

FINDING OF NO SIGNIFICANT IMPACT

PROGRAMMATIC ENVIRONMENTAL ASSESSMENT FOR NATURAL RESOURCES MANAGEMENT COMPLIANCE AT ARMY MATERIEL COMMAND INSTALLATIONS

1. **PROPOSED ACTION:** The Proposed Action and subject of this Programmatic Environmental Assessment (PEA), which is hereby incorporated by reference, is the implementation of supplementary natural resources management plans on Army Materiel Command (AMC) installations. Implementing the Proposed Action would ensure that natural resources management activities on AMC installations comply with a common set of federal, U.S. Department of Defense (DoD), and Army laws, regulations, and guidance documents.

2. **PURPOSE OF THE PEA:** Use of the PEA by AMC installations ensures their compliance with applicable natural resources planning DoD Directives and Instructions, Army Regulation 200-1 (*Environmental Protection and Enhancement*), and the Sikes Act (Title 16 of the *United States Code* 670 et seq.). Use of the PEA reduces the time and cost burden on the installations of preparing a separate National Environmental Policy Act (NEPA) document for each natural resources plan, which have historically resulted in a Finding of No Significant Impact. The PEA accomplishes this by using a checklist to determine whether a new or updated natural resources planning document might have a significant adverse environmental impact. Those plans for which no significant adverse effect is foreseen can use a Record of Environmental Consideration to complete their NEPA requirement. The installations bear the burden of preparing an Environmental Assessment or Environmental Impact Statement (EIS) only for those plans for which a significant adverse environmental impact is foreseen.

3. **ALTERNATIVES CONSIDERED:** The PEA considered the Preferred Alternative and the No Action Alternative. The No Action Alternative was to conduct a separate NEPA analysis for each supplementary natural resources management plan required at each AMC installation. The No Action Alternative was found to be reasonable but would be more costly and require additional staff time to achieve the same result. Both the Preferred Alternative and the No Action Alternative are evaluated in the PEA. The PEA characterizes the likely environmental impacts, including impacts on human health, which could result from implementing the Preferred Alternative and the No Action Alternative.

4. **ENVIRONMENTAL CONSEQUENCES AND MITIGATION MEASURES:** It is unlikely that significant adverse environmental impacts will result from implementing the Preferred Alternative. The Preferred Alternative includes adherence to applicable existing health, safety, and environmental regulations. Implementing standard best management practices for natural resources and human health protection during implementation of supplementary natural resources management plans will ensure environmental protection and mitigate risks to people.

5. **FACTORS CONSIDERED IN THE FINDING OF NO SIGNIFICANT IMPACT:** The PEA discusses the nature of the Preferred Alternative and the likely environmental effects, including cumulative effects, on all relevant resource areas associated with its implementation.

6. **PUBLIC REVIEW AND COMMENT:** The PEA was made available for public and agency review in April 2019. A Notice of Availability (NOA) of the PEA and draft Finding of No Significant Impact was published in newspapers local to AMC installations. The documents were available electronically at <http://www.amc.army.mil/Resources/Environmental>. Hard copies of the PEA were made available at public libraries or other public buildings near each AMC installation. Comments were accepted for 30 days after the publication of each NOA. No comments on the PEA were received.

FINDING OF NO SIGNIFICANT IMPACT (Continued): PROGRAMMATIC ENVIRONMENTAL ASSESSMENT FOR NATURAL RESOURCES MANAGEMENT COMPLIANCE AT ARMY MATERIEL COMMAND INSTALLATIONS

7. CONCLUSIONS: Based on the analysis, the Preferred Alternative would have no significant adverse effects on the natural or human environment. Preparation of an EIS is not required. Implementing the No Action Alternative also would have no significant adverse effects on the natural or human environment but would require additional staff time and budget to accomplish while achieving the same result.



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3 July 2019

Date

Final

**Programmatic Environmental Assessment for
Natural Resources Management Planning Compliance
at AMC Installations**



Prepared for

U.S. Army Materiel Command

Prepared by

U.S. Army Corps of Engineers, Mobile District

With technical assistance from

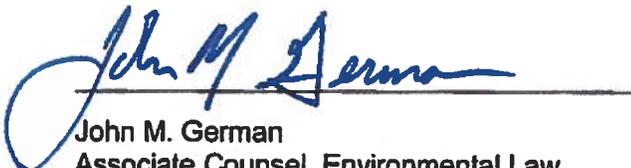
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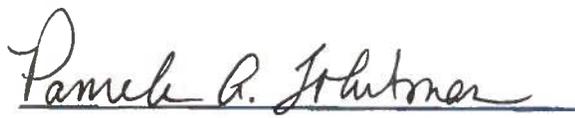
**Programmatic Environmental Assessment for
Natural Resources Management Planning Compliance
at AMC Installations**

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CONTENTS

SECTION 1.0 Purpose of and Need for the Proposed Action	1-1
1.1 Purpose and Need of the Proposed Action	1-2
1.2 Scope of Environmental Analysis	1-2
1.3 Decision to be Made	1-4
SECTION 2.0 Preferred Alternative and No Action Alternative.....	2-1
2.1 Preferred Alternative.....	2-1
2.2 No Action Alternative	2-1
2.3 Regulatory Requirements	2-1
SECTION 3.0 Affected Environment.....	3-1
3.1 Land Use	3-1
3.2 Airspace	3-1
3.3 Aesthetics and Visual Resources	3-2
3.4 Air Quality.....	3-2
3.5 Noise	3-3
3.6 Geology, Topography, and Soils.....	3-3
3.7 Water Resources.....	3-4
3.8 Biological Resources	3-5
3.9 Cultural Resources	3-6
3.10 Socioeconomics	3-6
3.11 Infrastructure and Utilities.....	3-7
3.12 Traffic and Transportation	3-7
3.13 Hazardous Materials and Wastes.....	3-7
SECTION 4.0 Environmental Consequences.....	4-1
4.1 Natural Resources Management on AMC Installations.....	4-1
4.1.1 Army Land Resource Management	4-1
4.1.2 Federal Resource Management	4-4
4.2 Activities Associated with Implementing Each Type of Plan.....	4-4
4.2.1 Forest Management Activities.....	4-4
4.2.2 Endangered Species Management Activities.....	4-6
4.2.3 Fisheries Management Activities	4-6
4.2.4 Invasive Species Management Activities	4-7
4.2.5 Aquatic Vegetation Management Activities	4-8
4.2.6 Wildland Fire Management Activities	4-8
4.2.7 Erosion and Sediment Control Activities	4-8
4.2.8 Wetlands Management Activities.....	4-9
4.2.9 Low-impact Development Activities	4-10
4.2.10 Floodplain Protection and Management Activities.....	4-11

4.2.11 Watershed Protection and Management Activities.....	4-12
4.3 Impacts of Implementing SNRMPs by Resource Area.....	4-12
4.3.1 Land Use.....	4-13
4.3.2 Airspace.....	4-13
4.3.3 Aesthetics and Visual Resources.....	4-14
4.3.4 Air Quality.....	4-15
4.3.5 Noise.....	4-15
4.3.6 Geology, Topography, and Soils.....	4-16
4.3.7 Water Resources.....	4-17
4.3.8 Biological Resources.....	4-18
4.3.9 Cultural Resources.....	4-19
4.3.10 Socioeconomics.....	4-20
4.3.11 Infrastructure and Utilities.....	4-21
4.3.12 Transportation, Traffic, and Roads.....	4-21
4.3.13 Hazardous Materials and Wastes.....	4-22
4.3.14 Cumulative Effects.....	4-23
SECTION 5.0 REFERENCES.....	5-1

APPENDICES

A: Environmental Checklist for Supplemental Natural Resources Management Plan Implementation.....	A-1
B: Matrices of Environmental Impact by Management Plan and Activity.....	B-1

FIGURES

Figure 1-1. Locations of AMC Installations.....	1-3
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TABLES

Table 3-1. Army Land Use Classifications.....	3-1
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ACRONYMS

AICUZ	Air Installation Compatibility Use Zone
AMC	Army Materiel Command
APZ	Accident Potential Zone
AQCR	Air Quality Control Region
AR	Army Regulation
BMP	best management practice
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CONUS	Continental United States
CRM	Cultural Resources Manager
CWA	Clean Water Act
DoD	U.S. Department of Defense
DoDD	U.S. Department of Defense Directive
DoDI	U.S. Department of Defense Instruction
EO	Executive Order
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
ESC	erosion and sediment control
ICRMP	Integrated Cultural Resources Management Plan
INRMP	Integrated Natural Resources Management Plan
IPM	Integrated Pest Management
LID	low-impact development
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHPA	National Historic Preservation Act
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NRHP	National Register of Historic Places
NRM	Natural Resources Manager
PEA	programmatic environmental assessment
SNRMP	Supplementary Natural Resources Management Plan
TMDL	total maximum daily load
U.S.C.	United States Code

USFWS U.S. Fish and Wildlife Service
UXO unexploded ordnance

SECTION 1.0 PURPOSE OF AND NEED FOR THE PROPOSED ACTION

This programmatic environmental assessment (PEA) addresses the environmental effects of complying with regulatory requirements in natural resources management planning at U.S. Army Materiel Command (AMC) installations. AMC installations are required to prepare a variety of resource-specific management plans, including the following:

- Forest Management Plan
- Endangered Species Management Plan
- Fisheries Management Plan
- Invasive Species Management Plan
- Aquatic Vegetation Management Plan
- Integrated Wildland Fire Management Plan
- Erosion and Sediment Control (ESC) Plan
- Wetlands Management Plan
- Low-impact Development (LID) Plan
- Floodplain Management Plan
- Watershed Protection and Management Plan

One or more of these plans are required at individual AMC installations, depending on the natural resources present on the installation. Each management plan provides information about specific natural resources and details best practices for managing those resources in compliance with applicable U.S. Department of Defense (DoD) Directives (DoDDs) and Instructions (DoDIs) and Army Regulations (ARs) and in consideration of the installation's mission. These individual plans—or *supplementary natural resources management plans* (SNRMPs)—collectively expand upon the installation's overall natural resources management strategies documented in its Integrated Natural Resources Management Plan (INRMP), which most Army installations are required to have under the Sikes Act (Title 16 of the *United States Code* [U.S.C.] 670 *et seq.*).

AMC is the Army's premier provider of materiel readiness—technology, acquisition support, materiel development, logistics power projection, and sustainment. AMC's missions range from research and development of weapon systems to maintenance and distribution of spare parts. AMC installations include Army depots, ammunition plants, arsenals, and military ocean terminals. They fabricate, manufacture, repair, test, store, demilitarize, and recycle a wide range of items, from specialty parts to unique prototype weapon systems and vehicles. Depending on the installation, the focus can be on overhauling, repairing, and modifying vehicles, helicopters, artillery, small arms, missile systems, or power-generating equipment; restoring, enhancing, and upgrading weapon systems; demilitarizing conventional ammunition and ammunition-related components; manufacturing propellants and explosives; producing, repairing, and managing chemical and biological defense weapons; or welding, heat-treating, machining, painting, and engineering metals. The mission of AMC's two military ocean terminals, one located on the east coast and the other on the west coast, is to safely provide ammunition terminal services to meet the nation's objectives.

This PEA provides National Environmental Policy Act (NEPA) documentation for AMC installation SNRMPs. The management approaches detailed in those documents are based on accepted federal, DoD, Army, and state practices incorporated into DoDDs, DoDIs, ARs, federal

laws and Executive Orders (EOs), state regulations and guidances, and nonregulatory environmental guidances (e.g., *Bay-Friendly Landscape Guidelines*, a collection of sustainable practices for the landscaping professional published by the Bay-Friendly Landscaping & Gardening Coalition of the San Francisco Bay area [ReScape 2008]). An installation's mission is considered in developing the management approaches.

1.1 PURPOSE AND NEED OF THE PROPOSED ACTION

The purpose of the proposed action is to evaluate the environmental effects of developing and implementing new and updated SNRMPs on AMC installations. Upon completion, the PEA will help ensure that natural resources management activities on AMC installations comply with a common set of federal, DoD, and Army laws and regulations and guidance documents. The proposed action is needed to provide consistency in developing and implementing natural resources management plans and programs across AMC installations, thereby ensuring that AMC installations can meet their environmental stewardship and mission requirements.

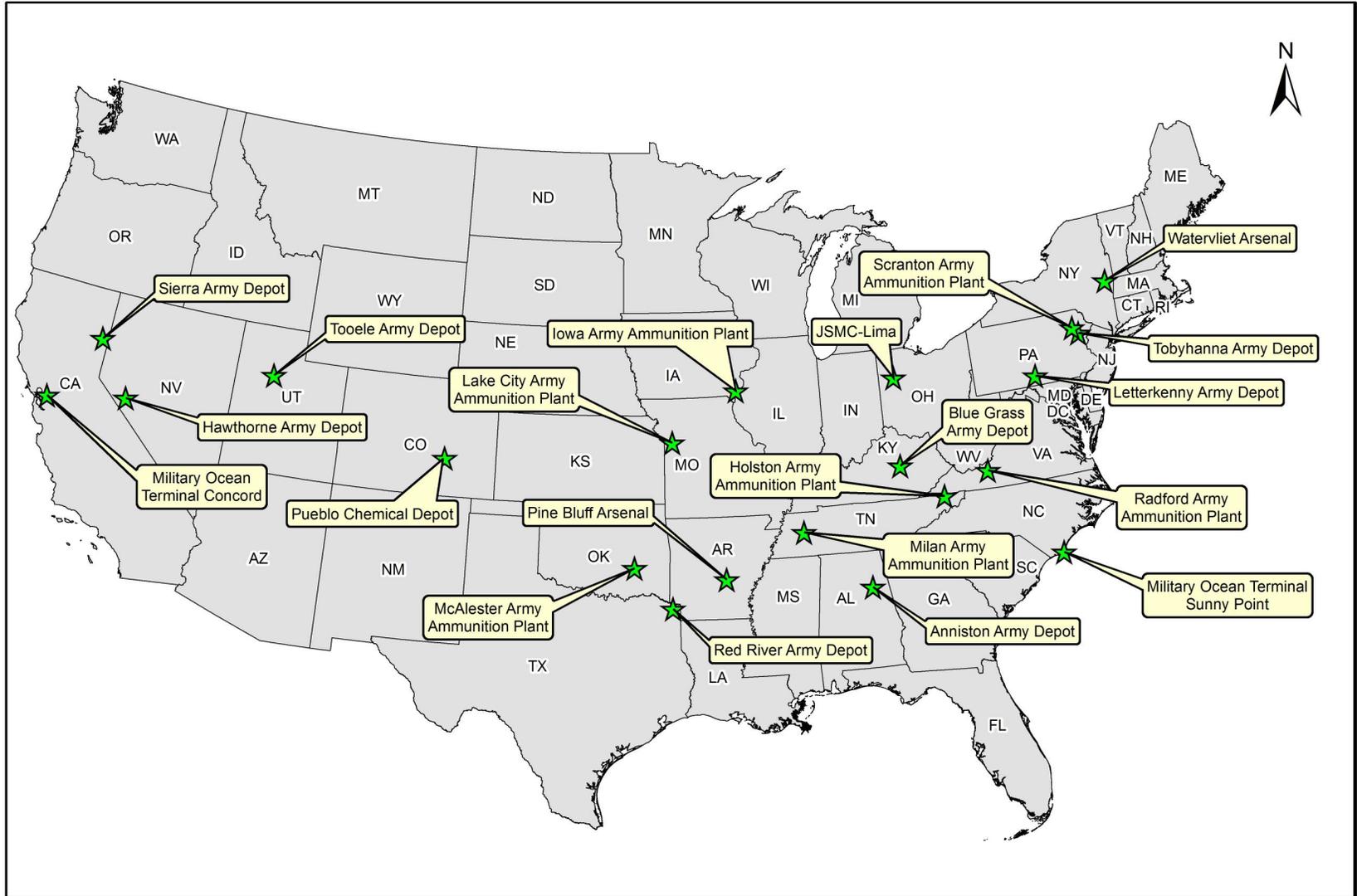
1.2 SCOPE OF ENVIRONMENTAL ANALYSIS

This PEA will be used to inform decision makers and the public of the likely environmental consequences of implementing the proposed action. It evaluates two alternatives for achieving the proposed action: the preferred alternative and the no action alternative, as described in section 2.0. The geographic scope of the PEA is AMC installations in the continental United States (CONUS).

As of February 2019, AMC consists of 21 CONUS installations (Figure 1). Future Army restructuring could expand AMC (and potentially redesignate it) to include many other CONUS installations. All Army installations are required to have INRMPs and SNRMPs if they have significant natural resources that require management, so installations that would fall under AMC (or its redesignated name) through a future Army restructuring would be expected to be compliant with NEPA requirements for natural resources management. However, if an installation that became part of AMC (or as redesignated) was to require NEPA analysis for natural resources management, such NEPA would be tiered off this PEA in the same manner that current AMC installations will use the PEA to fulfill their natural resources NEPA requirements.

The PEA evaluates the likely environmental and socioeconomic effects that developing and implementing a new or substantial revision of an existing SNRMP might have on an installation's resource areas. Resource areas analyzed in the PEA are land use, aesthetics, air quality, noise, geology and soils, water resources, biological resources, cultural resources, socioeconomics, infrastructure, transportation, and hazardous and toxic materials.

This PEA is a starting point for the NEPA process for developing and implementing new and updated SNRMPs at AMC installations. It provides a checklist that AMC installation personnel can use to complete the NEPA documentation for each plan or plan update (appendix A). Every SNRMP or plan update will require an additional NEPA assessment tiered from this PEA—either a Record of Environmental Consideration (if the PEA adequately analyzes the potential environmental effects of implementing the plan or plan update) or a supplemental environmental assessment (if potential impacts on resource areas are not adequately addressed in this PEA). Each AMC installation will complete the checklist, identifying natural resources management



LEGEND

★ AMC Installation

Locations of AMC Installations*

* Current as of February 2019.

Figure 1

activities that need further evaluation from an environmental perspective, if any, before the plan or plan update would be implemented.

AMC developed this PEA in accordance with Title 32 of the *Code of Federal Regulations* (CFR) part 651, *Environmental Analysis of Army Actions*; NEPA (42 U.S.C. 4321 *et seq.*); and applicable Council on Environmental Quality (CEQ) requirements in 40 CFR parts 1500–1508 to determine the potential environmental impacts of the proposed action.

1.3 DECISION TO BE MADE

The Army must decide whether the socioeconomic and environmental impacts of the selected alternative that best meets the purpose and need for the proposed action will support a finding of no significant impact or will require publishing in the *Federal Register* a notice of intent to prepare an environmental impact statement. The Army will publish a notice of intent if the potential adverse environmental impacts associated with the selected alternative remain significant even after all reasonable mitigation measures have been implemented.

SECTION 2.0 PREFERRED ALTERNATIVE AND NO ACTION ALTERNATIVE

2.1 PREFERRED ALTERNATIVE

AMC's preferred alternative is to evaluate at a programmatic level the environmental effects of developing and implementing new and updated SNRMPs on AMC installations. The management plans evaluated in this PEA include the following:

- Forest Management Plan
- Endangered Species Management Plan
- Fisheries Management Plan
- Invasive Species Management Plan
- Aquatic Vegetation Management Plan
- Integrated Wildland Fire Management Plan
- ESC Plan
- Wetlands Management Plan
- LID Plan
- Floodplain Management Plan
- Watershed Protection and Management Plan

Developing and implementing these plans is driven by DoDDs, DoDIs, and ARs, which are based on accepted best practices for natural resources management and environmental stewardship. Because these controlling legal authorities and best management practices (BMPs) dictate how natural resources are to be managed at AMC installations, the on-the-ground practices of managing natural resources vary little from installation to installation. A programmatic level of analysis of the environmental impacts of developing and implementing the SNRMPs, therefore, achieves the purpose of and need for the proposed action in an administratively efficient and cost-saving manner.

2.2 NO ACTION ALTERNATIVE

The environmental analysis includes the no action alternative to provide a baseline for comparison with the preferred alternative and is presented in this PEA in accordance with CEQ regulations for implementing NEPA. Like the preferred alternative, the no action alternative is to develop and implement SNRMPs on AMC installations in accordance with DoDDs, DoDIs, ARs, and established BMPs and in consideration of the installation's mission requirements. The difference between the alternatives is that the no action alternative involves conducting a separate NEPA analysis (or EA) for each plan to be developed and implemented. The no action alternative meets the purpose of and need for the proposed action, and this PEA analyzes it in full.

2.3 REGULATORY REQUIREMENTS

AR 200-1 implements federal, state, and local environmental laws and DoD policies for preserving, protecting, conserving, and restoring the quality of the environment. It is the primary AR governing natural resources management on Army installations. Following are other contributing legal authorities related to natural resources management on AMC installations:

- DoDI 4715.03, Natural Resources Conservation Program
- DoDM 4715.03, Integrated Natural Resources Management Plan (INRMP) Implementation Manual
- Anadromous Fish Conservation Act (16 USC 757a-757g)
- Army Wildland Fire Policy Guidance (DA 2002)
- 32 CFR part 651, Environmental Effects of Army Actions
- Bald and Golden Eagle Protection Act (16 U.S.C. 668-668d)
- Clean Water Act (CWA) section 404 (33 U.S.C. 1344)
- Endangered Species Act (ESA) (16 U.S.C. 1531 et seq.)
- Fish and Wildlife Conservation Act (16 U.S.C. 2901)
- Fish and Wildlife Coordination Act (16 U.S.C. 661 et seq.)
- Fishery Conservation and Management Act (16 U.S.C. 1801–1882 et seq.)
- Marine Mammal Protection Act (16 U.S.C. 1361–1423h)
- Migratory Bird Treaty Act (16 U.S.C. 703–712)
- Military Reservations and Facilities: Hunting, Fishing, and Trapping (10 U.S.C. 2671)
- Natural Resource Management on Military Lands Act of 1960, or the Sikes Act (16 U.S.C. 670 et seq.)
- NEPA of 1969 (42 U.S.C. 4321–4347)
- Nonindigenous Aquatic Nuisance Prevention and Control Act (16 U.S.C. 4701–4751)
- Watershed Protection and Flood Prevention Act (16 U.S.C. 1001–1012)
- EO 11988, Floodplain Management
- EO 11990, Protection of Wetlands
- EO 13112, Invasive Species
- EO 13186, Responsibilities of Federal Agencies to Protect Migratory Birds
- EO 13751, Safeguarding the Nation from the Impacts of Invasive Species
- EO 13834, Efficient Federal Operations

SECTION 3.0 AFFECTED ENVIRONMENT

3.1 LAND USE

Army installation land use planning incorporates 12 general land use classifications (Table 3-1). Like designations used in the civilian sector, the Army's land use classifications identify the principal kinds of facilities and activities to be found in particular areas of an installation. Table 3-1 lists the Army's 12 land use categories. Also shown are facility category groups typically appropriate to each land use category. Not all land uses are present on each AMC installation; the land uses present and the amount of land devoted to each land use depend on an installation's military mission. Because of the variety of missions and locations of AMC installations, it is difficult to generalize about land use on AMC installations.

**Table 3-1
Army Land Use Classifications**

Airfield Land Use: Landing and takeoff area, aircraft maintenance, airfield operational and training facilities, and navigational and traffic aids
Maintenance Land Use: Depot maintenance, installation maintenance, Table of Organization and Equipment (TOE) unit maintenance
Industrial Land Use: Production; research, development, and test facilities; potable water supply, treatment, and storage; electric power source, transmission, distribution, substations, and switching stations; heat sources, transmission lines, and distribution lines; sewage and industrial waste treatment and disposal; sewage and industrial waste collection; and parking areas
Supply/Storage Land Use: Installation ammunition storage, depot ammunition storage, cold storage, general-purpose warehouse, controlled-humidity warehouse, flammable materials storehouse, fuel storage, engineer material storage, medical warehouse, unit storage, and salvage and surplus property storage
Administration Land Use: Installation command and control, directorates, tenants, organizational, and special
Training/Ranges Land Use: Training facilities, buildings; training grounds and facilities other than buildings; firing ranges, training; and firing ranges, research, development, testing, and evaluation
Unaccompanied Personnel Housing Land Use: Officer unaccompanied personnel housing, enlisted unaccompanied personnel housing, and visiting officers and soldiers quarters
Family Housing Land Use: Family housing
Community Land Use: Commercial and services
Medical Land Use: Hospital, dental clinic, clinic without beds, electric power source, heat source, parking areas
Outdoor Recreation Land Use: Recreation building, outdoor swimming pool, tennis courts, multiple court areas, baseball field, softball field, football field, and soccer field
Open Space: Unoccupied land, buffer and easement, and greenbelt

3.2 AIRSPACE

The Federal Aviation Administration manages all airspace within the United States and its territories. The Federal Aviation Administration recognizes the military's need to conduct certain flight operations and training within airspace that is separated from that used by commercial and general aviation.

Military operations are conducted within designated airspace identified for defense-related purposes. Military operations follow specific procedures to maximize flight safety for nonparticipating civil and military aircraft. Airspace areas designated for special military use are those used to separate visual military flight activities from instrument flight traffic and Military Training Routes, which represent airspace routes generally below 10,000 feet above mean sea level that are used for high-speed navigation and tactical flight training. Some AMC installations have heliport or airfield facilities and support air operations.

Relevant to land use planning at airports and airfields is the designation of the Air Installation Compatibility Use Zone (AICUZ), Clear Zone, and the Accident Potential Zone (APZ). The AICUZ consists of land areas on which certain land uses may obstruct the airspace or otherwise be hazardous to aircraft operations, and land areas that are exposed to the health, safety, or welfare of aircraft operations. The purposes of AICUZ are to minimize the potential of major catastrophe from aircraft accidents; to prevent incompatible development in noise exposure and accident areas; to assist local authorities to protect and promote the public health, safety, and welfare of area inhabitants; and to protect, through compatible land use planning and control, the compromise of installation operation capability. A Clear Zone represents the area at the end or just beyond the runway surface where most land uses are incompatible with military aircraft landing operations. Extending beyond the Clear Zone along the aircraft flight path, the APZ allows a variety of land uses; however, intensive uses (e.g., schools, churches, and restaurants) are restricted because of the greater accident risk in these areas. Outside the Clear Zone and APZ, the risk of accidents is generally not significant enough to warrant special consideration in land use planning.

3.3 AESTHETICS AND VISUAL RESOURCES

The overall aesthetic of most AMC installations is that of a small rural town, with a centralized developed area in which administrative, industrial, and maintenance functions are located and large undeveloped areas dedicated to ammunition storage, test ranges, recreational areas, and open space. Industrial and maintenance areas have warehouse-style buildings, railroad infrastructure, vehicle staging areas, or other similar facilities. Undeveloped areas are often wooded or contain munitions storage areas, providing a buffer between the installation and surrounding areas.

Being predominantly located in rural settings, AMC installations are generally surrounded by sparsely populated areas. Isolated residences, small towns, and two-lane roads commonly abut installation boundaries. Visually, there is little difference between the installations and their surroundings, and the installations are not of high or valued visual quality or character, or within the viewshed of sensitive viewpoints.

3.4 AIR QUALITY

Each AMC installation that is a major source of air pollutants has been issued an air operating permit (Title V permit or Synthetic Minor permit) by the appropriate state regulatory agency. Air permits are normally active for five years from the date they are issued. The permits require an annual inventory of all significant stationary sources of air emissions for each criteria pollutant as well as monitoring and recordkeeping. The primary stationary sources of air emissions at AMC installations are boilers, generators, and fuel storage areas.

The U.S. Environmental Protection Agency (EPA) established primary and secondary National Ambient Air Quality Standards (NAAQS) (40 CFR part 50) under the Clean Air Act (42 U.S.C. 7401–7671q). The NAAQS specify acceptable concentrations of six criteria pollutants: particulate matter (measured as both particulate matter less than 10 microns in diameter and particulate matter less than 2.5 microns in diameter), sulfur dioxide, carbon monoxide, oxides of nitrogen, ozone, and lead. EPA has established short-term NAAQS (1-, 8-, and 24-hour periods) for pollutants that contribute to acute health effects, as well as long-term NAAQS (annual averages) for pollutants that contribute to chronic health effects. Most states accept the federal standard, but some states (e.g., California and New York) have adopted more stringent standards for some pollutants (CARB 2017, NYSDEC 2018).

The country is divided into Air Quality Control Regions (AQCRs) for monitoring and controlling air pollutants. AQCRs with levels of all criteria pollutants below the NAAQS are “attainment areas,” AQCRs with concentrations of one or more criteria pollutants that exceed the NAAQS are “nonattainment areas,” and AQCRs that were classified as nonattainment areas but have improved air quality are “maintenance areas.” Most AMC installations are in attainment areas for all criteria pollutants.

3.5 NOISE

Daily sources of noise at AMC installations in general include railroad and vehicle traffic and industrial activities. Buffer areas on installations surround areas of high noise intensity so noise levels that would exceed local noise ordinances are spatially confined to within the installation boundary and temporally to normal business hours. Loud noises such as from munitions testing and destruction occur on AMC installations but either are produced at locations situated so that noise levels off the installation do not exceed allowable noise levels or the duration of the noise is too short to violate local noise ordinance.

The Noise Control Act of 1972 (42 U.S.C. 4901–4918) directs federal agencies to comply with applicable federal, state, interstate, and local noise control regulations consistent with the military mission. A municipal noise ordinance might limit the time of day during which heavy equipment may be operated, the equipment’s distance from noise-sensitive receptors (e.g., schools, hospitals, churches, and residences), and the duration of its operation. Some ordinances set specific not-to-exceed noise levels, and others are simple nuisance noise ordinances. The Noise Control Act requires compliance with state or local noise control regulations in off-post areas only and, in general, AMC installations conduct noisy operations (industrial operations and range tests) during normal business hours (7 a.m. to 5 p.m.) to remain compliant with the regulations.

3.6 GEOLOGY, TOPOGRAPHY, AND SOILS

The geology of an area consists of the composition, structure, and configuration of surface and subsurface features and the processes acting upon them. In general, projects implemented at AMC installations have little effect on the geology or topography of a site. The soils of an installation result from an interaction of the types of rock, their erodibility, and rainfall characteristics of an area. The geology of an area must be considered in project planning because its history determines its susceptibility to potential threats such as flooding, landslides, and earthquakes. AMC installations that would implement SNRMPs are in 17 of the lower 48 states. The geological, topographical, and soil types and conditions vary from state to state,

from installation to installation, and within an installation and make generalizing about these features across AMC installations meaningless.

Soil types not only differ between AMC installations, but also can differ a great deal within an installation's boundaries. Soil characteristics influence the suitability of a site for building construction, forest growth, agriculture, and recreational use. U.S. Geological Survey soil surveys of the United States describe these soil characteristics and are consulted before an installation undertakes a project to ensure that soils are suitable for the proposed project and appropriate measures are taken to protect soils during project implementation.

Section 402 of the CWA is a primary federal law governing the Army's management of soils. It established the National Pollutant Discharge Elimination System (NPDES) permit program, under which point source discharges of wastewater—including stormwater—are regulated. Dischargers must comply with requirements established by a NPDES permit issued either by EPA or a state that has an approved NPDES program. Stormwater discharges associated with construction activities that disturb one acre or more of land must be regulated under an NPDES construction permit that establishes requirements for erosion, sediment, and stormwater runoff control to limit soil loss from a site. One permit requirement is to prepare, submit, and obtain approval of an ESC Plan before construction activity can be initiated. The objective of the plan is to reduce construction-related erosion and sedimentation by implementing BMPs to minimize soil loss from the site and stormwater pollution in receiving waters.

3.7 WATER RESOURCES

AMC installations are in desert, coastal, coastal plain, temperate forest, and other environments. The variety of those environments renders any generalization about water resources on the installations meaningless.

Key federal laws and EOs govern how the Army manages water resources, including CWA section 402, which established the NPDES program. In addition to requiring BMPs to control soil loss from construction sites, the permit typically includes requirements for maintaining the quality and quantity of water leaving the construction site and for reducing pollutants (including sediment) in the stormwater runoff from the site. It also specifies all potential sources from which pollution could enter construction site stormwater and the methods to be used to reduce pollutants in stormwater runoff during and after construction. Each AMC installation is required to have a Stormwater Pollution Prevention Plan, which describes how the installation manages stormwater from developed areas on the installation to protect water resources.

CWA section 404 also established requirements for permits for dredged or fill material and is the major federal law protecting wetlands. AMC installations undertaking projects that involve the discharge of dredged or fill materials into navigable waters must apply for a permit issued by the U.S. Army Corps of Engineers (USACE). A state permit could also be required. Notable exceptions to the requirement for a section 404 permit are discharges of dredged or fill material from normal silviculture activities such as harvesting forest products and constructing or maintaining forest roads that are constructed and maintained in accordance with BMPs.

Two EOs are important for protecting wetlands and floodplains during federal projects. EO 11990, *Protection of Wetlands*, requires federal agencies to minimize the destruction, loss, or degradation of wetlands and to preserve and enhance their natural and beneficial values. EO 11988, *Floodplain Management*, requires federal agencies to reduce the risk of flood loss;

minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values of floodplains. The Army adheres to these EOs with its construction projects and as circumstances arise.

The Army implements watershed-based management of its land resources that protects the waterbodies within each installation watershed. Watershed management involves evaluating land uses and the condition of natural resources in a watershed and designing projects that are compatible with the natural environment. Watershed-based analysis, which is heavily dependent on geographic information system data, identifies best practices for sustainable natural resources management.

3.8 BIOLOGICAL RESOURCES

Biological resources consist of the flora and fauna of an area, including native flora and fauna and nonnative species, invasive species, and sensitive species and the vegetative community types (e.g., grasslands and forests) present on an installation. The biological environments on AMC installations are extremely diverse and include California coastal bay shore, desert environments in Utah and Nevada, temperate forests of the northeastern United States, and coastal plains of the southeastern United States. The natural local vegetation and wildlife vary greatly from installation to installation, making generalizations about them meaningless.

AR 200-1 establishes specific requirements for managing natural resources on Army installations, and Army environmental policy protecting natural environments on AMC installations is based on the principles of sustainability—which, in the context of Army environmental management, means to meet current and future mission requirements while enhancing the natural environment (ASAIE 2004). One aspect of this policy involves invasive species. EO 13751, *Safeguarding the Nation from the Impacts of Invasive Species* (81 FR 90181, December 13, 2016), directs federal agencies, including DoD, to continue their efforts to prevent and control the spread of invasive species and the damage they cause, which were begun under EO 13112, *Invasive Species* (64 FR 6183, February 8, 1999). That EO established invasive species management policies to prevent the introduction of invasive species, control their populations in a cost-effective and environmentally sound manner, and provide for restoration of native species and habitat conditions in areas that have been invaded.

Sensitive biological resources such as threatened and endangered species and their critical habitats are afforded special protection under various federal laws, including the ESA, Marine Mammal Protection Act, Migratory Bird Protection Act, Bald and Golden Eagle Protection Act, and Anadromous Fish Conservation Act. AMC installations are required to comply with these laws when undertaking actions that could harm the species they protect, including consulting with the U.S. Fish and Wildlife Service (USFWS) or the National Marine Fisheries Service (NMFS), depending on the species of concern, to determine what actions the proponent of the Preferred Alternative must take to avoid or minimize impacts on the potentially affected species. Installations should obtain the most recent USFWS listing of threatened, endangered, and candidate species for their location from the USFWS website (www.fws.gov/ipac/) or contact the appropriate USFWS Ecological Services office for an up-to-date listing before analyzing the impacts of plan implementation on federally protected species and critical habitat.

3.9 CULTURAL RESOURCES

Cultural resources consist of prehistoric and historic districts, sites, structures, artifacts, and any other physical evidence of human activities considered important to a culture, subculture, or community for scientific, traditional, religious, or other reasons. Cultural resources can be divided into three major categories: prehistoric and historic archaeological resources, historic buildings and structures, and traditional cultural properties.

The developed parts of AMC installations are principally industrial, including ammunition production and storage facilities with buildings and structures such as manufacturing buildings, warehouses, ammunition storage igloos, and administrative buildings. Some installations have buildings and structures that have been found to be historically significant, either as part of a larger historic district or on an individual basis. Such buildings and structures are called historic properties, as defined by the National Historic Preservation Act (NHPA). Cultural resources such as buildings, structures, and archaeological resources at Army installations are managed through installation-specific Integrated Cultural Resources Management Plans (ICRMPs), which are prepared in compliance with section 110 of the NHPA and AR 200-1. An ICRMP is a 5-year plan for managing cultural resources at an installation. It provides guidelines and procedures to enable an installation to meet its legal responsibilities pertaining to cultural resources. Cultural resources vary from installation to installation depending on the cultural history of the installation. Each installation, therefore, must refer to its most up-to-date ICRMP to ascertain the status of its cultural resources.

The NHPA, enacted in 1966, is the cornerstone of federal preservation law and the most important piece of legislation for managing the Army's cultural resources. The act directs the Secretary of the Interior to maintain a list of historic properties, called the National Register of Historic Places (NRHP), which is composed of districts, buildings, sites, structures, and objects deemed significant in American history, architecture, archaeology, engineering, or culture. The requirements of Section 106 of the NHPA are implemented by the regulations promulgated at 36 CFR Part 800 and form the basis for most of the cultural resources work conducted on AMC installations. This section ensures that federal agencies consider historic properties in their proposed programs, projects, and actions before initiation. Under the Section 106 process, a federal agency evaluates the NRHP eligibility of resources within the proposed undertaking's area of potential effect and assesses the possible effects of the undertaking on historic resources in consultation with the State Historic Preservation Office and other parties. The area of potential effect is defined in section 106 as the geographic area(s) "within which an undertaking may directly or indirectly cause alterations in the character of use of historic properties, if any such properties exist."

3.10 SOCIOECONOMICS

Socioeconomics are defined as the basic attributes and resources associated with the human environment, particularly population and economic activity. Population levels are affected by regional birth and death rates and immigration and emigration. Economic activity typically encompasses employment, personal income, and industrial or commercial growth. Changes in these two fundamental socioeconomic indicators may be accompanied by changes in other components, such as housing availability and the provision of public services. Socioeconomic data at county, state, and national levels permits characterization of baseline conditions in the context of regional, state, and national trends. The economic and social well-being of a local community can be dependent upon the activities of the installation because installations are generally major employers in their regions.

3.11 INFRASTRUCTURE AND UTILITIES

Utilities serving individual facilities at AMC installations include water conveyance systems (potable water, sanitary sewer, stormwater drainage), energy systems (steam, electricity, natural gas, fuel oil, propane), telecommunications (cellular and analog telephone, cable and satellite television, and Internet networking), and solid waste disposal (trash removal and landfills). These systems are concentrated in the developed portions of Army installations. Installations develop master plans to establish long-term plans for the installation's growth, including ensuring that the utilities at an installation are sufficient to support the mission. Utility systems at Army installations have undergone substantial changes recently, including moving from Army-owned systems to privatized systems that are owned, operated, and maintained by private utility companies, and installing sustainable, renewable energy systems at Army facilities that both reduce the carbon footprint of an installation and help ensure continuation of the mission should the regional power grid go down.

3.12 TRAFFIC AND TRANSPORTATION

Most AMC installations are outside the city limits of the closest population center where traffic is free flowing except during daily rush hours. Most roadways providing access to facilities on AMC installations are secondary paved arterials connecting to nearby state highways. Heavy traffic volume on roads leading to AMC installations is rare and would generally occur only because of road closure and roadway construction. Rural highways in the United States rarely operate at volumes approaching capacity. Seasonal weather conditions—when snow, flooding, and mudflows can make roads impassable—are the primary cause of inefficient access on rural and remote roadways. At most times, intersections and roadways near installations in rural and remote areas would typically be free flowing.

3.13 HAZARDOUS MATERIALS AND WASTES

“Hazardous materials” are substances with physical properties of ignitability, corrosivity, reactivity, or toxicity that might cause an increase in mortality or reversible illness, or that might pose a substantial threat to human health or the environment. “Hazardous wastes” are solids, liquids, contained gaseous or semisolid wastes, or any combination of wastes that poses a substantial present or potential hazard to human health or the environment. Such materials or wastes can present substantial danger to public health or welfare and the environment when released or improperly managed. Army installations that use, store, and dispose of hazardous materials and wastes are required to have Hazardous Materials Management Plans that contain policies and procedures for managing and disposing of hazardous materials and their containers in an environmentally safe manner. AMC installations, like other Army installations, employ management controls and pollution prevention initiatives to comply with regulations and EOs in handling, storing, and disposing of hazardous materials.

Many installations have facilities and areas that are included in environmental restoration programs such as environmentally impacted sites being investigated and remediated in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act and Resource Conservation and Recovery Act. Undeveloped areas on AMC installations might have unexploded ordnance (UXO) that pose an explosive risk. Special precautions must be taken when working in areas known or suspected to contain UXO. Before implementing any natural resources management project that would disturb such a site, the Natural Resources Manager (NRM) would contact the installation's environmental office to coordinate the activity

and take any necessary precautions to ensure the protection of human health and environmental safety.

SECTION 4.0 ENVIRONMENTAL CONSEQUENCES

This section discusses the environmental consequences that would be expected from implementing the variety of SNRMPs considered in this PEA. It introduces the main requirement behind implementing each type of plan—whether that is primarily a DoD and Army regulation and policy or a federal law and regulation. The typical activities that an installation would take in implementing each type of plan are then discussed. Finally, the overall impact of implementing the plans is discussed by resource area. Little-to-no effect on some resource areas would be expected from implementing any of the types of plans, and those resource areas have been eliminated from further analysis, with the reasons for their dismissal discussed in section 3.0. The resource areas on which a more than negligible effect would be expected from implementing one or more plan types are discussed individually. Before implementing any SNRMP, an installation would conduct an independent review of the activities proposed in the plan with respect to their potential to adversely affect each resource area, including those dismissed from further consideration in section 3.0. The independent analysis would capture effects from activities that might not be typically implemented under an SNRMP and, therefore, are not considered in the PEA, or that might be considered in the PEA but that, because of installation-specific circumstances, would be implemented at an extent or intensity not normally associated with implementing the type of plan. The independent analysis would also capture the specific characteristics at the installation—the specific topography, soils, type of vegetation, and the like—that the PEA does not consider at the installation level.

4.1 NATURAL RESOURCES MANAGEMENT ON AMC INSTALLATIONS

AMC installations have flexibility over how their natural resources are managed, with greater flexibility over some natural resources management decisions than others. For instance, protection for federally listed species is dictated by the ESA, and an installation with one or more federally protected species must consult with USFWS and implement measures, such as habitat protection and enhancement, determined by that agency to protect the species. On the other hand, an installation implementing LID practices at a construction project will adhere to minimum criteria in the final design of the project, as required by DoD and Army policy, but an installation has flexibility in how it meets those criteria.

4.1.1 Army Land Resource Management

Army requirements primary determine how an AMC installation conducts land resources management, plan development and management, water resources protection and management, forest management, fisheries management, invasive species management, aquatic vegetation management, wildland fire management, and watershed protection and management on AMC installations. AR 200-1 requires that an INRMP be developed for an installation when one or more of the following criteria are met.

1. Federally listed, proposed, or candidate species are onsite, or critical habitat has been designated or proposed on the installation, and on-installation conservation measures are necessary to conserve the federally listed species.
2. Conservation reimbursable forestry or agricultural outleasing activities consist of 100 acres or more.
3. Hunting and/or fishing takes place for which special state permits are issued by the installation in accordance with 16 U.S.C. 670a(b)(3).

4. The installation conducts intensive, on-the-ground military missions that require conservation measures to minimize impacts (for example, soil erosion control, prescribed fire) and sustain natural resources. Installations designated by the Headquarters, Department of the Army, Deputy Chief of Staff, G-3/5/7 for management under the Integrated Training Area Management program meet this criterion.
5. Unique biological resources, wetlands, species at risk, or ecological issues require a level of planned management that can only be addressed by an INRMP.

The Army's land resources management goals are to:

- Integrate natural resources stewardship and compliance responsibilities with operational requirements to help achieve sustainable ranges, training areas, and other land assets.
- Develop, initiate, and maintain programs for the conservation, utilization, and rehabilitation of natural resources on Army lands.
- Systemically conserve biological diversity on Army lands within the context of its mission.
- Protect the land and water resources to minimize loss, degradation, or destruction.
- Control sources of pollutants harmful to the land and its resources.

The Army's land resources management goals are achieved through the following management actions.

Land Use and Conservation Management. Army land use management programs are developed and Army lands are maintained with adherence to the tenet of multiple land use and compatibility with the military mission.

Plan Development and Management. INRMPs, as referenced to in the Sikes Act, are developed and maintained for all Army installations. These plans are prepared, implemented, and monitored by natural resources management professionals, and coordinated with appropriate federal, state, and local NRMs and agencies with natural resources expertise. INRMPs are a component and supporting element of the installation master plan. New and continuing mission activities that impact on natural resources are coordinated with appropriate NRMs.

Water Resources Protection and Management. Water resources protection and management is comprised of floodplain and wetlands conservation. The Army is committed to improving its resilience to flooding and better preparing the Army for the impacts of climate change. Floodplain management is intended to identify, assess, and mitigate risk to better protect Army personnel and property from the effects of natural and man-made flood hazards. In addition, the Army is dedicated in minimizing the destruction, loss, or degradation of wetlands, and to preserve and enhance the natural and beneficial values of wetlands by avoiding undertaking or performing new construction in wetlands.

Endangered/Threatened Species Management. The Army is committed to being a national leader in conserving federally listed species. Department of the Army personnel at all levels must ensure that they carry out mission requirements in harmony with the requirements of the ESA. Mission requirements do not justify actions violating the ESA. All Army land uses, including military training, testing, timber harvesting, recreation, and grazing, are subject to ESA requirements for the protection of listed species and critical habitat. The key to successfully

balancing mission requirements and the conservation of listed species is long-term planning and effective management to prevent conflicts between these competing interests.

Forest management. AR 200-1 requires that forested lands be managed according to principles of responsible stewardship in a manner that is compatible with and supports the military mission. All revenues from forest product sales are deposited into the Army Forestry Account and can be used only for forest and natural resources management.

Fisheries management. State and federal laws pertaining to fishing (and hunting and trapping) are enforced on AMC installations, although fishing regulations might deviate from state and federal regulations in minor ways to support the goals of the specific installation's fisheries management program. All Army installations with fishing (and hunting) programs are required to provide access to uniformed personnel, family members, and the public to the maximum extent consistent with security requirements and safety concerns.

Invasive species management. AR 200-1 requirements related to invasive species management include the following:

- Installation Invasive Species Management Plans must be consistent with specific federal and/or state initiatives.
- Mission activities must be conducted in a manner that precludes the introduction or spread of invasive species.
- Invasive species must not be used in installation landscaping or land rehabilitation and management projects.

DoDI 4150.07, *DoD Pest Management Program*, directs Army installations to use the most effective and environmentally sound approach to controlling invasive species, including the use of pesticides as necessary. The other major federal requirements for invasive species management on Army installations are contained in EO 13112.

Aquatic vegetation management. AR 200-1 contains no specific requirements for aquatic vegetation management. It does state that turbidity and sediment levels in waterbodies are to be controlled so they do not irreparably degrade aquatic biota and habitat from an ecosystem perspective.

Wildland fire management. AR 200-1 requirements related to wildland fire management on Army installations include the following:

- Wildland fire management is to be conducted using appropriate management practices (e.g., prescribed burning and firebreak maintenance/construction) to reduce wildfire potential.
- Each installation with unimproved grounds that present a wildfire hazard (most AMC installations) or that uses prescribed burns as a land management tool must develop and implement an Integrated Wildland Fire Management Plan that complies and is integrated with the INRMP, the installation's fire and emergency services program plan, and the ICRMP.
- All personnel involved in wildland fire management must be appropriately trained and possess the physical fitness needed for the task. Only qualified personnel are permitted to conduct prescribed burns.

Watershed protection and management. AR 200-1 requirements related to watershed protection and management on Army installations include the following:

- Implement the *Unified Federal Policy for a Watershed Approach to Federal Land and Resource Management* (65 FR 62565–62572), which requires installations to assess watershed impacts as appropriate, considering upstream and downstream water quality data or other background levels, proximity to potentially designated impaired waters, and any effects on mission activities.
- Use a watershed management approach when evaluating projects and programs to satisfy environmental regulations, facility projects, and master planning that may impact the quality of water resources.
- Ensure that watershed assessments and management plans are integrated with the installation master plan, INRMP, and other plans as appropriate.
- Establish and integrate environmental education and participation programs required by federal laws for all Army personnel and their families based on watershed concepts and requirements to restore impaired waters and maintain designated uses of local water bodies.

4.1.2 Federal Resource Management

Federal requirements are the primary drivers for listed species management (endangered, threatened, and candidate species and their critical habitat), wetlands management, ESC, LID, and stormwater control, and floodplain management. As noted above, while the ESA is the primary law governing management of federally listed species, AR 200-1 specifies the circumstances under which an Army installation is to manage its lands and activities in accordance with the law. Federal requirements for wetlands protection are driven by CWA section 404 and EO 11990. Federal requirements for ESC and LID also are driven by the CWA insofar as both ESC and LID activities primarily are focused on managing stormwater runoff. Federal requirements for floodplain protection are driven by EO 11988. AR 200-1, DoDDs, and DoDIs incorporate the protections afforded to these resources by federal requirements into Army policy.

4.2 ACTIVITIES ASSOCIATED WITH IMPLEMENTING EACH TYPE OF PLAN

Implementing each of the SNRMPs considered in the PEA involves undertaking a variety of activities to accomplish the goals and objectives of the plan. The activities typically undertaken in implementing each type of plan are briefly discussed below.

4.2.1 Forest Management Activities

Forest management is providing forested areas the proper care so that they remain healthy and vigorous and provide the products and amenities the landowner—in this case, the U.S. government—desires. Forest management is a process. It involves developing and executing a plan, the Forest Management Plan, that integrates all the principles, practices, and techniques necessary to care for forested areas properly. A Forest Management Plan for an AMC installation provides details on the management actions such as timber harvest, wildfire fuel removal, and invasive species management that the installation will perform to maintain or improve forest health and wildlife habitat, harvest and sell timber, and reduce the risk of wildfire and property damage. An AMC installation Forest Management Plan covers all the forested

areas on the installation and might include activities for tree care in developed areas (generally referred to as *urban forestry*).

Typical activities involved in forest management include the following:

- Timber marking and forest harvesting
- Forest pest and invasive species control
- Wildfire management, which involves firebreak creation and maintenance, fuel reduction by manual removal or prescribed fire, and wildfire fighting
- Wildlife population management when a species causes damage that hinders forest health (e.g., overbrowsing by white-tailed deer [*Odocoileus virginianus*] or rutting by feral hogs [*Sus scrofa*])
- Replanting areas that have experienced high tree mortality from pest or disease infestations, areas burned by wildfire, or harvested areas with desirable and resistant native tree species

Timber is marked before a harvest or to designate dead or nonnative trees to be removed for improved forest health. A small crew of people generally performs these activities using vehicles to get to the areas to be marked, but otherwise requiring little equipment, most of which is not gasoline powered. After arriving on-site, the crew generally travels through an area on foot.

Forest harvesting is accomplished by removing either select trees within a designated area, called “selective harvesting,” or all trees within an area, called “clearcutting.” The crew employs environmental protection measures during forest harvesting to prevent excessive loss of forest soils and to minimize sediment delivery to surface waters. Streamside management zones are protected and state forestry BMPs are used during harvesting. Streamside management zone protection involves not harvesting within a certain distance of a stream (generally 50–100 feet) or selectively harvesting near streams so enough trees are left to keep the soil stable and to form a vegetative buffer along the stream. It also involves creating stream crossings for forest harvesting equipment to minimize stream disturbance and prevent streamflow problems at culverts. If stream crossings are created on temporary access roads for a harvest, the stream might be returned to a natural state once the crossing is no longer needed.

Forest pests and invasive species are controlled either by widespread application of pesticides by airplane in large areas (particularly for insect pests) or manually using handheld equipment to treat a small area or individual trees or shrubs or groups of shrubs. Individual trees or shrubs within a forest might be removed using handheld equipment if the target invasive species is not widespread.

Firebreak creation and maintenance initially involves removing trees from a wide area. A system of firebreaks will use existing roads, paths, and utility line rights-of-way to the maximum extent feasible, but new firebreaks through forested areas initially need to be harvested of timber. Maintaining a firebreak requires clearing on a regular basis, about every 2–3 years depending on how fast new woody vegetation becomes established in the cleared area. Clearing an existing firebreak of vegetation generally involves bush hogging.

Reducing forest fire fuel can be done by crews walking an area and loading dead and fallen limbs into a truck for removal or setting a prescribed fire in an area to burn off the excess fuel.

Wildlife populations can be reduced either through an installation's hunting program or by Army personnel culling an animal population. Regardless of the method used, a survey of the target population generally is completed first to determine the number of animals that need to be removed to reduce the population to the desired level.

Replanting areas of high tree mortality or areas burned to remove invasive species involves planting resistant native species. Young trees or shrubs can be transported to the site in vehicles and planted by hand, or the area to be replanted can be burned, treated with herbicides to prevent undesirable species from reestablishing themselves, and natural regeneration allowed to occur.

4.2.2 Endangered Species Management Activities

Endangered species management activities include conducting field surveys to determine whether a species or suitable habitat for a species is found on an installation, to monitor any populations found, and to determine what management approaches would most benefit a species; protecting the individuals and habitats of species found on an installation; modifying habitats to ensure their suitability to a species' survival; consulting with USFWS or NMFS regarding activities that could affect a species; and conducting awareness training for installation personnel to minimize accidental disturbance or harm to protected species.

Species field surveys are nondestructive. They generally involve observation only, not taking or harming any individuals of a species. Some survey methods such as mist netting for bats involve trapping the animals but, after they have been identified, setting them free unharmed. Sometimes field surveyors must collect specimens of invertebrates or plants to positively identify them to the species level. If specimens must be collected, the team first obtains a permit from USFWS or NMFS.

Once a federally protected species is known to occur on an installation, it might be necessary for installation personnel to modify suitable habitat areas to better support the species. That effort could involve selective cutting to remove trees or shrubs that do not support the species and planting or allowing natural propagation of vegetation beneficial to the species. It could involve maintaining habitat in a state suitable to a species by conducting prescribed burns to keep habitat open and prevent an area from changing over time to a habitat less suitable. Or it could mean leaving dead trees in an area for nesting instead of removing them. Because in all cases the target species is native, these habitat modifications are geared toward keeping a habitat in or returning it to a natural state.

Consultation with USFWS or NMFS regarding a federally protected species and conducting awareness training for installation personnel are administrative actions.

4.2.3 Fisheries Management Activities

Fisheries management activities involve maintaining optimal fish populations by manipulating the populations directly or through habitat manipulation. Optimum levels of fish populations are determined by conducting fish surveys, which can involve recording angler catches ("creel surveys") or catching and identifying fish using nets or electroshocking. Results of these surveys are extrapolated to estimate the sizes of populations of individual species and along with information on waterbody size, type, and condition, optimal population levels are determined. Based on this information, quotas are set on the number and size of each species

of fish an angler may catch and, if a population is determined to be depleted, a waterbody might be stocked with fish generally from a state or federal hatchery.

The information about the waterbody and surrounding habitat required to determine an optimal fish population size can include depth, substrate type, percent coverage by and types of aquatic vegetation (e.g., a fish pond should have 10–20 percent of the surface area covered with aquatic vegetation), habitat variety, sunlight penetration, and water quality parameters. These data are all considered in developing a fish habitat portrait and related back to the species of fish in the waterbody to assess the suitability of the habitat to the species present and for desired species, particularly game fish. The habitat is then manipulated to optimize it for the preferred species.

Habitat manipulation activities include clearing brush and weeds from the shoreline and aquatic vegetation from within the waterbody, mechanically or with herbicides, and placing large woody debris or artificial habitat elements in the waterbody to provide cover for fish. Indirect habitat manipulation can also be used and might include controlling off-site stormwater to reduce sediment and pollutant input to a waterbody.

4.2.4 Invasive Species Management Activities

Invasive species management activities include conducting field surveys to determine which invasive species are on an installation as well as their distribution and abundance. If an identified species is not determined to be an immediate problem, follow-up surveys are conducted to monitor changes in the population. If a species is determined to be a problem, then Integrated Pest Management (IPM) techniques are used to control it.

IPM involves using different methods to control or eliminate an invasive species while causing the least amount of environmental harm:

- Mechanical control methods involve physically removing a species by cutting or digging invasive plants or hunting or trapping invasive animals. If a species is too abundant, difficult, or elusive to control using mechanical means, biological or chemical control can be used.
- Biological control involves releasing a biological agent such as an insect that preys on the target species to reduce or eliminate an invasive species. Biological controls must be approved by and are generally applied by the federal or state government.
- Chemical control is the use of pesticides or herbicides for pest control.
- Cultural control involves educating people about actions they can take to reduce the risk of spreading or introducing an invasive species on an installation and invasive species identification. An example of cultural control is to wash vehicles, boats, and boots after they have been in an area or waterbody known to have an invasive species to prevent carrying the species or its seeds to a noninfested area.

Plants known to be invasive are no longer used for landscaping purposes. Native plant species are used instead. Nonnative species known not to be invasive are sometimes used for special purposes such as stabilizing soil after construction with a rapidly growing grass.

Aquatic invasive species such as Eurasian water-milfoil (*Myriophyllum spicatum*) are treated with herbicides formulated to be used in aquatic environments, using mechanical means (e.g., pulling or cutting and removing), or using biological controls. The native milfoil weevil

(*Euhrychiopsis lecontei*), for instance, feeds on milfoil but does not eat other types of plants. Altering a reservoir level seasonally can help control aquatic invasive plants, too. Lowering or raising a reservoir level at specific times of the year can reduce a species' abundance or reproductive success.

4.2.5 Aquatic Vegetation Management Activities

Aquatic vegetation management is used as a fisheries management technique and in controlling aquatic invasive species. It is also important in ensuring optimal water quality in a waterbody, especially if the waterbody is a source of potable water. As noted above, a fish pond with 10–20 percent of the surface area covered with aquatic vegetation is considered ideal for a balance of food, habitat, and water quality. Controlling aquatic vegetation also can prevent damage to equipment such as boat motors and water intakes.

Aquatic vegetation management activities include applying herbicides to control an overabundance of aquatic vegetation, including invasive species such as Eurasian water-milfoil and curly-leaf pondweed (*Potamogeton crispus*); and removing aquatic vegetation through mechanical harvesting. Shoreline vegetation can also be altered to allow more sunlight to reach a waterbody or to diminish the amount of sunlight if aquatic vegetation growth is excessive. Some species of undesirable aquatic vegetation can be controlled with biological agents such as the milfoil weevil that feeds solely on milfoil.

4.2.6 Wildland Fire Management Activities

Wildland fire management involves fighting fires in undeveloped parts of an installation that have been ignited by lightning, weapons use, or carelessness such as someone discarding a lit cigarette. The priority with any wildfire on an AMC installation is to protect human health and life. It is desirable to extinguish a wildfire quickly with as little interruption to the military mission and as little environmental or property damage as possible. Once a wildland fire has been reported and a decision has been made to respond, fire crews mobilize to the vicinity of the fire with firefighting equipment, including hand tools like shovels, fire rakes, and axes as well as a fire truck with a pressurized water tank and hose. Most installations have cooperative agreements for firefighting assistance with fire departments of surrounding communities.

Activities conducted during wildfire suppression include smothering remnants of already-burned areas by digging and burying them with soil or spraying them with water, spraying still-burning areas with water or with fire-suppressing chemicals, and removing vegetation by mechanical or other means from areas to which the wildfire is spreading. From an environmental impact perspective, it is important to note that although some activities involved in extinguishing a wildfire have impacts associated with them, in most cases, allowing a wildfire to burn would have a much greater impact on the environment.

4.2.7 Erosion and Sediment Control Activities

ESC activities involve stabilizing areas that are subject to or that could become subject to erosion such as areas disturbed by construction activities or off-road vehicle activity and streambanks or drainage ditches that carry excessive flows of stormwater. ESC practices are used to stabilize disturbed or threatened areas temporarily, permanently, or both depending on the situation. Whether required by law or done voluntarily to limit soil loss from an area subject to erosion, implementing ESC practices generally causes initial ground disturbance but results in less soil erosion and water resources impact in the long term.

ESC is mandatory for land-disturbing construction projects that disturb an area of specified size, which varies from as little as 2,500 square feet in areas with sensitive waters to one acre. ESC activities implemented at construction sites typically include one or more of the following:

- Placement of silt fencing or straw bales around a disturbed area to prevent sediment from moving to off-site locations.
- Planting rapid-growing annual grasses, small grains, or legumes to provide temporary cover on disturbed areas.
- Planting perennial vegetative cover with seed to provide permanent cover on disturbed areas.
- Covering the planted area with protective matting, seed mats, or straw or mulch to keep the seed in place until germination.

ESC activities implemented at construction sites where wetlands or surface waters are disturbed require a permit from USACE. ESC activities in those areas are like activities conducted on upland sites except that plant species used in wetlands are native and appropriate for the type of wetland involved. A mixture of perennial native grasses, rushes, and sedges is suitable for establishing permanent ground cover within wetlands, riparian areas, and floodplains.

In areas in which establishing vegetation is difficult because erosive forces are particularly strong, riprap (or rocks) can be used to prevent erosion. Areas where riprap would be an appropriate ESC method include cut-and-fill slopes along forest roads; channel side slopes and bottoms; inlets and outlets for culverts, bridges, slope drains, grade stabilization structures, and storm drains; streambank and stream grades, and shorelines subject to wave action (NCDEQ 2013).

If upslope runoff threatens a disturbed area, a temporary diversion—a temporary ridge or excavated channel constructed across sloping land—might be installed to redirect the runoff and minimize erosion. If upslope runoff threatens to erode soil around a structure, a diversion might be constructed to permanently redirect the runoff.

4.2.8 Wetlands Management Activities

Wetlands management involves conducting field delineations of wetlands or identifying wetland areas using graphical databases such as the USFWS National Wetlands Inventory, and then protecting the delineated or identified wetlands. Wetlands are protected by avoiding them during construction projects or, if a construction project must disturb wetlands, mitigating their loss either by creating new wetlands in another location or by purchasing wetlands in a wetlands mitigation bank. Protecting and avoiding wetlands during construction projects is a way of doing construction, rather than a separate construction activity, and has no environmental effects beyond those of the proposed construction project. A wetland mitigation bank is a wetland area that has been restored, established, enhanced, or preserved to provide compensation for wetlands lost to development. If a wetland mitigation bank would not offset wetlands lost to development, it might be necessary to construct new wetlands in an appropriate location.

Wetlands management includes protecting them from damaging influences such as runoff containing excessive amounts of sediment or pollutants. Invasive plant species can damage wetlands by outcompeting and diminishing the abundance and diversity of native vegetation; and invasive animal species such as nutria (*Myocastor coypus*) might feed excessively on

wetland plants, creating open water and removing habitat for native species such as muskrat (*Ondatra zibethicus*) and waterfowl. Protecting wetlands from these disturbances could involve creating a detention basin in which sediment and pollutants can settle out before the water is discharged to a wetland or removing invasive species mechanically, chemically, or biologically.

4.2.9 Low-impact Development Activities

LID involves land planning, engineering design, and installing stormwater management practices that result in the quality and quantity of stormwater runoff from a developed site being very similar to those of the predevelopment site. Activities to achieve this result include decreasing the amount of stormwater directed to storm drains, increasing the amount of stormwater that infiltrates into the soil and groundwater, capturing pollutants from impervious areas of the developed site, and slowing the delivery of stormwater to streams. The term *green infrastructure* is used to refer to LID practices and involves reducing and treating stormwater at its source while, at the same time, providing environmental, social, and economic benefits. In contrast, traditional stormwater management is focused on directing untreated runoff directly to streams and rivers or to drainage channels and pipes leading either to streams and rivers or to a centralized treatment facility. LID is an approach to development and, therefore, the environmental impact of using an LID approach is generally either nil or beneficial. That is, if a development project has been approved, using an LID approach will generally result in less environmental impact than if the project had been designed without LID practices.

Key components of LID are limiting the amount of impervious surface created and ensuring that large areas of impervious ground are punctuated with pervious green areas to reduce the amount of stormwater runoff or slow the rate at which it is carried off-site. LID practices result in the postdevelopment landscape having infiltration and evapotranspiration characteristics much like the predevelopment landscape and can include detaining and using stormwater (e.g., for garden watering or a landscape pond). These practices protect water quality and aquatic habitat. Because of the prevalence of nonnative and invasive species and the ecological and economic damage associated with them, using native species for landscaping after construction is completed is generally one aspect of an LID project.

The following are examples of constructed LID practices:

- Bioretention. Directing runoff to an area where stormwater is retained and absorbed and cleaned by vegetation, lost to evaporation, or infiltrates into groundwater.
- Green roofs. Vegetated rooftops that absorb rainfall on buildings. They are suitable in dense urban environments where space for other LID practices is not available.
- Permeable pavers. Used in place of solid cement or asphalt paving to permit stormwater to infiltrate directly to the soil and groundwater below.
- Rain barrels. Collect rainwater from building downspouts for later use for watering lawns or other nonpotable water uses.
- Tree box filters. Small bioretention areas beneath trees and distributed throughout an otherwise developed site. Stormwater is directed to the tree box, where vegetation and soil infiltration cleans it before it enters a catch basin. Tree box filters are especially effective along streets and sidewalks where they both reduce stormwater runoff to drains and provide sufficient water to the trees that would otherwise not survive being surrounded by impervious surfaces.

4.2.10 Floodplain Protection and Management Activities

Increasingly, record-breaking storms have impacted DoD installations, causing power outages and damage due to flooding, high winds, and storm surges. The most substantial damage has occurred in areas where, for mission reasons, facilities are within areas designated by the Federal Emergency Management Agency as the 100-year floodplain hazard area (areas having a one percent annual chance of flooding). DoD recognizes that with changes in climate and near-term weather variability, it is imperative to plan and manage installations that have areas vulnerable to flooding to ensure the resilience of the installations and facilities required to support the missions.

Army installations are starting to implement the various requirements of EO 11988, but to date no Army installation has developed a floodplain management plan. EO 11988 requires Federal agencies to carefully consider floodplain area use and provides guidance on what actions would have to be taken at AMC installations to manage floodplains.

The purpose of floodplain management is to avoid to the extent practicable the long- and short-term adverse impacts associated with occupying and modifying floodplains and to avoid direct or indirect support of floodplain development wherever there is a practicable alternative. Floodplain management involves developing and executing a plan, the Floodplain Management Plan, that integrates all the principles, practices, and techniques necessary to manage floodplains to minimize risk to and loss of human life and property and to maximize to the extent practicable the natural beneficial properties of floodplains.

A Floodplain Management Plan for an AMC installation provides details on the location and extent of floodplains on the installation, the known history of floods and flood levels on the installation, and how the installation manages its floodplains. An AMC installation Floodplain Management Plan covers all areas on the installation within the 100-year floodplain and considers the location of the 500-year floodplain when siting facilities.

Typical activities involved in floodplain management include the following:

- Determine whether a proposed action will occur in a floodplain, using a floodplain map or, if not available, best available information.
- If the only practicable alternative requires siting in a floodplain, design or modify the action to minimize potential harm to or within the floodplain.
- Consider floodplain management when formulating or evaluating water and land use plans. Require land and water resources use appropriate to the degree of hazard involved.
- Construct structures and facilities in accordance with standards and criteria and consistent with those promulgated under the National Flood Insurance Program.
- Apply floodproofing and other flood protection measures to new construction or rehabilitation. Elevate structures above the base flood level wherever practicable rather than filling in land.
- For property used by the general public that has suffered flood damage or is located in an identified flood hazard area, conspicuously delineate past and probable flood height to enhance public awareness of and knowledge about flood hazards.

Many of these floodplain management activities are administrative actions that have no direct impact on the environment. Others affect how activities within flood-prone areas are conducted or what activities are allowed within them, but they are not themselves separate activities. Such

practices include designing or modifying an action to minimize the potential impact on the floodplain, constructing structures and facilities in accordance with standards and criteria for flood-prone areas and consistent with the standards and criteria promulgated under the National Flood Insurance Program, applying floodproofing and other flood protection measures to new construction or rehabilitation, and elevating structures above the base flood level rather than filling in land. Conspicuously delineating past and probable flood heights to enhance public awareness of and knowledge about flood hazards promotes public knowledge of flood risks on an installation.

4.2.11 Watershed Protection and Management Activities

Watershed protection and management is more a collection of LID, ESC, wetlands protection, forest management, and other environmental protection practices than a separate set of activities. In assessing the environmental impacts of watershed protection and management, therefore, only additional impacts associated with taking a watershed approach when conducting those practices are considered, rather than assessing the overall environmental impact of accomplishing these activities, as the latter approach would essentially *double count* the impacts.

The goal of watershed protection and management is to protect water quality and aquatic habitats by accounting for all pollutant inputs within a watershed, the extent of wetlands and the rate at which they are being lost (or gained), and the land uses in a watershed and how they each contribute to impairing water quality and aquatic habitat. Based on studies of a watershed, quotas might be set for pollutants and limits set on discharges of individual pollutants in permits. These are called total maximum daily loads, or TMDLs. TMDLs establish the maximum daily amount of critical pollutants that is safe to discharge; regulatory mechanisms ensure these discharge limits are not exceeded from permitted discharges. Voluntary mechanisms—implementing BMPs to control sediment runoff, limit pesticide and herbicide use, or maintain streamside buffers—are established for nonpermitted sources of pollutants.

Watersheds vary in size, from small subwatersheds of individual streams to multistate watersheds that feed large rivers or estuaries such as the Mississippi River and the Chesapeake Bay. An AMC installation might be located within one watershed or its land might fall within two or more watersheds. Generally, multistate task forces in cooperation with EPA manage large watersheds like the Chesapeake Bay, and TMDLs for large watersheds—especially ones that span more than one state—are generally established by EPA. AMC installations within these watersheds adhere to the maximum extent feasible to the protection measures established by the watershed task force, while still ensuring accomplishment of the military mission. Any regulatory limits on pollutant discharges at an AMC installation are permitted and enforced by the state. AMC installations employ forest management, LID practices, ESC practices, wetlands protection, nonpoint source pollution control, and IPM to limit the impact that military activities have on water quality and aquatic habitats on an installation, and thus on the watersheds in which the installations lie.

4.3 IMPACTS OF IMPLEMENTING SNRMPs BY RESOURCE AREA

The impacts of implementing the Preferred Alternative and No Action Alternative on each resource area carried forth for analysis in the PEA are discussed below. These discussions are summaries of the effects of implementing the SNRMPs on each resource area that consider together similar types of impacts from activities undertaken to implement different SNRMPs. Because there is a variety of activities that can be implemented under each plan, considering

each activity for each type of SNRMP individually would be repetitive and would not provide a more accurate picture of the impacts of implementing the SNRMPs. Appendix B, however, which forms the basis of the discussions below, provides details on the impacts of individual activities commonly implemented under each SNRMP and a summary of the impacts by resource area and SNRMP.

4.3.1 Land Use

Preferred Alternative

An alternative would be considered to have a significant adverse impact on land use if it resulted in a land-use incompatibility. No land-use incompatibilities would be expected from implementing SNRMPs.

A long-term minor beneficial effect on land use could result from implementing a Floodplain Management Plan and a Watershed Protection and Management Plan. The former would have a beneficial effect on land use by leading to the redesignation of areas within floodplains and flood-prone areas from land uses inappropriate for such areas to more suitable designations. The latter would have a beneficial effect if it led to the conversion of areas from developed land to open space or vegetated land for water quality protection or to provide natural corridors to allow animal movement and reduce habitat fragmentation.

Implementing the following SNRMPs would not be expected to have any effects on land use: Forest Management Plan, Endangered Species Management Plan, Fisheries Management Plan, Invasive Species Management Plan, Aquatic Vegetation Management Plan, Integrated Wildland Fire Management Plan, ESC Plan, Wetlands Management Plan, and LID plan or practices.

No additional evaluation under NEPA would be required for land use unless the management activity would create a land-use incompatibility.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same effects on land use as implementing the Preferred Alternative.

4.3.2 Airspace

Preferred Alternative

An alternative would be considered to have a significant adverse impact on airspace if implementing it would require a change to an AICUZ, clear zone, or APZ designation for an installation; would cause a change in existing airspace use; or would create a need to modify an airspace permit or related memorandum of agreement or military training route. The Preferred Alternative would involve minimal use of airspace, would not involve interfering with or altering air traffic or airspace, and would not be expected to have adverse impacts on airspace or its use. Use of airspace for natural resources management activities would generally be limited to airplane or helicopter use for aerial applications of pesticides or herbicides and for large animal population monitoring, and the use of drones for population or natural area monitoring. These operations are conducted seasonally or over very short periods of time and would not constitute a change to airspace. If necessary, any aircraft operation would be coordinated with flight

operations at an installation to ensure the safety of the operation and lack of conflict with airfield operations at the installation.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same effects on airspace as implementing the Preferred Alternative.

4.3.3 Aesthetics and Visual Resources

Preferred Alternative

An alternative would be considered to have a significant adverse impact on aesthetics and visual resources if it substantially altered a valued aesthetic resource or viewshed. No valued aesthetic resource or viewshed would be expected to be affected from implementing the Preferred Alternative.

Short- and long-term minor adverse and beneficial effects on aesthetics and visual resources would be expected from implementing some SNRMPs. Short-term minor adverse effects on aesthetics would be expected from implementing the following SNRMPs:

- Invasive Species Management Plan: Reservoir drawdown to control aquatic invasive species (if used).
- Wetlands Management Plan: Initial site preparation for wetland creation and restoration.

Long-term minor adverse effects on aesthetics and visual resources would be expected from timber harvesting and creating firebreaks because those activities convert forest to open areas, slash is generally left on-site after these activities, and some ground disturbance is caused by these activities.

Long-term beneficial effects would be expected on aesthetics and visual resources from the implementing the following SNRMPs:

- Forest Management Plan: Regrowth after a timber harvest and forest restoration after a wildfire.
- ESC Plan: Soil stabilization and revegetation after ground-disturbing activities.
- LID Plan and practices: Reduced ground disturbance during construction activities.
- Wetlands Management Plan: Wetlands creation and restoration.
- Watershed Protection and Management Plan: Activities that increase the amount of open or vegetated land.

No effects on aesthetics or visual resources would be expected from implementing an Endangered Species Management Plan, Fisheries Management Plan, Aquatic Vegetation Management Plan, and Floodplain Management Plan.

No additional evaluation under NEPA would be required for aesthetics and visual resources unless the management activity would affect a designated scenic viewshed or the view from a valued aesthetic resource.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same effects on aesthetics and visual resources as implementing the Preferred Alternative.

4.3.4 Air Quality

Preferred Alternative

An alternative would be considered to have a significant adverse impact on air quality if it led to a violation of an air operating permit. No violation of an air operating permit or changes to an existing air permit would be expected from implementing SNRMPs.

Short-term minor adverse effects on air quality would be expected from heavy equipment use during forest harvesting and wetland creation or restoration. Watershed management could also require some heavy equipment use, with short-term minor adverse effects on air quality.

Implementing the following SNRMPs would not be expected to affect air quality: Endangered Species Management Plan, Fisheries Management Plan, Invasive Species Management Plan, Aquatic Vegetation Management Plan, Integrated Wildland Fire Management Plan, ESC Plan, LID Plan and practices, and Floodplain Management Plan.

Vehicle trips would be associated with implementing most plans, but the number of vehicles involved would be very small and the overall emissions from vehicle use would be negligible. Implementing any SNRMP would not introduce a new stationary source of air pollution, and no new air permit or modification to an existing permit would be required. Any vehicle use involved in implementing an SNRMP would be short-term, and the environmental effect on air quality would be minor.

No additional evaluation under NEPA would be required for air quality unless the project would violate the installation's air operating permit.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same effects on air quality as implementing the Preferred Alternative.

4.3.5 Noise

Preferred Alternative

An alternative would be considered to have a significant adverse impact on the noise environment if it would substantially increase ambient noise levels in off-post adjoining areas. (An increase of 10 decibels is perceived as a doubling of noise and is generally considered substantial.) No sustained changes in the noise environment would be expected from implementing SNRMPs and implementing the Preferred Alternative would not be expected to have a significant adverse effect on the noise environment.

Short-term minor adverse effects on the noise environment would be expected from vehicle and construction equipment use and use of other machinery during implementation of SNRMPs (e.g., forest harvesting, ESC stormwater control projects, wetland creation and restoration, and watershed management).

Appreciable levels of noise from construction equipment generally can be heard within 800 feet of the source. Management activities would be confined to on-post areas and temporary, any nearby sensitive areas would have limited exposure to the noise, and BMPs such as limiting heavy equipment use to daytime hours and ensuring that all equipment is properly maintained and in good working order would help reduce any noise effects. Noise effects from implementing SNRMPs would be minor.

No long-term changes in the overall noise environment would be expected with the Preferred Alternative. Implementing the following SNRMPs would not be expected to affect the noise environment: Endangered Species Management Plan, Fisheries Management Plan, Invasive Species Management Plan, Aquatic Vegetation Management Plan, Integrated Wildland Fire Management Plan, ESC Plan, LID Plan and practices, and Floodplain Management Plan.

No additional evaluation under NEPA would be required for noise unless the management activity would involve noise-producing activities within 800 feet of an installation boundary for more than one year.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same effects on the noise environment as implementing the Preferred Alternative.

4.3.6 Geology, Topography, and Soils

Preferred Alternative

An alternative would be considered to have a significant adverse impact on soils in the following instances:

- Substantial soil loss or compaction to the extent that establishing native vegetation within two growing seasons is precluded on a land area larger than 1,000 acres; or
- A loss of soil productivity through converting pervious ground to impervious ground on more than five percent of installation land.

The Preferred Alternative would not be expected to have a significant adverse effect on soils at any AMC installation. Short-term minor adverse effects on soils would be expected from use of heavy equipment during forest harvest, fireline work and firebreak creation, installation of stormwater management practices such as infiltration basins or trenches, and wetland creation and restoration. Use of state-accepted BMPs for these activities and incorporating LID practices into site design would minimize soil disturbance and loss.

Long-term beneficial effects on soil stability would be expected from reseeding a burned area after a wildfire has occurred, stabilizing soils after construction, and implementing stormwater runoff control practices that prevent excessive erosion from stormwater flows.

The Preferred Alternative would not be expected to affect the geology or topography of any AMC installation.

Implementing the following SNRMPs would not be expected to affect geology, topography, or soils: Endangered Species Management Plan, Invasive Species Management Plan, Aquatic Vegetation Management Plan, LID Plan and practices, and Floodplain Management Plan.

No additional evaluation under NEPA would be required for geology, topography, or soils unless the management activity could cause substantial soil loss or compaction to the extent that establishing native vegetation within two growing seasons is precluded on a land area larger than 1,000 acres or a loss of soil productivity through converting pervious ground to impervious ground on more than five percent of installation land.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same effects on geology, topography, and soils as implementing the Preferred Alternative.

4.3.7 Water Resources

Preferred Alternative

An alternative would be considered to have a significant adverse impact on water resources (surface waters, groundwater, or wetlands) in the following instances:

- An exceedance of a TMDL.
- A change in the impairment status of a surface water.
- An unpermitted direct impact on a water of the United States.
- The unpermitted loss or destruction of more than one acre of jurisdictional wetlands.

Implementing the Preferred Alternative would not be expected to have a significant adverse effect on water resources. Short-term minor adverse effects on water resources would be expected from implementing the following SNRMPs:

- Forest Management Plan: Soil disturbance caused by heavy equipment use during forest harvesting would be expected to lead to sediment in stormwater runoff to surface waters. The use of forest harvesting BMPs would minimize the adverse effect.
- Integrated Wildland Fire Management Plan: Chemicals used to fight fires (e.g., firefighting foams and gels, long-term retardants) and disturbed soils from fireline work would be expected to be carried in stormwater runoff to surface waters. Chemicals used in firefighting are approved for their intended use and qualified for use in federal firefighting, and fire fighters are trained in their appropriate application; however, runoff into surface waters is possible.
- Wetlands Management Plan: Wetland construction and creation would be expected to cause sediment runoff to the wetland area and downstream surface waters.
- Watershed Protection and Management Plan: Construction of some stormwater structures would disturb soils and be expected to cause some sediment runoff to surface waters.

Short- and long-term minor beneficial effects on water resources would be expected from implementing the following SNRMPs:

- Fisheries Management Plan: Fish management practices would be expected to improve waterbody conditions.
- Invasive Species Management Plan and Aquatic Vegetation Management Plan: Controlling aquatic invasive species and overabundant aquatic vegetation improves waterbody conditions.

- Integrated Wildland Fire Management Plan: Reducing the amount of forest affected by a wildland fire and reseeding an area after a fire prevents damage to some forest soils and stabilizes soils where a fire has burned, reducing runoff of sediment and fire debris to surface waters.
- ESC and LID Plans and practices: Reducing ground disturbance during construction, stabilizing surfaces after construction, and controlling runoff limit or prevent sediment input to surface waters.
- Floodplain Management Plan: Reducing inappropriate land uses on floodplains and in flood-prone areas lessens the likelihood of facilities flooding. Substances in structural elements of facilities and items stored in them that are flooded enter flood waters, causing pollution. This is reduced by implementing a Floodplain Management Plan.
- Watershed Protection and Management Plan: Watershed management improves the quality of water resources on a large scale and benefits all affected downstream surface waters.

No effect on water resources would be expected from implementing an Endangered Species Management Plan.

Because any potential impact on wetlands would be permitted, no adverse impacts on wetlands would be expected under the Preferred Alternative.

Additional evaluation under NEPA for water resources would be required if the project was within the buffer zone or riparian area of a surface water.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same effects on water resources as implementing the Preferred Alternative.

4.3.8 Biological Resources

Preferred Alternative

An alternative would be considered to have a significant adverse impact on the biological environment in any of the following instances:

- A permanent net loss of habitat at a landscape scale.
- A long-term loss or impairment of a substantial portion of local habitat on which native species depend.
- The unpermitted “take” of a threatened or endangered species.

Implementing the Preferred Alternative would not be expected to have a significant adverse effect on biological resources. Short- and long-term minor adverse and long-term minor beneficial effects on the biological environment would be expected from implementing the Preferred Alternative. Short-term adverse effects could be expected from forest harvesting, which reduces the availability of forest habitat and creates disturbances in a forest environment that increase opportunities for invasive species to become established. Following state guidelines for forest harvesting and implementing invasive species management on recently harvested areas would minimize the impact of forest harvesting on invasive species spread.

A long-term adverse and beneficial effect of forest harvesting is the creation of edge and open habitat. As noted above, the disturbance to soils during forest harvest and the additional sunlight reaching the ground where harvesting has occurred is conducive to the establishment of invasive species and forces forest species of animals to move to nearby areas or to perish. Forest openings are also areas of rapid vegetative growth and habitat diversity and are often more biologically diverse than a dense forest environment. As the forest regenerates, the mix of species in the area changes and the rapid growth of herbaceous vegetation, followed by shrubs and then trees, makes these areas productive for food for wildlife, attractive to birds for nesting, and ideal for many species of invertebrates.

The following long-term minor beneficial effects would be expected from implementing the Preferred Alternative:

- Forest management and invasive species management would reduce damage done to forests by controlling overabundant wildlife populations.
- Endangered species management practices would protect and enhance the biological condition of the affected habitats for all resident species.
- Fish management, aquatic vegetation management, ESC and LID practices, wetland restoration, and watershed management would improve waterbody conditions, which benefits aquatic and terrestrial biota.
- Invasive species management would benefit native species.
- Wildland fire management would reduce the amount of habitat damage caused by a fire.
- Reseeding after a wildland fire has occurred would restore habitat.
- ESC and LID practices would reduce soil loss and sedimentation to surface waters, with benefits to aquatic systems and biota.
- Floodplain management, as mentioned above under Water Resources, reduces pollution entering flood waters, which benefits aquatic biota and habitats.

Additional evaluation under NEPA for biological resources would be required if the project would disturb the habitat of a federally or state-protected species.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same environmental impacts on biological resources as implementing the Preferred Alternative.

4.3.9 Cultural Resources

Preferred Alternative

An alternative would be considered to have a significant adverse effect on cultural resources if it resulted in altering any of the characteristics of an historic property (including prehistoric and historic-era resources) that qualify it for inclusion on the NRHP in a manner that would diminish the integrity of the property's location, design, setting, materials, workmanship, feeling, or association.

Adverse effects on historic properties include the following:

- Physical destruction of or damage to all or part of the property.

- Alteration of a property that is inconsistent with the Secretary's Standards for the Treatment of Historic Properties (36 CFR part 68) and applicable guidelines.
- Removal of the property from its historic location.
- Change of the character of the property's use or of physical features within its setting that contribute to its historic significance.
- Introduction of visual, atmospheric, or audible elements that diminish the integrity of the property's significant historic features.
- Transfer, lease, or sale of property out of federal ownership or control without adequate and legally enforceable restrictions or conditions to ensure long-term preservation of the property's historic significance.

Implementing the Preferred Alternative would not be expected to adversely affect cultural resources. It would not adversely affect historic, prehistoric, or archaeological resources. If implementation of an SNRMP had the potential to disturb an historic, prehistoric, or archaeological resource, the NRM would contact the Cultural Resources Manager (CRM) and would follow all protocols necessary to avoid affecting any cultural resource. If a cultural resource was inadvertently discovered during implementation of an SNRMP (e.g., during forest harvest, stormwater detention basin installation, or wetland creation), the activity would be stopped immediately and the installation CRM would be notified, with no further project implementation occurring until approved by the installation CRM.

Additional evaluation under NEPA for cultural resources would be required if implementing an SNRMP disturbed an archaeological resource.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same environmental impacts on cultural resources as implementing the Preferred Alternative.

4.3.10 Socioeconomics

Preferred Alternative

An alternative would be considered to have a significant adverse effect on socioeconomics (population, economic activity, environmental justice, and the protection of children) if its implementation resulted in the following instances:

- Substantial gains or losses in population or employment.
- Disequilibrium in the housing market such as severe housing shortages or surpluses.
- Project-related demands on public services (e.g., police, fire, and emergency services) triggering the need for expanded capacity or resulting in discernible reductions in the level of service provided.
- Activities or operations substantially altering lifestyles or quality of life of base employees and their families or civilian households living near the base.
- Disproportionately high and adverse environmental or human health impacts on an identified minority or low-income population or children, which appreciably exceed those to the general population around the project area.

Implementing the Preferred Alternative would not be expected to have a significant adverse effect on socioeconomics. It would not cause changes in population, local employment levels, personal income, or regional industrial or commercial growth. A potential socioeconomic effect of implementing the Preferred Alternative would be a short-term increase in local economic activity resulting from hiring contractors to accomplish elements of the work required to implement an SNRMP (e.g., to harvest timber, conduct a field survey, or install ESC practices), which would be a minor beneficial effect. Also, by implementing a Floodplain Management Plan the economic loss associated with facilities flooding can be avoided.

Additional evaluation under NEPA for socioeconomics would be required if implementing an SNRMP caused a substantial adverse impact on the regional economy, housing market, or public services, disproportionately affecting a minority or low-income population or children.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same environmental impacts on socioeconomics as implementing the Preferred Alternative.

4.3.11 Infrastructure and Utilities

Preferred Alternative

An alternative would be considered to have a significant adverse effect on infrastructure and utilities if its implementation resulted in exceeding the capacity of an infrastructure system at an installation (i.e., creating an energy, water, or sewer demand that exceeds the existing supply) or violating a regulatory limit (e.g., a larger wastewater discharge than permitted).

No adverse effects on infrastructure and utility systems would be expected from implementing the Preferred Alternative. It would not result in the need for any upgrades to installation utility systems or an increase in the long-term demand for public utility services or affect regional or local energy supplies.

Additional evaluation under NEPA for infrastructure and utilities would be required if implementing an SNRMP resulted in exceeding the capacity of an infrastructure system or violating a regulatory limit.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same environmental impacts on infrastructure and utilities as implementing the Preferred Alternative.

4.3.12 Transportation, Traffic, and Roads

Preferred Alternative

An alternative would be considered to have a significant adverse impact on transportation, traffic, or roads in the following instances:

- A decrease in the level of service on a roadway or at an intersection by more than two levels.

- Recurring traffic delays on roadways or discernible degradation of existing roads or rail facilities.
- Changes to existing rail schedules.

Implementing the Preferred Alternative would not be expected to have a significant adverse effect on transportation, traffic, or roads. Short-term adverse effects on traffic and roads would be expected from forest harvest and wetland creation activities. Forest harvesting requires the use of heavy equipment and trucks for hauling timber from the harvest site. Wetlands creation also generally requires the use of construction equipment. These activities would affect installation and regional roads only for the duration of the activity and would not be recurring activities with any long-term effects on the transportation system, traffic, or roads.

No adverse effects would be expected from implementing the following SNRMPs: Aquatic Vegetation Management Plan, ESC Plan, Endangered Species Management Plan, Fisheries Management Plan, Invasive Species Management Plan, Integrated Wildland Fire Management Plan, LID Plan, Floodplain Management Plan, and Watershed Protection and Management Plan.

Additional evaluation under NEPA for transportation, traffic, and roads would be required if implementing an SNRMP caused a change in level of service or substantial traffic delays for an extended period of time.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same environmental impacts on transportation, traffic, and roads as implementing the Preferred Alternative.

4.3.13 Hazardous Materials and Wastes

Preferred Alternative

An alternative would be considered to have a significant adverse impact on hazardous materials and wastes in any of the following instances:

- Noncompliance with applicable local, state, and federal regulations.
- An increase in the amount of hazardous waste generated or procured beyond the waste management capacity of an installation.
- Disturbance of contaminated sites, causing adverse effects on ecological and human health by creating exposure pathways.
- Inability of established management policies, procedures, and handling capacities for fuel management to accommodate the activities associated with the Preferred Alternative.

Implementing the Preferred Alternative would not be expected to have a significant adverse effect on hazardous materials and wastes. No adverse effects on hazardous materials and wastes would be expected from implementing SNRMPs. If implementing any SNRMP involved potentially disturbing an area with soil contamination or UXO, the NRM would first notify the environmental office and all required precautionary measures would be taken to ensure the safety of personnel and adherence to protocols for working on or near contaminated sites.

Additional evaluation under NEPA for hazardous materials and wastes would be required if implementing an SNRMP resulted in noncompliance with a local, state, or federal regulation or required a change in an installation's hazardous materials or waste generation or management capacity.

No Action Alternative

Implementing the No Action Alternative would be expected to have the same environmental impacts on hazardous materials and wastes as implementing the Preferred Alternative.

4.3.14 Cumulative Effects

CEQ regulations implementing NEPA define a *cumulative impact* as follows:

Cumulative impact is the impact on the environment, which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable actions regardless of what agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from individually minor but collectively significant actions taking place over a period of time. (40 CFR 1508.7).

EPA guidance to reviewers of cumulative impact analyses further adds:

...the concept of cumulative impacts takes into account all disturbances since cumulative impacts result in the compounding of the effects of all actions over time. Thus, the cumulative impacts of an action can be viewed as the total effects on a resource, ecosystem, or human community of that action and all other activities affecting that resource no matter what entity (federal, non-federal or private) is taking the action (USEPA 1999).

For the purposes of this PEA, significant cumulative impacts would occur if incremental impacts of the Preferred Alternative, added to the environmental impacts of past, present, and reasonably foreseeable actions would exceed significance thresholds for resources at an installation and the surrounding region. The analysis in the PEA indicates that implementing the Preferred Alternative could have a short- or long-term minor adverse effect on one or more of the following resource areas: aesthetics and visual resources, air quality, noise, soils, water resources, biological resources, and traffic and transportation systems. Cumulative effects on these resource areas are addressed below.

Aesthetics and Visual Resources. Implementing some SNRMPs could cause alterations to the visual aspect of a landscape. Forest harvesting alters the look of a forest. Creating a firebreak in a forested area has a visual impact. Drawing down a reservoir as a means of controlling invasive aquatic species alters the visual aspect and aesthetic of the reservoir. Rarely, however, would taking these actions contribute to cumulative effects because their visual and aesthetic effects are isolated from similar actions taken in other locations and their visual effects are temporary.

Air Quality. Each state considers the effects of all past, present, and reasonably foreseeable emissions during the development of the State Implementation Plan. In developing the plan, the state accounts for all significant stationary, area, and mobile emission sources. Emissions generated by the Preferred Alternative would be *de minimis*, and it is understood that activities of this limited size and nature would not contribute significantly to adverse cumulative effects on air quality.

Noise. Noise effects are limited to within approximately 800 feet of a loud noise source so to contribute to cumulative noise effects an action would have to occur near an action taken to implement an SNRMP. Noise-mitigating measures such as conducting noisy operations only during normal working hours would be implemented for all noise-contributing projects, and all noise effects would cease with completion of the construction phase of each project. Cumulative noise effects, therefore, would be limited and temporary.

Soils. Soil disturbance is a site-specific effect. Projects that disturb soils do not contribute to cumulative effects on soils because each project disturbs soils in a different location and all exposed soils are stabilized and revegetated at the completion of a project.

Water Resources. Soil erosion from any project can contribute to water pollution and therefore to cumulative effects on water resources. BMPs appropriate to each project are used to minimize sediment runoff to surface waters, which minimizes cumulative effects on surface waters.

Biological Resources. Direct impacts on biological resources from project implementation are site-specific but can have regional effects if numerous projects affect similar biological resources in a region. Impacts on biological resources are reviewed by the USFWS or NOAA if a federally protected species could be affected and the state natural resources agency reviews NEPA documents for Army actions. The state agency notifies the Army proponent if landscape-level or regional adverse effects are a concern, and if possible the Army would alter how a project is implemented to minimize such effects while still meeting the military mission.

Traffic and Transportation Systems. Most projects involve some vehicle use and construction projects involve the use of heavy trucks for delivering equipment and materials to an installation. All construction and therefore any impacts on local and regional traffic and transportation are temporary. The Army minimizes cumulative effects on traffic and transportation systems by ensuring that heavy vehicles use roads approved for such vehicles, scheduling deliveries to avoid peak-hour traffic, and coordinating with local authorities to avoid effects on traffic and roads that could be caused by multiple projects occurring at the same time.

SECTION 5.0 REFERENCES

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APPENDIX A

**Environmental Checklist for Supplemental Natural Resources Management
Plan Implementation**

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Environmental Checklist for Supplemental Natural Resources Management Plan Implementation

The checklist in this appendix supports referencing the *Programmatic Environmental Assessment for Natural Resources Management Planning Compliance at AMC Installations* and the associated Finding of No Significant Impact (FNSI) for site-specific plans and projects on Army Materiel Command (AMC) installations. The checklist ensures compliance with the President's Council on Environmental Quality guidance (40 Code of Federal Regulations [CFR] Parts 1500–1508) and the Army's National Environmental Policy Act (NEPA) regulation (32 CFR Part 651). The programmatic environmental assessment (PEA) addresses Supplemental Natural Resources Management Plans (SNRMPs), including Forest Management Plans, Endangered Species Management Plans, Fisheries Management Plans, Invasive Species Management Plans, Aquatic Vegetation Management Plans, Integrated Wildland Fire Management Plans, Erosion and Sediment Control Plans, Wetlands Management Plans, Low-impact Development Plans, Floodplain Management Plans, and Watershed Protection and Management Plans. The checklist facilitates the consideration of environmental effects for proposed installation-specific natural resource management plans and provides a framework for identifying installation-specific NEPA requirements. If an installation-specific natural resource management plan includes work outside the scope of the PEA, additional NEPA would be required.

“Installations” includes active AMC installations (refer to Figure 1 of the PEA).

Use of the PEA assumes that an installation has an updated or new SNRMP to implement to meet their natural resources management needs.

AMC installations tiering from the PEA and associated FNSI are to use this checklist to determine whether reliance on the PEA (and possibly other NEPA analyses and one or more Categorical Exclusions [CXs]) are appropriate, or whether additional NEPA analysis is needed before implementing a proposed plan.

If the installation can respond “no” to each of the statements in the checklist below, then generally no further NEPA analysis would be required and the action would likely qualify for a Record of Environmental Consideration (REC).

When a project qualifies for a REC, the installation REC should cite 32 CFR § 651.12(a)(2) (‘action is adequately covered within an existing environmental assessment or environmental impact statement’) and name this PEA and associated FNSI. If the REC is also based on other environmental analyses and/or CXs under 32 CFR Part 651, the REC should name the other applicable analyses and their associated FNSI or Record of Decision and cite any applicable CX(s). The completed checklist should be attached to the installation's REC.

If the installation responds “yes” to one or more questions in the checklist, it can reconsider the proposed plan or the specific activity that would lead to a “yes” response to see whether the effect on the resource can be avoided and the answer changed to “no”.

If a “yes” or “maybe” response to any checklist item cannot be changed to a “no,” then additional environmental analysis may be required as part of an installation-level NEPA process. If, upon investigation of each “yes” and “maybe” response on the checklist, the installation determines that no further environmental analysis is required and that a REC is appropriate, documentation of the results of the investigation should be maintained with the REC and completed checklist.

If the installation concludes that additional NEPA analysis is necessary, 32 CFR Part 651 requires it be prepared before any irreversible and irretrievable commitments of resources occur for the proposed action. The plan-specific NEPA process should be streamlined by tiering off the SNRMP PEA, with the tiered document focused only on those resource areas where plan-specific considerations require additional NEPA analysis of potential impacts. Within the tiered analysis (e.g., within an appendix), as it relates to resource areas for which no further analysis was needed, documentation should be included regarding the completed checklist and those “yes” and “maybe” investigations which concluded that a resource area did not need further analysis because of the proposed action.

This checklist is to enable the identification of the documentation required to meet NEPA requirements. Requirements to comply with other federal and state environmental and/or energy laws and regulations are to be adhered to, as appropriate and applicable. These may include, for example, those requiring resource-specific consultations with other federal, state, and Tribal governments and agencies (such as consultation under the Endangered Species Act or National Historic Preservation Act [NHPA]) or completing NEPA-like requirements of the state, if any and if applicable.

Environmental Checklist for Supplemental Natural Resources Management Plans

This adopted checklist is a duplicate of the checklist contained in Appendix A of the *Programmatic Environmental Assessment for AMC New and Updated Supplemental Natural Resources Management Plans*.

Resource Area and Questions	Check the appropriate response:
Land Use	
Will any action taken to implement the plan conflict with an installation planning document (master plan, land use plan, etc.)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan create a land use incompatibility?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Airspace	
Will any action taken to implement the plan require a change to an Air Installation Compatible Use Zone, Clear Zone, or Accident Potential Zone designation for the installation?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan cause a change in existing airspace use?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan create a need to modify an airspace permit or related memorandum of agreement or military training route?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Aesthetics and Visual Resources	
Will any action taken to implement the plan adversely affect a valued scenic view or sensitive aesthetic or visual resource?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan conflict with the Installation Design Guide or Common Installation Picture?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Air Quality	
Will any action taken to implement the plan contribute to a change in the air quality compliance status in the region (e.g., from attainment to nonattainment)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan violate the installation's air operating permit?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe

Resource Area and Questions	Check the appropriate response:
Noise	
Will any action taken to implement the plan involve substantial noise generation within 800 feet of a sensitive noise receptor for a prolonged period?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
<p><i>Substantial</i> noise generation is considered a doubling of the normal sound level, or an increase of 10 decibels at the noise receptor.</p> <p><i>Sensitive noise receptors</i> include residences, hospitals, churches, and schools, and/or sensitive wildlife populations, including threatened or endangered species.</p> <p>A <i>prolonged period</i> could be anywhere from a month to a year or longer, depending on the noise receptor.</p>	
Geological and Soil Resources	
Will any action taken to implement the plan be conducted in a manner that conflicts with accepted state best management practices (BMPs) applicable to the activity (e.g., forestry BMPs for timber harvesting, wetlands and riparian area protection BMPs)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan involve construction activities on highly erodible soils?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan disturb contaminated soil?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Water Resources	
Will any action taken to implement the plan violate a National Pollutant Discharge Elimination System (NPDES) stormwater permit?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan modify a floodplain such that the floodplain's natural and beneficial values are diminished?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan occur completely or partially within a floodplain, requiring implementation of Executive Order 11988, possibly resulting in a Finding of No Practicable Alternative?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan cause an exceedance of a Total Maximum Daily Load?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan cause a change in the impairment status of a surface water?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan result in unpermitted direct impacts to waters of the U.S., regulated recharge zones, and/or groundwater aquifers?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan occur on or within jurisdictional wetlands or require additional surveys to identify and delineate jurisdictional wetlands?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe

Resource Area and Questions	Check the appropriate response:
Will any action taken to implement the plan cause the unpermitted loss or destruction of more than 1 acre of jurisdictional wetlands?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan affect a coastal zone regulated by the Coastal Zone Management Act (CZMA), requiring a CZMA consistency evaluation that has not yet been completed?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan require substantial modification of the installation's storm water discharge prevention plan?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan depend on groundwater resources that are stretched to or beyond their capacity, or cause or worsen a problem of brackish or salt water intrusion?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan be done on a site known to contain contamination and be done in a way that could cause surface water or groundwater contamination or violate water quality regulations?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Biological Resources	
Will any action taken to implement the plan adversely affect a federally protected plant or animal species?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan contradict an installation-specific tree replacement or other natural resources protection policy or not comply with any previously agreed upon NEPA mitigation actions for natural resources protection?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan not comply with the Endangered Species Act, Migratory Bird Treaty Act, Marine Mammal Protection Act, and Bald and Golden Eagle Protection Act, including compliance with any previously agreed upon NEPA mitigation actions? <i>(Note: All required U.S. Fish and Wildlife Service or National Marine Fisheries Service informal or formal consultation must be completed prior to implementing the proposed plan.)</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan result in an unauthorized "take" of a state-protected species for which the installation is required to comply with the associated legal and regulatory requirements of the state?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan include activities in biological sensitive areas other than those mentioned above?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan trigger a survey for one or more protected species, such as threatened or endangered species protected under the Endangered Species Act? <i>(Note: A YES means that the appropriate biological resource survey does not exist for all or part of the project area.)</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe

Resource Area and Questions	Check the appropriate response:
Will any action taken to implement the plan cause a substantial decrease in the relative percentage of any one vegetation type (native to the region) on the installation, particularly a vegetation type in the region that is already highly fragmented because of human activity?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Cultural Resources	
Will any action taken to implement the plan disturb buildings or structures that are eligible for or listed on the National Register of Historic Places (NRHP)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan adversely affect an historic district that is eligible for or listed on the NRHP?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan trigger a survey for cultural resources? <i>(Note: A YES means that a cultural resources survey does not exist for all or part of the construction area.)</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan have an adverse effect on a NRHP-listed or -eligible historic property that is unlikely to be able to be avoided or mitigated? <i>(Note: All required NHPA Section 106 consultation with the State Historic Preservation Office [SHPO], Advisory Council on Historic Preservation [ACHP], Tribes, and other interested parties must be completed prior to commencing with the proposed project.)</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan prevent the traditional use of sacred or ceremonial sites or resources by Federally-recognized Native Americans, Alaska Natives, or Native Hawaiians? <i>(Note: All required NHPA Section 106 consultation with SHPO, ACHP, Tribes, and other interested parties must be completed prior to commencing with the proposed project.)</i>	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Socioeconomics	
Will any action taken to implement the plan cause a long-term loss or displacement of recreational opportunities and resources?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan have a disproportionate adverse economic, social, or health impact on a minority or low-income population?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan create a disproportionate environmental health or safety risk to children?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan result in substantial loss or displacement of recreational opportunities and resources (e.g., hunting and fishing) relative to the baseline?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe

Resource Area and Questions	Check the appropriate response:
Will any action taken to implement the plan be accomplished adjacent or near a low-income or minority population area that is one of only a few residential areas bordering the installation that are primarily occupied by low-income or minority populations?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Transportation and Traffic	
Will any action taken to implement the plan create any long-term road closures or traffic delays?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan require large construction and delivery vehicles to use roads that are already congested?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Utilities	
Will any action taken to implement the plan cause an exceedance of the existing capacity of an element of infrastructure?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan violate a regulatory limit of any infrastructure system (e.g., wastewater discharge)?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan be incompatible with the existing installation or regional electrical grid system?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan create utility shortages (electricity, natural gas, water, telecommunication service, wastewater management services, solid waste management service [non-hazardous], and other essentials) to local communities, homes, and businesses for a length of time that would affect health, welfare, and economic viability?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Hazardous Materials and Hazardous Wastes	
Will any action taken to implement the plan disturb a known or create a new contaminated site that would be subject to regulatory control?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan cause a violation of a law or regulation governing hazardous materials or wastes or an installation hazardous waste permit?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan require new or substantially modified facilities for waste petroleum, oil, and lubricant products storage to be compliant with local/state/federal regulations?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan require a substantial change in the quantity of a hazardous material or waste that needs to be transported, stored on the installation, or disposed of?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Will any action taken to implement the plan require substantial modification of the installation's Spill Prevention, Control and Countermeasures Plan?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe

Resource Area and Questions	Check the appropriate response:
Human Health and Safety	
Will any action taken to implement the plan require substantial modification of the installation's health and safety plan?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe
Cumulative Effects	
Are there other actions underway or proposed whose effects—when combined with the potential effects of implementing the proposed plan—could have a significant adverse cumulative effect on human health or the environment?	<input type="checkbox"/> Yes <input type="checkbox"/> No <input type="checkbox"/> Maybe

ACRONYMS

- ACHP Advisory Council on Historic Preservation
- AMC Army Materiel Command
- BMP best management practice
- CFR Code of Federal Regulations
- CX Categorical Exclusion
- CZMA Coastal Zone Management Act
- FNSI Finding of No Significant Impact
- NEPA National Environmental Policy Act
- NHPA National Historic Preservation Act
- NPDES National Pollutant Discharge Elimination System
- NRHP National Register of Historic Places
- PEA Programmatic Environmental Assessment
- REC Record of Environmental Consideration
- SHPO State Historic Preservation Office
- SNRMP Supplemental Natural Resources Management Plan

APPENDIX B

Matrices of Environmental Impact by Management Plan and Activity

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Summary of Effects on Resource Areas by Natural Resources Management Plan Type													
Management Plan	Land Use	Airspace	Aesthetics/Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
Forest Management	No effect	No effect	LTm- / LTm+	STm-	STm-	STm- / STm+	STm-	STm- / STm+ / LTm- / LTm+	No effect	STm+	No effect	STm-	STm-
Endangered Species Management	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	No effect
Fisheries Management	No effect	No effect	No effect	No effect	No effect	STm-	STm+ / LTm+	STm+ / LTm+	No effect	No effect	No effect	No effect	No effect
Invasive Species Management	No effect	No effect	STm-	No effect	No effect	No effect	STm+ / LTm+	STm+ / LTm+	No effect	No effect	No effect	No effect	No effect
Aquatic Vegetation Management	No effect	No effect	No effect	No effect	No effect	No effect	STm+ / LTm+	STm+ / LTm+	No effect	No effect	No effect	No effect	No effect
Integrated Wildland Fire Management	No effect	No effect	LTm+	No effect	STm-	STm- / LTm+	STm- / LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
Erosion and Sediment Control	No effect	No effect	STm+	No effect	No effect	STm- / LTm+	STm+ / LTm+	STm+ / LTm+	No effect	No effect	No effect	No effect	No effect
Wetlands Management	No effect	No effect	STm- / LTm+	STm-	No effect	STm-	STm- / LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
Low-impact Development	No effect	No effect	STm+ / LTm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
Watershed Protection and Management	No effect	No effect	STm- / STm+ / LTm- / LTm+	STm-	STm-	STm- / STm+ / LTm+	STm- / STm+ / LTm+	STm- / STm+ / LTm+	No effect	STm+	No effect	STm-	STm-
Effects Summary by Resource Area	No effect	No effect	STm- / STm+ / LTm- / LTm+	STm-	STm-	STm- / STm+ / LTm+	STm- / STm+ / LTm+	STm- / STm+ / LTm+	No effect	STm+	No effect	STm-	STm-

Note: LTm = long-term minor, STm = short-term minor, - = adverse, + = beneficial

Light orange shading indicates this row summarizes the effects listed in the resource area column above.

Summary of Effects of Implementing a Forest Management Plan

Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
Firebreak creation		Firebreak creation has no effect on land use.	Firebreak creation has no effect on airspace.	Firebreaks create visual openings in forested areas; these can be seen if they intersect roads and from high vantage points.	Harvesting equipment produces negligible amounts of air pollutant emissions; prescribed burning (if used for firebreak creation) releases smoke.	Equipment use causes localized noise.	Equipment use and vegetation clearing disturbs soil and can cause erosion.	Stormwater runoff after firebreak creation can cause sediment runoff to surface waters.	Habitat for forest-dwelling species is reduced. Favorable conditions for invasive species are created. Habitat for open-habitat and edge species is increased.	Firebreak creation has no effect on cultural resources.	Firebreak creation has no effect on socioeconomics, EJ, or the protection of children.	Firebreak creation has no effect on infrastructure or utility systems.	Firebreak creation has no effect on transportation systems, traffic patterns, or roads.	Negligible spills of petroleum, oils, and lubricants from equipment.
	<i>Timber harvest for firebreak creation</i>	No effect	No effect	LTm-	STm-	STm-	STm-	STm-	LTm- / LTm+	No effect	No effect	No effect	No effect	STm-
Firebreak maintenance		Firebreak maintenance has no effect on land use.	Firebreak maintenance has no effect on airspace.	Removing overgrown vegetation improves appearance.	Firebreak maintenance has no effect on air quality.	Equipment use causes localized noise.	Firebreak maintenance has no effect on geology, topography, or soils.	Firebreak maintenance has no effect on water resources.	Habitat variety is reduced.	Firebreak maintenance has no effect on cultural resources.	Firebreak maintenance has no effect on socioeconomics, EJ, or the protection of children.	Firebreak maintenance has no effect on infrastructure or utility systems.	Firebreak maintenance has no effect on transportation systems, traffic patterns, or roads.	Firebreak maintenance has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	<i>Vegetation cutting</i>	No effect	No effect	LTm+	No effect	STm-	No effect	No effect	STm-	No effect	No effect	No effect	No effect	No effect
Invasive plant species control		Invasive plant control has no effect on land use.	Invasive plant control has no effect on airspace.	Invasive plant control has no effect on aesthetics.	Invasive plant control has no effect on air quality.	Invasive plant control has no effect on the noise environment.	Invasive plant control has no effect on geology, topography, or soils.	Invasive plant control has no effect on water resources.	Invasive species abundance is reduced.	Invasive plant control has no effect on cultural resources.	Invasive plant control has no effect on socioeconomics, EJ, or the protection of children.	Invasive plant control has no effect on infrastructure or utility systems.	Invasive plant control has no effect on transportation systems, traffic patterns, or roads.	Invasive plant control has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	<i>Pesticide application</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Cutting</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Digging</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	No effect

Summary of Effects of Implementing a Forest Management Plan (cont.)

Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
Forest harvest		Forest harvest has no effect on land use.	Forest harvest has no effect on airspace.	Adverse aesthetic effects by converting forested areas if clearcut, leaving stumps and harvest slash, and creating forest openings if selectively cut, with residual slash.	Harvesting equipment emits minor amounts of air pollutants; if slash is burned, smoke is produced.	Harvesting equipment use causes localized noise.	Equipment use, vehicle traffic on forest soils, and tree felling cause soil disturbance and erosion.	Ground disturbance causes some sedimentation in surface waters.	Reduced habitat for forest-dwelling species. Favorable conditions for invasive species are created. Some wildlife are displaced. Old, damaged, and diseased trees are removed; conditions for open-habitat and edge species are improved; regrowth improves forest health.	Forest harvest has no effect on cultural resources.	Forest harvest has no effect on socioeconomics, EJ, or the protection of children.	Forest harvest has no effect on infrastructure or utility systems.	Truck traffic during the harvest.	Negligible spills of petroleum, oils, and lubricants from equipment.
	Timber marking	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	Forest harvesting	No effect	No effect	LTm-	STm-	STm-	STm-	STm-	LTm- / LTm+	No effect	No effect	No effect	STm-	STm-
Wildlife population control		Wildlife population control has no effect on land use.	Wildlife population control has no effect on airspace.	Wildlife population control has no effect on airspace.	Wildlife population control has no effect on air quality.	Wildlife population control has no effect on the noise environment.	Removing feral hogs reduces soil disturbance (rutting).	Wildlife population control has no effect on water resources.	Reduced browse or environmental damage caused by overpopulation; improved conditions for remaining population.	Wildlife population control has no effect on cultural resources.	Wildlife population control has no effect on socioeconomics, EJ, or the protection of children.	Wildlife population control has no effect on infrastructure or utility systems.	Negligible traffic from hunters.	Wildlife population control has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Population culling	No effect	No effect	No effect	No effect	No effect	STm+	No effect	STm+ / LTm+	No effect	No effect	No effect	STm-	No effect
Revegetation		Revegetation has no effect on land use.	Revegetation has no effect on airspace.	Revegetation has no effect on airspace.	Revegetation has no effect on air quality.	Revegetation has no effect on the noise environment.	Revegetation has no effect on geology, topography, or soils.	Revegetation has no effect on water resources.	Improved species mix, reduced invasive species abundance.	Revegetation has no effect on cultural resources.	Revegetation has no effect on socioeconomics, EJ, or the protection of children.	Revegetation has no effect on infrastructure or utility systems.	Revegetation has no effect on transportation systems, traffic patterns, or roads.	Revegetation has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Tree planting	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	No effect

Summary of Effects of Implementing a Forest Management Plan (cont.)													
	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
EFFECTS SUMMARY	Forest management has no effect on land use.	Forest management has no effect on airspace.	Long-term minor adverse effect. Converting forest to open areas by creating firebreaks or harvesting timber has an adverse aesthetic effect that diminishes over time as regrowth occurs.	Short-term minor adverse effect. Equipment used during forest harvest has a short-term minor adverse effect on air quality.	Short-term minor adverse effect. Equipment use during forest harvest has a short-term minor adverse effect on the noise environment.	Short-term minor adverse effect. Use of heavy equipment during forest harvest disturbs soils and leads to some erosion. Use of forest harvesting BMPs minimizes the soil loss.	Short-term minor adverse effect. Soil disturbance caused by heavy equipment can lead to sediment in stormwater runoff to surface waters. Use of forest harvesting BMPs minimizes the adverse effect.	Forest harvest reduces forest habitat but increases edge and open habitat. Invasive species control in forested areas is beneficial for native species. Controlling overabundant wildlife populations reduces forest damage. Regrowth after harvest improves forest health.	Forest management has no effect on cultural resources.	Forest management has no effect on socioeconomics, EJ, or the protection of children.	Forest management has no effect on utility or infrastructure systems.	Short-term minor adverse effects on traffic and roads are due to equipment and timber transport on trucks during forest harvest.	Forest management has no effect on hazardous materials use or management.

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Gold shading indicates the effects of individual management activities conducted to implement the management practice.

Light orange shading indicates this row summarizes the effects listed in the column above.

Summary of Effects of Implementing an Endangered Species Management Plan														
Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
Field work		Field work has no effect on land use.	Field work has no effect on airspace.	Field work has no effect on aesthetics.	Field work has no effect on air quality.	Field work has no effect on the noise environment.	Field work has no effect on geology, topography, or soils.	Field work has no effect on water resources.	Field work has no effect on biological resources.	Field work has no effect on cultural resources.	Field work has no effect on socioeconomics, EJ, or the protection of children.	Field work has no effect on infrastructure or utility systems.	Field work has no effect on transportation systems, traffic patterns, and roads.	Field work has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Conduct PLSs	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	Evaluate habitat	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	Monitor known populations	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
ESMP development		Developing an ESMP has no effect on land use.	Developing an ESMP has no effect on airspace.	Developing an ESMP has no effect on aesthetics.	Developing an ESMP has no effect on air quality.	Developing an ESMP has no effect on the noise environment.	Developing an ESMP has no effect on geology, topography, or soils.	Developing an ESMP has no effect on water resources.	Developing an ESMP has no effect on biological resources.	Developing an ESMP has no effect on cultural resources.	Developing an ESMP has no effect on socioeconomics, EJ, or the protection of children.	Developing an ESMP has no effect on infrastructure or utility systems.	Developing an ESMP has no effect on transportation systems, traffic patterns, or roads.	Developing an ESMP has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Write ESMP	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	Consult with USFWS	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect

Summary of Effects of Implementing an Endangered Species Management Plan (cont.)														
Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
Population and habitat protection and enhancement		Protection and enhancement have no effect on land use.	Protection and enhancement have no effect on airspace.	Protection and enhancement have no effect on aesthetics.	Protection and enhancement have no effect on air quality.	Protection and enhancement have no effect on the noise environment.	Protection and enhancement have no effect on geology, topography, or soils.	Protection and enhancement have no effect on water resources.	Protection and enhancement protect and improve habitat for protected species.	Protection and enhancement have no effect on cultural resources.	Protection and enhancement have no effect on socioeconomics, EJ, or the protection of children.	Protection and enhancement have no effect on infrastructure or utility systems.	Protection and enhancement have no effect on transportation systems, traffic patterns, or roads.	Protection and enhancement have no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Install fence protection around small populations (plants)	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	No effect
	Control invasive species	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	No effect
	Modify habitat (e.g., remove competing vegetation; plant native food species)	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	No effect
USFWS consultation	Consult with USFWS	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Personnel awareness training	Train installation personnel on how to avoid harming TES	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Project review	Review all projects with potential to harm TES	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
EFFECTS SUMMARY		Endangered species management has no effect on land use.	Endangered species management has no effect on airspace.	Endangered species management has no effect on aesthetics or visual resources.	Endangered species management has no effect on air quality.	Endangered species management has no effect on the noise environment.	Endangered species management has no effect on geology, topography, or soils.	Endangered species management has no effect on water resources.	Protection and enhancement for endangered species management has a long-term minor beneficial effect on the affected habitat and resident species.	Endangered species management has no effect on cultural resources.	Endangered species management has no effect on socioeconomics, EJ, or the protection of children.	Endangered species management has no effect on utility or infrastructure systems.	Endangered species management has no effect on transportation systems, traffic patterns, or roads.	Endangered species management has no effect on hazardous materials use or management.

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Summary of Effects of Implementing a Fisheries Management Plan														
Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
Fish surveys		Fish surveys have no effect on land use.	Fish surveys have no effect on airspace.	Fish surveys have no effect on aesthetics.	Fish surveys have no effect on air quality.	Fish surveys have no effect on the noise environment.	Fish surveys have no effect on geology, topography, or soils.	Fish surveys have no effect on water resources.	Fish surveys have no effect on biological resources.	Fish surveys have no effect on cultural resources.	Fish surveys have no effect on socioeconomics, EJ, or the protection of children.	Fish surveys have no effect on infrastructure or utility systems.	Fish surveys have no effect on transportation systems, traffic patterns, or roads.	Fish surveys have no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Conduct creel surveys	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	Survey fish with nets or electroshocking	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Habitat surveys		Habitat surveys have no effect on land use.	Habitat surveys have no effect on airspace.	Habitat surveys have no effect on aesthetics.	Habitat surveys have no effect on air quality.	Habitat surveys have no effect on the noise environment.	Habitat surveys have no effect on geology, topography, or soils.	Habitat surveys have no effect on water resources.	Habitat surveys have no effect on biological resources.	Habitat surveys have no effect on cultural resources.	Habitat surveys have no effect on socioeconomics, EJ, or the protection of children.	Habitat surveys have no effect on infrastructure or utility systems.	Habitat surveys have no effect on transportation systems, traffic patterns, or roads.	Habitat surveys have no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Assess waterbody habitat	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	Assess nearshore habitat	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Population management		Fish population management has no effect on land use.	Fish population management has no effect on airspace.	Fish population management has no effect on aesthetics.	Fish population management has no effect on air quality.	Fish population management has no effect on the noise environment.	Fish population management has no effect on geology, topography, or soils.	Fish population management improves waterbody conditions.	Fish population management improves aquatic life health; the effect is short term if annual restocking is needed.	Fish population management has no effect on cultural resources.	Fish population management has no effect on socioeconomics, EJ, or the protection of children.	Fish population management has no effect on infrastructure or utility systems.	Fish population management has no effect on transportation systems, traffic patterns, or roads.	Fish population management has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Set fishing quotas	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	Stock waterbodies with fish	No effect	No effect	No effect	No effect	No effect	No effect	STm+ / LTm+	STm+ / LTm+	No effect	No effect	No effect	No effect	No effect

Summary of Effects of Implementing a Fisheries Management Plan (cont.)

Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes	
Habitat management		Habitat management has no effect on land use.	Habitat management has no effect on airspace.	Habitat management has no effect on aesthetics.	Habitat management has no effect on air quality.	Habitat management has no effect on the noise environment.	Installing stormwater management devices disturbs soil and can cause erosion	Waterbody habitat management improves conditions in the target waterbody	Waterbody habitat management improves waterbody biotic conditions	Habitat management has no effect on cultural resources.	Habitat management has no effect on socioeconomics, EJ, or the protection of children.	Habitat management has no effect on infrastructure or utility systems.	Habitat management has no effect on transportation systems, traffic patterns, or roads.	Habitat management has no effect on material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.	
	<i>Modify shoreline vegetation mechanically</i>	No effect	No effect	No effect	No effect	No effect	No effect	STm+	STm+	No effect	No effect	No effect	No effect	No effect	
	<i>Apply herbicides to shoreline vegetation</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	STm+	STm+	No effect	No effect	No effect	No effect	No effect
	<i>Remove aquatic vegetation mechanically</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	STm+	STm+	No effect	No effect	No effect	No effect	No effect
	<i>Apply herbicides in waterbody</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	STm+	STm+	No effect	No effect	No effect	No effect	No effect
	<i>Place habitat elements in waterbody</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	STm+	STm+	No effect	No effect	No effect	No effect	No effect
	<i>Control contributing conditions</i>	No effect	No effect	No effect	No effect	No effect	No effect	STm-	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
EFFECTS SUMMARY		Fish management has no effect on land use.	Fish management has no effect on airspace.	Fish management has no effect on aesthetics or visual resources.	Fish management has no effect on air quality.	Fish management has no effect on the noise environment.	Installing stormwater management practices to control runoff to surface waters to improve fish habitat would have a short-term minor adverse effect from soil being disturbed and erosion.	Short- and long-term minor beneficial effects from fish management practices used to improve waterbody conditions.	Short- and long-term minor beneficial effects from fish management practices used to improve waterbody conditions.	Fish management has no effect on cultural resources.	Fish management has no effect on socioeconomics, EJ, or the protection of children.	Fish management has no effect on utility or infrastructure systems.	Fish management has no effect on transportation, traffic patterns, or roads.	Fish management has no effect on hazardous materials use or management.	

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Summary of Effects of Implementing an Invasive Species Management Plan														
Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
Field studies		Field studies have no effect on land use.	Field studies have no effect on airspace.	Field studies have no effect on aesthetics.	Field studies have no effect on air quality.	Field studies have no effect on the noise environment.	Field studies have no effect on geology, topography, or soils.	Field studies have no effect on water resources.	Field studies have no effect on biological resources.	Field studies have no effect on cultural resources.	Field studies have no effect on socioeconomics, EJ, or the protection of children.	Field studies have no effect on infrastructure or utility systems.	Field studies have no effect on transportation systems, traffic patterns, or roads.	Field studies have no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Conduct PLSs	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	Monitor invasive species populations	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Implement IPM		Implementing IPM has no effect on land use.	Implementing IPM has no effect on airspace.	Most IPM practices have no effect on aesthetics. The exposed shoreline in a reservoir after drawdown is aesthetically adverse.	Implementing IPM has no effect on air quality.	Implementing IPM has no effect on the noise environment.	Implementing IPM has no effect on geology, topography, or soils.	Most IPM practices have no effect on water resources. Biological control for aquatic species and reservoir drawdown both reduce invasive species abundance in the target waterbody.	Reducing invasive species benefits biota by improving conditions for native species.	Implementing IPM has no effect on cultural resources.	Implementing IPM has no effect on socioeconomics, EJ, or the protection of children.	Implementing IPM has no effect on infrastructure or utility systems.	Implementing IPM has no effect on transportation systems, traffic patterns, or roads.	Implementing IPM has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Mechanical PM (digging, cutting, tilling, etc.)	No effect	No effect	No effect	No effect	No effect	No effect	No effect	STm+	No effect	No effect	No effect	No effect	No effect
	Chemical PM (pesticide use)	No effect	No effect	No effect	No effect	No effect	No effect	No effect	STm+	No effect	No effect	No effect	No effect	No effect
	Cultural PM (modify behavior or protocols to prevent IS spread/introduction)	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	No effect
	Biological PM (introduce biological control)	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	Reservoir drawdown	No effect	No effect	STm-	No effect	No effect	No effect	STm+	STm+	No effect	No effect	No effect	No effect	No effect

Summary of Effects of Implementing an Invasive Species Management Plan (cont.)													
	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
Restoration	Habitat restoration has no effect on land use.	Habitat restoration has no effect on airspace.	Habitat restoration has no effect on aesthetics.	Habitat restoration has no effect on air quality.	Habitat restoration has no effect on the noise environment.	Habitat restoration has no effect on geology, topography, or soils.	Habitat restoration (terrestrial) has no effect on water resources.	Habitat restoration benefits all biota.	Habitat restoration has no effect on cultural resources.	Habitat restoration has no effect on socioeconomics, EJ, or the protection of children.	Habitat restoration has no effect on infrastructure or utility systems.	Habitat restoration has no effect on transportation systems, traffic patterns, or roads.	Habitat restoration has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	<i>Replant voided areas</i>	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	No effect
EFFECTS SUMMARY													
	Invasive species management has no effect on land use.	Invasive species management has no effect on airspace.	Short-term minor adverse effect from reservoir drawdown to control aquatic invasive species.	Invasive species management has no effect on air quality.	Invasive species management has no effect on the noise environment.	Invasive species management has no effect on geology, topography, or soils.	Short- and long-term minor beneficial effects from controlling aquatic invasive species.	Short- and long-term minor beneficial effects reducing the abundance of invasive species.	Invasive species management has no effect on cultural resources.	Invasive species management has no effect on socioeconomics, EJ, or protection of children.	Invasive species management has no effect on utility or infrastructure systems.	Invasive species management has no effect on traffic and roads.	Invasive species management has no effect on hazardous materials use or management.

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Summary of Effects of Implementing an Aquatic Vegetation Management Plan														
Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Roads / Traffic	Hazardous Materials / Wastes
Field studies		Field studies have no effect on land use.	Field studies have no effect on airspace.	Field studies have no effect on aesthetics.	Field studies have no effect on air quality.	Field studies have no effect on the noise environment.	Field studies have no effect on geology, topography, or soils.	Field studies have no effect on water resources.	Field studies have no effect on biological resources.	Field studies have no effect on cultural resources.	Field studies have no effect on socioeconomics, EJ, or the protection of children.	Field studies have no effect on infrastructure or utility systems.	Field studies have no effect on transportation systems, traffic patterns, or roads.	Field studies have no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	PLSs & monitoring	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Habitat management		Habitat management has no effect on land use.	Habitat management has no effect on airspace.	Habitat management has no effect on aesthetics.	Habitat management has no effect on air quality.	Habitat management has no effect on the noise environment.	Habitat management has no effect on geology, topography, or soils.	Habitat management improves conditions in the target waterbody.	Habitat management improves conditions for biota in the target waterbody.	Habitat management has no effect on cultural resources.	Habitat management has no effect on socioeconomics, EJ, or the protection of children.	Habitat management has no effect on infrastructure or utility systems.	Habitat management has no effect on transportation systems, traffic patterns, or roads.	Habitat management has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Modify shoreline vegetation mechanically	No effect	No effect	No effect	No effect	No effect	No effect	STm+	STm+	No effect	No effect	No effect	No effect	No effect
	Apply herbicides to shoreline vegetation	No effect	No effect	No effect	No effect	No effect	No effect	STm+	STm+	No effect	No effect	No effect	No effect	No effect
	Remove aquatic vegetation mechanically	No effect	No effect	No effect	No effect	No effect	No effect	STm+	STm+	No effect	No effect	No effect	No effect	No effect
	Apply herbicides in waterbody	No effect	No effect	No effect	No effect	No effect	No effect	STm+	STm+	No effect	No effect	No effect	No effect	No effect
Biological control	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect

Summary of Effects of Implementing an Aquatic Vegetation Management Plan (cont.)													
	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Roads / Traffic	Hazardous Materials / Wastes
EFFECTS SUMMARY	Aquatic vegetation management has no effect on land use.	Aquatic vegetation management has no effect on airspace.	Aquatic vegetation management has no effect on aesthetics and visual resources.	Aquatic vegetation management has no effect on air quality.	Aquatic vegetation management has no effect on the noise environment.	Aquatic vegetation management has no effect on geology, topography, or soils.	Short- and long-term minor beneficial effects on water resources from improving waterbody conditions.	Short- and long-term minor beneficial effects on aquatic biota from improving waterbody conditions.	Aquatic vegetation management has no effect on cultural resources.	Aquatic vegetation management has no effect on socioeconomics, EJ, or children.	Aquatic vegetation management has no effect on infrastructure or utility systems.	Aquatic vegetation management has no effect on traffic and roads.	Aquatic vegetation management has no effect on hazardous materials use or management.

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Summary of Effects of Implementing an Integrated Wildland Fire Management Plan														
Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
Training		Fire training has no effect on land use.	Fire training has no effect on airspace.	Fire training has no effect on aesthetics.	Equipment and vehicles emit negligible amounts of air pollutants.	Equipment and vehicles produce negligible levels of noise for short periods.	Fire training has no effect on geology, topography, or soils.	Fire training has no effect on water resources.	Fire training has no effect on biological resources.	Fire training has no effect on cultural resources.	Fire training has no effect on socioeconomics, EJ, or the protection of children.	Fire training has no effect on infrastructure or utility systems.	Fire training requires some vehicle use but has no effect on transportation systems, traffic flow, or road conditions.	Fire training has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Equipment training	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	Field training	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Fire response		Fire response has no effect on land use.	Fire response has no effect on airspace.	Fire response has no effect on aesthetics.	Equipment and vehicles emit negligible amounts of air pollutants, and reduce smoke caused by wildfire.	Equipment and vehicles produce noise only during mobilization.	Fireline creation causes localized soil disturbance; no effect on geology or topography.	Firefighting chemicals can drift or runoff to surface waters; runoff of disturbed soil to surface waters.	Fire response benefits biota by limiting the adverse effects of wildfire.	Fire response has no effect on cultural resources. Cultural resources are protected during fire response.	Fire response has no effect on socioeconomics, EJ, or the protection of children.	Fire response has no effect on infrastructure or utility systems.	Fire response requires some vehicle use but has no effect on transportation systems, traffic flow, or road conditions.	Fire response has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Initial response	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect	No effect
	Water tank use (truck)	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect
	Fire chemical use	No effect	No effect	No effect	No effect	No effect	No effect	No effect	STm-	LTm+	No effect	No effect	No effect	No effect
	Fireline & control line creation	No effect	No effect	No effect	No effect	No effect	No effect	STm-	STm-	LTm+	No effect	No effect	No effect	No effect
	Backburning	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	No effect
Post-fire restoration		Postfire restoration has no effect on land use.	Postfire restoration has no effect on airspace.	Accelerates return to preburn appearance.	Postfire restoration has no effect on air quality.	Postfire restoration has no effect on noise.	Postfire restoration stabilizes soils disturbed by a wildfire and the fire response; no effect on geology or topography.	Vegetation regrowth stabilizes soil and reduces sediment runoff.	Postfire restoration hastens forest regrowth.	Postfire restoration has no effect on cultural resources.	Postfire restoration has no effects on socioeconomics, EJ, or protection of children.	Postfire restoration has no effect on infrastructure or utility systems.	Postfire restoration requires some vehicle use but has no effect on transportation systems, traffic flow, or road conditions.	Postfire response has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Seeding	No effect	No effect	LTm+	No effect	No effect	LTm+	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect

Summary of Effects of Implementing an Integrated Wildland Fire Management Plan (cont.)													
	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
EFFECTS SUMMARY	Wildfire management has no effect on land use.	Wildfire management has no effect on airspace.	Forest restoration after a wildfire has a long-term beneficial effect on aesthetics and visual resources.	Wildfire management has no effect on air quality.	Wildfire management has no effect on the noise environment.	Fireline work has a short-term adverse effect on soils. Reseeding a burned area after a fire has a long-term beneficial effect on soil stability.	Chemicals used to fight fires and disturbed soils from fireline work can enter surface waters. Reseeding after a fire stabilizes soils, with a long-term beneficial effect on surface waters.	Extinguishing a wildfire reduces the amount of habitat damage caused, with beneficial effects on biota. Reseeding restores habitat.	Wildfire management has no effect on cultural resources.	Wildfire management has no effect on socioeconomics, EJ, or children.	Wildfire management has no effect on infrastructure or utility systems.	Wildfire management has no effect on traffic and roads.	Wildfire management has no effect on hazardous materials use or management.

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Summary of Effects of Implementing an Erosion and Sediment Control Plan																
Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes		
Surface stabilization		Surface stabilization practices have no land use effects.	Surface stabilization practices have no effects on airspace.	Most practices reduce gullying and promote vegetation growth.	Most practices involve some use of motorized equipment, contributing at most negligible amounts of air pollutants.	Equipment and vehicle use has localized, negligible noise effects.	Some practices cause minor soil disturbance, but all practices reduce long-term soil loss and erosion.	All practices reduce sedimentation in surface waters.	Vegetation growth benefits flora and fauna. Stream channel stabilization benefits aquatic biota.	NRM consults with CRM before undertaking any work that could affect a cultural resource.	Contractors hired for specific practices (e.g., riprap installation) would receive revenue, but any economic effect would be negligible.	Negligible amounts of utility use would be involved in accomplishing some surface stabilization practices.	Most practices would involve no additional vehicle use beyond what the construction effort would require. Some practices (e.g., riprap installation) might require a few truck or POV trips.	All hazardous materials would be handled, stored, transported, and disposed of in accordance with regulations and installation policies.		
		Seeding	No effect	No effect	STm+	No effect	No effect	LTm+	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect	
		Sodding	No effect	No effect	STm+	No effect	No effect	LTm+	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect	No effect
		Plant trees, shrubs, ground cover	No effect	No effect	STm+	No effect	No effect	STm- / LTm+	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect	No effect
		Mulch	No effect	No effect	No effect	No effect	No effect	LTm+	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect	No effect
		Install riprap	No effect	No effect	No effect	No effect	No effect	STm- / LTm+	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect	No effect
	Install erosion control mats	No effect	No effect	No effect	No effect	No effect	LTm+	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect	No effect	
Runoff control		Runoff control practices have no land use effects.	Runoff control practices have no effects on airspace.	Runoff control practices do not affect the aesthetics or visual resources.	Most practices involve some use of motorized equipment, contributing at most negligible amounts of air pollutants.	Equipment and vehicle use has localized, negligible noise effects.	Installation of some practices cause minor soil disturbance, but reduce long-term soil loss and erosion.	Runoff control reduces sediment and pollutant input to surface waters and modifies runoff volume and rate to more closely mimic a natural process.	Reduced sediment input and natural stormwater runoff rate and volume benefit aquatic systems and biota.	NRM consults with CRM before undertaking any work that could affect a cultural resource.	Contractors hired for specific practices (e.g., rock dam installation) would receive revenue, but any economic effect would be negligible.	Negligible amounts of utility use would be involved in installing some runoff controls.	Most practices would involve no additional vehicle use beyond what the construction effort would require. Some practices (e.g., rock dam installation) might require a few truck or POV trips.	All hazardous materials would be handled, stored, transported, and disposed of in accordance with regulations and installation policies.		
		Stormwater diversion	No effect	No effect	No effect	No effect	No effect	STm- / LTm+	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect	No effect
		Conveyance channel	No effect	No effect	No effect	No effect	No effect	STm- / LTm+	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect	No effect
		Sediment basin	No effect	No effect	No effect	No effect	No effect	STm- / LTm+	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect	No effect
		Silt fence	No effect	No effect	No effect	No effect	No effect	LTm+	STm+	STm+	No effect	No effect	No effect	No effect	No effect	No effect
		Straw bales	No effect	No effect	No effect	No effect	No effect	LTm+	STm+	STm+	No effect	No effect	No effect	No effect	No effect	No effect
	Rock dam	No effect	No effect	No effect	No effect	No effect	STm- / LTm+	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect	No effect	

Summary of Effects of Implementing an Erosion and Sediment Control Plan (cont.)													
	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
EFFECTS SUMMARY	Erosion and sediment control practices have no effect on land use.	Erosion and sediment control practices have no effect on airspace.	Surface stabilization after ground disturbance has a beneficial aesthetic effect.	Erosion and sediment control practices have no effect on air quality.	Erosion and sediment control practices have no effect on the noise environment.	Some surface stabilization and runoff control practices cause short-term soil disturbance, but all have a long-term beneficial effect on soil stability.	Surface stabilization and runoff control reduce sediment input to surface waters.	Reduced sediment input and controlled stormwater runoff rate and volume benefit aquatic systems and biota.	Erosion and sediment control practices have no effect on cultural resources.	Erosion and sediment control practices have no effect on socioeconomics, EJ, or children.	Erosion and sediment control practices have no effect on infrastructure or utility systems.	Erosion and sediment control practices have no effect on traffic and roads.	Erosion and sediment control practices have no effect on hazardous materials use or management.

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Summary of Effects of Implementing a Wetlands Management Plan

Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomic s / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
Delineate wetlands		Wetland delineations have no effect on land use.	Wetland delineations have no effect on airspace.	Wetland delineations have no effect on aesthetics.	Wetland delineations have no effect on air quality.	Wetland delineations have no effect on the noise environment.	Wetland delineations have no effect on geology, topography, or soils.	Wetland delineations have no effect on water resources.	Wetland delineations have no effect on biological resources.	Wetland delineations have no effect on cultural resources.	Wetland delineations have no effect on socioeconomics, EJ, or the protection of children.	Wetland delineations have no effect on infrastructure or utility systems.	Wetland delineations have no effect on transportation systems, traffic patterns, or roads.	Wetland delineations have no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Map wetlands with GIS	Mapping wetlands has no effect on land use.	Mapping wetlands has no effect on airspace.	Mapping wetlands has no effect on aesthetics.	Mapping wetlands has no effect on air quality.	Mapping wetlands has no effect on the noise environment.	Mapping wetlands has no effect on geology, topography, or soils.	Mapping wetlands has no effect on water resources.	Mapping wetlands has no effect on biological resources.	Mapping wetlands has no effect on cultural resources.	Mapping wetlands has no effect on socioeconomics, EJ, or the protection of children.	Mapping wetlands has no effect on infrastructure or utility systems.	Mapping wetlands has no effect on transportation systems, traffic patterns, or roads.	Mapping wetlands has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Assess and monitor wetland condition	Assessing and monitoring wetlands has no effect on land use.	Assessing and monitoring wetlands has no effect on airspace.	Assessing and monitoring wetlands has no effect on aesthetics.	Assessing and monitoring wetlands has no effect on air quality.	Assessing and monitoring wetlands has no effect on the noise environment.	Assessing and monitoring wetlands has no effect on geology, topography, or soils.	Assessing and monitoring wetlands has no effect on water resources.	Assessing and monitoring wetlands has no effect on biological resources.	Assessing and monitoring wetlands has no effect on cultural resources.	Assessing and monitoring wetlands has no effect on socioeconomics, EJ, or the protection of children.	Assessing and monitoring wetlands has no effect on infrastructure or utility systems.	Assessing and monitoring wetlands has no effect on transportation systems, traffic patterns, or roads.	Assessing and monitoring wetlands has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	Monitor water quality	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	Monitor invasive species	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Protect and avoid wetlands		Protecting and avoiding wetlands has no effect on land use.	Protecting and avoiding wetlands has no effect on airspace.	Protecting and avoiding wetlands has no effect on aesthetics.	Protecting and avoiding wetlands has no effect on air quality.	Protecting and avoiding wetlands has no effect on the noise environment.	Protecting and avoiding wetlands has no effect on geology, topography, or soils.	Protecting and avoiding wetlands has beneficial effects on the target wetlands and downstream water resources.	Protecting and avoiding wetlands has beneficial effects on wetlands biota and downstream aquatic resources.	Protecting and avoiding wetlands has no effect on cultural resources.	Protecting and avoiding wetlands has no effect on socioeconomics, EJ, or the protection of children.	Protecting and avoiding wetlands has no effect on infrastructure or utility systems.	Protecting and avoiding wetlands has no effect on transportation systems, traffic patterns, or roads.	Protecting and avoiding wetlands has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies..
	Avoid impacting wetlands during construction	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	Design construction to limit stormwater runoff impacts on wetlands	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect

Summary of Effects of Implementing a Wetlands Management Plan (cont.)

Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomic s / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
	<i>Establish and maintain wetland buffers</i>	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
Restore wetlands		Wetland restoration has no effect on land use.	Wetland restoration has no effect on airspace.	Wetland restoration improves the aesthetics of the target wetlands. Any construction involved has a short-term adverse aesthetic effect.	Construction involved in wetland restoration produces minor amounts of air pollutant emissions.	Construction involved in wetland restoration produces minor levels of noise.	Wetland restoration has no effect on geology or topography. Some erosion occurs with any associated construction.	Restored wetlands improve water quality. Some sedimentation occurs during any associated construction.	Wetland restoration has beneficial effects on wetland biota and downstream aquatic resources.	Wetland restoration has no effect on cultural resources.	Wetland restoration has no effect on socioeconomics, EJ, or the protection of children.	Wetland restoration has no effect on infrastructure or utility systems.	Wetland restoration has no effect on transportation systems, traffic patterns, or roads.	Wetland restoration has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	<i>Improve wetlands protection</i>	No effect	No effect	LTm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Construct wetlands</i>	No effect	No effect	STm- / LTm+	STm-	STm-	STm-	STm- / LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
Create new wetlands		Wetland creation has no effect on land use.	Wetland creation has no effect on airspace.	STm-: Construction is aesthetically adverse. LTm+: Mature wetlands are aesthetically pleasing.	STm-: Construction produces minor quantities of air pollutants.	STm-: Construction produces noticeable noise effects near the construction site.	STm-: Some soil erosion is caused by construction.	STm-: Construction causes some sediment runoff in stormwater. LTm+: Wetlands improve water quality.	LTm+: Wetlands are beneficial to aquatic and terrestrial biota.	Wetland creation has no effect on cultural resources.	Wetland creation has no effect on socioeconomics, EJ, or the protection of children.	Wetland creation has no effect on infrastructure or utility systems.	STm-: Some construction traffic is associated with wetland creation.	Wetland creation has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
EFFECTS SUMMARY		Wetlands management has no effect on land use.	Wetlands management has no effect on airspace.	Initial site preparation for wetland creation and restoration can be aesthetically adverse but have a long-term beneficial aesthetic effect.	Construction equipment use for wetland creation or restoration produces minor amounts of air pollutant emissions.	Construction equipment use for wetland creation or restoration has a minor adverse effect on the noise environment.	Construction for wetlands creation or restoration disturbs soil and can result in some erosion.	Wetland construction or creation can lead to sediment runoff to surface waters.	Wetland restoration has beneficial effects on terrestrial and aquatic biota.	Wetlands management has no effect on cultural resources.	Wetlands management has no effect on socioeconomics, EJ, or children.	Wetlands management has no effect on infrastructure or utility systems.	Wetland creation can involve use of trucks, causing short-term adverse effects on traffic and roads.	Wetlands management has no effect on hazardous materials use or management.

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Summary of Effects of Implementing a Low-impact Development Plan														
Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Roads / Traffic	Hazardous Materials / Wastes
Site design		Site design has no effect on land use.	Site design has no effect on airspace.	Incorporating natural features into site design results in aesthetically pleasing developed landscapes.	Site design has no effect on air quality.	Site design has no effect on the noise environment.	Incorporating natural topography into site design lessens the need for constructed erosion control solutions and reduces the amount of ground disturbance and soil erosion.	Incorporating natural topography, hydrology, and vegetation into site design lessens the amount of stormwater runoff from the site and reduces the impact on receiving surface waters.	Reduced stormwater quantity and improved stormwater quality lessens the impact on aquatic biota.	Site design has no effect on cultural resources.	Site design has no effect on socioeconomics, EJ, or the protection of children.	Site design has no effect on infrastructure or utility systems.	Site design has no effect on transportation systems, traffic patterns, or roads.	Site design has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	<i>Use site natural topography</i>	No effect	No effect	LTm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Use site natural hydrology</i>	No effect	No effect	LTm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Preserve existing vegetation</i>	No effect	No effect	LTm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Protect slopes, channels</i>	No effect	No effect	LTm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Model stormwater runoff</i>	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
Stormwater management		Using LID stormwater management practices has no effect on land use.	Using LID stormwater management practices has no effect on airspace.	LID stormwater management practices are incorporated into design to be aesthetically pleasing.	Using LID stormwater management practices has no effect on air quality.	Using LID stormwater management practices has no effect on the noise environment.	Using LID stormwater management practices has no effect on geology, topography, or soils.	Using LID stormwater management practices lessens the adverse effects of stormwater runoff on water resources.	Reduced stormwater quantity and improved stormwater quality lessens the impact on aquatic biota.	Using LID stormwater management practices has no effect on cultural resources.	Using LID stormwater management practices has no effect on socioeconomics, EJ, or the protection of children.	Using LID stormwater management practices has no effect on infrastructure or utility systems.	Using LID stormwater management practices has no effect on transportation systems, traffic patterns, or roads.	Using LID stormwater management practices has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.
	<i>Infiltration basin</i>	No effect	No effect	STm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Infiltration trench</i>	No effect	No effect	STm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Dry well</i>	No effect	No effect	STm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Capture and use</i>	No effect	No effect	STm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Biofiltration/bioretentation</i>	No effect	No effect	STm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
	<i>Permeable pavement</i>	No effect	No effect	STm+	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect

Summary of Effects of Implementing a Low-impact Development Plan (cont.)

	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Roads / Traffic	Hazardous Materials / Wastes
EFFECTS SUMMARY	LID practices have no effect on land use.	LID practices have no effect on airspace.	Surface stabilization after ground disturbance has a beneficial aesthetic effect.	LID practices have no effect on air quality.	LID practices have no effect on the noise environment.	LID practices have no effect on geology, topography, or soils.	LID practices reduce ground disturbance during construction and limit sediment input to surface waters.	Reduced soil loss and sediment in stormwater runoff, and controlled stormwater runoff rate and volume benefit aquatic systems and biota.	LID practices have no effect on cultural resources.	LID practices have no effect on socioeconomics, EJ, or children.	LID practices have no effect on infrastructure or utility systems.	LID practices have no effect on traffic and roads.	LID practices have no effect on hazardous materials use or management.

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Summary of Effects of Implementing a Floodplain Management Plan															
Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Roads / Traffic	Hazardous Materials / Wastes	
Floodplain planning and design	Floodplain planning and design has no effect on land use.	Floodplain planning and design has no effect on airspace.	Floodplain planning and design has no effect on aesthetics.	Floodplain planning and design has no effect on air quality.	Floodplain planning and design has no effect on the noise environment.	Floodplain planning and design has no effect on geology, topography, or soils.	Floodplain planning and design has no effect on water resources.	Floodplain planning and design has no effect on biological resources.	Floodplain planning and design has no effect on cultural resources.	Floodplain planning and design has no effect on socioeconomics, EJ, or the protection of children.	Floodplain planning and design has no effect on infrastructure or utility systems.	Floodplain planning and design has no effect on transportation systems, traffic patterns, or roads.	Floodplain planning and design has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.		
	<i>Determine whether a proposed action will occur in a floodplain</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	
	<i>Design action to minimize potential harm</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	<i>Modify action to minimize potential harm</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	<i>Require land and water resources use appropriate to degree of hazard</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
	<i>Construct structures and facilities per appropriate standards and criteria</i>	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect
Construction management	Floodplain-related construction practices have no effect on land use.	Floodplain-related construction practices have no effect on airspace.	Floodplain-related construction practices have no effect on aesthetics.	Floodplain-related construction practices have no effect on air quality.	Floodplain-related construction practices have no effect on noise.	Floodplain-related construction practices have no effect on geology, topography, or soils.	Applying flood protection measures reduces water quality impacts when there is a flood	Applying flood protection measures reduces impacts on aquatic biota when there is a flood	Floodplain-related construction practices have no effect on cultural resources.	Applying flood protection measures has a beneficial economic effect by reducing economic loss. No effects on EJ, or the protection of children.	Floodplain-related construction practices have no effect on infrastructure and utilities.	Floodplain-related construction practices have no effect on transportation systems, traffic, or roads.	Floodplain-related construction practices have no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.		
	<i>Apply floodproofing and other flood protection measures</i>	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	LTm+	No effect	LTm+	No effect	No effect	No effect	
Public awareness	Delineating flood height reduces inappropriate land use conflicts.	Delineating flood height has no effect on airspace.	Delineating flood height has no effect on aesthetics.	Delineating flood height has no effect on air quality.	Delineating flood height has no effect on noise.	Delineating flood height has no effect on geology, topography, or soils.	Delineating flood height has no effect on water resources.	Delineating flood height has no effect on biological resources.	Delineating flood height has no effect on cultural resources.	Delineating flood height has a beneficial effect on the protection of children. It has no effect on socioeconomics or EJ.	Delineating flood height has no effect on infrastructure and utilities.	Delineating flood height has no effect on transportation systems, traffic, or roads.	Delineating flood height has no effect on hazardous material storage, use, handling, or disposal. All hazardous materials are managed in accordance with regulations and installation policies.		
	<i>Delineate past and probable flood height</i>	LTm+	No effect	No effect	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	No effect	No effect	No effect	

Summary of Effects of Implementing a Floodplain Management Plan (cont.)													
	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Roads / Traffic	Hazardous Materials / Wastes
EFFECTS SUMMARY	Floodplain management can reduce land use conflicts.	Floodplain management has no effect on airspace.	Floodplain management has no effect on aesthetics.	Floodplain management has no effect on air quality.	Floodplain management has no effect on noise.	Floodplain management has no effect on geology, topography, or soils.	Floodplain management can reduce water quality impacts when there is a flood.	Floodplain management can reduce impacts on aquatic biota when there is a flood.	Floodplain management has no effect on cultural resources.	Floodplain management can have a beneficial economic effect and help protect children.	Floodplain management has no effect on infrastructure and utilities.	Floodplain management has no effect on transportation systems, traffic, and roads.	Floodplain management has no effect on hazardous material storage, use, handling, or disposal.

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Summary of Effects of Implementing a Watershed Management Plan														
Management Practice	Management Activity	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
Enhance terrestrial environments														
	<i>Provide or protect natural corridors</i>	LTm+	No effect	LTm+	STm-	STm-	STm-	STm-	LTm+	No effect	No effect	No effect	STm-	No effect
Enhance aquatic environments														
	<i>Restore degraded stream channels</i>	See ESC tab												
	<i>Protect and restore wetlands</i>	See Wetlands tab												
	<i>Establish riparian buffers</i>	See Wetlands tab												
Prioritize areas for improvement		No effects; planning and administrative action.												
Control nonpoint source pollution														
	<i>Use pesticides properly</i>	No effects; done as part of normal hazardous materials management protocol.												
	<i>Dispose of used oil properly</i>	No effects; done as part of normal hazardous materials management protocol.												
	<i>Manage hazardous and toxic materials properly</i>	No effects; done as part of normal hazardous materials management protocol.												
	<i>Maintain vehicles</i>	No effects; done as part of normal installation protocol.												
	<i>Inspect and maintain stormwater and sanitary infrastructure</i>	No effects; done as part of normal installation protocol.												
	<i>Sweep streets</i>	No effects; done as part of normal installation protocol.												
	<i>Collect litter</i>	No effects; done as part of normal installation protocol.												
	<i>Conduct staff/employee awareness training</i>	No effect	No effect	No effect	No effect	No effect	No effect	LTm+	LTm+	No effect	No effect	No effect	No effect	No effect
Adhere to waterbody TMDLs		No effects; done as part of normal installation protocol												
Control invasive species		See Invasive Species Management tab												
Practice low impact development		See LID tab												
Protect SMZs		See Forest Mgmt tab												
Protect wetlands		See Wetlands tab												
Protect and manage forests		See Forest Mgmt tab												
Practice ESC		See ESC tab												
Manage stormwater runoff		See ESC and Wetlands tabs												
Revegetate disturbed areas														
	<i>Reduce invasive species</i>	See InvSppM tab												
	<i>Plant native species</i>	No effects; done as part of normal installation protocol												

Summary of Effects of Implementing a Watershed Management Plan (cont.)													
	Land Use	Airspace	Aesthetics / Visual Resources	Air Quality	Noise	Geology / Topography / Soils	Water Resources	Biological Resources	Cultural Resources	Socioeconomics / EJ / Protection of Children	Infrastructure / Utilities	Transportation / Traffic / Roads	Hazardous Materials / Wastes
EFFECTS SUMMARY	Watershed management could result in converting some areas from developed to open/vegetated.	Watershed management has no effect on airspace.	Watershed management could result in an increase in open or vegetated areas, with beneficial aesthetic effects.	Watershed management could require heavy equipment use, with short-term minor adverse effects on air quality.	Heavy equipment use for watershed management would have short-term minor adverse effects on the noise environment.	Some short-term adverse effects would result from construction efforts, but overall watershed management stabilizes soils or reduces disturbance of soils.	Some short-term adverse effects would result from sedimentation during construction efforts, but overall watershed management results in healthier surface waters and groundwater.	Watershed management results in healthier surface waters, which has beneficial effects on terrestrial and aquatic biota.	Watershed management has no effect on cultural resources.	Watershed management has no effect on socioeconomics, EJ, or children.	Watershed management has no effect on infrastructure or utility systems.	Watershed management has no effect on traffic and roads.	Watershed management has no effect on hazardous materials use or management.

Note: - = adverse, + = beneficial, LTm = long-term minor, STm = short-term minor

Blue shading indicates effects for a broad management practice, which might involve different management activities.

Gold shading indicates the effects of individual management activities conducted to implement the management practice.

Light orange shading indicates this row summarizes the effects listed in the column above.