WESTOVER AIR RESERVE BASE
CHICOPEE, MASSACHUSETTS

MANAGE AIRFIELD VEGETATION TO PROTECT FLIGHT SAFETY

FINAL
ENVIRONMENTAL ASSESSMENT

U.S. AIR FORCE

On behalf of:

23 April 2015

ENVIRONMENTAL ASSESSMENT
WESTOVER AIR RESERVE BASE
MANAGE AIRFIELD VEGETATION TO PROTECT FLIGHT SAFETY

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This Finding of No Significant Impact (FONSI) was prepared in accordance with the *National Environmental Policy Act* of 1969, the Council on Environmental Quality (CEQ) regulations (40 *Code of Federal Regulations* (CFR) 1500-1508), and the *Air Force Environmental Impact Analysis Process* (32 CFR 989). The decisions included in this FONSI are based upon information contained in the Environmental Assessment (EA), Manage Airfield Vegetation to Protect Flight Safety at Westover Air Reserve Base (ARB), Massachusetts. The EA analyzed potential environmental consequences that could result from implementation of the Proposed Action (including two action Alternatives) or the No Action Alternative.

Purpose of and Need for the Proposed Action

The Proposed Action is the management of airfield vegetation on Westover ARB to maximize flight safety and minimize the Bird/Wildlife Aircraft Strike Hazard (BASH) risk. The purpose of the Proposed Action is to manage airfield vegetation in a manner that complies with the Air Force Instruction (AFI) 91-202, paragraph 7.3.1.5.9 grass height standard (maintaining grass height within 500 feet of an Aircraft Movement Area (AMA) at a height between 7 and 14 inches) while conserving state listed species to the extent practicable as required by AFI 32-7064, paragraph 7.1.2. The need for the Proposed Action is to protect flight safety by reducing the bird/wildlife aircraft strike hazard (BASH) risk, as collisions between fauna and aircraft can cause loss of life and substantial damage and loss of property, as well as interfere with the flying mission and military readiness of Westover ARB. This includes not only the C-5B aircraft located at Westover ARB, but also all of the other transitory aircraft that utilize this airfield on a daily basis.

Description of No Action and Action Alternatives

No Action Alternative. Under the No Action Alternative, Westover ARB would not implement the Proposed Action. The No Action Alternative would be the continuance of the current mowing program. This mowing program maintains grass height between 7 and 14 inches within 499 acres of the AMA, accomplished by approximately 2-3 mowings per year beginning in late May or early June. Approximately 832 acres, encompassing part of the AMA and the buffer zone extending 500 feet from the AMA, are currently mowed once per year (between August 1 and November 15) to a height of 7 inches. Continuing with the current mowing program (No Action Alternative) would leave Westover ARB in non-compliance with AFI 91-202. Military readiness, USAF mission, and safety of aircrews and aircraft would potentially be jeopardized by non-compliance with AFI 91-202. As such, the No Action Alternative does not meet the project purpose and need.

Alternative 1: Initiate Mowing Earlier in the Growing Season and Increase the Frequency of Mowing. Alternative 1 would initiate earlier in the growing season the mowing of the outer airfield grasslands at Westover ARB, and increase the frequency of mowing, to maintain grass height between 7 and 14 inches in compliance with the revised AFI 91-202. This includes mowing the AMA and areas within 500 feet of the AMA where able (i.e. where grass presently exists). The limits of mowing generally correspond to all grassy areas (i.e. non-pavement or non-wooded) within the airfield's primary surface and clear zones and extending 500 feet beyond the AMA. The total grassland area to be continuously maintained between 7 and 14 inches in height under Alternative 1 encompasses approximately 1,232 acres. Of this area, approximately 499 acres are presently maintained between 7 and 14 inches, in accordance with Westover ARB's previously approved mowing plan. The additional area (e.g. 733 acres) is mowed once per year, but would likely increase to approximately 2-3 mowings per year, to achieve compliance with the revised AFI.

Alternative 2 (Preferred): Application of Plant Growth Regulators When Possible; Followed by Mowing As Necessary; with Additional Management Tools, such as Pre-Emergent Herbicides and Prescribed Burns. Under the Preferred Alternative (Alternative 2), the height of the additional grasslands beyond the inner airfield area would be maintained at 7-14 inches through a multi-component management approach, including the application of pre-emergent herbicides, plant growth regulator, prescribed burns, and mowing when vegetation height exceeds the 14-inch threshold. In Spring 2015, a pre-emergent herbicide would be applied to all airfield grasslands, including the inner 499 acres (already mowed at 7-14") and the outer grasslands (733 acres), totaling approximately 1,232 acres. The intent of the pre-emergent herbicide is to reduce the abundance of broad-leaved weeds, which tend to have early season vigor and thus achieve a height of 14 inches earlier than warm season grasses. Additionally, a plant growth regulator would be applied to the outer grasslands (733 acres) now required by the revised AFI 91-202 to be managed at the 7-14 inch height. With early Spring application, the use of plant growth regulators is anticipated to delay the first mowing required (by approximately 8-10 weeks, although annual variations may occur) to maintain the grass at heights between 7 and 14 inches. If PGR treatment is not successful in preventing grasses from exceeding 14 inches in height during the nesting season, the AF will continue to collaborate with the MADFW to develop alternate strategies to mowing; but if no feasible strategies are identified, the AF will mow as necessary to remain in compliance with the flight safety standards set forth in AFI 91-202.

FONSI (continued)

Controlled burn of portions of the airfield grassland would occur each year. The annual controlled burns are anticipated to slowly transition the ecosystem towards one with a greater dominance of warm season grasses, rather than cool season grasses and broad-leafed weeds. For the inner airfield, Alternative 2 (like Alternative 1) entails the same mowing protocol as is currently performed under the No Action Alternative (499 acres presently maintained at 7-14 inches). For the outer grasslands (733 acres) under Alternative 2, mowing would be initiated (anticipated in mid/late July) following the initial suppression by the plant growth regulators.

Decision

The potential impacts to human health and the environment were evaluated relative to the existing conditions. The EA assessed anticipated direct, indirect, short-term and long-term impacts as a result of the Proposed Action (Alternative 1 and Alternative 2) and the No Action Alternative. Based upon a review of the EA and operational requirements, as its Preferred Alternative, the Air Force proposes to proceed with the Alternative 2 for compliance with AFI 91-202. Alternative 2 contributes toward maintaining flying safety while minimizing impacts on breeding grassland birds.

Overall, the analysis for the multi-component vegetation management approach as described under Alternative 2 would not result in or contribute to significant negative cumulative or indirect impacts to the resources in the region. These resources include: water resources (surface water, ground water, wetlands, and floodplains), biological resources (vegetation, wildlife, and threatened and endangered species), air quality (climate change and greenhouse gases), topography, geology and soils, cultural resources, noise, infrastructure, transportation, solid wastes, hazardous materials, safety and occupational health, socioeconomics, and aesthetics. While there is the possibility of potential adverse effects to wildlife as a direct result of mowing (including direct impact to individual bird eggs and nestlings), these effects are not anticipated to be significant in relation to the maintenance of regional populations of the species. While mowing was determined to be a source of direct nest mortality for grassland birds (though less common than other sources of nest failure, such as predation) in a recent study completed at Westover ARB, comparison of nest daily survival rates failed to reveal significant differences, although the researchers cautioned that statistical power was low due to relatively small sample sizes. Westover ARB will continue to grant access to interested parties (e.g. bird groups) to conduct surveys and monitor the populations of various bird species present on the base, including those listed by Massachusetts as threatened, endangered, or of special concern.

Consultation, Coordination, and Public Involvement

During the refinement of the Preferred Alternative, the USAF conducted extensive consultation with MA Division of Fisheries & Wildlife (DFW), Natural Heritage & Endangered Species Program. The Draft EA was distributed to, and input sought from, a lengthy list of local and state government officials, state agencies, federal regulatory agencies, public and private regional agencies, civic and community organizations, and other potential stakeholders. Additionally, the Draft EA was provided to all parties who had commented on the related, previous proposed action. Four comment letters were received on this Draft EA, including: New Jersey Audubon Society, Mass Audubon, MA DFW, and USFWS. These stakeholder comments generally pertained to requests for additional research and/or monitoring, questions about 'what if' scenarios if the Proposed Action were to not proceed as anticipated, and comments about the conclusions drawn from the existing studies having low sample sizes. In response to these comments, Westover ARB intends to continue supporting MA DFW/NHESP in the biennial census (i.e. breeding season survey of grassland birds). Also, Westover ARB anticipates that the current monitoring of birds/mammals by the USDA APHIS personnel on base will be expanded to provide decision makers with additional data on the abundance of grassland birds at Westover ARB. Additionally, Westover ARB is investigating the potential to program and budget for additional census (i.e. filling in the gaps between the alternate years of MA DFW/NHESP biennial census). Westover ARB will explore the possibility of extending legacy studies, such as the bird productivity studies, or participating in ongoing studies. Furthermore, Westover ARB is contemplating the application of PGR/herbicides by helicopter, rather than tractor. Although this option may not be implementable in 2015 (due to timing, budget, and other constraints), Westover ARB will continue to investigate the feasibility of aerial application and/or other means to reduce the disturbance to habitat during the nesting season, to the extent that the base's mission is not compromised.

Conclusion

In accordance with Council of Environmental Quality regulations implementing the National Environmental Policy Act of 1969, as amended, and Environmental Impact Analysis Process, 32 CFR 989, the USAF concludes that the Proposed Action will have no significant impact on the quality of the natural or human environment; thus an Environmental Impact Statement (EIS) is not warranted and a FONSI is appropriate.

AVL

ALBERT LUPENSKI, Colonel, USAFR
Commander, Westover Air Reserve Base

25 Apr 15
DATE

ACRONYMS AND ABBREVIATIONS

AFCEC	Air Force Civil Engineering Center
AFI	Air Force Instruction
AF PAM	Air Force Pamphlet
AFSEC/SEFW	Air Force Safety Center
AFRC	Air Force Reserve Command
AMA	Aircraft Movement Area
ARB	Air Reserve Base
BASH	Bird/wildlife Aircraft Strike Hazard
BHWG	Bird Hazard Working Group
BMP	Best Management Practice
BOS	Base Operating Support
CAA	Clean Air Act
CAAA	Clean Air Act Amendments
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CO	Carbon Monoxide
DoD	Department of Defense
DoDI	Department of Defense Instruction
EA	Environmental Assessment
EIS	Environmental Impact Statement
ESA	Endangered Species Act
EO	Executive Order
FAA	Federal Aviation Administration
FEMA	Federal Emergency Management Agency
FONSI	Finding of No Significant Impact
FY	Fiscal Year
GHG	Greenhouse Gas
GWP	Global Warming Potential
HAZMAT	Hazardous Material
HFC	hydrofluorocarbons
HQ	Headquarters
IICEP	Interagency/Intergovernmental Coordination for Environmental Planning
INRMP	Integrated Natural Resources Management Plan
LMUs	Land Management Units

Acronyms and Abbreviations (continued)

MassDEP	Massachusetts Department of Environmental Protection
MAJCOM	Major Command
MA NHESP	Massachusetts Natural Heritage and Endangered Species Program
MBTA	Migratory Bird Treaty Act
MDFW	Massachusetts Division of Fish and Wildlife
M.G.L.	General Laws of the Commonwealth of Massachusetts
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
OSHA	Occupational Safety and Health Administration
PFC	perfluorocarbons
PGR	Plant Growth Regulator
REPI	Readiness and Environmental Protection Initiative
RCRA	Resource Conservation and Recovery Act
SAIA	Sikes Act Improvement Amendments
SIP	State Implementation Plan
T&E	Threatened or Endangered
TMDL	Total Maximum Daily Load
TSCA	Toxic Substances Control Act
tpy	tons per year
USACE	United States Army Corps of Engineers
USAF	United States Air Force
U.S.C.	United States Code
USDA/FS	United States Department of Agriculture/ Forest Service
USDA/WS	United States Department of Agriculture/ Wildlife Services
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USMCR	United States Marine Corps Reserve
USNR	United States Navy Reserve
VOC	Volatile Organic Compound
WARB	Westover Air Reserve Base

1.0 INTRODUCTION

1.1 BACKGROUND

Westover Air Reserve Base (WARB), located in Chicopee and Ludlow, Massachusetts (Figure 1-1) is the nation's largest United States Air Force (USAF) Reserve base. The 439th Airlift Wing, a unit of the Air Force Reserve Command (AFRC), operates 16 C-5B model aircraft at Westover ARB. The C-5B aircraft specializes in missions involving outsized and oversized cargo that no other aircraft can carry. The 337th Airlift Squadron is the wing's flying unit at Westover ARB. The mission of the wing is to provide worldwide air movement of troops, supplies, equipment, and medical patients. The peacetime mission includes training of personnel to assure mission readiness. In addition, a number of transient aircraft, including various single-engine aircraft, use the airfield and the adjacent Westover Metropolitan Airport on a daily basis.

Due to the resident and migratory birds and wildlife present at Westover ARB, and the associated bird/wildlife strike hazard, Westover ARB implements a number of procedures to manage the Bird/Wildlife Aircraft Strike Hazard (BASH) risk, including grounds maintenance to discourage BASH-risk species from inhabiting the airfield.

The USAF recently issued revisions to Air Force Instruction (AFI) 91-202, *The U.S. Air Force Mishap Prevention Program*. AFI 91-202 was revised in August 2011, subsequently updated in March 2013 by Air Force Guidance Memorandum AFI 91-202 AFGM2, and specifies grass height requirements under the Aviation Safety Program referred to as the Bird/Wildlife Aircraft Strike Hazard (BASH) Program.

The latest revision of AFI 91-202 requires substantial changes to Westover ARB's vegetation management plan, including the current mowing procedures. With regard to aviation safety, the revised AFI 91-202 directs all US Air Force organizations and personnel, including US Air Force Reserve Command units, to:

> Mow aircraft movement area (AMA) to maintain a grass height between 7 and 14 inches. The AMA, as defined in UFC 3-260-01, *Airfield and Heliport Planning and Design*, is that area of the airfield encompassed by the Primary Surface[1] and the Clear Zones[2], as well as apron areas and

[1] Primary Surface: An imaginary surface symmetrically centered on the runway, extending 200 feet beyond each runway end. The width of the Primary Surface is dependent upon the class of runway and coincides with the lateral clearance distance. At Westover ARB, the Primary Surfaces are 2,000 feet wide, extending 1,000 feet from and perpendicular to the runway centerline on each side.

[2] Clear Zone: Surface on the ground (or water) beginning at the runway end and symmetrical around the runway centerline. The Clear Zones at Westover ARB reflect Air Force standards for large, fixed-wing aircraft. They measure 3,000' wide; i.e. 1,500 feet from either side of the runway centerline.

> taxiways, regardless of their location. As a minimum, turf shall be maintained 500 feet outside the AMA boundary where able. Installations located in arid climates where growing grass is difficult may develop natural vegetation on the airfield to limit attractiveness to wildlife. These situations require comprehensive vegetation/wildlife hazard management and will be reviewed individually by Headquarters Air Force Safety Center (HQ AFSEC/SEFW) for approval. Installation safety offices may request a grass height restriction waiver from HQ AFSEC/SEFW after Major Command (MAJCOM) coordination. (*Section 7.3.1.4.9 – Grass Height*)

Formerly, the AFI had left to the discretion of the Bird Hazard Working Group (BHWG) at each Air Force installation the decision of where on the airfield to maintain the grass at a height between 7 and 14 inches. The BHWG at Westover ARB had used that discretion, with the support of the USAF BASH Safety Team in 2001 and 2004, to delay mowing of more than half of the airfield grasslands for about 8-10 weeks (compared to initiation of mowing of the inner airfield adjacent to the runways and taxiways). Mowing of these outer areas (away from airfield pavements) was originally delayed in order to reduce the BASH risk from gulls and other species that prefer short grass. An ancillary effect of this delay allowed breeding and nesting by grassland birds that are listed by Massachusetts as endangered or threatened.

In June 2013, the USAF issued a Draft Environmental Assessment (EA) proposing an increase in the acreage that would be more frequently mowed at Westover ARB to comply with the recently revised AFI. The Preferred Alternative would have initiated mowing of approximately 730 additional acres of airfield earlier in the growing season to comply with the AFI. The June 2013 Draft EA included two alternatives which incrementally, but to a lesser degree, would have expanded the acreage of more frequently mowed grasslands, namely: Alternative 1 (Currently Mowed Area with an Additional 42.2 Acres Mowed) and Alternative 2 (Incorporates Alternative 1, plus Runway Clear Zones; i.e. an Additional 217 Acres Mowed). However, the June 2013 Draft EA noted that Alternatives 1 and 2 would only be viable approaches to vegetation management if a waiver could be obtained from the Air Force Safety Center. The June 2013 Draft EA also included a third alternative (Use of Vegetation Growth Inhibitors and Supplemental Mowing).

The USAF received comments on the June 2013 Draft EA from the Director of the Massachusetts Division of Fisheries & Wildlife (MA DFW), the State Ornithologist at MA DFW, the Director of Public Policy & Government Relations at Mass Audubon, and the Vice President for Research and Monitoring at New Jersey Audubon. These commenters expressed concern that the Preferred Alternative put forward by the USAF in the June 2013 Draft EA could have significant adverse impacts on grassland birds listed by Massachusetts as endangered or threatened. The commenters cited research (Jones, 2000; Shriver et al., 2005; among others) stating that the extensive grasslands at Westover ARB support the largest single breeding population of grasshopper sparrows and upland sandpipers in New England.

In light of the comments offered by these agencies, the USAF has reconsidered the alternatives for implementing the Proposed Action, and is herein providing a revised Environmental Assessment, which includes the selection of a different Preferred Alternative for implementing the Proposed Action.

1.2 PURPOSE AND NEED FOR THE PROPOSED ACTION

The Proposed Action addressed in this EA is the management of airfield vegetation on Westover ARB to maximize flight safety, minimize the BASH risk, and comply with the revised AFI 91-202, while conserving state listed species to the extent practicable as required by AFI 32-7064.

By means of the revised AFI 91-202, the US Air Force has directed its host organizations to maintain the AMAs and areas within 500 feet of AMAs at a grass height between 7 and 14 inches to minimize the attractiveness of airfield grassland as habitat for birds and other wildlife that contribute to the BASH hazard. Low vegetation (generally less than 7 inches in height) attracts gulls, European starlings, and other avian species such that they have an unobstructed view while loafing or feeding. In addition, short grass also allows easier access to insects for various wildlife species and small mammals for birds of prey.

High vegetation (generally taller than 14 inches in height) provides more cover and forage for both large and small mammals. Deer, coyotes, and feral/domestic dogs are difficult to observe and remove in high vegetation. AFI 91-202, part 7.3.1.4.8 states, "Maintain a zero tolerance toward large free-roaming animals on or adjacent to the aircraft movement area (free roaming animals include, but are not limited to, deer, canines, geese, etc.). Allowing grass to grow above the set AFI standard of 7-14 inches hinders BASH program personnel from executing the above AFI regulation. In recent years, USDA staff monitoring for BASH species at Westover ARB have detected the presence of large mammals, such as deer, through presence of scat, but have been unable to locate the mammals, in large part due to the tall grass in the areas adjacent to the AMA. Additionally, USDA staff have observed an increase in wild turkey near the airfield areas, but are unable to track these large birds when they enter higher grass. Knowing that a large animal is within the controlled area, but not readily observable, is of great concern to flight operations.

The purpose of the Proposed Action is to manage airfield vegetation in a manner that complies with the AFI 91-202, paragraph 7.3.1.5.9 grass height standard (maintaining grass height within 500 feet of an AMA at a height between 7 and 14 inches) while conserving state listed species to the extent practicable as required by AFI 32-7064, paragraph 7.1.2.

Military readiness, USAF mission, and safety of aircrews and aircraft are paramount to all other activities on the airfield. The need for the Proposed Action is to protect flight safety by reducing the bird/wildlife aircraft strike hazard (BASH) risk, as collisions between fauna and aircraft can

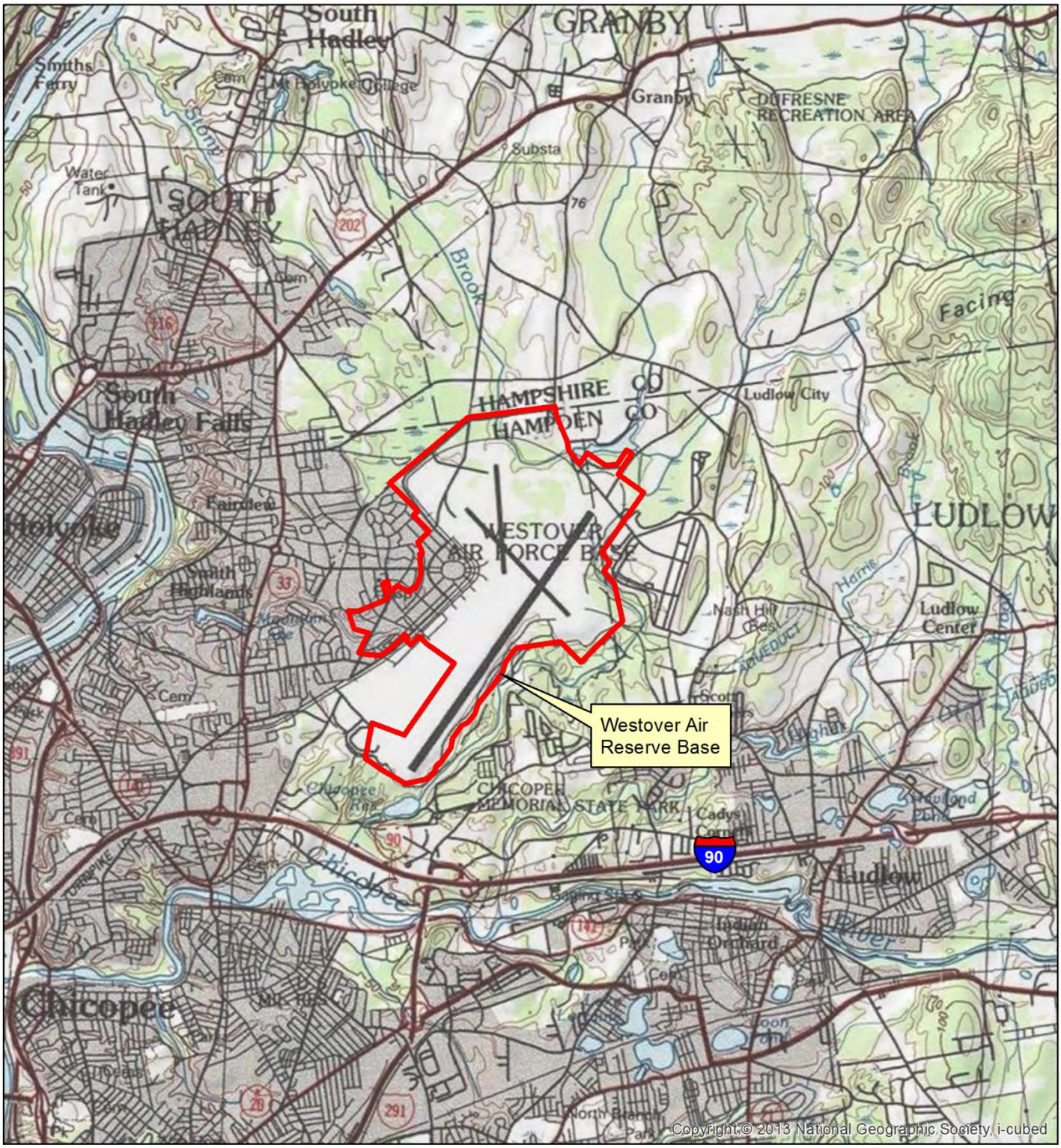
cause loss of life and substantial damage and loss of property, as well as interfere with the flying mission and military readiness of Westover ARB. This includes not only the C-5B aircraft located at Westover ARB, but also all of the other transitory aircraft that utilize this airfield. Data from Westover ARB, spanning the period 1998 to 2011 indicate that, on average, 5-10 BASH incidents occur in the Summer/Fall each year, with a peak of nearly 30 BASH incidents reported in late Summer 2005.

The USAF reported more than 192 wildlife strikes with military aircraft in Massachusetts in the 15 year period spanning 1985 to 2000, resulting in hundreds of thousands dollars in damage to aircraft (USDA, 2002). The risk that birds pose to aircraft is well documented, with 27,433 civil aircraft collisions with birds reported in the USA from 1990 to 1999 (Cleary et al., 2000). A prime example where pro-active management would have saved human lives occurred in September 1995, when an USAF AWAC aircraft crashed immediately after take-off at Elmendorf Air Force Base, Alaska, killing all 24 personnel on board. The plane struck a flock of Canada geese that had been observed on a field adjacent to the airfield (USDA, 2002). Similarly, the risk that mammals pose to aircraft is well documented, with 420 civil aircraft collisions with deer reported in the USA from 1990 to 1999 (Cleary et al., 2000). Mammal strikes result in aircraft damage and countless hours of aircraft down time, and in some cases, injuries to passengers and crew. Since 1985, the USAF has recorded approximately 200 strikes that involved aircraft and mammals. Of these strikes, deer are the most costly to aircraft (USDA, 2002).

1.3 APPLICABLE ENVIRONMENTAL REGULATIONS AND REQUIRED COORDINATION

This EA addresses the Proposed Action (including Action and No Action alternatives) in accordance with the National Environmental Policy Act (NEPA) (42 United States Code [USC] 4321-4347), Council on Environmental Quality (CEQ, 1978) Regulations for Implementing the Procedural Provisions of NEPA (40 Code of Federal Regulations [CFR] §§ 1500-1508), and AFI 32-7061 The Environmental Impact Analysis Process, as promulgated by 32 CFR Part 989, Environmental Impact Analysis Process.

NEPA implementing regulations require coordination with relevant federal, state, and local agencies to evaluate the potential environmental impacts of implementing the Proposed Action. Westover ARB is coordinating with regulatory agencies, including the Massachusetts Department of Fish and Game Natural Heritage and Endangered Species Program (NHESP). Westover ARB does not expect any formal Endangered Species Act (Section 7) consultation (because there are no federally protected species on base) nor any National Historic Preservation Act (Section 106) consultation (because mowing would not affect cultural resources). Westover ARB and the US Fish & Wildlife Service (USFWS, Region 5) agree that airfield mowing is a Military Readiness activity that is exempted from MBTA permit requirements. Thus, formal consultation with USFWS is not anticipated. A list of agencies to which a copy of this EA has been provided is included in Chapter 6.



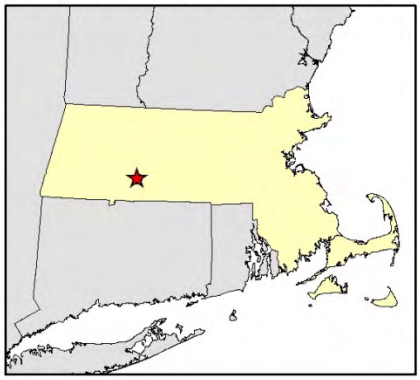


Figure 1-1.
Location of Westover Air Reserve Base (WARB)

Westover ARB
Chicopee, MA 01022

N

1 inch = 6,000 feet

0 3,000 6,000
Feet

G:\Projects\MUNI\60285541\WST\Maps\Figure 1.1-1 Location of Westover Air Reserve Base (WARB).mxd

2.0 DESCRIPTION OF THE PROPOSED ACTION, INCLUDING ACTION AND NO ACTION ALTERNATIVES

2.1 INTRODUCTION

Control of wildlife activity is essential to safe flight operations. As is the case at all airfields, a bird/wildlife strike hazard exists at Westover ARB and its vicinity due to resident and migratory birds and other wildlife. Daily and seasonal bird/wildlife movements create various hazardous conditions. Among the key contributors to the BASH risk at Westover ARB are:

- Mammals: Deer, coyote, fox and moose present a direct strike risk. Rabbits, mice, and voles contribute indirectly to the strike risk, as prey species for raptors and other mammals.
- Birds of Prey (raptors): Hawks, eagles, owls, turkey vultures, and falcons are hazardous to local aircraft because they fly and hover over the airfield. While hunting, they soar at aircraft traffic pattern altitudes, thus increasing the risk of conflict with aircraft.
- Gulls: Gulls are attracted to the three active landfills located north and south of the base.
- Waterfowl: The Canada goose is a species of major concern due its large body size and occurrence in flocks. The local Canada goose population varies from less than 100 residents in the summer and winter to nearly 1,000 migratory birds in the spring and fall.
- "Black" birds (including members of Icteridae, Corvidae, and other families): Starlings, cowbirds, red-winged blackbirds, and American crows are particularly hazardous to local aircraft because of their flocking behavior.

Tall vegetation attracts and provides food and cover for small mammals such as rabbits, voles, shrews, and mice that, in turn, attract both terrestrial (coyote and fox) and avian predators (hawks, owls, falcons, and herons) to the airfield. Controlling the height of vegetation has been shown to reduce small mammal presence within grassland habitats (Seamans et al., 2007; Washburn and Seamans, 2007), thus decreasing the attractiveness of the airfield to hazardous raptor species.

Although smaller birds may not take down a large aircraft, smaller birds are prey for raptors, and during nesting, this attractiveness increases to both avian and terrestrial predators. Even an ingestion of a small bird or flock of small birds can take an asset off the flight line for inspection or repair, impacting the USAF mission and military readiness. Similarly, a crack to the leading edge of an aircraft's wing due to a raptor strike can take that aircraft offline for repair, further impacting military readiness. The difference between a non-damaging strike, a Class A, or a catastrophic loss of life is often only a matter of millimeters (depending on what part of the aircraft is struck). Additionally, not all aircraft that utilize Westover ARB are large. In a typical

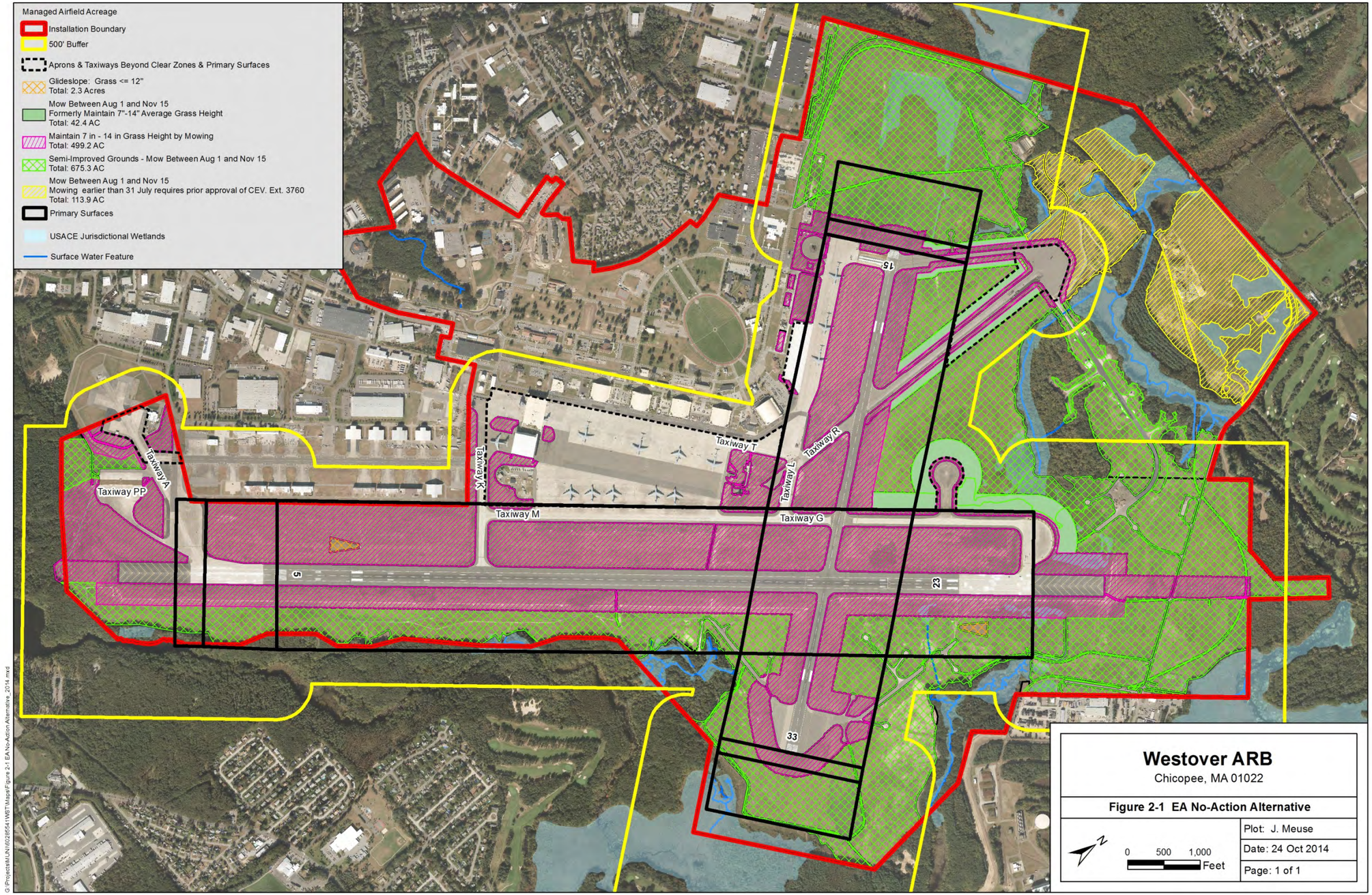
year, Westover ARB has over 7,000 take-off or landings by civil or general aviation aircraft (Westover ARB, 2014a).

In the past couple decades, Westover ARB has historically not mowed the 675 acres encompassing portions of the AMA and the adjoining 500-foot buffer until 1 August of each year. The delayed mowing of these areas was intended to discourage gulls (and their associated BASH risk); however, an ancillary effect of the delayed mowing provided habitat for breeding grassland birds, including state-listed endangered or threatened species. This chapter describes Westover ARB's Proposed Action, relative to a change in vegetation management approach, to comply with AFI 91-202, for the semi-improved grounds that previously had been mowed only once per year.

2.2 THE NO ACTION ALTERNATIVE

The No Action alternative would be the continuance of the current mowing program (Figure 2-1). This mowing program maintains grass height between 7 and 14 inches within approximately 499 acres of the AMA (shown as pink hatching on Figure 2-1, accomplished by approximately 2-3 mowing cycles per year beginning in late May or early June.

Approximately 832 acres, including portions of the AMA, the buffer zone extending 500 feet from the AMA, and areas beyond the 500 foot buffer zone, are currently mowed once per year, between 1 August and 15 November. A portion of this area includes semi-improved grounds (areas shown as green cross-hatching in Figure 2-1) which comprise approximately 675 acres and are mowed once per year at a height of 7 inches to prevent the establishment of woody species. A small area in the vicinity of the compass rose (which looks like a cul de sac on Figure 2-1), as well as narrow strips (50-75 feet wide) along the northern taxiways (approximately 36.7 acres, shown in light solid green on Figure 2-1), are also mowed once between August 1 and November 15. These areas had been maintained between 7 and 14 inches under Westover ARB's most recently approved mowing plan (i.e. 2004). The present delay in mowing these areas reflects a consensus that Westover ARB reached with NHESP in 2009. A predominantly wetland area to the northeast of the compass rose (solid light green) is occasionally trimmed through a combination of mowing and hand tools (encompassing approximately 5.7 acres). The combined area of the compass rose area, northern taxiways areas, and predominantly wetland area near the compass rose is 42.4 acres.


Managed Airfield Acreage
Installation Boundary
500' Buffer
Aprons & Taxiways Beyond Clear Zones & Primary Surfaces
Glideslope: Grass <= 12"
Total: 2.3 Acres
Mow Between Aug 1 and Nov 15
Formerly Maintain 7"-14" Average Grass Height
Total: 42.4 AC
Maintain 7 in - 14 in Grass Height by Mowing
Total: 499.2 AC
Semi-Improved Grounds - Mow Between Aug 1 and Nov 15
Total: 675.3 AC
Mow Between Aug 1 and Nov 15
Mowing earlier than 31 July requires prior approval of CEV. Ext. 3760
Total: 113.9 AC
Primary Surfaces
USACE Jurisdictional Wetlands
Surface Water Feature
Taxiway A
Taxiway PP
Taxiway K
Taxiway T
Taxiway R
Taxiway L
Taxiway M
Taxiway G
15
5
23
33
Westover ARB
Chicopee, MA 01022
Figure 2-1 EA No-Action Alternative
0 500 1,000
Feet
Plot: J. Meuse
Date: 24 Oct 2014
Page: 1 of 1
G:\Projects\MUNI\60226541\WST\Maps\Figure 2-1 EA No-Action Alternative_2014.mxd

Approximately 114 acres in the northern portion of the base (shown as yellow hatching) are typically mowed once per year between August 1 and November 15, but mowing occasionally occurs earlier (with advance coordination and approval by Westover ARB's natural resources manager) to allow for training activities (e.g., field encampments, evacuating medical patients, loading aircraft).

Glide slope areas (totaling approximately 2.3 acres, shown as cross-hatched orange polygons on Figure 2-1) on either side of the primary runway are maintained at heights less than 12 inches, and developed portions of the base, beyond the airfield, are typically mowed more frequently to maintain a lawn appearance.

Mowing is, and would be, performed by the Base Operating Support (BOS) Contractor. However, continuing with the current mowing program (No Action Alternative) would leave Westover ARB in non-compliance with AFI 91-202. Military readiness, USAF mission, and safety of aircrews and aircraft would potentially be jeopardized by non-compliance with AFI 91-202. As such, the No Action Alternative does not meet the project purpose and need. However, the No Action Alternative is evaluated in this EA pursuant to NEPA requirements, and provides a baseline against which the action alternatives may be evaluated.

2.3 ACTION ALTERNATIVES ELIMINATED FROM FURTHER CONSIDERATION

In response to the comments received on the June 2013 Draft EA, the USAF has reconsidered the alternatives for implementing a modified vegetation management approach. The USAF recognizes the concerns raised by the commenters, and strives to implement an action which will achieve the USAF purpose of increasing flight safety and comply with AFI 91-202, while minimizing impact to the natural environment to the maximum extent practicable.

Subsequent to the June 2013 Draft EA, Westover ARB coordinated with its Major Command and the USAF Safety Center (HQ AFSEC/SEFW) and explored the possibility of seeking a waiver from AFI 91-202. HQ AFSEC/SEFW has stated unequivocally that no waivers from the mowing requirements outlined in the updated AFI 91-202 will be granted for any purpose other than military readiness, USAF mission, or flight safety (USAF, 2013). The Safety Center only considers waivers in circumstances where it is not possible to grow grass to the minimum 7 inches (e.g. arid regions of Southwestern USA) or where taller grass may be required to discourage Canada geese (e.g. parts of Alaska with large Canada goose populations) (Westover ARB, 2014). While some resident Canada geese are present at/near Westover ARB, the base does not have a significant problem with resident Canada geese. Westover ARB mitigates the BASH risk during the seasonal migrations through operational controls, such as minimizing flights at dawn and dusk, and then applying harassment and/or removal strategies, if necessary. Thus, it is unlikely that Westover ARB would be able to justify a waiver request based on Canada geese.

As a result of the clarification provided by HQ AFSEC/SEFW, the USAF has concluded that it will not be possible to obtain a waiver from AFI 91-202 at Westover ARB. Consequently, two of the previously proposed alternatives; formerly referred to (in the June 2013 Draft EA) as Alternative 1 and Alternative 2, are no longer viable options, as they would be incapable of meeting the project purpose and need.

The former Alternative 1 was referred to as "Currently mowed area with an additional 42.4 acres mowed". This option would have followed the same mowing program as described above for the "No Action Alternative", but would have included a resumption of more frequent mowing in the small area (36.7 acres) in the vicinity of the compass rose, as well as the narrow strips (50-75 feet wide) along the northern taxiways, to include these areas within the limits of grassland to be maintained between a height of 7 and 14 inches. The predominantly wetland area to the northeast of the compass rose (encompassing approximately 5.7 acres) would also have been cut more frequently, to keep this vegetation within the prescribed height of 7 to 14 inches. Thus, the combined area of the compass rose area, northern taxiways areas, and predominantly wetland area near the compass rose (42.4 acres) would have been included in the same mowing protocol as currently employed on the inner airfield. This option reflected a slight increase in mowing compared to existing conditions, but still reflects a substantial deviation from the requirements identified in the revised AFI 91-202. This alternative would leave substantial areas of tall vegetation in which mammals (fox, deer, coyotes, wild dogs) and large birds (turkeys) could hide without being seen by airfield operations personnel. As such, this option does not sufficiently reduce the risk of bird/wildlife collisions with aircraft, and has been eliminated from further consideration.

The former Alternative 2 was referred to as "Incorporates Alternative 1, plus Runway Clear Zones". This option would have included those areas described under the former Alternative 1, but also would have added the Runway 05/23 clear zones to the area that would be maintained at a grass height between 7 and 14 inches. Nearly 94% of the take-offs and landings use Runways 05/23, with only 6% using the other runways (Westover ARB, 2013). As clear zones reflect one of the highest accident potential zones on the airfield, this option provided additional hazard mitigation when compared to the former Alternative 1, but still falls short of compliance with regard to other portions of the AMA, as well as the 500-foot area extending from the AMA. Likewise, this alternative would leave substantial areas of tall vegetation in which mammals and large birds could hide without being seen by airfield operations personnel. As such, this option also does not sufficiently reduce the risk of bird/wildlife collisions with aircraft, and has been eliminated from further consideration.

2.4 ACTION ALTERNATIVES EVALUATED IN THIS EA

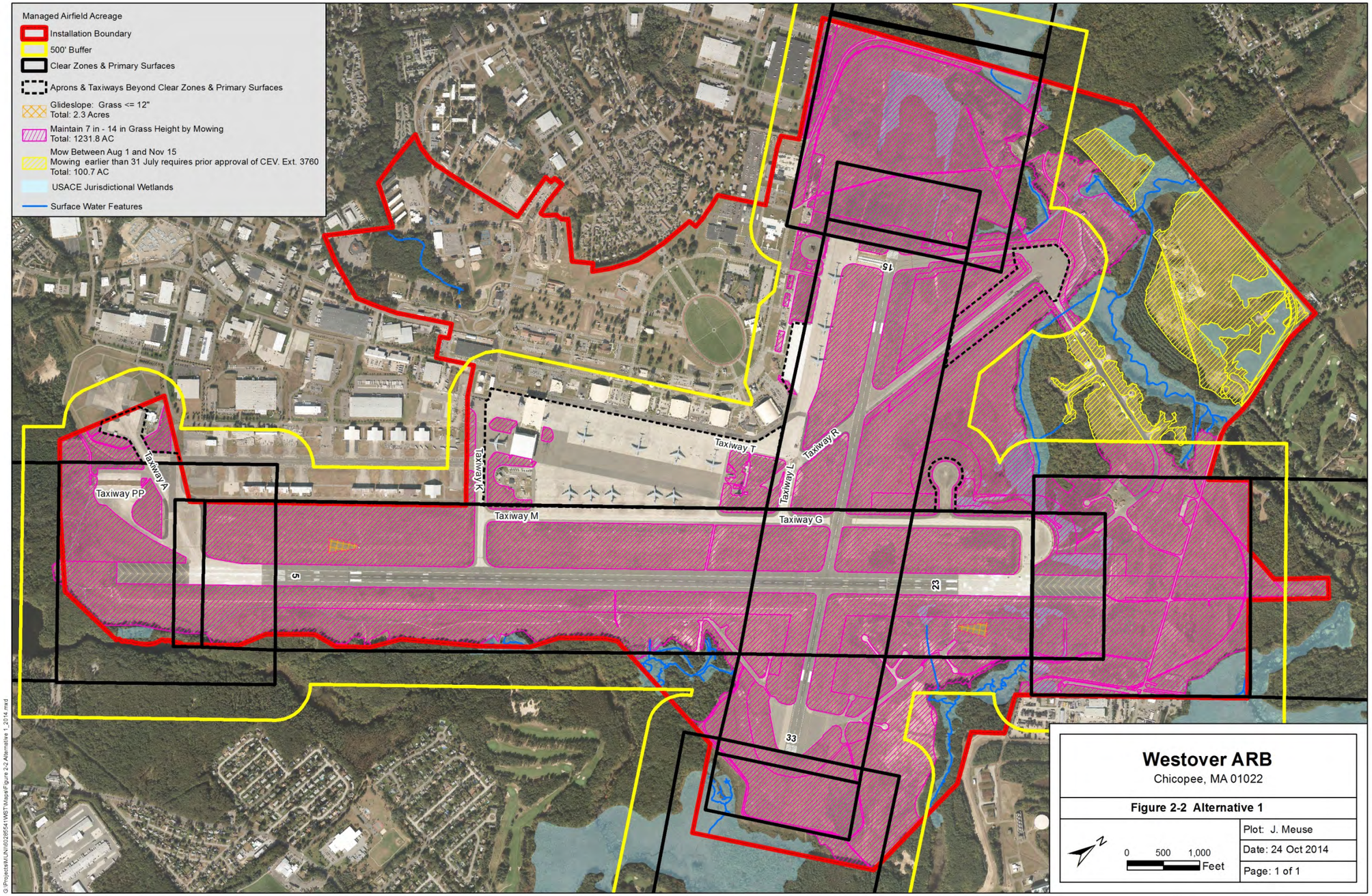
Thus, this EA evaluates two action alternatives. The previously designated Preferred Alternative, as presented in the June 2013 Draft EA, is now referred to as Alternative 1. Alternative 1 is described in Section 2.4.1.

A new Preferred Alternative, as described in Section 2.4.2, has been developed by the USAF after consultation among various USAF stakeholders (e.g. BASH experts, Operations personnel, natural resource specialists), MA DFW, and outside consultants. The new Preferred Alternative was developed in collaboration with representatives from MA DFW who visited Westover ARB in Summer 2014 and participated in a subsequent consultation teleconference in October 2014. The new Preferred Alternative is an adaptation (and evolution) of the previously evaluated Alternative 3, i.e. use of vegetative growth inhibitors and supplemental mowing); however, this alternative has been expanded to include additional management controls suggested by the stakeholders, including integration of a pre-emergent herbicide (to control invasive weeds) and application of prescribed burns (to restore the ecosystem to more desirable warm season grasses).

2.4.1 Alternative 1 (Initiate Mowing Earlier in the Growing Season and Increase the Frequency of Mowing)

Alternative 1 would initiate earlier in the growing season the mowing of the outer airfield grasslands at Westover ARB, and increase the frequency of mowing, to maintain grass height between 7 and 14 inches in compliance with the revised AFI 91-202. This includes mowing the AMA and areas within 500 feet of the AMA where able (i.e. where grass presently exists). The limit of the proposed mowing is depicted with pink hatching on Figure 2-2. The limits of mowing generally correspond to all grassy areas (i.e. non-pavement or non-wooded) within the airfield's primary surface and clear zones (shown as black lines) and extending 500 feet beyond the AMA (shown as a yellow line). As reflected in Figure 2-2, some areas within 500 feet of the AMA are excluded from the mowing plan because they are either currently forested and/or extend off-base.

The mowing plan, however, does include a few areas beyond the limits of the 500-foot buffer for the AMA. If Westover ARB were to apply a strict interpretation of the AFI, these irregularly shaped patches of grass along the outer edges of the airfield (i.e. beyond the yellow line shown on Figure 2-2), would not be required to be maintained at grass heights between 7 and 14 inches. However, these fragmented patches of taller grass by themselves would be insignificant to grassland birds for breeding, as the patches are too small and too close to wooded areas that shelter


Managed Airfield Acreage
Installation Boundary
500' Buffer
Clear Zones & Primary Surfaces
Aprons & Taxiways Beyond Clear Zones & Primary Surfaces
Glideslope: Grass <= 12"
Total: 2.3 Acres
Maintain 7 in - 14 in Grass Height by Mowing
Total: 1231.8 AC
Mow Between Aug 1 and Nov 15
Mowing earlier than 31 July requires prior approval of CEV. Ext. 3760
Total: 100.7 AC
USACE Jurisdictional Wetlands
Surface Water Features
Taxiway A
Taxiway PP
Taxiway K
Taxiway T
Taxiway L
Taxiway R
Taxiway M
Taxiway G
15
5
23
33
Westover ARB
Chicopee, MA 01022
Figure 2-2 Alternative 1
0 500 1,000
Feet
Plot: J. Meuse
Date: 24 Oct 2014
Page: 1 of 1
G:\Projects\KU\NI\02854\1\MXD\Figure 2-2 Alternative 1_2014.mxd

predators. One of the areas is part of the airfield drop zone that is disturbed by dropped loads and vehicles, and another is a training ground that is already mowed when necessary to reduce personnel's exposure to deer ticks. In addition, from a maintenance perspective, it is not practicable to separately mow these small patches at a different height than the adjacent portions of the airfield. Thus, these patches are included in the mowing plan.

Some areas of Westover ARB that are beyond the airfield but within 500 feet of the AMA are currently managed as lawn. They show near the middle of Figure 2-2 as small, light green patches, inside the yellow line on the aerial photograph. They are north, east and south of the grassy ellipse nearby. Those familiar with the area will recognize them as lawns for the following buildings: operational contracting, the hangar complex, airfield operations, fitness center, U.S. Navy Reserve (USNR) and U.S. Marine Corps Reserve (USMCR). They total approximately 30 acres that would continue to be maintained at a height more consistent with manicured lawns (e.g. 2-5 inches).

Glide slope areas (approximately 2.3 acres, shown as cross-hatched orange polygons on Figure 2-2) on either side of the primary runway would continue to be maintained at heights less than 12 inches as required for proper performance of these aids to air navigation.

The total grassland area to be continuously maintained between 7 and 14 inches in height under Alternative 1 encompasses approximately 1,232 acres (all pink hatched areas in Figure 2-2). Of this area, approximately 499 acres are presently maintained between 7 and 14 inches, in accordance with Westover ARB's previously approved mowing plan[3]. The additional area (e.g. 733 acres) is currently mowed once per year, but would likely increase to approximately 2-3 mowings per year, to achieve compliance with the revised AFI. An additional area of approximately 101 acres beyond the 500 foot buffer line (shown in yellow hatching) is anticipated to be mowed once per year (between 1 August and 15 November), unless training or other mission activities require the area to be mowed earlier or more frequently, consistent with the current mowing protocol.

The revised requirement to maintain all of the airfield grasslands at a height between 7 and 14 inches will require Westover ARB to initiate mowing of those approximately 733 acres earlier in the season which will overlap with the nesting season of certain grassland birds. In a typical year, it is expected that the first mowing would occur in late May or early June (dependent upon prior month's weather conditions). A warm, wet Spring may result in the need to initiate mowing by mid-May.

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[3] Westover ARB's mowing plan has been considerably revised twice since 2000. The purpose has been to reduce BASH risk. In July 2001, following a survey by the Chief of the USAF BASH Team, a senior USDA wildlife biologist, and a NHESP senior zoologist, the mowing plan was revised to the agreement of all parties. The mowing plan was revised again in August 2004. Notable changes to the plan included the reduction of habitat near the Runway 23/33 area, an increase in grassland bird breeding habitat along the Runway 05 eastern edge, the planned conversion of airfield grass to little bluestem, and the increase in grassland habitat via the conversion of woody/semi-improved grounds and forested areas to grasslands.

The increased mowing would be performed by the Base Operating Support (BOS) Contractor responsible for mowing the inner airfield grasslands. The decision to initiate mowing of the outer airfield grasslands would be made following the guidance currently used to decide when to initiate mowing of the inner airfield grasslands, i.e. Air Force Pamphlet (AF PAM) 91-212. Paragraph 2.3.1.1 of AF PAM 91-212 states "Airfields with a variety of grass species should be mowed when the average grass height, not including seed heads, exceeds tolerance." Base Operations personnel would inspect the airfield daily and provide guidance on the area(s) of the airfield that may need mowing sooner than others. AF PAM 91-212 further advises "Begin mowing adjacent to runways and finish in the infield or outermost grass areas. This causes insects and other animals to move away from aircraft takeoff and landing areas. Also, avoid mowing grass shorter next to the runway than in other areas, as much as possible." While there would be no set pattern/phasing for the mowing at Westover ARB (to allow flexibility to respond to requests from Base Operations, Base Civil Engineer, or to react to weather, equipment problems, etc.), past experience has demonstrated that the runways and taxiway pavement edges show the earliest growth, and thus would be mowed first. The mowers would then target the next fastest growing vegetation, which can vary year to year depending on snowfall and/or rainfall (as well as localized variations in soil fertility, drainage, and vegetation type). Typically, it has taken 4 to 5 weeks to complete one full mowing of the inner 499 acres, and then the cycle repeats with the mowers returning to the areas immediately adjacent to runways and taxiway pavement edges. If Alternative 1 were implemented, it is anticipated that the BOS contractor would need to purchase/lease additional tractors and mowing equipment in order to maintain the expanded acreage within the 7-14" criteria.

2.4.2 Alternative 2 - Preferred (Application of Plant Growth Regulators When Possible; Followed by Mowing As Necessary, with Additional Management Tools, such as Pre-Emergent Herbicides and Prescribed Burns)

Under the Preferred Alternative (Alternative 2), the height of the additional grasslands beyond the inner airfield area will be maintained at 7-14 inches through a multi-component management approach, including the application of pre-emergent herbicides, plant growth regulator, prescribed burns, and mowing when vegetation height exceeds the 14-inch threshold.

Pre-Emergent Herbicide. In Spring 2015, a pre-emergent herbicide would be applied to all airfield grasslands, including the inner 499 acres (already mowed at 7-14") and the outer grasslands (733 acres), totaling approximately 1,232 acres. The intent of the pre-emergent herbicide is to reduce the abundance of broad-leaved weeds, which tend to have early season vigor and thus achieve a height of 14 inches earlier than warm season grasses. The specific herbicide has not yet been selected by Westover ARB and may potentially include a formulation that also targets cool season grasses, as they too tend to achieve a height of 14 inches earlier than warm season grasses. The pre-emergent herbicide application may be repeated in subsequent Spring seasons, if additional control is needed. Additionally, herbicides (such as Embark®/

Milestone®/Garlon®) may be applied in the Summer/Fall after initial mowings, if necessary. All herbicides will be applied in accordance with the manufacturer's label instructions and restrictions.

The herbicide will be applied under the direction of the BOS contractor by a tractor with a tank and boom. It is estimated that 100 acres per day can be effectively sprayed with herbicide. Thus, it is anticipated that full coverage of the airfield grasslands will be achieved in 12 to 13 working days.

Plant Growth Regulator. Initially, in Spring 2015, a plant growth regulator would be applied to the outer grasslands (approximately 733 acres) now required by the revised AFI 91-202 to be managed at the 7-14 inch height. Plant growth regulators are chemical compounds typically applied to golf course roughs, highway roadsides, and airports to suppress seedhead development and vegetative growth of desirable grass species. With early Spring application, the use of plant growth regulators is anticipated to delay the first mowing required (by approximately 8-10 weeks, although annual variations may occur) to maintain the grass at heights between 7 and 14 inches. Westover ARB has not yet selected a specific plant growth regulator, although the use of Plateau® (active ingredient: imazapic), Stronghold®/Embark® (active ingredient mefluidide), Escort® (active ingredient: metsulfuron), or a comparable product is anticipated (see Appendix A for a sample manufacturer's product label for a plant growth regulator). These products may be combined with one or more herbicides to control woody, invasive, or broadleaved weed species where necessary. While only the outer airfield grasslands (depicted in blue hatching in Figure 2-3) are initially planned for treatment with plant growth regulator, if its use is determined to be effective, application of plant growth regulator may be expanded to the inner airfield (i.e. 499 acres) in subsequent years.

Application of the plant growth regulator will be via a tractor with a tank and boom, and be in accordance with the manufacturer's label instructions and restrictions. In Spring 2015, it is anticipated that the plant growth regulator will be tank-mixed with the pre-emergent herbicide (described above) so that only one application is necessary. At the estimated application rate of 100 acres per day, it is expected that the plant growth regulator can be applied to the outer grasslands (i.e. 733 acres) in 7 to 8 working days. For maximum efficacy, application of the plant growth regulator is anticipated to occur between April 15 and May 15, dependent upon early Spring weather patterns and other factors (such as availability of equipment). Note that most plant growth regulators require a period of at least 2-4 hours without precipitation in order for foliar absorption of the chemical to occur. Thus, Westover ARB would not apply the plant growth regulator when weather forecasts indicate rainfall is imminent. An extremely rainy Spring could potentially prevent Westover ARB from completing the application of plant growth regulator within the targeted timeframe (i.e. April 15 to May 15).

Prescribed Burns. Controlled burn of portions of the airfield grassland will occur each year in accordance with Westover ARB's Prescribed Fire Plan (Westover ARB, 2013c). The annual controlled burns are anticipated to slowly transition the ecosystem towards one with a greater dominance of warm season grasses, rather than cool season grasses and broad-leafed weeds (both of which tend to require earlier mowing to maintain heights below the 14-inch threshold). Westover ARB is divided into 25 fire unit areas. Annually, approximately 200 to 250 acres will be burned during the dormant season (primarily during March and April), with an expected period of return of 5 years to include all the airfield grasslands. Burns will be performed by trained personnel, between the hours of 0800 and 1730 (to comply with Massachusetts Department of Environmental Protection standards). An illustrative map of the fire units at Westover ARB and conceptual schedule for burn is provided in Appendix B. It should be noted that there are a number of constraints around which burning must be scheduled, e.g. red flag conditions, fire crew availability, wind, precipitation, cloud cover, air quality, and aircraft movement.

Mowing. For the inner airfield, Alternative 2 (like Alternative 1) entails the same mowing protocol as is currently performed under the No Action Alternative (approximately 499 acres presently maintained at 7-14 inches as shown in pink hatching on Figure 2-3). For the outer grasslands (approximately 718 acres, shown in blue hatching on Figure 2-3), mowing would be initiated (anticipated in mid/late July) following the initial suppression by the plant growth regulators. As with Alternative 1, the decision to initiate mowing of the outer airfield grasslands would be made in accordance with the guidance currently used to decide when to initiate mowing of the inner airfield grasslands, i.e. Air Force Pamphlet 91-212. In the event that plant growth regulators cannot be applied or are ineffective or become cost prohibitive, the Air Force will consult with USFWS and MADFW to develop an alternate strategy to implement the 7"-14" grass height standard required by AFI 91-202.

Areas beyond the 500 foot buffer as shown in yellow hatching (approximately 114 acres) will still be cut just once per year between 1 August and 15 November. Consistent with the currently approved protocol, mowing of these areas may occur before 1 August to allow for training activities as needed, with advance coordination and approval by Westover ARB's natural resources manager.

Similarly, glide slope areas (approximately 2.3 acres, shown as cross-hatched orange polygons on Figure 2-3) on either side of the primary runway would be maintained at heights less than 12 inches via regular mowing. Likewise as with Alternative 1, some areas of Westover ARB beyond the airfield but within 500 feet of the AMA that are currently lawn (e.g., near the ellipse, gym, USNR, and USMCR) will be maintained at a height more consistent with manicured lawns (e.g. 2-5 inches).

Managed Airfield Acreage

- Installation Boundary
- 500' Buffer
- Clear Zones & Primary Surfaces
- Aprons & Taxiways Beyond Clear Zones & Primary Surfaces
- Glideslope: Grass <= 12"
  Total: 2.3 Acres
- Maintain 7 in -14 in Grass Height using Plant Growth Regulators with Follow-Up Mowing As Necessary
  Total: 717.6 AC
- Mow Between Aug 1 and Nov 15
  Mowing earlier than 31 July requires prior approval of CEV. Ext. 3760
  Total: 113.9 AC
- Maintain 7 in - 14 in Grass Height by Mowing
  Total: 499.2 AC
- USACE Jurisdictional Wetlands
- Surface Water Feature
- Apply pre-emergent herbicide to control invasives and cool season grasses; apply prescribed burning selectively to portions of area on an approx. 7 year period of return.

Taxiway PP
Taxiway A
Taxiway K
Taxiway M
Taxiway T
Taxiway L
Taxiway R
Taxiway G
15
5
23
33

Westover ARB
Chicopee, MA 01022

Figure 2-3 Alternative 2 (Preferred)

0 500 1,000 Feet

Plot: J. Meuse
Date: 24 Oct 2014
Page: 1 of 1

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Implementation of Alternative 2 would achieve substantial compliance with the revised AFI. As such, Alternative 2 is not anticipated to require a waiver from HQ AFSEC/SEFW, other than the minor deviation related to lawn areas in developed portions of the base. Additionally, the application of the herbicides and plant growth regulator would be implemented in accordance with AFI 32-7064 (Natural Resources, Chapter 13: Invasive Species Management), AFI 32-1053 (Integrated Pest Management Program), and Executive Order 13112 (Invasive Species).

2.5 SCOPE OF THE ENVIRONMENTAL ASSESSMENT

This EA was scoped to identify relevant environmental parameters to be analyzed in depth. The purpose of this process is to de-emphasize insignificant issues and focus the scope of the environmental analysis on significant issues (32 CFR 989.18). Following a preliminary evaluation of potential environmental consequences (see Table 2-1), it was determined that the following potential environmental effects will be evaluated in detail for the alternatives for implementing the Proposed Action, as well as the No Action alternative: water resources (surface water, ground water, wetlands, and floodplains), biological resources (vegetation, wildlife, and threatened and endangered species), and air quality (climate change and greenhouse gases). Refer to Chapters 3 and 4 for a discussion of the baseline conditions and anticipated effects for these parameters.

Table 2-1. Summary of Potential Environmental Consequences

	No Action	**Alternative 1**	**Alternative 2 Preferred**
Topography, Geology, and Soils	No Effect	No Effect	No Effect
Land Use	No Effect	No Effect	No Effect
Water Resources	Low-Medium	Low-Medium	Medium
Biological Resources	Low-Medium	Medium	Low-Medium
Cultural Resources	No Effect	No Effect	No Effect
Air Quality	Very Low	Very Low	Very Low
Noise	No Effect	No Effect	No Effect
Infrastructure	No Effect	No Effect	No Effect
Transportation	No Effect	No Effect	No Effect
Solid Wastes	No Effect	No Effect	No Effect
Hazardous Materials	No Effect	No Effect	No Effect
Socioeconomics	No Effect	Small Positive Effect	Small Positive Effect
Environmental Justice	No Effect	No Effect	No Effect
Safety & Health	No Effect	Positive Effect	Positive Effect
Aesthetics	No Effect	No Effect	No Effect

The Proposed Action and its Alternatives were determined to be unlikely to have an appreciable effect, either positive or negative, on the following parameters: topography, geology and soils; land use, cultural resources; noise; infrastructure; transportation; solid wastes and hazardous materials; socioeconomics (including environmental justice and children); or aesthetics. Thus, no further discussion of these parameters is warranted as explained below.

Topography: Neither mowing nor the application of plant growth regulators would result in any cut or fill; thus, none of the alternatives have the potential to alter topography.

Geology and Soils: Mowing would not alter geology or soils. Application of plant growth regulators, in compliance with label instructions and applicable law, would not alter geology or soils.

Cultural Resources: No known cultural resources are present on the airfield (Westover ARB, 1995). Moreover, none of the alternatives would result in subsurface disturbance; thus, no adverse effect on archaeological resources would be expected.

Noise: While tractors would generate some noise, these activities are considered insignificant contributors to the overall noise environment at Westover ARB given existing ground and air operations. Additionally, there are no residential receptors within 1,000 feet of the proposed activities; the distance and landscape (including a buffer of mature trees) would attenuate noise.

Infrastructure: The project will not require any additional infrastructure, nor will it place a burden on existing infrastructure.

Transportation: The project would generate less than 5 vehicle trips per day (on average) and would not require any additional parking spaces.

Solid Wastes: The project would generate minimal solid waste. Grass clippings from mowing would be left in place to decompose.

Hazardous Materials: Operation and maintenance of mowing equipment will require the use of fuel, oil, and other potentially hazardous materials; however, Westover ARB has safety procedures in place for these routine activities. Application of herbicides and plant growth regulator would be conducted by a licensed applicator, with appropriate training, in accordance with product labeling and applicable laws.

Safety and Occupational Health: Mowing already occurs on large portions of Westover ARB. The potential increased frequency of mowing would not appreciably increase risks to workers operating the mowing equipment. Application of herbicides and plant growth regulator would be conducted by a licensed applicator, with appropriate training, in accordance with product labeling and applicable laws.

Socioeconomics: A potential increase in mowing would result in a small, but regionally insignificant, increase in spending by Westover ARB, for purchase of additional mowing attachment(s) and fuel. Similarly, the use of herbicides and plant growth regulator would result in a small, but regionally insignificant, increase in spending by Westover ARB. No adverse impacts to minority populations or low income

populations are expected; therefore, the project is consistent with Executive Order (EO) 12898 (*Federal Actions to Address Environmental Justice in Minority Populations and Low-Income)* and EO 13045 (*Protection of Children from Environmental Health Risks and Safety Risks*).

Aesthetics: The project would not alter the viewshed at Westover ARB.

3.0 AFFECTED ENVIRONMENT

3.1 INTRODUCTION

The purpose of this chapter is to provide relevant environmental baseline information to allow for the evaluation of potential environmental impacts that could result from the Proposed Action, the Alternatives, or the No Action Alternative. The baseline resources presented for discussion are those resources most likely to be affected by the Proposed Action or Alternatives.

For the purposes of discussion, "the subject area of this EA" is all of the area located within the 500-foot AMA buffer boundary (yellow line on the attached maps) where those areas lie within the Westover ARB installation and some areas beyond the 500-foot AMA buffer boundary but still located on Base, where specified (e.g. areas of additional mowing beyond the limits of AFI 91-202).

Land uses located within the boundaries of the Westover ARB installation that are also located within the 500-foot buffer subject to AFI 91-202 (and the subject of this EA) include: administrative, aircraft operations and maintenance, industrial, aircraft parking apron, runways, taxiways, infield, Dog Patch training area, mixed grasslands, forests, wetlands, Stony Brook area, and Cooley Brook area. The land management units within this boundary and the subject of this EA total approximately 1,816 acres.

3.2 WATER RESOURCES

The characteristics of surface water and groundwater as well as associated wetlands and floodplains on Westover ARB are discussed in this section and generally describe the conditions in the vicinity of the Proposed Action and Alternatives.

3.2.1 Surface Water

Surface water resources typically consist of lakes, rivers, and streams. Surface water is important for its contributions to the economic, ecological, recreational, and human health of a community or locale. However, at Westover ARB, surface waters are not used for any industrial, domestic, or municipal purposes (Westover ARB, 2011). Surface waters at Westover ARB consist of natural streams and extensive man-made surface drainage features. Many of these surface drainage features are associated with underground storm sewer lines, culverts, and oil/water separators that conduct stormwater flows from developed portions of the Base. Stormwater flows are ultimately received by three primary drainages located on or adjacent to Westover ARB: Cooley Brook, Stony Brook, and Willimansett Brook.

Stony Brook is generally located along the northern portion of the Base. Stony Brook is fed by Wade Lake (a 16-acre pond), located just off Base to the northeast. As the brook enters the Base from Wade Lake, it forms a wetland, and then bends toward the north, where it ultimately exits the Base north of the Dog Patch Training Area, flowing northward. After exiting the Base, Stony Brook flows in a circuitous route, ultimately to the Connecticut River (Westover ARB, 2009). Stony Brook receives drainage from the Base through a variety of sources including a network of storm sewers, a stormwater outfall, overland flow, and sheet flow from wooded and filled areas. Stony Brook is impaired by *E. coli*, turbidity, and non-native macrophytes (MassDEP 2011, 2012). A Total Maximum Daily Load (TMDL) has not been established for Stony Brook (MassDEP 2011, 2012).

Cooley Brook is generally located along the southeastern periphery of Westover ARB. Cooley Brook flows through adjacent wetlands to the approximately 16-acre Chicopee Reservoir, ultimately discharging to the Chicopee River to the south (Westover ARB, 2009). Chicopee Reservoir is not used for drinking water, but is used as a bathing beach in Chicopee Memorial State Park (Westover ARB, 2011). The majority of industrial areas of the Base (including flightline hangars and runways) discharge to Cooley Brook via ditches, stormwater sewer lines, and culverts (Westover ARB, 2009). Most stormwater containing de-icing fluid used for aircraft operations on the Base is bioremediated via a constructed wetland before discharging to Cooley Brook. Cooley Brook is not identified as impaired on the Massachusetts Integrated List of Waters [per Section 303(d) of the Clean Water Act)], and a TMDL has not been completed for it (MassDEP 2011, 2012).

The headwaters to Willimansett Brook are located in the western portion of Westover ARB. From the Base, Willimansett Brook flows generally westward to the former Mountain Lake, and continuing westward, ultimately discharges to the Connecticut River. Willimansett Brook receives stormwater from developed portions of the base in this area, primarily serving office buildings. While portions of the EA subject area contribute stormwater flow to Stony Brook and Cooley Brook (Westover ARB, 2011), Willimansett Brook does not receive flows from the geographic area that is the subject of this EA.

3.2.2 Groundwater

Groundwater consists of the subsurface hydrologic resources. Groundwater may serve as an important source of potable water and water for industrial applications and agricultural irrigation. Water quality, aquifer or well capacity, water depth from the surface, recharge, and surrounding geologic composition are often used to characterize groundwater (Westover ARB, 2011).

The water table located under Westover ARB in the general vicinity of the EA subject area typically ranges in depth from 5 to 65 feet (shallower near wetlands and streams/ditches on the Base, with greater depths in the southern portions of the Base) and is greatly influenced by

topography. Groundwater beneath the Base is contained within a shallow glacial delta outwash plain. The thickness of this unconfined aquifer is generally 25 to 85 feet. This aquifer lies above lacustrine and glacial till deposits that range in thickness from 10 to 270 feet. These deposits overlay Triassic bedrock. The aquifer can yield approximately 100 to 300 gallons of groundwater per minute under normal pumping conditions. However, this shallow groundwater is not used for drinking water at Westover ARB. A deeper confined aquifer located off-Base is used as a source of drinking water for nearby residences (Westover ARB, 2011). The potable water supply for Westover ARB is provided by the City of Chicopee (via MWRA's Quabbin Reservoir) through a connection in Ludlow on Moody Street (Westover ARB, 2005b).

3.2.3 Wetlands

Wetlands perform valuable functions including: stormwater storage and attenuation, groundwater recharge, nutrient cycling, sediment detention, water quality improvement, and provision of habitat for a host of animal and plant species, among others. "Wetlands" are defined by the US Army Corps of Engineers as "those areas that are inundated or saturated by surface or ground water at a frequency and duration sufficient to support, and that under normal circumstances do support, a prevalence of vegetation typically adapted for life in saturated soil conditions. Wetlands generally include swamps, marshes, bogs, and similar areas" (33 CFR 328.3). Wetlands are protected at Westover ARB under Section 404 of the Clean Water Act and the Massachusetts Wetlands Protection Act and its implementing Regulations and local conservation commission bylaws (Chicopee and Ludlow). Regulating agencies for wetlands located on Base include the US Army Corps of Engineers, MassDEP, and the local conservation commissions.

In September 2004, a Base-wide wetland survey was conducted to identify and delineate jurisdictional wetlands located on Westover ARB. Approximately 162 acres of wetlands were identified, comprised of 34 wetlands. Several wetland types (emergent, scrub-shrub, and forested) were identified in locations ranging from open grasslands to forested areas. The majority of wetlands identified are located in the northern and eastern portions of the Base (Westover ARB, 2005B). Many of these wetlands are located within the subject area of this EA and are primarily associated with Stony Brook and Cooley Brook. However, some wetlands identified within the EA subject area are found in scattered depressions in the northern portions of the Base. Westover ARB has an Order of Conditions (permit) issued by the Chicopee Conservation Commission that authorizes mowing of wetlands under their jurisdiction as part of a Vegetation Management Plan (Chicopee, 2007).

Emergent wetlands associated with the Stony Brook area are mostly dominated by cattails (*Typha* spp.), sedges, and cutgrass (*Leersia oryzoides*). Scrub-shrub wetlands are generally dominated by a mixture of alder (*Alnus* spp.), buttonbush (*Cephalanthus occidentalis*), elderberry (*Sambucus* spp.), skunk cabbage (*Symplocarpus foetidus*), dogwoods (*Cornus* spp.), and a variety of sedges.

Wetlands located within the open grasslands of the Base are generally dominated by fowl manna grass *(Glyceria striata)*, a variety of sedges, sensitive fern (*Onoclea sensibilis*), and cattails. However, two wetlands located within the open grassland area south of the former antennae farm and within the southern and eastern portions of the drop zone are dominated by large cranberry *(Vaccinium macrocarpa)*, small cranberry *(Vaccinium oxycoccus)*, and leatherleaf *(Chamaedaphne calyculata)*.

The forested wetlands located on Base are primarily dominated by red maple in the canopy with a mix of alders, high bush blueberry (*Vaccinium corymbosum*), silky dogwood (*Cornus amomum*), buttonbush, spice bush (*Lindera benzoin*), and winterberry (*Ilex verticillata*) in the shrub layer. The herbaceous layer of these forested wetlands is generally dominated by a variety of ferns, mosses, and skunk cabbage (Westover ARB, 2009).

Vernal pools are temporary bodies of fresh water that provide important habitat for many vertebrate and invertebrate species. Vernal pools are typically filled by snow melt and spring rains and often dry during the summer (MA NHESP, 2009a). The location and extent of six areas on Base that exhibit characteristics of vernal pools were determined during a May 1999 aquatic habitat survey. Four of these areas are located in the northern portion of the Base while two are located south and southwest of Pad 33 in the eastern portion of the Base (Westover ARB, 2009). As indicated above, Westover ARB has an Order of Conditions (permit) issued by the Chicopee Conservation Commission that authorizes mowing of wetlands under their jurisdiction as part of a Vegetation Management Plan.

3.2.4 Floodplains

The Federal Emergency Management Agency (FEMA) defines floodplains as "any land area susceptible to being inundated by flood waters from any source" (FEMA, 2013). Inland floodplains are typically low-lying, relatively flat areas present along rivers or steam channels that may be subject to periodic or infrequent inundation due to rain or melting snow. Flooding risks are generally influenced by the frequency and duration of precipitation events or snowmelt, local topography, vegetation, soil/geological characteristics, and the size of the watershed above the floodplain, among others. FEMA evaluates flood potential risk for 100- and 500-year flood events. Development within floodplains may be limited by Federal, state, and local regulations in order to reduce the risks to human health and safety (Westover ARB, 2011).

FEMA maps illustrate floodplains associated with Stony Brook in the vicinity of Westover ARB (off-base) as it enters and exits the Base. However, flood zones on the Base have not been determined, apparently because the federal government is a self-insurer. Therefore, Flood Insurance Rate Maps for the communities of Chicopee and Ludlow show the area of Westover ARB as an "area not included in mapping" (ANI) zone (Westover ARB, 2011). In May 2013,

the Base contracted with the US Army Corps of Engineers to map the floodplains; however, this work has not yet been completed.

3.3 BIOLOGICAL RESOURCES

This section contains descriptions of biological resources, including vegetation, wildlife, and threatened or endangered species for Westover ARB in the vicinity of the Proposed Action and Alternatives (subject area of this EA).

3.3.1 Vegetation

In 1994, a survey of botanical resources was conducted at Westover ARB. The survey reported that native-dominated plant communities on the Base were comprised primarily of open grasslands, deciduous woodlands (temperate deciduous forests with tall, broadleaf trees that provide a continuous and dense canopy in summer, but shed their leaves completely in winter), and open wetlands (described above in Section 3.2.3). In addition, approximately 60 acres of pine plantations, grassland areas dominated by non-native species, and weedy barren areas are also located on the Base (Westover ARB, 2009; 2011). In total, the survey identified 461 plant species. Of these, 354 were native while 81 were non-native. A separate survey identified 121 species of lichen and 50 species of moss on the Base. No federally listed threatened or endangered plant species were observed on Base as part of the botanical survey. However, one Massachusetts' Special Concern Species, the climbing or Hartford fern (*Lygodium palmatum*), was identified in several areas on the Base (Westover ARB, 2009), although not within the subject area of this EA. Rare species are discussed below in Section 3.3.3.

The majority of the western and central portions of Westover ARB within the subject area of this EA have been mowed, plowed, or disced, which has greatly affected the composition of the remaining vegetation in these areas of the Base. Most of the western portion of the Base has been developed, and the original vegetation has been removed or significantly altered as a result of development activities over the years. As a result, historic native plant communities typically do not occur on this portion of Westover ARB (Westover ARB, 2009). The dominant vegetation type in the urbanized portions of the base consists of turf grasses and various broad-leaf herbs. Grass species consist of common introduced species including Kentucky bluegrass (*Poa pratensis*), tall fescue (*Festuca arundinacea*), creeping red fescue (*Festuca rubra*), chewing fescue (*Festuca altissima*), perennial ryegrass (*Lolium perenne*), colonial bent grass (*Agrostis tenuis*), and timothy (*Phleum pratense*). A variety of ornamental and native shrubs and trees are also present in these developed portions of the Base (Westover ARB, 2009).

Westover ARB has the largest contiguous grasslands in the Connecticut River Watershed and contains more than 100 species. These open grasslands are found throughout the northern, central, and southern portions of the Base and comprise the largest vegetative cover type within

the geographic area of the Proposed Action and Alternatives addressed in this EA. These grasslands are mowed with varying frequency and differ in composition in different locations of the Base. Some are dominated by native species of grasses and herbs, while others are dominated almost entirely by European pasture grasses.

The dry grasslands located in the northwestern, eastern border, and southern portions of the Base are generally dominated by tussock-forming native species including little bluestem *(Schizachyrium scoparium)*, common oatgrass *(Danthonia spicata)*, linear-leaved panic grass *(Panicum linearifolium)*, red fescue *(Festuca rubra)*, hairgrass *(Deschampsia flexuosa)*, and purple-love grass *(Eragrostis spectabilis)*. These grasslands often also contain a substantial sedge component including both creeping species, such as Pennsylvania sedge *(Carex pennsylvanica)* and Seventh Avenue sedge *(Carex vestita)*; and tussock-forming species, such as wrinkled-seed sedge *(Carex rugosperma)*, whitened sedge *(Carex albicans)*, short-headed sedge *(Carex brevior)*, Muhlenberg's sedge *(Carex muhlenbergii)*, and pointed-broom sedge *(Carex scoparia)*. These grasslands also contain a component of mostly non-native herbs along with low shrub species that can survive mowing (Westover ARB, 2009).

Grasslands in the northeastern and east-central portions of the Base are dominated by European pasture grasses that are common in New England and include: bromes *(Bromus* spp.*)*, fescues *(Festuca* spp.*)*, bluegrasses *(Poa* spp.*)*, redtop *(Agrostis alba)*, quackgrass *(Eletrigia ripens)*, and timothy. These European pasture grasslands have fewer shrubs and sedges than the native grasslands, but contain more creeping grasses (Westover ARB, 2009).

Forested areas of Westover ARB in the vicinity of the EA subject area (primarily located in the northern and eastern portions of the Base) are generally dominated by white oak *(Quercus alba)* and red oak *(Quercus rubra),* but depending on location may also include other tree species such as red maple *(Acer rubrum)*, sugar maple *(Acer saccharum)*, black birch *(Betula lenta)*, bitternut hickory *(Carya cordiformes)*, pignut hickory *(Carya glabra)*, mockernut hickory *(Carya tomentosa)*, chestnut *(Castanea dentata)*, American beech *(Fagus grandifolia)*, yellow poplar *(Lirodendron tulipifera)*, white pine *(Pinus strobus)*, scarlet oak *(Quercus coccinea)*, scrub oak *(Quercus ilicifolia)*, chinkapin oak *(Quercus muhlenbergii)*, chestnut oak *(Quercus prinus)*, black oak *(Quercus velutina)*, and hemlock *(Tsuga canadensis)* (Westover ARB, 2009).

Invasive species, such as purple loosestrife (*Lythrum salicaria*), common reed (*Phragmites australis*), Japanese knotweed (*Polygonum cuspidatum***)**, and Asiatic bittersweet (*Celastrus orbiculatus*) are present on the Base and pose a threat to native vegetative species as a result of competition for resources including moisture and light, among others (Westover ARB, 2009). Other non-native species such as spotted knapweed (*Centaurea maculosa*) have also been observed on Base, particularly in portions of open grasslands.

In 2014, Polatin Ecological Services conducted a survey of a portion of the grasslands at Westover ARB. Approximately 315 acres were surveyed, focusing primarily on two areas: the approach to Runway 15 and the approach to Runway 23. The surveyed areas consisted primarily of grasslands that are currently only mowed once per year, but did include areas adjacent to the pavement where more frequent mowing has been conducted. Polatin (Westover ARB, 2014) divided the surveyed area into approximately 20 blocks, which demonstrated considerable variability among three habitat types: 1) low-growing, warm season grasses [122 acres]; 2) cool-season pasture and tall native grasses [48 acres]; and 3) herbs and shrubs / early-successional habitat [145 acres].

Low-growing, warm season grasses. These areas were similar to Cultural Grasslands or Sandplain Grasslands as described by NHESP (Swain and Kearsley, 2011). These blocks were characterized as an open landscape of small bunchgrasses usually dominated by little bluestem. Though Pennsylvania sedge and poverty grass (*Danthonia spicata*) are common in this habitat type, red fescue is also common at Westover ARB. Agrostis species, such as red top grass, path rush (*Juncus tenuis*), purple love grass, and others were also noted to be present (Westover ARB, 2014).

Cool-season pasture and tall native grasses: The larger non-native pasture grasses sprout earlier in the spring and grow later into the fall than most warm season grasses. These species can form dense stands that outcompete natives. Smooth bromegrass (*Bromus inermis*), timothy, perennial ryegrass, and orchard grass (*Dactylis glomerata*) were the most commonly observed in the surveyed blocks at Westover ARB. Some taller native species include switchgrass (*Panicum virgatum*) and big bluestem (*Andropogon gerardii*) (Westover ARB, 2014).

Herbs and shrubs / early successional habitat: Dominated by small trees, shrubs, and herbaceous plants, these were the tallest and densest areas among the 315 acres recently surveyed. Cherry (*Prunus* spp.); alder (*Populus* spp.); birch (*Betula* spp.); oak (*Quercus* spp.); maple (*Acer* spp.); willow (*Salix* spp.); sumac (*Rhus* spp.); *Spirea* spp.; blackberry, raspberry, and dewberry (*Rubus* spp.); grape vines (*Vitis* spp.); and the invasives autumn olive and black locust are the most common woody species. Goldenrod (*Solidago* spp.); milkweed (*Asclepias* spp.); invasive spotted knapweed; wild lettuce (*Lactuca* spp.); whorled loosestrife (*Lysimachia quadrifolia*); white sweet clover (*Melilotus albus*); red clover (*Trifolium pretense*); blackeyed susan (*Rudbeckia* spp.); bush clover (Lespedeza); purple crown vetch (*Securigera varia*) and bird vetch (*Vicia cracca*); bedstraw (*Galium* spp.); and Indian hemp (*Apocynum cannabinum*) are the common herbaceous species. Occasionally at WARB, the species composition (low growing, ericaceous shrubs, including *Vaccinium* spp.) resembles a Sandplain Heathland community as described by NHESP (Swain and Kearsley, 2011). What is more widespread, however, appears to be simply a cleared community regenerating to a forest community. The vegetative stage along this successional gradient is influenced by past land use, management

strategies or timing, and other physical characteristics of the site. Grasses were found to occur as a component of this habitat, even when large woody plants and dense herbaceous stands appeared completely dominant (Westover ARB, 2014).

3.3.2 Wildlife

Westover ARB has many animal species within and adjacent to the area subject to this EA as a result of the diverse habitat types found there, including open grasslands, forested areas, riparian corridors, and wetlands. Many wildlife surveys have been conducted on the Base to identify species present (Westover ARB; 2005, 2011). Common mammalian species observed on or in the vicinity of Westover ARB include: white-tailed deer (*Odocoileus virginianus*), red fox (*Vulpes vulpes*), coyote (*Canis latrans*), raccoon (*Procyon lotor*), woodchuck (*Marmota monax*), gray squirrel (*Sciurus carolinensis*), southern flying squirrel (*Glaucomys volans*), eastern chipmunk (*Tamias striatus*), eastern cottontail rabbit (*Sylvilagus floridanus*), northern short-tailed shrew (*Blarina brevicauda*), and white-footed mouse (*Peromyscus leucopus*) (Westover ARB, 2011).

Streams on or near Westover ARB, particularly Stony Brook and Cooley Brook, provide habitat for fish found on or near the Base. Although these areas are not directly located within the EA subject area, they are located nearby and receive runoff from the Base. Surveys conducted in 1999 noted yellow bullhead (*Ameiurus natalis*), white sucker (*Catostomus commersoni*), chain pickerel (*Esox niger*), brown bullhead (*Ictalurus nebulosus*), pumpkinseed sunfish (*Lepomis gibbosus*), bluegill (*Lepomis macrochirus*), largemouth bass (*Micropterus salmoides*), golden shiner (*Notemigonus crysoleucus*), yellow perch (*Perca flavescens*), and brook trout (*Salvelinus fontinalis*) in Stony Brook, while white sucker, pumpkinseed, golden shiner, and brook trout were documented in Cooley Brook. No fish species were documented within Willimansett Brook as part of these surveys (Westover ARB, 2009).

Surveys conducted on Westover ARB have identified 7 reptile species and 11 amphibian species. Common reptiles include the eastern garter snake (*Thamnophis sirtalis*), northern ringneck snake (*Diadophus punctatus*), black racer (*Coluber constrictor*), northern water snake (*Nerodia sipedon*), common snapping turtle (*Chelydra serpentina*), and spotted turtle (*Clemmys guttata*). Common amphibians identified on Westover ARB include wood frog (*Rana sylvatica*), bullfrog (*Lithobates catesbeiana*), gray tree frog (*Hyla versicolor*), spring peeper (*Pseudacris crucifer*), green frog (*Rana clamitans*), American toad (*Bufo americanus*), Fowler's toad (*Bufo fowleri*), redback salamander (*Plethodon cinereus*), and eastern spotted newt (*Notophthalmus viridescens*) (Westover ARB, 2011). Surveys conducted on Westover ARB have also identified five species of tiger beetles, 18 species of dragonflies and damselflies, 41 species of butterflies, and 370 species of moths (Westover ARB, 2005a).

Diverse avian populations have been observed at Westover ARB. Waterfowl and gull species observed on Base include mallard (*Anas platyrhynchos*), Canada goose (*Branta canadensis*), black duck (*Anas rubripes*), herring gull (*Larus argentatus*), ring-billed gull (*Larus delawarensis*), and greater black-backed gull (*Larus marinus*), while wading birds include great blue heron (*Ardea herodias*), greater yellowlegs (*Tringa melanoleuca*), upland sandpiper (*Bartramia longicauda*) and white-rumped sandpiper (*Calidris fuscicollis*). Raptors observed on base (particularly during spring and fall migrations) include red-tailed hawk (*Buteo jamaicensis*), broad-winged hawk (*Buteo platypterus*), red shouldered hawk (*Buteo lineatus*), rough-legged hawk (*Buteo lagopus*), and American kestrel (*Falco sparverius*). Cooper's hawk *(Accipiter cooperii)* is a transient migratory species not noted for relying heavily on the grasslands at Westover ARB and has been de-listed in Massachusetts. The peregrine falcon *(Falco peregrinus)*, formerly federally- and state- listed as endangered but recently delisted at the federal level subject to further monitoring, has also been documented on the base as a transient species. Common seasonal seed-eating bird species (granivores) include eastern meadowlark (*Sturnella magna*), horned-lark (*Eremophila alpestris*), field sparrow (*Spizella pusilla*), and Savannah sparrow (*Passerculus sandwichensis*). Other commonly observed bird species include European starling (*Sturnus vulgaris*), house sparrow (*Passer domesticus*), rock dove (*Columba livia*), house finch (*Haemorhous mexicanus*), and turkey vulture (*Cathartes aura*). The most abundant native birds in the area include mourning dove (*Zenaida macroura*), eastern king bird (*Tyrannus tyrannus*), blue jay (*Cyanocitta cristata*), American crow (*Corvus brachyrhynchos*), American robin (*Turdus migratorius*), killdeer (*Charadrius vociferus*), red-winged blackbird (*Agelaius phoeniceus*), black-capped chickadee (*Poecile atricapillus*), bobolink (*Dolichonyx oryzivorus*), and eastern phoebe (*Sayornis phoebe*) (Westover ARB, 2011).

As indicated above, as part of ongoing participation in the Air Force Mishap Prevention Program to minimize collisions of aircraft with birds and other wildlife found at the Base, Westover ARB follows a Bird/Wildlife-Aircraft Strike Hazard (BASH) plan.

The main elements of the BASH plan include:

- guidelines for the Base's BHWG
- procedures for reporting hazardous bird activity and altering or discontinuing flying operations (the Base maintains bird strike reports, which include details of each incident such as the date and time of each strike, conditions, aircraft model, number of birds, bird species, and altitude and location at the time of the strike)
- procedures to disseminate information to all assigned and transient aircrews for specific bird hazards and procedures for avoidance
- procedures to eliminate or reduce environmental conditions that attract birds to the airfield
- procedures to disperse birds on the airfield

The plan also includes:

- maintenance specifications for grass mowing between 7 to 14 inches on certain areas of the airfield
- seasonal inspection requirements for grain-type grasses that attract high-threat avian species
- periodic inspection requirements for ponding and proper drainage on the airfield whenever possible to reduce insect breeding, a major food source for birds during much of the year
- an educational program to acquaint crew members with the hazards associated with birds

In addition, Westover ARB has established an interagency agreement and contracts the USDA/Wildlife Services (WS), formerly USDA/Animal Damage Control, to regularly monitor and reduce wildlife hazards to aircraft occurring on the Base. BASH reduction techniques currently employed by the Base and USDA/WS include abating nuisance avian species with pyrotechnics and depredation when necessary (Westover ARB, 2011).

3.3.3 Threatened and Endangered Species

The Endangered Species Act (ESA), (Title 16 United States Code, Sections 1531-1544), requires protection and conservation of federally listed threatened and endangered (T&E) plants and animals and their habitats. The ESA lists species to provide protection to those species that are in danger of extinction as a result of economic growth or development without adequate concern and conservation. Conservation includes the use of all methods and procedures which are necessary to bring any T&E species to the point where the measures pursuant to the ESA are no longer necessary (Westover ARB, 2011). While no federally-listed threatened or endangered species have been found on Westover ARB, Massachusetts state-listed species occur on the Base. Table 3-1 shows the listed (legally protected) species that occur on the Base or nearby. Westover ARB's Integrated Natural Resource Management Plan (INRMP) provides for the protection and conservation of state listed protected species when practicable. Although not required by the Endangered Species Act, the INRMP provides similar conservation measures for species protected by state law when such protection is not in direct conflict with the military mission. When conflicts occur, Westover ARB consults with the appropriate state authority to determine if any conservation measures can be feasibly implemented to mitigate impacts (Westover ARB, 2011).

Climbing fern (*Lygodium palmatum*) is a state-listed fern species of Special Concern that can twine to heights of 3 to 5 feet up shrubs and coarse herbs. Climbing fern grows in moist pine-oak-maple woods with an open understory, in moist thickets, and along stream margins,

preferring acidic soils that are sandy and rich in humus, but poor in nutrients. Habitat also includes regenerating woodlands and powerline corridors (MA NHESP, 2009b). However, this species has not been observed in the subject area of this EA.

Westover ARB supports the largest populations of two State-listed bird species in the six state New England region: the upland sandpiper *(Bartramia longicanda)*, State-listed as endangered, and the grasshopper sparrow *(Ammodramus savannarum)*, State-listed as threatened (Westover ARB, 2011).

Table 3-1. Massachusetts State-Listed Endangered, Threatened, and Species of Special Concern on Westover ARB

Scientific Name	Common Name	Presence on Westover ARB[1]	Status[2]	
			Federal	State
PLANTS				
Lygodium palmatum	Hartford fern (or climbing fern)	O	NL	SC
BIRDS				
Bartramia longicauda	Upland sandpiper	O	NL	E
Ammodramus savannarum	Grasshopper sparrow	O	NL	T
Circus cyaneus	Northern harrier	O	NL	T
Falco peregrinus anatum	American peregrine falcon	M	NL	E
Pooecetes gramineus	Vesper sparrow	O	NL	T
Dendroica striata	Blackpoll Warbler	M	NL	SC
Accipter striatus	Sharp-shinned hawk	M	NL	SC
AMPHIBIANS				
Ambystoma laterale	Blue-spotted salamander	O	NL	SC
INSECTS				
Grammia phyllira	Phyllira tiger moth	O	NL	E
Zanclognatha martha	Pine Barrens zanclognatha moth	O	NL	T
Callophrys irus	Frosted elfin butterfly	O	NL	SC

Sources: Adapted from Westover ARB, 2009, revised with current information from MA NHESP website
Notes:
1. O = Occurs - refers to a species documented as inhabiting or occurring on Westover ARB on a continual basis.
   M = Migrates through – refers to a species inhabiting Westover ARB on an indiscriminate basis.
2. NL: Not Listed, E: Endangered, T: Threatened, SC: Special Concern

Grassland bird species are suffering from habitat loss in the historic core of their breeding range. More than 97% of the native grasslands of the USA have been lost, mostly because of conversion to high-intensity agriculture in the Western USA. Consequently, grassland birds as a group have declined more than any other group (MassAudubon, 2013). Recent research by the Massachusetts Audubon Society indicates that in the Northeastern USA, airports provide most of the last refuges for grassland species (MassDOT, undated). Between 1966 and 2010, grasshopper sparrows and upland sandpipers throughout eastern North America experienced annual declines of -4.85% and -3.36%, respectively, resulting in region-wide population reductions of 89% for the grasshopper sparrow and 78% for the upland sandpiper (Sauer et al., 2011). In Massachusetts, the majority of upland sandpipers and grasshopper sparrows are found on cultural grasslands at military bases and municipal airports, and the largest population of both species occurs at Westover ARB (Houston et al, 2011). MA DFW has analyzed the current importance and the long-term management potential of all known, extant grasshopper sparrow and upland sandpiper sites in Massachusetts. MA DFW concludes that the especially large populations (relatively speaking) of grasshopper sparrow and upland sandpiper at Westover ARB stand alone in terms of importance. A second tier of sites that make an important contribution to the Massachusetts population of these birds include the Massachusetts Military Reservation (MMR), Nashawena Island, Westfield-Barnes Airport, Fort Devens, Hanscom Field, Plymouth Airport, and Logan Airport. A third tier of sites that also are import include smaller airports, wildlife management areas (Frances Crane and Southwick), and capped landfills. The Westover ARB grasshopper sparrow and upland sandpiper populations are by far the largest known populations of these species in all of New England, and are thought to be source populations that play a key role in supporting smaller populations of these species in Massachusetts and throughout the region (Jones 2000, as cited by MA DFW 2013).

Upland sandpipers are rare and declining in the region because they require large contiguous tracts of grassland. Contiguous open areas, larger than 200 acres, are scarce in the Northeast (MassAudubon, 2014). Upland sandpipers traditionally nested in sandplain grasslands, blueberry barrens, pastures, and old hayfields, but are no longer able to find suitable habitat in most areas (MassAudubon, 2014). The upland sandpiper migrates from its wintering habitat in South America during mid-April to early May to breed in Massachusetts, among other states. A bird of the prairies and open grasslands, the upland sandpiper was probably uncommon in Massachusetts prior to colonial times when only unforested areas of Cape Cod and the larger islands provided suitable habitat (MassAudubon, 2014). European settlement created extensive nesting habitat through the clearing of forests for agricultural and grazing purposes. The species has been state-listed in Massachusetts because of its rarity, declining population, and the continuing loss of open grassland habitat due to urban development and the natural succession of open lands to forests. Habitat for upland sandpiper includes grassy fields, hay fields, and mown grassy strips adjacent to runways and taxiways of airports and military bases. Upland sandpipers require a variety of vegetation types for breeding. Optimum habitat includes separate areas of

short and tall vegetation. Areas with short grass are used for feeding, whereas areas with taller grass (4 to 12 inches in height) are required for nesting, as these taller grass regions provide cover and concealment for the nests. Upland sandpipers typically avoid areas with excessively tall shrubs, dense ground litter, and uniform grasses and legumes. Nests consist of well-concealed grass-lined depressions in the ground approximately 3 inches wide. The nest itself is a small depression lined with dead grass, often concealed under an arched clump of growing grass. Clutch size is normally four eggs. The eggs are incubated by both sexes for an average of 24 days. In Massachusetts, incubation typically occurs during mid-May to mid-June. A nesting survey conducted at Westover ARB in 2012 determined that eight of nine upland sandpiper nests with estimable dates were initiated between 8 and 24 May, while one was initiated in mid-June (Tsipoura et al., 2013). Upland sandpipers are not known to have multiple broods per season (Houston et al., 2011), although they may re-lay if the first attempt fails (MassAudubon, 2014). Incubating adults are well concealed and will usually tolerate close approach before flushing from the nest (Houston et al., 2011). Chicks are precocial and fledge during July, when they are about 30 days old. Both adults and juveniles feed on a variety of insects, weed seeds, and, when available, small grains (MassAudubon, 2014). Following the breeding season, the upland sandpipers gather into flocks before departing to their wintering grounds in South America (Westover ARB, 2011).

Loss of appropriate habitat to land development, changes in agricultural practices (early harvesting and fewer fallow fields), and natural succession appear to be the primary factors in the decline of the grasshopper sparrow (Westover ARB, 2011). It is estimated that more than 90% of coastal heathlands and grasslands in the northeastern United States have been lost since the middle of the 19th century due to development, cultivation, and shrub encroachment (Barbour et al., 1999). Grasshopper sparrows were once common in dry, upland meadows throughout southern New England. Because of habitat loss and fragmentation, grasshopper sparrows now breed at only a few scattered locations in the Northeast, mostly at airports, military bases, large blueberry barrens, and coastal heathlands on islands off Massachusetts (MassAudubon, 2014). The grasshopper sparrow habitat includes sandplain grasslands, pastures, hayfields, and airfields characterized by clumping grass species (rather than sod-forming grasses). It is also found on open knolls, on sandplains within pine barrens, and in coastal heathlands. It requires a patchy grassland habitat with bare ground and bunch grasses such as poverty grass (*Danthonia spicata*), bluestem (*Andropogon* spp.) and fescue (*Festuca* spp.). Preferred habitat in primarily dry upland sites is characterized by short native bunch grasses, minimal litter cover, patches of bare ground, scattered forbs, and short shrubs. This species is generally absent from fields with over 35% cover in shrubs. Bare ground is particularly important, as grasshopper sparrows run along the ground to escape predators and to forage for invertebrates. Grasshopper sparrows require breeding sites of at least 30 acres and prefer sites greater than 100 acres (MassAudubon, 2014). Nests are constructed on the ground and well-concealed, consisting of a cup of grass lined with fine grass and may include other materials such as hair. The female alone incubates the 4-5 eggs

for a period of 11 to 12 days, and young leave during the next 9 days after hatching. Initiation dates suggest two broods per season. In nesting surveys conducted at Westover ARB, the number of grasshopper sparrow nest initiations peaked in late May and again in late June (Tsipoura et al., 2013). Both parents help feed the young. When they leave the nest, the young are not yet able to fly well, and the parents continue to provide care for 4-19 more days. Fall migration of adults and juveniles commences during late August and September and continues well into October. The grasshopper sparrow winters from southern California to El Salvador, and the West Indies (MA NHESP, 2008).

In addition, several other State-listed species have been documented on the base, including the northern harrier (also known as a marsh hawk) *(Circus cyaneus)* and vesper sparrow *(Pooecetes gramineus)* (both State-listed as threatened); and the sharp-shinned hawk *(Accipiter striatus)* and blackpoll warbler *(Dandroica striata)* (State-listed special concern species) (Westover ARB, 2011).

Nesting and feeding habitat of the northern harrier includes wet meadows, grasslands, abandoned fields, and coastal and inland marshes. Nests are usually located on the ground in a slightly hollowed out area among shrubs, grasses, and other low vegetation. The nest typically consists of a thick pad of grasses surrounded by dry plant stalks, weeds, and small twigs. While the northern harrier's diet is quite varied (rodents, rabbits, small mammals, insects, small birds, reptiles, amphibians, carrion, etc.), voles are an important source of food for northern harriers in Massachusetts, with a direct correlation between breeding success and the number of voles found in their territory. The primary factor in the decline of the northern harrier is destruction of suitable habitat (MA NHESP, 2010a).

Vesper sparrow habitat in Massachusetts consists of airfields, disturbed heathlands and barrens (e.g. at military grounds), active and abandoned hayfields and cropfields, abandoned gravel pits, sandplain grasslands, and coastal moors, among others. The female vesper sparrow constructs the nest on the ground, typically in a slight depression at the base of vegetation (grasses, forbs, and shrubs), using coarse and fine grasses, moss, bark, hair, down feathers, and occasionally pine needles. The nest is usually concealed, but occasionally found in the open. Diet includes insects and seeds. Although widespread use of fire, combined with agricultural development and abandonment have in the past increased the numbers of vesper sparrows, fewer unmanaged open fields, continuing fire suppression, and increasing forest succession have led to a loss of suitable breeding habitat (MA NHESP 2010b). While vesper sparrow is included in Table 3-1 above, only one vesper sparrow has been observed during June grassland bird counts at Westover ARB from 2001 through 2012, with this one observation occurring in June 2012 (Melvin, 2012).

Sharp-shinned hawk habitat in Massachusetts generally consists of mixed woodlands, coniferous forests (containing spruce, pine, or Atlantic white cedar), and open nearby areas for hunting.

Breeding habitat for the sharp-shinned hawk is typically located near open areas and in the vicinity of water. Trees are used for nesting, where nests are placed in denser portions of the lower canopy and are generally well concealed. Nests are generally constructed from twigs and strips of bark, with the female constructing most, if not all, of the nest (MA NHESP, 2010c).

Blackpoll warbler habitat is limited in Massachusetts due to the lack of the preferred stunted spruce-fir forest. Breeding sites are generally small to medium sized conifers, where the nest is generally placed 2 to 7 feet above the ground, resting against the trunks of trees and concealed by neighboring branches. The nest is constructed of a variety of materials including: small twigs, sprays of spruce branchlets, dried grasses, lichens, hair, and feathers. The diet of the blackpoll warbler is primarily insects, with some seed and berries consumed in the fall. The blackpoll warbler is considered a species of special concern in Massachusetts due to its rarity as a breeding species; it is known to breed in only two locations in Massachusetts - Mt. Greylock and the Savoy Mountain State Forest, both in the extreme northwestern part of the state (MA NHESP, 2008a).

Table 3-2 summarizes nest initiation, incubation period, nestling period, and overall vulnerability period for selected grassland birds (both State-listed and common) that have the potential to be impacted by the Proposed Action or Alternatives since the species nest on or close to the ground.

The blue-spotted salamander (*Ambystoma laterale*) is a listed Species of Special Concern observed on the Base. The blue-spotted salamander requires moist, moderately shaded habitat such as northern hardwood/hemlock forests near seasonal depressions where standing water can be found, such as vernal pools. These pools need to be filled with dead and decaying leaves for cover and overhanging shrubs or grasses for egg deposition. Roadside ditches, kettle holes, and temporary pasture ponds provide habitat in the spring when flooded. Diet consists of invertebrates such as insects, spiders, larvae, worms, and centipedes. Threats to this species include loss or degradation of habitat of pools required for breeding and terrestrial habitat needed for foraging and overwintering (MA NHESP, 2007).

Two rare moth species are present on the base: the phyllira tiger moth (*Grammia phyllira)* (State-listed as endangered) and pine barrens zanclognatha *(Zanclognatha marta)* (State-listed as threatened). Phyllira tiger moth habitat includes dry sandplain grasslands, including grasslands maintained by anthropogenic disturbances, such as airfields, power line corridors, old fields, and pastures. Female moths lay their eggs scattered on the ground in the vicinity of suitable host plants. Fire suppression and other factors have led to the loss of suitable habitat for the host plants upon which breeding success relies (MA NHESP, 2012a). As the name implies, suitable habitat for the pine barrens zanclognatha includes pitch pine/scrub oak barrens, including late successional barrens. The larvae feed on pitch pine (*Pinus rigida*). This species is threatened by habitat loss and fire suppression, parasitoids, insecticides, and light pollution (MA NHESP, 2012b).

The frosted elfin butterfly (*Callophrys irus*) is a State-listed species of Special Concern. Habitat for this small butterfly includes dry and open, disturbance-dependent habitats on sandy (occasionally rocky) soil, including grassy openings in pitch pine/scrub oak barrens and similar anthropogenic habitats such as power line corridors, railways, old sand/gravel pits, and airports. Larvae feed on lupine (*Lupinus perennis*) (a host plant) or wild indigo (*Baptisia tinctoria*), while adult nectar sources include lupine, cherries (*Prunus* spp.), blackberries (*Rubus* spp.), and blueberries (*Vaccinium* spp.). Major threats to the frosted elfin include loss and degradation of habitat (particularly pitch pine/scrub oak barrens) due to development, succession, fire suppression, pesticides, and excessive grazing by deer on larval host plants (Westover ARB, 2011).

Table 3-2. Estimated vulnerability period for grassland bird eggs and nestlings at Westover ARB, MA

Species	***Nest Initiation***	***Incubation (days)***	***Nestling Period (days)***	***Vulnerability Period***
Upland Sandpiper	Late April–Early May	21	30	21 April - 1 July
Grasshopper Sparrow (2- 3 broods/year)	11 May - 20 July 50% initiated by 10 Jun 80% initiated by 1 July	11-12	9 (can't fly)	11 May - 20 August
Northern Harrier	Mid May	29-39	14-37	15 May - 1 August
Eastern Meadowlark	85% initiated by 10 June 100% initiated by 30 June	13-15	11-12	10 June - 27 July
Bobolink	Mid-late May	11-13	10-14 (can't fly)	15 May - 11 June
Savannah Sparrow	11 May - 20 July 75% initiated by 20 June 100% initiated by 20 July	8-12	8-14	11 May - 15 August
Killdeer	3 April - 4 Jul	24-26	1, fly @ 40	3 April - 10 September
Horned Lark	Mid May - Mid June	10-14	9-12 (can't fly), fly @12-17	15 May - 15 June

Note: **Boldfaced** species are Massachusetts State-listed. Table adapted from Baicich and Harrison 1997.

3.4 AIR QUALITY

3.4.1 National Ambient Air Quality Standards

The USEPA, under the requirements of the 1970 Clean Air Act (CAA) as amended in 1977 and 1990, has established National Ambient Air Quality Standards (NAAQS) for six contaminants, referred to as criteria pollutants (40 CFR 50). These are carbon monoxide (CO), nitrogen dioxide (NO_2), ozone (O_3), particulate matter (PM_{10}: diameter $\leq$ 10 micrometers, and $PM_{2.5}$: diameter $\leq$ 2.5 micrometers), lead (Pb), and sulfur dioxide (SO_2). The NAAQS include primary and secondary standards. The primary standards were established at levels sufficient to protect public health with an adequate margin of safety. The secondary standards were established to protect the public welfare from the adverse effects associated with pollutants in the ambient air. Table 3-3 shows the primary and secondary standards.

Areas that meet the NAAQS for a criterion pollutant are designated "in attainment." Areas where a criterion pollutant level exceeds the NAAQS are designated as "nonattainment" areas. O_3 nonattainment areas are categorized based on the severity of the pollution problem - marginal, moderate, serious, severe, or extreme. CO and PM_{10} nonattainment areas are categorized as either moderate or serious. A maintenance area is one that has been re-designated from nonattainment status and has an approved maintenance plan under Section 175 of the CAA. Where insufficient data exist to determine an area's attainment status, it is designated unclassifiable or in attainment.

In areas where the NAAQS are exceeded, the CAA requires preparation of a State Implementation Plan (SIP), which details how a state would attain the standards in designated nonattainment areas within a mandated time frame. The Massachusetts Department of Environmental Protection (MassDEP) in January 2008 submitted to the U.S. Environmental Protection Agency (EPA) a State Implementation Plan (SIP) for attaining the federal 8-hour NAAQS for ground-level ozone. The SIP describes the national, regional and local control measures to be implemented to reduce emissions, and uses air quality modeling and other analyses of air quality and meteorological data to demonstrate that Massachusetts is likely to attain the NAAQS for ozone in the near future (MassDEP, 2008).

3.4.2 Existing Air Quality Condition

The existing air quality conditions at the area affected by the proposed action are determined by the NAAQS attainment status for the county where the Westover ARB is located. The proposed action would take place in Chicopee and Ludlow, Hampden County, Massachusetts. Hampden County is in a nonattainment area for O_3, partially in maintenance for CO within the city of Springfield, and attainment for all other criteria pollutants.

Table 3-3: National Ambient Air Quality Standards

Pollutant	Primary/ Secondary	Averaging Time	Level	Form
Carbon Monoxide	Primary	8-hour	9 ppm	Not to be exceeded more than once per year
		1-hour	35 ppm	
Nitrogen Dioxide	Primary	1-hour	100 ppb	98th percentile, averaged over 3 years
	Primary and secondary	Annual	53 ppb	Annual Mean
Ozone	Primary and secondary	8-hour	0.075 ppm	Annual fourth-highest daily maximum 8-hr concentration, averaged over 3 years
Particular Matter ($PM_{2.5}$)	Primary	Annual	12 $\mu g/m^3$	Annual mean, averaged over 3 years
	Secondary	Annual	15 $\mu g/m^3$	Annual mean, averaged over 3 years
	Primary and secondary	24-hour	35 $\mu g/m^3$	98th percentile, averaged over 3 years
Particular Matter (PM_{10})	Primary and secondary	24-hour	150 $\mu g/m^3$	Not to be exceeded more than once per year on average over 3 years
Lead	Primary and secondary	Rolling 3 month average	0.15 $\mu g/m^3$	Not to be exceeded
Sulfur Dioxide	Primary	1-hour	75 ppb	99th percentile of 1-hour daily maximum concentrations, averaged over 3 years
	Secondary	3-hour	0.5 ppm	Not to be exceeded more than once per year

3.4.3 Clean Air Act Conformity

The Clean Air Act Amendments (CAAA) of 1990 expand the scope and content of the act's conformity provisions in terms of their relationship to a SIP. Under Section 176(c) of CAAA, a project is in "conformity" if it corresponds to a SIP's purpose of eliminating or reducing the severity and number of violations of the NAAQS and achieving their expeditious attainment. Conformity further requires that such activities would not:

- cause or contribute to any new violations of any standards in any area
- increase the frequency or severity of any existing violation of any standards in any area
- delay timely attainment of any standard or any required interim emission reductions or other milestones in any area

The USEPA published final rules on general conformity (40 CFR Parts 51 and 93) in the Federal Register on November 30, 1993. The rules apply to federal actions in nonattainment or

maintenance areas for any of the criteria pollutants. The rules specify *de minimis* emission levels by pollutant to determine the applicability of conformity requirements for a project. The General Conformity Rule applies to the Proposed Action since it is located in the Hampden County 8-hour ozone nonattainment area. The corresponding *de minimis* levels for the ozone precursors are 100 tons per year (tpy) of nitrogen oxides (NOx) and 50 tpy for volatile organic compounds (VOC). Although part of Hampden County, i.e., the city of Springfield, is in a CO maintenance area, the proposed action is not located within the city of Springfield, therefore, the General Conformity Rule is not applicable for CO.

3.4.4 Hazardous Pollutants

In addition to the criteria pollutants discussed above, non-criteria toxic pollutants, called hazardous pollutants (HAPs), are also regulated under the CAA. USEPA has identified a total of 188 HAPs that are known or suspected to cause health effects in small doses. HAPs are emitted by a wide range of man-made and naturally occurring sources including combustion mobile and stationary sources. However, unlike the NAAQS for criteria pollutants, federal ambient air quality standards do not exist for non-criteria pollutants.

3.4.5 Greenhouse Gas Emissions and Climate Change

Greenhouse gases (GHGs) are compounds that contribute to the greenhouse effect. The greenhouse effect is a natural phenomenon where gases trap heat within the surface-troposphere (lowest portion of the earth's atmosphere) system, causing heating at the surface of the earth. The primary long-lived GHGs directly emitted by human activities are carbon dioxide (CO_2), methane (CH_4), nitrous oxide (N_2O), hydrofluorocarbons (HFCs), perfluorocarbons (PFCs), and sulfur hexafluoride (SF_6).

The heating effect from these gases is considered the probable cause of the global warming observed over the last 50 years (USEPA, 2009a). Global warming and climate change can affect many aspects of the environment. The USEPA Administrator has recognized potential risks to public health or welfare and signed an endangerment finding regarding GHGs under Section 202(a) of the Clean Air Act (CAA) (USEPA 2009b), which finds that the current and projected concentrations of the six key well-mixed GHGs – CO_2, CH_4, N_2O, HFCs, PFCs, and SF_6 - in the atmosphere threaten the public health and welfare of current and future generations. To estimate global warming potential (GWP), all GWPs are expressed relative to a reference gas, CO_2, which is assigned a GWP equal to 1. All six GHGs are multiplied by their GWP and the results are added to calculate the total equivalent emissions of CO_2 (CO_2e). However, the dominant GHG gas emitted is CO_2, mostly from fossil fuel combustion (85.4%) (USEPA2009c). This EA considers CO_2 as the representative greenhouse gas emission.

This EA follows the Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas issued by the Council of Environmental Quality (CEQ) (CEQ, 2010). The

potential effects of proposed GHG emissions are, by nature, global and cumulative impacts, as individual sources of GHG emissions are not large enough to have an appreciable effect on climate change. As such, this EA predicts CO_2 levels as appropriate for disclosure purposes.

4.0 SUMMARY OF ANTICIPATED ENVIRONMENTAL IMPACTS

4.1 INTRODUCTION

This section addresses the known, potential, and reasonably foreseeable environmental consequences associated with the Proposed Action and Alternatives for those resources most likely to be affected by the Proposed Action or Alternatives. These resources include: water resources (including surface water, groundwater, wetlands, and floodplains), biological resources (including vegetation, wildlife, threatened and endangered species), and air quality (including climate change and greenhouse gases).

4.2 WATER RESOURCES (Surface Water, Groundwater, Wetlands, and Floodplains)

4.2.1 No Action (Continue Current Mowing Protocol)

The No Action alternative would continue the existing mowing protocol within the EA subject area. Although water resources exist within this subject area, the current mowing protocol does not impact groundwater or surface waters since mowing activities are not located within areas of standing or flowing water or where the groundwater table is at the ground surface.

While portions of the EA subject area contain jurisdictional wetlands that are located within or generally adjacent to areas mapped as grasslands, these wetlands will continue to be regularly mowed within the general AMA area as shown in Figure 2-1 and mowed once per year between August 1 and November 15 for areas beyond the general AMA vicinity (as also shown in Figure 2-1) under the No Action alternative. However, two small vernal pools located near the edges of areas currently mowed within the EA subject area will continue to be avoided by mowing activities under the No Action alternative (as well as Alternatives 1 and 2). These two vernal pool areas are located in the northern and northwestern portions of the Base in Vegetation Management Units 13 and 16, respectively. Rather than mowing these two vernal pool areas, one-third of the saplings growing there are hand cut each year in order to keep woody vegetation short and thinned out. The same protocol would continue to apply to the No Action (as well as Alternatives 1 and 2) for these specific areas. As discussed above, Westover ARB has an Order of Conditions (permit) issued by the Chicopee Conservation Commission that authorizes mowing of wetlands under their jurisdiction as part of a Vegetation Management Plan.

As noted in Section 3.2.4, FEMA has not mapped floodplains on Westover ARB. Floodplains are often associated with relatively flat low-lying areas adjacent to waterbodies such as lakes, ponds, and streams and are subject to periodic or infrequent inundation due to rain events or snowmelt. While the locations of floodplains, if actually present, have not been specifically mapped at Westover ARB, the areas currently mowed under the No Action alternative are not prone to flooding and are unlikely to be located within inundated areas if floodplains were to be

mapped on Base. In addition, no changes to the flood storage capacity would occur within a floodplain, should one exist where mowing would occur under this alternative since no filling or modification to existing elevations are proposed.

4.2.2 Alternative 1

Alternative 1 would continue to mow the same geographic area as currently included under the No Action alternative, but with greater frequency for areas beyond the general AMA vicinity as shown in Figure 2-2. An increase in mowing frequency in these areas under Alternative 1 is not anticipated to result in any impacts to groundwater, surface water, or floodplains for the same reasons as described above for the No-Action Alternative.

Alternative 1 would maintain vegetation within the wetland areas currently mowed (the majority generally located within grassland areas) to a height between 7 and 14 inches within the general AMA vicinity but also maintain vegetation in wetlands beyond the general AMA vicinity to a height of 7 to 14 inches as shown in Figure 2-2. Under the current mowing protocol (No Action alternative), vegetation heights within mowed/hand cut wetlands beyond the general AMA vicinity may exceed 14 inches in height prior to the August 1 to November 15 mowing period. With Alternative 1, repetitive mowing of vegetation may favor shorter species over time (species that may produce viable seed at heights lower than the cutting height), perennial plant species versus annual plant species (Maron and Jefferies, 2001), and/or species that may have a competitive advantage using vegetative reproduction as opposed to reproduction through seed. Repetitive mowing may also lead to a reduction in species diversity, biomass, and seed production over time (IDFW, 2007; Perry and Deller, 2000), although others have found an increase in species richness in regularly mowed plots if previously dominated by weedy exotic grasses (Maron and Jefferies, 2001). The MA Wetlands Protection Act (310 CMR 10.00) allows for vegetation management at airports as a Limited Project status for existing facilities, but requires that vegetation management must be done with careful design and precautions to minimize adverse effects on wetlands. As discussed above, the Chicopee Conservation Commission has issued a permit (Order of Conditions) to the Base for vegetation management within and adjacent to wetlands as part of an airport Vegetation Management Plan (VMP). The Order of Conditions for the Westover ARB VMP was issued on 9 November 2007. Typically, such an order would be valid for five years. However, it was administratively extended by the MA Permit Extension Act, which automatically extended for four years any permit that was in effect or existence between 15 August 2008 and 15 August 2012. Thus, the Order of Conditions for the VMP remains valid and will expire on 9 November 2016.

4.2.3 Alternative 2 (Preferred)

Alternative 2 may include increased frequency of mowing (for which the impacts would be similar to those described in Alternative 1); however, Alternative 2 includes the additional integrated

vegetation management components of pre-emergent herbicide, plant growth regulator, and prescribed burns.

It is anticipated that in Spring 2015 (and in following years, as necessary) a pre-emergent herbicide will be applied to nearly all airfield grasslands (including both the inner 499 acres and the 733 acres of outer grasslands). Additionally, a plant growth regulator (PGR) would be applied to areas beyond the general AMA vicinity, as shown in Figure 2-3, to retard the early-season growth of vegetation. Follow-up mowing in areas sprayed with PGR, once vegetation heights reach 14 inches during the growing season, is anticipated to occur between July and November 15 (initiation of mowing, however, would be based on the height criteria established in AF PAM 91-212, and not restricted by the calendar).

The mowing component of this alternative would result in similar impacts as the current protocol (No Action alternative) or Alternative 1; i.e. no impacts to groundwater, surface water, or floodplains are anticipated for the mowing component of Alternative 2. Infrequent mowing (approximately 1-2 times per year) of PGR-treated areas that contain wetlands under this protocol are not anticipated to result in negative impacts to wetlands and is consistent with Westover ARB's Vegetation Management Plan. Such vegetation management would not result in a loss of vegetated areas in wetlands, but would convert taller plant communities to shorter ones. Shorter growing grassland species have been demonstrated to be capable of providing equal levels of soil stabilization and water quality protection (i.e. wetland functions and values) when compared to species dominant in taller (woody, shrub-scrub) wetland communities (MassDOT, undated).

Application instructions for herbicides and PGRs, such as Stronghold® and Plateau®, often include a requirement prohibiting direct application to water (lakes, ponds, streams, etc.) or areas where surface water is present (such as swamps, bogs, marshes, etc.). However, it is permissible to treat seasonally dry swamps, bogs, marshes, or the berms of ditches according to the manufacturer's directions (see Appendix A). The use of herbicides and/or plant growth regulators in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination. The time of the year when pre-emergent herbicides and PGR should be applied for maximum effectiveness is in the Spring. This is typically also the time of year when water tables are generally higher from snowmelt and Spring rains. Since the groundwater table at the Base typically ranges in depth from 5 to 65 feet (shallower near wetlands and streams/ditches on the Base, with greater depths in the southern portions of the Base), careful planning and care will be taken to not apply herbicides or PGR in specific locations where surface water is present or groundwater is at or near the surface (wetland areas within the mapped herbicide/PGR application areas). Avoidance of herbicide/PGR application in these areas would comply with the manufacturers' directions for application and minimize the possibility for surface water or groundwater contamination. In the event that the Spring is

unseasonably dry, herbicides and/or PGR could be applied to wetland areas at that time if no surface water or high ground water table is present. If, prior to herbicide/PGR application, it is determined that standing water or high groundwater is present, wetland areas within the airfield would instead be hand cut (via string trimmers, brush cutters, etc.) in order to maintain vegetation heights between 7 and 14 inches in these locations. If hand-cutting of wetland vegetation is necessary in the Spring in lieu of PGR application, the potential impacts to these wetland areas would be similar to those as described above for the No Action alternative. Note that MA DFW allows the use of herbicides in wetlands to control invasive species; however, application is typically restricted to hand operations (e.g. backpack sprayer). Applied directly, chemical treatment in compliance with statutory regulatory requirements has been shown to entail far less disturbance to wetlands than follow-up mechanical removal techniques for woody vegetation (MassDOT, undated). The proposed integrated vegetation management approach within wetlands for Alternative 2 is consistent with the "Vegetation Management at Airports: A Guidance to Conservation Commissions", which was jointly prepared and reviewed by the Mass Aeronautics Commission (MAC), Massport, FAA, and MassDEP (MassDOT, undated). Thus, with adequate protective measures to prevent accidental spills of large quantities of herbicides/PGR, the use of herbicides and PGR as described for Alternative 2 is not anticipated to have significant adverse effects on the wetlands of Westover ARB or its surroundings.

Similarly, the use of prescribed burns is not anticipated to have an adverse effect on surface water, groundwater, wetlands, or floodplains. Natural grasslands evolved with, and are maintained by, fire. Prescribed fire would mimic this natural disturbance (WARB, 2005). The prescribed fires may eliminate brush and tree species not adapted to fire that could otherwise encroach upon grasslands.

4.3 BIOLOGICAL RESOURCES (Vegetation, Wildlife, Threatened and Endangered Species)

As discussed above in Section 3.3.3, while no federally listed threatened or endangered plant or animal species are present on the Base, Westover ARB supports the largest populations of two Massachusetts State-listed bird species in the New England region: the upland sandpiper (State-listed as endangered) and the grasshopper sparrow (State-listed as threatened). In addition, several other State-listed species have also been observed on the Base (Table 3-2 above). A discussion of the potential impacts of the Proposed Action and Alternatives on these species, other wildlife species present on Base, the vegetation that provides their habitat, and its implications for the BASH program is included below.

4.3.1 No Action (Continue Current Mowing Protocol)

The most significant interaction between biological resources found at the Base and safe aircraft operations is the bird/wildlife-aircraft strike hazard (BASH). Bird and other wildlife strikes can

result in the loss of human life, millions of dollars in cost, and thousands of hours in repair time (Milroy, 2007) in addition to the loss of the wildlife involved in the incident.

The Westover ARB BASH program plan includes airfield mowing and is required by, and conducted in accordance with, USAF safety directives. Airfield mowing is essential to safe flying, which is essential to the USAF mission. The USAF has determined that airfield mowing is a military readiness activity under Section 315 of the FY03 National Defense Authorization Act, P.L. 107-772 (Westover ARB, 2011). The No Action alternative would continue the current program of regular mowing of vegetation within the AMA to maintain vegetation heights between 7 and 14 inches and the mowing of selected areas beyond the general AMA vicinity once per year between August 1 and November 15 as shown in Figure 2-1. Therefore, no change in impacts to vegetation, wildlife, or threatened and endangered species would occur for the No Action alternative.

The current (No Action) mowing protocol maintains herbaceous vegetation in the general AMA vicinity (Figure 2-1) via regular mowing while allowing vegetation in areas beyond the general AMA vicinity to grow later in the season before being cut, which has the ancillary effect of reducing disturbance to breeding birds (State-listed and common) in these areas since the majority of bird breeding activity typically occurs between April 1 and July 31 (Westover ARB, 2009). This approach provides nesting and other habitat resources for grassland bird species and other wildlife during the more critical time periods for them. This current protocol is intended to deter these species from foraging near the runway and attract these species to areas away from the runway (Westover ARB, 2009). However, the no action alternative would leave substantial areas of tall vegetation in which mammals (fox, deer, coyotes, wild dogs) and large birds (turkeys) could hide without being seen by airfield operations personnel.

4.3.2 Alternative 1

Alternative 1 would result in an increase in the frequency of airfield mowing of the outer airfield grasslands, and initiate the mowing earlier in the growing season, to maintain grass height between 7 and 14 inches as shown in Figure 2-2. Alternative 1 would comply with the revised AFI 91-202, paragraph 7.3.1.5.9 grass height standard, which requires grass height within 500 feet of an AMA to be maintained at a height between 7 and 14 inches.

An increase in mowing in areas previously only mowed between August 1 and November 15 under the No Action alternative may result in some changes to the current vegetative communities beyond the general AMA vicinity over time. As indicated above in Section 4.2.2, repetitive mowing of vegetation may favor shorter species over time (species that may produce viable seed at heights lower than the cutting height), perennial plant species versus annual plant species, and/or species that may have a competitive advantage using vegetative reproduction as opposed to reproduction through seed. Repetitive mowing may also lead to a reduction in species

diversity, biomass, and seed production over time, although other studies have found an increase in species richness in regularly mowed plots if previously dominated by weedy exotic grasses. It is possible that over time, areas currently only mowed once per season under the No Action alternative could approximate the vegetative communities that are currently regularly maintained. The timing of mowing in relation to flowering and seed/fruit production by grasses and forbs (early season, mid-season, late season species) may also affect the degree to which changes may occur. Since regularly mowed grasslands on the Base also provide valuable habitat for wildlife (grassland bird nesting habitat, raptor hunting habitat, etc.), a shift to this type of vegetative community, should it occur, is not anticipated to significantly affect the overall offering of wildlife habitat on the Base. In addition, other areas of grassland located in the northern portion of the Base (approximately 114 acres) will still be cut just once per year (areas of yellow hatching on the attached maps), when consistent with the Base mission. These areas are typically mowed once per year between August 1 and November 15, but mowing occasionally occurs earlier (with advance coordination and approval by Westover ARB's natural resources manager) to allow for training activities as needed.

Many species of wildlife (both State-listed and common) currently use both regularly mowed and annually mowed (once between August 1 and November 15) portions of the EA subject area. Indirect impacts to wildlife as a result of increased mowing may include flushing of wildlife in the vicinity of the mower. Some wildlife species, such as larger mammals, birds (capable of flying), and smaller mammals that tunnel or burrow (voles, shrews, etc.) would likely be unharmed during mowing activities if able to move or find safety as the mower passes through an area. However, direct mortality may occur to grassland bird nests and nestlings/young birds that are still not capable of flight at the time of the mowing. Newly mowed or regularly mowed areas may potentially expose wildlife to predators who can more easily detect them. Conversely, mowed grassland areas may benefit some wildlife species (for example, when foraging) if they are better able to detect a potential predator sooner (Devereux, 2005). A potential indirect impact may also include the loss of food sources (including seed or fruit) if these resources are typically present prior to the annual August 1 through November 15 mowing under the current (No Action) protocol and located above the height of the mower blade. However, seed and fruit typically produced below the height of the mower blade as well as seed and fruit (if mature when cut) in the clippings may be usable by wildlife following a mowing event. Certain species of grass may continue to serve as a source of seed between mowing events. For example, in the southern and eastern United States, common oatgrass begins active growth in early spring. Flowers develop and bloom from late spring to early June, with seed maturation and shattering closely following pollination (Darbyshire and Cayquette, 1989). In addition, as indicated above, other areas of grassland located in the northern portion of the Base will still be cut just once per year. Therefore, indirect impacts to wildlife food sources as a result of mowing are not anticipated to be significant.

Several studies have been conducted to assess the potential impacts of mowing on grassland birds; however, the findings are varied, with no uniform conclusion. In conducting this EA, an effort was made to evaluate these studies, taking into consideration what factors may be similar or dissimilar to existing and proposed conditions at Westover ARB, to assess the likelihood of similar types of impact. Kershner and Bollinger (1996) investigated reproductive success of grassland birds at seven airports in east-central Illinois. Their study concluded that 44% of nest failure (primarily eastern meadowlark) was attributed to mowing and nest density declined as mowing height decreased. Nest predation was the second leading cause of failure (23%) in that study. The airport fields included in the Kershner and Bollinger study were mowed at relatively lower heights (2 to 4.5 inches), which are lower than the seven-inch mowing height at Westover ARB and Patuxent River Naval Air Station. This height difference, while not large, may have increased the probability of direct damage to eggs or nestlings as compared to the lesser observations at Westover ARB documented in the New Jersey Audubon Society studies (described below). In a study conducted by the US Fish and Wildlife Service (2006) on the impacts of grass mowing on bird species in semi-improved areas of the Niagara Falls Air Reserve Station at Niagara Falls, New York, nest data were examined in several ways to determine if there were differences between mowed and unmowed locations. The results were ambiguous.

The New Jersey Audubon Society (NJAS) conducted a study to determine avian response to grassland management on military airfields in the mid-Atlantic and the Northeast (Peters and Allen 2010 and Peters, Allen, and Tsipoura 2012) and grassland bird productivity on military airfields in the mid-Atlantic and Northeast regions (Peters and Allen 2011). The grassland management study and the grassland bird productivity study included the Patuxent River Naval Air Station, the Lakehurst section of the joint base McGuire-Dix-Lakehurst, and Westover ARB. Additionally, the New Jersey Audubon recently completed a third year of study of grassland bird nest survival on Westover ARB (2009-2012) as part of the broader study spanning the three military airfields in the eastern USA (Tsipoura et al., 2013). The researchers found some evidence of adverse effects of mowing on nest survivals. For example, eastern meadowlark and grasshopper sparrow nests trended towards higher daily nest survival rates (DSR) in non-mowed versus mowed areas (mainly due to fewer nest abandonments); however, the researchers found no statistical differences in daily nest survival rates based on location in the mow plan, or whether or not a nest was directly mowed over (Tsipoura et al. 2013). Of 40 eastern meadowlark nests tracked by NJAS, 25 (63%) were located in mowed areas, 8 were mowed over, and 3 failed due to mowing. Of the three mower-caused eastern meadowlark failures, one nest was pulled out by the mower, and two were abandoned immediately following mowing. In productivity analyses, eastern meadowlark nests (both all nests, and successful nests only) fledged more chicks in non-mowed versus mowed areas, but statistically significant differences were not found for other species, or for nests that were mowed over versus those that were not. However, the researchers suggest that the absence of statistically significant differences may be due in part to

limited sample sizes (which were at or below the minimum recommended for DSR analyses, <20 nests, for at least one group in all comparisons) (Tsipoura et al., 2013).

Nine of 31 (29%) upland sandpiper nests monitored by NJ Audubon in 2012 were located in mowed areas, and six of these were mowed over (67% of those in mowed areas, 195 of total). Of the six nests that were mowed over, five were successful and one failed due to mowing (Tsipoura et al., 2013). Fifteen (71%) of 21 successful upland sandpiper nests with adequate data hatched the full clutch of eggs, while six nests hatched incomplete clutches. General linear models to test for mowing effects on productivity (i.e. upland sandpiper chicks hatched or passerine chicks fledged) revealed no significant differences between mowed/unmowed areas or mowed/unmowed nests for upland sandpiper (Tsipoura et al., 2013). Combining all three years of study, the researchers observed that 3% of all monitored upland sandpiper nests and 11% of those in mowed areas failed as a direct result of mowing. However, the researchers suggest that these estimates are better calculated using daily failure rates as they are subject to the same biases as nest survival estimates (i.e. to adjust for nests destroyed before discovery). Based on the daily direct mowing failure rate, estimates of mowing failures increased to 18% of upland sandpiper nests in mowed areas (Tsipoura et al., 2013), although wide confidence intervals acknowledge uncertainty in the precision of this estimate. The NJ Audubon researchers note that they only monitored success over less than half of the upland sandpiper breeding cycle, and did not follow chicks through fledgling. As the young remain flightless for up to 30 days, the researchers suggest that total juvenile mortality for this species due to mowing may be higher than 18% (Tsipoura et al, 2013).

Of the 49 grasshopper sparrow nests monitored in 2012 during the NJ Audubon study at Westover ARB, 29 (59%) were located in mowed areas, 10 were mowed over, and 2 failed as a direct result of mowing (both crushed by tires). Thus, for the state-threatened grasshopper sparrow, mowing was the direct cause of failure in 7% of the nests in mowed areas (2 of 29), with a similar corrected estimate of 18% (Tsipoura et al., 2013). To estimate the potential effect on grasshopper sparrow populations, the NJ Audubon referenced the abundance estimates from 2012 which indicated that there were approximately 236 pairs of grasshopper sparrows breeding on Westover ARB (Melvin, 2012). Then, the researchers applied the calculated 18% direct failure rate, and concluded that the expected loss due to mowing would be about 42 grasshopper sparrow nests per season.

In 1994, blue-spotted salamander (State-listed species of Special Concern) had been found in some of the temporarily flooded wetlands on site including the shallow jurisdictional wetlands located within the grasslands in the northwest portion of the Base (Whitlock *et al.*. 1994); however, no formal surveys have been conducted to verify the presence of this species. The vegetation in this area is proposed to be maintained at heights between 7 and 14 inches (hand cut if too wet to mow and mowed when seasonally dry). Blue-spotted salamanders are rarely

encountered above ground, except as adults during their early spring breeding season or as metamorphosed juveniles in the late summer. Adults usually reside in leaf litter or below ground. However, larvae develop in the pools (standing water) and salamanders have been known to migrate approximately 100 to 900 feet between their breeding pools and their terrestrial habitat (MA NHESP, 2007). It is anticipated that migration to the pools in the Spring would occur prior to the season's first mowing/hand cutting; therefore, an impact during this time of the year is not anticipated. The most vulnerable period anticipated for blue spotted salamanders, should they still be present in depressional areas in the northern portion of the grasslands near the old railbed, would likely be during the larval development stage in the pools and during adult migrations from the pools to their terrestrial habitat. There is potential that some salamanders may be impacted if hand cutting occurs within the pool area while salamanders are present at the surface or in the water or if mowing occurs during migration from the pools. Since mowing would likely occur once per month during the growing season, with the intrusion of the mower into the habitat lasting only for a brief time, impacts to this population, should salamanders still be present in this location, is not anticipated to be significant. In addition, several other blue spotted salamander breeding locations have been observed on the Base property that will not be included in areas where regular mowing would occur.

The Phyllira tiger moth, a State-listed endangered species, has been identified on the Base and inhabits dry sandplain grassland areas. Eggs are laid on the ground, the larvae are ground-dwelling and feed on low-growing broad-leaved plants, and larvae pupate on the ground (MA NHESP, 2012a). While it is unlikely that these portions of their life cycle would be affected directly by the mower blades, there is a slight possibility of larvae or cocoons being crushed by mower tires or direct impacts to adults if they cannot fly from the path of the mower. While this possibility exists, the impact to the species on the Base is anticipated to be insignificant. In fact, the general plant community they depend on, sandplain grassland, is maintained through a variety of mechanisms, including fire, salt spray (near coastal areas), and mowing (Swain and Kearsley 2001). Mowing would provide this maintenance mechanism at Westover ARB.

The State-listed butterfly, the frosted elfin, can be found in grassland areas. Since the larvae feed on wild indigo or lupine from May through July, there is a small possibility that frosted elfin could potentially be impacted by mowing in grassland areas containing these plants. However, mowing contributes to the maintenance of habitat that this species depends on. Therefore, it is anticipated that the overall impact to the frosted elfin population would be insignificant.

Since the State-listed Threatened Pine Barrens Zanclognatha moth typically occupies pine barrens and the larvae feed on pitch pine (MA NHESP 2012b), this species would unlikely be affected by Alternative 1 due to the nature of its typical habitat and life cycle. Hartford fern, a State-listed species of Special Concern, is also not anticipated to be impacted by the mowing activities since its typical habitat does not include grasslands.

4.3.3 Alternative 2 (Preferred)

Alternative 2 differs from Alternative 1 in that it includes the use of a spray application of plant growth regulators as the primary means of vegetation height control within areas beyond the general AMA vicinity that are not currently maintained at a height of 7 to 14 inches (i.e. areas mowed once between August 1 and November 15). Regular mowing would still occur within the general AMA vicinity to maintain grass heights, therefore any impacts to biological resources such as vegetation and/or wildlife that may occur now under the No Action alternative would still potentially occur. Additionally, Alternative 2 includes the use of pre-emergent herbicides to control fast-growing broadleaf plants and incorporates prescribed burns to increase the abundance of slower growing warm season grasses on the airfield.

From a biological perspective, the advantage to using a PGR within the areas beyond the general AMA vicinity is that less frequent mowing would be required to maintain these grasslands to heights below 14 inches (for example, several mowings are required per season to maintain the general AMA vicinity between 7 and 14 inches in grass height). The use of PGR within areas that recently have been mowed just once per season would assist Westover ARB in complying with AFI 91-202 while at the same time potentially allowing wildlife, particularly small ground-nesting birds, to use these areas undisturbed by mowing for longer periods of time. PGR is anticipated to be applied in the Spring (April 15 to May 15) prior to the peak nest initiation of grassland birds. Follow-up maintenance mowing is anticipated to only be needed once or twice (likely between July and November 15), once the majority of nesting activities have been completed. This anticipated follow-up mowing schedule may be adjusted, however, depending on the effectiveness of the PGR as influenced by seasonal growing conditions, etc. If PGR treatment is not successful in preventing grasses from exceeding 14 inches in height during the nesting season, the AF will continue to collaborate with the MADFW to develop alternate strategies to mowing; but if no feasible strategies are identified, the AF will mow as necessary to remain in compliance with the flight safety standards set forth in AFI 91-202. While application of the PGR (and pre-emergent herbicide) may overlap with the early portion of some grassland bird nesting season, Alternative 2 is anticipated to have less impact on grassland bird nesting success rates, by reducing the number of times equipment is driven through the habitat, particularly once nests have already been established. For example, the maximum number of active grasshopper sparrow nests on Westover ARB in 2009, 2010, and 2012 occurred in late May and early June (Tsipoura et al., 2013. Similarly, the number of active upland sandpiper nests on the airfield peaked in the last 10 days of May. If use of the PGR and pre-emergent herbicide is able to control early season vegetation heights, and thereby avoid the need to mow during mid-May to mid-June, one would anticipate reduced direct nest mortality, as compared to Alternative 1.

Since PGRs can suppress the formation of seed heads, particularly for grasses, an indirect consequence of using PGR could potentially be a reduction in grass seed as a food source, assuming that this food source had been available prior to annual mowing under the current No Action protocol. If usable seed is not typically developed and available prior to annual mowing under the No Action alternative, then one would expect no additional reduction in potential food source under this alternative. Since at least 2002, Westover ARB has typically mowed the airfield before most little bluestem seed has ripened enough to fall off the stalk (Westover ARB, 2013b). Therefore, it appears that, at least in relation to little bluestem, a potential reduction in seed source may not be a consequence under this alternative. It is also possible that the shorter PGR treated vegetation may be less desirable to certain wildlife species than taller vegetation. However, the advantage with PGR is the decreased probability of direct injury or death resulting from mower wheels and moving blades should wildlife choose to use these areas.

Some PGR products include an herbicide action. One such PGR product "Plateau®" can also be used for native prairie grass renovation and restoration. Plateau herbicide controls many annual and perennial grass and broadleaf plant species, reducing competition from these species and allowing desirable prairie grass seedlings to establish. Products such as Plateau are also effective at controlling many noxious weeds in established prairie grass stands when applied at post-emergence as a foliar treatment to perennial weeds. Tolerant grass species, such as little bluestem, are unharmed by the herbicide action. The Executive Order 13112, *Invasive Species* (February 3, 1999) requires all federal agencies to prevent the introduction of invasive species, provide for their control and minimize their economic, ecological, and human health impacts. Since Westover ARB specifically seeks to promote establishment of native warm season grass species such as little bluestem while reducing broadleaf species on the airfield as part of the Westover ARB BASH plan, the use of this type of PGR is compatible with this plan.

If a particular PGR product contains an herbicide or is applied in conjunction with an herbicide (such as a broad-leaf herbicide for weed control), it is possible that secondary impacts to rare species could occur as a result of the loss of host plants (lupine or wild indigo) for rare insect species such as the frosted elfin butterfly. If PGR is applied in conjunction with an herbicide, host plant areas (such as the area containing lupine in the northern portion of the Base near the old railbed) would need to be avoided or PGR could be applied to these areas without an herbicide in order to avoid secondary impacts.

Washburn and Seamans (2007) compared the effectiveness of management techniques in Erie County, Ohio for managing vegetation height and altering plant community characteristics and compared bird and mammal use of cool-season grasslands that were not managed, managed by mechanical methods (mowing), and managed by chemical methods (plant growth regulator). The study found that bird presence was higher in unmowed plots versus mowed or PGR-treated plots. Red-winged blackbirds (*Agelaius phoeniceus*), American robins (*Turdus migratorius*), American

goldfinches (*Carduelis tristis*), and European starlings (*Sturnus vularis*) were the bird species most frequently observed using the study plots. Species-specific variation occurred in bird use of unmanaged and managed vegetation. Red-winged blackbirds, American goldfinches, field sparrows (*Spizella pusilla*), and song sparrows (*Melospiza melodia*) used unmanaged vegetation plots more than plots where vegetation management practices (mowing or chemical) were implemented, whereas European starlings and American robins were observed primarily in managed plots.

PGR/herbicide is anticipated to be applied prior to the peak nesting season for both common and rare bird species at Westover ARB. If, as a result of high water table, presence of standing water, or other factors, PGR/herbicide would need to be applied later than anticipated, birds may be nesting in areas to be treated with PGR/herbicide. The labels for PGR/herbicide products such as "Stronghold®" and "Plateau®" indicate hazards to humans and domestic animals such as eye irritation and harmful if inhaled or absorbed through the skin, and list indications not to contaminate food or feed, feed clippings to livestock, or graze livestock in treated areas. However, the Material Safety Data Sheet (MSDS) sheet for Plateau indicates the product is relatively non-toxic after single ingestion, non-toxic for short-term inhalation, and short-term skin contact and eye irritation are slight and temporary. Ecological information on the MSDS sheet indicates that the product was not acutely harmful to terrestrial organisms (mallard duck and honey bee). Therefore, significant adverse impacts as a result of inadvertent spraying of PGR/herbicide on wildlife, should they be present when spraying occurs, are not anticipated.

The use of plant growth regulators and herbicides is often a vital part of the management of vegetation at airports and along utility rights-of-way for a number of government agencies. For example, one of the Bureau of Land Management's highest priorities is to promote ecosystem health, and one of the greatest obstacles to achieving this goal is the rapid expansion of invasive plants (including noxious weeds and other plants not native to the region) across public lands. As part of an Environmental Impact Statement (EIS) for its vegetation treatment programs, BLM conducted ecological risk assessments on a number of herbicides (BLM, 2005). In a risk assessment, estimated exposure concentrations (EECs) are identified for various receptor groups in each of the applicable exposure scenarios via exposure modeling. Risk quotients (RQs) are calculated by dividing the EECs by herbicide- and receptor-specific or exposure media-specific Toxicity Reference Values (TRVs) selected from the available literature. These RQs are then compared to Levels of Concern (LOC) established by the US EPA Office of Pesticide Programs for specific risk presumption categories (i.e. acute high risk, acute high risk potentially mitigated through restricted use, acute high risk to endangered species, and chronic high risk). Thus, an ecological risk assessment is a structured evaluation of all currently available scientific data (e.g. exposure chemistry, fate and transport, toxicity) that leads to quantitative estimates of risk from environmental stressors to non-human organisms and ecosystems.

For the purposes of this EA, we focus on imazapic, the active ingredient of Plateau®, a dual use PGR/herbicide that is most likely to be the recommended chemical control for Westover ARB. The potential ecological effects of imazapic have been previously evaluated by both BLM (BLM, 2005) and the USDA – Forest Service (USDA, 2004) in detailed ecological risk assessments. Terrestrial animals may be exposed to an applied PGR/herbicide through a number of pathways including from direct spray, the ingestion of contaminated media (vegetation, prey species, or water), grooming activities, or indirect dermal contact with contaminated vegetation. In acute exposure scenarios evaluated by USDA (2004), the highest exposures for small terrestrial vertebrates would occur after a direct spray and could reach up to approximately 2.4 mg/kg at an application rate of 0.1 pounds of active ingredient per acre./acre (USDA, 2004). The ecological risk assessment calculated a wide range of exposures anticipated from the consumption of contaminated vegetation by terrestrial animals: central estimates range from 0.125 mg/kg for a small mammal to 2.69 mg/kg for a large bird, with upper ranges of about 0.27 mg/kg for a small mammal and 7.6 mg/kg for a large bird (USDA, 2004). Exposure scenarios for birds involve the consumption of contaminated insects by a small bird, the consumption of contaminated fish by a predatory bird, the consumption of small mammals contaminated by direct spray by a predatory bird, and the consumption of contaminated grasses by a large bird (USDA, 2004). The USDA concluded that the acute toxicity of imazapic to birds appear to be low, citing that after 8-day exposures to imazapic in the diet at concentrations up to 5,000 ppm, no effects were observed in either quail (Pedersen et al., 1993a) or ducks (Pedersen et al., 1993b). USDA determined that the chronic toxicity of imazapic to birds is comparable to that in dogs with a "no observed adverse effect level" (NOAEL) of 113 mg/kg of bodyweight per day and a "lowest observed adverse effect level" (LOAEL) of 170 mg/kg of body weight per day. The BLM noted some potential toxicity, but at concentrations considerably greater than would result from normal application. For reference, the estimated daily doses for a small mammal from the consumption of contaminated vegetation at an application site are in the range of about 0.0001 mg/kg to 0.01 mg/kg (USDA, 2004). Based on general relationships of body size to body volume, large vertebrates would be exposed to lower doses and smaller animals, such as insects, to much higher doses than small vertebrates under comparable exposure conditions. In BLM's ecological risk assessment, it determined that while birds fed high concentrations of imazapic in their diets for short periods of time showed no acute adverse effects, long-term exposure to 96.9% imazapic (22 weeks or more) did cause reductions in body weight in both large and small birds. Bobwhite quail fed 1,950 ppm imazapic (equivalent to 170 mg/kg of body weight per day) in their diets exhibited reduced body weight gains over a 24-week period (USEPA, 2003), while bobwhite quail fed 1,306 ppm imazapic (equivalent to 113 mg/kg of body weight per day) over the same period showed no signs of adverse effects (Miller et al., 1998 as cited in SERA, 2001). Imazpic has also been assayed for subchronic toxicity and reproductive effects in both ducks (Mortensen et al., 1998) and quail (Miller et al., 1998). No signs of systemic toxicity or reproductive effects (egg production, hatchability, survival of hatchlings) were observed in ducks over a 22 week exposure to imazapic in the diet at a concentration of up to 1,658 ppm (Mortensen et al., 1998). In addition to these toxicity studies,

pharmacokinetic studies have been conducted in hens (Afzal 1994; Gatterdam 1993a,b). These studies are consistent with pharmacokinetic studies in mammals, indicating that imazapic is rapidly excreted unchanged and does not accumulate in body tissue. In addition, no detectable concentrations of imazapic were found in eggs (USDA, 2004).

In BLM's ecological risk assessment, acute toxicity risk quotients for fish and aquatic invertebrates were all below the most conservative LOC of 0.05 (acute endangered species) for all pond and stream scenarios, indicating that surface runoff potentially containing imazapic residue is not likely to pose a risk to aquatic species (BLM, 2005). Study results for both coldwater and warmwater fish species failed to demonstrate adverse effects to imazapic concentrations of 100 mg/L. As a consequence, imazapic is considered to have low toxicity in fish species. Imazapic is absorbed slowly by fish. After 28 days of exposure, concentrations of imazapic in bluegill fish tissue were less than aqueous concentrations, indicating that imazapic does not appreciably bioaccumulate in fish tissue (Barker et al. 1998).

Thus, adverse effects from application of a PGR/herbicide in compliance with manufacturer's directions and label instructions do not appear to be likely. Although this discussion focused on the most likely PGR/herbicide (i.e., Plateau), it should be noted that any herbicide must be registered by EPA to ensure that, when used according to label directions, it can be used with a reasonable certainty of no harm to human health and without posing unreasonable risks to the environment. To make such determinations, EPA requires more than 100 different scientific studies and tests from herbicide manufacturers prior to authorizing its use (USEPA, 2014). In Massachusetts, all herbicides must be registered and approved for a specific use by the both the EPA and the MA Department of Food and Agriculture (DFA).

As noted previously, Alternative 2 integrates the use of PGR/herbicide with prescribed burns (prior to initiating mowing). The environmental effects of the fire component of Alternative 2 are primarily positive, as mimicking a natural grassland fire regime is the primary purpose for these fires (Westover ARB, 2008). The impacts of prescribed burns have been previously evaluated in the "*Environmental Assessment of the Use of Prescribed Fire on Six Burn Units at Westover ARB*" (WARB, 2005). A goal of the Wildfire Management program at Westover ARB is to effectively use fire as a tool to manage fuels and habitat, with the objective of burning grasslands on a five year return cycle. Large mammals, some small mammals, and birds would likely move to areas not burned (as only 1/5 of the grasslands would be targeted for burning each year). Some small mammals such as mice and voles would stay underground as the fire passed. However, it is possible that a small number of small mammals may die from the effects of the fire. As the prescribed burns would occur during the dormant season, no impacts on nesting birds would be anticipated. Native grassland vegetation is adapted to living with fire. It would regenerate quickly as nutrients sequestered in the dead portions of plants are made available to living roots via the ashes (Brown and Smith, 2000). While some invasive plants may also respond favorably to fire,

Westover ARB will continue to employ an integrated pest management approach to eradicating invasive species, as described in the base's Vegetation Management Plan.

4.4 AIR QUALITY

The potential effects of the Proposed Action and alternatives on air quality are presented in this section.

4.4.1 No Action (Continue Current Mowing Protocol)

Under the No Action Alternative, no change in existing mowing conditions would occur. Therefore, no impacts to air quality are anticipated.

4.4.2 Alternative 1

The increase in acreage of grassland to be maintained at a height of 7 to 14 inches would result in an increase in mowing equipment operational hours. Thus, Alternative 1 would result in a small increase in air quality emissions, corresponding to the increased use of (gasoline or diesel) fuel-powered mowing equipment.

CAA General Conformity Applicability

Nonattainment criteria pollutant emissions generated by the increase in mowing activities were calculated using the EPA-developed NONROAD emission factor model and the equipment usage hours. The mowing equipment operation hours are estimated based on RSMeans handbook guidance. The change in on-site indirect vehicular emissions from mowing worker's commuting to and from the site is anticipated to be negligible assuming that a similar number of vehicular trips from same personnel would be required as compared to the No Action Alternative. Therefore, no commuting vehicular net emissions were considered.

Alternative 1 would result in a slightly greater amount of air emissions as compared to the No Action Alternative (Table 4-1). However, these net emissions would be well below the *de minimis* thresholds and no formal general conformity determination is required. Therefore, the potential air quality impact is less than significant. The detailed emissions estimate can be found in Appendix C.

Attainment Criteria Pollutant and HAPs Emissions

Unlike the nonattainment criteria pollutants, *de minimis* levels have not been established for attainment criteria pollutants and HAPs emissions. This EA follows the Air Force Instruction 32-7040 (June 8, 2011) and quantifies these emissions with the comparisons of the relevant on-base baseline annual emissions inventory and the Hampden County annual emissions inventory,

respectively, for the purpose of informing the public and decision makers about the relative air quality impacts from the proposed action and alternatives under NEPA requirements.

Since the increase in attainment pollutant and HAPs emissions predicted for the proposed project for mobile sources (see Appendix C) are only fractions of the available baseline (stationary source only) emissions inventory and negligible compared with the Hampden County emissions inventory as summarized in Table 4-1, Alternative 1 would have negligible and non-significant air quality impact with respect to attainment pollutants and HAPs.

Table 4-1. Total Net and Net Percent Increase in Operational Emissions

Annual Emissions (tons)								
Alternative	**VOC**	**NOx**	**CO**	**$PM_{2.5}$**	**PM_{10}**	**SO_2**	**HAPs**	**CO_2[a]**
Alternative 1	0.03	0.12	0.12	0.02	0.02	0.00	0.0072	10.81
Alternative 2	0.02	0.08	0.07	0.01	0.01	0.00	0.0048	6.60
Baseline Stationary Source Annual Emissions Inventory	**6.82**	**4.08**	**1.79**	**0.17**	**0.99**	**1.06**	**0.055**	**n/a**
Maximum Net Percent Increase over Baseline Stationary Source Annual Emissions Inventory (%)[1]	0.4%	2.9%	6.7%	11.8%	2.0%	0.0%	13.1%	n/a
Hampden County Annual Emissions Inventory[2]	**18,082**	**10,806**	**63,059**	**4,704**	**10,437**	**2,411**	**2,895**	**n/a**
Maximum Net Percent Increase over Hampden County Annual Emissions Inventory (%)	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	0.00%	n/a
De minimis Threshold	*50*	*100*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*

Note:
[1] the net percent increase comparison is extremely conservative, as it is made between the increase of mobile source emissions from the proposed project and the available baseline inventory for stationary sources. The available baseline inventory does not account for the existing mobile sources at Westover ARB.
[2] Source: http://www.epa.gov/ttn/chief/EIINFOR.htm.
[a] CO_2 levels are in unit of metric ton.

Greenhouse Gas Emissions

The change in climate conditions caused by GHG resulting from the burning of fossil fuels from mowing activities associated with the Proposed Action is a global effect, and requires that the emissions be assessed on a global scale. Consequently, given the minimal increase predicted for the proposed project, which is well below the CEQ meaningful assessment threshold of 25,000 metric tons per year, the proposed project would result in an insignificant impact on overall global or US cumulative GHG emissions and global climate change. No specific GHG emission mitigation measures are warranted.

4.4.3 Alternative 2 (Preferred)

Alternative 2 would be expected to have similar effects on air quality as Alternative 1. The overall hours of equipment operation under Alternative 2 would be greater than the No Action alternative (because of the addition of herbicide/PGR application activities), but less than the Alternative 1 (due to comparatively fewer mowings per season). Therefore, potential air quality impacts are similarly less than significant. The predicted nonattainment criteria pollutant emissions, attainment criteria pollutant and HAPs emissions, and greenhouse gas emissions are summarized in Table 4-1.

While the calculations above do factor in some of the additional vegetation management components encompassed by Alternative 2 (i.e. application of plant growth regulator and/or herbicides), the calculations do not include the prescribed burn component. Per USAF guidance, the emissions from prescribed burn activities are exempt from quantitative evaluation and conformity analysis. Notably, the environmental effects from prescribed burning have been previously evaluated in the "*Environmental Assessment of the Use of Prescribed Fire on Six Burn Units at Westover ARB*", which concluded that the smoke generated will be equivalent to a tiny percentage of Westover ARB's yearly air emissions (WARB, 2005). While the prescribed burn component of Alternative 2 would temporarily generate smoke and ash, Westover ARB has received a permit from the MassDEP to conduct these prescribed burns. The use of fire by qualified experts according to the permit stipulations would not significantly increase pollutant emissions, exceed National Ambient Air Quality Standards or other federal, state, and local limits, or impact existing air permit limits (WARB, 2005). The cumulative effects of prescribed fire on global climate change are not well understood, but may be neutral. Smoke both contains greenhouse gasses that contribute to atmospheric warming, and sufficient opacity as to dim the amount of sunlight in the atmosphere, resulting in cooling. Grassland plants evolved with fire and are stimulated by it to grow, thereby sequestering carbon from the atmosphere (WARB, 2005).

4.5 CUMULATIVE IMPACTS

Cumulative impacts are defined by the CEQ in 40 CFR Section 1508.7 as "the impact on the environment which results from the incremental impact of the action when added to other past, present, and reasonably foreseeable future 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." The potential environmental effects resulting from the incremental impacts of the Proposed Action, when added to other recent, ongoing, or proposed projects occurring on Westover ARB in the near future, are considered in the cumulative effects analysis in this section.

Westover ARB recently undertook a grading and paving of the shoulders along Runway 15/33 resulting in the loss of some grassland areas adjacent to the previous footprint of the airfield pavement in these specific locations. This action comprised pavement repair, improvement of drainage structures, and lighting replacement, and was evaluated in an Environmental Assessment (Westover ARB, 2011). The EA concluded that the grading/paving would result in permanent and temporary direct and indirect impacts to grassland birds, including a net loss of approximately 2.9 acres of grassy habitat lost to the project. However, Westover ARB has also undertaken activities to convert forest to grassland, to reduce potential collision and/or line of sight hazards near the airfield, but with the ancillary effect of offsetting the loss of grassland resulting from other projects.

Other recent construction projects at Westover ARB include: construction of a munitions storage area, construction of a practice grenade range, creation of a materials storage area near the grenade range, demolition of Building 8700, and miscellaneous small electrical projects. Individually and collectively, these recent construction projects had little (or no) effect on the environmental resources in the area subject to this Proposed Action (i.e. the airfield grasslands). Westover ARB recently removed the inactive railroad tracks which used to traverse the grasslands to the northwest of Runway 15, allowing for natural restoration of the grassland habitat in this area.

Future actions under consideration by Westover ARB that could have effects within the area subject to this EA include: extending the thresholds for Runways 15/33 (to enhance the safety for airplanes that undershoot or overrun the runway). If the thresholds for Runways 15/33 were extended, it is anticipated that up to 1000 linear feet of pavement may be added at either/both ends of the runway, resulting in the loss of grassland habitat. While the runway extension project would result in the loss of some grasslands, overall it should be noted that Westover ARB has been actively increasing the amount of grasslands on base, through its ongoing tree removal and prescribed burn programs.

4.6 UNAVOIDABLE ADVERSE IMPACTS

The Proposed Action addressed in this EA is the management of airfield vegetation on Westover ARB to maximize flight safety, minimize the BASH risk, and comply with the revised AFI 91-202. The purpose of the Proposed Action is to manage airfield vegetation in a manner that complies with the AFI 91-202, paragraph 7.3.1.5.9 grass height standard (maintaining grass height within 500 feet of an AMA at a height between 7 and 14 inches) while conserving state listed species to the extent practicable as required by AFI 32-7064, paragraph 7.1.2. The need for the Proposed Action is to reduce the bird/wildlife aircraft strike hazard (BASH) risk, as collisions between fauna and aircraft can cause loss of life and substantial damage and loss of property, as well as interfere with the flying mission of Westover ARB. This includes not only the C-5B aircraft located at Westover, but also all of the other transitory aircraft that utilize this airfield.

Unavoidable adverse impacts associated with the Proposed Action, if implemented as described above, include potential impacts to biological resources (including wildlife and rare species). These potential impacts may include:

- Changes to the current vegetative communities beyond the general AMA vicinity over time, including a possible reduction in species diversity, biomass, and seed/fruit production

- Direct impacts to wildlife, including injury or fatality caused by the mower blades or wheels during mowing operations, particularly ground-nesting bird species and possibly migrating blue-spotted salamander and rare moth species

- Indirect impacts to wildlife including flushing of wildlife in the vicinity of the mower, abandonment of nests following disturbance by mowing, or loss of potential habitat or food sources (including seed or fruit)

- Possibility of increased predation as a result of less protective cover in mowed locations, although this occurrence has not been demonstrated at the Base

Although Westover ARB is not bound to comply with state law with regard to state-listed species in uplands, the Base attempts to provide responsible stewardship of the entire Westover ARB natural environment concurrent with the need to operate the airfield for flight safety (Westover ARB, 2012). However, the primary mission of Westover ARB is to provide worldwide air movement of troops, supplies, equipment, and medical patients, as well as to train flight personnel to assure mission readiness. To ensure that these mission activities can occur with the least risk of loss of human life or expensive military aircraft, the adverse impacts described above are unavoidable.

4.7 BEST MANAGEMENT PRACTICES TO REDUCE IMPACTS

Westover ARB recognizes that mowing is a source of direct nest mortality for some grassland birds breeding within the airfield, though less common than other sources of nest failure, such as nest predation. With the selection of an integrated vegetation management program (i.e. the Preferred Alternative - Alternative 2), incorporating the use of plant growth regulators, pre-emergent herbicides, and prescribed burns, prior to initiating mowing, the likelihood of adverse impact can be reduced. Mowing within the subject area would only be implemented as necessary to maintain grass heights at or below 14 inches in order to minimize unnecessary impacts to wildlife and vegetation from excessive mowing. The USAF will conduct, or participate in, annual breeding season (mid-June) surveys of grassland birds at Westover ARB. To facilitate comparability of data, it is anticipated that the bird surveys would follow the methodology and protocols that have been employed by MA DFW / MA NHESP annually between 1991 and 1995 and then bi-annually between 1997 and 2013 (with a census scheduled for June 2015)(MA NHESP, 2012c). In addition, agencies and organizations will continue to be granted access to work with Westover ARB environmental staff (consistent with Base security and mission) in conducting field data collection and analyses to determine the short and long-term and direct and indirect effects of the Proposed Action. The information gained can be forwarded to Air Force decision makers for the possible future refinement of mowing policy for both more effective BASH policy and conservation of threatened/endangered grassland bird species. Monitoring can be employed for these purposes, regardless of whether the Proposed Action or an Alternative is selected. Westover ARB is obliged to contact USFWS if the Base begins to observe a potential impact from mowing on the entire population of a migratory bird species present at Westover ARB.

The use of PGR/herbicides has been determined to be safe, when conducted in accordance with label directions, and appropriate precautions are taken. It is expected that the PGR/herbicide will be sprayed by a licensed applicator who has reviewed, understands, and conforms to the "Environmental Hazards" section on the herbicide label. This section warns of known risks to wildlife receptors or to the environment and provides practical ways to avoid harm to organisms or the environment. Adherence to certain application guidelines (e.g. defined application rates, equipment, herbicide mixture, and downwind distance to potentially sensitive habitat) is expected to minimize the potential for unintended effects on the environment. PGR/herbicides will not be applied during the following adverse weather conditions: high wind, dense fog, moderate to heavy rainfall, high temperatures and low humidity (for volatile herbicides), and/or deep snow preventing adequate coverage of target plants. Westover ARB's intended use of ground applications (i.e. tractor), instead of aerial applications (e.g. helicopter or fixed wing aircraft), is anticipated to considerably reduce potential impacts to non-target receptors from off-site drift.

While the environmental effects of the prescribed burn component of the Preferred Alternative are generally considered favorable, best management practices must be implemented to ensure no adverse impacts. Use of prescribed fire is included in the latest revision of the Westover ARB Integrated Natural Resources Management Plan, as well as the base Vegetation Management Plan and Wildland Fire Management Plan, per AFI 32-7064 (Chapter 12). These plans provide for conservation and rehabilitation of natural resources in a manner that is consistent with the military mission. Each prescribed fire requires adequate lift and transport conditions to ensure that smoke does not cause problems for sensitive receptors nearby. Burns would be restricted to the hours of 10:00AM and 4:30PM, and only authorized on days when meteorological conditions allow for optimum dissipation of smoke. Westover ARB will manage smoke so that it does not result in a nuisance, health or safety hazard, nor lower visibility on roads or the two interstate highways nearby. No burning will occur in habitats where birds are actively breeding and/or rearing young (and thus would not be able to escape the fire).

4.8 RELATIONSHIP BETWEEN SHORT-TERM USES AND THE MAINTENANCE AND ENHANCEMENT OF LONG-TERM PRODUCTIVITY

The short-term uses of man's environment in relation to the proposed action are the application of pre-emergent herbicides, plant growth regulator, prescribed burns, and mowing when vegetation height exceeds the 14-inch threshold. These activities are needed to reduce the BASH risk and provide a greater level of safety for U.S. Air Force personnel and equipment. Economic, political, and social benefits accrue from the safe operation of military aircraft at the base.

The long-term productivity of the natural environment at Westover ARB is affected by a wide variety of factors, many unrelated to the proposed action. Even in the absence of proposed action, global environmental conditions are changing as a result of climate change. Many of the bird species temporally present at Westover ARB rely seasonally on habitats in places quite remote from Massachusetts. A decline in populations of an avian species could be caused by significant weather events, changes in land use/development patterns, and/or political decisions made in far distant states or even countries (e.g. migratory winter habitat); these variables may make it difficult to assess what role, if any, activities at Westover ARB have on the overall populations of these species.

Westover ARB grants access to interested parties (e.g. bird groups) to conduct surveys and monitor the populations of the various bird species present on the base, including those listed by Massachusetts as threatened, endangered, or of special concern. These outside groups contribute to the monitoring of the long-term productivity of the grassland habitat on-base. As noted above, the USAF will conduct, or participate in, annual breeding season (mid-June) surveys of grassland birds at Westover ARB, similar to the bi-annual censuses which have been conducted by MA DFW / MA NHESP since 1997 (with a census scheduled for June 2015)(MA NHESP, 2012c).

Westover ARB is obliged to contact USFWS if the base begins to observe a potential impact from mowing on the entire population of a migratory bird species present at Westover ARB.

4.9 IRREVERSIBLE AND IRRETRIEVABLE COMMITMENT OF RESOURCES

Irreversible and irretrievable resource commitments are related to the use of non-renewable resources and the effects that the use of those resources have on future generations. An irreversible effect could result from the use of resources that cannot be replaced within a reasonable time (e.g. energy and minerals). An irretrievable effect could result from the loss of resources that cannot be restored as a result of the Proposed Action. Irretrievable resource commitments involve the loss in value of an affected resource (e.g., extinction of a threatened or endangered species or the disturbance of a cultural site). The Proposed Action would constitute an irreversible or irretrievable commitment of non-renewable or depletable resources (such as fuel to support PGR/herbicide application and mowing, etc.), time, machinery and hand tools, money, and energy expended during activities implementing the Proposed Action. Irreversible loss of biological resources would include the loss of individual animals or nests that are displaced or destroyed as PGR/herbicide application and/or mowing activity occurs.

5.0 LIST OF PREPARERS

AECOM prepared this document to fulfill the requirements of the National Environmental Policy Act (NEPA) for the Proposed Action of airfield vegetation management at Westover Air Reserve Base in Massachusetts. The following persons authored and provided direct oversight for the preparation of this EA:

MANAGEMENT

Shreve-Gibb, Betsy. M.R.P. Urban and Regional Planner. AECOM. As Senior Project Manager responsible for NEPA compliance, with extensive experience preparing environmental assessments and permits, provided technical review and oversight for preparation of all sections of the EA.

Briggs, Jeffrey. PhD. Ecology. AECOM. As a Senior Ecologist providing technical support for ecological risk assessments, wetlands assessments, habitat restoration, flora and fauna surveys, and endangered species assessments, provided technical review for all sections of the EA.

TASK LEADER

Petras, James. B.S. Biology. AECOM. As a Project Manager with expertise in preparing environmental assessments and impact reports for federal, municipal, and commercial entities, authored portions of the EA and provided review.

CONTRIBUTING AUTHORS

Touchet, Thomas. M.S. Environmental and Forest Biology. AECOM. As a Certified Professional Wetland Scientist and Senior Technical Specialist with expertise in plant ecology, wetland science, biology, threatened and endangered species, and the preparation of technical and scientific documents and permits, authored portions of the EA and assisted in preparing maps/figures.

Burm, Jeff. B.S. Wildlife Management. M.S. Spatial Data Analysis. As a subject matter expert in natural resources management, including wildlife inventories and population dynamics, provided technical support for the evaluation of impacts to avian species.

Meuse, Jim. M.S. Environmental Engineering. AECOM. As a GIS specialist, prepared maps and figures for the EA.

Coolidge, Brian. B.S. Cartography. AECOM. As a GIS/CADD Specialist with expertise in GIS database development, map generation, application development, and mobile data collection and integration, prepared maps/figures for the EA.

6.0 INTERAGENCY/INTERGOVERNMENTAL CO-ORDINATION FOR ENVIRONMENTAL PLANNING (IICEP) CONTACTS

6.1 WESTOVER ARB

The following Westover ARB personnel were consulted during the preparation of this Environmental Assessment:

Lt Col Charles Carroll	439 AW/SE	(413) 557-3587
Jack Moriarty	439 MSG/CEV	(413) 557-2434
Andrew Milroy	439 MSG/CEV	(retired)
Maj Charles Gartland	439 AW/SJA	
Maj Emily Koziol	337 AS/DOP	
Wayne Williams	439 MSG/CE	

6.2 LOCAL GOVERNMENT

• City of Chicopee
Conservation Commission
City Hall, Market Square
17 Springfield Street
Chicopee, MA 01013

• City of Chicopee
Planning and Administrator
Lee Pouliot
274 Front Street
Fourth Floor, City Hall Annex
Chicopee, MA 01013

• Town of Ludlow
Conservation Commission
c/o Chairperson, Jason Martowski
Ludlow Town Hall, 3rd Floor
488 Chapin Street
Ludlow, Ma 01056

• Town of Ludlow
Planning Board
488 Chapin Street
Ludlow, MA 01056

• City of Springfield
Mayor Domenic J. Sarno
36 Court Street
Springfield, MA 01103

• City of Holyoke
Alex B. Morse, Mayor
536 Dwight Street
Holyoke, MA 01040

• Town of Granby
Christopher Martin, Town Administrator
257 East State Street
Aldrich Hall
Granby, MA 01033

• Town of South Hadley
Acting Town Administrator: Mike Sullivan
Town Hall
116 Main Street, Room 109
South Hadley, MA 01075

6.3 STATE GOVERNMENT (ELECTED MASSACHUSETTS STATE OFFICIALS)

• The Honorable Charlie Baker, Governor
Western Massachusetts Office of the Governor
State Office Building
436 Dwight Street, Suite 300
Springfield, MA 01103
(413) 784-1200

• The Honorable Donald F. Humason, Jr.
Second Hampden and Hampshire District
District Office
64 Noble Street
Westfield, MA 01085
(413) 568-1366

• The Honorable James T. Welch
Hampden District
District Office
32-34 Hampden Street
Springfield, MA 01103
Phone: 413-737-7756

• The Honorable Eric P. Lesser
First Hampden and Hampshire District
State House
Room 309
Boston, MA 02133
(617) 722-1291

• The Honorable Stanley C. Rosenberg
Hampshire, Franklin & Worcester District
District Office
1 Prince St
Northampton, MA 01080
(413) 584-1649

• The Honorable Michael J. Finn
Massachusetts House of Representatives
6th Hampden District
District Office
71 Park Avenue
West Springfield, MA 01089
(413) 363-1965

• The Honorable John Scibak
Massachusetts House of Representatives
2nd Hampshire District
District Office
P.O. Box 136
South Hadley, MA 01075
(413) 539-6566

• The Honorable Ellen Story
Massachusetts House of Representatives
3rd Hampshire District
State House
Room 277
Boston, MA 02133
(617) 722-2012

• The Honorable Thomas M. Petrolati
Massachusetts House of Representatives
7th Hampden District
District Office
116 Sewall Street
Ludlow, MA 01056
(413) 589-7303

• The Honorable Joseph F. Wagner
Massachusetts House of Representatives
8th Hampden District
District Office
333 Front Street, Suite 3
Chicopee, MA 01013
(413) 592-7857

• The Honorable Jose F. Tosado
Massachusetts House of Representatives
9th Hampden District
District Office
640 Page Blvd., Ste 108
Springfield, MA 01104-3000
(617) 722-2425

6.4 MASSACHUSETTS STATE AGENCIES

• Massachusetts Department of Transportation Aeronautics Division
Christopher Willenborg, Administrator
Logan Office Center
One Harborside Drive
Suite 205N
East Boston, MA 02128-2909

• Commonwealth of Massachusetts Executive Office of Energy and Environmental Affairs
Secretary Matthew Beaton
100 Cambridge Street, Suite 900
Boston, MA 02114
Telephone: 617-626-1000

• MA Division of Fisheries & Wildlife
100 Hartwell St, Suite 230
West Boylston, MA 01583
(508) 389-7890

• Department of Conservation and Recreation
Jack Murray, Commissioner
251 Causeway Street, Suite 900
Boston, MA 02114-2104

• Chicopee Memorial State Park
570 Burnett Rd.
Chicopee, MA 01020

6.5 FEDERAL REGULATORY AGENCIES

• US Fish & Wildlife Service
Wendi Weber
300 Westgate Center Drive
Hadley, MA 01035-9589
*(*413) 253-8627

• Federal Aviation Administration
Office of Environment and Energy AEE-300
800 Independence Avenue SW
Suite 900W
Washington, DC 20591
202) 267-3576

• Federal Aviation Administration
New England Region
Airports Division (ANE-600)
12 New England Executive Park
Burlington, MA 01803

• Environmental Protection Agency New England, Region 1
Regional Administrator
5 Post Office Square - Suite 100
Boston, MA 02109-3912

6.6 PUBLIC AND PRIVATE REGIONAL AGENCIES

• Pioneer Valley Planning Commission
Timothy W. Brennan, Executive Director
60 Congress Street
Springfield, MA 01104-3419

• Chicopee Chamber of Commerce
Eileen P. Drumm, President
264 Exchange Street
Chicopee MA 01013
T: (413) 594-2101

• Jeffrey Ciuffreda, President
Affiliated Chambers of Commerce of Greater Springfield, Inc.
1441 Main St., Suite 136
Springfield, MA 01103-1449

• Westover Metropolitan Airport
Michael W. Bolton, Director of Civil Aviation
255 Padgette Street
Chicopee, MA 01022

• Westfield-Barnes Airport
Brian P. Barnes, Airport Manager
110 Airport Road Suite 218
Westfield, MA 01085

• Westover Metropolitan Development Corporation
255 Padgette Street
Chicopee, MA 01022

6.7 CIVIC AND COMMUNITY ORGANIZATIONS

• East Springfield Neighborhood Council
Kathy Brown, President
c/o 136 Edendale Street
Springfield, MA 01104

• Mass Audubon
208 South Great Road
Lincoln, MA 01773
781-259-9500

• New Jersey Audubon Society Headquarters
9 Hardscrabble Road
Bernardsville, New Jersey 07924
(908) 204-8998

• Hampshire Bird Club
P.O. Box 716,
Amherst, MA 01004-0716

• Brookline Bird Club
c/o Linda Ferraresso, Director
24 Patten Street #28
Watertown, MA 02472

• Hitchcock Center for the Environment
525 S Pleasant St
Amherst, MA 01002
(413) 256-6006

• Springfield Naturalists' Club
c/o Springfield Science Museum
236 State Street
Springfield, MA. 01103

6.8 COMMENTORS ON THE JUNE 2013 DRAFT EA

• Andrew Vitz, Ph.D.
State Ornithologist
Massachusetts Division of Fisheries and Wildlife
100 Hartwell Street, Suite 230
West Boylston, MA 01583

• John J. Clarke
Director of Public Policy & Government Relations
MassAudubon
Advocacy Department
6 Beacon Street, Suite 1025
Boston, MA 02108

• David Mizrahi, Ph.D
Vice President for Research and Monitoring
New Jersey Audubon
Center for Research and Education
600 Route 74 North
Cape May Court House, NJ 08210

• Wayne MacCallum
Director
MA Division of Fisheries and Wildlife
Field Headquarters
1 Rabbit Hill Road
Westborough, MA 01581

6.9 PARTIES CC'ED ON COMMENTS ON THE JUNE 2013 DRAFT EA

• Brad Bortner, Chief
US Fish & Wildlife Service Headquarters
Division of Migratory Bird Management
5275 Leesburg Pike
Falls Church, VA 22041-3803

• George Allen, Chief
US Fish & Wildlife Service Headquarters
Branch of Permits & Regulations
5275 Leesburg Pike
Falls Church, VA 22041-3803

• Wendi Weber, Regional Director
US Fish & Wildlife Service
Northeast Regional Office
300 Westgate Center Drive
Hadley, MA 01035-9589

• George Peterson, Jr. Commissioner
MA Department of Fish & Game
251 Causeway St, Suite 400
Boston, MA 02114-2152

• Nellie Tsipoura
New Jersey Audubon Society
9 Hardscrabble Road
Bernardsville, New Jersey 07924

• Kimberly Peters
Chief Scientist, Director of Bird Conservation
Mass Audubon
208 South Great Road
Lincoln, MA 01773

6.10 MEDIA (NEWSPAPER)

• The Republican
1860 Main Street
Springfield, MA 01101

6.11 PUBLIC INVOLVEMENT

A public notice was placed in the Republican (http://www.masslive.com/republican/) on 21 February 2015 announcing the availability of the revised Draft EA and revised Draft FONSI for public review and comment, with comments due to Westover ARB by close of business 23 March 2015. Copies were also available at the Chicopee Public Library and the Hubbard Memorial Library in Ludlow.

A copy of the Notice of Availability provided to each of the Interagency/Intergovernmental Coordination for Environmental Planning (IICEP) parties listed above, is provided in Appendix D.

7.0 REFERENCES

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APPENDIX A

VEGETATION GROWTH INHIBITORS

CLICK HERE TO JUMP TO USE DIRECTIONS

GORDON'S INDUSTRIAL
VEGETATION MANAGEMENT PRODUCTS

STRONGHOLD®

PLANT GROWTH REGULATOR

ACTIVE INGREDIENT:

Mefluidide, diethanolamine salt	21.45%
Imazethapyr, ammonium salt	4.09%
Imazapyr, ammonium salt	0.15%
OTHER INGREDIENTS	74.31%
TOTAL	100.00%

THIS PRODUCT CONTAINS:

1.46 lb acid equivalent of mefluidide (N-[2,4-dimethyl-5-[[[(trifluoromethyl)sulfonyl] amino]phenyl]acetamide) per gallon or 16.02%.
0.35 lb acid equivalent of imazethapyr ((±)-2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1-H-imidazol-2-yl]-5-ethyl-3-pyridinecarboxylic acid) per gallon or 3.86%.
0.01 lb acid equivalent of imazapyr (2-[4,5-dihydro-4-methyl-4-(1-methylethyl)-5-oxo-1-H-imidazol-2-yl]-3-pyridinecarboxylic acid) per gallon or 0.14%.

KEEP OUT OF REACH OF CHILDREN

CAUTION

READ THE ENTIRE LABEL FIRST. OBSERVE ALL PRECAUTIONS AND FOLLOW DIRECTIONS CAREFULLY.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

CAUTION: Causes eye irritation. Harmful if inhaled or if absorbed through the skin. Avoid contact with skin, eyes, or clothing.

Personal Protective Equipment (PPE)

Some materials that are chemical-resistant to this product are natural rubber. If you want more options, follow the instructions for category A on an EPA chemical-resistance category selection chart.

All mixers, loaders, applicators and other handlers must wear:

- long-sleeved shirt and long pants,
- shoes and socks,
- chemical-resistant gloves

User Safety Requirements

Follow manufacturer's instructions for cleaning/maintaining PPE. If no such instructions for washables exist, use detergent and hot water. Keep and wash PPE separately from other laundry. Discard clothing and other absorbent material that have been drenched or heavily contaminated with the product's concentrate. Do not reuse them.

User Safety Recommendations

- Users should wash hands before eating, drinking, chewing gum, using tobacco, or using the toilet.
- Users should remove clothing/PPE immediately if pesticide gets inside. Then wash thoroughly and put on clean clothing.
- Users should remove PPE immediately after handling this product. Wash the outside of gloves before removing. As soon as possible, wash thoroughly and change into clean clothing.

First Aid	
If in eyes:	• Hold eye open and rinse slowly and gently with water for 15-20 minutes. • Remove contact lenses, if present, after the first 5 minutes, then continue rinsing eye. • Call a poison control center or doctor for treatment advice. *(cont. on next column)*

First Aid *(cont.)*	
If inhaled:	• Move person to fresh air. • If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. • Call a poison control center or doctor for treatment advice.
If swallowed:	• Call a poison control center or doctor immediately for treatment advice. • Have person sip a glass of water if able to swallow. • Do not induce vomiting unless told to do so by the poison control center or doctor. • Do not give anything by mouth to an unconscious person.
If on skin or on clothing:	• Take off contaminated clothing. • Rinse skin immediately with plenty of water for 15-20 minutes. • Call a poison control center or doctor for treatment advice.
Have the product container or label with you when calling a poison control center or doctor or going for treatment. You may also contact 1-877-800-5556 for emergency medical treatment advice.	

Environmental Hazards

This product is toxic to plants. Drift and run-off may be hazardous to plants in water adjacent to treated areas. Do not apply directly to water, to areas where surface water is present, or to intertidal areas below the mean high water mark. Do not contaminate water when disposing of equipment wash waters or rinsate. See Directions for Use for additional precautions and requirements.

This chemical (mefluidide) has properties and characteristics associated with chemicals detected in groundwater. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in groundwater contamination.

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

APPLICATION RESTRICTIONS:

- Do not apply this product in a way that will contact workers or other persons, either directly or through drift. Only protected handlers may be in the area during application.
- Do not enter or allow others to enter treated areas until sprays have dried.
- Not for use on turf being grown for sale or other commercial use as sod, or for commercial seed production, or for research purposes.

NOT FOR SALE, DISTRIBUTION OR USE IN NASSAU OR SUFFOLK COUNTIES IN NEW YORK STATE.

STRONGHOLD Plant Growth Regulator (PGR) can be incorporated into highway vegetation management programs to eliminate seedhead production and to reduce the mowing requirements. STRONGHOLD PGR may be useful in the following noncropland areas:

- Highway rights-of-way (principal, interstate, state, and county highways), interchange ramps, waysides, service areas, and unpaved roads.
- Municipal, state, and federal lands such as airports, military installations, schools/universities, libraries, and hospitals.
- Commercial/Industrial areas including industrial parks, tank farms, plant sites, storage areas, fencerows, and utility rights-of-way.

STRONGHOLD PGR may be used in established turfgrass maintained under high levels of cultural management. Examples of these sites include improved sections of industrial grounds, athletic fields, cemeteries, parks, golf course roughs, and institutional grounds.

STRONGHOLD PGR inhibits the growth of bahiagrass, tall fescue, smooth bromegrass, orchardgrass, and Kentucky bluegrass. All established stands of these grasses should be at least one year old.

SPRAY EQUIPMENT AND MIXING INSTRUCTIONS

SPRAY EQUIPMENT:

Use conventional power spray equipment with bypass or mechanical agitation and fitted with a spray boom, off-center nozzles, or a spray gun.

It is essential that the spray equipment is properly adjusted and calibrated to assure proper dosage and uniform spray coverage. Follow the spray

equipment manufacturer's directions for cleaning, adjusting pressure and selecting appropriate nozzles.

SPRAY VOLUMES:
Spray volumes of 15 to 150 gallons per acre are recommended. Uniform applications are essential. Avoid spray overlaps that will increase the dosage above those recommended.

SURFACTANTS AND SPRAY COLORANTS:
The use of a nonionic surfactant is recommended to increase the extent and consistency of the growth regulation. The suggested surfactant rate is 0.25 to 0.50% vol/vol or 1 to 2 quarts per 100 gallons of spray solution. Temporary, slight discoloration of the turf may increase with the use of a surfactant.

The use of Gordon's Spray Colorant is recommended to allow the applicator to make uniform applications.

SPRAY PREPARATION FOR STRONGHOLD PGR ALONE:
1. Pour the required amount of STRONGHOLD PGR into the spray tank containing approximately one-half the required amount of water.
2. When thoroughly mixed, add the measured amount of nonionic surfactant.
3. Add Gordon's Professional Spray Colorant to the spray tank to ensure the uniformity of the application. Refer to instructions for this colorant for the proper concentration.
4. Fill the tank as required with water and spray as recommended.

SPRAY PREPARATION FOR STRONGHOLD PGR TANK MIXTURES:
STRONGHOLD PGR may be applied in combination with one or more of the specified herbicides or plant growth regulators. These tank mixtures must be used according to the most restrictive label limitations and precautions. No label dosage rate should be exceeded. Follow the labeling of each companion product for precautionary statements, directions for use, dosage rates, and application schedules. Tank mixture recommendations are for use only in states where the companion products and application site are registered.

Follow these guidelines and refer to the labeling of the companion product for further instructions.
1. Add one-half to two-thirds of the required amount of water into the spray tank.
2. Add the appropriate amount of the companion product (dispersible granules or dimethylamine salt formulations) into the spray tank with agitation.
3. Pour the appropriate amount of STRONGHOLD PGR into the spray tank.
4. Continue agitation while adding the remainder of water and add the measured amounts of nonionic surfactant and spray colorant.
5. Continue agitation throughout the spraying operation.

SEEDHEAD SUPPRESSION
The application window or timing is critical for the optimum seedhead control.

Generally the application window for the best results will range from 2 to 3 weeks for the cool season grasses. The beginning of the application window for the cool season grasses occurs in the spring after full green-up with rapid vertical growth. The end of the application window occurs approximately 2 weeks prior to the seedhead appearance or when the seedhead can be felt at the base of the stem. Applications of STRONGHOLD PGR after the optimum window will result in reduced seedhead suppression.

STRONGHOLD PGR must be applied prior to the seedhead appearance at the stem apex. Application of STRONGHOLD PGR after the seedhead emergence will suppress only the later forming seedheads.

Bahiagrass seedheads are produced from late spring until early fall. An application of STRONGHOLD PGR in the spring will provide seedhead inhibition for 6 to 10 weeks and will suppress the vegetative growth for 4 to 5 weeks. Apply STRONGHOLD PGR after full green-up of the bahiagrass with at least two inches of vertical growth (April to May). Applications of STRONGHOLD PGR must be made prior to seedhead (boot) emergence.

STRONGHOLD PGR should be used according to the instructions on this label. Refer to Table 1 for the application rate recommended for established turfgrass in noncropland sites.

VEGETATIVE GROWTH SUPPRESSION
STRONGHOLD PGR will provide growth inhibition for cool season grasses 6 to 8 weeks under favorable growing conditions. Apply STRONGHOLD PGR with a nonionic surfactant after full green-up of turfgrass in the spring. At the time of treatment, turf should have developed the desired appearance, the desired height, and sufficient leaf area for uptake.

Apply 12 to 16 fluid ounces of STRONGHOLD PGR per acre with a nonionic surfactant to actively growing turf for growth suppression up to 8 weeks. Refer to Table 1 for the use rates for tank mixtures applied to low maintenance turf. Refer to Table 2 for the use rates appropriate for turfgrass with intensive management care.

STRONGHOLD PGR will suppress the vegetative height of bahiagrass for 4 to 5 weeks. Tank mixtures of STRONGHOLD PGR and Oust® Herbicide Dispersible Granules will extend the period of growth suppression up to 8 to 10 weeks. Refer to Table 1 for the use rates for bahiagrass.

Limitations on broadcast treatments:
The maximum application rate is 38 fl. oz. of product per acre per application. The maximum seasonal rate is 88 fl. oz. of product per acre.

Table 1. Use Rates for STRONGHOLD PGR and Tank Mixtures For Established Turfgrasses in Noncropland Sites.

Product Name	Amount of Product	Nonionic Surfactant, % vol/vol	Comments
A. BAHIAGRASS			
STRONGHOLD PGR	28 to 38 fl. oz./acre	0.250	For growth suppression, apply after grasses are at 100 percent green-up with at least two inches of vertical growth. Use the higher dosage rate for more extended periods of foliar growth suppression. For seedhead suppression, apply prior to seedhead (boot) emergence. Do not use this product with Telar® Herbicide Dispersible Granules on bahiagrass turf because severe injury will occur. STRONGHOLD PGR may be used prior to or sequential to all currently registered herbicides EXCEPT there must be a three month interval of grass growth between applications of STRONGHOLD PGR and sulfonylurea and imidazolinone herbicide applications.
STRONGHOLD PGR plus Oust® Herbicide Dispersible Granules	24 to 26 fl. oz/acre plus 1/8 to 1/4 oz./acre	0.250	For growth suppression, apply after grasses are at 100 percent green-up with at least two inches of vertical growth. Use the higher dosage rate for more extended periods of foliar growth suppression. For seedhead suppression, apply prior to seedhead (boot) emergence. STRONGHOLD PGR may be used prior to or sequential to all currently registered herbicides EXCEPT there must be a three month interval of grass growth between applications of STRONGHOLD PGR and sulfonlyurea and imidazolinone herbicide applications.
B. TALL FESCUE, KENTUCKY BLUEGRASS, AND MIXED STANDS OF FESCUE/BLUEGRASS			
STRONGHOLD PGR	12 to 16 fl. oz./acre	0.250	Apply after grasses are at 100 percent green-up with at least two inches of vertical growth. On finer turfgrass areas where more uniform quality is desired, apply after two mowings. For seedhead suppression, apply prior to the seed stalk elongation and seedhead emergence. STRONGHOLD PGR may be used prior to or sequential to all currently registered herbicides EXCEPT there must be a three month interval of grass growth between applications of STRONGHOLD PGR and sulfonylurea and imidazolinone herbicide applications.
STRONGHOLD PGR plus Telar® Herbicide Dispersible Granules	6 to 8 fl. oz./acre plus 1/8 oz./acre	0.250	Do not apply Telar® Herbicide Dispersible Granules plus STRONGHOLD PGR to turf that is under stress from drought, insects, disease, cold temperatures or poor fertility, as injury may result. Do not apply to turf less than 1 year old. Do not exceed 1/2 ounce Telar® Herbicide Dispersible Granules per acre within a 12 month period.
STRONGHOLD PGR plus Hi-Dep® Broadleaf Herbicide, 3.8# a.e./gal.	12 to 16 fl. oz./acre plus 64 fl. oz./acre	0.250	Do not apply this tank mixture to turf that is under stress from drought, insects, disease, cold temperatures, or poor fertility, as injury may result. Do not apply to turf less than 1 year old.
C. MIXED STANDS OF FESCUE/BLUEGRASS, SMOOTH BROMEGRASS, AND ORCHARDGRASS.			
STRONGHOLD PGR plus Arsenal® Herbicide, 2.0# a.e./gal.	12 to 16 fl. oz./acre plus 1.5 fl. oz./acre	0.250	Differential responses of mixed turf species may occur with STRONGHOLD PGR and may result in a non-uniform appearance. Determine the predominant species in the mixed turf and follow the application schedule/window for the species most commonly found.

Table 2. Application Rate Recommendations For STRONGHOLD PGR For Established Kentucky Bluegrass And Fescues That Are Maintained With Intensive Cultural Practices.

Product Name	Amount of Product	Nonionic Surfactant, % vol/vol	Comments
A. KENTUCKY BLUEGRASS AND FESCUES			
STRONGHOLD PGR	2.2 to 4.35 fl. oz/acre (0.05 to 0.10 fl. oz./ 1000 sq. ft.)	—	This application rate will provide vegetative growth suppression for up to 5 weeks. Apply after grasses are at 100 percent green-up with at least two inches of vertical growth. On finer turfgrass areas where more uniform quality is desired, apply after two mowings. For seedhead suppression, apply prior to the seed stalk elongation. STRONGHOLD PGR may be used prior to or sequential to all currently registered herbicides EXCEPT there must be a three month interval of grass growth between applications of STRONGHOLD PGR and sulfonylurea and imidazolinone herbicide applications.

IRRIGATION AND RAINFALL:
To prevent product run-off, do not apply when raining or when rain is expected within 8 hours. Do not irrigate for 8 hours after application.

STRESSES:
Applications of STRONGHOLD PGR to turfgrass that is stressed because of high air temperatures, drought, excessive soil water, diseases, or insects may cause temporary discoloration. Management practices to promote the health and vigor of the turfgrass should be continued on the treated areas.

PRECAUTIONS AND LIMITATIONS:

1. Turf treated with STRONGHOLD PGR may appear less dense and temporarily discolored when compared with untreated, actively growing turf.
2. Do not apply to any body of water such as lakes, streams, rivers, canals, ponds, reservoirs, or bays. Also, do not apply to areas where water is present on the soil surface such as swamps, bogs, potholes, or marshes. However, it is allowable to treat seasonally dry swamps, bogs, potholes, or marshes, berms of ditches, and road shoulders.
3. STRONGHOLD PGR may be tank mixed with methylarsonate herbicides such as MSMA or DSMA. Do not tank mix with other postemergence grass herbicides labeled for use in turfgrass.
4. Do not use on newly established stands less than 1 year old.
5. Do not reseed before three months following an application of STRONGHOLD PGR.
6. Do not use on ornamental plants as injury may result.
7. Do not contaminate food or feed.
8. Do not contaminate water intended for irrigation or domestic purposes.
9. Do not feed clippings to livestock. Do not graze livestock in treated areas.
10. Keep out of lakes, streams, and ponds.
11. Do not apply through any type of irrigation system.

Spray Drift Requirements
Wind direction
Only apply this product if the wind direction favors on target deposition.

Wind Speed
Do not apply when the wind velocity exceeds 10 mph.

Temperature Inversions
Do not make ground spray applications into temperature inversions. Inversions are characterized by stable air and increasing temperatures with height above the ground. Mist or fog may indicate the presence of an inversion in humid areas. The applicator may detect the presence of an inversion by producing a smoke layer near the ground surface.

Droplet Size
Use Coarse or coarser droplet size (ASAE S572) or, if specifically using a spinning atomizer nozzle, applicators are required to use a volume mean diameter (VMD) of 385 microns or greater.

Additional Requirements for Groundboom Applications
All ground boom application equipment must be properly maintained and calibrated using appropriate carriers or surrogates. Do not apply with a nozzle height greater than 4 feet above the ground or foliage canopy.

STORAGE AND DISPOSAL

Do not contaminate water, food, or feed by storage or disposal.

PESTICIDE STORAGE: Keep from freezing.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER HANDLING: Nonrefillable container. Do not reuse or refill this container. Offer for recycling, if available, or puncture and dispose of in a sanitary landfill, or by incineration, or, if allowed by state and local authorities, by burning If burned, stay out of smoke.

Triple rinse or pressure rinse container (or equivalent) promptly after emptying.

Triple rinse as follows: Empty the remaining contents into application equipment or a mix tank and drain for 10 seconds after the flow begins to drip. Fill the container 1/4 full with water and recap. Shake for 10 seconds. Pour rinsate into application equipment or a mix tank or store rinsate for later use or disposal. Drain for 10 seconds after the flow begins to drip. Repeat this procedure two more times.

Pressure rinse as follows: Empty the remaining contents into application equipment or a mix tank and continue to drain for 10 seconds after the flow begins to drip. Hold container upside down over application equipment or mix tank or collect rinsate for later use or disposal. Insert pressure rinsing nozzle in the side of the container, and rinse at about 40 PSI for at least 30 seconds. Drain for 10 seconds after the flow begins to drip.

LIMITED WARRANTY AND DISCLAIMER

FOR USE ONLY AS DIRECTED. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, THE MANUFACTURER NEITHER MAKES NOR INTENDS ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING ANY WARRANTY OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE, WHICH ARE HEREBY EXPRESSLY DISCLAIMED. TO THE EXTENT CONSISTENT WITH APPLICABLE LAW, IN NO CASE SHALL THE MANUFACTURER BE LIABLE FOR INCIDENTIAL, CONSEQUENTIAL, OR SPECIAL DAMAGES RESULTING FROM THE USE OR HANDLING OF THIS PRODUCT. If these terms are not acceptable, return this product unopened immediately to the point of purchase, and the purchase price will be refunded in full. The terms of this LIMITED WARRANTY AND DISCLAIMER cannot be varied by any written or verbal statements or agreements at the point of sale or elsewhere.

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PBI/GORDON CORPORATION
1217 WEST 12TH STREET
KANSAS CITY, MISSOURI 64101
www.pbigordon.com

PLATEAU®

herbicide

SPECIMEN

BASF Corporation
26 Davis Drive
Research Triangle Park, NC 27709

BASF

STATEMENT OF PRACTICAL TREATMENT

IF INHALED: Move person to fresh air. If person is not breathing, call 911 or an ambulance, then give artificial respiration, preferably mouth-to-mouth if possible. Call a poison control center or doctor for further treatment advice.

IF ON SKIN: Take off contaminated clothing. Rinse skin immediately with plenty of water for 15-20 minutes. Call a poison control center or doctor for treatment advice.

IF IN EYES: Hold eye open and rinse slowly and gently with water for 15-20 minutes. Remove contact lenses, if present, after the first 5 minutes, then continue rinsing. Call a poison control center or doctor for treatment advice.

Have the product container or label with you when calling a poison control center or doctor or going for treatment.

PRECAUTIONARY STATEMENTS HAZARDS TO HUMANS AND DOMESTIC ANIMALS

CAUTION!

Harmful if inhaled or absorbed through skin. Avoid breathing spray mist. Avoid contact with skin, eyes or clothing. Wash thoroughly with soap and water after handling. Remove contaminated clothing and wash before reuse.

ENVIRONMENTAL HAZARDS

For terrestrial use only. DO NOT apply directly to water, or to areas where surface water is present, or to intertidal areas below the mean high water mark.

DO NOT contaminate water when disposing of equipment washwaters or rinsate.

This chemical demonstrates the properties and characteristics associated with chemicals detected in ground water. The use of this chemical in areas where soils are permeable, particularly where the water table is shallow, may result in ground-water contamination.

IMPORTANT

DO NOT use on food or feed crops. For the maintenance of non crop sites, PLATEAU herbicide may be applied to non-irrigation ditches and low lying areas when water has drained, but may be isolated in pockets due to uneven or unlevel conditions. DO NOT treat the inside of irrigation ditches. DO NOT rinse equipment on or near desirable trees or ornamental plants, or on areas where their roots may extend, or in locations where the chemical may be washed or moved into contact with their roots. DO NOT use on lawns.

DIRECTIONS FOR USE

It is a violation of Federal law to use this product in a manner inconsistent with its labeling.

This labeling must be in the possession of the user at the time of pesticide application.

DO NOT use on areas to be grazed, or cut for hay.

DO NOT use on turf being grown for sale or other commercial use as sod, or for commercial seed production, or for research purposes.

DO NOT use organophosphate insecticides on newly seeded areas treated with PLATEAU herbicide unless severe injury or loss of stand can be tolerated.

Observe all cautions and limitations on this label and on the labels of products used in combination with PLATEAU herbicide. Do not use PLATEAU herbicide other than in accordance with the instructions set forth on this label. The use of PLATEAU herbicide not consistent with this label may result in injury to desired vegetation. Keep containers closed to avoid spills and contamination.

When making new plantings of prairiegrass or wildflowers, carry-over from persistent herbicides such as sulfonyl-urea, imidazolinone, triazine, substituted urea, dinitroanaline, and other herbicides applied the previous year may result in compounded injury or death of desirable vegetation when treated with PLATEAU herbicide.

When making applications around desirable trees or ornamental plants, small areas should be tested to determine the tolerance of a particular species to soil and/or foliar applications of PLATEAU herbicide. See TOLERANCE OF TREES AND BRUSH TO PLATEAU HERBICIDE Section of this label.

DO NOT apply this product through any type of irrigation system.

DO NOT exceed 12 ounces of PLATEAU herbicide per acre in one year.

STORAGE AND DISPOSAL

PROHIBITIONS: KEEP FROM FREEZING. DO NOT store below 20°F. DO NOT contaminate water, food or feed by storage or disposal.

PESTICIDE DISPOSAL: Wastes resulting from the use of this product may be disposed of on site or at an approved waste disposal facility.

CONTAINER DISPOSAL: Triple rinse (or equivalent). Then offer for recycling or reconditioning, or puncture and dispose of in a sanitary landfill, by incineration or, if allowed by State and local authorities by burning. If burned, stay out of smoke.

DISCLAIMER

The label instructions for the use of this product reflect the opinion of experts based on research and field use. The directions are believed to be reliable and should be followed carefully. However, it is impossible to eliminate all risks inherently associated with use of this product. Turf injury, ineffectiveness or other unintended consequences may result because of such factors as weather conditions, presence of other materials, or the use of, or application of the product contrary to label instructions, all of which are beyond the control of BASF Corporation. All such risks shall be assumed by the user.

BASF shall not be responsible for losses or damages resulting from use of this product in any manner not set forth on this label. User assumes all risks associated with the use of this product in any manner not specifically set forth on this label.

BASF warrants only that the material contained herein conforms to the chemical description on the label and is reasonably fit for the use therein described when used in accordance with the directions for use, subject to the risks referred to above. BASF DOES NOT MAKE OR AUTHORIZE ANY AGENT OR REPRESENTATIVE TO MAKE ANY OTHER WARRANTIES, EXPRESS OR IMPLIED AND EXPRESSLY EXCLUDES AND DISCLAIMS ALL IMPLIED WARRANTIES OF MERCHANTABILITY OR FITNESS FOR A PARTICULAR PURPOSE.

BUYER'S EXCLUSIVE REMEDY AND BASF'S EXCLUSIVE LIABILITY, WHETHER IN CONTRACT, TORT, NEGLIGENCE, STRICT LIABILITY OR OTHERWISE, SHALL BE LIMITED TO REPAYMENT OF THE PURCHASE PRICE OF PLATEAU herbicide. In no case shall BASF or the seller be liable for consequential, special or indirect damages resulting from the use or handling of this product.

BASF makes no other express or implied warranty, including other express or implied warranty of FITNESS or of MERCHANTABILITY. User assumes the risk of any use contrary to label instructions, or under abnormal conditions, or under conditions not reasonably foreseeable by BASF.

USES WITH OTHER PRODUCTS (TANK-MIXES)

If this product is used in combination with any other product except as specifically recommended in writing by BASF Corporation then BASF Corporation shall have no liability for any loss, damage, or injury arising out of its use in any such combination not so specifically recommended. If used in combination recommended by BASF Corporation, the liability of BASF Corporation shall in no manner extend to any damage, loss or injury not directly caused by the inclusion of the BASF Corporation product in such combination use, and in any event shall be limited to return of the amount of the purchase price of the BASF Corporation product.

GENERAL INFORMATION

PLATEAU herbicide is an aqueous solution to be mixed with water and an adjuvant and applied as a spray solution to provide weed control and/or turf height suppression on noncropland areas such as railroad, utility, pipeline and highway rights-of-way, railroad crossings, utility plant sites, petroleum tank farms, pumping installations, non-agricultural fence rows, storage areas, non-irrigation ditchbanks, Conservation Reserve Program (CRP) land (see USE OF PLATEAU HERBICIDE ON CONSERVATION RESERVE PROGRAM LAND section), prairie sites, airports, industrial turf, golf courses, recreational and non-residential turf and other similar areas. PLATEAU herbicide may be used for the release of unimproved bermudagrass, bahiagrass, smooth bromegrass, wheatgrass, "wildtype" common Kentucky bluegrass, native prairiegrass, wildflowers, crown vetch and certain legumes. PLATEAU herbicide can also be used for weed control during the establishment of native prairiegrasses (see NATIVE PRAIRIEGRASS RENOVATION AND RESTORATION).

PLATEAU herbicide is readily absorbed through leaves, stems, and roots and is translocated rapidly throughout the plant, with accumulation in the meristematic regions. Treated plants stop growing soon after spray application. Chlorosis appears first in the newest leaves, and necrosis spreads from this point. In perennials, the herbicide is

translocated into, and kills, underground storage organs which prevents regrowth. Chlorosis and tissue necrosis may not be apparent in some plant species for several weeks after application. Complete kill of plants may not occur for several weeks after application. Adequate soil moisture is important for optimum PLATEAU herbicide activity. When adequate soil moisture is present, PLATEAU herbicide will provide residual control of susceptible germinating weeds. Activity on established weeds will depend on the weed species and rooting depth. PLATEAU herbicide is rainfast one hour after application.

PLATEAU herbicide will control annual and perennial grasses and broadleaf weeds and vine species. PLATEAU herbicide will provide residual control of labeled weeds which germinate in the treated area. Certain brush species and ornamentals may be injured by direct application of PLATEAU herbicide to their foliage. This product may be applied either preemergence or postemergence to the weeds. However, post emergence application is the method of choice in most situations, particularly for perennial species. For maximum activity, weeds should be growing vigorously at the time of postemergence applications and the spray solution should include an adjuvant (See "Adjuvants" Section). These solutions may be applied as a broadcast or as a spot treatment using backpack, or ground equipment.

PLATEAU herbicide may be applied in the dormant or growing season for weed control.

Depending on the turf type being treated, some yellowing of turf may occur with applications during the growing season. Depending on weather conditions, yellowing will usually disappear in 2 to 4 weeks.

PLATEAU herbicide should not be applied to newly seeded or sprigged grass stands, unless otherwise stated in this label. See COASTAL BERMUDAGRASS and PRAIRIEGRASS RENOVATION AND RESTORATION sections.

MIXING INSTRUCTIONS

Fill the spray tank one-half to three-quarters full with clean water. Use a calibrated measuring device to measure the required amount of PLATEAU herbicide. Add PLATEAU herbicide to the spray tank while agitating. Fill the remainder of the tank with water.

For postemergence applications, add a surfactant to the spray tank (See Adjuvants section of this label for specific recommendations). Maintain agitation while spraying to ensure a uniform spray mixture. An antifoaming agent may be added to the tank if needed.

When tank-mixing PLATEAU herbicide with recommended herbicides, add wettable powders, dispersible granules or other dry formulations first, then EC's, then PLATEAU herbicide, and then an adjuvant.

SPRAYING INSTRUCTIONS

DO NOT apply during windy or gusty conditions unless applications are being made with an enclosed or shielded spray system. DO NOT apply if rainfall is threatening. Rainfall within 1 hour after PLATEAU herbicide application may reduce weed control.

GROUND APPLICATIONS:

Uniformly apply with properly calibrated ground equipment in 2 or more gallons of water per acre. Application equipment, specially designed to make low volume application should be used when making applications using less than 10 gallons of water per acre. A spray pressure of 20 to 40 psi is recommended.

Adjust the boom height to ensure proper coverage of weed foliage or soil surface (according to the manufacturer's recommendation). Avoid overlaps when spraying.

SPOT TREATMENTS:

To prepare the spray solution, thoroughly mix in water 0.25 to 1.5% (0.3 to 1.9 oz/gallon water) PLATEAU herbicide plus an adjuvant (see "SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS" section). A methylated seed oil is the recommended spray adjuvant except when treating seedling prairiegrasses and wildflowers. See section on desired species and do not exceed the recommended PLATEAU rate per acre. Also see "WEEDS CONTROLLED" and "SPECIAL WEEDS CONTROLLED" sections for specific rate and/or tank-mix recommendations.

AERIAL APPLICATION:

All precautions should be taken to minimize or eliminate spray drift. Fixed wing aircraft and helicopters can be used to apply PLATEAU herbicide, however, when making applications by fixed wing aircraft maintain appropriate buffer zones to prevent spray drift out of the target area. Aerial equipment designed to minimize spray drift such as a helicopter equipped with a MICROFOIL™ boom, or THRU-VALVE™ boom or raindrop nozzles, must be used and calibrated. Except when applying with a MICROFOIL boom, a drift control agent may be added at the recommended label rate. To avoid drift, applications should not be made during inversion conditions, when winds are gusty, or under any other conditions which promote spray drift.

Uniformly apply recommended amount of PLATEAU herbicide in 5 or more gallons of water per acre, using enough volume to provide adequate coverage of target area or foliage. Include an adjuvant in the spray solution (See "Adjuvants" Section). A foam reducing agent may be added at the recommended rate, if needed.

IMPORTANT: Thoroughly clean application equipment, including landing gear, immediately after use of this product. Prolonged exposure of this product to uncoated steel (except stainless steel) surfaces may result in corrosion and failure of the exposed part. The maintenance of an organic coating (paint) may prevent corrosion.

Avoid overlaps when spraying.

SPRAY ADJUVANTS FOR POSTEMERGENCE APPLICATIONS

Postemergence applications of PLATEAU herbicide require a spray adjuvant. See "Special Weed Control" section. Due to variations in surfactant contents, certain surfactants containing high amounts of alcohols, paraffin based petroleum oils, and other compounds which can increase phytotoxicity to desirable vegetation, it is recommended to choose a low phytotoxic surfactant.

Methylated Seed Oils or Vegetable Oil Concentrates: Instead of a surfactant, a methylated vegetable-based seed oil concentrate containing 5 to 20% surfactant and the remainder of the methylated vegetable oil may be used at the rate of 1.5 to 2 pints per acre. Methylated seed oils provide their greatest effects at 30 GPA or less. At spray volumes above 50 GPA, their advantage appears negated. When using spray volumes greater than 30 gallons per acre methylated seed oil or vegetable based seed oil concentrates should be mixed at a rate of 1% of the total spray volume or alternatively use a nonionic surfactant as described below. Research indicates these oils may aid in deposition and uptake of PLATEAU herbicide for hard-to-control perennials, waxy leaf species or when plants are under moisture or temperature stress. **DO NOT** use a methylated seed oil or vegetable oil concentrate when making applications to newly emerged seedling prairiegrasses or wildflowers as injury may occur.

Nonionic Surfactants: Use a nonionic surfactant at the rate of 0.25% v/v or higher (see manufacturer's label) of the spray solution (0.25% v/v is equivalent to 1 quart in 100 gallons). For best results, select a nonionic surfactant with a HLB (hydrophilic to lipophilic balance) ratio between 12 and 17 and having at least 60% surfactant in the formulated product (alcohols, fatty acids, oils, ethylene glycol or diethylene glycol should not be considered as surfactants to meet the above requirements).

Silicone-Based Surfactants: See manufacturer's label for specific rate recommendations. Silicone-based surfactants may reduce the surface tension of the spray droplet allowing greater spreading on the leaf surface as compared to conventional nonionic surfactants. However, some silicone-based surfactants may dry too quickly, limiting herbicide uptake and higher spray volumes may exhibit "run-off".

Fertilizer/Surfactant Blends: Nitrogen-based liquid fertilizers such as 28%N, 32%N, 10-34-0, or ammonium sulfate, may be added at the rate of 2 to 3 pints per acre in combination with the recommended rate of nonionic surfactant or methylated seed oil. Research indicates that nitrogen based fertilizers aid in the burndown of annual weeds and increase PLATEAU herbicide uptake through waxy leaf species. However, fertilizers may increase phytotoxicity to desired species and newly emerged seedling prairiegrasses and wildflowers. The use of fertilizers in a tank-mix without a nonionic surfactant or a methylated seed oil is not recommended and may result in herbicide failure.

TANK MIXES

PLATEAU herbicide may be tank-mixed with PENDULUM® herbicide for additional control of late season annual grasses and certain broadleaves. For additional weed control, PLATEAU herbicide may be tank-mixed with ACCORD™, ROUNDUP™ PRO, glyphosate, ARSENAL® herbicide, diuron, CAMPAIGN™, FINALE™, GARLON™ 3A, MSMA, VANQUISH™, OUST™, ESCORT, TORDON™, or other labeled products. A compatibility test is advised for products not listed. 2,4-D and other phenoxy type herbicides have resulted in reduced control of perennial grass weeds.

DO NOT tank mix with organophosphate insecticides or use the same year as PLATEAU herbicide.

Consult manufacturer's labels for specific rates and weeds controlled. Always follow the more restrictive label when making an application involving tank-mixes.

FOR FOLIAR AND SEEDHEAD SUPPRESSION OF BAHIAGRASS, COOL SEASON GRASSES AND SUPPRESSION OF SOME ANNUAL WEEDS

Bahiagrass: PLATEAU herbicide may be used at the rate of 2 to 6 oz per acre to suppress growth and seedhead development of bahiagrass in unimproved areas. In North and South Carolina it is recommended to use PLATEAU herbicide at the rate of 2 oz per acre as higher rates may cause turf thinning. Depending on rate of PLATEAU herbicide used, surfactant and environmental conditions, temporary turf discoloration may occur. For optimum performance, application should be made after green-up. Applications may be made before or after mowing. If applied prior to mowing, raise mowing height to leave adequate existing foliage as new growth will be suppressed. If applied after mowing, allow adequate foliage to remain by increasing mower height or allowing time for foliar regrowth prior to application. **DO NOT** apply to turf under stress (drought, cold, insect, disease, etc.) or severe injury may occur. **DO NOT** use a methylated seed oil adjuvant.

PLATEAU	PHYTOTOXICITY	LENGTH OF SUPPRESSION
2 oz	none to low	partial to season long
3 to 6 oz	low to moderate	season long

For winter annual weed control, apply 8 oz of PLATEAU herbicide when bahiagrass is dormant, but when weeds are actively growing. This can be followed by 3 to 4 oz of PLATEAU herbicide in the spring after bahiagrass green-up for the suppression of seedheads and foliage.

Cool Season Grasses:

KY31 Tall Fescue and "Wildtype Common" Kentucky Bluegrass: Apply PLATEAU herbicide at 2 to 4 oz per acre for foliar and seedhead suppression of certain cool season grasses such as "KY31" tall fescue and "wildtype common" Kentucky bluegrass. Add a surfactant to the 2 oz rate of PLATEAU herbicide for optimum performance. The addition of a surfactant to 4 oz of PLATEAU herbicide may cause excessive turf injury or mortality of tall fescue. Application to turf type tall fescue or Kentucky bluegrass may result in severe injury or loss of stand.

Crested Wheatgrass: Apply PLATEAU herbicide at 6 to 10 oz. per acre for foliar and seedhead suppression of crested wheatgrass, and 6 to 12 oz. per acre for foliar and seedhead suppression of intermediate wheatgrass. Other wheatgrass species may also be suppressed, however, apply PLATEAU herbicide to a limited area to determine effectiveness. Tank-mixes with 2,4-D or products containing 2,4-D may decrease the effectiveness of PLATEAU herbicide. Tank-mixes with GARLON, TORDON™, TRANSLINE™ and VANQUISH may decrease the potential of turf injury. DO NOT apply to turf under stress or severe injury may occur.

FOR THE CONTROL OF UNDESIRABLE WEEDS IN UNIMPROVED BERMUDAGRASS

PLATEAU herbicide may be used on unimproved bermudagrass turf such as roadsides, utility rights-of-way, railroad crossings, airports, non-irrigation drainage ditches and other such noncropland sites. There is a differential tolerance between bermudagrass types (See below paragraphs). Depending on bermudagrass type, timing of application, and PLATEAU herbicide rate, some foliar, stolon, and seedhead suppression may occur. IMPORTANT: Apply PLATEAU herbicide after bermudagrass has reached full green-up. Spring applications made prior to full green-up may delay green-up. Always add a surfactant when applying PLATEAU herbicide. DO NOT apply to grass under stress from drought, disease, insects or other causes. Simultaneous mow/spray operations may suppress internode development. After mowing, allow adequate foliage regrowth prior to PLATEAU application as some internode suppression may prevent bermudagrass from quickly recovering from mowing.

Common Bermudagrass: Common bermudagrass is the most tolerant bermudagrass to PLATEAU herbicide. Tank-mixes with Roundup Pro, Accord or glyphosate will improve the weed control spectrum, but may increase turf phytotoxicity. Some stolon internode shortening and seedhead suppression may occur for the first 8 weeks.

Sprigged Coastal Bermudagrass: PLATEAU herbicide at 4 to 6 oz per acre may be applied at sprigging for weed control to aid in the establishment of coastal bermudagrass. **DO NOT** use on hybrid varieties such as Tifton 85, New World, etc.

Established Coastal Bermudagrass: PLATEAU herbicide at 6 to 12 oz per acre will provide control of labeled weeds as well as foliar and seed head suppression of established coastal bermudagrass. Do not use on hybrid varieties such as Tifton 85, New World, etc. Depending on environmental conditions and weed pressure, the longevity of suppression and weed control increases as the PLATEAU herbicide rate increases. Tank-mixes with ROUNDUP PRO, ACCORD, or glyphosate may result in death or excessive injury of coastal bermudagrass.

Turf Type Bermudagrass: Turf type bermudagrass varieties show a high degree of variation in tolerance to PLATEAU herbicide. PLATEAU herbicide at rates of 4 to 6 oz per acre will provide some annual weed control and foliar & seedhead suppression. Rates above 6 oz per acre may result in excessive injury or death of turf type bermudagrass.

SEE ABOVE SECTIONS FOR PLATEAU HERBICIDE RATES AND TIMINGS FOR SPECIFIC BERMUDAGRASS TYPES WITH REGARD TO WEED CONTROL AND TURF TOLERANCE.

Winter Annual Weed Control: Apply PLATEAU herbicide at the rate of 10 to 12 oz. per acre prior to winter weed germination or while winter weeds are actively growing. Early spring applications may delay green-up of bermudagrass turf.

Summer Annual Weeds: For best results, apply PLATEAU herbicide at the rate of 8 to 12 oz per acre pre-emergence or early postemergence before weeds have reached 6 inches in height. Larger weeds may be controlled depending on susceptibility, growing conditions, tank-mix partner and adjuvant selection.

Perennial Weeds: Apply PLATEAU herbicide at the rate of 8 to 12 oz per acre postemergence after weeds have produced adequate foliage for herbicide uptake. For a particular weed see "Special Weed Control" section below. The addition of ACCORD or ROUNDUP PRO herbicide may increase control.

Bahiagrass Control: Apply PLATEAU herbicide at the rate of 10 to 12 oz per acre postemergence. See SPECIAL WEED CONTROL section below for recommendations. The addition of ROUNDUP PRO or ACCORD herbicide at 12 to 16 oz per acre may increase control.

FOR THE CONTROL OF UNDESIRABLE WEEDS IN UNIMPROVED CENTIPEDE GRASS

PLATEAU herbicide may be applied at a rate of 4 to 8 oz per acre to established centipede grass for the control of annual broadleaf and grass weeds. Apply PLATEAU herbicide after centipede grass has reached full green-up. Spring applications made prior to full green-up may delay green-up. Always add a surfactant when applying PLATEAU herbicide. DO NOT apply to grass under stress from drought, disease, insects or other causes. Simultaneous mow/spray operations may suppress internode development. After mowing, allow adequate foliage regrowth prior to PLATEAU application as some internode suppression may prevent centipede grass from quickly recovering from mowing.

FOR CONTROL OF UNDESIRABLE WEEDS IN SMOOTH BROMEGRASS, WILDTYPE COMMON KENTUCKY BLUEGRASS AND WHEATGRASSES

PLATEAU herbicide may be used on unimproved smooth bromegrass, "wildtype" common Kentucky bluegrass and crested, western, bluebunch and intermediate wheatgrass in noncropland areas. For other types of wheatgrass species, make application to small area to determine tolerance to PLATEAU herbicide. PLATEAU herbicide provides control of labeled grass and broadleaf weeds (See WEEDS CONTROLLED and SPECIAL WEED CONTROL sections). Treatment of smooth bromegrass and wheatgrass with PLATEAU herbicide may result in foliar height and seedhead suppression.

Smooth Bromegrass and "Wildtype" Common Kentucky Bluegrass: Use PLATEAU herbicide at 4 to 8 oz per acre in the spring for weed control and growth suppression after smooth bromegrass and "wildtype" common Kentucky bluegrass have reached 100% green-up. Applications prior to 100% green-up may delay green-up. Rates from 8 to 12 oz per acre may be applied in the spring but may result in excessive growth suppression. For fall applications (see SPECIAL WEED CONTROL section), PLATEAU herbicide may be used at 8 to 12 oz per acre for control of perennial weeds.

Wheatgrass: To control undesirable weeds in crested, western, bluebunch, intermediate and other wheatgrasses apply PLATEAU

herbicide at 4 to 12 oz. per acre. For wheatgrass species other than crested, western, bluebunch and intermediate, make application to small area to determine tolerance to PLATEAU herbicide.

FOR CONTROL OF UNDESIRABLE WEEDS IN CROWN VETCH

PLATEAU herbicide may be applied at the rate of 4 oz per acre to newly seeded crown vetch beds to aid in the establishment of vetch and reduce weed competition.

PLATEAU herbicide at 8 to 12 oz per acre may be used on unimproved established crown vetch in noncropland areas. PLATEAU herbicide provides control of labeled grass and broadleaf weeds (Refer to the "Weeds Controlled" and "Special Weed Control" section for specific rates). Treatment of crown vetch beds with PLATEAU herbicide may cause internode shortening and some minor tip chlorosis depending on timing of application.

PLATEAU herbicide should be applied during winter dormancy or early spring to reduce potential injury. Applications made after May, may result in increased injury or defoliation. Addition of surfactants such as dilimenene based or crop oil concentrates will increase injury. Fall applications during the period of active crown vetch growth may result in severe injury or loss of stand.

NATIVE PRAIRIEGRASS RENOVATION AND RESTORATION

PLATEAU herbicide may be applied at the rate of 2 to 12 oz per acre to newly established or existing stands of labeled species (see below for details) in such areas as roadsides, industrial sites, prairie restoration sites, drainage ditch banks, and other such noncropland areas. Certain local ecotypes or varieties may be suppressed by PLATEAU herbicide. Many factors such as poor seedling vigor, cool temperatures, poor soil, planting depth, excessive moisture, disease, insects and dry weather after emergence can all result in poor stands. Additional stress of herbicide residue, poor soils and other factors contributing to poor seedling vigor can also increase injury and could result in mortality. BASF can not be held responsible for such unforeseen factors. It is suggested to try PLATEAU herbicide on a small area if tolerance is not known. PLATEAU herbicide controls many annual and perennial grass and broadleaf weeds. Weed competition is reduced allowing prairiegrass seedlings to establish. PLATEAU herbicide is also effective for control of noxious weeds in established prairiegrass stands and must be applied postemergence as a foliar treatment to perennial weeds. IMPORTANT: ALWAYS ADD AN ADJUVANT when applying PLATEAU herbicide. To maximize weed control always use a methylated seed oil when treating established prairiegrass stands. Use a nonionic surfactant when treating newly emerged seedling prairiegrasses. The addition of liquid fertilizer will decrease grass tolerance and should not be used when treating newly emerged seedling prairiegrasses.

PLATEAU herbicide may be applied at a rate of up to 4 oz per acre to Federal Conservation Reserve Program (CRP) land for the establishment or release of big bluestem, little bluestem, Indiangrass, sideoats and blue grama.

Establishment: For optimum results in establishing mixed prairiegrass stands with PLATEAU herbicide, make application at planting before prairiegrass seedlings emerge. Newly emerged grasses can be sensitive to PLATEAU herbicide and/or the adjuvant used. If native warm season prairiegrasses have begun to emerge, it is best to wait until they have reached the five leaf stage to make a PLATEAU herbicide application and use a nonionic or silicone surfactant. Do not use a methylated seed oil at this time as some grass species tolerance will be lost. PLATEAU herbicide will control annual weeds preemergence or early postemergence. See "WEEDS CONTROLLED" section for maximum height of weeds and see below for more details on best rate and timing for prairiegrass and wildflower species. Postemergence applications may result in stand thinning due to variability in seedling grass tolerance to the use of spray adjuvants. Seedling grasses are generally more tolerant to the use of spray adjuvants after they have reach the five leaf stage. When planting into a field which was row cropped the previous year, compounded injury may occur from herbicide carry-over (See "DIRECTIONS FOR USE" section).

Rates and Control: Apply PLATEAU herbicide at 2 to 6 oz per acre to fields cropped the previous year, when annual weeds are the target and/or if grass/forb mixtures are used. PLATEAU herbicide at 2 to 6 oz per acre will provide control and/or suppression of many annual grass and broadleaf weeds. Use lower rates when in the northern most U.S., dry climates or for late season plantings into clean seedbeds. PLATEAU herbicide rates as low as 2 oz. per acre may be used on soils with a pH > 7, a low CEC and a course texture containing a minimum of clay and organic matter. Use higher rates in heavy weed pressure, heavy residue, high organic matter, high rainfall and long growing season (southern portions of Illinois, Indiana, Missouri and Ohio, etc.). Apply PLATEAU herbicide at 8 to 12 oz per acre for giant ragweed or for perennial weed control/suppression. PLATEAU herbicide rates of 8 to 12 oz per acre may result in stunting or stand thinning. The duration and intensity of suppression are directly related to weed pressure, chemical residue, soil type and environmental conditions. See below for details for particular grass tolerances and timings.

Established Stands: For optimum results, apply PLATEAU herbicide as an early postemergence application to annual grasses and broadleaf weeds. For perennial weed control, see "SPECIAL WEED CONTROL" section. The use of high rates may result in foliar and/or seed head height suppression of established stands of prairiegrass. This effect is more likely to occur under conditions of light soils, low weed pressure, low rainfall, and short growing seasons. Use the lower rates for light weed infestations or when mixing with wildflowers and legumes (See "Wildflower" Section for rate tolerance). Use higher rates to broaden and lengthen weed control spectrum.

Big Bluestem, Little Bluestem and Indiangrass: PLATEAU herbicide may be applied at the rate of 2 to 12 oz per acre at planting, or any time thereafter, including after seedling grasses have emerged or to perennial stands (dormant or actively growing). See weed control section for desired rate. Use the lower rates in Wisconsin, Michigan, Minnesota, South Dakota, North Dakota, and Nebraska and higher rates as rainfall and/or growing season increases.

Switchgrass *(Panicum virgatum)*: PLATEAU herbicide is not recommended for the establishment of pure switchgrass stands as severe injury or death may result. PLATEAU herbicide may be applied at a rate of 2 to 4 oz per acre if switchgrass is planted in mixed stands with tolerant species, but only if some stand thinning or loss of stand can be tolerated. Mature switchgrass planting can be reclaimed from certain perennial weeds such as tall fescue, leafy spurge, johnsongrass, etc., with PLATEAU herbicide at rates of 10 to 12 oz per acre. However, severe stunting and injury is imminent. DO NOT apply PLATEAU herbicide to switchgrass if such severe injury can not be tolerated.

Sideoats and Blue Grama: Apply PLATEAU herbicide to monoculture stands of sideoats and blue grama only if some stand thinning or loss of stand can be tolerated. PLATEAU herbicide may be applied at the rate of 2 to 4 oz/A plus an adjuvant to aid in the establishment of sideoats and blue grama after new seedlings have emerged and reached the five (5) leaf stage. When using PLATEAU herbicide at 4 oz per acre it is not recommended to use in combination with a methylated seed oil adjuvant as stand thinning may occur. The lower rates may provide adequate weed suppression in early summer plantings in the states of Wisconsin, Michigan, Minnesota, South Dakota, North Dakota, and Nebraska and other states where growing degree days are short. Sideoats and blue grama have shown tolerance to PLATEAU herbicide at 2 to 4 oz/A, applied pre-emergence at planting, however, some stand thinning may occur. For weed control in established stands use 4 to 10 oz/A of PLATEAU herbicide. Up to 12 oz/A of PLATEAU herbicide may be applied, but may result in foliar and/or seedhead suppression, or in the injury of sideoats and blue grama, depending on surfactant choice, soil type, variety, weed pressure and environmental conditions.

Buffalograss: Apply PLATEAU herbicide at the rate of 2 to 4 oz/A for control or suppression of labeled weeds and to aid in the establishment of newly sprigged buffalograss. Apply PLATEAU herbicide immediately after planting prior to spring growth or seed germination. New growth and small seedlings can be severely injured or killed. If applying after emergence it is best to wait until buffalograss has at least five true leaves and use a nonionic or silicone surfactant. Do not use a methylated seed oil. For established stands, PLATEAU herbicide may be applied at the rate of 2 to 8 oz/A for weed control. Higher rates may cause some turf discoloration and stunting. PLATEAU herbicide may be applied to dormant buffalograss to control winter annual weeds. Turf type buffalograss may express different tolerance level to PLATEAU herbicide than wild type buffalograss. Some turf types can tolerate low rates of PLATEAU herbicide at seeding. Consult seed dealer for details.

Eastern Gamagrass: PLATEAU herbicide should only be used for the establishment or maintenance of eastern gamagrass if some stand thinning or loss can be tolerated. Apply PLATEAU herbicide at 2 to 6 oz per acre at planting prior to gamagrass emergence. Stand thinning and stunting is imminent. Adverse conditions, poor soils, or added stress to

the gamagrass could result in stand mortality. Postemergence application to seedlings will cause mortality. On established Eastern gamagrass, apply PLATEAU herbicide at 2 to 8 oz per acre prior to gamagrass breaking dormancy. Some stunting will occur and increases as the PLATEAU herbicide rate increases. Applications made during or after green-up may result in foliar and seedhead suppression and possible mortality of weak plants.

Tall Fescue Control: Tall fescue can be controlled by using PLATEAU herbicide at the rate of 12 oz per acre plus methylated seed oil at 2 pints per acre in established stands of or to prepare a seed bed for big bluestem, little bluestem, and indiangrass. The addition of Nitrogen fertilizer (See "ADJUVANTS" Section) to the above mix will aid in control. Tall fescue must be actively growing for optimum control. If tall fescue has reached the boot stage or has reached summer dormancy, control may be poor. For improved control of tall fescue, PLATEAU herbicide may be tank mixed with ACCORD, ROUNDUP PRO, or glyphosate. Fall applications of PLATEAU herbicide at 8 to 12 oz/A plus 24 to 64 oz/A ACCORD or ROUNDUP PRO will result in best control of existing tall fescue and new germinating seedlings. With spring applications of PLATEAU herbicide at 6 to 12 oz/A, plus a ACCORD or ROUNDUP PRO at 32 to 64 oz/A, use higher rates for older, mature fescue stands and lower PLATEAU herbicide rates when planting forbs. When using 8 oz/A of PLATEAU herbicide in the fall with a glyphosate product, it is recommended to apply 4 oz/A PLATEAU herbicide in the spring at planting for annual weed and seedling fescue control. Burning the fescue stand, where permitted, the following spring, just prior to green-up, will aid in control and provide a better seedbed for planting. Mowing the fescue several times the summer before fall application, will weaken the fescue root system, making it more susceptible to herbicides. Always allow for at least 10 inches of regrowth, following the last mowing before spraying, as both PLATEAU herbicide and glyphosate products need foliage present for herbicide uptake and satisfactory control.

TOLERANT GRASS SPECIES[1]

Prairiegrass		PLATEAU herbicide Rate (oz/A)[2]	
Common Name	Genus species	New Seeding	Established
Big Bluestem	*Andropogon gerardii*	2-12	2-12
Little Bluestem	*Schizachyrium scoparium*	2-12	2-12
Indiangrass	*Sorghastrum nutans*	2-12	2-12
Bushy Bluestem	*Andropogon glomeratus*	–*	2-12
King Ranch Bluestem	*Bothriochloa ischaemum*	–	2-12
Silver Beard Bluestem	*Bothriochloa saccharoides*	–	2-12
Broomsedge	*Andropogon virginicus*	–	2-12
Fingergrass, Rhodes grass	*Choris* spp.	–	2-12
Needlegrass	*Stipa* spp.	–	2-12
Needleandthread	*Stipa comata*	–	2-12
Kearny (Plains) Threeawn	*Aristida longespica*	–	2-12
Prairie Threeawn	*Aristida oligantha*	–	2-12
Prairie Sandreed	*Calamovilfa longifolia*	–	2-12
Smooth Bromegrass	*Bromus inermis*	–	2-12
Kentucky Bluegrass	*Poa pratensis*	–	2-12
Wheatgrasses	*Agropyron* spp.	–	2-12
Sideoats Grama	*Bouteloua curtipendula*	2-8[3]	2-8
Blue Grama	*Bouteloua gracilis*	2-8[3]	2-8
Buffalograss	*Buchloe dactyloides*	2-4	2-8
Eastern Gamagrass	*Tripsacum dactyloides*	2-6[3]	2-8

[1] See individual grass sections for application timing.
[2] High rates may result in stunting and growth suppression.
[3] PLATEAU herbicide preemergence applications to newly seeded sideoats and blue grama may results in thinning or loss of stand.
*– Tolerance unknown

WILDFLOWER ESTABLISHMENT AND MAINTENANCE

Due to high degree of variation in genotypes, ecotypes and varieties of wildflowers, tolerances to PLATEAU herbicide can vary dramatically and may be reduced under certain soil types and environmental conditions. Apply PLATEAU herbicide only if some stand thinning or loss can be tolerated. Preemergence applications of low use rates (4 oz/A) to tolerant species, result in the least amount of injury, but may not eliminate it. Postemergence applications of PLATEAU herbicide can result in injury or death of some genotypes, and should be used only as a rescue treatment when weed competition threatens the stand. Use of certain spray adjuvants can also increase wildflower injury and loss of stand. Although most legumes listed in the tolerance table are tolerant to 4 oz/A of PLATEAU herbicide preemergence, some stand thinning may occur. Legumes are more tolerant to post applications, but chlorosis or stunting is possible. Recommendations listed in the tables below are designed for mixed grass/wildflower stands. Less than satisfactory results may occur from applications to monoculture stands. It is recommended to try on a small scale to determine degree of satisfaction on monoculture stands.

For use in wildflower beds: Certain wildflowers have shown tolerance to PLATEAU herbicide applied pre-emergence and/or postemergence. Apply PLATEAU herbicide at the rate of 2 to 4 oz per acre plus a silicone or nonionic surfactant to wildflower beds when weed competition threatens establishment or preservation of stand. Do not use a methylated seed oil or add fertilizer after seedling wildflowers have emerged or severe injury or death of some species may occur. Do not use if injury can not be tolerated. Species listed in the table below will outgrow early phytotoxicity. Higher rates may cause delayed flowering and/or height suppression of some species. Late postemergence applications (at bolting, bud or bloom set) on seedling and established beds will delay or prevent bloom. Combinations with PENDULUM® herbicide will provide broad spectrum grass and broadleaf weed control (see PENDULUM herbicide label for tolerant species).

For prairiegrass/wildflower mixtures: Where some wildflower injury (phytotoxicity, height suppression) can be tolerated, apply PLATEAU herbicide at the rate to achieve desired weed control, but not to exceed tolerance rate listed in the table below. Wildflower injury can be reduced or eliminated with pre-emergence applications. To minimize injury, apply PLATEAU herbicide at 2 to 4 oz per acre at planting to tolerant species listed below. Use the 2 oz per acre rate under cool dry conditions and in low rainfall areas. If postemergence application is made to established prairiegrass/wildflower mixtures, use the lowest rate of PLATEAU herbicide necessary to achieve desired weed control (see "WEEDS CONTROLLED" section). Postemergence application can result in stand thinning or death due to vast variation in seed sources, varieties and genotypes. It is recommended that a small area be tested prior to full application for tolerance of desired species. The rates listed below are for those species in which acceptable tolerance has been confirmed on the varieties/genotypes being treated.

Application of PLATEAU herbicide in conjunction with an organophosphate insecticide may cause an increase in wildflower injury.

Seedling Wildflower and Legume Tolerance to PLATEAU herbicide (4 oz/A)[1] in mixed grass/forb stands

Common Name	Genus Species	PRE	POST
Alfalfa	*Medicago sativa*	No	Yes
Aster, New England	*Aster novae angliae*	No	Yes
Aster, Prairie	*Aster tanacetifolius*	No	Yes
Baby Blue Eyes	*Nemophila menziestii*	No	Yes
Beggar ticks	*Bidens frondosa*	No	Yes
Bird's Eyes	*Gilia tricolor*	No	Yes
Bishop's Flower	*Anuni majus*	No	Yes
Blackeyed Susan	*Rudbeckia hirta*	Yes	Yes
Blanketflower	*Gaillardia aristata*	No	Yes
Bundleflower, Illinois	*Desmanthus illinoensis*	Yes	Yes
Catchfly	*Silene armeria*	No	Yes
Chicory	*Cichorium intybus*	Yes	Yes
Clover, Crimson	*Trifolium incarnatum*	Yes	Yes

Seedling Wildflower and Legume Tolerance to PLATEAU herbicide (4 oz/A)[1] in mixed grass/forb stands

Common Name	Genus Species	PRE	POST
Clover, White	*Trifolium repens*	No	Yes
Coneflower, Purple	*Echinacea purpurea*	Yes	Yes
Coneflower, Upright Prairie	*Ratibida columnifera*	Yes	Yes
Coreopsis, Dwarf Red Plains	*Coreopsis tinctoria* var. Gay Feather	Yes	Yes
Coreopsis, Lance Leaved	*Coreopsis lanceolata*	Yes	Yes
Coreopsis, Plains	*Coreopsis tinctoria*	Yes	Yes
Cornflower	*Centaurea cyanus*	No	Yes
Cosmos, Garden	*Cosmos* bipinnatus	Yes	Yes
Cosmos, Yellow	*Cosmos sulphureus*	Yes	Yes
Daisy, Ox-eye	*Chrysanthemum leucanthermum*	Yes	Yes
Daisy, Shasta	*Chrysanthemum maximum*	Yes	Yes
Five Spot	*Nemophila maculata*	No	Yes
Flax, Blue	*Linum perenne*	No	Yes
Indian Blanket	*Gaillardia pulchella*	No	Yes
Indigo, Blue False	*Baptisia ausralis*	Yes	No
Johnny Jump-ups	*Viola cornuta*	Yes	Yes
Lemon Mint	*Monarda citriodora*	No	Yes
Lespedeza, Bicolor	*Lespedeza*	Yes	Yes
Lespedeza, Korean	*Lespedeza stipulacea*	No	Yes
Lespedeza, Sericea	*Lespedeza cuneata*	No	Yes
Lupine, Perennial	*Lupinu perennis*	Yes	Yes
Mexican Hat	*Ratibida columnifera*	Yes	Yes
Partridgepea	*Cassia fasciculata*	Yes	Yes
Pea, Calico	*Pisum viganasinensis*	Yes	Yes
Pea, Flat	*Lathyrus sylvestris*	Yes	Yes
Pea, Perennial	*Lathyrus latifolius*	Yes	Yes
Phlox, Drummond	*Phlox drummondii*	Yes	No
Poppy, California	*Eschscholzia californica*	Yes	No
Poppy, Corn	*Papaver rhoeas*	Yes	Yes
Poppy, Red Corn	*Papaver* sp.	Yes	Yes
Prairieclover, Purple	*Dalea purpurea*	Yes	Yes
Prairieclover, White	*Petalostemum candidum*	Yes	Yes
Tick-trefoil, Showy	*Desmodium canadense*	No	Yes
Trefoil, Birdsfoot	*Lotus corniculatus*	No	Yes
Vetch, Crown	*Coronilla varia*	Yes	–
Vetch, Hairy	*Vicia villosa*	Yes	–
Yarrow, Gold	*Achillea filipendulina*	No	Yes

[1] For legumes, at least three true leaves should be present before a postemergence application.

Perennial Wildflower and Legume Tolerance to PLATEAU herbicide (maximum rate[1], oz/A) in mixed grass/forb stands.

Common Name	Genus Species	PRE	POST[2]
Flax, Blue	*Linum perenne*	0	6
Indian Blanket	*Gaillardia pulchella*	0	6
Blanketflower	*Gaillardia aristata*	0	8
Chickory	*Cichorium intybus*	4	6
Daisy, Shasta	*Chrysanthemum maximum*	4	8

Perennial Wildflower and Legume Tolerance to PLATEAU herbicide (maximum rate[1], oz/A) in mixed grass/forb stands.

Common Name	Genus Species	PRE	POST[2]
Prairieclover, Purple	*Dalea purpurea*	4	12
Coneflower, Upright Prairie	*Ratibida columnifera*	6	6
Mexican Hat	*Ratibida columnifera*	6	6
Poorjoe	*Diodia teres*	8	–
Lupine	*Lupinu perennis*	8	6
Coneflower, Purple	*Echinacea purpurea*	8	8
Daisy, Ox-eye[3]	*Chrysanthemum leucanthermum*	8	8
Leadplant	*Amorpha canescens*	8	8
Lespedeza, Bicolor	*Lespedeza*	8	8
Milkweed, Common	*Asclepias syriaca*	8	–
Pea, Prairie Scurf	*Psoralea esculenta*	8	8
Yarrow, Gold[3]	*Achillea filipendulina*	8	8
Blackeyed Susan	*Rudbeckia hirta*	8	10
Johnny Jump-ups	*Viola cornuta*	8	12
Sweetclover	*Melilotus* sp.	12	8
Alfalfa	*Medicago sativa*	12	12
Bundleflower, Illinois	*Desmanthus illinoensis*	12	12
Lespedeza, Sericea	*Lespedeza cuneata*	12	12
Partridgepea	*Cassia fasciculata*	12	12
Sensitive vine	*Mimosa strigillosa*	12	12
Vetch, Crown	*Coronilla varia*	12	12
Violet, Wild	*Viola* spp.	12	12

[1] Height suppression or stand reduction may occur at maximum use rate. For legumes, at least three true leaves should be present before a postemergence application.

[2] Postemergence application should be made early post on the flowers to reduce injury and increase flower set.

[3] Will not flower.

Wildflower Establishment with PLATEAU herbicide 4 oz/A + PENDULUM herbicide 2 LB a.i./A[1]

Common Name	Genus Species	PRE[2]	POST[3]
Blackeyed Susan	*Rudbeckia hirta*	Yes	Yes
Blanketflower	*Gaillardia pulchella*	No	Yes
Bundleflower, Illinois	*Desmanthus illinoensis*	>50% thinning	Yes
Clover, Crimson	*Trifolium incarnatum*	>50% thinning	Yes
Coneflower, Clasping	*Dracopsis amplexicaulis*	Yes	Yes
Coneflower, Upright Prairie	*Ratibida columnifera*	No	OK
Coneflower, Purple	*Echinacea purpurea*	Yes	Yes
Coreopsis, Dwarf Red Plains	*Coreopsis tinctoria* var. Gay Feather	OK stunting	OK stunting
Coreopsis, Plains	*Coreopsis tinctoria*	OK stunting	Yes
Coreopsis, Lance Leaved	*Coreopsis lanceolata*	25% thinning	Yes
Cornflower	*Centaurea cyanus*	No	OK 20% thinning
Cosmos, Garden	*Cosmos bipinnatus*	OK 10% thinning	OK stunting
Cosmos, Yellow	*Cosmos sulphureus*	Yes	Yes

Wildflower Establishment with PLATEAU herbicide 4 oz/A + PENDULUM herbicide 2 LB a.i./A[1]

Common Name	Genus Species	PRE[2]	POST[3]
Daisy, Ox-eye	*Chrysanthemum leucanthermum*	25% thinning	Yes
Daisy, Shasta	*Chrysanthemum maximum*	marginal-OK 20% thinning	Yes
Lupine, Perennial	*Lupinu perennis*	Yes	≤50% thinning
Partridgepea	*Cassia fasciculata*	25% thinning	Yes
Poppy, California	*Eschscholzia californica*	Yes	25% injury stunting, thinning
Yarrow, Gold	*Achillea filipendulina*	OK thinning	OK

[1]2 lbs ai/A = 2.4 qts of PENDULUM herbicide 3.3 EC or 3.3 lbs of PENDULUM herbicide WDG

[2]Preemergence at planting

[3]Postemergence to seedlings

Yes = no injury

No = results in no wildflower germination or unacceptable injury to seedling flowers.

OK = can be used if thinning and/or stunting can be tolerated or if establishment is threatened by weed competition.

Due to the diversity of species and varieties which exist in areas where wildflowers are grown, the response to PLATEAU herbicide may vary greatly. Careful testing on desirable species is recommended to determine if area-wide applications can be made. Try on a limited area to verify tolerance in a specific area.

The suitability of PLATEAU herbicide use on wildflower species not listed, should be determined by treating a small number of such wild flowers at an appropriate rate, not to exceed 12 oz per acre per year. Treated wildflowers should be evaluated 1 to 2 months following application for possible injury. THE USER ASSUMES RESPONSIBILITY FOR ANY DAMAGE OR OTHER LIABILITY.

SPECIAL WEED CONTROL

ALWAYS ADD AN ADJUVANT to PLATEAU herbicide (see "ADJUVANTS" section). Research has shown Methylated Seed Oil (MSO) surfactants provide PLATEAU herbicide with superior control of perennial weeds. This effect is not always observed and is most prevalent on waxy leaf species, perennials and weeds under stress conditions. For the weeds listed below, it is recommended to use a MSO for best results. The use of nonionic surfactants or silicone based surfactants may result in less than acceptable control.

Johnsongrass & Itchgrass: For best results, apply PLATEAU herbicide at the rate of 8 to 12 oz per acre after johnsongrass or itchgrass has reached 18 to 24 inches in height at the whorl. The addition of ACCORD or ROUNDUP PRO at the rate of 8 to 16 oz per acre may improve control after culm elongation or in dense stands. Use higher herbicide rates as density increases. Larger grass than specified above can be controlled.

Dallisgrass, Bahiagrass, Vaseygrass, *Paspalum* spp., Smutgrass: For best results, apply PLATEAU herbicide at the rate of 10 to 12 oz per acre postemergence after grass has reached 100% greenup. The addition of ACCORD or ROUNDUP PRO at the rate of 12 to 16 oz per acre will improve efficacy. Use higher herbicide rates as target grass weed densities and/or maturity increase. The addition of PENDULUM herbicide will provide increased preemergence control of these grasses from seed.

Leafy Spurge: For best results, apply PLATEAU herbicide at 8 to 12 oz per acre in late summer or fall (late August through mid-October). Consecutive year applications will optimize long term control. PLATEAU herbicide at 12 oz/A applied spring or fall, or 4 oz/A in the spring following an 8 oz/A fall treatment may result in excessive injury to cool season grasses in some areas. For best results, always use a methylated seed oil at 2 pints per acre. Two pints per acre of Nitrogen fertilizer (See Adjuvant Section) may also be added to the spray tank to increase leafy spurge control, however, this may increase injury to desired species of grasses and forbs. The use of nonionic and silicone based surfactants have resulted in little or no control of leafy spurge. Approximate dates for fall timing in North and South Dakota is late August through September; for Nebraska and Iowa is mid September through mid-October. This application should be made after good soil moisture is present but prior to a killing frost.

Canada Thistle: Spring applications of 12 oz PLATEAU herbicide plus 2 pints of Methylated Seed Oil per acre applied postemergence to Canada thistle will provide control and/or suppression of above ground biomass. For best results, apply when thistle is in the rosette to early bolt. Applications made at flowering will provide knock down of existing foliage but may result in root sucker sprouting.

Tall Fescue Control: Tall fescue can be controlled by using PLATEAU herbicide at the rate of 12 oz plus Methylated Seed Oil at 2 pints per acre. The addition of ACCORD, glyphosate or ROUNDUP PRO and/or Nitrogen fertilizer (See "ADJUVANTS" Section) to the above mix will aid in control. Tall fescue must be actively growing for optimum control. If tall fescue has reached summer dormancy, control may be poor.

Fall applications of PLATEAU herbicide at 8 to 12 oz/A plus a ACCORD or ROUNDUP PRO at 24 to 64 oz/A will result in best control of existing tall fescue and new germinating seedlings. With spring applications of PLATEAU herbicide at 6 to 12 oz/A, plus ACCORD or ROUNDUP PRO at 32 to 64 oz/A, use higher rates for older, mature fescue stands and lower PLATEAU herbicide rates when planting forbs. When using 8 oz/A of PLATEAU herbicide in the fall with ACCORD or ROUNDUP PRO, it is recommended to apply 4 oz/A PLATEAU herbicide in the spring at planting for annual weed and seedling fescue control. Burning the fescue stand, where permitted, the following spring, just prior to green-up, will aid in control and provide a better seedbed for planting. Mowing the fescue several times the summer before fall application, will weaken the fescue root system, making it more susceptible to herbicides. Always allow for at least 10 inches of regrowth, following the last mowing before spraying, as both PLATEAU herbicide and ROUNDUP products need foliage present for herbicide uptake and satisfactory control.

Resistant Biotypes: Naturally occurring biotypes (a plant within a given species that has a slightly different, but distinct genetic makeup from other plants of the same species) of some weeds listed on this label may not be effectively controlled by this and/or other herbicides (OUST™) with the ALS/AHAS enzyme inhibiting mode of action. If naturally occurring ALS/AHAS resistant biotypes are present in an area, PLATEAU herbicide should be tank-mixed or applied sequentially with an appropriate registered herbicide having a different mode of action to ensure control.

RESIDUAL BAREGROUND WEED CONTROL

For sensitive areas and use around desirable vegetation PLATEAU herbicide at 12 ounces per acre may be tank mixed with PENDULUM herbicide, ROUNDUP PRO, ESCORT, KARMEX™, 2,4-D, diuron, ENDURANCE™ or other labeled products to provide total vegetation control. For other bareground areas PLATEAU herbicide at 12 oz per acre may be tank mixed with ARSENAL herbicide, SAHARA DG herbicide, KROVAR, OUST, TORDON™, VANQUISH or other labeled products to provide total bareground weed control. For maximum weed control, use 2 pints per acre of methylated seed oil as an adjuvant. The addition of a nitrogen fertilizer may aid in weed control (see ADJUVANTS section for recommendation).

Spot Treatments: PLATEAU herbicide may be used to control weed encroachment in bareground or total vegetation control situations. To prepare the spray solution, thoroughly mix in each gallon of water 0.25 to 5% volume/volume (0.3 oz to 5.4 oz per gallon) PLATEAU herbicide plus a methylated seed oil adjuvant.

USE UNDER PAVED SURFACES

Applications should be made to the soil surface only when final grade is established. DO NOT move soil following PLATEAU herbicide application. Apply PLATEAU herbicide in sufficient water to ensure thorough and uniform wetting of the soil surface, including the shoulder area. Add PLATEAU herbicide at a rate of 12 oz. per acre to clean water in the spray tank during the filling operation. Agitate before spraying. If soil is not moist prior to treatment, incorporation of PLATEAU herbicide will improve control. PLATEAU herbicide can be incorporated into the soil to a depth of two inches using a rototiller or disc. Rainfall or irrigation totaling one inch is also sufficient to incorporate PLATEAU herbicide into the soil surface. DO NOT allow treated soil to wash or move into untreated area.

USE OF PLATEAU HERBICIDE ON FEDERAL CONSERVATION RESERVE PROGRAM (CRP) LAND

PLATEAU herbicide may be used on Federal Conservation Reserve Program (CRP) land at rates up to 4 oz. per acre per year (see minimum plant-back intervals below). See appropriate section of this label for specific instructions for the intended use. DO NOT use rates higher than 4 oz per acre per year on CRP land.

MINIMUM PLANT-BACK INTERVALS (months after PLATEAU herbicide application)

4	9	18	26	40
Bahiagrass Rye Wheat	Field Corn Snapbeans Southern Peas Soybeans Tobacco	Barley Cotton* Grain Sorghum Oats Sweet Corn	All crops not otherwise listed	Canola Potatoes Red Table Beets Sugar Beets

***For Arizona, New Mexico, Oklahoma, and Texas only:** Cotton may be planted 18 months after PLATEAU herbicide application in the states of Arizona, New Mexico, Oklahoma, and Texas unless drought conditions develop the year of PLATEAU herbicide application. DO NOT rotate to cotton at 18 months after PLATEAU herbicide application if less than 15 inches of rainfall or irrigation is received from the time of PLATEAU herbicide application through November 1 of the same year. If drought conditions develop the year of PLATEAU herbicide application, cotton may be planted 26 months after PLATEAU herbicide application.

Use of PLATEAU herbicide in accordance with label directions is expected to result in normal growth of plant-back crops in most situations; however, various environmental and agronomic factors make it impossible to eliminate all risks associated with the use of this product and, therefore, plant-back crop injury is always possible.

TOLERANCE OF TREES AND BRUSH TO PLATEAU HERBICIDE

DO NOT use PLATEAU herbicide on nursery, orchard, ornamental plantings, new plantings, seedling trees or fiber farms except as specified on supplemental labeling. It is suggested that PLATEAU herbicide be tried on a limited basis to determine tolerance in your area. PLATEAU herbicide may be used at rates up to 12 oz per acre for general weed control in and around established trees on roadsides, prairies and other noncropland areas used for wildlife cover, erosion control, wind breaks, etc. Tree and brush species known to have acceptable tolerance to PLATEAU herbicide when applied under the canopy and/or to the foliage are listed below. Tolerance is based upon trees with a minimum of 2 inch DBH. Some species may exhibit tip chlorosis and minor necrosis. Foliar contact may increase injury to include defoliation and terminal death.

Tolerant Brush and Tree Species to PLATEAU herbicide at 12 oz per Acre[1]

Common Name	Genus Species	Tolerance by Application Method[2]	
		Directed below foliage	To foliage
Apple (Var. Winesap)[3]	*Malus sylvestris*	Yes	NR
Ash, Blue	*Fraxinus quadrangulata*	Yes	NR
Ash, Green	*Fraxinus pennsylvanica*	Yes	Yes[5]
Azalea	*Rhododendron* spp.	No	No
Basswood	*Tilia hetrophylla*	No	No
Boxelder	*Acer negundo*	Yes	Injury
Buckeye, Ohio	*Aesculus glabra*	Yes	NR
Cedar-juniper, Western	*Thuja plicata*	Yes	Yes
Cherry, Black[3]	*Prunus serotina*	No	No
Cherry, Sweet[3]	*Prunus avium*	Yes	NR
Cottonwood	*Populus deltoides*	Yes	Yes[5]
Dogwood, Flowering	*Cornus* spp.	Yes	Yes
Dogwood, Grey	*Cornus racemosa*	Yes	Injury
Douglas Fir	*Pseudotsuga menziesii*	Yes	Yes[4]
Elm, American	*Ulmus americana*	Yes	Yes

Tolerant Brush and Tree Species to PLATEAU herbicide at 12 oz per Acre[1]

Common Name	Genus Species	Tolerance by Application Method[2]	
		Directed below foliage	To foliage
Elm, Slippery	*Ulmus rubra*	Yes	Yes
Hackberry	*Celtis occidentalis*	Yes	Yes
Juniper, Chinese	*Juniperus chinensis*	Yes	Yes
Juniper, Western	*Juniperus osteosperma*	Yes	Yes
Linden, American	*Tilia americana*	No	No
Locust, Black	*Robinia pseudoacacia*	Yes	Yes
Locust, Honey	*Gleditsia triacanthos*	Yes	Yes
Maple, Red	*Acer rubrum*	Yes	Yes
Maple, Sugar	*Acer saccharum*	Yes	Yes
Mulberry, Red	*Morus rubra*	Yes	NR
Mulberry, White	*Morus alba*	Yes	NR
Oak, Black	*Quercus velutina*	Yes	NR
Oak, Live	*Quercus virginiana*	Yes	Yes
Oak, Southern Red	*Quercus falcata*	Yes	NR
Oak, White	*Quercus alba*	Yes	NR
Osage Orange	*Maclura pomifera*	Yes	NR
Peach (Var. Elberta)[3]	*Prunus persica*	Yes	NR
Photinia, Red Tip	*Photinia fraseri*	Yes	Yes
Pine, Lodgepole	*Pinus contorta*	Yes	Yes[4]
Pine, White[4]	*Pinus strobus*	Yes	Yes
Pittosporum, Japanese	*Pittosporum tobira*	Yes	Yes
Poplar, Yellow (Tulip)	*Liriodendron tulipfera*	Yes	NR
Privet, Common	*Ligustrum vulgare*	Yes	Yes
Rabbitbrush species	*Chrysothamnus* spp.	Yes	Yes
Redbud	*Cercis canadenis*	Yes	Yes
Redcedar, Eastern	*Juniperus virginiana*	Yes	Yes
Rose, Multiflora	*Rosa multiflora*	Yes[5]	No
Sage, Big	*Artemisia tridentata*	Yes	Yes
Sage, Fringe	*Artemisis frigida*	Yes	Yes
Sage, Silver	*Artemisia cana*	Yes	Yes
Sagebrush, Big	*Artemisia tridentata*	Yes	Yes
Sagebrush, Fringed	*Artemisia frigida*	Yes	Yes
Serviceberry	*Amelanchier alnifolia*	Yes	NR
Snowberry, Western	*Symphoricarpos occidentalis*	Yes	Yes
Sugarberry	*Celtis laevigata*	Yes	Yes
Sweetgum	*Liquidambar styraciflua*	Yes	Yes[6]
Sycamore	*Plantanus occidentalis*	Yes	No
Tree-of-Heaven	*Ailanthus altissima*	Yes	Yes
Walnut, American Black	*Juglans nigra*	Yes	No

[1] Not intended for nursery, orchard, ornamental plantings, new plantings or seedling trees.

[2] Yes=Tolerant
No=Not Tolerant, Severe injury or death
NR=Not Recommended due to insufficient tolerance data

[3] Not for use on ornamental or fruit bearing trees

[4] Applications made just before or during candling may cause candle injury or death.

[5] Possible defoliation and/or death. Some species may exhibit tip chlorosis and minor necrosis. If spray contacts foliage then defoliation and terminal death may occur.

[6] See supplemental label, "For Use In Sweetgum *(Liquidambar styraciflua)* Grown on Fiber Farms".

WEEDS CONTROLLED

PLATEAU herbicide, 4 to 6 oz per acre

Common Name	Genus Species	PRE[1]	POST[2]	Annual/ Biennial/ Perennial[3]
BROADLEAVES				
Bedstraw, Catchweed	*Galium aparine*	X	4	SA
Beggarweed, Florida	*Desmodium tortuosum*	X	2	SA
Buffalobur	*Solanum rostratum*	–	X	SA
Cocklebur, Common	*Xanthium strumarium*	S	6	SA
Lambsquarters, Common	*Chenopodium album*	X	2	SA
Morningglory				
Entireleaf	*Ipomoea hederacea*	S	3	SA
Ivyleaf	*Ipomoea hederacea*	S	3	SA
Tall	*Ipomoea purpurea*	S	3	SA
Mustard, Wild	*Brassica kaber*	X	X	SA
Pigweed	*Amaranthus* sp.	X	6	SA
Queen Anne's Lace	*Daucus carota*	–	4	B
Radish, Wild	*Raphanus raphanistrum*	S	4	SA
Yellow Rocket	*Barbarea vulgaris*	X	4	WA
Sicklepod	*Senna obtusifolia*	X	4	SA
Sida, Prickly	*Sida spinosa*	X	2	SA
Smartweed				
Ladysthumb	*Polygonum persicaria*	X	X	SA
Pennsylvania	*Polygonum pensylvanicum*	X	X	SA
Swamp	*Polygonum coccineum*	X	X	SA
Starbur, Bristly	*Acanthospermum hispidum*	X	2	SA
Velvetleaf	*Abutilon theophrasti*	X	6	SA
GRASS WEEDS				
Brome, Downy	*Bromus tectorum*	X	4	WA
Crabgrass				
Large (Hairy)	*Digitaria sanguinalis*	X	4	SA
Smooth	*Digitaria ischaemum*	X	4	SA
Foxtail				
Giant	*Setaria faberi*	X	6	SA
Green	*Setaria viridis*	X	4	SA
Yellow	*Setaria glauca*	X	4	SA
Goosegrass	*Elusine indica*	S	2	SA
Johnsongrass (Seedling)	*Sorghum halepense*	X	12	SA
Panicum, Fall	*Panicum dichotomiflorum*	S	6	SA
Shattercane	*Sorghum bicolor*	X	12	SA
Stiltgrass, Japanese	*Microstegium vimineum*	X	4	A
SEDGES				
Nutsedge				
Yellow	*Cyperus esculentus*	S	4S	P
Purple	*Cyperus rotundus*	S	4S	P
Sedge	*Juncus* sp.	S	4S	A/P

[1] X = control, S = suppression in northern United States only
[2] Maximum plant height in inches at time of application
[3] Growth habit: A=Annual, SA=Summer Annual, WA=Winter Annual, B=Biennial P=Perennial

PLATEAU herbicide, 8 to 12 oz per acre

Common Name	Genus Species	PRE[1]	POST[2]	Annual/ Biennial/ Perennial[3]
BROADLEAVES:				
Anoda, Spurred	*Anoda cristata*	X	6	SA
Baby's Breath[5]	*Gypsophila paniculata*	–	X	P
Bedstraw, Catchweed	*Galium aparine*	X	X	A
Bedstraw, Swamp	*Galium* spp.	X	X	A
Beggarweed, Florida	*Desmodium tortuosum*	X	6	SA
Bindweed, Field	*Convolvulus arvensis*	–	X	P
Buffalobur	*Solanum rostratum*	–	X	SA
Burclover	*Medicago* sp.	–	4	SA
Chickweed, Common	*Stellaria media*	X	6	SA
Cocklebur, Common	*Xanthium strumarium*	X	6	SA
Cornsalad, Common	*Valerianella locusta*	–	X	SA
Crownbeard, Golden	*Verbisina encelioides*	X	2	SA
Dandelion	*Taraxacum officinale*	–	X	P
Dock, Curly	*Rumex crispus*	X	6	B
Fiddleneck	*Amsinckia* sp.	–	X	SA
Flax, Spurge	*Thymelaea passerina*	X	X	A
Fleabane, Annual	*Erigeron annuus*	–	X	A
Geranium, Carolina	*Geranium carolinianum*	–	X	WA/B
Geranium, Cranesbill	*Geranium maculatum*	X	X	P
Ground Cherry	*Physalis heterophylla*	–	X	P
Hemlock, Poison	*Conium maculatum*	X	6	B
Henbit	*Lamium amplexicaule*	X	3	WA/B
Hoary Cress	*Cardaria* spp.	–	X	P
Houndstongue, Bristly	*Cynoglossum officinale*	X	X	B
Indigo, Hairy	*Indigofera hirsuta*	X	2	P
Jimsonweed	*Datura stramonium*	X	6	SA
Knapweed, Russian[6]	*Centaurea repens*	–	X	P
Knotweed, Prostrate	*Polygonum aviculare*	X	X	SA
Kochia*	*Kochia scoparia*	X	3	SA
Lambsquarters, Common	*Chenopodium album*	X	3	SA
Morningglory				
Cypressvine	*Ipomoea quamoclit*	X	6	SA
Entireleaf	*Ipomoea hederacea*	X	6	SA
Ivyleaf	*Ipomoea hederacea*	X	6	SA
Pitted	*Ipomoea lacunosa*	X	6	SA
Smallflower	*Jacquemontia tamnifolia*	X	6	SA
Tall	*Ipomoea purpurea*	X	6	SA
Mustard, Wild	*Brassica kaber*	X	X	SA
Nightshade, Silverleaf	*Solanum elaeagnifolium*	X	6	P
Onion, Wild	*Allium canadense*	X	X	P
Pepperweed, Perennial	*Lepidium latifolium*	–	X	P
Pigweed[4]	*Amaranthus* sp.	X	6	SA
Plantain, Narrowleaf	*Plantago lanceolata*	X	X	B
Poinsettia, Wild	*Euphorbia heterophylla*	X	6	SA

WEEDS CONTROLLED

PLATEAU herbicide, 8 to 12 oz per acre

Common Name	Genus Species	PRE[1]	POST[2]	Annual/ Biennial/ Perennial[3]
BROADLEAVES:				
Puncture Vine	*Tribulus terrestris*	–	X	SA
Purslane, Common	*Portulaca oleracea*	X	4	SA
Pusley, Florida	*Richardia scapra*	X	4	SA
Queen Anne's Lace	*Daucus carota*	X	X	B
Ragweed				
Common	*Ambrosia artemisiifolia*	X	3	SA
Giant	*Ambrosia trifida*	S	6	SA
Western	*Ambrosia psilostachya*	–	X	A/P
Rocket, Yellow	*Barbarea vulgaris*	X	X	WA
Senna, Coffee	*Cassia occidentalis*	X	4	SA
Sicklepod	*Senna obtusifolia*	X	6	SA
Sida, Prickly	*Sida spinosa*	X	6	SA
Smartweed				
Ladysthumb	*Polygonum persicaria*	X	X	SA
Pennsylvania	*Polygonum pensylvanicum*	X	X	SA
Swamp	*Polygonum coccineum*	X	X	SA
Spurge				
Leafy	*Euphorbia esula*	–	FALL*	P
Spotted	*Euphorbia maculata*	X	4	SA
Toothed	*Euphorbia dentata*	X	4	SA
Starbur, Bristly	*Acanthospermum hispidum*	–	6	SA
Starthistle, Yellow	*Centaurea solstitialis*	–	X	A
Sunflower	*Helianthus annuus*	–	18	SA
Tansymustard	*Descurainia pinnata*	X	X	WA
Teasel, Common	*Dipsacus fullonum*	–	X	B
Thistle				
Bull	*Cirsium vulgare*	S	X	WA/B
Canada	*Cirsium arvense*	–	S*	P
Musk	*Carduus nutans*	S	X	B
Platt	*Cirsium canescens*	S	X	P
Russian*	*Salsola iberica*	X	3	A
Velvetleaf	*Abutilon theophrasti*	X	X	A
Vervain, Blue	*Verbena hastata*	–	S	SA
Vervain, prostrate	*Verbena bracteata*	–	X	P
Whitetop	*Cardaria* spp.	–	X	P
Willowherb	*Epilobium* spp.	–	X	P
Woodsorrel, Yellow	*Oxalis stricta*	X	X	P
GRASS				
Bahiagrass	*Paspalum nutatum*	S	X*	P
Barley, Little	*Hordeum pusillum*	X	4	SA
Barley, Squirrel Tail	*Hordeum jubatum*	–	X	P
Barnyardgrass	*Echinochloa crus-galli*	X	6	SA
Cheat	*Bromus secalinus*	X	4	WA
Crabgrass	*Digitaria* sp.	X	6	SA

PLATEAU herbicide, 8 to 12 oz per acre

Common Name	Genus Species	PRE[1]	POST[2]	Annual/ Biennial/ Perennial[3]
GRASS				
Crowfootgrass	*Dactyloctenium aegyptiium*	X	X	SA
Dallisgrass	*Paspalum dilatatum*	S	X*	P
Downy Brome	*Bromus tectorum*	X	X	WA
Dropseed, Tall	*Sporobolus cryptandrus*	S	X	A/P
Fescue, Tall	*Festuca arundinacea*	X	X*	P
Foxtail				
Giant	*Setaria faberi*	X	X	SA
Green	*Setaria viridis*	X	X	SA
Knotroot	*Setaria geniculatus*	S	6	SA
Purple Robust	*Setaria viridis*	S	S	SA
Yellow	*Setaria glauca*	X	4	SA
Garlic, Wild	*Allium vineale*	X	X	P
Goosegrass	*Elusine indica*	X	3S	SA
Guineagrass	*Panicum maximum*	–	X	P
Itchgrass	*Rottboellia cochinchinensis*	–	X*	SA
Johnsongrass				
Seedling	*Sorghum halepense*	X	X	SA
Rhizome	*Sorghum halepense*	–	X*	P
Panicum				
Fall	*Panicum dichotomiflorum*	X	X	SA
Texas	*Panicum texanum*	X	X	SA
Ryegrass, Annual (Italian)	*Lolium multiflorum*	X	X	SA
Ryegrass, Perennial	*Lolium perenne*	–	X	P
Sandbur	*Cenchrus* sp.	S	XS	A/P
Shattercane	*Sorghum bicolor*	X	X	SA
Signalgrass, Broadleaf	*Brachiaria platyphylla*	X	X	SA
Smutgrass	*Sporobolus indicus*	–	X	P
Stiltgrass, Japanese	*Microstegium vimineum*	X	X	A
Stinkgrass, Annual	*Eragrostis cilianensis*	X	2	SA
Torpedograss	*Panicum repens*	–	X	P
Vaseygrass	*Paspalum urvillei*	–	X	P
Wild Oats	*Avena fatua*	–	X	A
SEDGES/RUSHES				
Nutsedge				
Yellow	*Cyperus esculentus*	X	X	P
Purple	*Cyperus rotundus*	X	X	P
Rush	*Juncus* sp.	S	4	A/P

[1]X = control, S = suppression

[2]Maximum plant height in inches at time of application

[3]Growth habit: A=Annual, SA=Summer Annual, WA=Winter Annual, B=Biennial P=Perennial

[4]Some species are tolerant and resistant biotypes are possible.

[5]For annual control. The addition of 1-2 pints of 2,4-D will aid in burndown.

[6]For best control apply in the fall.

*See SPECIAL WEED CONTROL section

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BASF Corporation
26 Davis Drive
Research Triangle Park, NC 27709

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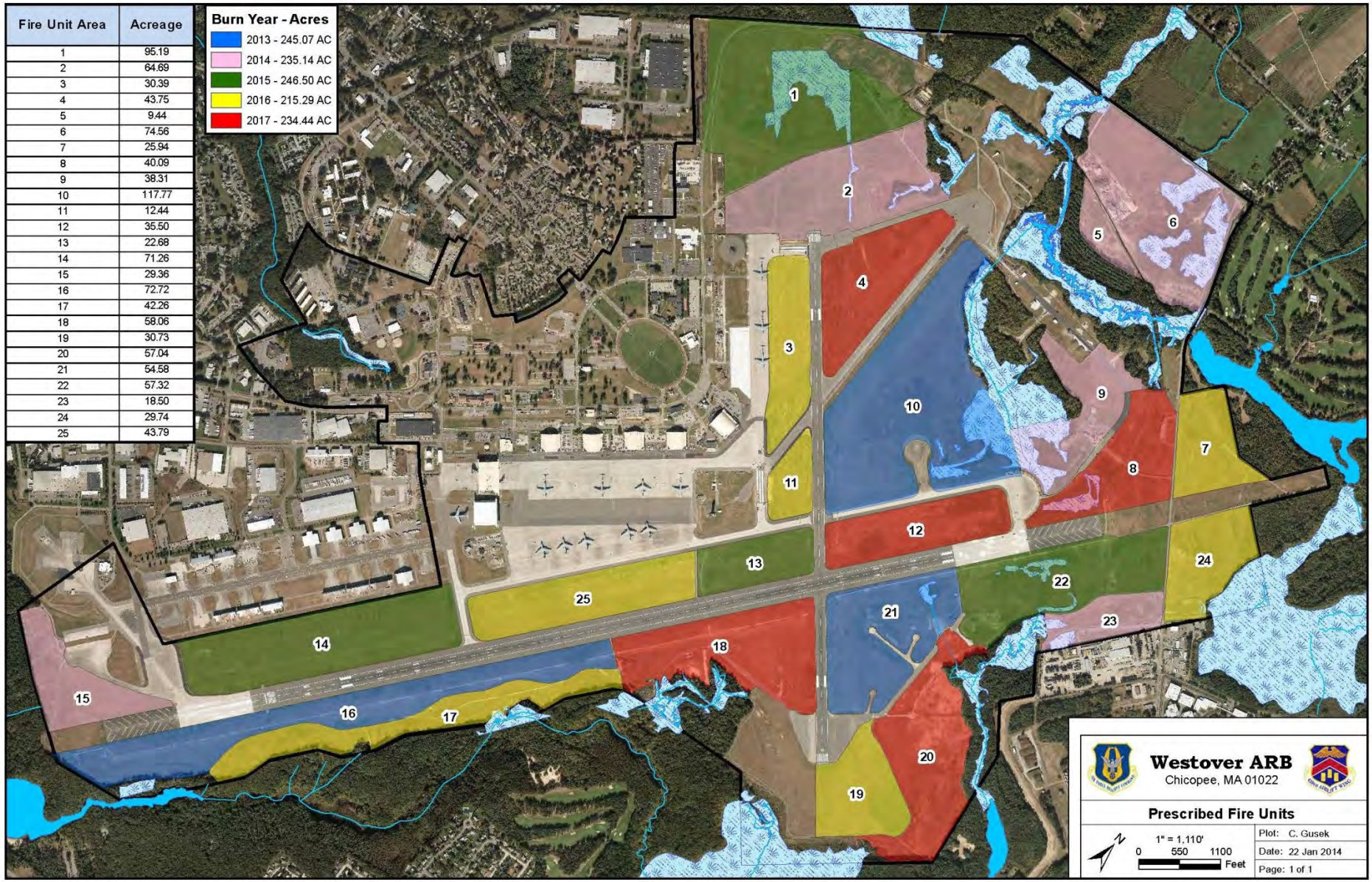
NVA 2000-04-126-0421

APPENDIX B

WESTOVER ARB
PRESCRIBED FIRE UNITS

Fire Unit Area	Acreage
1	95.19
2	64.69
3	30.39
4	43.75
5	9.44
6	74.56
7	25.94
8	40.09
9	38.31
10	117.77
11	12.44
12	35.50
13	22.68
14	71.26
15	29.36
16	72.72
17	42.26
18	58.06
19	30.73
20	57.04
21	54.58
22	57.32
23	18.50
24	29.74
25	43.79



APPENDIX C

GENERAL CONFORMITY RULE

AND

CRITERIA AND HAZARDOUS POLLUTANTS

AND

GREENHOUSE GAS EMISSIONS ANALYSIS

C.1 Introduction

This appendix provides the following analyses of potential air quality impacts:

- Criteria and hazardous pollutants emissions analysis and Clean Air Act general conformity rule applicability analysis.
- Greenhouse gas analysis.

C.2 Clean Air Conformity

The 1990 amendments to the Clean Air Act (CAA) require federal agencies to ensure that their actions conform to the appropriate State Implementation Plan (SIP) in a nonattainment area. The SIP provides for implementation, maintenance, and enforcement of the National Ambient Air Quality Standards (NAAQS); it includes emission limitations and control measures to attain and maintain the NAAQS. Conformity to a SIP, as defined in the CAA, means conformity to a SIP's purpose of reducing the severity and number of violations of the NAAQS to achieve attainment of the standards. The federal agency responsible for a proposed action is required to determine if its proposed action conforms to the applicable SIP.

The US Environmental Protection Agency (USEPA) has developed two sets of conformity regulations; federal actions are differentiated into transportation projects and non-transportation-related projects:

- Transportation projects, which are governed by the "transportation conformity" regulations (40 CFR Parts 51 and 93), effective on December 27, 1993 and revised on August 15, 1997.
- Non-transportation projects which are governed by the "general conformity" regulations (40 CFR Parts 6, 51 and 93) described in the final rule for *Determining Conformity of General Federal Actions to State or Federal Implementation Plans* published in the *Federal Register* on November 30, 1993. The general conformity rule became effective January 31, 1994 and was revised on March 24, 2010.

Since the Proposed Action is not a transportation project, the general conformity regulation applies. The general conformity applicability analysis is prepared for the proposed project that includes a change in the airfield vegetation management program at the Westover ARB in Chicopee and Ludlow, Massachusetts.

C.3 General Conformity

C.3.1 Attainment and Nonattainment Areas

The general conformity rule applies to federal actions occurring in air basins designated as nonattainment for the NAAQS or in attainment areas subject to maintenance plans (maintenance areas). Federal actions occurring in air basins that are in attainment with the NAAQS are not subject to the conformity rule.

A criterion pollutant is a pollutant for which an air quality standard has been established under the CAA. The designation of nonattainment is based on the exceedances or violations of the air quality standard. A maintenance plan establishes measures to control emissions to ensure the air quality standard is maintained in areas that have been re-designated as attainment from a previous nonattainment status.

Under the requirements of the 1970 Clean Air Act (CAA), as amended in 1977 and 1990, the USEPA established NAAQS for six criteria pollutants: carbon monoxide (CO), sulfur dioxide (SO_2), nitrogen dioxide (NO_2), ozone (O_3), inhalable particulate matter (PM_{10} and $PM_{2.5}$), and lead (Pb).

Areas that meet the NAAQS for a criterion pollutant are designated as being in "attainment;" an area where a pollutant level exceeds the corresponding NAAQS is designated as being in "nonattainment." O_3 nonattainment areas are subcategorized based on the severity of their pollution problem (marginal, moderate, serious, severe, or extreme). PM_{10} and CO nonattainment areas are classified as moderate or serious. When insufficient data exist to determine an area's attainment status, it is designated unclassifiable (or in attainment).

The proposed action would take place at the Westover ARB in Chicopee and Ludlow, Hamden County, Massachusetts, an area that is currently designated as a moderate nonattainment area for 8-hour O_3 and an attainment/unclassified area for the other criteria pollutants. O_3 is principally formed from nitrogen oxides (NOx) and volatile organic compounds (VOC) through chemical reactions in the atmosphere.

C.3.2 *De Minimis* Emissions Levels

To focus general conformity requirements on those federal actions with the potential to have significant air quality impacts, threshold (*de minimis*) rates of emissions were established in the final rule. A formal conformity determination is required when the annual net total of direct and

indirect emissions from a federal action occurring in a nonattainment or maintenance area for a criterion pollutant would equal or exceed the annual *de minimis* level for that pollutant. Table C-1 lists the *de minimis* levels for each pollutant.

Table C-1
***De Minimis* Emission Levels for Criteria Air Pollutants**

Pollutant	Nonattainment Designation	Tons/Year
Ozone*	Serious	50
	Severe	25
	Extreme	10
	Other nonattainment or maintenance areas outside ozone transport region	100
	Marginal and moderate nonattainment areas inside ozone transport region	50/100**
Carbon Monoxide	All	100
Sulfur Dioxide	All	100
Lead	All	25
Nitrogen Dioxide	All	100
Particulate Matter ≤ 10 microns	Moderate	100
	Serious	70
Particulate Matter ≤ 2.5 microns***	All	100
Notes: * Applies to ozone precursors – volatile organic compounds (VOC) and nitrogen oxides (NO_X); ** VOC/NO_X; *** Applies to PM2.5 and its precursors.		

For O_3 nonattainment areas, USEPA's conformity rules establish *de minimis* emission levels for both O_3 precursors, NO_x and VOC, on the presumption that NO_x and VOC reductions will contribute to reductions in O_3 formation. Since the project site is located in an O_3 moderate nonattainment area in an O_3 transport region, the *de minimis* levels of 100 tons per year (tpy) of NO_x and 50 tpy of VOC apply.

C.3.3 Analysis

This CAA General Conformity Rule (GCR) analysis was conducted according to the guidance provided by *40 CFR Parts 6, 51, and 93. Determining Conformity of Federal Actions to State or Federal Implementation Plans,* (USEPA, November 30, 1993 and March 24, 2010).

The GCR analysis was performed to determine whether a formal conformity analysis would be required. Pursuant to the GCR, all reasonably foreseeable emissions (both direct and indirect) associated with the implementation of the project were quantified and compared to the applicable annual *de minimis* levels to determine potential air quality impacts.

The conformity analysis for a federal action examines the impacts of the direct and indirect net emissions from mobile and stationary sources. Direct emissions are emissions of a criterion pollutant or its precursors that are caused or initiated by a federal action and occur at the same time and place as the action. Indirect emissions, occurring later in time and/or further removed in distance from the action itself, must be included in the determination if both of the following apply:

- The federal agency can practicably control the emissions and has continuing program responsibility to maintain control.
- The emissions caused by the federal action are reasonably foreseeable.

Direct and indirect NO_x and VOC emissions would potentially result from the following operational activities:

- Use of diesel-powered mowing equipment.
- Use of diesel-powered tractor to pull sprayer (for Alternative 2 only)
- Movement of worker's commuting vehicles during the operation.

C.4 Emissions Determination

The GCR requires that potential emissions generated by any project-related activity and/or increased operational activities be determined on an annual basis and compared to the annual *de minimis* levels for those pollutants (or their precursors) for which the area is classified as nonattainment or maintenance. Emissions attributable to activities related to the proposed project were analyzed for NO_x and VOC.

C.4.1 Proposed Activities Resource Data Estimates

An estimate to identify equipment and manpower requirements for the change in airfield vegetation management program was made to develop the list of major operational items and the equipment necessary based on data presented in:

- "2003 RSMeans Facilities Construction Cost Data", R.S. Means Co., Inc., 2002
- "2011 RSMeans Facilities Construction Cost Data", R.S. Means Co., Inc., 2010

The purpose of the proposed change in vegetation management is to maintain grass heights in most areas within the Aircraft Movement Area (AMA) and areas within 500 feet of the AMA located on Westover ARB property between 7 and 14 inches in order to comply with AFI 91-202 with the goal of reducing the bird/aircraft strike hazard (BASH) risk (current lawn areas would be maintained as lawn and are not included in this analysis). Currently, a total of 499 acres of grassland is maintained at a height of 7 to 14 inches (which requires 2 to 4 mowings per year, depending on growing conditions), a total of 832 acres are mowed once per year, and 2.3 acres (the glideslope areas) are maintained at a grass height of less than 12 inches. Under the proposed action, 1,232 acres of grasslands would be maintained between 7 and 14 inches, 101 acres would be mowed once per year, and 2.3 acres (the glideslope areas) would continue to be maintained at a grass height of less than 12 inches (i.e., no change from the existing condition). Alternative 1 would achieve compliance with the AFI by increasing the mowing frequency in the outer grasslands; while Alternative 2 would achieve compliance with the AFI by applying a combination of pre-emergent herbicides, plant growth regulator, and follow-on mowing, as necessary (thereby delaying and reducing the mowing effort).

It is assumed that all mowing is performed using RSMeans item 02935-600-4180, mowing by tractor with 3-gang reel (7-ft) attachment, and spraying of PGR/herbicide is performed using RSMeans item 02935-300-0120, Fertilize, dry granular, 8-ft tractor-towed sprayer. Total calculation of mowing acreages under various conditions are provided in Table C-2 with total acreages further summarized in Table C-3.

Table C-2
Mowing Area Worksheet

	Maintain 7-14" exclusively by mowing (pink)	Semi-Improved (green)	Remote Grasslands (yellow)	Glideslope (orange)	Other	Total Acreage Mowed in Season	Total Acreage Sprayed in Season
No Action	499.2	675.3	113.9	2.3	42.4		
Min # of Mowings	2	1	1	2	1	1835	
Max # of Mowings	4	1	1	4	1	2838	
Alternative 1	1231.8	0	100.7	2.3	0		
Min # of Mowings	2	-	1	2	-	2569	
Max # of Mowings	4	-	1	4	-	5037	
Alternative 2	499.2	717.6	113.9	2.3	0		
Min # of Mowings	2	1	1	2	-	1835	717 - 1232
Max # of Mowings	4	1	1	4	-	2838	717 – 1232

Table C-3
Total Mowing Area

Scenario	Annual Mowing Acreage		Growth Inhibitor Acreage
	Minimum	Maximum	
Existing Conditions	1,835	2,838	N/A
Alternative 1	2,569	5,037	N/A
Alternative 2	1,835	2,838	717 - 1232

C.4.2 Equipment Operations and Emissions

Tractors with attachment were identified and assumed as the necessary equipment to perform the proposed mowing activities. Estimates of equipment emissions were based on the estimated hours of usage and emission factors for each motorized source for the project. It should be noted, the proposed activity could involve one piece or several pieces of same equipment type but the activity data developed were based on the worst-case mowing capacity-driven total operating hours with a total of four mows per year. It is assumed that the mowing activities over the entire

area would occur on an annual basis. Emission factors for NO_x and VOC related to heavy-duty diesel equipment were obtained from the NONROAD emission factor model (USEPA, 2008).

The USEPA recommends the following formula to calculate hourly emissions for the i^{th} pollutant from non-road engine sources including tractors:

$$M_i = N \times HP \times LF \times EF_i$$

where:

M_i = mass of emissions of i^{th} pollutants during inventory period;
N = source population (units);
HP = average rated horsepower;
LF = typical load factor; and
EF_i = average emissions of i^{th} pollutant per unit of use (e.g., grams per horsepower-hour).

Typical load factor values were obtained from the NONROAD model emission factor worksheet (USEPA, 2008). Estimated emissions from operation of mowing equipment are presented in Table C-4.

C.4.3 Mowing Vehicle Operations and Emissions

Because the mowing/spraying activities are currently occurring at the base, it is anticipated that the base would need to hire two additional season workers. Emissions from two commuting vehicle trips during the growing season are negligible and do not warrant a quantification.

Table C-4
Maximum Annual Net Equipment Emissions

Equipment Type	Net Hour Increase	Horsepower (hp)	Load Factor (%)	Emission Factor (grams/hp-hour)							Emissions (tons)						
				VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2	VOC	NO_x	CO	$PM_{2.5}$	PM_{10}	SO_2	CO_2
Alternative 1 (2,569 – 5,037 acres/year)																	
Tractor	827	94	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.03	0.122	0.12	0.02	0.02	0.00	11.91
Alternative 2 Mowing (1,835 – 2,838 acres/year) and Inhibitor (718 acres/year)																	
Tractor (Mowing)	0	94	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.00	0.00	0.00	0.00	0.00	0.00	0.00
Tractor (Inhibitor)	505	94	21	1.47	6.80	6.42	0.98	1.01	0.14	662.28	0.02	0.08	0.07	0.01	0.01	0.00	7.27

C.5 Compliance Analysis

Based on this analysis of NO_x and VOC emissions performed in conjunction with the Final Rule of *Determining Conformity of Federal Actions to State or Federal Implementation Plans,* (USEPA, November 30, 1993 and March 24, 2010), the proposed action would not require a formal conformity determination. Even in a worst case scenario (assuming that some portions of the base require a total of four tractor passes [i.e. combination of spraying and/or mowing] each year, the total net emissions conservatively predicted from tractor activities and presented in Table C-5 for each alternative, show no exceedance of the applicable *de minimis* criteria of 100 tpy for NO_x and 50 tpy of VOC. Therefore, the proposed action would have minimal air quality impacts and would not require a formal conformity determination.

Table C-5
Total Net Increase in Operational Emissions

Annual Emissions (tons)								
Alternative	**VOC**	**NO_x**	**CO**	**$PM_{2.5}$**	**PM_{10}**	**SO_2**	**HAPs**	**CO_2**
Alternative 1	0.03	0.12	0.12	0.02	0.02	0.00	0.01	11.91
Alternative 2	0.02	0.08	0.07	0.01	0.01	0.00	0.01	7.27
De Minimis Level	*50*	*100*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*	*n/a*

C.6 Attainment Criteria Pollutants, Hazardous Pollutants, and Greenhouse Gas Emissions

With regard to vegetation management, the related attainment pollutants (i.e., CO, PM2.5, PM10, and SO2) and greenhouse gas emissions in terms of CO_2 levels were estimated in the same way used for predicting nonattainment criteria pollutant emissions, and they are summarized in Table C-5. Since the NONROAD model is not capable of predicting HAPs emission factors for nonroad equipment, the nonroad equipment HAP emissions inventory methodology established in the USEPA-sponsored document, *Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory* (E.H. Pechan & Associates, Inc. 2005), was used to predict mowing equipment HAPs. Specific HAP speciation factor for each available toxic in terms of VOC or PM10 fraction are summarized in Table C-6. The combined HAPs fraction was further used in predicting HAPs annual emissions from the proposed action based on the annual VOC and PM10 emissions summarized in Table C-5.

Table C-6
HAP Speciation Factor

HAPs	National Diesel Exhaust HAP/VOC or HAP/PM10 Fraction
1,3-Butadiene	0.0018616
2,2,4-Trimethylpentane	0.000719235
Acetaldehyde	0.05308
Acrolein	0.00303
Benzene	0.020344
Ethylbenzene	0.0031001
Formaldehyde	0.11815
n-Hexane	0.0015913
PAH (fraction of PM10)	0.0004
Propionaldehyde	0.011815
Styrene	0.00059448
Toluene	0.014967
Xylenes	0.010582
Total VOC Fraction	**0.24**
Total PM10 Fraction	**0.0004**

Assuming the Council on Environmental Quality (CEQ) suggested assessment threshold of 25,000 metric tpy as an indicator of potential climate impact (CEQ, 2010b), the resulting greenhouse gas emissions under each alternative would be minimal.

REFERENCES

Council on Environmental Quality (CEQ). 2010. Memorandum for Heads of Federal Departments and Agencies from: Nancy H. Sutley, Chair, Council on Environmental Quality Subject: *Draft NEPA Guidance on Consideration of the Effects of Climate Change and Greenhouse Gas*. February 18, 2010.

E.H. Pechan & Associates, Inc. 2005. Documentation for Aircraft, Commercial Marine Vessel, Locomotive, and Other Nonroad Components of the National Emissions Inventory. EPA Contract No.: 68-D-02-063, September 30, 2005.

Federal Aviation Administration. September 2004. *Air Quality Procedures for Civilian Airports & Air Force Bases.*

R.S. Means Co., 2002. *2003 RSMeans Facilities Construction Cost Data.*

R.S. Means Co., 2010. *2011 RSMeans Facilities Construction Cost Data.*

US Environmental Protection Agency. November 30, 1993. *40 CFR Parts 6, 51, and 93. Determining Conformity of Federal Actions to State or Federal Implementation Plans, Federal Register*.

US Environmental Protection Agency. March 24, 2010. *40 CFR Parts 51 and 93. Revision to the General Conformity Rule*.

USEPA. December 31, 2008. Nonroad Model Emission Factor Worksheet.

APPENDIX D

NOTICE OF AVAILABILTY

(PROVIDED TO IICEP DISTRIBUTION LIST)

DEPARTMENT OF THE AIR FORCE
AIR FORCE RESERVE COMMAND

20 February 2015

MEMORANDUM FOR: DISTRIBUTION

FROM: 439 MSG/CE
250 Patriot Avenue, Box 35
Westover ARB, MA 01022-1670

SUBJECT: Draft Environmental Assessment/Finding of No Significant Impact, Manage Airfield Vegetation to Protect Flight Safety at Westover Air Reserve Base (ARB)

1. The United States Air Force has prepared a draft Environmental Assessment/Finding of No Significant Impact (EA/FONSI) for the management of airfield vegetation to protect flight safety at Westover ARB in Chicopee and Ludlow, Massachusetts. The proposed action, which would modify the airfield mowing plan, will comply with the recently revised Air Force Instruction entitled *The U.S. Air Force Mishap Prevention Program* (AFI 91-202). The need for the proposed action is to protect flight safety by reducing the bird/wildlife aircraft strike hazard risk. Collisions between fauna and aircraft can cause loss of human life and substantial damage and loss of property, as well as interfere with the flying mission of Westover ARB. The draft EA addresses the environmental consequences of the proposed action. That analysis supports a FONSI.

2. The proposed action encompasses a multi-component vegetation management approach, including the application of pre-emergent herbicides, plant growth regulator, prescribed burns, and mowing when vegetation heights exceed the 14-inch threshold within the Aircraft Movement Area (AMA) and areas within 500 feet of the AMA where able (i.e. where grass presently exists). The proposed action is anticipated to slowly transition the airifield ecosystem towards one with a greater dominance of warm season grasses, rather than cool season grasses and broad-leaved weeds (both of which tend to require earlier mowing to maintain heights below the 14-inch threshold). The total grassland area to be continuously maintained between 7 and 14 inches in height under the proposed action encompasses 1,232 acres. Of this area, approximately 499 acres are presently maintained between 7 and 14 inches, in accordance with Westover ARB's previously approved mowing plan.

3. In accordance with Executive Order 12372, *Intergovernmental Review of Federal Programs*, the Installation Commander, Colonel Albert Lupenski, has authorized me to solicit your comments on the attached draft EA and FONSI. Copies of the documents are also available at the Chicopee Public Library, 449 Front Street, Chicopee, MA and the Hubbard Memorial Library, 24 Center Street, Ludlow, MA, or online at http://www.westover.afrc.af.mil. Please provide your comments by mail to Mr. John Moriarty, Environmental Engineer; 250 Patriot Avenue, Box 35; Westover ARB, MA 01022-1670, or by email to john.moriarty.1@us.af.mil, by 20 March 2015.

WAYNE M. WILLIAMS, GS-13, DAF
Base Civil Engineer

2 Attachments:
1. Draft EA and FONSI
2. Distribution List

APPENDIX E

RESPONSE TO COMMENTS ON THE DRAFT EA

RESPONSE TO COMMENTS RECEIVED ON THE DRAFT EA –
MANAGE AIRFIELD VEGETATION TO PROTECT FLIGHT SAFETY (FEBRUARY 2015)

New Jersey Audubon Society. Letter Dated March 20, 2015. Signed by David Mizrahi (Vice President for Research and Monitoring)

A-1	*Comment:* The EA proposes to apply the growth inhibitor chemicals between April 15 and May 15 (Page 15, lines 292 to 294). The EA further states (Page 33 line 456-459) that 8 out of 9 nests of Upland Sandpiper were initiated between May 8 and May 24 (based on Tsipoura et al. 2013). In fact, these dates refer to the start of incubation, with the first egg being laid approximately 4 days before that date. Furthermore, this only looks at nest data from 2012. If data from all years are included, data for all 27 nests in the three years combined, the earliest nest incubation date is actually May 5 and the median date (the date by which half the birds are incubating) is May 17. This implies that the date when the first egg is laid is closer to May 1 than May 8. The timing of application of the growth inhibitor if it continues into mid-May, overlaps by two weeks with the nesting season of the state-endangered Upland Sandpiper, which will have half of all nests started within the first 2 weeks of that month (Tsipoura et al. 2013). This should be more explicitly acknowledged and mitigated by earlier spraying if possible. *Response: In order for the application of plant growth regulator and herbicides to be effective, the targeted vegetation needs to have emerged from dormancy and initiated growth. Licensed applicators with experience in the New England region suggest that the optimum time to apply such chemicals coincides with the Spring bloom of dandelions (Taraxacum officinale). Thus, it is not practicable to shift the start date earlier than April 15. Once conditions are favorable for application of the chemicals, Westover ARB will attempt to complete the application as expeditiously as possible, acknowledging that tractor-based activities extending into May increase the potential for adverse impacts on nesting habitat. Additionally, Westover ARB will consider application of PGR/herbicides by helicopter. Although this option may not be implementable in 2015 (due to timing, budget, and other constraints), Westover ARB will continue to investigate the feasibility of aerial application and/or other means to reduce the disturbance to habitat during the nesting season, to the extent that the base's mission is not compromised.*
A-2	*Comment:* Most mower-caused nest mortality is due to crushing by tires (Tsipoura et al. 2013), so chemical application via tractor in the later part of the window will likely cause nest failures. This should be acknowledged more clearly, and efforts should be made to minimize this impact. Therefore, efforts should be taken to minimize the impact of tractor traffic by 1) using the longest spray booms practicable and 2) making every effort to spray before start of the Upland Sandpiper nesting season (~ May 1st). *Response: See response to Comment A-1. Once conditions are favorable for application of the chemicals, Westover ARB would attempt to complete the application as expeditiously as possible, acknowledging that tractor-based activities extending into May increase the potential for adverse impacts on nesting habitat. Westover ARB will seek to locate and procure the longest boom feasible to minimize the number of tractor passes through the airfield grasslands. Additionally, Westover ARB is contemplating the application of PGR/herbicides by helicopter, rather than tractor. Although this option may not be implementable in 2015 (due to timing, budget, and other constraints), Westover ARB will continue to investigate the feasibility of aerial application and/or other means to reduce the disturbance to habitat during the nesting season, to the extent that the base's mission is not compromised.*
A-3	*Comment:* NJ Audubon conducted a regional grassland bird productivity study at Westover collecting data in 2009, 2010, and 2012 and produced a Legacy Program report (Tsipoura et al. 2014). The citation (with URL) is as follows: Tsipoura, N., M. C. Allen, K. A. Peters, and D. Mizrahi. 2014. Department of Defense Legacy Resource Management Program: #11-408 Grassland Bird Productivity on Military Airfields in the Mid-Atlantic and Northeast Regions - Final Report. New Jersey Audubon Society. February. https://www.dodlegacy.org/Legacy/project/productdocs/11-

New Jersey Audubon Society. Letter Dated March 20, 2015. Signed by David Mizrahi (Vice President for Research and Monitoring)

	408_Final_Report_- submitted_f3652a6c-138d-4714-afd5-839177b36528.pdf. This study was not cited in the EA; an older interim report was actually cited, but contains incomplete information (Peters and Allen 2011). In addition, the EA uses the results of and cites a Westover study conducted by NJA (Tsipoura et al. 2013) which has a somewhat different and more limited analysis of the nesting data. *Response: Westover ARB notes that the NJ Audubon has been actively engaged in studies of regional grassland bird productivity, including research hosted at Westover ARB. At the time the Draft EA was prepared, a number of NJ Audubon's reports were reviewed and incorporated into the Draft EA, including Peters and Allen, 2010; Peters and Allen, 2011; Peters et al., 2012; and Tsipoura et al., 2013. Westover ARB appreciates receiving the latest report (Tsipoura et al., 2014). The USAF has reviewed the latest report and determined that it would not substantively change the conclusions reached in the environmental assessment process.*
A-4	*Comment:* In this 2014 final Legacy report, 2009-2012 (Tsipoura et al. 2014) we reported a statistically significant difference in Eastern Meadowlark and Grasshopper Sparrow nest survival between mowed and non-mowed areas. This was not true when the two species were analyzed separately (Tsipoura et al 2013) - most likely due to small sample sizes. It should at least be noted in the EA that when these two grassland bird species are analyzed jointly (thus increasing the sample size), there is a statistically significant difference. Further analysis using additional data collected during the 2013 breeding season does not change the nest survival results. *Response: Westover ARB notes that the researchers combined data pertaining to different bird species in order to overcome the obstacle of small sample sizes. The Draft EA did acknowledge, despite the statistical uncertainty, that mowing would result in some direct mortality of grassland birds. Additionally, the modified Preferred Alternative, as presented in the Draft EA, incorporates a number of integrated vegetation management components intended to delay the onset of mowing and minimize the frequency of mowing (and thus reduce impacts to grassland birds), without compromising the military mission.*
A-5	*Comment:* The EA (Page 47, lines 271-274) states that productivity in Eastern Meadowlarks was significantly lower in the mowed areas (Tsipoura et al 2013). Similarly to comment above, when data from Eastern Meadowlarks and Grasshopper Sparrows were combined in the 2014 report, thereby increasing the sample size, productivity for both of these two grassland bird species combined was lower in mowed vs non-mowed areas. Lower productivity/ fledging success in mowed areas needs to be taken into consideration as a possible indirect effect of lower prey availability as the habitat changes. Bird productivity and factors that affect it need to be monitored when the preferred alternative is implemented. This would include following up on effects of the growth retardant on the birds and on their invertebrate prey. *Response: See Response to Comment A-4. Westover ARB notes that the researchers combined data pertaining to different bird species in order to overcome the obstacle of small sample sizes. The Draft EA did acknowledge, despite the statistical uncertainty, that mowing would result in some direct mortality of grassland birds. Relative to monitoring, Westover ARB intends to continue supporting MA DFW/NHESP in the biennial census (i.e. breeding season survey of grassland birds). Westover ARB anticipates that the current monitoring of birds/mammals by the USDA APHIS personnel on base will be expanded to include point counts of the state-listed grassland birds, to provide decision makers with additional data on the abundance of these species at Westover ARB. Additionally, Westover ARB is investigating the potential to program and budget for additional census (i.e. filling in the gaps between the alternate years of MA DFW/NHESP biennial census). Westover ARB will explore the possibility of extending legacy studies, such as the bird productivity studies conducted by NJ Audubon, or participating in ongoing studies such as those at the former Pease AFB being conducted by the Vermont Center of Ecostudies.*

New Jersey Audubon Society. Letter Dated March 20, 2015. Signed by David Mizrahi (Vice President for Research and Monitoring)

A-6 *Comment:* On Page 16, lines 323 to 326 the EA states that- "In the event that plant growth regulators cannot be applied or are ineffective, become cost prohibitive, or otherwise determined to be infeasible or not in the best interests of the Air Force [emphasis added], mowing would be implemented as soon as the average grass height exceeds the 14-inch tolerance." The EA does not state how many applications (or what price point) the Preferred Alternative would be considered "infeasible." The language leaves open the possibility that the Preferred Alternative could be abandoned for arbitrary reasons resulting in de facto reversion to Alternative 1 (i.e., frequent mowing of all 1232 acres). More specific language is needed here regarding which circumstances would be considered infeasible and how likely they are to occur.

Response: Westover ARB will implement vegetation management control options that best suit its mission of military readiness, minimize adverse environmental impact, and fall within allowable appropriations. Westover ARB's budget is limited to Congressional authorization; thus, options that are incompatible with the budget would be considered "cost prohibitive". Westover ARB intends to proceed with the multi-component vegetation management approach; however, as noted in the Draft EA, if observation suggests that the PGR/herbicides are ineffective, Westover ARB may reduce/eliminate their application in subsequent years. Conversely, if observation suggests that PGR is effective in maintaining compliance with the AFI and in reducing the necessary frequency of mowing, application of PGR may be expanded to the inner airfield. Flexibility in managing the airfield grasslands must be retained, with Westover ARB maintaining an emphasis on the safe launch and recovery of pilots and aircraft.

Mass Audubon. Letter Dated March 23, 2015. Signed by John J. Clarke (Director of Public Policy & Government Relations)

B-1 *Comment:* The current draft EA's preferred alternative now entails application of pre-emergent plant growth regulators and herbicides across 1,232 acres with the intention of retarding growth of broadleaf herbaceous plants and cool season grasses. This method, combined with mowing and prescribed burns, is intended to result in a transition of the entire area toward plant communities dominated by desirable warm season grasses. This proposal is experimental and should be treated as such.

Response: Westover ARB acknowledges that this combination of integrated vegetation management components has not previously been implemented at the base. However, use of herbicides and/or plant growth regulators is common practice along utility rights-of-way in New England. Additionally, application of herbicides to large tracts of federal land is fairly commonplace, as reflected by US Forest Service and Bureau of Land Management activities. The proposed vegetation management plan, with the goal of transitioning the plant community towards a greater dominance of warm season grasses, has been developed with the support and encouragement of the MA Division of Fisheries & Wildlife / Natural Heritage & Endangered Species Program.

B-2 *Comment:* As noted in our previous comments in July 2013, the scientific understanding of optimum management to minimize aircraft-wildlife strike hazards is not exact, and should be considered on a site-specific basis. If action is taken as proposed to maintain the entire 1,232 acre grassland area at a height between 7 and 14 inches at all times for consistency with AFI91-202, it is important that a rigorous monitoring protocol be instituted. Monitoring should include: use of the area by potentially hazardous bird and wildlife species; breeding activity and productivity of rare grassland birds; response of the vegetation to the revised monitoring regime; and monitoring for chemicals applied over such a broad area. The monitoring program should include vegetation monitoring to document whether and to what degree the proposed applications of herbicides and plant growth regulators in combination with prescribed burns results in the desired transition of the plant communities.

Mass Audubon. Letter Dated March 23, 2015. Signed by John J. Clarke (Director of Public Policy & Government Relations)

Response: Westover ARB must comply with the AFI, which was issued by the USAF HQ and is managed by the USAF Safety Center. Westover ARB currently does, and will continue to, monitor the area for the presence of wildlife species (bird and mammal) potentially hazardous to aircraft operations; this function is provided by the USDA APHIS personnel. Base Operations currently, and will continue to, monitor the airfield to assess grass height and potential safety conflicts; this includes inspections up to twice daily from vantage points along the runway and taxiways as the grass approaches mowing height. Additionally, base personnel provide a QA/QC of the BOS contractor, and conduct spot checks of vegetation height using a yardstick to assess the average grass height. The chemicals to be applied are EPA and MA approved/registered herbicides and plant growth regulators; when used in accordance with the manufacturer's label and applied by licensed professionals, these chemicals have been determined to be unlikely to have adverse environmental effect. Thus, the establishment of a monitoring program for surface water or groundwater in response to routine application of PGR/herbicides is unwarranted. As noted in response to Comment A-5 relative to monitoring of grassland birds, Westover ARB intends to continue supporting MA DFW/NHESP in the biennial census (i.e. breeding season survey of grassland birds). Westover ARB is investigating the potential to program and budget for additional census (i.e. filling in the gaps between the alternate years of MA DFW/NHESP biennial census). Westover ARB will explore the possibility of extending legacy studies, such as the bird productivity studies conducted by NJ Audubon, or participating in ongoing studies such as those at the former Pease AFB being conducted by the Vermont Center of Ecostudies.

B-3 *Comment:* Monitoring of both the vegetative community response and wildlife response to a revised management regime is essential to determine whether the action is in fact meeting the intended goals of maintaining aircraft safety while supporting rare species to the extent feasible.

Response: As noted in response to Comment B-2, Base Operations currently, and will continue to, monitor the airfield to assess grass height and potential safety conflicts; this includes inspections twice daily from vantage points along the runway and taxiways. Additionally, base personnel provide a QA/QC of the BOS contractor, and conduct spot checks of vegetation height using a yardstick to assess the average grass height. Westover ARB may also utilize fixed location cameras with time lapse photography (including a fixed measuring stick) to record grass height over time, allowing decision makers to assess the extent to which the plant growth regulator and herbicides slows the overall growth of the vegetation and thereby potentially delays/reduces the need for mowing. Westover ARB anticipates that the current monitoring of birds/mammals by the USDA APHIS personnel on base will be expanded to include point counts of the state-listed grassland birds, to provide decision makers with additional data on the abundance of these species at Westover ARB. As noted in response to Comment A-5 relative to monitoring of grassland birds, Westover ARB intends to continue supporting MA DFW/NHESP in the biennial census (i.e. breeding season survey of grassland birds). Westover ARB is investigating the potential to program and budget for additional census (i.e. filling in the gaps between the alternate years of MA DFW/NHESP biennial census). Additionally, Westover ARB will explore the possibility of extending legacy studies, such as the bird productivity studies conducted by NJ Audubon, or participating in ongoing studies such as those at the former Pease AFB being conducted by the Vermont Center of Ecostudies.

B-4 *Comment:* Mass Audubon also notes for the record that the Draft EA incorrectly states the minimization of impacts to rare species as a result of the preferred alternative:

Response: The statement in the Draft EA is intended as a comparison between the previous preferred alternative described in the June 2013 and the currently proposed alternative that was developed in coordination with MA DFW/ NHESP. The current preferred alternative, described in the February 2015 Draft EA, incorporates a number of vegetation management techniques (e.g. use of prescribed burns, application of PGR/herbicides) that are anticipated

	to delay or reduce the need to mow, while maintaining compliance with AFI 91-202. The delay/reduction in mowing of the outer airfield, with the corresponding reduction in disturbances of the grassland habitat, represents a minimization of impacts from the previous preferred alternative. Westover ARB recognizes that the current preferred alternative may result in greater impacts than the no action alternative; however, no action would result in non-compliance with AFI 91-202. Military readiness, USAF mission, and safety of aircrews and aircraft would potentially be jeopardized by non-compliance. Thus, Westover ARB has selected the action alternative which achieves the project purpose and need while best minimizing the potential impact to biological resources.
B-5	*Comment:* "While there is the possibility of potential adverse effects to wildlife as a direct result of mowing (including direct impact to individual bird eggs and nestlings), these effects are not anticipated to be significant in relation to the maintenance of regional populations of the species." Mass Audubon does not agree that impacts to grassland species at Westover ARB are unlikely to have adverse regional impacts on these birds. As noted in Mass Audubon's previous comments, breeding productivity of grassland bird habitat at Westover is important to the overall regional populations of these species. *Response: Westover ARB is undertaking considerable steps to minimize the impact of mowing by implementing additional vegetation controls prior to mowing, including the use of prescribed burns that should encourage slower growing warm season grasses and the application of plant growth regulators and herbicides to slow the growth of grasses and kill fast growing broadleaf weeds. Each of these steps is anticipated to delay the initiation of first mowing until much of the grassland bird nesting season is completed. Additionally, Westover ARB is contemplating the application of PGR/herbicides by helicopter, rather than tractor. Although this option may not be implementable in 2015 (due to timing, budget, and other constraints), Westover ARB will continue to investigate the feasibility of aerial application and/or other means to reduce the disturbance to habitat during the nesting season, to the extent that the base's mission is not compromised.*
B-6	*Comment:* Secondly, the Draft EA states: "While mowing was determined to be a source of direct nest mortality for grassland birds (though less common than other sources of nest failure, such as predation) in a recent study completed at Westover ARB, comparison of nest daily survival rates failed to reveal significant differences, although the researchers cautioned that statistical power was low due to relatively small sample sizes." The report's statement that there were no significant differences in daily nest survival rates between mowed and un-mowed treatments wrongly implies that mowing does not include adverse impacts. Rather, as the study authors note within their report, the sample sizes were simply so small that the statistical analyses had relatively little ability to demonstrate differences that did exist. *Response: The Draft EA did acknowledge, despite the statistical uncertainty, that mowing would result in some direct mortality of grassland birds. The modified Preferred Alternative, as presented in the Draft EA, incorporates a number of integrated vegetation management components intended to delay the onset of mowing and minimize the frequency of mowing (and thus reduce impacts to grassland birds), without compromising the military mission.*
B-7	*Comment:* In conclusion, if the decision is made to proceed with the new, experimental alternative approach to management of the grasslands around Westover ARB, specific protocols for monitoring should be included. A mere commitment to allow other parties to continue avian monitoring, while appreciated, is not sufficient in light of the large scale of the proposed change in management. *Response: As noted in response to Comment B-3, Base Operations will monitor the airfield to assess grass height and potential safety conflicts; this includes inspections twice daily from vantage points along the runway and taxiways. Additionally, base personnel provide a QA/QC of the BOS contractor, and conduct spot checks of vegetation height*

Mass Audubon. Letter Dated March 23, 2015. Signed by John J. Clarke (Director of Public Policy & Government Relations)

using a yardstick to assess the average grass height. Westover ARB may also utilize fixed location cameras with time lapse photography (including a fixed measuring stick) to record grass height over time, allowing decision makers to assess the extent to which the plant growth regulator and herbicides slows the overall growth of the vegetation and thereby potentially delays/reduces the need for mowing. Westover ARB anticipates that the current monitoring of birds/mammals by the USDA APHIS personnel on base will be expanded to include point counts of the state-listed grassland birds, to provide decision makers with additional data on the abundance of these species at Westover ARB. As noted in response to Comment A-5 relative to monitoring of grassland birds, Westover ARB intends to continue supporting MA DFW/NHESP in the biennial census (i.e. breeding season survey of grassland birds). Westover ARB is investigating the potential to program and budget for additional census (i.e. filling in the gaps between the alternate years of MA DFW/NHESP biennial census). Westover ARB will explore the possibility of extending legacy studies, such as the bird productivity studies conducted by NJ Audubon, or participating in ongoing studies such as those at the former Pease AFB being conducted by the Vermont Center of Ecostudies.

Massachusetts Division of Fisheries & Wildlife. Letter Dated March 23, 2015. Signed by Jack Buckley (Acting Director)

C-1 *Comment:* The Division continues to question the science behind AFI 91-202 and is not aware of any empirical evidence to suggest that strict compliance with AFI 91-202 will reduce BASH risk relative to the current management regimen (No Action Alternative). Nonetheless, given the need to comply with relevant USAF policies, we commend WARB and the USAF for the actions taken since June 2013. The collaborative, pragmatic approach to developing Alternative 2 demonstrates a real commitment to achieving mission objectives while responding to the Commonwealth's environmental concerns.

Response: AFI 91-202 was promulgated by the USAF Headquarters and is managed by the USAF Safety Center. Westover ARB must comply with USAF policies, including AFI 91-202. As noted in the EA, the tall grass (occasionally exceeding 4 feet high) that previously occurred on the airfield under the prior mowing regimen (when mowing outer areas was delayed until August 1) provided hiding areas for large mammals (such as deer and coyote) and large birds (such as turkeys). Establishing a maximum height of 14" for the grassland will increase the ability of Westover ARB personnel to detect and track large mammals and large birds on the airfield, thereby increasing the safety factor.

C-2 *Comment:* As discussed in further detail below, we believe that the core elements of Alternative 2 could form the basis for a FONSI provided that: An adaptive management plan is developed and implemented to account for the inherent uncertainty in the effectiveness of the Preferred Alternative. In other words, if the combination of management techniques is not as effective as anticipated in delaying the timing of mowing, significant impacts on the New England population of Grasshopper Sparrows and Upland Sandpipers are likely. Therefore, a process of monitoring the effectiveness of the Proposed Alternative and refining it as necessary (e.g. aerial application of growth inhibitor, changes in the sequencing of mowing across the site) should be developed and described prior to issuance of the FONSI.

Response: As described in the Draft EA, the Preferred Alternative (Alternative #2) comprises a number of vegetation management components that will be implemented prior to mowing. First, prescribed burns will be employed during the dormant season to encourage greater dominance of slow growing warm season grasses. Secondly, PGR/herbicide will be applied to stunt the growth of grasses and kill fast-growing broad-leaved weeds. Additionally, Westover ARB may employ spot retreatment of the PGR/herbicides in select areas, if it appears this may be beneficial in further slowing the growth of the vegetation. When those components are no longer capable of keeping

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	the grass beneath the 14" threshold, mowing will be employed to maintain compliance with AFI 91-202. As noted in the response to Comment A-1, Westover ARB is also contemplating the application of PGR/herbicides by helicopter, rather than tractor. Although this option may not be implementable in 2015 (due to timing, budget, and other constraints), Westover ARB will continue to investigate the feasibility of aerial application and/or other means to reduce the disturbance to habitat during the nesting season, to the extent that the base's mission is not compromised.
C-3	*Comment:* Given the novel approach of combining the use of growth inhibitors, invasives control and prescribed fire to manage grassland height and growth rates, there is the potential for significant challenges to arise that may not be able to be addressed within the context of an adaptive management program. Therefore, to support the FONSI a contingency plan should be developed that might include additional mitigation and the possibility of additional NEPA review in the event that habitat and environmental impacts turn out to be greater than we think. *Response: As described in the response to Comment C-2, the Preferred Alternative comprises a number of vegetation management components that will be implemented prior to mowing. First, prescribed burns will be employed during the dormant season to encourage greater dominance of slow growing warm season grasses. Secondly, PGR/herbicide will be applied to stunt the growth of grasses and kill fast-growing broad-leaved weeds. When those components are no longer capable of keeping the grass beneath the 14" threshold, mowing will be employed to maintain compliance with AFI 91-202. The anticipated environmental effects of this action, including the multi-step components (fire, PGR/herbicide, and mowing) are described in the Draft EA. As noted in the Draft EA, Westover ARB is obliged to consult with USFWS if the Base begins to observe a potential impact from mowing on the entire population of a migratory bird species present at Westover ARB. As noted in response to Comment A-5, Westover ARB intends to continue supporting MA DFW/NHESP in the biennial census (i.e. breeding season survey of grassland birds). Westover ARB anticipates that the current monitoring of birds/mammals by the USDA APHIS personnel on base will be expanded to include point counts of the state-listed grassland birds, to provide decision makers with additional data on the abundance of these species at Westover ARB. Also, Westover ARB is investigating the potential to program and budget for additional census (i.e. filling in the gaps between the alternate years of MA DFW/NHESP biennial census). Westover ARB will explore the possibility of extending legacy studies, such as the bird productivity studies conducted by NJ Audubon, or participating in ongoing studies such as those at the former Pease AFB being conducted by the Vermont Center of Ecostudies.*
C-4	*Comment:* The Preferred Alternative contains language that states, "In the event that plant growth regulators cannot be applied or are ineffective, become cost prohibitive, or otherwise determined to be infeasible or not in the best interests of the Air Force, mowing would be implemented as soon as the average height exceeds the 14-inch tolerance." This broad and expansive language potentially undermines the credibility of the FONSI and should be removed or clarified, consistent with points 1 and 2, above. *Response: See response to Comment A-6. Westover ARB will implement vegetation management control options that best suit its mission of military readiness, minimize adverse environmental impact, and fall within allowable appropriations. Westover ARB's budget is limited to Congressional authorization; thus, options that are incompatible with the budget would be considered "cost prohibitive". Westover ARB intends to proceed with the multi-component vegetation management approach; however, as noted in the Draft EA, if observation suggests that the PGR/herbicides are ineffective, Westover ARB may reduce/eliminate their application in subsequent years. Conversely, if observation suggests that PGR is effective in maintaining compliance with the AFI and in reducing the necessary frequency of mowing, application of PGR may be expanded to the inner airfield. Flexibility in managing the airfield grasslands must be retained, with Westover ARB maintaining an emphasis on the safe launch and recovery of pilots and aircraft.*

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C-5 *Comment:* As stated above, the Division recognizes that aircraft safety must be the highest priority at WARB. However, we are not aware of empirical data suggesting that mowing once the grass reaches 14 inches will decrease the BASH risk and believe that the current grassland management (No Action Alternative) is effective at both minimizing BASH risk while promoting the conservation of state-listed grassland birds. However, the proposed action (Alternative 2) may also accomplish this goal if it is implemented according to the proposed timing (e.g. early spring application of growth inhibitor), and achieves the desired effects on plant growth rates and timing of mowing.

Response: See response to Comment C-1. AFI 91-202, which requires that airfield grasslands be maintained at heights between 7" and 14", was promulgated by the USAF Headquarters and is managed by the USAF Safety Center. Westover ARB must comply with USAF policies, including AFI 91-202. As noted in the EA, the tall grass (occasionally exceeding 4 feet high) that previously occurred on the airfield under the prior mowing regimen (when mowing outer areas was delayed until August 1) provided hiding areas for large mammals (such as deer and coyote) and large birds (such as turkeys). Establishing a maximum height of 14" for the grassland will increase the ability of Westover ARB personnel to detect and track large mammals and large birds on the airfield, thereby increasing the safety factor. Westover ARB recognizes that the proposed action (Alternative 2) may result in greater impacts than the no action alternative; however, no action would result in non-compliance with AFI 91-202. Military readiness, USAF mission, and safety of aircrews and aircraft would potentially be jeopardized by non-compliance. Thus, Westover ARB has selected the alternative (i.e. Alternative 2) which achieves the project purpose and need while best minimizing the potential impact to biological resources.

C-6 *Comment:* However, this proposed action is a new management approach at WARB, and the outcome of such management is uncertain. We believe that a FONSI is justified only if Alternative 2 is fully carried out (as described in the Draft EA) and is successful at delaying mowing of the outer 733 acres of the airfield until mid/late July.

Response: As noted in response to Comment B-5, Westover ARB is undertaking considerable steps to minimize the impact of mowing by implementing additional vegetation controls prior to mowing, including the use of prescribed burns that should encourage slower growing warm season grasses and the application of plant growth regulators and herbicides to slow the growth of grasses and kill fast growing broadleaf weeds. Each of these steps is anticipated to delay the initiation of first mowing until much of the grassland bird nesting season is completed. Additionally, Westover ARB is contemplating the application of PGR/herbicides by helicopter, rather than tractor. Aerial spraying would reduce impact to grassland birds by eliminating the 'direct crush' mortality to eggs and young chicks during the PGR/herbicide application window (April 15 – May 15). Although this option may not be implementable in 2015 (due to timing, budget, and other constraints), Westover ARB will continue to investigate the feasibility of aerial application and/or other means to further reduce the disturbance to habitat during the nesting season, to the extent that the base's mission is not compromised.

C-7 *Comment:* The timing of an herbicide/plant growth inhibitor application to the outer airfield (733 acres) is critical for the success of the strategy. The application of a plant growth regulator/herbicide (e.g., PLATEAU) will take 7-8 days with a single tractor and boom, as indicated in the Draft EA. Given that wet weather often compromises the ability to get tractors on a grassland, and that the plant growth regulator should not be applied if rain is in the immediate forecast (most plant growth regulators require at least 2-4 hrs of no precipitation following the application to allow for foliar absorption of the chemical), we believe there is a high probability that the growth regulator will not get applied to the entire 733 acre area before May 15. As stated in the Draft EA "an extremely rainy spring could potentially prevent WARB from completing the application of plant growth regulator within the targeted timeframe (April 15- May 15)". However, using a tractor and boom to apply the plant growth regulator after May 15 jeopardizes active nests of Upland Sandpipers, Grasshopper Sparrows, and other grassland birds. If weather is anticipated to restrict the ability to apply the plant growth regulator between April 15 – May 15, the

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	Division recommends that the Base Operating Support (BOS) contractor purchase or lease additional tractors to accomplish the work in fewer than the anticipated 7-8 days. Alternatively, the plant growth regulator could be applied using aerial methods between April 15 – May 15. *Response: See response to Comment A-1. Once conditions are favorable for application of the chemicals, Westover ARB would attempt to complete the application as expeditiously as possible, acknowledging that tractor-based activities extending into May increase the potential for adverse impacts on nesting habitat. Westover ARB is contemplating the application of PGR/herbicides by helicopter, rather than tractor. Westover ARB recognizes that aerial application may have some advantages, e.g., faster application time reduces risks from unfavorable weather, as well as a reduction in impact to grassland birds during the PGR/herbicide application window of April 15 – May 15. Westover ARB is currently coordinating with the USAF Pest Management Board to develop a Statement of Need in accordance with Air Force Instruction (AFI) 32-1074 "Aerial Application of Pesticides". Although this option may not be implementable in 2015 (due to timing, budget, and other constraints), Westover ARB will continue to investigate the feasibility of aerial application and/or other means to reduce the disturbance to habitat during the nesting season, to the extent that the base's mission is not compromised.*
C-8	*Comment:* Wet weather would restrict the ability to carry out prescribed burns in the spring as described in the EA. We recommend that staff at WARB work with the Division to develop a comprehensive fire management strategy, including the possibility of prescribed burns in winter and fall in addition to spring. *Response: Westover ARB will not restrict the possibility of burning to just the Spring season. Westover ARB will strive to conduct prescribed burns whenever conditions are favorable. Thus, a 3-season approach to prescribed burns is potentially feasible. Burns would not be conducted during the growing (or nesting) season. However, burns may be conducted, if meteorological conditions permit, shortly after the first frost in Autumn, at select times during the Winter (if there is no snowpack), and early Spring (before growing season begins).*
C-9	*Comment:* Building on the materials presented in the draft EA, a comprehensive long- term grassland management plan should be developed that provides clear goals and objectives. The Division recommends that a long-term adaptive management plan be developed that works toward the goal of returning the composition of the airfield to native warm season grasses. The Division believes that achieving a warm-season grass dominated community on the airfield will have the mutual benefits of reduced BASH risk (less attractive habitat for the most dangerous animals), decreased maintenance efforts (less mowing), less conflict with important species of ground nesting birds (a delayed need to mow), and greatly improved ecological integrity. Short-term objectives related to this plan should include the employment of such immediate actions as the application of approved plant growth inhibitors in order to initially delay mowing, the implementation of early season prescribed fire to shift the grass composition to native warm season grasses, and the use of selective herbicides to control invasive and woody vegetation. These short-term actions should be monitored closely to evaluate their effectiveness, and staff at WARB should be in a position to adapt their management regime dependent upon the results of monitoring. Additionally, any grassland management plan at WARB should be developed with the goal of long-term sustainability of a native warm season grass community. Considerations for long-term management at the site should include the phasing out of growth inhibitor use as the grass community shifts toward warm season grasses, the employment of a three-season prescribed fire plan, and an ongoing invasive species treatment plan. Ideally, this plan will also incorporate a grassland bird monitoring program aimed to evaluate avian response to management actions and outcomes. *Response: The long-term management of the grasslands at Westover ARB is described in the recently revised Vegetation Management Plan, as well as the Integrated Natural Resources Management Plan, which is in the process of being updated. The intent of the Vegetation Management Plan is to ultimately achieve a grassland*

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	community with greater dominance of warm season grasses, such as little blue-stem. The integrated vegetation management plan, described in the Draft EA, incorporates a number of components developed towards achieving this goal. The controlled burns, which may occur in Autumn, Winter, or Spring, are anticipated to slowly transition the ecosystem towards one with a greater dominance of warm season grasses, rather than cool season grasses and broad-leafed weeds (both of which tend to require earlier mowing to maintain heights below the 14-inch threshold). Early Spring applications of plant growth regulator is anticipated to delay the first mowing required by approximately 8-10 weeks (although annual variations may occur), and the intent of the pre-emergent herbicide is to reduce the abundance of broad-leaved weeds (including invasive species), which tend to have early season vigor and thus achieve a height of 14 inches earlier than warm season grasses. Westover ARB intends to proceed with the multi-component vegetation management approach; however, if observation suggests that the PGR/herbicides are ineffective, Westover ARB may reduce/eliminate their application in subsequent years. Conversely, if observation suggests that PGR is effective in maintaining compliance with the AFI and in reducing the necessary frequency of mowing, application of PGR may be expanded to the inner airfield.
C-10	*Comment:* Despite the importance of taking accurate grass measurements, the Division is concerned that there is very little detail provided on how grass height will be measured. The Draft EA indicates the grassland would be "mowed when the average grass height, not including seed heads, exceeds tolerance" and that "Base Operations personnel would inspect the airfield daily and provide guidance on the area(s) of the airfield that may need mowing sooner than others". The Division would like to continue to consult with WARB to better understand how decisions to initiate mowing initiation will be made and the sequence of areas to be mowed determined once mowing begins. *Response: As noted in the Draft EA, the decision to initiate mowing of the outer airfield grasslands would be made following the guidance currently used to decide when to initiate mowing of the inner airfield grasslands, i.e. Air Force Pamphlet (AF PAM) 91-212. Base Operations will continue to monitor the airfield to assess grass height and potential safety conflicts; this includes inspections twice daily from vantage points along the runway and taxiways. Additionally, base personnel provide a QA/QC of the BOS contractor, and conduct spot checks of vegetation height using a yardstick to assess the average grass height. Initially, four mowers will be stationed at Westover ARB, one in each of the four quadrants. Mowers can be re-assigned to other areas, as needed (e.g. two mowers may operate in one quadrant, if the tallest grass is located in that quadrant). Mowing is anticipated to begin in those areas immediately adjacent to the runways and taxiways, and then move outward. Mowing of the outer grasslands potentially would lag approximately 1-2 weeks behind the inner grasslands; this lag in mowing the outer grasslands may provide additional time for grassland birds to complete their nesting and fledging activities.*
C-11	*Comment:* When mowing is conducted at WARB it is important that the intended 7 inch cut height be strictly applied. In the past, Dr. Scott Melvin from the Division reported observing areas mowed to 5-6 inches and lower than the reported 7 inches. Lower cut height result in higher nest mortality rates with airports reporting 14% nesting success when grass height is cut between 2.0-4.5 inches (Kershner and Bollinger 1996) and hayfield cuts often result in 0% nesting success (Perlut et al. 2006). *Response: The intent of the proposed action is to maintain the grass at heights between 7" and 14". There is no intent to mow the grass to a lower height. Low vegetation (generally less than 7 inches in height) attracts gulls, European starlings, and other avian species and thus could increase the BASH risk. Thus, mowing below 7" is to be deliberately avoided. Base personnel will provide a QA/QC of the BOS contractor and conduct spot checks of vegetation height using a yardstick to assess the average grass height. If the BOS contractor is determined to be mowing the grass too low, base personnel will instruct the BOS contractor to adjust the height of the cutting element. While it is recognized that there may be occasional instances where small plots of grass are cut to heights of less than 7" due to uneven terrain or rutting, Westover ARB intends to cut no lower than 7".*

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C-12 *Comment:* The draft EA does not identify a specific plant growth regulator for use despite the importance of its application between April 15 – May 15 of 2015. We recommend that this decision be made as soon as possible with input from the Division. The preferred plant growth regulator might be PLATEAU, which has a history of use promoting native warm season grasses and grassland bird conservation.

Response: The Draft EA was written to allow Westover ARB some flexibility in selecting and/or modifying the specific plant growth regulator, as impacts would be expected to be similar for similar classes of chemicals. At this time, the mix of herbicides and plant growth regulator (PGR) most likely to be applied at WARB under the Proposed Action include Plateau®, Escort®, and Milestone®. Westover ARB recognizes that one of the advantages of Plateau® is its suitability for native warm season grassland renovation and restoration.

C-13 *Comment:* As stated above, if the combination of plant growth regulator, invasive plant control and prescribed fire is not effective at keeping the average grass height below 14 inches until mid/late July and requiring mowing earlier than expected, the FONSI would not be justified. We believe that mowing of the grassland during the nesting period will have a substantial negative impact on grassland bird nesting success including the state-listed Grasshopper Sparrow and Upland Sandpiper. Because WARB supports the largest population of Grasshopper Sparrow and Upland Sandpiper in New England, negative impacts on this population would have region-wide implications for these species, both of which are of high conservation concern throughout eastern North America.

Response: Westover ARB recognizes that the populations of many grassland birds have been in decline for several decades. Scientists have suggested many possible causes of this decline, including urban development; changes in agricultural crop management; rapid conversion of grassland to cropland in many birds' winter territory; increases in the populations of predators such as raccoons, foxes, and coyotes; and/or the increased use of organophosphate and carbamate insecticides. Many of these factors are beyond Westover ARB's control, and further decline of the grassland birds, unfortunately, may be inevitable, unless broad changes that extend far beyond Westover ARB's political and geographical boundaries are implemented. That being said, Westover ARB has committed extensive resources towards the conservation of state-listed species to the extent practicable, as required by AFI 32-7064 ("Integrated Natural Resources Management"). Westover ARB is undertaking considerable steps to minimize the impact of mowing by implementing additional vegetation controls prior to mowing, including the use of prescribed burns that should encourage slower growing warm season grasses and the application of plant growth regulators and herbicides to slow the growth of grasses and kill fast growing broadleaf weeds. Each of these steps is anticipated to delay the initiation of first mowing until much of the grassland bird nesting season is completed. Additionally, Westover ARB is contemplating the application of PGR/herbicides by helicopter, rather than tractor. Aerial spraying would further reduce impact to grassland birds by eliminating mechanical incursion into the habitat during the PGR/herbicide application window (April 15 – May 15). Although this option may not be implementable in 2015 (due to timing, budget, and other constraints), Westover ARB will continue to investigate the feasibility of aerial application and/or other means to reduce the disturbance to habitat during the nesting season, to the extent that the base's mission is not compromised.

C-14 *Comment:* If the proposed alternative is attempted but the outer airfield still required mowing before mid/late July to comply with AFI 91-202, the Division believes that mitigation should be provided to offset harm to state-listed Grasshopper Sparrows, Upland Sandpipers, and grassland habitat, and support the FONSI. Possible mitigation scenarios would need to be discussed among WARB and the Division staff, but it could include offsite mitigation and funding for continued monitoring and conservation research (e.g. on BASH risk reduction).

Response: The Preferred Alternative, as described in the Draft EA, is not expected to require mowing before mid/late July. However, as noted in the Draft EA, Westover ARB is obliged to consult with USFWS if the Base begins to observe

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	a potential impact from mowing on the entire population of a migratory bird species present at Westover ARB. Relative to monitoring, Westover ARB intends to continue supporting MA DFW/NHESP in the biennial census (i.e. breeding season survey of grassland birds). Westover ARB anticipates that the current monitoring of birds/mammals by the USDA APHIS personnel on base will be expanded to include point counts of the state-listed grassland birds, to provide decision makers with additional data on the abundance of these species at Westover ARB. Additionally, Westover ARB is investigating the potential to program and budget for additional census (i.e. filling in the gaps between the alternate years of MA DFW/NHESP biennial census). Westover ARB will explore the possibility of extending legacy studies, such as the bird productivity studies conducted by NJ Audubon, or participating in ongoing studies such as those at the former Pease AFB being conducted by the Vermont Center of Ecostudies.
C-15	*Comment:* The airfield at WARB provides the most important site in Massachusetts for the state- listed Upland Sandpiper and Grasshopper Sparrow, and it is crucial for the long-term viability of these species in the state and region (NHESP Action Plan). The Division believes that grassland management at WARB can be conducted in a way that both adheres to aircraft safety requirements while also supporting a sustainable population of state-listed grassland birds. These goals can be accomplished using an integrated approach that utilizes mowing, the application of a plant growth regulator and herbicide, and prescribed fire. These actions, if successful, will promote warm season grasses, which should naturally delay the need to mow because of their slow growth during the early growing period. To continue to evaluate the effects of this new management strategy, we strongly recommend that the Air Force commit to monitoring the avian response to the grassland management outlined in the EA. Such information can be used in an adaptive management framework to continue to develop the best strategy to minimize the BASH risk while supporting state-listed grassland birds. We believe that such a science-based adaptive management approach will allow for continued development of the best strategy to minimize the BASH risk while supporting state-listed grassland birds and potentially reducing the costs of long-term vegetation maintenance at WARB. *Response: The Preferred Alternative incorporates a number of integrated vegetation management components intended to delay the onset of mowing and minimize the frequency of mowing (and thus reduce impacts to grassland birds), without compromising the military mission. As described in the Draft EA, Westover ARB's integrated approach will utilize prescribed burns and the application of plant growth regulators and herbicides, prior to mowing. Each of these steps is anticipated to delay the initiation of first mowing until much of the grassland bird nesting season is completed. Relative to monitoring, Westover ARB intends to continue supporting MA DFW/NHESP in the biennial census (i.e. breeding season survey of grassland birds). Westover ARB anticipates that the current monitoring of birds/mammals by the USDA APHIS personnel on base will be expanded to include point counts of the state-listed grassland birds, to provide decision makers with additional data on the abundance of these species at Westover ARB. Additionally, Westover ARB is investigating the potential to program and budget for additional census (i.e. filling in the gaps between the alternate years of MA DFW/NHESP biennial census). Westover ARB will explore the possibility of extending legacy studies, such as the bird productivity studies conducted by NJ Audubon, or participating in ongoing studies such as those at the former Pease AFB being conducted by the Vermont Center of Ecostudies.*

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D-1 *Comment:* Under the 2014 Memorandum of Understanding between the U.S. Department of the Defense (DoD) and the U.S. Fish and Wildlife Service to Promote the Conservation of Migratory Birds, DoD and the Service have acknowledged a common interest in the conservation and management of America's natural resources. They also have agreed to protect, enhance, and restore migratory bird habitats, as practicable, on DoD-managed lands, in ways that do not conflict with or impede the military mission. The Service recognizes that DoD priorities include ensuring flight safety, mission implementation, and military readiness. Given the challenges in meeting DoD standards for its operational priorities while also working toward natural resource conservation, we commend Westover Air Reserve Base for working with the Massachusetts Division of Fisheries and Wildlife to develop the new alternative (Alternative 2) presented in the Draft EA released in February 2015. The grassland bird population at WARB is regionally significant for its number of breeding individuals for species such as Upland Sandpiper and Grasshopper Sparrow. WARB has been a successful steward of the grassland bird populations on its property for many years, and we encourage and support efforts by WARB and the State of Massachusetts to collaboratively work toward sustaining them. Negative impacts on the grassland birds at WARB would have negative ripple effects across southern New England since WARB serves as a source population for smaller populations of these grassland bird species in the region.

Response: Westover ARB acknowledges, and appreciates, that USFWS (and MA DFW) recognize that considerable effort has been extended to develop a vegetation management plan that addresses two often conflicting goals: maintaining a safe operational environment for the launch/recovery of aircraft and the conservation of migratory bird habitat. Westover ARB recognizes that the populations of upland sandpiper and grasshopper sparrow at Westover ARB are the largest within New England, and Westover ARB looks forward to continued collaboration with MA DFW.

D-2 *Comment:* We consider the innovative approach presented as the Preferred Alternative, including the use of vegetation growth inhibitors, prescribed fire, and invasive plant control, to be a promising solution to maintaining the 7-14 inch grass height required by the U.S. Air Force under AFI 91-202 while delaying the need to mow until later in the growing season. This approach potentially gives the grassland birds a suitable length of time for successfully fledging young from their nests before mowing would be needed and thereby potentially avoiding direct take of birds or nests by mowing activities. However, we concur with the comments Massachusetts Division of Fisheries and Wildlife provided in its letter of March 23, 2015, that this new approach, while promising, comes with uncertainty regarding the results of its implementation and that several factors need to be addressed before Alternative 2 could be considered as the basis for a FONSI.

Response: Westover ARB acknowledges that this combination of integrated vegetation management components has not previously been implemented at the base. However, use of herbicides and/or plant growth regulators is common practice along utility rights-of-way in New England. Additionally, application of herbicides to large tracts of federal land is fairly commonplace, as reflected by US Forest Service and Bureau of Land Management activities. The proposed vegetation management plan, with the goal of transitioning the plant community towards a greater dominance of warm season grasses, has been developed with the support and encouragement of the MA Division of Fisheries & Wildlife / Natural Heritage & Endangered Species Program. As noted above, this approach is anticipated to give the grassland birds a suitable length of time to successfully fledge young from their nests by delaying the initiation of mowing, which is recognized to result in some adverse impact on the grassland birds depending on the extent to which mowing overlaps with the nesting season. See also responses to Comments D-3 and D-4 relative to implementation of the new vegetation management plan.

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D-3 *Comment:* A well-defined monitoring and adaptive management plan should be developed to track both the vegetation and bird responses under the Preferred Alternative and to adjust the new vegetation management techniques as necessary to achieve the desired delay in mowing so as to avoid significant impacts to grassland birds. In addition to uncertainty about the success of the new methods in delaying the timing of mowing, there is uncertainty about what changes the new methods might have on the structural characteristics of the grass community or the food resources available for grassland birds, both of which impact the bird community beyond what impacts the timing of mowing would have. Bird monitoring should include abundance, at a minimum, but preferably also include monitoring reproductive success after new vegetation management techniques are implemented.

Response: With respect to vegetation monitoring, Base Operations currently, and will continue to, monitor the airfield to assess grass height and potential safety conflicts; this includes inspections twice daily from vantage points along the runway and taxiways. Additionally, base personnel provide a QA/QC of the BOS contractor, and conduct spot checks of vegetation height using a yardstick to assess the average grass height. Westover ARB may also utilize fixed location cameras with time lapse photography (including a fixed measuring stick) to record grass height over time, allowing decision makers to assess the extent to which the plant growth regulator and herbicides slow the overall growth of the vegetation and thereby potentially delay/reduce the need for mowing. With respect to avian monitoring, Westover ARB intends to continue supporting MA DFW/NHESP in the biennial census (i.e. breeding season survey of grassland birds). Westover ARB anticipates that the current monitoring of birds/mammals by the USDA APHIS personnel on base will be expanded to include point counts of the state-listed grassland birds, to provide decision makers with additional data on the abundance of these species at Westover ARB. Additionally, Westover ARB is investigating the potential to program and budget for additional census (i.e. filling in the gaps between the alternate years of MA DFW/NHESP biennial census). Westover ARB will explore the possibility of extending legacy studies, such as the bird productivity studies conducted by NJ Audubon, or participating in ongoing studies such as those at the former Pease AFB being conducted by the Vermont Center of Ecostudies.

D-4 *Comment:* If the new vegetation management techniques ultimately prove to be ineffective in delaying the timing of when mowing would have to occur or prove to have unexpected impacts on grassland bird abundance or reproductive success, the EA should address what the contingency plans will be for either additional NEPA review or possible mitigation in support of a FONSI. The current language for the Preferred Alternative states, "In the event that plant growth regulators cannot be applied or are ineffective, become cost prohibitive, or otherwise determined to be infeasible or not in the best interests of the Air Force, mowing would be implemented as soon as the average height exceeds the 14-inch tolerance." Such language puts the FONSI in question if the vegetation management methods under the Preferred Alternative do not have the desired effect and mowing is implemented as soon as the grass height exceeds 14 inches. Significant impacts to grassland birds (including direct mortality from mowing) are likely if vegetation growth is not sufficiently slowed such that mowing occurs during the nesting season. We suggest removing this language from the EA and addressing contingency plans necessary to justify a FONSI in the event the methods described under the Preferred Alternative are not effective or are discontinued for other reasons.

Response: Westover recognizes that the phrase "or otherwise determined to be infeasible or not in the best interests of the Air Force, mowing would be implemented as soon as the average height exceeds the 14-inch tolerance" was of concern to a few reviewers. This statement has been re-worded in the Final EA. In the event that controlled burns, application of herbicides to kill fast-growing broadleaved weeds, and application of plant growth regulator to slow the growth of the airfield grasses do not delay the mowing as anticipated

United States Department of the Interior, Fish and Wildlife Service. Letter Dated April 15, 2015. Signed by Randy Dettmers (Acting Chief, Migratory Birds)

	(and presented in the EA), the USAF will consult with USFWS and MADFW to develop an alternate strategy to implement the 7"-14" grass height standard required by AFI 91-202.
D-5	*Comment:* As suggested by the Massachusetts Division of Fisheries and Wildlife, developing a long-term adaptive management plan integrating the use of multiple techniques (e.g., plant growth inhibitors, prescribed burning, and mowing) with the goal of promoting warm season grasses would be a sound approach to managing WARB's grasslands to minimize BASH risks in compliance with AFI 9 I-202 while continuing to support the significant populations of grassland birds on the Air Base. We strongly recommend the development of an appropriate vegetation and avian monitoring plan to complement the new vegetation management approach outlined under the Preferred Alternative in the Draft EA and to inform an adaptive management approach. We also strongly encourage continued coordination and collaboration with the Division of Fisheries and Wildlife on the implementation of such monitoring and management plans. *Response: As described in the Draft EA, the Preferred Alternative (Alternative #2) comprises a number of vegetation management components that will be implemented prior to mowing. First, prescribed burns will be employed during the dormant season to encourage greater dominance of slow growing warm season grasses. Secondly, PGR/herbicide will be applied to stunt the growth of grasses and kill fast-growing broad-leaved weeds. Additionally, Westover ARB may employ spot retreatment of the PGR/herbicides in select areas, if it appears this may be beneficial in further slowing the growth of the vegetation. When those components are no longer capable of keeping the grass beneath the 14" threshold, mowing will be employed to maintain compliance with AFI 91-202. As noted in the response to Comment A-1, Westover ARB is also contemplating the application of PGR/herbicides by helicopter, rather than tractor. Although this option may not be implementable in 2015 (due to timing, budget, and other constraints), Westover ARB will continue to investigate the feasibility of aerial application and/or other means to reduce the disturbance to habitat during the nesting season, to the extent that the base's mission is not compromised. Relative to monitoring, Westover ARB intends to continue supporting MA DFW/NHESP in the biennial census. Westover ARB is investigating the potential to program and budget for additional census (i.e. filling in the gaps between the alternate years of MA DFW/NHESP biennial census). Additionally, Westover ARB anticipates that the current monitoring of birds/mammals by the USDA APHIS personnel on base will be expanded to include point counts of the state-listed grassland birds, to provide decision makers with additional data on the abundance of these species at Westover ARB. Westover ARB will explore the possibility of extending legacy studies, such as the bird productivity studies conducted by NJ Audubon, or participating in ongoing studies such as those at the former Pease AFB being conducted by the Vermont Center of Ecostudies.*
D-6	*Comment:* WARB has been a leader in demonstrating how aircraft safety and bird conservation can be jointly addressed. We acknowledge the Base's efforts to maintain that balance through the proposed grassland management approach described in the Draft EA and encourage you to address our concerns presented in this letter so as to achieve the greatest conservation benefit while maintaining the necessary DoD standards for aircraft safety and mission priorities. *Response: Westover ARB acknowledges, and appreciates, that USFWS recognizes that considerable effort has been extended to develop a vegetation management plan that addresses two often conflicting goals: maintaining a safe operational environment for the launch/recovery of aircraft and the conservation of migratory bird habitat. Refer to the responses to Comments D-3, D-4, and D-5 to see the ways in which Westover ARB is addressing the concerns of USFWS (and others) to the extent that the base's mission is not compromised.*