildlife movements, patterns, and population numbers are dynamic and risk associated with
631 currently observed or new species observed in the area will fluctuate. Bird species occurring and
632 potentially occurring at Barnes ANGB are shown in **Table 4**, and amphibian and reptile species
633 (herpetofauna) in **Table 5**. Common mammal species include woodchucks (*Marmota monax*),
634 mice (*Peromyscus* sp.), white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*),
635 coyotes (*Canis latrans*), and various species of voles (*Microtus* sp.). Mammal species occurring
636 and potentially occurring at Barnes ANGB are shown in **Table 6**. Fish have been observed in
637 wetland WO1 on the east side of the airfield (confirmed by USDA [C. Cousineau, personal
638 communication, July 15, 2019]). Species index or a species specific survey has not been
639 conducted for fish.
640

Table 4. Bird Species Occurring and Potentially Occurring at Barnes ANGB

Scientific Name	Common Name	Scientific Name	Common Name
Accipiter cooperii	Cooper's Hawk	*Carpodacus mexicanus*	house finch
Accipiter striatus	sharp-shinned hawk	*Carpodacus purpureus*	purple finch
Actitis macularia	spotted sandpiper	*Casmerodius albus*	great egret
Agelaius phoeniceus	red-winged blackbird	*Cathartes aura*	turkey vulture
Aix sponsa	wood duck	*Catharus fuscescens*	veery
Ammodramus savannarum	grasshopper sparrow	*Catharus guttatus*	hermit thrush
Anas americana	American wigeon	*Catharus ustulatus*	Swainson's thrush
Anas crecca	green-winged teal	*Certhia americana*	brown creeper
Anas platryrhynchus	mallard	*Chaetura pelagica*	chimney swift
Anas rubripes	American black duck	*Charadrius vociferus*	killdeer*
Anas strepera	gadwall	*Chen caerulescens*	snow goose
Archilochus colubris	ruby-throated hummingbird	*Chordeiles minor*	common nighthawk
Ardea herodias	great blue heron*	*Circus cyaneus*	northern harrier
Aythya collaris	ring-necked duck	*Coccyzus erythropthalmus*	black-billed cuckoo
Baeolophus bicolor	tufted titmouse*	*Colaptes auratus*	common flicker
Bartramia longicauda	upland sandpiper	*Columba livia*	rock dove*
Bombycilla cedrorum	cedar waxwing	*Contopus virens*	eastern wood pewee*
Bonasa umbellus	ruffed grouse	*Corvus brachyrhynchus*	American crow*
Branta bernicla	Atlantic brant	*Cyanocitta cristata*	blue jay*
Branta canadensis	Canada goose	*Cygnus olor*	mute swan
Bubo scandiacus	snowy owl	*Dendroica discolor*	prairie warbler
Bubo virginianus	great horned owl	*Dendroica pensylvanica*	chestnut-sided warbler
Buteo jamaicensis	red-tailed hawk*	*Dendroica petechia*	yellow warbler
Buteo platypterus	broad-winged hawk	*Dendroica striata*	blackpoll warbler
Butorides striatus	green-backed heron	*Dolichonyx oryzivorus*	bobolink
Calcarius lapponicus	Lapland longspur	*Dumatella carolinensis*	gray catbird*
Cardinalis cardinalis	northern cardinal	*Empidonax alnorum*	alder flycatcher
Carduelis tristis	American goldfinch*	*Empidonax trailii*	willow flycatcher

Table 4. Bird Species Occurring and Potentially Occurring at Barnes ANGB			
Scientific Name	**Common Name**	**Scientific Name**	**Common Name**
Eremophila alpestris	horned lark	*Piranga olivacea*	scarlet tanager
Euphagus carolinus	rusty blackbird	*Plectrophenax nivalis*	snow bunting
Falco columbarius	merlin	*Podiceps auritus*	horned grebe
Falco sparverius	American kestrel	*Pooecetes gramineus*	vesper sparrow
Fulica americana	American coot	*Quiscalus quiscula*	common grackle*
Gallinago gallinago	common snipe	*Regulus calendula*	ruby-crowned kinglet
Gavia immer	common loon	*Regulus satrapa*	golden-crowned kinglet
Gavia stellata	red-throated loon	*Riparia riparia*	bank swallow
Geothlypis trichas	common yellowthroat	*Sayornis phoebe*	eastern phoebe
Haliaeetus leucocephalus	bald eagle	*Scolopax minor*	American woodcock*
Hirundo rustica	barn swallow*	*Seiurus aurocapillus*	ovenbird
Hylocichla mustelina	wood thrush	*Setophaga pinus*	pine warbler*
Icterus galbula	northern oriole	*Setophaga ruticilla*	American redstart
Junco hyemalis	dark-eyed junco	*Sialia sialis*	eastern bluebird
Larus argentatus	herring gull	*Sitta canadensis*	red-breasted nuthatch
Larus delawarensis	ring-billed gull	*Sitta carolinensis*	white-breasted nuthatch*
Larus marinus	great black-backed gull	*Spizella arborea*	American tree sparrow
Lophodytes cucullatus	hooded merganser	*Spizella passerina*	chipping sparrow
Megaceryle alcyon	belted kingfisher*	*Spizella pusilla*	field sparrow
Melanerpes carolinus	red-bellied woodpecker*	*Strix varia*	barred owl
Meleagris gallopavo	wild turkey	*Sturnella magna*	eastern meadowlark
Melospiza georgiana	swamp sparrow	*Sturnus vulgaris*	European starling
Melospiza melodia	song sparrow*	*Tachycineta bicolor*	tree swallow*
Mimus ployglottos	northern mockingbird	*Toxostoma rufum*	brown thrasher
Mniotilta varia	black-and-white warbler	*Tringa flavipes*	lesser yellowlegs
Molothrus ater	brown-headed cowbird	*Tringa melanoleuca*	greater yellowlegs
Myiarchus crinitus	great crested flycatcher *	*Troglodytes aedon*	house wren
Pandion haliaetus	osprey	*Turdus migratorius*	American robin*
Parula americana	northern parula	*Tyrannus tyrannus*	eastern kingbird*
Parus atricapillus	black-capped chickadee *	*Vermivora pinus*	blue-winged warbler
Passer domesticus	house sparrow	*Vireo gilvus*	warbling vireo
Passerina cyanea	indigo bunting	*Vireo olivaceus*	red-eyed vireo*
Pheucticus ludovicianus	rose-breasted grosbeak	*Vireo solitarius*	blue-headed vireo
Phlacrocorax auritus	double-crested cormorant*	*Wilsonia canadensis*	Canada warbler
Picoides pubescens	downy woodpecker *	*Wilsonia pusilla*	Wilson's warbler
Picoides villosus	hairy woodpecker	*Zenaida macroura*	mourning dove*
Pipilo erythrophthalamus	eastern towhee*	*Zonotrichia albicollis*	white-throated sparrow

Source: MAANG. 2018, MAANG 2015a, Barnes ANGB 2010, USDA 2010
* = Observed on base

641

Table 5. Reptiles and Amphibians Occurring and Potentially Occurring at Barnes ANGB

Scientific Name	Common Name	Scientific Name	Common Name
Ambystoma maculatum	spotted salamander	*Heterodon platyrhinos*	eastern hog-nosed snake
Ambystoma opacum	marbled salamander	*Hyla versicolor*	gray treefrog
Agkistrodon contortrix	copperhead	*Lithobates catesbianus*	American bullfrog*
Ambystoma jeffersonianum	Jefferson salamander	*Lithobates clamitans melanota*	green frog*
Anaxyrus americanus	American toad*	*Lithobates sylvaticus*	northern leopard frog
Anaxyrus fowleri	Fowler's toad	*Lithobates sylvaticus*	wood frog*
Carphophis amoenus	eastern worm snake	*Notophthalmus viridescens*	eastern newt
Chelydra serpentine	Snapping turtle	*Opheodrys vernalis*	smooth greensnake
Chrysemys picta	Painted turtle	*Pantherophis allegheniensis*	eastern ratsnake
Clemmys guttata	Spotted turtle	*Plethodon cinereus*	Eastern red-backed salamander
Coluber constrictor	black racer	*Pseudacris crucifer*	northern spring peeper*
Crotalus horridus	timber rattlesnake	*Sternotherus odoratus*	Eastern musk turtle
Desmognathus fuscus	Northern dusky salamander	*Storeria dekayi*	Dekay's brownsnake
Diadophis punctatus	ring-necked snake	*Storeria occipitomaculata*	red-bellied snake
Eurycea bislineata	Northern two-lined salamander	*Terrapene carolina*	eastern box turtle
Gleptemys insculpta	Wood turtle	*Thamnophis sauritus*	eastern ribbonsnake
Hemidactylium scutatum	Four-toed salamander	*Thamnophis sirtalis*	common gartersnake

Source: MAANG 2015a, MassWildlife 2019c
* Observed on base

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Table 6. Mammal Occurring and Potentially Occurring at Barnes ANGB

Scientific Name	Common Name	Scientific Name	Common Name
Alces alces	moose	*Myotis septentrionalis*	northern long-eared bat
Blarina brevicauda	northern short-tailed shrew	*Myotis sodalist*	Indiana bat
Canis latrans	coyote*	*Napaezapus insignis*	woodland jumping mouse
Canis lupus familiarus	domestic dog	*Neovison vison*	American mink
Castor canadensis	American beaver	*Odocoileus virginianus*	white-tailed deer *
Condylura cristata	star-nosed mole	*Ondatra zibethicus*	common muskrat
Didelphis virginiana	Virginia opossum	*Parascalops breweri*	hairy-tailed mole
Eptesicus fuscus	big brown bat	*Pipistrellus subflavus*	tri-colored bat
Erithizon dorsatum	North American porcupine	*Peromyscus leucopus*	white footed deer mouse
Felis catus	domestic cat	*Peromyscus maniculatus*	North American deer mouse
Glaucomys volans	southern flying squirrel	*Procyon lotor*	raccoon
Lasionycteris noctivagans	silver-haired bat	*Rattus norvegicus*	brown rat
Lasiurus borealis	eastern red bat	*Scalopus aquaticus*	eastern mole
Lasiurus cinereus	hoary bat	*Sciurus carolinensis*	eastern gray squirrel
Lepus americanus	snowshoe hare	*Sorex cinereus*	cinereus shrew
Lontra Canadensis	northern river otter	*Sorex dispar*	long-tailed shrew
Lynx rufus	bobcat	*Sorex fumeus*	smoky shrew
Marmota monax	woodchuck	*Sorex hoyi*	American pygmy shrew
Martes pennant	fisher	*Sorex palustris*	American water shrew
Mephitis mephitis	striped skunk	*Sylvilagus floridanus*	eastern cottontail
Microtus pennsylvanicus	meadow vole	*Sylvilagus transitionalis*	New England cottontail
Microtus pinetorum	woodland vole	*Synaptemys cooperi*	southern bog lemming
Mus musculus	house mouse	*Tamias striatus*	eastern chipmunk *
Mustela ermine	ermine	*Tasmiasciurus hudsonicus*	red squirrel
Mustela frenata	long-tailed weasel	*Urocyon cinereoargenteus*	gray fox
Myodes gapperi	southern red-backed vole	*Ursus americanus*	American black bear
Myotis leibii	eastern small-footed bat	*Vulpes vulpes*	red fox
Myotis lucifugus	little brown bat	*Zapus hudsonius*	meadow jumping mouse

Source: MAANG 2015a, MassWildlife 2019b
* Observed on base

5.4 Threatened and Endangered Species and Species of Concern

No federally listed species are known to occur within the vicinity of Barnes ANGB. Federally listed species with the potential to occur on Barnes ANGB include:

- Threatened northern long-eared bat (*Myotis septentrionalis*)
- Threatened small whorled pogonia (*Isotria medeoloides*)
- Proposed for threatened listing eastern black rail (*Laterallus jamaicensis jamaicensis*)

State special status species occurring or with the potential to occur on Barnes ANGB include:

- Endangered northern long-eared bat
- Endangered small whorled pogonia
- Endangered upland sandpiper (*Bartramia longicauda*)

- Threatened grasshopper sparrow (*Ammodramus savannarum*)
- Threatened vesper sparrow (*Pooecetes gramineus*)
- Threatened marbled salamander (*Ambystoma opacum*)
- Endangered New Jersey tea inchworm (*Apodrepanulatrix liberaria*)
- Species of special concern frosted elfin (*Callophyrs irus*)
- Species of special concern Pine Barrens speranza (*Speranza exonerata*)
- Species of special concern Pine Barrens zanclognatha (*Zanclognatha martha*)
- Species of special concern Eastern Box Turtle (*Terrapene carolina*)
- Species of special concern New England Blazing Star (*Liatris scariosa* var. *novae-angliae*)

5.5 Waters of the US, Wetlands, and Floodplains

There are 4 wetlands and 3 detention ponds located on Barnes ANGB. All Waters of the US on Barnes ANGB have been reviewed by the USACE and per that review, there are no jurisdictional Waters of the US on the Base (MAANG 2015b). However, several of the wetlands are regulated by the Commonwealth of Massachusetts.

Table 7 provides the acreage and the type of wetlands delineated on Barnes ANGB following the USFWS classification system. The 4 types of wetlands found on Barnes ANGB consisted of palustrine open-water (POW), palustrine emergent (PEM), palustrine scrub-shrub (PSS), and palustrine forested (PFO). Total wetland acreage on Barnes ANGB is 4.09 acres. W01 complex accounts for over 90% of the total wetland area.

Table 7. Delineated Wetlands on Barnes ANGB

Wetland	Type	Acreage	Federal Jurisdictional Status[a]	State Regulated Status
W01	POW/PEM/PSS/PFO	3.84	Non-Jurisdictional	Regulated
W02	PEM/PSS	0.17	Non-Jurisdictional	Non-Regulated
W03	POW/PEM	0.06	Non-Jurisdictional	Regulated
W04	PFO	0.02	Non-Jurisdictional	Non-Regulated

Source: MAANG 2015b
[a] Jurisdictional status confirmed by USACE 2014

W01 is a medium-sized wetland (3.84 acres) that potentially provides groundwater recharge/discharge, sediment/toxicant detention, production export, and wildlife habitat function. Most of this wetland consist of an open-water area within a depression that has a narrow forested wetland fringe. The wetland area to the north and northeast of the open-water area is primarily forested wetland with a strong scrub-shrub understory and occurs along a gentle slope. The upper portion of the wetland was a cat-tail (*Typha latifolia*) marsh that receives runoff from development around the airfield. There appears to be a groundwater seep near the upper limit of the wetland that may be natural groundwater outflow or outflow that has been altered historically by airfield construction. The wetland is not accessible to the public and is located in a secure area of the airport/ANGB. The principal function of W01 was as a wildlife habitat. Numerous common passerine songbirds and bullfrogs (*Rana catesbiana*) have been observed, and this wetland would likely be used by different species throughout the year.

Wetland W01

W02 is a small 0.17 acre wetland that potentially provides groundwater recharge/discharge, production export, and wildlife habitat functions. This wetland is located within a forested depression that likely only receives surface runoff. The principal function of W02 is as a wildlife habitat.

W03 is a 0.06 acre wetland that potentially provides a groundwater recharge/discharge function. W03 has already been assessed as regulated by the Commonwealth of Massachusetts, likely due to the fact it is a freshwater wetland that borders a manipulated or manmade pond, and that designation is unlikely to change (MAANG 2015b).

W04 is a 0.02 acre wetland that potentially provides a groundwater recharge/discharge function. It is located in a depression and is sparsely vegetated.

Three detention ponds occur within the boundaries of the Barnes ANGB. These are dry detention ponds with no outlets and drain nearby uplands. Two of these ponds are regularly maintained and mowed to maintain storage volumes. The ponds contained a mix of upland and wetland vegetation. Dominant vegetation of detention pond 1 included 2 species of sedge, tall goldenrod (*Solidago altissima*), and a species of *Polygonum*. Detention pond 2 is dominated by a species of sedge and ragweed (*Ambrosia artemisiifolia*). Detention pond 3 is dominated by red maple, amur honeysuckle (*Lonicera maackii*), soft rush (*Juncus effusus*), curly dock (*Rumex crispus*), and several species of sedge. In addition, the detention pond contained woody debris that was likely left from maintenance activities.

The Northeast portion of the 104 FW munitions area has a FEMA FIRM designation of Zone A, “areas of 100-year flood; installation flood elevations and flood hazard factors not determined”.

This area is located downslope of the munitions storage complex and receives surface runoff from Barnes ANGB. No other mapped floodplain areas are located within Barnes ANGB. Additional areas designated as Zone A are associated with Pond Brook and several related ponds located to the north, east, and south of the munitions area on the Westfield-Barnes Airport (MAANG 2011).

6.0 MISSION IMPACTS ON NATURAL RESOURCES

6.1 Natural Resources Needed to Support the Military Mission

The Barnes ANGB requires operational areas that support flying operations, facilities, and other support functions, with the surrounding areas serving as a buffer to reduce BASH risk and provide support facilities and functions. Degradation of natural resources can result in unintended impacts to the military mission, impaired readiness, and funds spent on natural resources crisis management and interventions rather than the military mission. The Barnes ANGB needs the land and its natural resources to function together in a healthy ecosystem to support the military mission. Management activities in this INRMP are designed to support the desired habitats and ecosystem functions.

6.2 Natural Resources Constraints to Mission and Mission Planning

The natural resources constraints to installation planning and mission are summarized as:

- Any projects which are anticipated to impact Waters of the State including wetlands may require permits from MassDEP.
- Any projects that are anticipated to significantly impact floodplains must undergo the NEPA process per 32 CFR Part 989 and be approved by NGB/A4AM.
- Barnes ANGB contains habitat features that attract and support high BASH threat wildlife species.
- Much of the grassland area on Westfield-Barnes Municipal Airport is designated Priority Habitat 1374. Priority Habitat is based on the known geographical extent of habitat for all state-listed rare species, both plants and animals, and is codified under the Massachusetts Endangered Species Act (MESA). Habitat alteration within Priority Habitats may result in a take of a state-listed species, and is subject to regulatory review by the Natural Heritage & Endangered Species Program. All projects or activities proposed within Priority Habitat, which are not otherwise exempt pursuant to 321 CMR 10.14, require review by MassWildlife for compliance with the MESA.

6.2.1 Land Use

Barnes ANGB comprises 2 separate lease holdings on the Westfield-Barnes Airport. All grounds on the installation are grouped in 3 categories based on operational needs and the intensity of landscape maintenance required: improved, semi-improved, and unimproved. Of the approximately 190 acres managed by the ANG, approximately 100 acres are considered improved, 20 acres of land are considered semi-improved, and 60 acres are considered unimproved. Semi-improved includes grounds on which maintenance is performed primarily for operational and safety purposes such as BASH reduction, erosion control, vegetation control, and fire hazard reduction. Semi-improved areas include road shoulders, ditch slopes, drainage canals, ditches, and swales. Unimproved land includes forested areas composed of commercial tree species and include approximately 50 acres on the western part of the installation and 10 acres on

the northeastern edge of the installation. Some open water exists within the western parcel amounting to approximately 1-2 acres.

6.2.2 Current Major Impacts

There are 4 primary areas of potential impacts to natural resources from MAANG's military mission:

- BASH
- Impacts to federally-listed and state-listed species
- Potential mishandling of hazardous and other waste materials
- Impacts from Environmental Restoration Sites

6.2.2.1 Environmental Restoration Sites

The Environmental Restoration Program (ERP) was developed by the DOD to identify and address environmental contamination from past military operations. Future development of sites identified through the ERP might be constrained depending on the severity of the contamination or the extent of the remedial action required. The overall objective of the ERP is to identify potential environmental problems and provide timely remedies to protect public health and the environment.

The 2014 INRMP identified 10 ERP sites and one area of concern (AOC) managed by Barnes ANGB. Only ERP Site #2 remains and is in the process of being closed. Several new sites have been opened as a result of PFAS compound contamination associated with past fire training.

NGB/A4OR performed a Preliminary Assessment (PA) and SI for PFAS at Barnes ANGB. The PA included a review of documented fire training and other areas suspected or known to have had a release of AFFF to the environment. The PA included a base reconnaissance where eight AOCs were inspected, personnel were interviewed, and on-base documentation was reviewed. The PA identified eight AOCs and recommended seven for further investigation (BB&E, 2016). The SI focused on collecting data to evaluate for the presence of PFAS at the seven AOCs retained for further investigation from the PA (referred to as PRLs in the SI) and to assess potential PFAS migration off-Base. The SI included collection of soil, sediment, surface water and groundwater samples. The results of the SI indicated that six of the seven AOCs retained from the PA required further investigation during this ESI, one AOC required no further action, and two AOCs (AOCs 1 and 8) were identified as requiring investigation during this ESI because they are located off-Base and were not fully investigated during the SI (**Table 3**; Amec Foster Wheeler, 2018).

Table 8. Barnes ANG ERP Sites

AOC/PRL Number	Site Name	SI Results
1	Former Fire Training Area (FTA)-01 (Installation Restoration Program [IRP] Site 1)	Not investigated; Groundwater (GW) (upgradient)
3	Stormwater Drainage Basin (IRP Site 4)	All data below screening levels.
4	Hangars 27A and 27B	GW (downgradient)
5	Former Fire Station (Building 004)	GW (downgradient at Base boundary)
6	Current Fire Station (Building 040)	GW (downgradient)
7	Hush House	GW (downgradient)
8	Fire Department Equipment Test Area	Not investigated

GW = Groundwater impact
FTA = Fire Training area
IRP = Installation Restoration Program

Environmental Restoration Program Site 2

ERP Site 2 is located on the west side of the 104 FW west parcel, about 300 feet south of Building 29. ERP Site 2 is within the current petroleum, oil, and lubricant portion of Barnes ANGB. ERP Site 2 is the former location of four 25,000-gallon underground storage tanks (USTs). The former USTs were used to store and dispense AVGAS, containing tetraethylead, and JP-4 until taken out of service in 1992 (MAANG 2007a). Site 2, the FUST/Tank Sludge Disposal Area, is located in the northwestern portion of the installation within the petroleum, oil, and lubricant facility. Site 2 was originally included for assessment in IRP based on the repeated disposal of tank sludge on-site. Historical documents indicate that one or more potential sources (i.e., tank sludge, USTs, releases to the floor drain at Building 10, and small spills during fueling) contributed to petroleum contamination in soil at the site. A summary of historical activities at the site is provided below (Richardson 2013).

- Four 25,000-gal USTs originally containing aviation gas, and later jet fuel (jet propellant-4), existed at the site.
- Tank sludge was reportedly removed from the USTs and disposed of on-site during the late 1950s. Approximately 500 gallons of tank sludge were reportedly buried in a tank sludge disposal trench.
- USTs and associated piping passed tightness tests in 1989 and 1991, respectively. The USTs were taken out of service in 1992 and associated fuel pumps were removed at that time. The USTs were removed in 1998 along with 1,500 tons of petroleum-contaminated soil.
- Soil vapor containing fuel-related hydrocarbons was detected next to Building 10 in 1990. The floor drain inside Building 10, which historically drained to a nearby dry well, was sealed in 1990.
- During the site investigation and remedial investigation, no evidence of tank sludge disposal could be found. Concentrations in soil were below applicable MCP S-1 cleanup standards, except for 4 of 51 samples, which were collected at the groundwater table. Concentrations were below applicable MCP GW-1 standards, except for detections in one well.
- Subsequent groundwater investigations conducted in 2000 as part of Phase III activities detected numerous exceedances of the GW-1 standard. Groundwater is encountered at approximately 16-20 feet BGS at Site 2 and flows to the southeast. The Supplemental

Phase III Remedial Action Plan, 104 FW, MAANG, Barnes ANGB, Westfield, Massachusetts, incorporating groundwater data from newly installed monitoring wells and the results of a biosparging pilot test, recommended biosparging as the comprehensive remedial alternative to remediate groundwater at Site 2. The Supplemental Remedial Action Plan was approved by MassDEP on January 30, 2004. The Phase IV Remedy Implementation Plan, 104 FW, MAANG, Barnes ANGB, Westfield, Massachusetts, which provided the design, installation, operation, and monitoring details for a biosparging remediation system, was approved by MassDEP on July 30, 2000.

- A biosparging system was installed to address the groundwater contamination at the site and began operation in 2005. The system was in operation between 2005 and 2009.
- Soil excavation activities commenced on September 1, 2009, and were completed on October 27, 2009. The excavation activities were conducted in 2 phases. Phase I encompassed an area of approximately 48 × 24 feet and Phase II encompassed an area of approximately 38 × 33 ft. Approximately 1,218 tons of impacted soil were transported off-site for disposal. In addition, approximately 13,000 gallons of water were removed and treated during the excavation activities.
- A total of 64 injection points were installed at the site. The first round of ISCO injection (38,000 pounds of sodium persulfate and 750 pounds of Fe-EDTA activator) was completed in November 2009. The second round of ISCO injection (28,600 pounds of sodium persulfate and 2,244 pounds of Fe-EDTA activator) was completed in April 2010. Subsequent injection wells were installed.

6.2.3 Potential Future Impacts

Known future mission impacts at Barnes ANGB would include continuation of current impacts as previously described, and additional impacts due to new missions or mission components. Construction- related activities that might be planned would undergo a separate NEPA process and fall into one of 3 categories:

- *Short-term facilities construction* intended to streamline operations and comply with minimum antiterrorism standards set forth by the DOD
- *Airfield-related maintenance and infrastructure* alternations to enable compliance with airfield safety requirements (UFC 3-260-01, Airfield and Heliport Planning and Design)
- *Demolition projects* required to enable the execution of short-term construction and infrastructure alterations.

The implementation of construction best management practices (BMPs) will limit or eliminate soil movement, stabilize runoff, and control sedimentation during surface disturbing activities. These BMPs may include the use of: well-maintained silt fences; minimizing surficial area disturbed; stabilization of cut/fill slopes; minimization of earth-moving activities during wet weather; and use of temporary detention/retention ponds. Following construction, disturbed areas not covered with impervious surfaces will be reestablished with appropriate vegetation and managed to minimize future erosion potential.

7.0 NATURAL RESOURCES PROGRAM MANAGEMENT

7.1 Natural Resources Program Management

The guiding philosophy of the Barnes ANGB INRMP is to take an ecosystems approach to managing natural resources. Ecosystem management is based on clearly stated goals and objectives, and associated projects. The Barnes ANGB INRMP identifies goals and objectives, and presents the means to accomplish them as well as the methodologies to monitor results.

7.2 Fish and Wildlife Management

Wildlife management involves manipulating various aspects of an ecosystem to benefit chosen wildlife species. Management of habitats generally is focused to benefit native species, particularly listed species and game species. The installation's limited size necessitates implementation of wildlife management options that do not increase the potential for wildlife-mission conflicts but still conserve regional biodiversity. Wildlife population and habitat management on Barnes ANGB will (1) attempt to deter animals from foraging or roosting in areas near or adjacent to the flightline and other mission-critical areas, (2) attract wildlife to portions of the installation away from these areas, (3) protect and conserve regional biodiversity through conservation of habitat corridors across the Base, and (4) reduce impacts on the habitat created by over abundant wildlife populations. This approach has been chosen due to the relative abundance and variety of wildlife species present on Barnes ANGB, and the low likelihood of excluding all wildlife species from the installation that pose a significant threat to the safety of the flying mission. While the first 3 objectives are addressed through appropriate habitat management, the fourth is a wildlife management goal.

The installation supports several native habitats, and a variety of native species. The DOD and the ANG encourage support of state WAPs as part of a comprehensive installation natural resources program. The implementation of this INRMP and many of the proposed projects will support the goals of the Massachusetts's WAP.

Flora/fauna surveys including a protocol bat survey are under contract to be completed by September 30, 2021 under the FY18 INRMP Support Contract.

7.2.1 Federal Wildlife Policies and Regulations

Migratory Bird Treaty Act

The Migratory Bird Treaty Act (MBTA) prohibits, unless permitted by regulations, the pursuit, hunting, take, capture, killing or attempting to take, capture, kill, or possess any migratory bird included in the MBTA, including any part, nest, or egg of any such bird (16 USC § 703). The DoD has a Memorandum of Understanding (MOU) with the USFWS pursuant to EO 13186 Responsibilities of Federal Agencies to Protect Migratory Birds, which outlines a collaborative approach to promote the conservation of migratory bird populations. This MOU specifically pertains to natural resource management activities, including, but not limited to, habitat management, erosion control, forestry activities, invasive weed management, and prescribed burning. It also pertains to installation support functions, operation of industrial activities, construction and demolition activities, and hazardous waste cleanup. In February 2007, the USFWS finalized regulations for issuing incidental take permits to the DoD. If any of the Armed Forces determine that a proposed or an ongoing military readiness activity may result in a significant adverse effect on a population of migratory bird species, then they must confer and

cooperate with the USFWS to develop appropriate and reasonable conservation measures to minimize or mitigate identified significant adverse effects (50 CFR Part 21).

Bald and Golden Eagle Protection Act

The Bald and Golden Eagle Protection Act (BGEPA; 16 USC 668-668c), enacted in 1940 and amended several times since then, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald eagles, including their parts, nests, or eggs. The Act provides criminal penalties for persons who "take, possess, sell, purchase, barter, offer to sell, purchase or barter, transport, export or import, at any time or any manner, any bald eagle ... [or any golden eagle], alive or dead, or any part, nest, or egg thereof."

In addition to immediate impacts, this definition also covers impacts that result from human-induced alterations initiated around a previously used nest site during a time when eagles are not present, if, upon the eagle's return, such alterations agitate or bother an eagle to a degree that interferes with or interrupts normal breeding, feeding, or sheltering habits, and causes injury, death, or nest abandonment.

Partners in Flight

The DoD Partners in Flight (PIF) program consists of natural resources personnel from military installations across the United States working collaboratively with partners throughout the Americas to conserve migratory and resident birds and their habitats on DoD lands. PIF sustains and enhances the military mission through proactive, habitat-based conservation and management strategies that maintain healthy landscapes and training lands. Additionally, PIF works beyond installation boundaries to facilitate cooperative partnerships, determine the current status of bird populations, and prevent the listing of additional birds as threatened or endangered. DoD PIF provides a scientific basis for maximizing the effectiveness of resource management, enhancing the biological integrity of DoD lands, and ensuring continued use of these lands to fulfill military training requirements.

Pollinator Conservation

DoD has emphasized the importance of pollinator conservation to the military services by developing partnerships to support their conservation. DoD has MOUs with Bat Conservation International (BCI) and Pollinator Partnership (P2) and has developed the USAF Pollinator Conservation Reference Guide (March 2018). The MOU with BCI "establishes a policy of cooperation and coordination between DoD and BCI to identify, document and maintain bat populations and their habitats on DoD installations" (signed Oct 2006, renewed Dec. 2011). The MOU with P2 is "to establish a framework for cooperative programs that promote the conservation and management of pollinators, their habitats and associated ecosystems" (signed February 9, 2015).The MOU states that this framework is important to "ensure that pollinator management activities are incorporated where practicable, into INRMPs and practices." Conservation of pollinators by USAF alone or in collaboration with groups such as BCI and P2 supports these DoD initiatives.

The USAF Pollinator Conservation Reference Guide provides specific pollinator conservation measures which can be implemented by the USAF and ANG. It was finalized March 2018, and is available on USFWS and AFCEC eDASH Natural Resources website (https://www.fws.gov/pollinators/PollinatorPages/USAF_Ref_Guide.html). This guide,

developed by the USFWS, establishes guidance as a National Pollinator Conservation Strategy on lands owned by the USAF. It supplements existing policy and instructions to guide USAF actions to contribute to pollinator conservation under Presidential Memo and Federal Pollinator Health Strategy. Further, it provides Technical Guides as reference materials for pollinators of conservation concern (listed species, birds of conservation concern, bees, and monarch butterflies), and native plant recommendations specific to ecoregions.

Some areas of ANG installations are more suitable for pollinator habitat conservation due to current use and/or habitat condition. For example conservation on unimproved (natural) areas, buffers, recreation areas, rights-of-way, golf courses, and landscaped areas may be more compatible with mission requirements than other areas. These areas should be a priority for implementing pollinator habitat improvements and using land management practices in ways beneficial to pollinators.

7.2.2 Nuisance Wildlife and Wildlife Diseases

Other than those that present a BASH risk, there are few nuisance wildlife species at Barnes ANGB. Future hazardous wildlife problems will be evaluated in conjunction with USDA-WS personnel, if appropriate. Any solutions to hazardous wildlife problems will follow the IPM Plan, Westfield-Barnes Municipal Airport Wildlife Hazard Assessment, and BASH Plan (ANG 2018; USDA 2010; MAANG 2018).

Diseases affecting wildlife may occur on the installation. Any wildlife deaths and unnatural behavior occurring on the installation will be reported, recorded, and investigated, in conjunction with USFWS, USDA-WS, US Environmental Protection Agency (US EPA), and MassWildlife personnel, as appropriate.

7.2.3 Management of Threatened and Endangered Species and Habitats

This section presents information about the management of special status species located within or with the potential to occur at Barnes ANGB, along with requirements and strategies for their management. As additional surveys and natural resources management activities are conducted, it is possible other species may be added in the future. Currently, there are 10 special status species of state and federal concern which have the potential to occur on Barnes ANGB.

7.2.3.1 Federally Special Status Wildlife Species

Barnes ANGB is required to manage for federally-listed species. Failure to protect federally-listed species could lead to an ESA violation, which could negatively impact training land availability. Three federally listed special status species have been identified to potentially occur on Barnes ANGB.

Northern long-eared bat: The northern long-eared bat is federally threatened and listed as endangered by the Commonwealth of Massachusetts. In Massachusetts, the northern long-eared bat is widespread occurring in 11 of 14 counties. In the warmer months, colonies of the bats may be found roosting and foraging in forested areas. The northern long-eared bat is flexible in its

roost selection choosing cavities and crevices in both live trees and snags (dead trees), as well as manmade structures such as bridges and abandoned buildings (Kentucky Working Group 2012). Northern long-eared bats forage under the forest canopy in structurally complex habitats, often above small ponds, vernal pools or streams, along gravel paths or roads, and at the forest edge. In winter, the bats hibernate in natural caves and abandoned mines, preferring habitats where the humidity is so high that water droplets sometimes cover their fur. Winter hibernacula (hibernation sites) have been reported in Hampden County (MassWildlife 2019a). A protocol bat survey has been contracted under the FY18 INRMP Support Contract. All future surveys should follow USFWS protocol: https://www.fws.gov/Midwest/endangered/mammals/inba/surveys/pdf/2019_Rangewide_IBat_Survey_Guidelines.pdf (USFWS 2019b).

Northern long-eared bat
Photo by Animal Diversity Web

Small whorled pogonia: The small whorled pogonia is federally threatened and listed as endangered by the Commonwealth of Massachusetts. This slender orchid usually has a single grayish-green stem with whorl of 5 or 6 leaves near the top of the stem beneath the flower and grows to be 25-36 centimeters tall. Flowers appear in May or June and the fruit, an upright ellipsoid capsule, later in the year (USFWS 2016). In Massachusetts, this plant is found on slightly sloping, previously logged forest land composed of extremely acidic and granitic soils. Like other sites known to support this orchid, the Massachusetts sites are composed of seasonally moist areas above a fragipan and light conditions are usually filtered rather than shaded or open (MassWildlife 2019a). A colony of small whorled pogonia has been documented near the Town of Southwick, approximately 6 miles from Barnes ANGB. A survey to determine presence of the plant will be conducted as a project under this INRMP.

Small whorled pogonia
Photo by USFWS

Eastern black rail: The eastern black rail is proposed for federal listing as threatened (USFWS 2019a). The small, secretive marsh bird is broadly distributed, living in salt and freshwater marshes in portions of the United States, Central America, and South America. Their habitat can be tidally or non-tidally influenced, and range in salinity from salt to brackish to fresh (USFWS 2019a). The eastern black rail is usually a pale to blackish-gray color and boasts bright red eyes with a small blackish bill. This species has not been documented on Barnes ANGB.

Eastern black rail
Photo by USFWS

7.2.3.2 State Special Status Species

Massachusetts state law provides for the protection of native species listed as special concern, threatened and endangered species. Three state-listed species, the upland sandpiper, the grasshopper sparrow, and the vesper sparrow, have been documented breeding on the Westfield-Barnes Municipal Airport property and not on the ANG property (MAANG 2011). These species occur primarily within open fields on the Westfield-Barnes Municipal Airport that are left unmowed during the majority of the growing season (May 1 to July 31) specifically to promote their preservation. These areas total approximately 250 acres and include some zones between

active taxiways and runways. Grassland bird surveys should ideally occur during the first three weeks of June.

Four state-listed species of moth have been known to occur within the City of Westfield, and have the potential to be found on the airport or ANG property (MassWildlife 2019a). All moths mentioned are threatened by habitat loss and fire suppression. Priority Habitat, as defined under the MESA, for all of the above mentioned state-listed birds and moths, except the Pine Barrens zanclognatha, can be found on the airport or ANGB properties. No wildlife surveys have occurred on base. Two state-special status species plants have a moderate likelihood of occurring on Barnes ANGB; bristly buttercup, and New England blazing star.

Upland sandpiper: The upland sandpiper is listed as endangered by the State of Massachusetts. It occurs on native prairie and other dry grasslands including airports and some croplands. The upland sandpiper primarily feeds on grasshoppers, crickets, weevils, beetles, ants, spiders, snails and earthworms on the ground. This is a slender, moderate-sized shorebird that stands about 30 centimeters tall and has a wingspan of 64-68 centimeters. This species often poses with its wings upraised when alighting on utility poles or fence posts (MassWildlife 2019a).

Upland sandpiper
Photo by National Audubon Society

Grasshopper sparrow: This species is listed as threatened by the State of Massachusetts. Occurring in open fields, the grasshopper sparrow is 11-13 centimeters long with a narrow short tail. Each feather of the tail tapers to a point giving it a ragged appearance. The typical song, often mistaken for the song of a grasshopper, consists of 2 chirp notes followed by "tsk tsick tsurrr". Breeding birds also sing a complicated song with many squeaky and buzzy notes intermixed in a long phrase (MassWildlife 2019a).

Grasshopper sparrow
Photo by National Audubon Society

Vesper sparrow: The vesper sparrow is listed as threatened by the State of Massachusetts. The vesper sparrow is considered more of a habitat generalist than some of the other Massachusetts sparrows because their territories often include taller woody vegetation interspersed within the grassland, rather than being completely open. Arrival and nesting dates have not been well studied in Massachusetts, but are thought to be from arrival in April to breeding in May through August. The nest is usually well-concealed sometimes found in open areas. Vesper sparrows produce 1-2 broods/year in Massachusetts, with clutch sizes typically consisting of 3-5 eggs. Nests are often parasitized by brown-headed cowbirds (*Molothrus ater*). The eggs are incubated for 11-14 days, mostly by the female. Young leave the nest at 9-13 days of age but remain dependent on their parents for 3 weeks (MassWildlife 2019a).

Grasshopper sparrow
Photo by National Audubon Society

New Jersey tea inchworm: This species is listed as endangered by the State of Massachusetts. The moth can be found in xeric, open habitats on sandy or rocky soil with New Jersey Tea (*Ceanothus americanus*),

New Jersey tea inchworm
Photo by MassWildlife

including pitch pine-scrub oak barrens and associated sand plain communities, as well as rocky outcrops and ridges. Adult New Jersey tea inchworms are geometrid moths with somewhat variable wing color and pattern, ranging from pale yellow to medium brown with a 25–33 millimeter wingspan. The larva is a green inchworm and a full-grown larva is 25–30 millimeters long (MassWildlife 2019a).

Frosted elfin
Photo by Bill Bouton

Frosted elfin: The frosted is elfin is listed as a species of special concern by the State of Massachusetts and is likely to be Federally listed in the next 5 years. The frosted elfin inhabits xeric and open, disturbance-dependent habitats on sandy or rocky soil, especially heath/grassy openings in pitch-pine/scrub oak barrens, but also along powerline right-of-ways, railways, old sand/gravel pits and airports This species is a tailed lycaenid butterfly with a wingspan of 22-35 millimeters. All 4 wings are brown on both sides (MassWildlife 2019a). Surveys for the frosted elfin should also search for their host plants, wild blue lupine (*Lupinus* spp.) and wild indigo (*Baptisia* spp.).

Pine Barrens speranza
Photo by MassWildlife

Pine Barrens speranza: This species is listed as a species of special concern by the State of Massachusetts. It inhabits scrub oak barrens, both on sandplain soils and on rocky summits and ridges. The Pine Barrens speranza is a geometrid moth with a forewing length of 11-13 millimeters (MassWildlife 2019a).

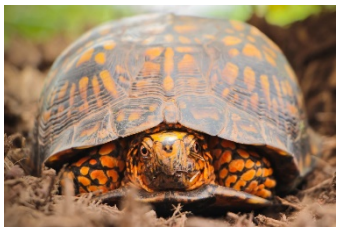
Pine Barrens zanclognatha: This species is listed as threatened by the State of Massachusetts. It inhabits late-successional sandplain pitch pine/scrub oak barrens. The Pine Barrens zanclognatha is a nondescript noctuid moth with a wingspan of 23-26 millimeters. Larvae feed on plant detritus, such as dead pitch pine (*Pinus rigida*) needles and scrub oak (*Quercus ilicifolia*) leaves (MassWildlife 2019a).

Pine Barrens speranza
Photo by Mark McCollough

Marbled salamander: The marbled salamander is listed as threatened by the State of Massachusetts. They are found in mature deciduous and mixed deciduous-coniferous forests and woodlands that house breeding wetlands (ex. vernal pools). The salamander has a stout and stocky medium-sized body and has black dorsal coloration with various shapes of whitish and grayish colors that creates its marbled look (MassWildlife 2019a). Disturbance within 500 feet of suitable / known breeding, habits should be avoided (MassWildlife 2019d).

Marbled salamander
Photo by Paul Sattler

Eastern box turtle: The Eastern box turtle is a special concern species in the State of Massachusetts. Its name comes from a hinge on the plastron that allows it to fold its head, legs, and tail completely under the carapace. The coloring of the carapace is dark brown or black with irregular yellow, orange or red blotches. The coloring of the head, neck and legs is similar with dark colors intermixed with orange or yellow spots. As a terrestrial turtle, its lives in both dry and moist woodlands, suitable overwintering habitat consists of upland forests with soft or loose soils covered by woody debris and leaf litter (MassWildlife 2019a). Typically in Massachusetts, the Eastern box turtle hibernates from late-October until mid-April, depending upon the weather. Surveys to identify important habitat features should be completed during May to September and surveys for the species should be completed during April to October, their active season (MassWildlife 2019d).



Eastern box turtle
Photo by Lindley Ashline

New England blazing star: This perennial is listed as a special concern species by the State of Massachusetts. The New England blazing star inhabits open, dry, low-nutrient sandy soils found in grasslands, heathlands and barrens and presents showy purple flowers from August to October. Fire-influenced natural communities are ideal for the plant. The blazing star can grow up to 2.6 feet and has narrow stem leaves (MassWildlife 2019a). This species benefits from grassland/ pitch pine-scrub oak habitat management techniques, including incorporating prescribed fire and herbicide application and potentially overseeding with native locally sourced little bluestem to ensure long-term grasslands maintenance.

New England blazing star
Photo by Thomas G. Barnes

7.3 Water and Wetland Resource Protection

Watershed protection is important to natural resources management because it directly affects surface water quality and the value of aquatic habitats. Barnes ANGB currently protects its watershed through compliance with a number of federal, state, local, and USAF environmental regulations that require the installation to have detailed spill control and response procedures and to implement storm water pollution prevention BMPs. The objective of these regulations is to prevent pollutants (e.g., fuels, solvents, sediments) from entering the watershed, thus protecting surface waters. Specific watershed protection measures used by the installation include spill clean-up equipment at industrial locations, integrated pest management, and reduction of fertilizer applications.

7.3.1 Regulatory and Permitting

The US Army Corps of Engineers (USACE) regulates the discharge of dredged or fill material into Waters of the US, including wetlands, under Section 404 of the Clean Water Act (CWA). Even an inadvertent encroachment into Waters of the US including wetlands resulting in a displacement or movement of soil or fill material has the potential to be viewed as a violation of the CWA if an appropriate permit has not been issued by the USACE. Waters of the US including wetlands are defined under 33 CFR Part 328.3(a) and referred to as Jurisdictional Waters. Jurisdictional Waters may include coastal and inland waters, lakes, rivers, ponds, streams, intermittent streams, vernal pools, wetlands, and other waters, that if degraded or destroyed could affect interstate commerce.

A jurisdictional determination is made based on multiple criteria, but the relationship of the wetland to other Waters of the US is important. Management of wetlands on federal lands and military installations is further governed by EO 11990 and DoDI 4715.03, respectively. Under those instructions, wetlands are required to be managed for no net loss on federal lands, including military installations. In support of these policies, long and short-term adverse impacts associated with the destruction or modification of wetlands and support of new construction in wetlands must be avoided to the maximum extent possible.

According to the US EPA regulations issued under Section 404(b)(1) of the CWA, permitting of fill activities will not be approved unless the following conditions are met: no practicable, less environmentally damaging alternative to the action exists; the activity does not cause or contribute to violations of state water quality standards (or compliance under Section 401 of the CWA); the activity does not jeopardize listed species or sensitive cultural resources (33 CFR Part 320.3 [e] and [g]); the activity does not contribute to significant degradation of Waters of the US; and all practicable and appropriate steps have been taken to minimize potential adverse impacts to the aquatic ecosystem (40 CFR Part 230.10).

Section 401 of the CWA gives the State of Massachusetts the authority to regulate, through the state water quality certification program, proposed federally-permitted activities resulting in a discharge to water bodies, including wetlands. The state may issue certification, with or without conditions, or deny certification for activities that may result in a discharge to water bodies. In Massachusetts, the Massachusetts Department of Environmental Protection (MassDEP) is responsible for issuing Section 401 Water Quality Certification. Any potential wetland disturbance must include the proper delineation per MassDEP regulation. The Westfield Conservation Commission has local jurisdiction over wetlands. For any potential wetland disturbance, the installation must submit a notice of intent to Westfield Conservation Commission, MassDEP, and the USACE.

The Wetlands Protection Act ((Massachusetts General Law [M.G.L.] chapter 131, Section 40 complemented by 310 Code of Massachusetts Regulation [CMR] 10.00) protects wetlands and the public interests they serve, including flood control, prevention of pollution and storm damage, and protection of public and private water supplies, groundwater supply, fisheries, land containing shellfish, and wildlife habitat. These public interests are protected by requiring a careful review of proposed work that could alter wetlands. The law protects not only wetlands, but other resource areas, such as land subject to flooding (100-year floodplains), the riverfront area (added by the Rivers Protection Act), and land under water bodies, waterways, salt ponds, fish runs, and the ocean.

Representatives of the towns of Easthampton, Holyoke, Southampton, and Westfield, in conjunction with the Pioneer Valley Planning Commission, created an inter-municipal committee (Barnes Aquifer Protection Advisory Committee) to protect the Barnes Aquifer from the adverse impacts of development that could reduce the quality and quantity of groundwater resources. The Aquifer Protection Bylaw was passed based on recommendations by the MassDEP that established an aquifer protection district (Water Resources Protection District), which specifies permitted and prohibited uses within the District. Part of the Aquifer Protection Bylaw includes protecting areas around public water supply wells within the Water Resources Protection District that contribute to the recharge zone of the Barnes Aquifer; these protection areas are described as

Zones I and II. According to the Commonwealth of Massachusetts Drinking Water Regulations (310 Commonwealth of Massachusetts Regulation (CMR) 22.02), Zone I is defined as the "protective radius required around a public water supply well or "wellfield" and Zone II is "that area of an aquifer which contributes water to a well under the most severe pumping and recharge conditions that can be realistically anticipated (180 days of pumping at safe yield, with no recharge from precipitation)." The Westfield-Barnes Airport is located within Zone II for the City of Westfield Water Wells No. 1, 2, 7, and 8 and within Zone I for Wells No. 7 and 8. Wells No. 7 and 8 are located immediately to the southeast of Runway 15-33 just outside of the airport's fence (MAANG 2011).

7.3.2 Vegetation Buffers

Vegetated buffers are also referred to as riparian management zones, riparian buffers, wetland buffers, lake buffers, buffer strips, filter strips, or streamside management areas. Buffers can take many forms and may vary in size and function depending on the upland land use and the type of water resource being protected. They can either be grassland or forest and may or may not be mowed and maintained occasionally. One of the primary purposes of a vegetated buffer is for water quality protection by providing vegetation to interrupt water flow and to trap and filter out suspended sediments, nutrients, chemicals, and other polluting agents before they reach the body of water. Vegetated buffers should be maintained along all perennial and intermittent streams, wetlands, lakes, or ponds where nearby management activities result in surface/soil disturbance, earth changes, and where erosion and sediment transport occurs during rain events. Maintaining the forest cover around small water resources is also important for preventing sedimentation and impacts to water quality.

7.4 Grounds Maintenance

Barnes ANGB currently occupies 190 acres of land and about half of this land is developed. The grounds maintenance personnel currently mow the grass in the maintained areas of the installation.

7.5 Soil Conservation and Sediment Management

The soils on Barnes ANGB are susceptible to water erosion if not protected with vegetation or other cover. Maintenance of key ecosystem functions such as erosion control and sediment retention require a healthy, uniform ground cover be established as quickly as possible following land use conversion or disturbance, and that interim soil stabilization measures be implemented.

7.6 Outdoor Recreation, Public Access, and Public Outreach

Limited open space and access issues preclude the development of outdoor recreation areas at Barnes ANGB.

7.7 Geographic Information Systems

Geographic Information Systems (GIS) is used to manage and catalog information acquired in natural resources research. GIS assists in planning by charting areas of environmental concern and providing a baseline for analyzing the potential impacts of any proposed natural resources management action. Managers can implement the capabilities of GIS to watershed, wetlands, wildlife, and various other natural resource management applications. GIS needs and requirements will be addressed through the ANG GeoBase Program.

7.8 Other Plans

7.8.1 Integrated Pest Management Plan

IPM objectives at Barnes ANGB include the protection of real estate, control of potential disease vectors or animals of other medical importance, control of undesirable or nuisance plants and animals (including insects), and prevention of damage to natural resources. In addition, the potential presence of several zoonotics (e.g., Lyme disease and encephalitis) on the installation, and the potential threat to human health and safety (e.g., transmission of disease) cannot be underestimated.

DODI 4150.07 states that it is DOD policy to establish and maintain safe, effective, and environmentally sound integrated pest management programs to prevent or control pests and disease vectors that could adversely impact readiness or military operations by affecting the health of personnel or damaging structures, material, or property.

IPM should use mechanical, physical, cultural, biological, and educational methods to maintain pests at populations low enough to prevent undesirable damage or annoyance. Application of the least toxic chemical should be used as a last resort.

Prevention of damage to natural resources is an important objective of pest management. Natural resources damage can result from infestations of damaging insects or insect larvae, from overpopulation of primary consumers such as white-tailed deer, from overgrowths of vegetation where natural resources management objectives demand their removal, and from invasions of noxious or exotic plant species that displace natural and native vegetation. On Barnes ANGB, pest management activities are coordinated by the IPM Coordinator. The installation reports annual pesticide application to the NGB/A4AM Pest Management Consultant until such time that a web-based reporting system is back online.

7.8.2 Invasive Species

EO 13112, Invasive Species, requires all federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause. The Massachusetts Introduced Pests Outreach Project is an educational component of the Cooperative Agricultural Pest Survey (CAPS) Program. This project is a collaborative effort between the Massachusetts Department of Agricultural Resources and University of Massachusetts Extension Agriculture and Landscape Program, and is funded by the USDA/Animal and Plant Health Inspection Service (CAPS 2012). The Integrated Pest Management (IPM) Plan manages pest species, including nuisance wildlife and invasive species (ANG 2018).

10 invasive plant species have been documented on Barnes ANGB with 1 high, 1 medium, and 8 low priority species identified (MAANG. 2015a; **Table 9**). Minimizing disturbance is the most effective way to manage the colonization, establishment, and spread of non-native, invasive species. Most of the invasive species occur in low densities sporadically throughout the installation. The high priority common reed occurs as a discrete stand in the eastern parcel, along the western wood's edge, adjacent to the ammunitions bunker. The medium priority tree of heaven occurs as isolated individuals along the wood's edge and in disturbed areas, both within the eastern parcel. Targeted removal and management of common reed and tree of heaven is

recommended because of their potential to spread rapidly at this installation and their currently limited distribution.

Table 9. Invasive Plant Species on Barnes ANGB

Scientific Name	Common Name	Priority	MDAR Status
Acer platanoides	Norway maple	Low	Prohibited
Ailanthus altissima	tree of heaven	Medium	Prohibited
Celastrus orbiculatus	Oriental bittersweet	Low	Prohibited
Centaurea stoebe	spotted knapweed	Low	Prohibited
Coronilla varia	crown vetch	Low	Prohibited
Elaeagnus umbellata	autumn olive	Low	Prohibited
Lonicera morrowii	Morrow's honeysuckle	Low	Prohibited
Phragmites australis	common reed	High	Prohibited
Rhamnus cathartica	common buckthorn	Low	Prohibited
Rosa multiflora	multiflora rose	Low	Prohibited

Source: MAANG 2015a, MDAR 2012; USDA 2014

An invasive species survey is expected to be completed in the summer of 2020 (ANG 2018). Once the study is done, the IPM Plan will be updated. A reconnaissance level flora/fauna survey is also planned and will include identification of threatened and endangered species and invasive species.

7.8.3 Stormwater Management

All stormwater generated on Barnes ANGB flows directly to one of three major storm water retention ponds which allow percolation into the ground. Flightline aircraft deicing is diverted to the city sewer. A valve installed in 2016 allows flightline crew to switch between stormwater (default) to sanitary sewer.

A raingarden was constructed in 2014 as part of the EPA initiative to reduce pollution from urban runoff. The 1200 ft^2 facility is located west of building 052 (Base Hazmat) and receives runoff from the building and adjacent parking lot. Routine annual maintenance is carried out by the EMO/contract.

Raingarden

7.8.4 Bird/Wildlife Aircraft Strike Hazard (BASH)

A bird/wildlife aircraft strike hazard exists at Barnes ANGB at Westfield-Barnes Regional Airport (BAF) and its vicinity, due to resident and migratory bird species and other wildlife. Daily and seasonal bird movements create various hazardous conditions. The BASH plan (MAANG 2018) establishes procedures to minimize the hazard to the MAANG and deployed aircraft at the installation and in their operating areas.

Animal and bird populations on the flightline area will be controlled to prevent wildlife/aircraft collisions. This will be accomplished by habitat modification, fence maintenance around the flightline, noise and distress calls, and depredation by the USDA Wildlife Services. Flightline vegetation will be maintained between 7 and 14 inches in height to discourage birds and limit the number of mowings required. The BASH plan covers procedures and techniques for preventing bird aircraft strikes and hazards. Aircraft are exposed to bird and wildlife hazards by both migratory and resident birds.

8.0 MANAGEMENT GOALS AND OBJECTIVES

Goals and objectives provide the framework for natural resources management programs. Goals provide a general guiding direction for each technical area and objectives are more specific actions that facilitate achieving those goals. The objectives then drive the development of specific projects. Management goals and objectives for the Barnes ANGB INRMP were developed through a thorough evaluation of the natural resources present on the installation in accordance with AFI 32-7064 and the principles of adaptive ecosystem management by an interdisciplinary team of biologists, planners, and environmental scientists. Goals and objectives should be revised over time to reflect evolving environmental conditions, adaptive management, and the completion of tasks as the INRMP is implemented.

GOAL – Natural Resources Program Management (PM): Manage natural resources in a manner that is compatible with and supports the military mission while complying with applicable federal and state laws, and USAF regulations and policies.

OBJECTIVE PM1: Coordinate an annual review of the INRMP with USFWS and MassWildlife, and modify and monitor the progress of goals and objectives. Update and document with the A4AM Natural Resources Program Manager.

OBJECTIVE PM2: Use adaptive, ecosystem management as the primary natural resources management paradigm. Ensure the INRMP is integrated with other plans such as the IPM Plan and BASH Plan.

OBJECTIVE PM3: Continue internal environmental awareness activities to minimize impacts to natural resources from MAANG and visiting personnel.

OBJECTIVE PM4: Ensure the annual budget is prepared and implement for the following fiscal year's activities.

OBJECTIVE PM5: Inform ecosystem based management that promotes biodiversity of native species, maintain or restore ecological processes such as disturbance regimes utilizing regional management approaches.

PROJECT FW5.1: Map natural communities across Barnes ANGB.

GOAL – Fish and Wildlife Monitoring (FW): Establish a monitoring program for wildlife where trends, habitats, and ecological data can be tracked and analyzed.

OBJECTIVE FW1: Conduct reconnaissance level flora and fauna surveys at Barnes ANGB to assess avian (including migratory birds), mammalian, herpetofauna, and insect species and populations.

PROJECT FW1.1: Conduct initial planning level surveys for plants and animals.

PROJECT FW1.2: Conduct protocol bat survey.

PROJECT FW1.3: Incorporate biological survey data into the INRMP as they are collected. Survey data can be incorporated into the applicable section of Chapter 5, *Ecosystems and the Biotic Environment*.

PROJECT FW1.4: Conduct followup flora and fauna surveys every 3 to 5 years depending on site conditions to determine if new species are present on the installation.

PROJECT FW1.5: Review USFWS and MassWildlife threatened, endangered and invasive species lists annually to ensure awareness of species listed.

OBJECTIVE FW2: Support goals and objectives of the Massachusetts' SWAP.

PROJECT FW2.1: Determine if there are possible areas where the installation could support wildlife conservation projects of mutual interest with the MassWildlife.

GOAL – Soil Conservation and Sediment Management (SO): Manage soil to minimize sediment loss and erosion, while protecting water quality.

OBJECTIVE SO1: Minimize erosion and sedimentation prevention while supporting the WAP conservation strategy of proactive habitat protection.

PROJECT SO1.1: Determine if MA has erosion and sediment control laws and regulations that include courses offered for sediment and erosion control. If feasible have EM, SEO, Base Civil Engineer, and/or grounds personnel attend the course and obtain certification as erosion and sediment control inspector.

GOAL – Water Resource Protection (WA): Manage water resources to ensure resiliency with no net loss of acreage or functions and values.

OBJECTIVE WA1: Ensure compliance with NPDES permits.

PROJECT WA1.1: Conduct monitoring and water quality testing required by NPDES permits issued to the installation.

OBJECTIVE WA2: Maintain stormwater BMPs (raingarden).

PROJECT WA2.1: Annually trim woody plants, replace dead plants, clean forebay, repair erosion, weed and mulch as necessary.

GOAL – Waters of the US/Wetland Management and Protection (WT): Contact the MA agency responsible for implementation of the state's Wetlands Act.

OBJECTIVE WT1: Obtain state verification of the boundaries identified in the 2014 WOTUS/Wetland Report and determination of jurisdiction in accordance with Massachusetts Wetlands Act.

PROJECT WT1.1: Submit the WOTUS/Wetland Survey conducted in 2014 to state for verification.

GOAL – Grounds Maintenance and Landscaping (GM): Manage vegetative cover, forested areas, and soil to minimize sediment loss and erosion, while protecting water quality.

OBJECTIVE GM1: Use native plant species for all areas to be planted on the installation and avoid introduction of invasive, nonnative species in revegetation and landscaping activities.

PROJECT GM1.1: Determine if development of a Native Plant List and/or a Native Landscaping Plan for the installation is feasible.

9.0 ANNUAL WORK PLANS

The INRMP Annual Work Plans contain projects listed by fiscal year (FY). For each project, a specific fiscal year for implementation is provided (as applicable), as well as the office of primary responsibility (OPR), funding source, and priority for implementation (**Tables 9-13**). Priorities are defined as follows:

- High: The INRMP signatories assert that if the project is not funded the INRMP is not being implemented and the ANG is non-compliant with the Sikes Act; or that it is specifically tied to an INRMP goal and objective and is part of a "Benefit of the Species" determination necessary for ESA Sec 4(a)(3)(B)(i) critical habitat exemption.
- Medium: Project supports a specific INRMP goal and objective, and is deemed by INRMP signatories to be important for preventing non-compliance with a specific requirement within a natural resources law or by EO 13112 on Invasive Species. However, the INRMP signatories will not contend the INRMP is not being implemented if the project is not accomplished within the programmed year due to other priorities.
- Low: Project supports a specific INRMP goal and objective, enhances conservation resources or the integrity of the installation mission, and/or support long-term compliance with specific requirements within natural resources law; but is not directly tied to specific compliance within the proposed year of execution.

Table 10. Work Plans FY 2020			
Project	**OPR**	**Funding Source**	**Priority Level**
Prepare budget to implement the natural resources management program			High
Complete annual review of INRMP with internal stakeholders.			High
Complete annual review of the INRMP with the USFWS and the MassWildlife. Incorporate MassWildlife and USFWS comments into INRMP.			High
Support the Safety Office in its management of BASH and their efforts to implement risk reduction measures while ensuring impacts to threatened and endangered species are minimal.			High
Attend quarterly BASH meetings to ensure knowledge of natural resource issues affecting BASH.			High
Support the IPM Plan and provide information to the IPMC regarding the presence of threatened and endangered species.			High
Monitor the progress of the natural resources surveys to be conducted on Barnes under the FY18 INRMP Support Contract.			High
Work with NGB/A4AM Natural Resources Program Manager to identify natural resource studies and actions needed for successful management of the INRMP.			High
Ensure replanting efforts on base as part of construction projects and in areas of erosion maximize use of native plant species.			High
Maintain raingarden			High
Monitor federal and state changes to listed species			High
Conduct reconnaissance level flora and fauna surveys, to include federally and state listed species pursuant to the ESA and MESA, in consultation and concurrence with USFWS and MassWildlife.			High

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Table 11. Work Plans FY 2021			
Project	**OPR**	**Funding Source**	**Priority Level**
Prepare budget to implement the natural resources management program			High
Complete annual review of INRMP with internal stakeholders.			High
Complete annual review of the INRMP with the USFWS and the MassWildlife. Incorporate MassWildlife and USFWS comments into INRMP.			High
Support the Safety Office in its management BASH and their efforts to implement risk reduction measures while ensuring impacts to threatened and endangered species are minimal.			High
Attend quarterly BASH meetings to ensure knowledge of natural resource issues affecting BASH.			High
Support the IPM Plan and provide information to the IPMC regards the threatened and endangered species.			High
Evaluate the outcome of the natural resource studies and consider what additional studies and/or actions may be needed.			High
Work with NGB/A4AM Natural Resources Program Manager to identify natural resource studies and actions needed for successful management of the INRMP.			High
Ensure replanting efforts on base as part of construction projects and in areas of erosion maximize use of native plant species.			High
Maintain raingarden			High
Conduct reconnaissance level flora and fauna surveys, to include threatened and endangered species.			High

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Table 12. Work Plans FY 2022			
Project	**OPR**	**Funding Source**	**Priority Level**
Prepare budget to implement the natural resources management program			High
Complete annual review of INRMP with internal stakeholders.			High
Complete annual review of the INRMP with the USFWS and the MassWildlife. Incorporate MassWildlife and USFWS comments into INRMP.			HIgh
Support the Safety Office in its management BASH and their efforts to implement risk reduction measures while ensuring impacts to threatened and endangered species are minimal.			High
Attend quarterly BASH meetings to ensure knowledge of natural resource issues affecting BASH.			High
Support the IPM Plan and provide information to the IPMC regards the threatened and endangered species.			High
Determine what actions are needed in the pending update of the INRMP.			High
Work with NGB/A4AM Natural Resources Program Manager to identify natural resource studies and actions needed for successful management of the INRMP.			High
Ensure replanting efforts on base as part of construction projects and in areas of erosion maximize use of native plant species.			High
Maintain raingarden			High
Monitor federal and state changes to listed species			Medium
Conduct reconnaissance level flora and fauna surveys, to include threatened and endangered species.			High

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Table 13. Work Plans FY 2023			
Project	**OPR**	**Funding Source**	**Priority Level**
Prepare budget to implement the natural resources management program			High
Complete annual review of INRMP with internal stakeholders.			High
Complete annual review of the INRMP with the USFWS and the MassWildlife. Incorporate MassWildlife and USFWS comments into INRMP.			High
Support the Safety Office in its management BASH and their efforts to implement risk reduction measures while ensuring impacts to threatened and endangered species are minimal.			High
Attend quarterly BASH meetings to ensure knowledge of natural resource issues affecting BASH.			High
Support the IPM Plan and provide information to the IPMC regards the threatened and endangered species.			High
Determine what actions are needed in the pending update of the INRMP.			High
Work with NGB/A4AM Natural Resources Program Manager to identify natural resource studies and actions needed for successful management of the INRMP.			High
Ensure replanting efforts on base as part of construction projects and in areas of erosion maximize use of native plant species.			High
Maintain raingarden			High
Monitor federal and state changes to listed species			High
Conduct reconnaissance level flora and fauna surveys, to include threatened and endangered species.			High

10.0 INRMP IMPLEMENTATION, UPDATE, AND REVISION PROCESS

10.1 INRMP Implementation

In accordance with AFI 32-7064, an INRMP is considered implemented if an installation:

- Actively requests, receives, and uses funds for "must fund" projects (Environmental Management).
- Executes all "must fund" projects in accordance with specific time frames identified in the INRMP.
- Prepares the INRMP in cooperation with appropriate stakeholders. Notifies stakeholders when a new or revised INRMP will be prepared, and solicits participation and input to the INRMP development and review process.
- Ensures that sufficient numbers of professionally trained natural resources management personnel are available to perform the tasks required by the INRMP.
- Ensures INRMP has been approved in writing by the appropriate representative from each cooperating agency within the past 5 years.
- Reviews the INRMP annually and coordinates annually with cooperating agencies.
- Establish and maintain regular communications with the appropriate federal and state agencies for the region where the installation is located.
- Documents specific INRMP action accomplishments undertaken each year.

- Ensures INRMP updates and reviews are conducted in cooperation with the USFWS, MassWildlife, and National Oceanic and Atmospheric Administration (NOAA), where applicable.
- Ensures the INRMP implements ecosystem management on ANG installations by setting goals for attaining a desired land condition.

Natural resource and land use management issues are not the only factors contributing to the development and implementation of the INRMP. Facility management and other seemingly unrelated issues affect implementation. It is important to the implementation of this INRMP that Barnes ANGB personnel take ownership of the INRMP to provide the necessary resources (e.g. personnel and equipment), and to utilize the appropriate funding allocated by the ANG NGB/A4AM to enact the INRMP. It is extremely important that the INRMP Working Group continue to participate in the implementation of this INRMP. The INRMP Working Group is made up of the key Barnes ANGB personnel, and has an oversight role to ensure the effective implementation of this INRMP. Top and middle-level management representation, as well as representation from several individuals with day-to-day on-site experience will provide the INRMP Working Group with the leadership and structure necessary for the successful implementation of this INRMP.

10.1.1 Monitoring INRMP Implementation

10.1.1.1 Barnes ANGB INRMP Implementation Analysis

The Barnes ANGB INRMP implementation will be monitored for meeting the legal requirements of the Sikes Act as well as for other mission and biological measures of effectiveness. The ultimate successful implementation of this INRMP is realized in no net loss in the capability of the Barnes ANGB training lands to support the military mission while at the same time providing effective natural resources management.

In order to monitor and evaluate the effectiveness of the INRMP implementation, the following will be reviewed as applicable and discussed within the context of the annual review and/or a formal review of operation and effect:

- Impacts to/from the military mission.
- Conservation program budget.
- Staff requirements.
- Program and project implementation.
- Trends in species and habitat diversity as evidenced by recurring biological surveys, land use changes, and opinions of natural resource experts.
- Compliance with regulatory requirements.
- Feedback from military trainers, the USFWS, the MassWildlife, and others.

Some of these areas may not be looked at every year due to lack of data or pertinent information. The effectiveness of this INRMP as a mission enabling conservation tool will be decided by mutual agreement of the USFWS, the MassWildlife, and Barnes ANGB during annual reviews and/or reviews for operation and effect.

10.1.1.2 USAF and DoD INRMP Implementation Monitoring

The USAF uses the Defense Environmental Programs Annual Report to Congress (DEPARC) to monitor Sikes Act compliance. DEPARC is the automated system used to collect installation environmental information for reporting to DoD and Congress. Established to fulfill an annual requirement to report the status of DoD's Environmental Quality program to Congress, DEPARC collects information on enforcement actions, inspections and other performance measures for high-level reports and quarterly reviews. DEPARC also helps the USAF track fulfillment of DoD Measures of Merit requirements. The Deputy under Secretary of Defense's (DUSD) Updated Guidance for Implementation of the Sikes Act also includes an updated Conservation Metrics for Preparing and Implementing INRMPs section. Progress toward meeting these measures of merit is reported in the annual report to Congress.

10.1.2 Priorities and Scheduling

The Office of Management and Budget considers funding for the preparation and implementation of this INRMP, as required by the Sikes Act, to be a high priority. However, the reality is that not all of the projects and programs identified in this INRMP will receive immediate funding. Therefore, projects need to be funded consistent with timely execution to meet future deadlines. Projects are generally prioritized with respect to compliance. Highest priority projects are projects related to recurring or current compliance, and these are generally scheduled earliest. The prioritization of the projects is based on need, legal drivers, and ability to further implement the INRMP.

Current compliance includes projects needed because an installation is currently or will be out of compliance if projects 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 (historical and archaeological sites).
- Biological Assessments (BAs), surveys, or habitat protection for a specific listed species.
- Mitigation to meet existing regulatory permit conditions or written agreements.
- Wetland delineations in support of subsequent jurisdictional determinations.
- Efforts to achieve compliance with requirements that have deadlines that have already passed.
- Initial documenting and cataloging of archaeological materials.

Maintenance requirements include those projects needed that are not currently out of compliance but shall be out of compliance if projects 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 GIS 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 EO for no net loss or to achieve enhancement of existing degraded wetlands.

- Public education programs that educate the public on the importance of protecting natural resources.

Lower priority projects include those that enhance conservation resources of the installation mission, or are needed to address overall environmental goals and objectives, but are not specifically required under regulation or EO, and are not of an immediate nature. These projects are generally funded after those of higher priority are funded. Examples include:

- Community outreach activities, such as Earth Day and Historic Preservation Week activities.
- Educational and public awareness projects, such as interpretive displays, oral histories, nature trails, wildlife checklists, and conservation teaching materials.
- BAs, biological surveys, or habitat protection for a non-listed species.
- 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.

10.1.3 Funding

Implementation of this INRMP is subject to the availability of annual funding. Funding sources for specific projects can be grouped into 3 main categories by source: federal ANG or NGB funds, other federal funds, and non-federal funds. When projects identified in the plan are not implemented due to lack of funding, or other compelling circumstances, the installation will review the goals and objectives of this INRMP to determine whether adjustments are necessary. Funding options include:

- The Legacy Resource Management Program provides financial assistance to DoD efforts to conserve natural and cultural resources on federal lands. Legacy projects could include regional ecosystem management initiatives, habitat preservation efforts, archeological investigations, invasive species control, and/or flora or fauna surveys. Project proposals are submitted to the Legacy program during their annual funding cycle (https://www.denix.osd.mil/legacy/home).
- There are also grant and assistance programs administered by other federal agencies that could be accessed for natural resources management at Barnes ANGB. Examples include funds associated with the CWA and endangered species.
- Other non-federal funding sources that could be considered include The Public Lands Day Program, which coordinates volunteers to improve the public lands they use for recreation, education, and enjoyment, and the National Environmental Education and Training Foundation, which manages, coordinates, and generates financial support for the program (https://www.neefusa.org/npld).
- Barnes ANGB may also consider entering into cooperative or mutual aid agreements with states, local governments, non-governmental organizations, and other individuals.

10.1.4 Cooperative Agreements

The DoD and subcommand entities have MOU, Memorandums of Agreement (MOA), and other cooperative agreements with other federal agencies, conservation and special interest groups, and various state agencies in order to provide assistance with natural resources management at installations across the US. Generally, these agreements allow installations and agencies, or conservation and special interest groups to obtain mutual conservation objectives. The DoD agreements applicable to Barnes ANGB include:

- MOU between DoD and USFWS/International Fund for Animal Welfare (IFAW) to promote the conservation of migratory birds (2011).
- MOU between DoD and USFWS/IFWA for a Cooperative Integrated Natural Resource Program associated with the ecosystem-based management of fish, wildlife, and plant resources on military lands (2006).
- MOU between the DoD and US EPA to form a working partnership to promote environmental stewardship by adopting IPM strategies to reduce the potential risks to human health and the environment associated with pesticides (2012).
- MOA for federal Neotropical Migratory Bird Conservation Program and addendum (Partners in Flight-Aves De Las Americas) among DoD, through each of the Military Services, and over 110 other federal and state agencies and non-governmental organizations (1991).
- MOU between the DoD and Ducks Unlimited, Inc. to provide a foundation for cooperative development of selected wetlands and associated uplands in order to maintain and increase waterfowl populations and to fulfill the objectives of the North American Waterfowl Management Plan, within the context of DoD's environmental security and military missions (2006).
- MOU between DoD and NRCS to promote cooperative conservation, where appropriate (2006).
- MOU with Watchable Wildlife Incorporated (2002).
- MOU between the DoD and BCI to identify, document, and maintain bat populations and habitats on DoD installations (2011).
- MOA between FAA, USAF, US Army, US EPA, USFWS, and USDA to address aircraft-wildlife strikes (2003).
- Cooperative Agreement between DoD and The Nature Conservancy to work cooperatively in areas of mutual interest (2010).
- Interagency Agreement (2010) and MOU (2009) between USAF and US Forest Service (USFS) to enhance cooperation and improve public service, and management of natural and cultural resources on lands managed by the USAF and the USFS.
- MOA (2003) between FAA, USAF, US Army, US EPA, USFWS, and USDA to address aircraft-wildlife strikes.

For a further list of cooperative agreements and MOUs please visit:
https://www.denix.osd.mil/announcements/unassigned/sikes-tripartite-mou/

10.1.5 Consultations Requirements

The Barnes ANGB has multiple natural resources consultation requirements in addition to the INRMP development and review requirements as identified in the Sikes Act. Federally-listed species management requires ESA Section 7 consultation with the USFWS. State-listed species management, as well as game species management, requires consultation with MassWildlife. Actions that fall under the jurisdiction of Section 401 of the CWA necessitate permitting from MassDEP, while Section 404 actions necessitate permitting from the USACE.

10.2 Annual INRMP Review and Coordination Requirements

Per DoD policy, Barnes ANGB will review the INRMP annually in cooperation with the USFWS and MassWildlife. On an annual basis, the EM will invite the USFWS Regional Office, the USFWS local Field Office, the MassWildlife, and ANG NGB/A4AM to attend a meeting or

participate in a conference call to review previous year INRMP implementation and discuss implementation of upcoming programs and projects. Invitations will be either by letter or email. Attendance is at the option of those invited, but at minimum the USFWS local field office and a representative of MassWildlife are expected to attend. The meeting will be documented with an agenda, meeting minutes, and sign-in roster of attendees.

At this annual meeting the need for updates or revisions will be discussed. If updates are needed, Barnes ANGB will initiate the updates and, after agreement of all 3 parties, they will be added to the INRMP. If it is determined that major changes are needed, all 3 parties will provide input and an INRMP revision will be initiated with Barnes ANGB acting as the lead coordinating agency. The annual meeting will be used to expedite the more formal review for operation and effect and, if all parties agree and document their mutual agreement, it can fulfill the requirement to review the INRMP for operation and effect.

If not already determined in previous annual meetings, by the fourth year annual review a determination will be made jointly to continue implementation of the existing INRMP with updates or to proceed with a revision. If the parties feel that the annual reviews have not been sufficient to evaluate operation and effect and they cannot determine if the INRMP implementation should continue or be revised, a formal review for operation and effect will be initiated. The determination on how to proceed with INRMP implementation or revision will be made after the parties have had time to complete this review.

As part of the annual review, Barnes ANGB will specifically:

- Invite feedback from USFWS and MassWildlife on the effectiveness of the INRMP.
- Inform USFWS and MassWildlife which INRMP projects are required to meet current natural resources compliance needs.
- Document specific INRMP action accomplishments from the previous year.

10.3 INRMP Update, and Revision Process

10.3.1 Review for Operation and Effect

Not less than every 5 years, the INRMP will be reviewed for operation and effect to determine if the INRMP is being implemented as required by the Sikes Act and contributing to the management of natural resources at Barnes ANGB. The review will be conducted by the 3 cooperating parties to include the Commander responsible for the INRMP, the Supervisor of the USFWS Local Field Office, and Director of the MassWildlife. While these are the responsible parties, technical representatives generally are the personnel who actually conduct the review.

The review for operation and effect will either conclude that the INRMP is meeting the intent of the Sikes Act and only needs an update and implementation can continue; or that it is not effective in meeting the intent of the Sikes Act and it must be revised. The conclusion of the review will be documented in a jointly executed memorandum, meeting minutes, or in some way that reflects mutual agreement.

If only updates are needed, they will be completed in a manner agreed to by all parties. The updated INRMP will be reviewed by the local USFWS Local Field Office and MassWildlife. Once concurrence letters or signatures are received from the Supervisor of the USFWS Local Field Office and the Director of the MassWildlife, the update of the INRMP will be complete and

implementation will continue. Generally, the environmental impact analysis will continue to be applicable to updated INRMPs, and a new analysis will not be required.

If a review of operation and effect concludes that an INRMP must be revised, there is no set time to complete the revision. The existing INRMP remains in effect until the revision is complete and USFWS and MassWildlife concurrence on the revised INRMP is received. Barnes ANGB will endeavor to complete such revisions within 18 months, depending upon funding availability. Revisions to the INRMP will go through a detailed review process similar to development of the initial INRMP to ensure Barnes ANGB's military mission, USFWS, and MassWildlife concerns are adequately addressed, and the INRMP meets the intent of the Sikes Act.

11.0 APPENDICES

APPENDIX A. REFERENCES

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APPENDIX B. LAW, REGULATIONS, POLICIES, AND EXECUTIVE ORDERS

Federal Laws

American Indian Religious Freedom Act of 1978 (Public Law 95-341; 42 USC §1196) – requires the US, where appropriate, to protect and preserve religious rights of the American Indian, Eskimo, Aleut, and Native Hawaiians, including but not limited to access to sites, use and possession of sacred objects, and the freedom to worship through ceremonials and traditional rites.

Animal Damage Control Act of 1931 (7 USC §426 et seq.) – provides broad authority for investigation, demonstrations and control of mammalian predators, rodents and birds.

Anti-Deficiency Act of 1982 (31 USC §1341 et seq.) - provides that no federal official or employee may obligate the government for the expenditure of funds before funds have been authorized and appropriated by Congress for that purpose.

American Antiquities Act of 1906 (Public Law 59-209; 16 USC §431-433) – authorizes the President to designate historic and natural resources of national significance, located on federal lands, as National Monuments for the purpose of protecting items of archeological significance.

Archeological and Historical Preservation Act of 1974 (Public Law 95-96; 16 USC §469 et seq.) – provides for the preservation of historical and archeological data, including relics and specimens, threatened by federally funded or assisted construction projects.

Archeological Resources Protection Act of 1979 (16 USC §470 et seq.) – prohibits the excavation or removal from federal or Indian lands any archeological resources without a permit.

Bald Eagle Protection Act of 1940 (Public Law 87-884; 16 USC §668a-d) – prohibits the taking or harming (i.e. harassment, sale, or transportation) of bald eagles or golden eagles, including their eggs, nests, or young, without appropriate permit.

Clean Air Act of 1970 (42 USC §7401 et seq.) – regulates air emissions from stationary, area, and mobile sources. This law authorizes the US EPA to establish National Ambient Air Quality Standards (NAAQS) to protect public health and the environment.

Clean Water Act of 1972 (Public Law 92-500; 33 USC §1251 et seq.) – aims to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Under Section 401, states have authority to review federal permits that may result in a discharge to wetlands or water bodies under state jurisdiction. Under section 404, a program is established to regulate the discharge of dredged or fill material into the Nation's waters, including wetlands.

Coastal Zone Management Act of 1972 (Public Law 92-583; 16 USC §1451 et seq.) – provides incentives for coastal states to develop coastal zone management programs. Federal actions that impact the coastal zone must be consistent to the maximum extent practicable with the state program.

Conservation and Rehabilitation Program on Military and Public Lands (Public Law 93-452; 16 USC §670 et seq.) – provides for fish and wildlife habitat improvements, range rehabilitation, and control of off-road vehicles on federal lands.

Conservation Programs on Military Reservations (Public Law 90-465; 16 USC §670 et seq.) – Requires each military department to manage natural resources and to ensure that services are provided which are necessary for management of fish and wildlife resources on each installation; to provide their personnel with professional training in fish and wildlife management; and to give priority to contracting work with federal and state agencies that

have responsibility for conservation or management of fish and wildlife. In addition it authorizes cooperative agreements (with states, local governments, non-governmental organizations, and individuals) which call for each party to provide matching funds or services to carry out natural resources projects or initiatives.

Endangered Species Act of 1973, as amended (16 USC §1531 et seq.) – provides for the identification and protection of threatened and endangered plants and animals, including their critical habitats. Requires federal agencies to conserve threatened and endangered species and cooperate with state and local authorities to resolve water resources issues in concert with the conservation of threatened and endangered species. This law establishes a consultation process involving federal agencies to facilitate avoidance of agency action that would adversely affect species or habitat. Further, it prohibits all persons subject to US jurisdiction from taking, including any harm or harassment, endangered species.

Federal Insecticide, Fungicide, and Rodenticide Act of 1947 (Public Law 92-516; 7 USC §136 et seq.) – governs the use and application of pesticides in natural resource management programs. This law provides the principal means for preventing environmental pollution from pesticides through product registration and applicator certification.

Federal Land Policy and Management Act of 1976 (43 USC §1701) – establishes public land policy and guidelines for its administration and provides for the management, protection, development, and enhancement of the public lands.

Federal Noxious Weed Act of 1974 (Public Law 93-629; 7 USC §2801) – provides for the control and eradication of noxious weeds and their regulation in interstate and foreign commerce.

Fish and Wildlife Conservation Act of 1980 (Public Law 96-366; 16 USC §2901 et seq.) – encourages management of non-game species and provides for conservation, protection, restoration, and propagation of certain species, including migratory birds threatened with extinction.

Fish and Wildlife Coordination Act of 1934 (16 USC §661 et seq.) – provides a mechanism for wildlife conservation to receive equal consideration and coordinate with water-resource development programs.

Land and Water Conservation Act of 1965 (16 USC §4601 et seq.) – assists in preserving, developing, and assuring accessibility to outdoor recreation resources.

Migratory Bird Conservation Act of 1929 (16 USC §715 et seq.) – establishes a Migratory Bird Conservation Commission to approve areas recommended by the Secretary of the Interior for acquisition with Migratory Bird Conservation Funds.

Migratory Bird Treaty Act of 1918 (Public Law 65-186; 16 USC §703 et seq.) – provides for regulations to control taking of migratory birds, their nests, eggs, parts, or products without the appropriate permit and provides enforcement authority and penalties for violations.

National Environmental Policy Act of 1969 (Public Law 91-190; 42 USC §4321 et seq.) – mandates federal agencies to consider and document environmental impacts of proposed actions and legislation. In addition it mandates preparation of comprehensive environmental impact statements where proposed action is “major” and significantly affects the quality of the human environment.

Native American Graves Protection and Repatriation Act of 1990 (Public Law 101-601; 25 USC §§3001-3013) – addresses the recovery, treatment, and repatriation of Native American and Native Hawaiian cultural items by federal agencies and museums. It includes provisions for data gathering, reporting, consultation, and issuance of permits.

Resource Conservation and Recovery Act of 1976 (42 USC §6901 et seq.) – establishes a comprehensive program which manages solid and hazardous waste. Subtitle C, Hazardous Waste Management, sets up a framework for managing hazardous waste from its initial generation to its final disposal. Waste pesticides and equipment/containers contaminated by pesticides are included under hazardous waste management requirements.

Sikes Act Improvement Act of 1997 (Public Law 105-85; 16 USC §670a et seq.) – amends the Sikes Act of 1960 to mandate the development of an INRMP through cooperation with the Department of the Interior (through the USFWS), DoD, and each state fish and wildlife agency for each military installation supporting natural resources.

Soil Conservation Act of 1935 (16 USC §590a et seq.) – provides for soil conservation practices on federal lands.

Federal Regulations

40 CFR 1500-1508 – CEQ Regulations on Implementing NEPA Procedures

40 CFR 6 – US EPA Regulations on Implementation of NEPA Procedures

40 CFR 162 – US EPA Regulations on Insecticide, Fungicide, and Rodenticide Use

15 CFR 930 – Federal Consistency with Approved Coastal Management Programs

50 CFR 17 – USFWS list of Endangered and Threatened Wildlife

50 CFR 10.13 – List of Migratory Birds

32 CFR 190 – Natural Resources Management Program

Federal Executive Orders (EOs)

Environmental Safeguard for Activities for Animal Damage Control on Federal Lands (EO 11870) - restricts the use of chemical toxicants for mammal and bird control.

Exotic Organisms (EO 11987) – restricts federal agencies in the use of exotic plant species in any landscape and erosion control measures.

Energy Efficiencies and Water Conservation at Federal Facilities (EO 12902) – federal agency use of energy and water resources is directed towards the goals of increased conservation and efficiency.

Floodplain Management (EO 11988) – specifies that agencies shall encourage and provide appropriate guidance to applicant to evaluate the effects of their proposals in floodplains prior to submitting applications. This includes wetlands that are within the 100-year floodplain and especially discourages filling.

Off-Road Vehicles on Public Lands (EO 11989) – The respective agency shall determines that the use of off-road vehicles will cause or is causing considerable adverse effects on the soil, vegetation, wildlife, wildlife habitat or cultural or historic resources of particular areas or trails of the public lands, immediately close such areas or trails to the type of off-road vehicle causing such effects, until such time as he determines that such adverse effects have been eliminated and that measures have been implemented to prevent future recurrence.

Greening the Government through Leadership in Environmental Management (EO 13148) – requires the head of each federal agency to be responsible for ensuring that all necessary actions are taken to integrate environmental accountability into agency day-to-day decision making and long-term planning processes across all agency missions, activities, and functions.

Indian Sacred Sites (EO 13007) – provides for the protection of and access to Indian sacred sites.

Invasive Species (EO 13112) – directs federal agencies to prevent the introduction of invasive species and provide for their control and to minimize the economic, ecological, and human health impacts that invasive species cause.
Protection and Enhancement of Environmental Quality (EO 11514) – provides for environmental protection of federal lands and enforces requirements of NEPA.
Protection of Wetlands (EO 11990) – directs all federal agencies to take action to minimize the destruction loss or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands. This applies to the acquisition, management, and disposal of federal lands and facilities; to construction or improvements undertaken, financed, or assisted by the federal government; and to the conduct of federal activities and programs which affect land use.
Responsibilities of Federal Entities to Protect Migratory Birds (EO 13186) – directs all federal agencies taking actions that have a potential to negatively affect migratory bird populations to develop and implement a MOU with the USFWS by January 2003 that shall promote the conservation of migratory bird populations.

DoDI, AFI, & Air Force Pamphlets (PAM)

DoDI 4715.03 – Natural Resources Conservation Program
DoDI 4165.57 – Air Installations Compatible Use Zones
DoDI 4150.07 – Pest Management Program
DoDI 6055.06 – Fire and Emergency Services Program
AFI 32-7064 – Integrated Natural Resources Management
AFI 32-1053 – Integrated Pest Management Program
AFI 32-7062 – Air Force Comprehensive Planning
AFI 32-7065 – Cultural Resources Management
AFPAM 91-212 – BASH Techniques

Department of Defense Memoranda

Memorandum, Assistant DUSD (Environment, Safety and Occupational Health), 20 Sept 11, Subject: *Interim Policy on Management of White Nose Syndrome in Bats.*
Memorandum, Assistant DUSD (Environment, Safety and Occupational Health), 3 Apr 07, Subject: *Guidance to Implement the Memorandum of Understanding to Promote the Conservation of Migratory Birds.*
Memorandum, Assistant DUSD (Environment, Safety and Occupational Health), 14 Aug 06, Subject: *Integrated Natural Resource Management Plan (INRMP) Template*
Memorandum, Assistant DUSD (Environment, Safety and Occupational Health), 17 May 05, Subject: *Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning Leased Lands*
Memorandum, Assistant DUSD (Environment, Safety and Occupational Health), 1 Nov 04, Subject: *Implementation of Sikes Act Improvement Amendments: Supplemental Guidance concerning INRMP Reviews*
Memorandum, DUSD (Installations and Environment), 10 Oct 02, Subject: *Implementation of Sikes Act Improvement Act: Updated Guidance*
Memorandum, Assistant DUSD (Environment), 5 Aug 02, Subject: *Access to Outdoor Recreation Programs on Military Installations for Persons with Disabilities.*
Memorandum, Assistant Secretary of Army (Environment, Safety and Occupational Health), Deputy Assistant Secretary of the Navy (Environment), Deputy Assistant Secretary of the

Air Force (Environment, Safety and Occupational Health), 20 Sep 11, Subject: *Interim Policy on Management of White Nose Syndrome in Bats.*