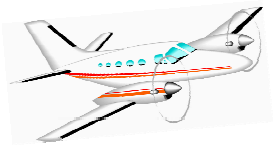
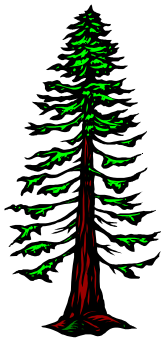
VEGETATION MANAGEMENT AT AIRPORTS
A GUIDANCE DOCUMENT TO CONSERVATION COMMISSIONS

DEP

MANAGING WETLAND VEGETATION AT AIRPORTS

All airports, from the smallest community airport to the largest commercial facility, need to manage their surrounding trees and smaller vegetation near the runways. As trees and other vegetation grow taller they create safety hazards for pilots and can limit the visibility between the aircraft and the control tower. The FAA Safety Regulations require that certain areas of trees and shrubs surrounding airports must be cut, even if they occur within wetlands. There are approximately 18,600 acres of airport property in the Commonwealth, of which about 1,350 acres are wetland resources (Draft General Environmental Impact Report [DGEIR, 1993]).





The MA Wetlands Protection Act (WPA; 310 CMR 10.00) allows for vegetation management at airports as a Limited Project Status for existing facilities only, but requires that vegetation management must be done with careful design and precautions to minimize adverse effects on the wetlands. The identification of areas that need to be cut in and near wetlands is presented in Vegetation Management Plans (VMPs) which are developed for each airport.

Subsequent to the revisions to the WPA regulations in January 1, 1994, vegetation management projects at many airports have been completed, with two more underway. All phases of tree removal have been monitored, and airports have been monitored by MAC for wetland impacts annually since the

cutting. The experience in permitting and monitoring of these VMPs has provided substantial information on the best approaches, common concerns experienced at the various airports, and successful Best Management Practices ("BMPs"), which are summarized and presented in this Guidance Document for Conservation Commissions.

The purpose of this Guidance Document is to address some of the commonly misunderstood aspects of the VMP programs, provide regulatory guidance under the MA Wetlands Protection Act, and to summarize the results from vegetation management that have occurred over the past decade.

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PREPARATION OF GUIDANCE DOCUMENT

This Guidance Document was jointly prepared and reviewed by MAC, Massport, FAA, DEP, and Baystate Environmental Consultants, Inc. to summarize the VMP development and WPA permitting at MA airports, addressing common issues that emerge in many Notice of Intents.

PURPOSE AND NEED FOR VEGETATION MANAGEMENT

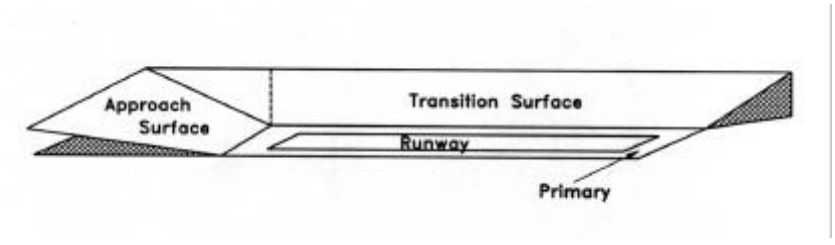
The Massachusetts Aeronautics Commission (MAC) is the oversight and certification agency for 42 of 44 public use airports in Massachusetts. Logan International Airport and Hanscom Field are owned and operated by the Massachusetts Port Authority (Massport). MAC and Massport sponsor vegetation management projects at their airports in order to meet Federal Aviation Administration (FAA) safety standards.

FAA regulations and standards require that airspace Protection Zones (PZs) must be achieved and maintained in order to assure an appropriate level of safety at each airport, and to maintain eligibility for Federal grant funds. PZs are crucial elements of aviation and public safety because when maintained they ensure unobstructed flight paths and views for pilots, air traffic controllers, and ground crew, enabling safe takeoffs, landings, and ground movements. The failure to keep these protection zones clear of penetrating vegetation results in a direct increase of risk to pilots and passengers due to the increase potential for a plane crash during takeoff or landing. The risk is also present for a secondary impact to local residents and the environment that would accompany any potential plane crash. In addition, compliance with FAA regulations, orders, and advisories is necessary for eligibility for federal funding for airport maintenance and improvement projects. If trees grow to a height that violates the safety standards, the airports are often required to artificially and temporarily shorten the runways using "displaced thresholds" by remarking the runway while preparing the removal of the penetrations. However, this reduces the usable runway, also creating a reduced margin of safety for the pilots and public.

Removing the trees maintains the originally approved runway and restores the necessary safety conditions. It does not allow use by larger planes or more frequent use of the airport.

The protected airspace at airports principally includes the "Part 77 Surfaces" (FAA regulations, 14 CFR Part 77, Objects Affecting Navigable Airspace) with some other visually protected areas (e.g., line of sight from the control tower) and certain aircraft navigational aid (NAVAID) critical areas. Determining "penetrations" within the protected airspace is a process called "Obstructions Analysis" which uses detailed survey photogrammetry to determine the height of vegetation surrounding the airport, comparing this information with the protected airspace. This process identifies the areas of vegetation that must be removed.

The Part 77 Surfaces include three surfaces for each runway: a **primary surface**, an **approach surface**, and a **transition surface**. These 3-dimensional surfaces are similar to the field and seats of a football stadium. The **Primary Surface** is essentially the runway surface and immediately adjacent areas (analogous to the football field, sidelines, and end zones). Continuing the stadium analogy, the seats along the side lines and the stadium rows along the length of the field represent the **Transition Surface**. The ends of the stadium, behind the goal posts, represent the **Approach Surface**. The transition surface slopes at a ratio of 7:1, meaning that it extends 7 feet horizontally for every 1 foot increase in elevation. The slope of the approach surface is a function of the instrument approach serving the runway and the type of aircraft using the runway, typically either 20:1, 34:1, or 50:1 (for precision instrument approaches). If a structure or an object, such as vegetation, penetrates any of the Part 77 Surfaces or other surfaces defined and described in the GEIR, it is considered an obstruction. When obstructions exist, an airport must either remove the obstruction or potentially compromise and constrain airport operations.



BACKGROUND AND EVOLUTION OF WETLAND REGULATIONS

Until the early 1990's, vegetation management at airports was an individual action at each airport in Commonwealth. With the strengthening of wetland regulations over the past three decades, vegetative penetrations into the protected airspace around airports were often not removed due to conflicts with the Wetlands Protection Act. As trees surrounding airports grew, runways and airports became increasingly out of compliance with safety regulations or faced with decreasing effective runway length and diminishing airport safety. As a result, many airports were forced to operate with "displaced thresholds" (markings on the runways showing the decreased operational runway length that pilots could safely and legally use).

Prior to 1994 and the changes in the Wetlands Protection Act (WPA) regulations, vegetation removal at airports within wetland areas larger than 5000 SF, required both a variance under the WPA and an Environmental Impact Report (EIR) under the Massachusetts Environmental Policy Act (MEPA). The original WPA process required sequential denial by the local Conservation Commission (frequently more than one Town for single airport), and denial by the Regional Office of DEP, prior to requesting the granting of a variance by the DEP Commissioner. The MEPA process required an Environmental Notification Form followed by a Draft EIR and a Final EIR. Each of these procedural steps, with its own documentation, notification, and time requirements, would need to have been repeated at each airport, resulting in significant delay of necessary safety actions mandated by the FAA and MAC.

Changes in the Wetland Regulations: Recognizing the repetitive and extensive permitting to be done for each of the airports, MAC and MassPort, began a public process with the Department of Environmental Protection (DEP) in 1991 to address the conflicts with the Wetlands Protection Act. It was recognized that vegetation management at airports, similar to VMP work along utility right-of-ways, needed to be done for the public good, and that a streamlined regulatory process needed to be developed to allow these activities without requiring a WPA variance and MEPA EIR for each of the airports. It was mutually determined to seek a regulatory remedy while studying and identifying the general environmental effects of VMP activities on wetland resources at airports.

MEPA Process: MAC, Massport, and DEP collaborated in the preparation of the 1993 Generic EIR (GEIR) to analyze the statewide impacts of airport vegetation management on wetlands and develop modifications to modify the wetland regulations to more readily allow vegetation management at airports for purposes of public safety. After a high level of public and environmental scrutiny, a "Limited Project" status category was developed and incorporated into the WPA regulations.

Summary of Airport VMP MEPA Process

Document	Date
ENF (#8978)	early 1992
ENF Certificate	April 8, 1992
Draft GEIR	early 1993
Draft GEIR Certificate	April 15, 1993
Final GEIR submitted	Aug. 31, 1993
Final GEIR Certificate	Oct. 15, 1993
GEIR Update/ Expanded ENF	Nov. 1999
GEIR/GENF Certificate (#8978/12092)	Jan. 14, 2000
Section 61 Finding	March 2, 2000
Annual Status Reports	March 2001 February 2002 March 2003

The focus of this MEPA process was stated in the Secretary's Certificate on the ENF.

"The overall objective is to stream line the review process so that airport operators can undertake badly needed tree clearing projects without extensive delays so that navigational airspace can be maintained."

After extensive public review and comment, the Final GEIR was accepted and a regulatory blueprint was created to allow VMP activities at airports within wetland resources. As stated in the Secretary's Certificate to the Draft GEIR:

"There is a clear need to develop a rea-

BACKGROUND AND EVOLUTION OF WETLAND REGULATIONS (CONTINUED)

sonable solution that allows airports to clear obstructions that are in wetlands while insuring that the wetlands are protected. If the [VMP] is designed according to the guidelines and recommendations presented in the GEIR and the NOI is properly prepared, the long-term impacts to the wetlands functions and values are not expected to be significant."

This extensive and public regulatory MEPA process recognized and accepted the purpose and need for VMP activity at airports and recommended an approach for the Conservation Commission review of VMP Notices of Intent.

Following the MEPA process, DEP issued an amendment to it's WPA regulations on January 1, 1994 to allow airport vegetation management activities to qualify as "Limited Project" status projects (310 CMR 10.53(3)(n)). This provision placed several limitations and requirements for the Airport VMP Notice of Intent (NOI) applications.

To qualify for the limited project status, VMP project must meet the following conditions (310 CMR 10.53(3)(n)(1-4)):

1. *such projects must be undertaken in order to comply with Federal Aviation Administration (FAA) Regulation Part 77 (14 CFR Part 77), FAA Advisory Circular 150/5300-13 (Navigational Aids and Approach Light Systems), and FAA Order 6480.4 (Air Traffic Control Tower Siting Criteria), all as amended, or to comply with the airport approach regulations set forth in M.G.L. c. 90, §§ 40A through 40I inclusive;*

2. *such projects must be undertaken at airports that are managed by the Massachusetts Port Authority (Massport) or that are subject to certification by the Massachusetts Aeronautics Commission (MAC);*

3. *the requirement outlined in 310 CMR 10.53(3)(n)1. must be certified in writing by the FAA or by the MAC;*

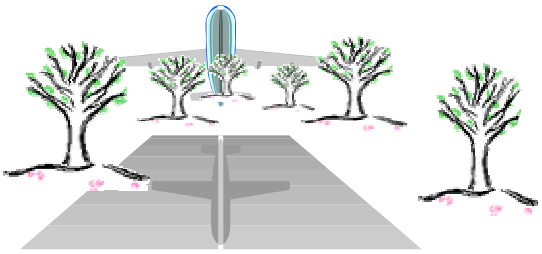
4. *such projects shall not include the construction of new airport facilities or the expansion or relocation of existing airport uses;*

Another outcome of the MEPA process was that the Secretary requested periodic updates to the GEIR filing to report on the effectiveness of the revised WPA regulation and on the progress in implementing vegetation management projects. As a requirement of the Secretary's January 2000 Certificate on the GEIR/GENF, MAC prepares and submits annual status reports detailing VMP work completed during the preceding year. As long as the VMP activities stay within the parameters established under the initial MEPA review process, additional MEPA review is performed under the annual status reports and GEIR/GENF updates. Through the 1999 GEIR Update, MAC and Massport volunteered to work with DEP to develop this guidance document for Conservation Commissions designed to clarify issues that have arisen in these initial vegetation management projects at airports, and help Commissions understand the permitting process for these unique, large scale projects in wetlands.

DEVELOPING THE VMP

Wetland regulation 310 CMR 10.53(n)(5) (f) requires that the Notice of Intent applications have a VMP developed for the airport which identifies all PZ's. Yearly Operational Plans (YOPs) for future maintenance of the VMP treated areas are also required (310 CMR 10.53(n)(5)(a-e)). The vegetation management process at airports has become well defined, and follows a regular, predictable path with regard to the Wetlands Protection Act. The typical steps in the VMP process include:

- ✈ Development of Draft VMP
- ✈ Public Presentation of Draft VMP and Outreach
- ✈ Preparation and Submittal of Notice of Intent and VMP
- ✈ Issuance of Orders of Conditions
- ✈ Finalization of VMP
- ✈ Implementation of VMP
  - Short-term cutting plan
  - Long-term maintenance plan
  - Monitoring plan



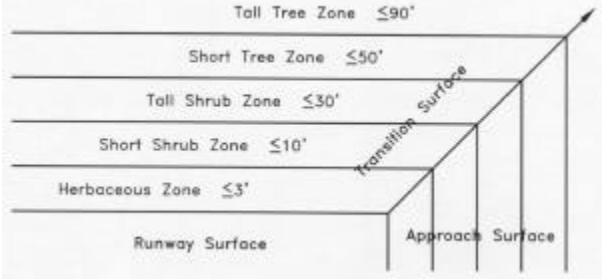
Draft VMP: The first step in developing the Draft VMP is to identify the vegetative obstructions that penetrate into the protected airspace which must be removed. This is done with the "Obstructions Analysis" for the "Part 77 Surfaces" and the identification of other protected areas (e.g., line of sight from the control tower) and certain aircraft navigational aid (NAVAID) critical areas (see description, page 2).

A cutting plan is developed based upon the critical vegetation requiring removal and the wetland resource information. The plan information on wetland resources and impacts (See Table of VMP Contents) is collated into a VMP document, which presents the discussion and conclusions in narrative form and tables, with the technical information placed in appropriate appendices. The document is focused toward the interests of Conservation Commission members, with the analysis and contents reflecting the requirements under the Limited Project Provision of the WPA.

Zonation and Integrated Vegetation Management: A vegetation zonation approach is often used for VMPs combined within an Integrated Vegetation Management Program. Generally, the further away from the runways, the taller vegetation can be permitted to grow without causing safety violations. Some VMPs identify vegetation management zones within which species that would grow to be penetrations are discouraged by active management such as selective cutting and herbicide use. The remaining species which will not grow to the penetration height of protected airspace will become dominant. Such an approach minimizes future maintenance activities, thereby minimizing wetland intrusion and operational costs. Integrated Vegetation Management combines sequential use of mechanical, chemical and biological treatment. The typical approach is to mechanically remove the penetrating trees/shrubs, chemically treat fast growing re-sprouting stumps and/or invasive species, and encourage the natural development of desirable species which suppress the re-establishment of undesirable plants through shading and other biological means.

Once the compatible vegetative structure is established, periodic herbicide treatment programs may be needed every two to five years to maintain the plant height zones and prevent succession to vegetative communities with taller species.

Typical VMP Vegetation Zones

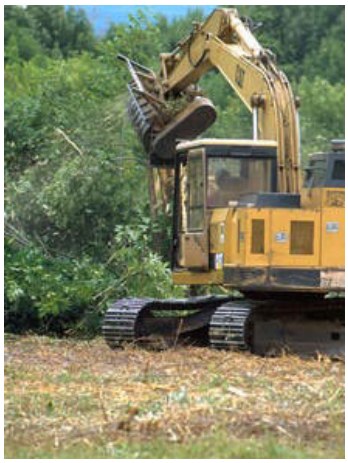


Common Tree and Shrub Removal Techniques

Method	Description
Logging	Individual trees cut with chain saws or other mechanized equipment (e.g., feller buncher). Trees transported and whole logs separated, and the remaining limbs and branches are chipped.
Drop and Lop	Trees cut with chain saws. All limbs, branches and resulting slash is lopped and left in place.
Drop and Mow	Trees cut with chain saws. All limbs, branches and resulting slash is mowed with flail mower. All slash resulting from mowing is less than one foot above the ground.
Cut and Chip	Trees cut with chain saws and transported by a cable or grapple skidder to a chipper in an upland area. The entire tree is chipped.
Mowing	A heavy duty track-mounted flail mowing head or a flail mowing head attached to a rubber-tired vehicle is used to mow and chip trees. This practice is commonly used for trees having a diameter of 6 inches or less. All slash resulting from mowing is less than one foot above the ground.

DEVELOPING THE VMP (CONTINUED)

Typical VMP Contents	
Section	**Description**
Introduction	VMP intent, compliance with WPA and MEPA, aviation safety issues, public process, relationship to other airport projects.
Setting	location, watershed/drainage patterns, floodplains, highways, and surrounding land uses
Goals and Objectives	as approved by MEPA (1993 GEIR and 1999 Updates), including compliance with FAA, MAC, MEPA, and WPA regulatory requirements
Protection Zones and Review of Existing Obstructions	Part 77 Surfaces; Airport Design Standards, NAVAID Critical Areas/surfaces; Air Traffic Control Tower Siting Criteria.
Methods of Vegetation Management	mechanical, chemical, and/or biological controls; rationale; Integrated Vegetation Management; design for minimization of future, large scale, and disruptive vegetation removal projects
Identification of Target Vegetation	defines location of Vegetation Management Areas/Zones (VMAs/VMZs); vegetation species to remain and be promoted in the various zones
Identification of Sensitive Resources	e.g., wetlands, listed species, critical habitats, public water supplies, private wells, cultural resources, residential abutters
Analysis of Alternatives	analysis and selection of removal and maintenance methods based upon ability to meet the program objectives, identifying the most practicable method with the least environmental impact.
Description of Impacts	projected changes in vegetative structure and wildlife characteristics in VMAs/VMZs; invasive species concerns, erosion and sedimentation potential; other.
Mitigating Measures	methods avoiding, minimizing, or compensating for impacts to sensitive resources including residential properties; enhancement of airport-compatible wildlife habitat (e.g., increasing habitat for rare & endangered grassland birds); erosion controls and other BMPs; suppression of invasive species; time of year restrictions (e.g., heavy equipment use when ground is "frozen, dry, or otherwise stable to support the equipment used.").
Yearly Operational Plan (YOP)	five yearly operational plans for implementation of VMPs, followed by periodic updates**.**
Monitoring Plan	VMP implementation pre-construction and post-construction monitoring programs for vegetative changes, wildlife, and/or water qual-
Public Participation Program	description of Public Outreach and Commentary
Appendices	Wildlife Survey Forms, MA Natural Heritage Program correspondence, Herbicide Information, Remedial Plan to Address Spills and Related Accidents, Airspace Obstruction Certification from MAC, Archaeological Reconnaissance Survey



Brontosaurus Flail Mower
(up to 6 inch diameter trees)

Tracked Mower

Tree removal using Feller-Buncher

Mowing with Flail Mower (Brontosaurus)

Invasive species are considered incompatible in all zones, irrespective of height, and, where possible, are removed. This practice is done as mitigation, not to maintain airspace.

Public VMP Process: Prior to the approval of the VMP, the document goes through an open, public planning and review process inclusive of all interested parties including municipal officials, the local news media, abutters, and State and Federal agencies. Local review includes discussion at informal, local meetings. Newsletters may also be used. Abutters typically receive direct written notification and there may be individual meetings with abutters, if requested. Draft and Final VMPs are submitted to the several state environmental regulatory agencies in accordance with the requirements of the Limited Project provision of the state wetland regulations. A notice of availability of the VMP is published in the *Environmental Monitor* for the proposed project. Federal review includes FAA and FDA, the latter in relation to herbicide use. Under certain circumstances, additional Federal agency review could be triggered relative to federally regulated rare species or Section 404 permitting by the Army Corps of Engineers, if any wetland fill (temporary or permanent) were involved as part of the work effort. However, the ACOE has concurred that the typical forestry work, by itself is not jurisdictional.

New Bedford Airport. Shrub wetland regrowth, second growing season.

IDENTIFICATION OF WETLAND IMPACTS

The loss of mature trees as a result of airport vegetation management does alter the wetland environment. The question is, what are the type of changes that occur and what is the potential significance of such alteration? There has been considerable study and public review of the general types of effects on wetlands by VMP activity (GEIR #8978, #6307). The cutting of trees in and near wetlands is not new or unique to airports. While such activity is typically discouraged unless absolutely necessary to the public interest, trees have been cut in wetlands as part of other programs for many years. The MA WPA makes allowances for vegetation management in wetlands under "Limited Project Status" (310 CMR 10.53) for several different types of projects. Vegetation management may also be performed as an environmental benefit. A MassWildlife (DFWELE) program converts forested lands shrub to grassland habitats as an environmental enhancement. This program also provides the use of herbicides to control invasive wetland species at www.state.ma.us/dfwele/dfw. The cutting of trees and vegetation within wetlands has been performed as part of airport management activities prior to the Wetlands Protection Act and more recently over the past eight years under the new regulatory changes of the Wetlands Protection Act granting Limited Project status for such endeavors.

Since 1995, VMP projects have taken place at ten separate airports, as permitted under the Wetlands Protection Act, with follow-up monitoring at each. Monitoring typically focuses upon the vegetative regrowth, especially within wetlands and the evaluation of wildlife habitat and overall health of the wetland. Additional observations are made relative to overall site conditions including erosion, stream scour, and sedimentation. The evaluation of wildlife habitat is primarily based upon examination of the structure of the vegetative

IDENTIFICATION OF WETLAND IMPACTS (CONTINUED)

communities and food species associations, inferring the expected species, with supplemental information provided by generalized observations of wildlife via direct and indirect observation by sign (ie: scat, tracks, dens, nests, auditory identification. Specific target species (e.g., rare species known to be present) may also be looked for during monitoring.

VMPs Permitted and Completed at Airports since 1993 Wetlands Protection Act Regulation Revision

Airport Name	VMP Mgmt. in Wetlands (acres)	Monitored Years	Environmental Issues Reviewed
Beverly	52.5	2001-2003	WR, H, WH, IS
Hanscom	17.4*	Pending	N/A
Marshfield	74.5	2001-2003	WR, H, WH, IS
New Bedford	177.5	2001-2003	WR, H, WH, VP, RS, IS
North Adams	36	2001-2003	WR, H, WH, IS
Norwood	100.7	2001-2003	WR, H, WH
Southbridge	4.7	2001-2003	WR, H, WH
Taunton	35.0	2001-2003	WR, H, WH, RS
Mansfield	13.7	2002-2003	WR, H, WH
Fitchburg	14	2002-2003	WR, H, WH, VP, IS
Orange	17.1	2002-2003	WR, H, WH, RS, IS
Total =	473.2		

*Runway 11/29 only. Remainder subject to subsequent permitting.

WR = Wetland Regrowth/Boundary H = Hydrology
WH = Wildlife Habitat VP = Vernal Pools
RS = Rare Species IS = Invasive Species

Based upon the recent VMP activity, several general conclusions can be made relative to wetland impacts at Massachusetts airports. The conclusions are based on the multiple years of wetland monitoring at each of the airports as summarized in the above table. The interested reader is referred to the detailed annual monitoring reports for each of the airports, which are submitted annually to the MAC, local airports and conservation commissions within the airport communities. While some subtle, not directly observable changes, cannot be ruled out, the following general observations have been made.

- No changes have been observed in wetland jurisdictional boundaries as a consequence of VMP activities.

- No changes in local hydrology (e.g., vernal pools or stream flow) have been observed as evidenced by diminished flooding boundaries in pools or increased stream scour.

- When tested at Beverly and Orange Airport, there has been no detection of herbicide residuals due to localized herbicide application as part of VMP activities.

- There have been no long-term impacts on erosion or sedimentation within wetlands due to the tree cutting activity. Short term erosion during initial cutting has been controlled and restored during operations.

- Periodic maintenance of the vegetative zones under the Yearly Operational Plans (i.e., long-term maintenance plans) has not increased observable impacts to wetland resources.

- No diminishment of rare species or their habitat has been observed as part of permitted VMP activities and some improvements to rare species habitat have been noted (e.g., spotted turtle at Taunton Airport; grassland birds at Beverly, New Bedford, and Orange Airports).

- Some invasive vegetation (e.g., European buckthorn, Japanese knotweed, purple loosestrife) can become more dominant following VMP activities and requires management.

Following the initial physical removal of the tree canopy, the wetland areas are kept in a state of early vegetative

succession via routine maintenance. Therefore, the vegetation tends to be dominated by herbaceous and shrub species with some young tree saplings. Vegetation management does not result in a loss of vegetated areas, but does convert taller plant communities to shorter ones. Shorter growing tree species, shrubs and grassland species can provide equal levels of soil stabilization, water quality protection and improved air quality. In some cases these values may be improved when converting from less dense areas of tall trees to more dense areas of shorter trees and shrubs. While there is a theoretical increase in runoff potential following tree removal due to the loss of rainfall interception by the tree canopy, this appears to be offset by the dense regrowth of the shrub layer once the light is able to reach the former forest floor. Increased stream scour and excessive erosion have not been noted following any of the VMP cutting at any of the airports.

Wildlife habitat type of a forested community is obviously different than that of shrub, immature woodland or grassland communities. Wildlife expected to be present will be those species dependent on, or accepting and/or tolerant of the ecological niches present in such early successional vegetative complexes, characterized by dense herbaceous and shrub-sized woody species. Experience at the various airports, as in similar projects, demonstrates that some of the same mammal, avian, reptiles and amphibians present prior to cutting are able to utilize the habitat after cutting. For example, raptors such as red-tailed hawk that use the trees for nesting or perching prior to cutting, may use the modified area for hunting of exposed prey. Similarly, spotted turtle and eastern box turtle have both been documented at airports in the same general areas, before and after tree removal. This does not mean that the habitat is equivalent. However, the alteration does not necessarily result in the elimination of all wildlife previously utilizing the area.

From some perspectives, the habitat value of younger (early successional) forests and grasslands can also potentially outweigh the value of mature trees due to increases in vegetative and habitat diversity and the relative rarity of that habitat in the nearby and regional environment. Recent research by the Massachusetts Audubon Society indicates that airports provide most of the last refuges for grassland species in the Northeast [www.massaudubon.org/Bird-&-Beyond/Grassland_Birds/large.html]. This important habitat type including some wetlands and buffer zone areas, can be protected, and even enlarged, by airport vegetation management efforts. Therefore, in many cases, important wildlife habitat can be improved by vegetation management at airports under a well designed program.

Invasive Species: The removal of the tree canopy under a VMP can possibly create conditions that favor the expansion of invasive species into the exposed unoccupied niche, especially if such species are already living in the area. The presence of purple loosestrife and European buckthorn has been a concern at several airports.

Second post-cutting growing season at Taunton Airport wetland.

Therefore, the VMP program may need to address these concerns, to prevent dominance in the vegetative regrowth by invasive species. Such dominance limits the establishment of a broader, more desirable vegetative community of diverse native species in the VMP areas. Follow-up work under the YOPs typically includes semi-annual or annual mowing of regrowth areas, hand pulling, or the selective use of herbicides, all of which have proved successful in limiting growth of invasive species. However, hand pulling is typically less effective for larger, more extensive infestations and viable root stock is often left with this technique. Nevertheless, localized hand pulling does have useful applications.

Herbicide Use: Herbicides are often a vital part of the management of vegetation at airports and along utility ROWs. Herbicides can be used to suppress rapid growth of suckers from stumps of cut trees and incompatible species, and give the shorter species an advantage. Over time, the shrubs may grow thick enough to shade out the tall tree seedlings. This dense and varied shrub community requires some maintenance – usually small, periodic herbicide applications –to maintain its stability. Applied directly by hand (via "Cut Stump Treatment" or "Foliar Spray Method" of resprouts), chemical treatment in compliance with statutory regulatory requirements has been shown to entail far less disturbance than follow-up mechanical removal techniques.

Conservation Commissions are frequently concerned about the use of herbicides in or near wetlands. Such use is strictly regulated by the MA Dept. of Food and Agriculture (DFA) and the airport VMPs follow the DFA

IDENTIFICATION OF WETLAND IMPACTS (CONTINUED)

guidelines and each VMP is reviewed by the DFA. All herbicides in MA must be registered and approved for a specific use by the U.S. EPA and the DFA. In addition, herbicide use in or near wetland resource areas requires additional levels of regulatory review. In Massachusetts, the Rights of Way Management Regulations apply (333 CMR 11.00). However, the DFA's VMP Advisory Panel has determined that herbicides, when applied under the guidance of an Integrated Vegetative Management (IVM) program and other conditions, have less impact on wetlands than mechanical only techniques (Environmental Consultants, Inc. 1989). IVM programs typically combine mechanical clearing with herbicide use and natural processes to aid in maintaining the desired vegetation with the goal of minimal future maintenance and disturbance of the environment. Such IVM programs are described within the VMP, if applicable to the project.

The Herbicide Regulations (333 CMR 11.00) dictate special procedures or limitations on the frequency of application allowed within specified distances to "sensitive areas" such as public and private drinking water supplies, standing or flowing water (10 feet), and agricultural or inhabited areas. Additional permitting would be required for use in water, but is not needed at airports to control vegetative penetrations. Other typical guidelines for herbicide application include:

- A qualified, DFA-licensed person must apply the herbicide.
- Vegetation management crews must exercise care to ensure that low-growing desirable species and other non-target organisms are not unreasonably affected by the application of herbicides.
- Herbicides must be handled and applied only in accordance with labeled instructions.
- Herbicides must 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, deep snow preventing adequate coverage of target plants).
- At least 21 days in advance of herbicide application, the DFA, the Town/City, the Board of Health, and Conservation Commission shall be notified of the appropriate date of the application.
- No foliar application of herbicides shall be used to control vegetation greater than 12 feet in height except for side trimming.

Experience with herbicide use at airports has proven that the controlled use of the appropriate herbicide, usually glyphosate (brand name, Roundup or Accord), is a viable method for vegetation management in PZs surrounding airports. Selective use of herbicides is cost effective and can reduce or eliminate the need for future, large-scale maintenance efforts that are more intrusive.

Glyphosate is typically applied directly to stumps or leaves by hand spraying with a backpack sprayer. This practice is used both to limit the amount of herbicide used and the amount of herbicide reaching non-target vegetation. Any glyphosate that reaches the ground will stay in the soil and rapidly biodegrade. Glyphosate works by inhibiting photosynthesis. At two airports, water and wells were tested for glyphosate before and after herbicide use. In all cases, the herbicide was not found to be present.

Rare Species: Rare species are protected under the Massachusetts Endangered Species Act (M.G.L. c.131A) and its implementing regulations (321 CMR 10.00). Both the Massachusetts Natural Heritage and Endangered Species Program (NHESP) and the United States Fish and Wildlife Service (USFWS) are contacted regarding the presence of any endangered or threatened species within or adjacent to the airport. If a project is located in a specified habitat of rare vertebrate or invertebrate species, as identified in the NHESP Atlas of Estimated Habitats of State-Listed Rare Wetlands Species, the project may not have an adverse effect on the habitat. In order to avoid adverse effects, the NHESP should be consulted for additional mitigation measures that may be implemented as part of the VMP. Such measures have included restrictions on time of cutting activity for grassland bird habitat maintenance and for amphibian migration, and limitations on the number of trees cut annually in sensitive areas (e.g. vernal pools).

Mitigation and Best Management Practices (BMPs): In developing the VMP Program requirements, the various existing programs for vegetation management in wetlands were used as a starting base (e.g. forestry practices and utility right of ways). The 1993 GEIR identified several BMP approaches among the alternative removal methods and other BMPs have evolved during the conduct of the work

over the past decade of VMP activity at various airports. These BMPs may include, but are not limited to, time of year restrictions, limiting the use of heavy equipment on steep slopes or in wetlands, stabilizing inactive skid roads, using erosion controls when needed, installing water bars, and not applying herbicides on windy days.

Modern, light pressure forestry equipment that exerts less than 4 pounds per square inch on the soil, less than a human walking through the wetland, is only used where local conditions are suitable and its use is an efficient alternative to other methods. In areas where stable soils are present at some time of the year, the use of flail mowers, feller-bunchers, and other heavy equipment, is yields excellent results for both tree removal and minimization of impacts. Large areas of trees in unstable soils, where there is good reason not to allow the cut material to remain in the wetland, may require sophisticated (and expensive) removal methods such as "high-lead logging" (i.e. the use of overhead cables) or removal by helicopter.

Box Turtle, Marshfield Airport

Other mitigation may include specific habitat enhancements following cutting such as the leaving of some snags in cut areas for wildlife and the planting of vegetation along a stream corridor for shade enhancement. Preservation of land in agricultural use is also identified by MEPA as a beneficial vegetation management technique and compatible use near airports. Forest practices BMPs intended to foster tree replenishment are not used since they would create future penetrations of protected airspace, although the promotion of shorter stature trees may be used at some locations.

FAA Waivers: FAA waivers from the obstruction clearing standards may, on rare, unique occasions, be issued for extreme cause relating to environmental, engineering, and/or economic issues. One such example was at Norwood Airport where FAA granted a waiver to reduce cutting in the transition surfaces because of a combination of its location within an Area of Critical Environmental Concern, the presence of three (3) State listed rare species, and the high cost of full implementation.

FROM NOI TO ORDER OF CONDITIONS

Once the Draft VMP has been reviewed by the public and interested agencies, the Notice of Intent is prepared for submission to the Conservation Commission. If an airport is located in more than one community, the NOI must describe impacts for all municipalities. The technical basis for the NOI is the VMP, which was already provided for a public review and may have an interim revised version. An airport vegetation removal project can only receive approval under the limited project provision (310 CMR 10.53(3)(n)) if MAC or FAA have certified in writing the need for compliance with protected navigable or other airspace, and the project is for existing facilities only. This restriction does not prohibit the airport from regaining full use of the runway and facilities that have been constrained by the vegetative penetrations.

As per sub-paragraph 8 of the limited project provision, there are several other requirements:

"such projects shall be designed, constructed, implemented, operated, and maintained to avoid or, where avoidance is not practicable, to minimize impacts to resource areas, and to meet the following standards to the maximum extent practicable:

a. hydrological changes to resource areas shall be minimized;

b. best management practices shall be used to minimize adverse impacts during construction, including prevention of erosion and siltation of adjacent water bodies and wetlands in accordance with standard U.S.D.A. Soil Conservation Service methods;

c. mitigating measures shall be implemented that contribute to the protection of the interests identified in M.G.L. c. 131, § 40;

d. compensatory storage shall be provided in accordance with the standards of 310 CMR 10.57(4)(a)1 for all flood storage volume that will be lost;

e. no access road or other structure or activity shall restrict flows so as to cause an increase in flood stage or velocity;

f. no change in the existing surface topography or the existing soil and surface water levels shall occur except for temporary access roads;

FROM NOI TO ORDER OF CONDITIONS (CONTINUED)

g. temporary structures and work areas in resource areas, such as access roads, shall be removed within 30 days of completion of the work. Temporary alterations to resource areas shall be substantially restored to preexisting hydrology and topography. At least 75% of the surface of any area of disturbed vegetation shall be reestablished with indigenous wetland plant species within two growing seasons and prior to said vegetative reestablishment and exposed soil in the area of disturbed vegetation shall be temporarily stabilized to prevent erosion in accordance with standard U.S.D.A. Soil Conservation Service methods;

h. work in resource areas shall occur only during those periods when the ground is sufficiently frozen, dry, or otherwise stable to support the equipment being used; and

i. slash, branches, and limbs resulting from cutting and removal operations shall not be placed within 25 feet of the bank of any water body"

The public review of the NOI follows the course of most typical NOIs, although the project areas are frequently quite large and the NOIs tend to be lengthy. Wetland boundaries are reviewed under the NOIs, as well as the wetland's dominant functions and values of wetlands. The tree removal methodologies are reviewed by the Commission, and modifications may result from the review process. Once the Commission members and the airport have discussed the relevant issues and resolved any uncertainties, the public hearing is closed and the Order of Conditions is issued.

While Conservation Commissions should review all projects in wetlands with caution, the justification for these projects (assuming the conditions of 310 CMR 10.53(3)(n) are met) has already been determined through the public MEPA process and the decisions of the Secretary of Environmental Affairs as supported by DEP. Therefore, the focus of Commission review of a VMP NOI should be on the short-term and long-term measures and mechanisms that will be necessary to achieve the desired vegetated cover within the wetlands, such that any other adverse impacts to the interests presented under the WPA are minimized or avoided.

Orders of Conditions: The Orders of Conditions typically issued for VMP projects tend to be of the same type and length normally issued by the Commissions relative to other large complex projects. Selected sample Special Conditions from the Final GEIR and past VMP projects are listed below.

The duration of the Orders can be written for a period of 5 years. Because the VMP/YOP must be developed for a 5-year period and the intended follow-up monitoring will be performed for this period, the Commissions are encouraged to issue their Orders for this same 5-year period so that the period of review coincides with the mandated term of the YOP. Commissions will have the opportunity to review and comment on the future revisions to the YOPs that will indicate the future VMP maintenance activities within the previously cut areas.

Selected Optional Special Conditions for Airport VMP Orders

- There shall occur no change in existing surface topography or the existing soil and surface water levels except for temporary access roads that are specifically defined on the approved plans.
- Wherever possible, the removal of trees shall occur during those periods when the ground is sufficiently frozen, dry, or otherwise stable to support the mechanized equipment used.
- All activities shall be undertaken in such a manner as to prevent erosion and siltation of adjacent water bodies and wetlands as specified by the U.S.D.A. Soil Conservation Service (presently, NRCS), Field Office Technical Guide of Standard Practices (Section IV), as amended.
- The placement of slash, branches, and limbs resulting from the cutting and removal operations shall not occur within twenty-five (25) feet of the bank of a water body and there shall be no stockpiling within other wetlands.
- All disturbed or exposed soil surfaces shall be temporarily stabilized after each work day with hay, straw, mulch, or any other protective covering and/or method approved by the US Department of Agriculture Soil Conservation Service to control erosion.
- Erosion control devices shall not block passage between uplands and vernal pools between the dates of March 1 and June 1, nor between September 1 and October 15. Alternate erosion controls shall

be constructed if needed during these periods.

- Drainage and flow patterns shall not be significantly altered. Water flow in perennial or intermittent streams shall be maintained at all times.
- Vegetation removal equipment and other construction equipment shall be stored in a manner and location that will minimize the compaction of soils and the concentration of runoff.
- Construction materials and used petroleum products resulting from maintenance of construction equipment shall be collected and disposed of offsite. No on-site disposal of these items is allowed.
- All stream crossings shall be conducted in accordance with the Massachusetts Best Management Practices Timber Harvesting Water Quality Handbook and as specified in the NOI.
- All fueling or lubrication of equipment, including chainsaws, within 100 feet of Bordering Vegetated Wetlands, Bank or Land Under Water shall be performed in a manner to contain the entire volume of any potential spillage. The contractor shall have appropriate spill control measures immediately on hand.

- Except as otherwise approved under this Order of Conditions and presented on approved plans, all equipment shall be operated and maintained to prevent alteration of resource area and buffer zones; no equipment is to enter or cross any wetland resource area at any time, unless the activity is clearly indicated on plans and/or within information approved within this Order of Conditions; no equipment shall be parked or stored within 100 feet of any wetland boundary.

AFTER THE ORDERS

Following the issuance of the Order of Conditions, the Draft VMP is modified to produce the Final VMP document, incorporating any changes or modifications that ensued from the NOI process.

Implementation of VMP: The first step in implementing the approved VMP is to develop the bid documents and the contract specifications. These technical documents complement the plans approved by the Commission and detail the environmental protections, methodology, and other procedures that must be followed by the successful bidder on the contract. Typically, the contract is limited to the first year's vegetation management activity, which includes most of the major tree removal. The airport consultant and environmental personnel with appropriate expertise in forestry, wildlife, water quality, and/or erosion/ sedimentation control provide monitoring of the daily activities, to document compliance with the specifications and the Order of Conditions. Follow-up monitoring is performed by environmental personnel, and additional cutting or treatments are performed under separate bid procedures to licensed or qualified contractors.

Beverly Airport

Guiding the overall progression of a VMP beyond the work covered in the first year's contract is a series of Yearly Operational Plans (YOPs), which are developed for a 5-year period. YOPs provide strategies for annual

AFTER THE ORDERS (CONTINUED)

scheduling and budgeting of vegetation management activities. These documents are updated periodically and eventually evolve into the maintenance schedule for the airport VMP, listing the routine management activities that need to be performed annually in order to preserve the vegetative zones as designed into the original VMP.

VMP Changes Over Time: Airport VMPs by regulation must cover a five-year period. The most intensive work during this period is typically during the first two years, when most of the vegetative removal takes place under a single contract. The activities typically covered under the last few years of the YOP are more directed towards routine maintenance and monitoring. The maintenance activities are the responsibility of the airport and monitoring is currently being performed by MAC for the airports.

Any activities beyond the limits of the original approval (e.g. revised PZs), will potentially be subject to a new permit application. A Certificate of Compliance may be issued by the Commission for the work approved under the original VMP and YOP, with future maintenance of the managed condition as a continuing condition under the original order. Conservation Commissions can, as a condition of the Certificate of Compliance, specify the continual submittal and review of the periodically updated YOPs.

ACRONYMS

BVW	Bordering Vegetated Wetland (as per Wetlands Protection Act)
DEM	MA Department of Environmental Management
DEP	MA Department of Environmental Protection
DFWELE	MA Department of Fisheries, Wildlife & Environmental Law Enforcement
DFA	MA Department of Food and Agriculture
EIR	Environmental Impact Report (as per MEPA)
ENF	Environmental Notification Form (as per MEPA)
EOEA	Executive Office of Environmental Affairs (includes MEPA office)
EPA	Environmental Protection Agency (federal)
FAA	Federal Aviation Administration
FDA	Food and Drug Administration
GEIR	Generic Environmental Impact Report (as per MEPA)
MAC	Massachusetts Aeronautics Commission
Massport	Massachusetts Port Authority
MEPA	Massachusetts Environmental Policy Act
MHC	Massachusetts Historic Commission
NHESP	Massachusetts Natural Heritage and Endangered Species Program
NOI	Notice of Intent (as per Wetlands Protection Act)
PZ	Protection Zone (as per FAA and MAC requirements)
ROW	Right of Way
VMA	Vegetation Management Area
VMP	Vegetation Management Plan
WPA	Massachusetts Wetlands Protection Act (310 CMR 10.00)
YOP	Yearly Operational Plan for VMP

LIST OF REFERENCES

- Draft Generic Environmental Impact Report for Tree Clearing in Wetlands at Public Use Airports (EOEA #8978). Massachusetts Aeronautics Commission and Massachusetts Port Authority. March 1, 1993.
- Final Generic Environmental Impact Report for Vegetation Removal in Wetlands at Public Use Airports (EOEA #8978) Massachusetts Aeronautics Commission and Massachusetts Port Authority. August 31, 1993.
- GEIR Update/Expanded GENF Airport Vegetation Management. (EOEA #8978/12092) MAC/Massport/DEP November 1999
- MEPA Status Report, 2000. (EOEA #8978/12092) Statewide Airport Vegetation Management Program. MAC. March 2001.
- Certificate of the Secretary of Environmental Affairs on the Final Generic Environmental Impact Report. (EOEA #8978/12092) September 8 1993.
- Massachusetts Best Management Practices Timber Harvesting Water Quality Handbook. April 1989. Cooperative Extension, University of Massachusetts.
- Study of the Impacts of Vegetation Management Techniques on Wetland for Utility Rights-of-Way in the Commonwealth of Massachusetts. June 1989. Environmental Consultants, Inc.
- Environmental Fate of Herbicides in Wetlands Soils of Massachusetts over the Short Term. Final Report. Nickerson, N.H. et. al., March 17, 1994. Massachusetts Pesticide Analysis Laboratory, Amherst, MA.
- Control of Vegetation on Utility and Railroad Rights-of-Way. Final Generic Environmental Impact Report. Department of Food and Agriculture, Commonwealth of Massachusetts. January 1985.
- Conserving Grassland Birds. Managing Large Grasslands including Conservation Lands, Airports, and Landfills over 75 Acre for Grassland Birds. Andrea Jones and Peter D. Vickery. Massachusetts Audubon Society.
- Forestry Practices (304 CMR 11.00, Forestry Practices Best Management Practices, and Memorandum of Understanding between EOEA and the Department of Environmental Management (DEM) Division of Forest and Parks 4/23/93.
- 2000-2003. Annual Monitoring Reports. Various Airports. Massachusetts Aeronautics Commission.

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