CDM Camp Dresser & McKee

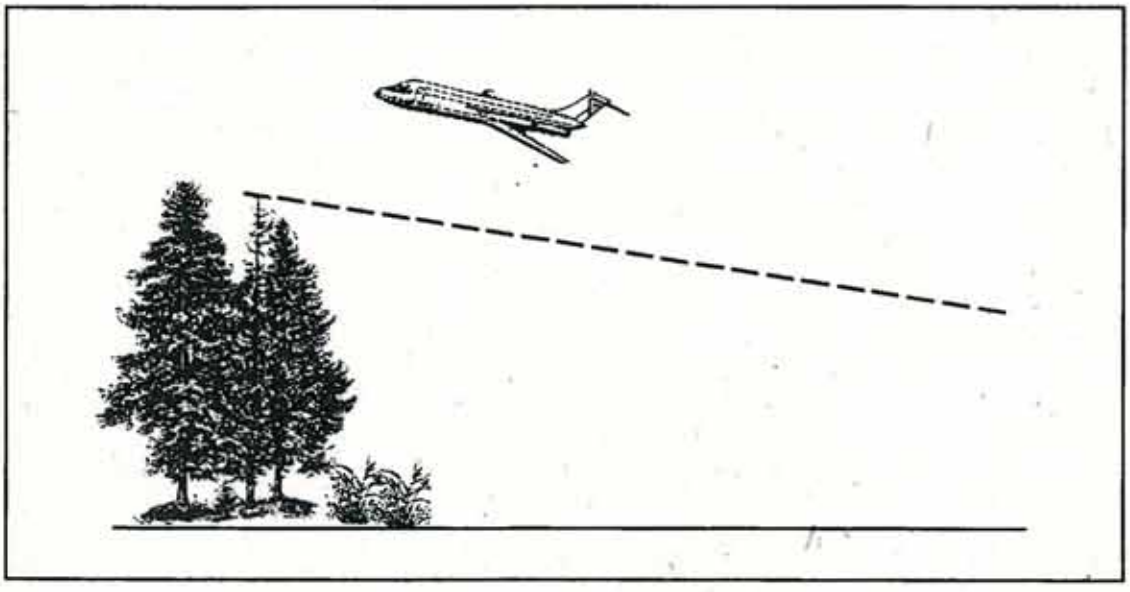
Report

Final Generic Environmental Impact Report (GEIR) for Vegetation Removal in Wetlands at Public Use Airports

EOEA No. 8978

Massachusetts Aeronautics Commission
and Massachusetts Port Authority

August 31, 1993



VOLUME 1

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August 31, 1993

Ms. Trudy Coxe, Secretary
Executive Office of Environmental Affairs
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Attn: MEPA Unit

Re: EOEA No. 8978
GEIR for Vegetation Removal in Wetlands at Public Use Airports

Dear Secretary Coxe:

Attached is a copy of the Final Generic Environmental Impact Report (GEIR) for Vegetation Removal in Wetlands at Public Use Airports (formerly "GEIR for Tree Clearing in Wetlands at Public Use Airports"), Executive Office of Environmental Affairs (EOEA) No. 8978. This letter summarizes the major document revisions to the Draft GEIR and responds specifically to the comments from the April 15, 1993 Secretary's Certificate.

Overview of Document Revisions

All comments received during the public comment period were thoroughly reviewed and considered, and as a result, the GEIR has been revised. Many of the comments dealt with similar issues and concerns, most of which were highlighted in the Secretary's Certificate. The three major document revisions based on these comments are the following:

- The vegetation removal options presented and evaluated in Section 5.2 were ranked according to potential for environmental impact. These rankings are as follows:
  - Tier 1 or minimal impact options, which involve use of hand held equipment in the wetlands;
  - Tier 2 or low impact options which involve use of hand-held equipment, and herbicides approved by the Massachusetts Department of Food and Agriculture for use in sensitive areas;
  - Tier 3 or moderate impact options, which involve limited use of heavy equipment and/or herbicides; and

- Tier 4 or high impact options, which involve significant use of heavy equipment and/or herbicides.

- Section 5.5 was added to provide specific guidelines for selection of vegetation removal alternatives. The guidelines will lead to a decreased emphasis on the use of heavy equipment and herbicides by requiring project proponents to consider using the lowest impact options first, and document why each tier of options is not selected before considering the next tier of options. For sensitive areas (e.g., rare species habitats, Areas of Critical Environmental Concern, water supply protection areas), the proponent is required to consult with an appropriate state agency during the method selection process and to demonstrate that each lower impact tier of options is infeasible before considering the next tier. (In addition, proponents of AVRLPs in sensitive areas are required to submit a copy of the Notice of Intent to the appropriate agency(ies).)

- The herbicide guidelines presented in Sections 5.2 and 7.2.4 were revised to use, as applicable, the Right-of-Way (ROW) Management regulations as guidelines for AVRLPs. Although the ROW regulations and guidelines do not specifically apply to vegetation removal in airport protection zones (PZs), they are recommended for use in these areas.

In addition, some of the comments were carefully considered yet did not result in document revisions for various reasons. For example:

- Several commentors suggested that there should be a threshold for the proposed regulatory revisions, above which the limited project provision would not apply. After careful review, it was determined that it would not be appropriate to establish such a threshold for the airport vegetation removal limited project (AVRLP) provision. If a given AVRLP will result in significant environmental impacts, there are several mechanisms within existing regulations by which addition review and restrictions can be required. The determination of which AVRLPs warrant further review must be established on a case-by-case basis.

- Several commentors noted that some of the maps in Appendix A incorrectly depict various wetland resources. As noted in the comment prefacing Appendix A, the wetland mapping is intended only to illustrate the approximate location and extent of the wetland resources around each airport. This information has not been field verified, and it is anticipated that the actual wetland resources in these areas will differ somewhat from those shown on the maps. Because the information is intended only to allow an assessment of

the magnitude of the need for wetland vegetation removal in the state, and in the interest of relying on consistent data sources for each map, the maps have not been updated.

Other key comments that did or did not result in document revisions are discussed below in the response to the Secretary's Certificate comments.

Copies of all letters received during the public comment period are presented in Section 1 of the GEIR with the Secretary's Certificate. It should be noted that copies of other letters received during the comment period that were not referenced in the Certificate are also included herein. These additional comments, which were reviewed and considered as part of the Final GEIR preparation, include the following:

- April 8, 1993 letter from Brona Simon, Massachusetts Historic Commission
- Miscellaneous letters supporting the project from public use airports across the state

In addition to comments related to document revisions, the Secretary's Certificate directed MAC and Massport to "hold several informational meetings with environmental and airport consistency groups." In preparing the Draft GEIR, MAC and Massport met with the Massachusetts Historical Commission, the Massachusetts Department of Environmental Protection, the Massachusetts Airport Managers Association and the Federal Aviation Administration. The proponents attempted to meet with the Massachusetts Association of Conservation Commissions (MACC), but MACC opted instead to review the document during the public review period. In addition, a full copy of the Draft GEIR was submitted to each conservation commission whose community may be affected by AVRLPs for review and comment, although this extensive distribution was not required. In preparing the Final GEIR, MAC and Massport met with representatives from the Massachusetts Environmental Policy Act (MEPA) Unit of the Executive Office of Environmental Affairs and the Massachusetts Department of Environmental Protection (DEP) Division of Wetlands and Waterways. In addition, MAC and Massport conducted an informational meeting at the DEP office in Woburn on June 22, 1993 to which all commentors who had recommended revisions to the Draft GEIR were invited. At this meeting, MAC and Massport presented their approach to addressing comments in the Final GEIR. As with the Draft GEIR, the Final GEIR will be submitted to all of the affected conservation commissions and the Draft GEIR commentors for review.

Responses to Comments in April 15, 1993 Secretary's Certificate

Comment 1: *"...the FGEIR should begin to rank or distinguish methods in terms of severity of potential impacts. Specifically, although I understand that each site will present its own unique set of physical circumstances, the FEIR should, to the extent possible, identify 'preferred' methods of vegetation removal and mitigation methods. ... It is appropriate that the GEIR highlight removal methods and mitigation that strive to accomplish avoidance and minimization of impacts, in accordance with the No Net Loss of Wetlands Policy."*

Response: As requested, the vegetation removal alternatives presented in Section 5.2 were ranked according to the likelihood and severity of environmental impacts. In addition, Section 5.5 was revised to provide specific guidance for selecting a vegetation removal option(s) for each project. This guidance is consistent with the "no net loss" sequencing process of avoidance, minimization and lastly mitigation of impacts. As part of Section 5.5, Table 5-4 was added to clarify when each option may be more or less appropriate and Figure 5-9 was added to illustrate the selection process related to vegetation removal in sensitive areas. Mitigation measures are not specifically ranked since their selection is related to the impacts that are expected to result rather than to the removal method. Figure 7-1 correlates each potential mitigation measure with potential wetland impacts to assist the project proponent in selection of appropriate mitigation measures.

Comment 2: *"The FGEIR should provide additional information regarding ways to avoid impacts. Although it is clear that FAA regulations have certain requirements, the DGEIR is weak in presenting information regarding whether and under what circumstances the FAA regulations can be waived. The FGEIR should identify whether there are any circumstances or combinations of circumstances where vegetation removal would be reconsidered by the FAA and should identify the process for receiving such a waiver."*

Response: Section 5.3.1 has been revised to provide additional information on the no action alternative including FAA waivers. It should be emphasized, however, that since all public use airports have already received federal and/or state funding for airport improvements, they have a continuing obligation to maintain their runways and navigational airspace in compliance with FAA rules and regulations. (In those cases where the

airport is a municipal airport, this obligation falls to the city or town.) Failure to remove an obstruction from a PZ is not a feasible alternative to vegetation removal; and it will result in FAA imposing one or more operational restrictions on the airport. As noted in the text, FAA is technically able to waive safety standards if they determine that the safety and efficiency of the airport will not be compromised. However, it is highly unlikely that FAA would waive safety regulations to allow an obstruction to remain in a PZ, particularly for a tree that will continue to grow and pose an increasingly significant hazard to air navigation. Because the option is not a feasible alternative to vegetation removal, it does not seem necessary to outline the process for seeking a waiver in the GEIR. In the rare instance where an FAA waiver is appropriate, FAA should be consulted regarding the current process for pursuing the option.

Comment 3: *"Guidelines for Vegetative Management Plans (VMPs) have been presented in the DGEIR. The development of these plans, however, appears to be voluntary on the part of the airport managers. Can the language of the Limited Project provision be revised to require VMPs with the Notice of Intent filing? Should the Management Plans contained in Appendix E of the DGEIR be part of the Model Order of Conditions?"*

Response: As proposed, development of VMPs is voluntary on the part of airport managers. MAC is currently pursuing a course of action that will ultimately result in public use airports preparing and complying with VMPs. However, MAC is not in a position at this time to establish a standard for VMPs. The information contained in the GEIR will be tremendously valuable in this regard. However, the GEIR only addresses state and local wetlands issues. Comprehensive VMPs for airports must incorporate other considerations including, but not limited to, clearing in uplands and coordination with other public agencies such as the Massachusetts Historical Commission and the U.S. Army Corps of Engineers. MAC intends to use the VMP recommendations in the GEIR as interim guidance until more comprehensive airport VMP guidelines can be developed.

Appendix E contains two types of Best Management Practice (BMP) information – excerpts from the U.S. Soil Conservation Service (SCS) Technical Guide Section IV and the Massachusetts BMPs Timber Harvesting Water Quality Handbook. All airport vegetation removal limited

projects (AVRLPs) must be conducted in accordance with the SCS Technical Guide, per the proposed regulatory revision and as listed as Special Condition No. 15 in the model Order of Conditions. In addition, the Model Order of Conditions (Special Condition No. 15) has been revised to require that the work also be conducted in accordance with the Timber Harvesting Water Quality Handbook.

Comment 4: *"The FGEIR should consider whether additional restrictions and/or review beyond the Conservation Commission should be required for a variety of environmentally sensitive areas. Specifically, the FGEIR should consider the need for additional protection in the following areas:*

a) Twenty of the forty-six public use airports identified in the GEIR are in areas that contain either known rare species or habitat for rare species. The Massachusetts Natural Heritage Program should be consulted with respect to issues pertaining to vegetation removal in these areas.

b) Four airport sites are located in Areas of Critical Environmental Concern (ACECs). The ACEC program within the Department of Environmental Management (DEM) should be consulted on this issue.

c) Highly sensitive areas related to public water supplies (groundwater and surface water)."

Response: Section 5.5 of the GEIR has been revised to provide detailed guidelines for selection of vegetation removal options in the sensitive areas listed above. These guidelines require selection of the lowest-impact, most feasible method for vegetation removal. They also require the project proponent to consult with an applicable review agency (Massachusetts Natural Heritage and Endangered Species Program (NHESP), Massachusetts Department of Environmental Management (inland ACECs) or Massachusetts Coastal Zone Management (coastal ACECs), or Massachusetts Department of Environmental Protection Water Supply Division, respectively) when selecting the removal method and related mitigation measures. These guidelines are summarized in Figure 5-9. In addition, Section 9.3.5 has been added to the GEIR requiring submission of the Notice of Intent (NOI) to the applicable review agency for AVRLPs in sensitive areas.

In addition to the above revisions, it should be emphasized that if an AVRLP is determined to have an adverse effect on a rare species habitat according to the procedures in 310 CMR 10.59, it cannot be permitted under the limited project provision. Even if no impact is likely to occur, the project will still be subject to review by NHESP. Thus, AVRLPs in rare species habitats will already be subject to additional restrictions and/or review.

Comment 5: *"The FGEIR should also consider whether there should be a threshold regarding the number of acres of impact that should require review by DEP or other agencies in addition to the Conservation Commission prior to approval. The comments of Mass. Audubon suggest several possibilities, such as a 10-acre threshold."*

Response: MAC and Massport do not believe that it is appropriate to establish a blanket threshold for AVRLPs. First, the degree of impact is a site-specific issue – dependent more on the site conditions, the selected removal method(s), and the mitigation measures than on the project size. Second, none of the limited project provisions in 310 CMR 10.26 and 10.53 are restricted by such a threshold. Rather, these limited project provisions allow the conservation commissions to approve projects that may otherwise not be approvable at the local level if they believe that the project will not significantly impair the functions and values of the protected wetlands. Any AVRLP that is likely to result in significant impacts can be subjected to additional review through the MEPA fail-safe provision or the Massachusetts Wetlands Protection Act appeal process. It should be emphasized, however, that any AVRLP that is designed in accordance with the guidelines and recommendations presented in the GEIR is not expected to result in significant wetland impacts.

Comment 6: *"How should an airport handle the Notice of Intent and disclosure of the full amount of impact area if more than one community is affected?"*

Response: Section 9.3.1 has been revised to clarify the NOI filing process for AVRLPs affecting more than one community. For AVRLPs in several communities, the Final GEIR recommends that a separate NOI should be submitted to each conservation commission for the work within their community. Each NOI should contain a complete description of the overall vegetation removal project, noting the full wetland impact area in all municipalities, and a community-specific description of the proposed work and impacts within the commission's jurisdiction. Each NOI

should be submitted to all of the affected communities, although only the reviewing commission would have any approval authority. This process is consistent with the existing process for any project affecting wetland resources in more than one community.

Comment 7: *"The FGEIR should provide direction to the Commissions regarding potential bases for denial of a proposed project, and should make it clear that local commissions are not automatically required to approve these projects. It should also discuss the appeal process if a project is denied."*

Response: Sections 3.4.2, 10.1 and 10.2 have been revised to acknowledge that commissions are not required to approve an AVRLP and to provide guidelines for situations when project denial may be appropriate. The basis for project denial, and the appeal process are the same for AVRLPs as they are for all limited projects. The appeal process for an AVRLP, which is the same as for all other projects subject to MWPA, is presented in 310 CMR 10.05(7). Briefly, the commission may deny a project if the proposed work will significantly impact the wetland interests protected by the Massachusetts Wetlands Protection Act or if the work will adversely affect the habitat of state-protected rare wetlands wildlife. If the AVRLP is designed according to the guidelines and recommendations in the GEIR (and subsequent DEP policy), such impacts are not likely to occur. Thus, project denial by the conservation commissions should be a rare occurrence. Further, it is the intention of MAC and Massport to work closely with the conservation commissions to resolve any discrepancies prior to submitting the NOI such that a negative Order of Conditions would rarely be issued.

Comment 8: *"Another concern that has been appropriately raised in the comments is the requirement that Conservation Commissions give 48 hours advance notice before they can gain access to the property in the event of a compliance issue. This appears inappropriate and unreasonable, and should be reconsidered."*

Response: The 48 hour advance notice requirement has been deleted from Administrative Condition No. 8 (Sections 2.9.2 and 10.3.3 and the model Order of Conditions) and the condition has been reworded to require reasonable advance notice within the confines of airport safety and environmental protection. While MAC and Massport agree that 48 hours will rarely be necessary in order to arrange a site visit, there may occasionally be extenuating circumstances at an airport that would preclude arranging

such a meeting within a few hours. The intent of the 48 hours advance notice was to recognize that unrestricted access for inspections on airport property may pose significant safety or liability issues for the airport or the conservation commission. MAC and Massport will instruct the airport managers to cooperate with the conservation commissions to arrange site visits as expeditiously as possible.

Comment 9: *"The DGEIR notes that if a project is denied, the appeal can be acted upon by the DEP. The proponent can also request a variance from the Wetlands Protection Act Regulations. No MEPA compliance is required following the approval of the GEIR (unless the Secretary of Environmental Affairs provides otherwise in the review of this generic EIR). The FGEIR should discuss environmental circumstances when the Secretary might want to provide additional environmental safeguards and/or protection (such as in the environmentally sensitive areas noted above)."*

Response: As discussed above, MAC and Massport do not believe that there are any circumstances in which additional environmental review for AVRLPs should categorically be required. As previously discussed, Section 5.5 has been revised to provide an additional level of review for projects in the sensitive areas noted. In the rare instances where addition environmental review is necessary, the vehicle that is recommended for this review is the Fail-Safe provision, which is discussed in 301 CMR 11.03(6).

Comment 10: *"The FGEIR should provide information on the possible application of the Fail-Safe provision of the MEPA Regulations (301 CMR 11.03 (6)), which would allow the Secretary to require MEPA compliance."*

Response: The GEIR does not in any way diminish the Secretary's authority to request additional MEPA compliance under the Fail-Safe provision. The Fail-Safe provision applies to AVRLPs in the same manner as to all other projects subject to MEPA.

Comment 11: *"Although the subject of the use of herbicides is addressed comprehensively in the comments, it merits some discussion here. The use of herbicides, and what is perceived by some of the commentors as overemphasis on their use, should be reconsidered in the FGEIR. The FGEIR might provide more specific guidelines on their use, in particular with respect to rare species, ACECs and water supply protection areas."*

Response: The GEIR has been revised with regard to recommendations related to herbicide use. Specifically, Sections 5.2 and 7.2.4 now coincide, as applicable, with the Right-of-Way (ROW) Management regulations and guidelines, although these regulations do not specifically apply to vegetation removal in airport PZs. In addition, Section 5.5 was revised to discourage the selection of removal alternatives involving herbicides, particularly in sensitive areas.

Comment 12: *"... several of the commentors identified a similar perceived over-emphasis on the use of heavy equipment in the wetland areas. The FGEIR should consider these comments carefully, and should evaluate them within the context of the objective of avoiding or minimizing impacts."*

Response: Section 5.2 and 5.5 of the GEIR have been revised regarding use of heavy equipment for vegetation removal in wetlands. First, as discussed above, all alternatives involving heavy equipment were ranked in the third (moderate impact) or fourth (high impact) tier of options. All AVRLP project proponents must consider the first tier (minimal impact) and second tier (low impact) removal options, which do not involve use of heavy equipment, before considering the options in the third and fourth tiers. In sensitive areas, the project proponent must actually demonstrate that the first and second tier options are infeasible before selecting a removal option involving heavy equipment. (Unless the proponent can demonstrate that use of heavy equipment will not adversely affect the sensitive area.)

Comment 13: *"The DGEIR identified a potential of up to 1,282 acres of forested wetland, 66 acres of shrub/scrub wetland and 762,800 linear feet of bank that might be impacted at some point in time. The obstruction removal program could also lead to the removal of 80,000 mature trees statewide. More consideration needs to be given to the impacts of this and mitigation of those impacts."*

Response: The potential wetland impacts referenced in this comment are were intentionally defined in such a way as to be an overstatement of the total area of wetlands that may be affected as a result of AVRLPs throughout the state. The reasons that this estimate is considered to be an overstatement are discussed in Sections 4.6 and 6.5.2 of the GEIR. The intent of providing these estimates was to identify the location and maximum extent of potential wetland vegetation removal projects

throughout the state. In considering these estimated alterations, it is important to note that:

- Because AVRLPs will be designed in accordance with the guidelines and recommendation in this GEIR (and subsequent DEP policy), the affected wetland resources will not be lost, and for the most part their functions and values will not be significantly impacted.

- Obstructing vegetation must be removed with or without the AVRLP, thus the proposed regulatory revision will not in any way increase the wetland impact as a result of these projects.

- In the case of the Emerson Hospital Heliport, the approximately one acre of wetland vegetation removal initially identified was later quantified as only an approximately 3,000 square foot alteration. Extrapolating this ratio to the proposed AVRLPs would suggest that only approximately 88 acres of forested wetland and 4.5 acres of shrub/scrub wetland would be affected across the state.

The obstructing trees must be removed in order to comply with federal and state regulations and to protect public safety, thus the question becomes how best to conduct the removal and how to minimize and/or mitigate the impacts. To this end, Section 5.0 of the GEIR has been revised to provide detailed guidelines for selecting an environmentally-sound vegetation removal option that is feasible from a technical and an economic standpoint. Section 6.0 then provides a general assessment, based on scientific literature, of the environmental impacts related to vegetation removal in wetlands.

Comment 14: *"The DGEIR raised the idea of a "mitigation bank." Such a plan should be developed to a greater extent in the FGEIR. When might such a "bank" be appropriate? Can and should the airports develop such a bank within the context of the FGEIR? Could MAC oversee such a program, with the assistance of DEP? In addition, what mitigation can be developed for the loss of 80,000 trees? Mass ReLeaf should be consulted, and perhaps a repository should be developed."*

Response: As discussed in Section 7.3.3, wetland mitigation banking is not considered an appropriate mitigation option for AVRLPs, primarily because wetland resources are not expected to be lost as a result of airport vegetation removal projects and because mitigation banking concepts

are not truly compatible with current DEP replication policies. Mitigation banking to replicate for the statewide tree loss, however, may be a mitigation measure for AVRLPs. Section 7.3.3 has been revised to discuss the option of a tree repository (e.g., through Mass ReLeaf) as a potential mitigation measure. However, as noted in the revised text, this mitigation measure is considered to be out of the context of this GEIR, particularly since it relates to the broader context of both wetland and upland vegetation removal. MAC is planning to consider the issue further within the context of overall statewide airport vegetation removal projects. It is the desire of MAC and Massport to maintain flexibility in terms of mitigating for tree loss to enable each airport to address the issue within the local conservation commission to best benefit the local community.

Thank you in advance for your time and consideration in reviewing this document. A copy of the EOTC sign-off sheet and the document distribution list are attached to this letter.

Very truly yours,

Stephen R. Muench

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Mr. James Davitt, Manager
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Mr. Donald G. McPherson, Manager
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Westfield Airport Commission
c/o Airport Manager's Office
Westfield-Barnes Municipal Airport
Westfield, MA 01085

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Allen Blair, President
WMDC
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c/o Airport Manager
Worcester Municipal Airport
Worcester, MA 01602

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Mass. Aeronautics Commission
10 Park Plaza
Boston, MA 02116
Attn: Mr. Steve Muench

Mass. Port Authority
10 Park Plaza
Boston, MA 02116
Attn: Laurie Cullen

Mr. John A. McGuiness
14 Circuit Avenue East
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Copies of Executive Summary Only:

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Westfield, MA 01085

Chairman, Town Council
Town Hall
Metcalf Square
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Chairman, City Council
City Hall, Room 209
Worcester, MA 01608

William F. Weld
Governor

Argeo Paul Cellucci
Lieutenant Governor

James J. Kerasiotes
Secretary and MBTA Chairman

The Commonwealth of Massachusetts
Executive Office of Transportation and Construction
Ten Park Plaza, Boston MA 02116-3969
Office of the Secretary

EOTC# 23-93

( )	ENF	#___ ( ) SUPP. DEIR #___
( )	DEIR	#___ ( ) SUPP. EIR #___
(X)	FGEIR	#8978 ( ) TRAF. STUDY #___
( )	PROJ. CHANGE	#___ ( ) FPI/FEIR #___

SUBMITTING AGENCY: Massachusetts Aeronautics Commission

PROJECT IDENTIFICATION: Vegetation Removal in Wetlands at Public Use Airports - Commonwealth of Massachusetts

---

General Recommendations & Suggested Conditions, if any are attached:

DATE: 8/23/93

James J. Kerasiotes
Secretary

Telephone (617) 973-7000 TDD (617) 973-7306 Telefax (617) 523-6454

The Commonwealth of Massachusetts
Executive Office of Transportation and Construction
Ten Park Plaza, Boston MA 02116-3969
Office of the Secretary

William F. Weld
Governor

Argeo Paul Cellucci
Lieutenant Governor

James J. Kerasiotes
Secretary and MBTA Chairman

MEMORANDUM

TO: James J. Kerasiotes
Secretary

FROM: Mark Primack
Deputy Secretary

RE: **FGEIR: Vegetation Removal in Wetlands at Public Use Airports EOEA# 8978 (EOTC# 23-93)**

DATE: August 17, 1993

Based on my review, I recommend that you approve the above-mentioned FGEIR.

[✓] Approved and signed
[] More information needed
[] Disapprove, no signature

For Environmental Policy Office:
Date of receipt: 8-13-93 Comments Due: 8-26-93

Forwarded to [] MHD [] MBTA [] MAC [] MASSPORT
[] MASSPIKE
[] EOEA

Attachment
MP/lmg

Telephone (617) 973-7000 TDD (617) 973-7306 Telefax (617) 523-6454

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GEIR FOR VEGETATION REMOVAL IN WETLANDS
AT PUBLIC USE AIRPORTS

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* Tables and figures are located at the end of each section.

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* Tables and figures are located at the end of each section.

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* Tables and figures are located at the end of each section.

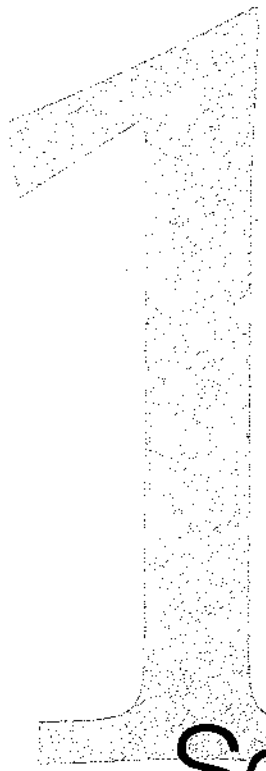
LIST OF APPENDICES
(VOLUME 2)

LIST OF ACRONYMS

AC	-	FAA Advisory Circular
ACEC	-	Area of Critical Environmental Concern
ALS	-	Approach Lighting System
ATCT	-	Airport Traffic Control Tower
AVRLP	-	Airport Vegetation Removal Limited Project
BLSF	-	Bordering Land Subject to Flooding
BMP	-	Best Management Practices
BVW	-	Bordering Vegetated Wetland
CC	-	Canopy Cover
CFR	-	Code of Federal Regulations
CMR	-	Code of Massachusetts Regulations
CW	-	Crown Width
CZM	-	Massachusetts Coastal Zone Management
DEM	-	Massachusetts Department of Environmental Management
DEP	-	Massachusetts Department of Environmental Protection
DFA	-	Massachusetts Department of Food and Agriculture
DMF	-	Massachusetts Division of Marine Fisheries
EIR	-	Environmental Impact Report
ENF	-	Environmental Notification Form
EOEA	-	Executive Office of Environmental Affairs
FAA	-	Federal Aviation Administration
FAC	-	Facultative Wetland Status
FACU	-	Facultative Upland Wetland Status
FACW	-	Facultative Wetland Status
FEMA	-	Federal Emergency Management Agency
FIRM	-	Flood Insurance Rate Maps
GEIR	-	Generic Environmental Impact Report
HEP	-	Habitat Evaluation Procedure
IFR	-	Instrument Flight Rules
ILS	-	Instrument Landing System

LIST OF ACRONYMS
(Continued)

ILSF	-	Isolated Land Subject to Flooding
LDIN	-	Lead-in Lighting System
LUO	-	Land Under the Ocean
LUW	-	Land Under Waterbodies or Waterways
MAC	-	Massachusetts Aeronautics Commission
Massport	-	Massachusetts Port Authority
MEPA	-	Massachusetts Environmental Policy Act
MHC	-	Massachusetts Historical Commission
MLS	-	Microwave Landing System
MWPA	-	Massachusetts Wetland Protection Act
NAVAIDS	-	Navigational Aids
NDB	-	Non-directional Beacons
NHESP	-	Massachusetts Natural Heritage and Endangered Species Program
NOAA	-	National Oceanic and Atmospheric Administration
NOI	-	Notice of Intent
NWI	-	United States Fish and Wildlife Service National Wetland Inventory
OBL	-	Obligate Wetland Status
ODALS	-	Omnidirectional Approach Lighting Systems
PAR	-	Precision Approach Radar
ROW	-	Right-of-Way Management
SCS	-	United States Soil Conservation Service
TERPS	-	Terminal Instrumental Procedures
UPL	-	Upland Wetland Status
USFWS	-	United States Fish and Wildlife Service
VFR	-	Visual Flight Rules
VMA	-	Vegetation Management Area
VMP	-	Vegetation Management Plan
VOR	-	Very High Frequency Omnirange
YOP	-	Yearly Operational Plan



Section One

1.0 TITLE PAGE AND MEPA CERTIFICATES

1.1 TITLE PAGE

PROJECT NAME: GEIR for Vegetation Removal in Wetlands at Public Use Airports (formerly "GEIR for Tree Clearing in Wetlands at Public Use Airports")*

PROJECT LOCATION: Miscellaneous - 46 Public Use Airports in Massachusetts

EOEA FILE NO: 8978

DOCUMENT TYPE: Final Generic Environmental Impact Report

PROJECT PROPONENTS: Massachusetts Aeronautics Commission (MAC) and Massachusetts Port Authority (Massport)

DOCUMENT PREPARERS: Camp Dresser & McKee Inc.

in conjunction with:

- Boelter & Associates
- Forest Solutions
- H_2O Engineering Consulting Associates, Inc.
- Hooper, Cuisbane & Krellman
- Landrum & Brown

DATE OF PREPARATION: August 31, 1993

ACKNOWLEDGEMENTS: In addition to the project proponents and document preparers listed above, we would like to acknowledge the following organizations and individuals for their contributions to this document:

- Federal Aviation Administration (Weedon Parris, John Silva)
- Massachusetts Department of Environmental Protection (Mike Stroman, Christy Foote-Smith)

- Massachusetts Airport Management Association (Barbara Patzner and others)
- Massachusetts Association of Conservation Commissions (Sally Zielinski)
- Massachusetts Historical Commission (Connie Crosby)
- Massachusetts Department of Food & Agriculture (Marcia Starkey)
- Massachusetts Audubon Society (E. Heidi Roddis)

* The project title has been changed in response to public comments and subsequent changes to the proposed regulatory revision. Any references to the previous project title should be assumed to encompass all necessary vegetation removal.

1.2 MEPA CERTIFICATES - see following pages

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Boston, 02202

WILLIAM F. WELD
GOVERNOR
ARGEO PAUL CELLUCCI
LIEUTENANT GOVERNOR
SUSAN F. TIERNEY
SECRETARY

(617) 727-9800

April 8, 1992

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS
ON THE
ENVIRONMENTAL NOTIFICATION FORM

PROJECT NAME	: Generic Environmental Impact Report (GEIR) for Tree Clearing in Wetlands at Public Airports
PROJECT LOCATION	: Statewide
EOEA NUMBER	: 8978
PROJECT PROPONENT	: Massachusetts Aeronautics Commission (MAC) and Massachusetts Port Authority (Massport)
DATE NOTICED IN MONITOR	: March 9, 1992

Pursuant to the Massachusetts Environmental Policy Act (G. L., c. 30, s. 61-62H) and Sections 11.04 and 11.06 of the MEPA regulations (301 CMR 11.00), I hereby determine that the above project requires the preparation of an Environmental Impact Report.

In conjunction with a proposed new regulation amendment to the Wetlands Protection Regulations (310 CMR 10.00) that would allow tree clearing projects in wetlands at public airports to be considered "limited projects," the MAC and Massport have submitted the Environmental Notification Form considered herein. The DEP amendment would apply only to tree clearing projects undertaken in order to comply with FAA Regulation Part 77 (14 CFR 77), FAA Advisory Circular 150/53001-13 (Navigational Aids and Approach Light Systems) and FAA Order 6480.4 (Air Traffic Control Tower Siting Criteria), as amended, at airports managed by Massport and those subject to certification by MAC pursuant to G. L. c. 90, Section 39B. This proposal does not apply to new airport facilities or to the expansion of existing airport uses which alter wetlands. The overall objective is to streamline the review process so that airport operators can undertake badly needed tree clearing projects without extensive delays so that safe navigational airspace can be maintained.

Under the current wetland regulations, these tree clearing operations can only be allowed through the DEP's variance procedure. The proposed amendment would allow local conservation commissions to review, condition and approve the projects under the "limited project" provisions of the regulations. Before the new limited project provision goes into effect, however, the proposed regulation calls for the preparation of a Generic Environmental Impact Report (GEIR). In addition, the proposed procedure would eliminate the need for an ENF submission and an environmental impact report for every project that proposes alteration of 5,000 square feet or more of bordering vegetated wetland.

In addition to evaluating the environmental impacts of tree clearing operations, the GEIR will provide a basis for identifying the type of information to be included in Notices of Intent submitted by the proponent to conservation commissions. It will also identify the types of conditions that should be incorporated into Orders of Conditions issued by conservation commissions.

The ENF submitted by MAC and Massport included a Proposed Scope for the GEIR (in table of contents format - see attached). I adopt this scope as appropriate for undertaking the GEIR. The comments received identify additional areas of concern that should also be considered in the GEIR. In addition, the GEIR should make an attempt to identify those airport facilities where wetland impacts due to tree clearing are likely to occur. It should, in general terms, identify what types of wetland systems are likely to be encountered. Under the long term maintenance section, the GEIR should discuss how access roads are likely to be employed. In addition to the areas listed in the Scope presented in the ENF, the GEIR should consider how both rare species and archaeological resources in the wetland areas should be protected.

When complete, the Draft GEIR should be circulated to those who commented on the ENF, to all DEP regional offices and to DEP Boston. An executive summary should be sent to all communities that are host to the facilities identified in the ENF. Thirty additional copies should be made available on a first come/first served basis.

April 8, 1992
DATE

Susan F. Tierney, Secretary

Comments received :
Massachusetts Audubon Society
City of Boston Environment Department
Wenham Conservation Commission
MACC
FAA
Department of Food and Agriculture
MHC
DEP/CERO

Attachment: Proposed Scope

SFT/JMD/jmd

P:TREEGEIR

PROPOSED SCOPE OF GEIR FOR AIRPORT APPROACH SURFACE VEGETATION MAINTENANCE ACTIVITIES

I. Introduction
   - A. Describe DEP's proposed airport tree clearing regulation (310 CMR 10.24(8) and 10.53(6))
   - B. Purpose of the GEIR (include history of vegetation maintenance below approach surfaces at airports)
   - C. Define vegetation maintenance
   - D. Describe airport operations
     1. Runways
     2. Approach Surfaces
     3. Instrument Landing System (ILS)
     4. FAA Regulations and guidelines for airport maintenance

II. Definition and Identification of Wetland Alterations
   - A. Discuss each wetland function as defined by the Wetlands Protection regulations; and the importance of these functions
   - B. Define Alteration - permanent vs. temporary for each wetland function discussed in Part A
   - C. Methodology for Identifying the Size of the Alteration - develop standardized methodology for identifying the actual size of the resource area(s) where the function will be impaired or destroyed (e.g. Forestry Manual)

III. Evaluation of Vegetation Removal Methods
   - A. Equipment required
   - B. Chemicals required
   - C. Both equipment and chemicals required - combination of A and B
   - D. No equipment or chemicals required
   - E Alternatives to vegetation removal

IV. Impact Assessment - Assess the impacts that the vegetation removal methods in Section III will have on the functions identified in Section I, Part A for the wetlands listed in this section.
   - A. Coastal wetlands
   - B. Inland wetlands

V. Mitigation Measures
   - A. Identification of measures to be taken during construction
   - B. Evaluation of methods and success of "In-Kind" replication of wetlands
   - C. Identification of alternatives to "In-Kind" replication
   - D. Evaluation of the feasibility of "In-Kind" replication and the alternatives

VI. Long-Term Vegetation Maintenance Plans
   - A. Alternatives for long-term maintenance of vegetation
   - B. Recommended outline for table of contents for plans
   - C. Example long-term vegetation maintenance plan - similar to utility ROW maintenance plans

VII. The Regulatory Review Process
   A. Descriptive narrative of the new process to obtain Orders of Conditions for vegetation maintenance projects
   B. Develop procedural flow chart

VIII. Model Notice of Intent - a Guide for Proponents
   A. Identify field work required for each individual project according to performance standards in the regulations
   B. Format and content of NOI - identify all relevant information which should be contained in a comprehensive Notice of Intent for each project
   C. Maps and attachments
   D. Example Notice of Intent - Develop model NOI as a guide to airport representatives planning a proposed vegetation removal project

IX. Model Order of Conditions - a Guide for Conservation Commissions
   A. Recommended conditions to Include
   B. Conditions not recommended due to infeasibility
   C. Example Order of Condition - Develop model Order of Conditions which local conservation commissions may use as a guide when reviewing and conditioning these projects

X. Conclusions and Recommendations
   A. Identify most appropriate resource impact assessment methodology
   B. Identify the most effective and feasible vegetation removal methods with the least amount of impacts
   C. Identify feasible mitigation measures which can be used to minimize resource impacts.

6628.29R
(Revised 2/4/92; 2/6/92; 2/18/92)

April 6, 1992

Secretary Susan Tierney
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

ATTN: MEPA Unit

RE: GEIR for Tree Clearing in Wetlands at Airports. EOEA# 8978

Dear Secretary Tierney:

Staff of the Massachusetts Historical Commission have reviewed the environmental Notification Form for the proposed project referenced above.

Many of the areas proposed for tree clearing at airports are considered to possess a strong likelihood for containing significant archaeological deposits. Numerous archaeological sites are located within or adjacent to airports. Since many of the airports have not been systematically examined by archaeologists, additional archaeological sites are likely to be present. In New England, archaeological sites are usually buried in the soil and thus require systematic test excavations to be identified.

MHC requests that within the scope of the GEIR there be a discussion of the effects of tree cutting on potentially significant archaeological sites and what measures will be taken to prevent damage to these fragile resources.

These comments are intended to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 (36 CFR 800), Massachusetts General Laws, Chapter 9, Sections 26-27C, as amended by Chapter 254 of the Acts of 1988 (950 CMR 71) and MEPA.

The MHC is willing to assist project proponents in developing an appropriate scope for the GEIR. If you have any questions, please feel free to contact Connie Crosby of my staff.

Sincerely,

Brona Simon

Brona Simon
State Archaeologist
Deputy State Historic Preservation Officer
Massachusetts Historical Commission

xc: Laurie Cullen, Massport
FAA
DEP
Kate Atwood, ACE
MAC

MEMORANDUM

TO: MEPA Unit
Attention: Jollene Dubner
THRU: Philip Nadeau, Section Chief
FROM: Marielle Stone, Environmental Analyst
DATE: March 27, 1992
RE: EOEA# 8978
GEIR for Tree Clearing in Wetlands at Airports

After a review of the ENF, it is recommended that the GEIR scope be expanded to include the following:

1. An examination, classification, and inventory of the wetland systems that occur within the existing airport's approach zones should be conducted. Of particular concern, is the determination of the amount of forested wetland areas within these areas. It is assumed that only forest wetland systems will be altered by these projects, is this true?

2. An assessment of the wetland impacts due to the installation of the access roads should be a part of the GEIR. It is recommended that access roads be installed in accordance with the Best Management Practices Timber Harvesting Water Quality Handbook that was recently developed by the Department of Environmental Management.

3. What are the potential impacts to wetland resource areas when tree clearing occurs in the Buffer Zone area? What mitigation measures will be used?

4. Will any of the airport tree clearing in wetland areas occur within a mapped rare species habitat area? Certified vernal pool? Zone II? ACEC? What measures will be taken to protect these sensitive environments?

5. Who makes the actual determination as to the amount of area within the approach zone to be cleared of trees. How is this determination made? Are there minimum and maximum dimensions of runway clear zones?

6. How frequently will this work be necessary?

Massachusetts Audubon Society

South Great Road
Lincoln, Massachusetts 01773
(617) 259-9500

JD

March 23, 1992

Susan Tierney, Secretary
Executive Office of Environmental Affairs
20th Floor
100 Cambridge St.
Boston, MA 02202

Attention: MEPA Unit

Re: EOEA # 8978; GEIR for Tree Clearing in Wetlands at Airports

Dear Secretary Tierney:

On behalf of the Massachusetts Audubon Society, I submit the following comments on the Environmental Notification Form (ENF) for this proposed GEIR.

I attended the scoping session in Boston on March 19th, and was generally pleased with the approach that is being proposed to address the environmental issues associated with tree clearing operations that are mandated by the FAA for safety reasons at airports. Massachusetts Audubon agrees that a GEIR, if prepared in accordance with an appropriate and comprehensive scope and in a timely manner, can provide an efficient mechanism for minimizing the impacts of the management of vegetation in approach safety zones at Massachusetts airports. Rather than trying to reanalyze the issues and reinvent the wheel at each airport, it makes sense to examine this topic on a statewide basis in a GEIR.

The following comments address the scope of study and the proposed GEIR outline presented with the ENF. Suggestions for items that should be included in the study, as well as general comments on the overall approach, are included.

Overall Approach

Define the problem carefully, and then seek the least damaging, effective and feasible alternatives. Part II of the outline offers a framework for general descriptions of wetland functions and defining the extent and type of alterations. This is important information, but it does not provide an adequate basis upon which to proceed to the next step in the outline, i.e. evaluation of vegetation removal methods. The GEIR should also include a general analysis of the types of wetland vegetation

systems likely to be found around airports in Massachusetts, e.g. red maple swamp, floodplain forested, shrub swamp, etc. This section should then provide an average growth rate of vegetation in each category of wetland, with guidelines based on underlying geology (e.g. shallow to bedrock, sandy, loamy, or clayey soils) and hydrology.

This information should be presented in a format that will allow airport managers and conservation commissions to estimate how soon vegetation in a particular area is likely to grow nearly to a height where it would encroach upon FAA safety zones. Such estimates are key to developing management plans that will protect air safety while also minimizing environmental impacts. For example, in wetlands restoration or replication projects, one of the hardest parts of a wetland system to establish is a wooded swamp. If an area is wet enough, trees will not resprout, or will grow very slowly, once they are cut. Seedlings, even of tree species that can survive wetness when mature, often die off from a single flooding event of only a few days to weeks. On the other hand, in drier, more transitional zones near the edges of wetlands, or in higher floodplain areas, cut stumps of hardwoods may resprout and a forest become reestablished within several years. Forests in this region generally grow at a rate of approximately one foot per year, but the rate may be slower under unfavorable conditions (such as excessive wetness) or greater in other instances (e.g. newly resprouted stumps for the first several seasons following cutting, or fast growing species such as poplar). There also should be some objective analysis of how long it will be until these areas again present a problem - if it will be 10 years or more, the risks of impacts from herbicide applications or other secondary treatments may outweigh any management benefits.

Evaluate Options, Minimize Impacts, Avoid Unstated Assumptions

The outline for the GEIR should be modified to reflect an emphasis on the least damaging methods of vegetation management. The presentation of information in the GEIR should be designed to enable airport managers and conservation commissions to evaluate and select methods that are most appropriate for the actual wetland systems present at particular sites. The Notice of Intent for tree clearing operations at a particular airport should be required to include maps and other graphic representations of the vegetation that is proposed for control in relation to the areas required by FAA to be maintained free of obstructions. Based on this information and the guidance provided by the GEIR, a management plan should be presented to the conservation commission which takes into account the type of hydrology, soils, and vegetation present in the areas in question.

Section III, Evaluation of Vegetation Removal Methods, should not start from an assumption of whether use of equipment or chemicals or both is required, but rather should analyze the effectiveness and impacts of various management techniques in relation to the several common wetland resource types identified in the GEIR (as suggested above). Section VI of the proposed GEIR outline contains some elements of this approach, but the larger view of alternatives, mitigation, and long term maintenance plans should not be left until the latter portion of this document, but rather should be an integral feature throughout.

Rare or Endangered Species

The GEIR should include maps showing estimated habitat areas as determined by the Massachusetts Natural Heritage and Endangered Species Program (MNHESP), and a caveat explaining that not all actual habitat has been mapped. The GEIR should provide guidance to airport managers on what types of rare species and their habitat may be present in areas where vegetation management is necessary, and how to determine whether such habitat does indeed exist in the affected areas. The GEIR should also explain the process for consultation with the MNHESP when filing the Notice of Intent.

It would be useful to have some general guidelines based on categories of rare species and mitigation techniques, with the understanding that more specific mitigation plans must be developed in conjunction with the MNHESP on a site-specific basis. For example, it would help airport managers in the drafting of plans if they had some guidance on seasonal scheduling vegetation control activities and other techniques for minimizing impacts to rare reptiles and amphibians (e.g. turtles and salamanders). Separate generic guidance could be provided for other categories of species, e.g. birds. If properly presented in the GEIR, the general mitigation measures proposed would then only require fine tuning upon filing of the NOI. This could help avoid situations where rare species impacts will be of such great concern that the entire management plan needs to be redrafted from scratch, resulting in delays and increased expense. We strongly recommend that the MNHESP be included in review of the GEIR scope and all stages of drafting of this document.

Recommendations for Revised Outline

In summary, we suggest that the overall approach taken in the GEIR should be reordered along the lines of:

I. Introduction

II. Definition of Wetlands and Functions

III. Identification of Common Massachusetts Wetland Types, Growth Rates of Vegetation by Type, Response of Vegetative Communities to Cutting and other Disturbances.
Identification of Rare Species Habitat.

IV. Impacts and Effectiveness of Vegetation Removal and Management Methods (equipment, chemical, other, including combinations of techniques, variations, frequency, and alternatives such as planting shrubs following removal of trees, or water level management). Analyze each method according to each resource area type identified in III, and each wetland functional value (e.g. fisheries, wildlife habitat, prevention of pollution, etc.).
Include Rare Species Habitat considerations.

V. Mitigation -- emphasis should be on preferred hierarchy of Avoidance, Minimization/Mitigation of Impacts, and Replication (latter as last resort only)
Include Rare Species Habitat considerations.

VI. Recommendations for Long-Term Vegetation Management Plans for each Wetland type.
Include Rare Species Habitat considerations.
Emphasis on least damaging, long-term control measures (Note: there may be ways to reduce impact and simultaneously incur less expenses for management over the long term.)

The remainder of the document should then provide additional guidance to proponents and conservation commissions, generally along the lines proposed in the draft outline. The regulatory process and information to be presented should be described, along with recommended conditions. Sample maps and diagrams of the area proposed to be altered based on FAA clearance requirements should be included as guidance for information to be provided in the NOI. If certain conditions are specifically recommended against in the GEIR (IX.B.) for inclusion in Orders of Conditions, there should be clear justification as to what is truly infeasible (not just slightly less costly). The emphasis should be on positive recommendations for avoidance and mitigation of impacts, not on restricting the conservation commission's authority to regulate activities in order to protect resource values.

Conclusion

This GEIR will be a useful document to both airport managers and conservation commissions. Its primary goal should be to provide guidance that facilitates the development of minimal-impact, feasible, long term management plans for vegetative obstructions in wetlands at airports. Every effort should be made to select techniques and to time activities so that there will be no adverse impact to rare or endangered species, and to minimize impacts to other wetland resource values.

Thank you for the opportunity to comment. Please place me on the distribution list for the GEIR.

Sincerely,

E. Heidi Roddis

E. Heidi Roddis
Environmental Policy Specialist

cc: Laurie Cullen, Massport
Michael Stroman, DEP
Christy Foote-Smith, DEP
MACC
CLF

JD

RECEIVED
MAR 10 1992
MEPA

March 10, 1992

Secretary Susan Tierney
Executive Office of Environmental Affairs
100 Cambridge St. 20th Floor
Boston, MA 02202

Attn: Jollene Dubner, MEPA Unit
RE: EOEA #8978, Tree Clearing GEIR

City of Boston
The Environment
Department

Raymond L. Flynn
Mayor

Lorraine M. Downey
Director

Boston City Hall Room 805
Boston, Massachusetts 02201
617-725-4416 or 725-5850

Dear Secretary Tierney:

The City of Boston Environment Department has reviewed the ENF for the proposed project referenced above and hereby submits the following comments in response thereto:

In general, the proposed scope of the GEIR appears adequate. However, this Department is concerned that the process of development of the GEIR should include greater input from organizations specifically concerned with environmental issues, and that DEP should be designated as a lead agency in the preparation of the document.

The ENF states that MAC and Massport will be the lead agencies in preparation of the GEIR. While these agencies have an obvious need to participate in the GEIR process, the GEIR is intended to focus on environmental impacts of airport tree clearings, and will include both model Notices of Intent and model Orders of Conditions. Both DEP and local Conservation Commissions thus need to play an important role in developing the GEIR; however, this point is not acknowledged in the ENF.

In addition, the Natural Heritage Program and private conservation groups should be solicited for input into the process as well, as the new "limited" projects could impact rare species habitat or other conservation interests.

Certification of the GEIR will allow for implementation of one of the recently-proposed changes to 310 CMR 10.00. It will create a process that does not now exist. Therefore, all participants in the new process should contribute to the GEIR formation, and an environmental organization (DEP) should be designated to prepare the document along with MAC and Massport.

I thank you for your time and consideration.

Sincerely,

Lorraine M. Downey

Lorraine M. Downey
Director

LMD/AP:ap

JD

Wenham Conservation Commission
Town Hall
138 Main Street
Wenham, MA 01984
March 23, 1992

Secretary of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

ATTENTION: Jollene Dubner, MEPA Unit

Dear Ms. Dubner:

I am writing to comment on the Environmental Notification Form which the Wenham Conservation Commission recently received from Laurie K. Cullen of Massport for the GEIR for tree-clearing in wetlands at airports.

I have reviewed the draft proposed changes to 310 CMR 10.00, including the proposed sections 10.24 (8) and 10.53 (6), and have sent separate comments to the MEPA Unit and DEP. The language proposed in those two sections specifically refers to "airport tree-clearing projects...which the FAA has confirmed in writing as being undertaken in order to comply with..." various FAA regulations for airport safety. The language in sub-sections (a) through (d) of those two sections goes on to include performance standards which are borrowed from the present sections 10.04 Agriculture (b)7 concerning forestry practices.

Based on the language which I have just described, I expected the ENF upon which I am now commenting to be limited to tree-cutting and forestry activities. Thus, I am concerned to see in the proposed scope of the GEIR which is included with this ENF, a number of references to "vegetation management" and "chemicals" (presumably herbicides). I would request that the DEIR and GEIR include specific information about exactly what standards the FAA requires airports to meet in these projects with respect to height of vegetation, density of vegetation, etc., and under what circumstances it would be necessary to do anything more than cut trees and other tall vegetation. If more than tree-clearing by cutting is going to be required by the FAA, then the proposed language in 310 CMR 10.24 and 10.53 may need to be changed.

The proposed section II of the scope seems to duplicate matters which have already been defined and described in the Wetlands Protection Act, its regulations, resulting court cases, and the decisions of DEP and local Conservation Commissions. Is

the purpose of including this section to inform airport officials and others who might be filing Notices of Intent for these projects about the relevant sections of the Act and Regulations? Or, is it to redefine wetlands functions and their importance, alterations, and wetlands boundaries for purposes of these projects? The latter is of tremendous concern and must not occur. The boundaries and values of a wetland are the same, whether it lies next to an airport runway or not. There is already enough controversy about how to identify wetlands boundaries without creating yet another methodology.

The Act does not distinguish between "permanent" and "temporary" alterations, but section II of the scope does. Why is this distinction being made in the GEIR? Also, the reference to the Forestry Manual in II.C. is not clear. I assume this is a reference to the manual which DEM is writing that will include standards for conducting forestry practices in wetlands resource areas. What will be the relative timing of the review and adoption of the Forestry Manual and the airport GEIR? Will DEM and Massport attempt to establish the same standards for forestry work at airports and at other locations? If not, in what areas will they differ and why? To what extent will all these standards be incorporated directly into 310 CMR 10.00?

In section III, does section D imply discussion of biological controls? Are there any such controls which would be effective in the areas which need to be cleared without moving into adjacent wetlands which do not need to be cleared?

Will sections IV and V place any limits on the amount of a resource area which may be altered and/or the performance standards for construction, replication, etc.? If 10.54 through 10.57, etc. are not applicable, what should be the basis for the applicant's design and the Commission's review and decision concerning the project? If the project can be done in compliance with the standards in 10.54 through 10.57, etc., can the Commission require that the applicant meet such standards? Under what circumstances would the Commission be justified in denying the project?

The references in section V to replication raise questions. If the work only involves cutting trees, the wetland would be converted from a forested swamp to a shrub-swamp, but would remain a wetland. Would replication in this case mean creating another forested swamp elsewhere? Do forestry operations now have to replicate in this way, or to plant new trees where the old ones were cut? Will they have to under the revised regulations? Will the same standards be applied to forestry at non-airport sites? If vegetation management goes beyond tree-cutting, then what?

Section VI refers to long-term vegetation maintenance plans. How many years will these cover? How does the length of time covered in the plan compare to the length of time for which an Order of Conditions is valid? How accurately can the planner predict the vegetation management needs ten or twenty years into the future?

Section VII refers to a "new process" to obtain Orders of Conditions. The proposed amendment to 310 CMR 10.00 does not say anything about a new process for reviewing this type of project. If there is any change at all contemplated, it should only differ from the present process where it absolutely must in order to protect aviation safety, and it should be included in 310 CMR 10.00 and MGL Ch. 131, s. 40.

Sections VIII, IX, and X anticipate the development of various models and recommendations for filings, Orders, and methodologies. At this point in the process, it is not clear to what extent the GEIR will include mandatory standards and methodologies, and to what extent it will include guidelines. There needs to be room for the applicant and the Commission to work together to determine the best design for the particular site, within a general framework applied to all sites.

By coincidence, Beverly Municipal Airport has just contacted this Commission and anticipates filing a Notice of Intent in the near future for a tree-clearing project. Perhaps this case could be of value as a model. If you would like further information, call me at (508) 468-5526.

Very Truly Yours,

Frances M. Fink

Frances M. Fink
Conservation Coordinator

cc: Laurie K. Cullen, Massport
Christy Foote-Smith, DEP

U.S. Department
of Transportation

Federal Aviation
Administration

New England Region

12 New England Executive Park
Burlington, Massachusetts 01803

MAR 27 1992

Secretary,
Executive Office of Environmental Affairs
100 Cambridge Street 20th Floor
Boston, MA 02202

Attention: MEPA Unit

EOEA No. 8978
Statewide GEIR: Tree Clearing
in Wetlands at Airports

This agency endorses the proposal of the Massachusetts Department of Environmental Protection to amend its regulations to include airport tree clearing, as needed for purposes of aviation safety , as "limited projects".

However, we believe it appropriate to take this opportunity under your procedures to alert you of some concerns we have regarding the potential application for Federal assistance to prepare the GEIR. With reference to the proposed scope for the GEIR which was a part of the above referenced ENF:

> Section II(A) - The FAA will be very reluctant to provide funding to document any summary or discussion about the philosophy, or goals and objectives of the state wetlands program. Such information and any discussion concerning each wetland function and their importance should already be available from sources within MEPA/DEP_WW.
> What will be needed is an evaluation of the types of wetlands benefits versus the FAR 77 requirements for airports to attain the safety objectives FAA desires achieved through its airport grant assurances and trust fund expenditures.

Section II(B) - This portion of the scope should consider the type of clearing action and related activities to be performed on the various wetland functions and report on the possible impacts that might occur. Whether an alteration occurs - permanent, temporary or none - would be a finding of the study. Whether or not the existing state regulations define alteration should also be discussed.

Section II(C) - If no state methodology, procedure or regulation exists that defines minimum threshold, or size, from which impact to any resource area should be assumed, a memorandum of understanding will need to be formulated to assure recommendations evolving from the efforts financed from FAA funding is not ignored, or discarded, without satisfactory documentation.

Section V - Availability of funding may not, at this time, be available to support all the activities that are finally designed for this portion of the study. The subject area appears appropriate for consideration were in-kind services would be acceptable if the any of the principal state agencies were interested. Areas were replication has been required or ordered should be a matter of record as a minimum database.

We hope the foregoing will be of assistance in the preparation of the work scope and indirectly, the selection of consultant finalists.

Sincerely,

William M. Cronan, Manager
Planning and Development Branch

Enclosure

cc: Cullen, Massport
Graham, MAC

JO

The Commonwealth of Massachusetts

Department of Food and Agriculture
Lancaster Regional Field Office
142 Old Common Road
Lancaster, Massachusetts 01523

Bureau of Land Use
(508) 792-7711
(508) 365-5068

MEMORANDUM

To: Susan F. Tierney, Secretary
Executive Office of Environmental Affairs

Attn: MEPA Unit Jollene Dubner

From: Marcia Starkey

Re: EOEA #8978 ENF for GEIR: Tree Clearing in Wetlands at Airports Statewide

Date: 23 March 1992

This Environmental Notification Form describes the proposed scope for the GEIR, as well as considerations for Notices of Intent and Orders of Conditions which would guide the process of local wetlands review. All references suggest that the Project Identification Section is correct in referring to these projects at "public airports" except for the map, Figure II-1, which states that the amendment would also apply to 19 privately owned, identified airports.

The inclusion of private lands suggests that there may be instances where forest, i.e. agricultural, crops would be affected. Performance standards for forestry activities in wetlands included in the current limited project section of the Massachusetts Wetlands Protection Act should be clearly separated from the airport tree clearing activities described in this GEIR.

The Bureau requests that the GEIR include 1.clarification of "public airports", 2.discussion of the application of FAA requirements to airport planning for tree clearing projects such as size and type of facility and how and when clear zones are determined (Section I.0.4.), and 3.confirmation that the location of required projects is entirely within airport property boundaries.

c/ Laurie K. Cullen
Massport

Massachusetts Association of Conservation Commissions
10 Juniper Road Belmont Massachusetts 02178 (617) 489-3930

March 29, 1992

Susan F. Tierney, Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202
Attention: MEPA Unit

Regarding: EOEA #8949
Proposed scope for GEIR for airport tree clearing

Dear Secretary Tierney:

The Massachusetts Association of Conservation Commissions (MACC) represents the local Conservation Commissions in the 351 cities and towns of Massachusetts who administer the Wetlands Protection Act (GL Ch.131, sec.40).

MACC has reviewed the ENF for the airport tree clearing GEIR and offers the comments below.

IIB. Definition of alteration.

'Alteration' is clearly defined in the Wetlands Protection Act Regulations (310 CMR 10). It is inappropriate to create an additional definition.

IIC. Identification of the 'size' of the area to be managed.

The boundaries of 'bordering vegetated wetland' and other resource areas are defined in the Regulations. The methodology utilized to locate the boundary must employ the standard delineation techniques required for other projects.

III. Vegetation.

We strongly recommend that the GEIR explore vegetation management alternatives, particularly fostering a low growing woody and herbaceous community through selective removal of tall tree species. Such a community requires less maintenance over time and retains much of the plant diversity and many of the important wildlife habitat values of a natural community. This approach has been effectively employed by Massachusetts electrical utilities to manage vegetation under power lines.

Rare Species

It is imperative that the GEIR fully assess the impacts of various alternatives on rare species. In most cases rare species have become rare because their habitat is disappearing and their specific habitat needs are unknown. Allowing complete habitat destruction through the proposed limited project is not tolerable. No project should be allowed to destroy specified habitat sites of rare vertebrate or invertebrate species. In addition herbicides should not be utilized within 100 feet of rare species habitat.

Temporary Access Roads

The proposed Regulations would permit 'temporary' access roads through wetlands. It is important that the GEIR assess the impact of roads left in place for varying periods of time on each of the values of the Act both during and after the time the road is in place. Results are likely to indicate that when shrub growth and understory vegetation are not removed to construct a temporary access road this vegetation will usually recover if the road is removed within a short period of time.

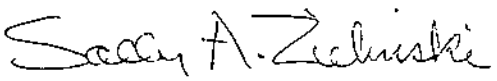
Erosion and Siltation Control

Control of erosion and sedimentation is important to the protection of wetlands and water bodies near areas of disturbance. Alternative methods and their impacts should be analyzed.

Placement of Slash

Since the draft Regulations propose allowing slash within 25 feet of a wetland resource areas the impact of such a practice on each of the interests of the Act is needed.

Thank you for the opportunity to comment. Please call if you have questions.



Sally A. Zielinski, Ph.D.
Executive Director

cc: Daniel S. Greenbaum
Commissioner, Department of Environmental Protection
Christy Foote-Smith
Director, DEP Division of Wetlands and Waterways

airgeir

The Commonwealth of Massachusetts
Executive Office of Environmental Affairs
100 Cambridge Street, Boston, 02202

WILLIAM F. WELD
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April 15, 1993

CERTIFICATE OF THE SECRETARY OF ENVIRONMENTAL AFFAIRS ON THE DRAFT GENERIC ENVIRONMENTAL IMPACT REPORT

PROJECT NAME	:Tree Clearing in Wetlands at Public Use Airports
PROJECT LOCATION	:Statewide
EOEA NUMBER	:8978
PROJECT PROPONENT	:MAC and Massport
DATE NOTICED IN MONITOR	:March 9, 1993

The Secretary of Environmental Affairs herein issues a statement that the Draft Generic Environmental Impact Report submitted on the above project adequately and properly complies with the Massachusetts Environmental Policy Act (G. L., c. 30, s. 61-62H) and with its implementing regulations (301 CMR 11.00).

Background and Introduction

In late 1991, the Massachusetts Aeronautics Commission (MAC) and the Massachusetts Port Authority (Massport) identified tree growth in Protection Zones (PZs) at public use airports as a critical issue. It was estimated that most of the state's 46 public use airports required vegetation removal to come into compliance with Federal Aviation Administration (FAA) guidelines and regulations. It was also determined that at most, if not all, of these airports, some work in wetlands will be required.

MAC and Massport, working with DEP, have taken a step toward resolving this problem by proposing a new "Limited Project" provision as a part of the Wetlands Protection Act Regulations. Specifically, the new limited provision would apply to tree clearing projects at public airports undertaken in order to comply with FAA regulations, orders and circulars. This provision would not apply to new airport facilities or to the expansion of existing airport uses which propose alteration of wetlands. The revisions to the wetlands regulations state that in order for this new limited project provision to become effective, the GEIR under review herein must be approved by the

Secretary of Environmental Affairs and adopted by DEP as policy.

Under current wetland regulations, the tree clearing projects that involve greater than 5,000 s.f. in wetlands can only be allowed through DEP's variance procedure, following MEPA review. The proposed regulatory change would allow local conservation commissions to review and approve the projects under the "Limited Project" provision of the regulations. In addition, the proposed amendment would eliminate the need to file an Environmental Notification Form (ENF) for every project that proposes alteration of over 5,000 s.f. or more of bordering vegetated wetland (BVW). Finally, unless the Secretary of Environmental Affairs provides otherwise in the review of this generic EIR, once the airport tree clearing policy has completed review under the MEPA regulations, individual applications for the subject permits (specifically Department of Environmental Protection (DEP) Wetlands permits) shall not require the filing of an ENF. 301 CMR 11.14.

I fully recognize the concerns related to safety at public airports. There is a clear need to develop a reasonable solution that allows airports to clear obstructions that are in wetlands while ensuring that the wetlands are protected. Therefore, I fully endorse the objectives of the regulatory provisions. These objectives are:

o To promote public safety by allowing removal of obstructions from PZs in wetlands in a timely and less costly manner.

o To ensure that environmental impacts from vegetation removal in wetlands are minimized through careful selection of appropriate removal and mitigation methods.

Review of the DGEIR by commenters has led to several suggestions that DEP further refine the proposed new limited project provision to enhance protection of wetlands. Based on my review of the DGEIR and the comments received, these suggestions should be considered in the FGEIR. There are several areas, most of which are outlined below, that merit this further consideration. In summary, these areas include incorporating requirements for integrating Vegetative Management Plans and Best Management Practices into local conservation commission project approvals and consideration on the types and extent of impacts allowable under the Limited Project provision. I shall reserve judgment regarding the implementation of these regulatory revisions until the review of these outstanding questions in the FGEIR.

Review of the Draft GEIR

I commend MAC and Massport on the DGEIR. Much hard work and thought has gone into the process to date. The staff of the DEP has also worked hard to develop a reasonable regulatory approach.

Not surprisingly, however, although the DGEIR is a comprehensive and thoughtful document, it has raised a number of issues that merit further analysis and consideration in the Final GEIR. Generally speaking, these issues fall into two broad categories - policy/regulatory development and technical evaluation. This Certificate will concentrate on policy/regulatory development. With respect to technical issues, the comments received on the Draft GEIR did a very good job of highlighting these issues. I will reference several of them in the more detailed review below, but call MAC and Massport's attention to the comments directly. I will expect any technical revisions that result from consideration of the comments to be reflected in the Final GEIR.

I would like to take this opportunity to thank the commentors for the unusually comprehensive and detailed comments submitted on the GEIR. I recognize the time and effort that went into preparing these comments, and I am thankful for the excellent participation in the review of this document and proposed regulatory change.

Prior to submitting the Final GEIR for review and during its preparation, I require that MAC and Massport hold several informational meetings with environmental and airport constituency groups. Such meetings can serve as useful fora to provide early input on the major outstanding issues, and may help to resolve them. My office should be notified of the dates and times of these meetings. I would also be happy to announce these meetings in the Environmental Monitor.

Policy and Regulatory Issues To Be Evaluated in the Final GEIR

o I found the DGEIR's presentation of potential areas of impact, methods for vegetation removal and mitigation to be good, objective and nonjudgmental, albeit generic in nature. As stated in the DGEIR, and noted above, the DEP will be looking to the GEIR as policy guidance. Therefore, the FGEIR should begin to rank or distinguish methods in terms of severity of potential impacts. Specifically, although I understand that each site will

present its own unique set of physical circumstances, the FEIR should, to the extent possible, identify "preferred" methods of vegetation removal and mitigation methods.

One of the primary objectives of MEPA is to identify, through EIR review, alternatives that avoid or minimize environmental impacts of proposed project. Although this GEIR takes a generalized look at vegetation removal and mitigation, recommendations of the GEIR will eventually translate into real projects. The FGEIR should strive to identify alternatives that fulfill the objective of MEPA to avoid or minimize impacts.

The Commonwealth has adopted a No Net Loss of Wetlands policy. That policy has two goals:

1) In the short-term, there shall be no net loss of wetlands in Massachusetts.

2) In the long term, there shall be an increase in the quantity and quality of the Commonwealth's wetlands resource base.

Implementation of this policy follows the following hierarchy: first, avoid wetland losses and impacts; second, minimize wetland losses and impacts; and third, mitigate wetland losses and impacts.

It is appropriate that the GEIR highlight removal methods and mitigation that strive to accomplish avoidance and minimization of impacts, in accordance with the No Net Loss of Wetlands Policy.

o The FGEIR should provide additional information regarding ways to avoid impacts. Although it is clear that FAA regulations have certain requirements, the DGEIR is weak in presenting information regarding whether and under what circumstances the FAA regulations can be waived. The FGEIR should identify whether there are any circumstances or combinations of circumstances where vegetation removal would be reconsidered by the FAA and should identify the process for receiving such a waiver.

o Guidelines for Vegetative Management Plans (VMPs) have been presented in the DGEIR. The development of these plans, however, appears to be voluntary on the part of the airport managers. Can the language of the Limited Project provision be revised to require VMPs with the Notice of Intent filing? Should the Management Plans contained in Appendix E of the DGEIR be part of the Model Order of Conditions?

o The FGEIR should consider whether additional restrictions and/or review beyond the Conservation Commission should be required for a variety of environmentally sensitive areas. Specifically, the FGEIR should consider the need for additional protection in the following areas:

a) Twenty of the forty-six public use airports identified in the GEIR are in areas that contain either known rare species or habitat for rare species. The Massachusetts Natural Heritage Program should be consulted with respect to issues pertaining to vegetation removal in these areas.

b) Four airport sites are located in Areas of Critical Environmental Concern (ACECs). The ACEC program within the Department of Environmental Management (DEM) should be consulted on this issue.

c) Highly sensitive areas related to public water supplies (groundwater and surface water).

The FGEIR should also consider whether there should be a threshold regarding the number of acres of impact that should require review by DEP or other agencies in addition to the Conservation Commission prior to approval. The comments of MA Audubon suggest several possibilities, such as a 10 acre threshold.

o The DGEIR raises a number of issues directly related to Conservation Commission procedures and review. These issues are reflected in the comments. They include the following:

a) How should an airport handle the Notice of Intent and disclosure of the full amount of impact area if more than one community is affected?

b) The FGEIR should provide direction to the Commissions regarding potential bases for denial of a proposed project, and should make it clear that local commissions are not automatically required to approve these projects. It should also discuss the appeal process if a project is denied.

c) Another concern that has been appropriately raised in the comments is the requirement that Conservation Commissions give 48 hours advance notice before they can gain access to the property in the event of a compliance issue. This appears inappropriate and unreasonable, and should be reconsidered.

d) The DGEIR notes that if a project is denied, the appeal can be acted upon by the DEP. The proponent can also request a variance from the Wetlands Protection Act Regulations. No MEPA compliance is required following the approval of the GEIR (unless the Secretary of Environmental Affairs provides otherwise in the review of this generic EIR). The FGEIR should discuss environmental circumstances when the Secretary might want to provide additional environmental safeguards and/or protection (such as in the environmentally sensitive areas noted above).

e) The FGEIR should provide information on the possible application of the Fail-Safe provision of the MEPA Regulations (301 CMR 11.03(6)), which would allow the Secretary to require MEPA compliance.

o Although the subject of the use of herbicides is addressed comprehensively in the comments, it merits some discussion here. The use of herbicides, and what is perceived by some of the commentors as over-emphasis on their use, should be reconsidered in the FGEIR. The FGEIR might provide more specific guidelines on their use, in particular with respect to rare species, ACECs and water supply protection areas. In addition, several of the commentors identified a similar perceived over-emphasis on the use of heavy equipment in the wetland areas. The FGEIR should consider these comments carefully, and should evaluate them within the context of the objective of avoiding or minimizing impacts.

o The DGEIR identified a potential of up to 1,282 acres of forested wetland, 66 acres of shrub/scrub wetland and 762,800 linear feet of bank that might be impacted at some point in time. The obstruction removal program could also lead to the removal of 80,000 mature trees statewide. More consideration needs to be given to the impacts of this and mitigation of those impacts.

The DGEIR raised the idea of a "mitigation bank." Such a plan should be developed to a greater extent in the FGEIR. When might such a "bank" be appropriate? Can and should the airports develop such a bank within the context of the FGEIR? Could MAC oversee such a program, with the assistance of DEP? In addition, what mitigation can be developed for the loss of 80,000 trees? Mass ReLeaf should be consulted, and perhaps a repository should be developed.

April 15, 1993
DATE

Trudy Coxe, Secretary

Comments received :
DEP
Bedford Conservation Commission
Boston Environment Department
Concord Natural Resources Commission
Wenham Conservation Commission
Dept. of Food and Agriculture
Massachusetts Audubon Society
US DOT - FAA
Berkshire Aviation Enterprises
Orange Municipal Airport
Beverly Airport Commission
A. Kawczak
J. McGuiness

TC/JD/jd

P:TREEGEIR

MEPA

JP

CONSERVATION COMMISSION

TOWN HALL
BEDFORD, MASS. 0173

April 7, 1993

Secretary Trudy Coxe
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

ATTN: MEPA Unit

RE: GEIR for Tree Clearing in Wetlands at Public Use Airports. EOEA# 8978

Dear Secretary Coxe:

The focus of the GEIR has been to establish detailed procedures for project design and operation, in the interest of consistent application of the proposed limited project provision for tree clearing at airports. The draft document has not succeeded in defining the framework within which site-specific impacts are to be reviewed. The Town of Bedford has numerous concerns with the GEIR in that extensive, permanent destruction of and alterations to forested wetland resource areas are proposed, with insufficient alternatives analysis and justification or mitigation for impacts. Therefore, specific responses are requested relative to the following issues.

1. **No Net Loss of Wetlands.** The justification given for proposed alterations is the argument that no net loss of wetlands will occur, as scrub-shrub wetlands are expected to develop after tree removal. There is inadequate detailed and scientific basis for supporting the claim that this type of wetland system can be expected to develop and persist with reasonable species diversity, and will provide the same functions as the lost wetland type. In order to achieve true mitigation, "replacement" ecosystems should maintain themselves over time as natural systems, without long-term herbicide treatment. In order to protect the interests of the Wetlands Protection Act, similar functions of the replacement wetland systems should be qualitatively documented on a site-specific basis. The GEIR should include scientifically credible support in terms of similar projects in the form of function analysis, site studies, long-term monitoring, and research references to accompany predictions regarding wetland losses and regeneration.

The **1991 DEP Wetlands White Paper** sets three standards for the "no net loss of wetlands" goal: avoidance, minimization and mitigation. The GEIR should specifically demonstrate compliance with these three parameters.

2. **Scope.** The proposed limited project category is for tree clearing in wetlands. Although the GEIR narrative clearly includes the cutting of shrubs, no impact analysis or mitigation strategies are included to address this type of resource area change. In addition, what impacts will be generated from alterations within the buffer zones to resource areas, and how will these results be mitigated?

3. **Alternatives Analysis.** The GEIR should define alternatives in conjunction with the extent to which they will be objectively considered. Evaluating criteria should be defined, keeping open the question of whether work in wetlands is unavoidable. Why should GEIR approval for wetlands alterations be given without demonstrated need? The report fails to demonstrate the site specific need for tree clearing at each airport. Existing and proposed traffic should be analyzed with regard to runway length requirements. **Table 5** of the **Executive Summary** indicates options for avoiding impacts to resource areas. However, without adequate justification, it appears that these options have been ruled out in favor of dramatic alterations to wetlands.

4. Impact Assessment. The GEIR identifies estimated maximum potential impact, and indicates that specific wetland alterations "should be quantified" **(Executive Summary, p. 13)**. However, the GEIR fails to propose definite criteria by which vegetation is to be identified for removal. Specifically, what height will vegetation have to be such that clearing will be proposed? **Page 8 of the Summary** is not clear. It states that "trees in forested wetlands rarely exceed 70 feet in height. However, in order to allow leeway to account for trees of unusual height, it has been conservatively assumed that trees may extend up to 100 feet above the runway and elevation." Does this mean that no trees less than 100 feet in height are to be removed? Use of the word "conservative" is misleading. A conservative approach would be to assume no wetlands alterations are needed unless proven otherwise.

The **Wetland Impact Evaluation Checklist (Section 6)** provides guidelines for identifying short and long-term, direct and indirect alterations to wetland resource areas. The list, however, is merely a checklist, with minimal criteria for evaluation, with emphasis on quantitative impact assessment. **Step 6** incorporates mitigation measures into the evaluation; this selection list should be part of **Section 7.** It is unfortunate that long-term alterations are defined as "impacts that result in the conversion of a wetland area to a non-wetland area". The removal of vegetation may result in adverse impacts to the wetland functions for which the resource area is presumed significant. The GEIR should clearly define the terms used, and acknowledge the necessity for wetland function assessment.

The **Summary of Potential Environmental Impacts Related to Vegetation Removal (Section 6, Table 6-7)** does not bear a realistic relationship to the **Potential Direct and Indirect Impacts Related to Vegetation Removal Activities in Wetlands (Section 6, Table 6-3).** The list of potential direct and indirect impacts has serious implications for the preservation of wetland functions. What is the documentation for the conclusions reached in the summary? The direct and indirect impacts should be related specifically to mitigation expected within a two year period from the replacement, restored, or replicated wetland. This comparison would have to include an assessment of wetland functions; conclusions should be scientifically supportable.

Are impact assessments and mitigation measures designed to justify effect rather than objectively assess? Are all impacts equally acceptable under the proposed limited project status? The qualitative description of existing resource areas is not matched by post-removal prediction of canopy coverage and species diversity. The cost of adequate design of scrub-shrub wetlands is not factored into the economic rationale for limited project status. If in fact this type of wetland conversion can be controlled, it is not documented how this is to occur, except by inference that nature abhors a vacuum, and that some restoration plantings will be provided. It is assumed that the shrub layer will "re-bound". In fact, the tree layer will rebound by resprouting, with periodic herbicide treatment required for control. After tree and tall shrub clearing, with slash remaining in place and stumps resprouting, it is questionable how successful shrub colonizing will be.

Provisions for protecting areas from invasion by opportunistic shrub species such as glossy buckthorn are inadequate. Shrub plantings at 1,000 feet will not foster revegetation within two years; not all wetland shrubs will display rapid vegetative regeneration. The plans should be designed not just to destroy the resprouting vegetation, but to ensure revegetation with desirable species of good diversity.

The 20 foot elevation zone includes many acres of forested wetland and buffer zone adjacent to the Shawsheen River, which the GEIR indicates will be completely cleared and revegetated with shrub type vegetation. This level of alteration will undoubtedly have dramatic impacts on water quality, yet the summary **Table 8 (Executive Summary)** indicates minimal short term and no long term impacts. The GEIR fails to evaluate impacts or distinguish between significant and insignificant impacts.

Mitigation measures appear to relate primarily to short term impacts, particularly erosion and sedimentation control. The sample narratives relate mitigation to interests of the Wetlands Protection Act. These interests are subject to long-term adverse impacts, and mitigation should address these; for example, if flood storage capacity reduction is predicted, will this be quantified in terms of downstream impacts? How long will this reduction persist, and what mitigation is offered in terms of temporary or permanent compensatory storage?

5. Rare (State-Listed) Species Habitat. The implications for rare species habitat are not fully addressed. A regulatory provision of all limited projects is that "no such project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.59". The GEIR assumes impact to these habitats when, in **Section 2.6.2,** off-site wetland enhancement is suggested as compensation for such impact. Since rare species habitat is specific, not generic, it is that specific habitat which must be protected for the survival of the species; such habitat cannot be easily replicated or the species made indigenous to a replicated habitat. The GEIR should clearly state that the existing limitation of 310 CMR 10.59 will apply to this as well as other limited project categories.

6. Residential and Protected Areas. The GEIR maps for Hanscom Field show study areas extending into residential areas and Town-owned conservation land. The GEIR should not contain implicit or implied assumptions concerning the extension of impacts off the project property.

While the GEIR might not be expected to solve noise impacts, it should set guidelines on how to approach this issue, to include monitoring of existing background noise at the nearest property line, modelling to predict increases in sound pressure levels at this point, and a list of detailed mitigation measures to be evaluated.

Clearing of forested wetland within the 20 foot zone in the South Road area would eliminate the only physical buffer between the runway and numerous residences which appear to be approximately 100 yards from the zone. What will the increase in sound pressure levels be at the property line due to the clearing? How will the increases be mitigated? What will the aesthetic impacts be?

7. Maintenance Plans.

With respect to the dependence on herbicides for maintenance, the proposed use within wetlands cannot meet the requirements of the Rights of Way Management Regulations **[333 CMR 11.00].** Given this fact, what standards will apply for the use of herbicides in this project type? In addition to prohibiting the use of herbicides in wetlands, these regulations require Vegetation Management Plans and Yearly Operational Plans for work in sensitive areas. What is the justification in the GEIR for advocating a use which cannot meet other existing regulations, and moreover stating that VMP's and YOP's should be optional?

Guidelines for projected vegetation growth patterns are not related to site specifics such as soils and geology, as suggested by the Massachusetts Audubon Society. Without this prediction, the proponent would not be able to justify long-term management plans, particularly with regard to herbicides.

8. Methods.

Why is filling or impoundment discussed as a methodology, when the definition as limited project excludes such changes? If temporary access roads are the reason for this inclusion, their construction design should in any case be accompanied by restoration provisions. Permanent access roads would not appear to qualify as part of this limited project category.

9. Orders of Conditions.

Inherent to the limited project provision **[310 CMR 10.53(3)]** is the right of the individual issuing authority to "impose such conditions as will contribute to the interests identified in the Act". The design of a model Order of Conditions included within the GEIR should not preclude individual Conservation Commissions from setting site specific conditions.

It is not clear what is meant by the statement that "the Order of Conditions should be prepared in accordance with the recommendations and guidance in this document" **[Section 11-4]**. Even if the document were to be used as a reference, language should be removed which, by design or implication, would hinder the ability of a conservation commission to condition the project appropriately.

Some of the suggested conditions are already proposed as provisions of the limited project status. Others relating to flood storage should be addressed in the Notice of Intent.

SUMMARY

In summary, the Town's concerns with the GEIR include:

1) **Unacceptable permanent destruction of forested wetlands;**

2) **Unacceptable planned long-term use of herbicides to control vegetation;**

3) **Insuffient analysis of proposed alterations' impact on surface water and groundwater quality, flood storage, vegetation, wildlife and rare species habitat;**

4) **Insufficient detail for proposed alterations.**

5) **The inclusion of Table 6-7: Summary of Potential Environmental Impacts Related to Vegetation Removal within the GEIR is unjustified, as site specific analysis has not been done. It is recommended that this table be deleted from the document.**

CONSERVATION COMMISSION

TOWN HALL
BEDFORD, MASS. 0173

Since project impacts are extensive both in area and in species destruction, **a threshold should be set for limited project qualification**, those projects exceeding this threshold requiring a variance. This would allow commissions to more reasonably review and monitor a project, while encouraging the proponent to explore alternatives to larger wetland alterations. Alternatives should be compared in terms of resource area impact rather than in terms of cost impact. Socio-economic variables should not be sited in the same matrix as wetland functions/impacts.

Existing wetland functions must be assessed and **functional losses** mitigated on a **site specific basis**. This assessment should be in the form of technical documentation, including modelling of existing and proposed parameters for air and water quality.

If the proposed limited project status is granted, conservation commission review of tree-clearing projects in wetlands must proceed within the parameters of the Wetlands Protection Act and the regulations. The Draft GEIR should be scrutinized for language which pre-empts the language promulgated by the state. The purpose of the GEIR should not be to rewrite other aspects of the wetlands regulations in order to render airport vegetation clearing acceptable in all cases.

Alternatives analyses should proceed throughout the planning process.

A vegetation management plan and yearly operational plan are so integral to the long-term impact and restoration assessment that they should be conditions of the limited project. They should not be limited to a "voluntary extension of the mitigation plan".

The GEIR should not presume exemption from regulations protective of rare (state-listed) species and their habitats. No aspect of the GEIR should be in conflict with other state regulations.

Thank you for the opportunity of offering these comments.

Sincerely,

Elizabeth J. Bagdonas

Conservation Administrator, Town of Bedford

FOR THE COMMISSION

cc: Town Administrator, Bedford
Department of Environmental Protection
Concord Natural Resources Commission
Lincoln Conservation Commission
Lexington Conservation Commission
Massachusetts Aeronautics Commission
and Massachusetts Port Authority
Camp, Dresser & McKee

City of Boston
The Environment Department

Raymond L. Flynn
Mayor

Lorraine M. Downey
Director

Boston City Hall/Room 805
Boston, Massachusetts 02201
617/635-4416 or 635-3850

April 8, 1993

Secretary Trudy Coxe
Executive Office of Environmental Affairs
100 Cambridge St. 20th Floor
Boston, MA 02202

Attn: Jollene Dubner, MEPA Unit
RE: EOEA #8978, Airport Tree Clearing Draft GEIR

Dear Secretary Coxe:

The City of Boston Environment Department has reviewed the Draft Generic Environmental Impact Report (DGEIR) referenced above and hereby submits the following comments in response:

While ostensibly undertaken in an admirable effort to streamline the regulatory process, the DGEIR could in fact lay the groundwork for the continued erosion of the Wetlands Protection Act. The DGEIR claims that large-scale vegetation removal (conceivably upwards of 80,000 mature trees over hundreds of acres of forested wetlands at some airports) should qualify as a "limited project" appropriate for review by local Conservation Commissions following wetlands guidelines developed by and quite amenable to the interests of Massport and the Massachusetts Aeronautics Commission.

In addition, the DGEIR claims that removal of large amounts of the vegetative cover over large geographic areas, often requiring development of significant access road infrastructure, will produce ecological impacts which are temporary and/or negligible. Furthermore, some tree clearing "limited projects" will take place in rare species habitat and/or Areas of Critical Environmental Concern, which are presumed to be especially worthy of heightened protection, not the domain of potential clearcutting under the guise of a "limited project." The DGEIR raises a number of questions, both scientific and policy, which must be addressed before the proposed regulatory changes to 310 CMR 10.00 are made effective. The current process of obtaining a variance should be continued for projects in rare species habitat. In addition, the FGEIR should present more information on the procedures and feasibility of an FAA waiver in situations where tree clearing would demonstrably impact rare species habitat.

The DGEIR glosses over the potential change in functional value of a forested wetland when, essentially, the forest is removed. Since the area cleared of tall trees is still a wetland, it is reasoned, the removal of the trees requires no mitigation outside of standard construction-period mitigation measures. However, converting a red maple swamp into a scrub-shrub wetland or (in a worst case and unacceptable scenario) a colony of Phragmites will produce significant changes in the ecology of the area, potentially harming the wetland's value as wildlife habitat. Removing large vegetation could also greatly influence rates of erosion, flood storage capacity, hydrologic balance, ability of the wetland to hold and biodegrade pollutants, and harm other interests identified in the Wetlands Protection Act (WPA).

The model Order of Conditions presented in the DGEIR would also seriously hamper the ability of Conservation Commissions to enforce the provisions of the WPA. The requirement for 48 hours advance notice to exercise the Commission's right of entry to enforce its orders is unreasonably long. Twelve hours is more than sufficient to allow airport operators to safely accommodate the legitimate presence of Conservation Commissioners or their agents.

The obvious lack of input by environmental interests in the DGEIR represents a major shortcoming in the document. The DGEIR was funded and written with aviation interests in mind, and this bias is reflected in the "model" guidelines given to applicants and Commissions, which basically recommend that Conservation Commissions allow any and all tree clearing deemed necessary under FAR Part 77 to be conducted with minimal mitigation. The FGEIR should rewrite Sections 9 and 10 and Appendix G to more reasonably reflect the interests of wetlands preservation. This revision should be undertaken in cooperation with representatives of environmental groups as active partners. The FGEIR should also establish a least damaging "preferred alternative" for tree removal projects, and create a rebuttal presumption that this least damaging method be employed in tree clearing projects.

Commissions also must be given greater latitude in ordering effective mitigation. Revegetation with the species just removed would obviously defeat the purpose of the "limited project" in the first place. Therefore, revegetation with shorter species should be given primary consideration as a method of maintaining functional needs of existing wetlands without conflicting with operational needs of airports. Off-site mitigation should also be given more consideration. The DGEIR does not really propose generic mitigation other than presenting various concepts of wetlands mitigation currently in use.

One appropriate form of indirect mitigation for tree clearing projects would be the negotiation of conservation restrictions on and/or purchase and protection of threatened forested wetlands off-site as a matter of policy, rather than after case-by-case review, which tends to set up adversarial relationships between aviation and conservation interests and promote running battles between the two. The FGEIR should include input from forest and wetlands ecologists from private conservation groups, DEP, and local Commissions in order to develop systematic conservation, replication and revegetation policies applicable to all or most tree clearing projects. This would serve to promote a much more harmonious relationship which would ultimately benefit both airport operators and the environment.

The Wetlands Protection Act recently suffered a major setback with the adoption of a definition of "agriculture" which allows many alterations to resource areas to be exempted from review by Conservation Commissions. The new "limited project" provision for airport tree clearing, while superficially neutral with respect to the WPA, actually creates a dangerous precedent for allowing the alteration of vast acreage of forested wetlands without significant mitigation beyond the construction period. The "limited project" will thus further erode the cause of wetlands protection, unless the FGEIR develops guidelines which allow for meaningful mitigation of permanent impacts. Environmentalists will need much greater input into the writing of the FGEIR to develop effective mitigation and prevent serious environmental impacts.

In summary, the Environment Department recognizes the safety issues involved with tree clearing projects, and recognizes that the permitting process can and should be streamlined. However, the "streamlining" presented in the DGEIR is more aptly described as "bulldozing," and is in need of major revision in the FGEIR, in the manner described above.

I thank you for your time and attention.

Sincerely,

Lorraine M. Downey
Director

LMD/AP:ap

The Commonwealth of Massachusetts
Department of Food and Agriculture
Lancaster Regional Field Office
142 Old Common Road
Lancaster, Massachusetts 01523

Bureau of Land Use
(508) 792-7711
(508) 365-5069

RECEIVED
APR 5 1993
MEPA

MEMORANDUM

To: Trudy Coxe, Secretary
Executive office of Environmental Affairs

Attn: MEPA Unit Jollene Dubner

From: Marcia Starkey MS

Re: EOEA # 8978 Draft GEIR Tree Clearing in Wetlands at Public Use Airports, Statewide

Date: 2 April 1993

The Draft Environmental Impact Report for this review in conjunction with a proposed new regulatory amendment to the Massachusetts Wetlands Protection Act has adequately clarified the Department's comment in regard to affected airports, and the determination of protection zones (PZs). It is also understood that project review will be site specific, and on existing airport property adjacent to runways, unless otherwise stated.

In attempting to serve as both a guidance document for airport managers, and DEP policy guidance for local conservation commissions, the GEIR seems unclear as to which Vegetation Management Plan options are least impacting or "best management practices", regardless of cost considerations.

In addition to Section 6 of the GEIR, two documents which may provide more specific data to local reviews are the Department of Environmental Management's GEIR on Forestland Management Practices and the "Massachusetts Best Management Practices Timber Harvesting Water Quality Guide" referred to in this text.

Local review should remain a valid process which seeks to protect wetlands resources while allowing the continuance of airport benefits to the community. Many commissions are already experienced in limited project application to forested wetlands. As with other limited projects, this proposed change would allow, but not require, issuance of a permit within specific guidelines.

The Department requests that the Evaluation Checklist and pertinent associated materials be amended to include an assessment of potential impacts to adjacent agricultural lands, including possible changes in microclimate and hydrologic regime within a watershed or wetland system. This addition would aid in anticipating any changes in frost and wind conditions due to loss of a tree buffer, transpiration values, and temperature modification.

c/ Laurie Cullen, Massachusetts Port Authority
Stephen R. Muench, Massachusetts Aeronautics Commission

JD

Concord Municipal Light Plant
135 KEYES ROAD • CONCORD • MASSACHUSETTS • 01742
508-369-2500 • FAX 508-371-1445
Daniel J. Sack, Superintendent

RECEIVED
APR 9 1993
MEPA

FACSIMILE TRANSMITTAL

Date: April 8, 1993

Transmitting To (name): Jollene Dubner

Transmitting To (phone): 1 (617) 727-2754

Fax Operator: Dan Monahan

Number Of Pages Transmitted (including this page): 4

Project Name: EOEA NO. 8978

Message: See enclosed statement to Trudy Coxe re: Airport Wetland Tree Clearing DEIR.

If you do not receive all pages of this transmission, please call (508) ~~369-2500~~ 371-6265. Thank you.

TOWN OF CONCORD
NATURAL RESOURCES COMMISSION
133 KEYES ROAD, CONCORD, MASSACHUSETTS 01742 (508) 371-6265

DANIEL H. MONAHAN
NATURAL RESOURCES COORDINATOR
TREE WARDEN

April 8, 1993

RECEIVED
APR 9 1993
MEPA

Trudy Coxe, Secretary
Executive Office of Environmental Affairs
Saltonstall Building
100 Cambridge Street
Boston, MA 02202

re: EOEA No. 8978
Airport Wetland Tree Clearing DGEIR

Dear Secretary Coxe,

The effort to designate airport tree clearing as a limited project pursuant to the Wetlands Protection Act is commendable. Our community has faced considerable confusion and difficulty attempting to administer wetlands regulations over the past 25 years at Hanscom Field and more recently involving the construction of a heliport at Emerson Hospital. In general, the DGEIR issued March 1, 1993 seems adequate to provide a basis for the issuance of regulatory revisions to 310 CMR 10.24(7) and 10.53(3) (n). However, there are some general comments that should be noted along with a few lesser matters:

1. MANAGEMENT/STEWARDSHIP OF AIRPORT BUFFER ZONE AREAS

Open lands around public airports represent a major holding and land stewardship responsibility of the Commonwealth. Because of their large size and character, they may contain unusual wildlife habitats and afford a variety of other environmental values. It seems inappropriate to expect that a governmental agency charged with providing safe and efficient public transportation be responsible for the stewardship of such a significant area of open space land. Arrangements should be made for an EOEA agency to manage such airport open space lands, including the maintenance of vegetation in compliance with height restrictions.

2. PLANNING REQUIREMENTS

All airports with significant open space land should have a comprehensive management plan approved by appropriate state, regional and local conservation agencies. Such a plan would provide an adequate inventory of natural resources, discription of management/maintenance objectives, and schedule of programs to assure proper stewardship of these areas. The plan should be a prerequisite to any major tree clearing program.

The proposed guidelines for the filing of a Notice of Intent calls for reference to the "Estimated Habitats of Rare Wildlife Species". This seems grossly inadequate since the documentation relies heavily on findings by naturalists among the general public who are discouraged from airport lands posted "no trespassing". It would therefore seem oppropriate that the Natural Heritage Program or knowledgeable consultants do the necessary field work to ascertain the existance of unique flora and fauna. This information would be a critical aspect of a management plan.

3. VEGETATION REMOVAL TECHNIQUES

Vegetation in wetlands should not be cut by land clearing contractors, but by logging and landscape companies who have experience under professional supervision working in sensitive environmental areas.

Use of hand held chain saws and brush cutters in wetlands are preferable to vehicular equipment. The DGEIR does not adequately address the use of rubber-tired skidders which are more commonly used than bulldozers. Skidders in general should remain out of wetlands as they may cause considerable damage to wetlands at any season of the year.

Chipping of tree branches and tops is generally desirable as a means of reducing fire hazard and enabling subsequent maintenance in the area.

The techniques of removal, season of operation, and method of slash disposal must be carefully regulated to suit the wildlife habitat and other natural resources conditions and concerns.

Proper selective use of herbicides to control vegetation should not be prohibited but carefully regulated.

4. CONCLUSION

The maintenance of vegetation in wetlands resources areas at airports as required to meet state and federal safety requirements should be designated as a limited project to enable timely review and approval. The DGEIR adequately addresses the major issues to justify promulgation of appropriate regulations pursuant to the Wetlands Protection Act.

Sincerely,

Daniel H. Monahan
Natural Resources Coordinator

DHM/ml

cc: Concord Natural Resources Commission

JD

Wenham Conservation Commission
138 Main Street
Wenham, MA 01984
April 8, 1993

MEPA Unit
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA

Subject: Draft GEIR for Tree Clearing in Wetlands at Public Airports,
EOEA File 8978

Dear Sir or Madame:

I am writing on behalf of the Wenham Conservation Commission to comment on the Draft GEIR referenced above. The Commission understands the general need to reclassify airport tree-clearing projects as limited projects in order to eliminate the costly and time-consuming variance process and to give local Commissions more direct control over local airport activities in wetlands. MAC, Massport, and their consultants have amassed an impressive amount of information in this GEIR and have analyzed it in a clear and logical fashion. There are, nonetheless, still a few areas in which I believe local Commissions will need more clarification and guidance in reviewing these projects. I will describe these areas below and request that MEPA require their incorporation into the Final GEIR.

1. In what circumstances are wetlands values greater than aviation values? What happens if there is a rare/endangered species habitat, an ORW, or an ACEC at stake? Under what circumstances should the Commission/DEP deny a project or some part of a project? Are there some projects which should require variances, i. e. should there be a maximum threshold for limited project status? Some of the airports in Table 2-7 have hundreds of acres of potential wetlands impacts. Also, airports which straddle town boundaries should disclose the total amount of wetlands alterations required to all Commissions involved, not just the impacts within one town's borders.

2. NOI's should contain clear evidence that no-cut alternatives have been considered and give reasons why they have been rejected. There may be cases in which the airport could implement a no-cut alternative at a reasonable cost. The airport should document exactly what it stands to lose if the cutting is not done. Under the present regulations, variances are

not granted unless alternatives are analysed and presented. This expectation should not be lost in the process of adopting the proposed regulatory amendment. The Section 5 of the GEIR is too quick to dismiss all consideration of no-cut alternatives.

3. Clearly, where the goal is to convert forested wetlands to shrub or emergent wetlands permanently, loss of wildlife habitat will be one of the biggest permanent impacts of these projects. Thus, a thorough analysis of existing wildlife habitat at the site should be required in the NOI. Its omission from normal BVW-altering projects may be due to the fact that they involve areas less than 5000 square feet and require replacement areas similar to the altered areas. The study should address ways to maintain biodiversity, should identify wildlife corridors and migratory routes which need special care, and should identify vernal pools whether certified or not. If there is an area outside the PZ where trees could be planted to replicate the forested wetland, this option should be considered.

4. Are there any airports in Massachusetts which are not covered under this GEIR? How should their runway clearing projects be treated under the Wetlands Protection Act and Regulations?

5. The analysis of relative costs of various approaches to runway clearing projects is not as clear as it might be. Figure 5-7 does not define what "low", "moderate", and "high" mean in dollars or orders of magnitude. It does not include long-term maintenance costs. Did it factor in site-specific variations such as accessibility to vehicles and machinery? To what extent should Commissions even consider costs in reviewing alternatives under a Notice of Intent? Are the forest products harvested of any economic value?

6. The information in Appendix C concerning herbicides is too general. Are the herbicides listed there the only ones which should even be considered for work in wetlands? What are their specific benefits and risks when applied in wetlands in Massachusetts to the species which will need to be treated? Table 5-1 tells which herbicides work on which species, but not benefits and risks.

In Section 5 on page 5-14, the GEIR states that herbicides tend to be non-specific, mobile in soils, toxic, persistent and that they bioaccumulate, but then goes on to say that "most of the herbicides currently used for vegetation management do not exhibit these characteristics and can be safely used in a wetland area...". Nonetheless the Model NOI rejects the use of herbicides in Areas 3 and 4 and restricts it in areas 5 and 6 because of proximity to waterways.

The "Summary of Alternatives" on page 5-27 of the GEIR recommends that "airports use (the ROW regulations) as guidelines for their use of herbicides for vegetation management". However, review of these regulations (Appendix C) shows that they would not allow many of the kinds of applications proposed at airports. 11.03(8) restricts touch-up applications to within 12 months of initial applications and to no more than 10% of the initial target plants. 11.04(3) prohibits herbicide use within 10 feet of any standing or flowing surface water and restricts use up to 100 feet away. Perhaps most damaging of all is 11.04(4)(a), which prohibits herbicide use <u>"on or within ten feet of a wetland"</u> and restricts

use within the rest of the buffer zone. The Model NOI does not follow these restrictions.

How can local Commissioners who have little expertise in herbicide use make well-informed and scientifically supportable decisions about herbicide use from the GEIR? Why should herbicides be allowed at all, when hedge clippers and chain saws can prevent stump sprouts from getting too tall. Is it significantly less labor-intensive to apply herbicides to individual stumps than to cut sprouts on the same stumps? Are there any feasible biological (IPM) methods of control?

7. DEP's proposed regulatory amendments quoted on pages 3-10 to 3-12 of the GEIR raise the following questions:

Why does each subsection 2 speak only of the removal of "trees" and not removal of shrubs, filling for temporary access roads, or other relevant activities?

Why does each subsection 4 select the distance of 25 feet? And how much slash can be left more than 25 feet from bank, but still in BVW, before it has negative impacts?

Why does the initial paragraph single out rare species habitat, but not ACEC's, ORW's, or other highly sensitive areas?

(Incidentally, there is a typo at the bottom of page 3-11.)

8. In Section 7, off-site wetland enhancement, mitigation wetland banking, and development restrictions should not be considered as mitigation options. Mitigation should be provided on-site. Also, compensatory flood storage should not be necessary if the project meets the "boiler plate" requirement that there be no change in topography, although it may be needed where temporary access roads are built in floodplains.

9. The "Wetland Impact Evaluation Checklist" in Section 6 of the GEIR needs a few additions. Airports may plan to clear trees and shrubs from upland areas in PZ's in conjunction with their wetlands clearing. It would be helpful for the Commission to know where these areas are, how large they are, and in what ways the work might impact wetlands. Step 1 of the Wetland Impact Evaluation Checklist would appear to require this information, although the sample NOI does not provide it. It would also be helpful for the site plan to show existing topography overlaid with 10-foot air-space PZ contours, in order to understand how tall a tree can be at a given location before it penetrates the PZ. On the other hand, it does not seem necessary to include the entire airport on the site plan, using a scale too small to convey meaningful information, when only a few small areas are involved in the project.

Step 2 should include not only all resource areas within PZ's that require vegetation removal, but also the extension of resource area boundaries for a reasonable distance beyond the areas to be cut, proposed access routes for vehicles and other equipment, proposed filling for access roadways and related drainage structures, landing and stockpiling areas, herbicide and fuel storage and handling areas, complete erosion control barrier lines, and limits of work outside the cutting zones. Such information will permit the applicant, the Commission,

and the contractor to determine exactly which areas can and can not be disturbed, and for what purposes, during the work.

The remaining steps in the Checklist are adequately comprehensive. Wording should be added to the second sentence at the beginning of the Checklist (General Instructions) to indicate that the Commission/DEP may ask for additional information if the applicant has not adequately described the project using the Checklist.

10. There is little attention to timing in the GEIR. The proposed regulations require the work to be done when the ground is frozen (winter), dry (late summer), or other wise sufficiently stable to support equipment with minimum soil disturbance. However, if the trees are removed in winter, the area can not be planted until after the wettest, most erosion-prone season of the year (spring). If the area floods during the spring to a great enough depth, standard erosion control barriers may be over-topped. There are probably certain seasons when herbicide applications are more effective and/or less risky, when filling for temporary access roads is less damaging, and when clearing work might be less disruptive to wildlife breeding, migration, or other activities. The last paragraph on page 5-9 of the GEIR indicates that trecs felled in late summer are less likely to send up sprouts than trees felled in winter, but that winter felling is less likely to compact soils and damage herbaceous plants. What is the best way to juggle all these factors?

There is another kind of timing which should be considered in advance, namely the phasing of the work itself. In general, it would be better to limit the amount of land in a disturbed state at any one time by clearing a small area, stabilizing it, and then moving on to the next area, rather than cutting large acreages at once. Also, the length of time that temporary fill for access roads remains in place should be minimized, again by using an area-by-area strategy.

11. There should be more scientifically-based comparison of different long-term maintenance strategies, and the long-term inplications of the initial clearing strategy used. For example, is it better to clear and grub an area, plant wet meadow species, and mow them annually in late fall than to selectively cut and then treat all stumps with herbicides annually and cut newly-seeded saplings as they come in? If it is desirable to leave some tree trunks and slash in the wetland for wildlife cover, how much should be left? Section 6 of the GEIR does not describe impacts of various long-term maintenance strategies.

12. Some guidelines should be given for siting, constructing, and removing temporary access roads and related drainage structures.

13. The Model Order of Conditions in Appendix G seems rather brief.

14. Site plans B1 and B2 should not be taken as a model by anyone! The scale is too small. The contour interval is not given. The dots and dashes scattered across the plans are distracting. The location and contour elevations of the PZ are not shown. The resource area boundaries are not shown. It is difficult to distinguish ditches and rivers from roads because neither is labeled. Property boundaries are not shown. Access routes to each cutting area

are not shown. Hazardous materials storage areas are not identified. Too much of the unaffected portion of the airport is shown. Attachments B3-B7 provide a little more information, but do not have a scale, topography, wetlands boundaries, access areas, limits of construction, etc. The proposed silt fence/hay bale locations do not completely surround all areas proposed for soil disturbance.

It is not clear why the NOI decided to use the specified herbicide, nor why it imposes a 50-foot setback from certain water bodies. If spraying is to take place 2-4 years after cutting, the Order of Conditions may have expired. How will this be addressed? Are there long-term maintenance plans?

The NOI proposes to leave all the trees and slash on the ground in various locations. It ignores the prohibition against leaving these materials within 25 feet of banks. It does not analyse the total volume of woody fill which will result from these practices in wetlands and floodplains, nor the total ground area to be covered. To what extent is leaving the trees on the ground good for wildlife habitat and to what extent is it harmful to soils, herbaceous species, wildlife migration, water quality, storm flow patterns, etc.?

The Spill Contingency Plan attached to the NOI does not address herbicide spills. Section I.B calls for materials to be placed on frozen ground, which may not be available throughout the work. What is the "extended-duration pumping test" in I.B.4? II.E should require that plastic sheeting, buckets, "speedy-dry" and other materials be replaced as used. II.B.1 should include the Conservation Commission on the list of people to notify. III.C should make the applicant responsible for the clean-up. If the applicant wants to pass this responsibility to the contractor in their contract, it is not the concern of the Commission.

The Wetlands Restoration Specifications do not say when the intial cutting and hydro-seeding would be done. If trees are cut when the ground is frozen, fine-grading might be difficult and hydroseeding might be of limited value. The proposed density of shrubs to be planted is too sparse, and not likely to keep out the purple loosestrife or provide valuable wildlife habitat. Almost 750 trees are to be removed from the area, with only 150 shrubs to replace them. The plan does not mention how large the shrubs will be at time of planting. The montioring program should include weeding out purple loosestrife and other undesirable species, and making additional plantings prior to the end of the second growing season if necessary.

15. The resource areas delineated in Wenham within the Beverly Municipal Airport air space (Figure A-4, Appendix A) are not as extensive as the resource areas delineated on the Town of Wenham Wetlands Maps. The Airport filed a Notice of Intent with this Commission shortly after the MAC/Massport ENF was circulated. Resource areas were delineated under that NOI which were even more extensive than those on the Town maps. If the rest of the maps in Appendix A are equally incomplete, the GEIR analysis in Section 4 of total potential wetlands impacts state-wide may be too low. However, to be fair, many of the wetlands on Figure A-4 lie at elevations too low for their trees to ever penetrate the PZ of the Airport. If this factor is also true at most other airports, the analysis may be fairly accurate.

While on the subject of this specific airport, please note that Table 4-1 neglects to include Wenham as one of the three communities affected by it, and that Figure 4-1

mislocates the airport too far to the south.

16. What about all the local wetlands bylaws which do not define these projects as limited projects?

17. The GEIR states that Section 404 permits from the ACOE would be required for clearing and grubbing work or other work using heavy equipment that disturbs soils (and presumably for access road filling). Will these projects also require Section 401 permits because they alter more than 5000 square feet of wetlands?

Thank you for your consideration of these comments.

Sincerely,

Frances M. Fink

Frances M. Fink
Conservation Coordinator

Commonwealth of Massachusetts
Executive Office of Environmental Affairs
Department of Environmental Protection

William F. Weld
Governor
Daniel S. Greenbaum
Commissioner

April 13, 1993

Janet McCabe
Executive Office of Environmental Affairs
MEPA Unit
100 Cambridge Street
Boston, MA 02202

Re: Generic Environmental Impact Report (GEIR) for Tree Clearing in Wetlands at Public Airports EOEA No. 8978

Dear Ms. McCabe:

I am writing on behalf of the Department of Environmental Protection's Division of Wetlands and Waterways to offer the following comments on the Draft Generic Environmental Impact Report (GEIR) for Tree Clearing in Wetlands at Public Airports.

Overall, the Draft GEIR represents a very thorough assessment of the wetland issues associated with vegetation management around airports. In particular, the section addressing impact assessments presents a good discussion of potential impacts and includes a detailed checklist at the end of the section.

Some other general comments on the Draft GEIR include the following. With respect to Vegetative Management Plans (VMP), it may be advisable for the GEIR to clarify how the implementation of a VMP, if adopted, should dovetail with the procedural requirements of the Wetlands Protection Act (WPA). For example, if VMP activities are not proposed with the initial clearing Notice of Intent (NOI) and authorized under the Order of Conditions, a second NOI would likely be necessary for such activities. Also, the GEIR should make it clear that the decision to issue an Order of Conditions is made upon a case by case basis. The discretion to issue an Order of Conditions still exists with the issuing authority in order to assure the selection of the most environmentally sound vegetation removal alternative.

In the course of the review of the GEIR, a number of more detailed comments were also developed which are provided as Attachment A. Most of these comments relate to either clarifying certain sections of the GEIR or elaborating upon existing text in the document.

Generic Environmental Impact Report (GEIR) for Tree Clearing in Wetlands at Public Airports EOEA No. 8978

April 13, 1993

Most of the additional comments are minor in nature.

In summary, I would like to extend my thanks to the Massachusetts Aeronautics Commission and the Massachusetts Port Authority for their efforts in coordinating and developing the Draft GEIR. The Draft GEIR addresses a complex issue in a clear and comprehensive manner. I look forward to the receipt of the Final GEIR.

Thank you for the opportunity to offer these comments.

Sincerely,

Christy Foote-Smith

Christy Foote-Smith, Director
Division of Wetlands and Waterways

Attachment A

Supplemental Comments on:
Generic Environmental Impact Report
(GEIR) for Tree Clearing in Wetlands
at Public Airports EOEA No. 8978

April 13, 1993

Section 2: Executive Summary

P 2-16, 2.6.2 The removal of trees and subsequent loss of cover, loss of shade and wildlife habitat may be considered a long term impact.

Table 2-8 Question whether the removal of canopy will have only minor to no negative effect on plant species and wildlife ecosystems.

Section 5: Alternatives Analysis

P 5-12, 5.2.2, last line, may be appropriate to state that "in wetlands, the use of vehicles likely create tracks, unless properly conditioned, by requiring use of swamp mats, or limiting timing of operations to those periods when ground is frozen, or sufficiently dry.

Section 6: Impact Assessment

P 6-4, 6.2.1 Not sure if statement that BVW boundary approximates edge of federal wetlands boundary is totally accurate. A more appropriate phrasing may be..."in many cases the Mass WPA BVW edge approximates the edge of federal wetlands boundary..."

P 6-5, 6.2.1 This section still contains an erroneous pond definition. The definition should read...

> "Pond (inland) means any open body of fresh water with a surface area observed or recorded within the last ten years of at least 10,000 square feet. Ponds may be either naturally occurring or man-made by impoundment, excavation, or otherwise..."

P 6-29, 6.2.4 The proposed regulatory amendment allows for "temporary" access roads to be constructed for the purpose of removing vegetation that has penetrated the protective zones. The GEIR suggests that the need for permanent access roadways will be rare. However, if yearly management to these areas are to be proposed under a VMP, how will access occur?

P 6-35, 6.3.3 With respect to tree clearing on stream BANKS, the GEIR should clearly indicate that in evaluating the extent of resource impacts, both sides of the stream need to measured

independently. For example, if 100 feet of stream will be cleared of vegetation, the alterations to BANK would be 100 x 2.

P 6-51, 6.5.4 There is no need for a comparison with statewide wetlands, and the conclusion concerning what a small percentage airport wetlands comprise.

Concern exists for use of herbicides over large areas. Wetlands function to protect ground water supply, and public and/or private water supplies. Some of the airport projects would alter greater than 15 acres.

P 6-56, 6.6.4 Is there any conflict with Division of Solid Waste

regulations regarding the leaving of trees and stumps on-site, and amounts acceptable?

P 6-57, 6.6.4 Location within Estimated Habitat of Rare and Endangered Species is not the trigger for wildlife habitat evaluations. If site is within such habitat, consultation with Mass. Natural Heritage and Endangered Species Program should take place. A copy of the NOI is to be filed with the Program. Wildlife habitat protection should be addressed.

Section 7: Mitigation Measures

P 7-18, 7.3.1 It should be noted that permanent wetland filling is not the only type of **alteration** that may occur.

P 7-18, 7.3.1 It may be more appropriate to delete or reword the last sentence of the overview. While it is true that wetland replication is not inherently required for limited projects, the Department has always striven to achieve replication when practical.

P 7-24, 7.3.1 Recommend deletion of the first sentence of the second paragraph for the above reason.

P 7-24, 7.3.1 If replication of rare species habitat is necessary, especially of forested wetlands, maybe some other solution is appropriate for such rare species. A 30 year wait for reforestation at another site does not seem adequate.

Table 7-1 In Applicability to Airport Vegetation Removal Limited Projects, under Wetland Replication, the wording should be changed to "should be conducted on 1:1 basis for permanently **altered** wetlands".

Section 8: Vegetation Management Plans

P 8-8 Use of herbicides over a large area, or rare spp. habitat should be carefully considered if allowed at all. Prevention of pollution and protection of public/private water supply are functions of wetlands.

The GEIR provides a list of vegetation management options. For those options which are the most environmentally damaging, the GEIR should emphasize that these methods are not the most acceptable and are not recommended.

Section 9: Notice of Intent Guidelines

P 9-1, 9.1 Regulations have been changed. A copy of the NOI is now required to be sent to MNHESP.

P 9-9, 9.3.2 Wildlife habitat evaluations are not required for work proposed within Estimated Habitat of Rare or Endangered Species. A copy of the NOI is to be forwarded to MHNESP. Information concerning wildlife habitat protection should be submitted when proposed alterations exceed one acre of any resource area or 500 feet of bank. Applicants should address wildlife habitat protection when rare species habitat is proposed to be altered.

P 9-11 Part III If an access road is constructed, filling may be involved and compensatory storage as well as wetland replication may be required.

P 9-13 Part V: Additional Information for a Department of the Army Permit. Rather than first stating that vegetation removal projects do not require ACOE permits unless wetland filling is involved, it may be more appropriate to precede that statement with the sentence clarifying wetland filling interpretation.

Section 10: Order of Conditions Guidelines

P 10-5 The spill plan should be referenced along with other plans cited in General Condition No. 12.

P 10-5, 10.3.2 LPSC#1 This condition should be further defined as to the means to prevent such changes. Restoration of areas altered (e.g. temporary access roads) should be required here.

P 10-6, 10.3.2 LPSC#2 If proposed wording is changed to recommended, the condition should require use of swamp mats, rubber tired vehicles, etc. Restoration of any alterations should be required.

P 10-6, 10.3.2 LPSC#4 Should require low growing shrub planting along banks if appropriate. Slash being left along the banks may increase erosion and siltation by preventing vegetation beneath from flourishing. In order to avoid erosion, slash should not be left along banks.

P 10-8, 10.3.3 ADMINC#1 is redundant. Plans are cited in General Condition No. 12.

P 10-8, 10.3.3 ADMINC#2 Conservation Commission should be replaced by the words "issuing authority".

P 10-8, 10.3.3 ADMINC#4 Same as above.

P 10-8, 10.3.3 ADMINC#5 Only appropriate if Conservation Commission is the issuing authority.

P 10-10 10.3.5 EC#2 is vague. Specific erosion control measures should be incorporated.

P 10-12, 10.3.7 First sentence should be changed. Wetland filling is not the only kind of alteration that could occur.

P 10-13, 10.3.7 WRC# 3 What DEP Guidelines? Does this mean the performance standards set forth in 310 CMR 10.55?

P 10-13, 10.3.7 Recommended WRC. Seasonal elevation of ground water should be verified by qualified professional. When replication area is excavated, distance to ground water should be certified by Mass. RPLS or RPE.

Rare Species protection Special Conditions should be placed here even if they are part of referenced plans and documents.

Crossing of streams should be conditioned here in accordance with Timber Harvesting Practices handbook.

Spill plan should be incorporated as part of referenced plans and documents, and perhaps some special conditions should be placed in the Order of Conditions.

Appendix A Wetlands at Fall River Airport may be more extensive than shown.

Appendix G In Model Order of Conditions the Spill Plan should be incorporated into the Order and referenced in the Plans section immediately below General Condition No. 12.

JD

Massachusetts Audubon Society

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April 8, 1993

Trudy Coxe, Secretary
Executive Office of Environmental Affairs
20th Floor
100 Cambridge St.
Boston, MA 02202

Attention: MEPA Unit

Re: EOEA # 8978, Draft GEIR for Tree Clearing in Wetlands at Public Use Airports, Statewide

and

EOEA # 9231A, Proposed Revisions to Wetlands Protection Regulations - Dam Safety; Lake Drawdown, Airport Vegetation Removal

Dear Secretary Coxe:

On behalf of the Massachusetts Audubon Society, I submit the following comments on the Draft Generic Environmental Impact Report for tree clearing in wetlands at 46 public use airports across the state.

The Draft GEIR provides material requested in the scope regarding the location and extent of wetlands within Protection Zones (PZs) at these airports and general information on a variety of tree/shrub removal methods and associated impacts. It also provides guidance to airport managers in how the wetlands permitting process works (e.g. how to prepare a Notice of Intent). The GEIR contains information that will be useful to conservation commissions in understanding these projects and reviewing NOIs submitted under the proposed new limited project provision.

However, the Society has significant concerns with the inadequate level of specific guidance necessary to achieve two of the major objectives of this document: 1) minimizing impacts to wetlands and their functional values; and 2) reducing the need for future vegetative management activities in these wetlands. While most of the necessary background information is contained in the Draft GEIR, there is little translation of this information into concrete recommendations that would serve to ensure that site-specific, carefully tailored plans are developed. The GEIR could easily lead airport managers to pursue a heavy reliance on intensive, high impact vegetation management activities carried out over large areas due to a lack of strong specific recommendations for lower impact, longer term vegetative management practices.

The Society strongly urges that DEP further refine the proposed new limited project provision to better protect wetland statutory values, prior to promulgation. The GEIR brings to light several areas where DEP could improve the regulatory language to ensure that impacts from removal of trees in PZs are minimized. For example, preparation of 5 or 10 year Vegetative Management Plans, incorporating Best Management Practices, should be required in the limited project provision, not merely presented as optional in the GEIR. The limited project provision should strictly control or prohibit the use of heavy equipment (particularly when the ground is not dry or frozen) and herbicides in wetlands. Wildlife habitat impact evaluations should be required for all but the most minor of these projects, and certainly for any project involving the use of equipment in wetlands. Regulatory limits on the extent and types of allowable impacts should be established for this limited project, so that projects involving very extensive impacts would be reviewed by DEP, and airport managers would have an added incentive to seek less intensive management methods wherever feasible.

The Society requests that you require that the following specific areas of concern be fully addressed before the GEIR and revisions to the wetlands regulations are finalized.

Extent of Impact

The GEIR documents that up to 1,282 acres of forested wetland, 66 acres of shrub/scrub wetland, and 762,800 linear feet of bank may be impacted by airport vegetation management projects at some point in time. While the Society recognizes that this is a maximum, conservative estimate of affected wetland resource areas, these figures nevertheless show the significance of this proposed new limited project and the importance of careful planning and review to minimize impacts. Many of the potentially affected areas are particularly sensitive: 20 of the 46 airports contain estimated habitat for rare species, and 4 of them are located within ACECs. It is unclear whether any of these projects might affect other sensitive resources such as Zone IIs of public groundwater supplies, or land where runoff contributes to a surface water supply.

The Draft GEIR characterizes all impacts associated with these projects as being short term and temporary. This is inaccurate and misleading. First, the overall goal of many of these projects will be to achieve a long **term** change in the vegetative composition of forested wetlands. While this may or may not negatively impact on the functional values provided by affected wetlands, it certainly represents a permanent alteration and should be recognized in the GEIR as such. Furthermore, a number of the proposed management methods have significant potential to have long term and/or permanent effects on wetlands and their functions. Permanently established access roads will result in fill which must be compensated for and may permanently impact areas of the wetland well beyond the precise limits of the road. Temporary roads which are not removed promptly or are improperly constructed and used may also cause long term impacts. Operation of heavy equipment in a wetland will affect the natural community and soils for a long period of time. The GEIR mentions that wildlife may be displaced, but fails to note that equipment will kill slow moving or stationary species (e.g. amphibians, reptiles), and that not all displaced animals will survive the search and competition for a new home range. The impacts of herbicide use in

wetlands on invertebrates, fisheries, and the wide variety of wildlife that use these habitats are uncertain but may be significant for some species. Data is insufficient to reach a conclusion that no long term permanent impacts will occur from herbicide applications in wetlands.

In the absence of clearer guidance and stronger controls over the selection of vegetative management measures and mitigation techniques, the GEIR cannot be relied upon for assurance that impacts to wetland resources and their functional values will be minor and temporary.

Relationship of GEIR to Regulatory Revisions

The Society opposed the adoption of the new limited project provision for airport tree clearing projects prior to completion of the GEIR precisely because of the types of issues raised in our review of this draft document. The draft GEIR brings to light several areas where the regulatory language could be refined to provide better resource protection while not impairing the ability of airports to maintain their PZs in an efficient manner. Examples include: adding a requirement that Vegetative Management Plans be developed, prohibiting or severely restricting the application of herbicides in wetlands, strong restrictions on use of heavy equipment in wetlands, and requirements that tree clearing activities be conducted using the least damaging methods available.

Appendix E of the GEIR contains information on Best Management Practices. The regulations should require that BMPs be employed, and any major deviations should disqualify the project from the limited project provision, triggering DEP review. Some BMPs might need to be tailored to airport tree clearing projects but could still be used in a modified manner. For example, the GEIR mentions that maintenance of buffer strips along waterways, where no vegetation removal would occur, may be impractical at some airports where trees in those areas intrude into PZs. However, this situation would not preclude the maintenance of a lower growing vegetative buffer, with removal of any obstructing trees accomplished by handcutting, and heavy equipment or clearcutting prohibited within a specific distance of waterways.

Also, the limited project provision should be written so that the conditions contained therein are automatically made a part of any Order of Conditions issued for such a project. This would ensure that these conditions will apply even in instances where the conservation commission fails to specifically adopt them within the Order.

The application of the proposed limited project provision should be restricted so that certain very large or severe impacts require DEP review. Examples could include projects involving over 10 acres of wetland impacts, clearcutting over 1 acre with use of heavy equipment, wetland destruction/filling without onsite replication, or inability to meet specified guidelines for BMPs and impact minimization.

The Society strongly urges that DEP further refine the proposed new limited project provision to better protect wetland statutory values, prior to promulgation.

Role of Conservation Commissions

The Society is concerned that the draft GEIR tends to detract from the important role conservation commissions can play in ensuring that these activities are carried out in the least damaging manner possible. As drafted, the GEIR implies that if information is presented in the proper format as provided in the model Notice of Intent, then the conservation commission must approve it, using only the conditions specified in the GEIR. To protect wetland resource values, it is critical that conservation commissions maintain some flexibility to condition these projects by requiring use of the least damaging methodology. For example, a conservation commissions should be able to decide if a particular tree removal project which is proposed to be carried out with heavy equipment and total clearing of the wetland could in fact be modified to reduce impacts through selective removal by handcutting. If the GEIR provided better guidance on how to select the least damaging activity that is practical for a specific situation, this potential area of conflict between airport managers and conservation commissions could be averted.

Determination of Project Areas and Selection of Management Methods

One of the biggest gaps in the GEIR lies in the lack of specific guidance for determining exactly what areas should be targeted for immediate vegetation control and how much time will elapse before trees or vegetation remaining after initial treatment are likely to reach obstructive heights within a PZ. The GEIR gives only a brief overview of the process for delineating areas where vegetative removal is needed. While the methods required to make these determinations are rather technical and do not need to be described in great detail in the GEIR, there should be a far greater emphasis on the importance of carefully delineating areas in need of vegetation management.

Tree removal and control activities should be strictly limited to the areas where they are actually necessary to prevent obstructions within PZs. The GEIR acknowledges that wetland trees rarely grow higher than 70 feet and that the areas where they are growing are often at a lower elevation than the base airport elevation. However, potential areas where vegetation management might be needed are then described according to areas of the PZs within 100 foot above base elevation. While this does ensure that the estimate of total wetland area affected is a conservative figure, the same information, if improperly applied, may have an unintended effect of encouraging a greater extent of vegetation removal activities than necessary. The Final GEIR should contain more extensive and explicit guidance emphasizing the need to limit controls to areas where trees actually threaten to cause obstructions within a specified number of years (e.g. 5 or 10).

The Society is very concerned that the GEIR as drafted will result in proposals under this limited project provision for clearcutting of large areas of forested wetlands where what is actually needed is only selective hand cutting of much smaller areas. Few wetland trees grow more than 1-2 feet per year. There is no need to destroy vegetation that will not present an obstruction for 20, 30 or even more years. The same issue applies to the control of stump sprouts. In areas where resprouting trees will not present obstructions within the PZ for a

period of a decade or more, there is no reason to accept the impacts and risks associated with applying herbicides in a wetland. The guidance in the GEIR with respect to stump resprouts seems to be derived from and is more appropriate to rights-of-way areas where vegetation heights must be maintained continually below 10-15 feet (e.g. over gas or water pipelines).

Limiting areas of controls and using selective removal wherever possible will not only serve to minimize wetland impacts, but also will generally reduce the cost of these operations. The GEIR acknowledges that smaller scale removal projects that do not require heavy equipment are less expensive than large scale clearing operations. Therefore, it is imperative that the Final GEIR provide clearer guidance, consistently stated throughout the document, to limit the scope of these activities to the greatest extent possible while meeting FAA requirements with regard to PZs. This guidance should then be incorporated into the limited project provision as regulatory requirements.

Vegetative Management Plans

The GEIR provides guidelines for development of vegetative management plans (VMPs) and explains the benefits to resource protection and airport expenditures that can be derived from these plans. The Society recommends that airport managers be required, through the limited project regulatory language, to prepare and submit comprehensive VMPs, with 5 or 10 year plans presented to conservation commissions with the Notice of Intent. These VMPs should provide the basis for a long term property management strategy that minimizes impacts to wetland resource values.

Use of Heavy Equipment

The descriptions of tree clearing methods in the GEIR places excessive emphasis on techniques involving use of heavy equipment. The impacts associated with heavy equipment are much more extensive and long lasting than selective removal by hand cutting. The GEIR identifies many impacts associated with the use of heavy equipment in wetlands, including soil disturbances, altered hydrology, changes in plant community and structure, and degradation of fisheries. However, the document fails to mention immediate, direct impacts to wildlife which occur from such operations, such as the killing of slow moving animals like reptiles and amphibians which cannot move out of the path of the equipment. The report also fails to discuss timing considerations, such as carrying out tree removal outside of the spring and summer breeding seasons to avoid, to the extent possible, wildlife mortality and destruction of nests.

The GEIR acknowledges that small scale, selective cutting projects are less expensive as well as lower impact. The report fails to highlight the appropriate guidance that flows logically from this information: **wherever possible, airport managers should focus on long term vegetative management plans that emphasizes small scale control on an ongoing basis rather than single year massive clearing operations.**

The GEIR proposes that DEP weaken the proposed limited project condition regarding use of equipment in wetlands, by adding "wherever possible" to the requirement that equipment be used only when the ground

is sufficiently frozen, dry, or otherwise stable to support it. This change was proposed in order to accommodate equipment use in wetlands that are almost never frozen or dry. This is absolutely unacceptable and the Society strongly opposes it. Wetlands that are large enough and/or deep enough to remain wet throughout the late summer/early fall and unfrozen throughout the winter are generally too wet to support a rapidly growing forest. While trees may grow in such areas, it is not necessary to obliterate the entire natural system to remove them. Any existing trees obstructing PZs in these areas should be cut by hand. The wetness of the area will prevent rapid regrowth of a forest community under these conditions, since seedlings of even water-tolerant trees such as red maple are susceptible to death from temporary flooding episodes. Forested wetlands are slow to become established for this very reason. The impacts of operating heavy equipment in such wet areas are too extensive to be acceptable, and other, less intrusive methods should be required.

Use of Herbicides

The Society opposes the broad acceptance of herbicide applications in wetlands as proposed in the GEIR. Even the Rights of Way (ROW) regulations (333 CMR 11.00), which the Society deems inadequate, provide far greater restrictions for the use of herbicides in sensitive areas than is proposed for this new limited project. The ROW regulations prohibit the application of herbicides within 10 feet of surface waters or wetlands, and mixing and loading is prohibited within the 100 foot buffer zone. Restrictions are also placed on herbicide use within other sensitive areas such as drinking water supplies.

The GEIR puts forth an unsubstantiated conclusion that the effects of herbicides in the environment are fully documented and will be limited to target plant species. This is simply untrue, as many data gaps exist, and the effects of these chemicals on natural wetland ecosystems are not clearly defined. The federal regulatory system controlling the registration and use of pesticides is flawed and inadequate. Testimony presented by the General Accounting Office to Congress in 1992 highlighted major shortcomings in the pesticide regulatory system, including the fact that while "[a]pproximately 25,000 pesticide products containing 750 active ingredients are registered on the market today; 19,000 of these products need to be reregistered" (which means that inadequate data has been presented and reviewed for those 19,000 products) (GAO/T-RCED-92-77 "Pesticides: 30 Years Since Silent Spring - Many Long-standing Concerns Remain"). The herbicides mentioned in the GEIR affect a broad spectrum of species, not just target species. Effects of herbicides on invertebrates, fisheries, and other critical components of wetland systems may be significant, particularly where application occurs very close to standing or flowing water.

The airport tree clearing limited project provision should prohibit or severely limit the use of herbicides within wetlands and other sensitive areas such as rare species habitat. **At a minimum, use of herbicides for tree clearing operations should be held to the same standards as required in the ROW regulations.**

Rare Species

The GEIR does not adequately examine the potential impacts to rare species from airport tree clearing operations. Since nearly half the airports contain estimated rare species habitat, it is vital that the GEIR provide more guidance on how to best protect two important public interests: safety of airport operations and preservation of rare species. The proposed limited project would prohibit any adverse impact to rare species habitat, and the Society strongly supports this provision. Nevertheless, the inherent conflict between safety of airport operations and protection of rare species needs to be more fully addressed in the GEIR. The report should provide guidance for consultation with the Massachusetts Natural Heritage and Endangered Species Program, in order to help airport managers develop vegetative management plans that will avoid impacts to these species and therefore will be allowable by the conservation commission. Failure to engage in such constructive consultation could result in projects being denied, and then delayed while appeals are made to DEP.

Girdling/Leaving Dead Trees Standing

The GEIR mentions the use of girdling trees to kill them before they grow up into a PZ, but goes on to express concerns about the hazards such standing dead trees might represent to humans in those areas. However, most of these areas have limited access to people anyway. Standing dead trees can provide substantial benefits to wildlife. This method should not be excluded out of hand because of unreasonable concerns of falling branches and trees.

Buffer Zones

The GEIR does not address potential impacts to wetland resources from clearing in buffer zones. The Final document should include information on how such impacts can be avoided or minimized.

Placement of Slash

The proposed limited project provision would prohibit the placement of slash within 25 feet of a waterway, but presumably would allow it within wetlands. Specific guidance should be provided in the Final GEIR for decisions to be made on when and where it is more desirable to leave cut vegetation in place (for wildlife habitat, to help prevent erosion, and to recirculate nutrients within the wetland system) vs. avoidance of adverse impacts from damaging placement of slash (e.g. blockage of normal flow of water, leading to upstream flooding).

Mitigation and Replication

The mitigation section focusses largely on reducing the long term effects on soils from intensive vegetation removal projects. The Final GEIR should provide more emphasis on how to minimize impacts through careful tailoring of a VMP to a specific site, and should incorporate mitigation measures for areas of impacts beyond soils, such as wildlife. For example, the seasonal timing of these activities can play a major role in the direct and indirect impacts on wildlife as well as on the ability of desirable understory vegetation to survive and flourish.

U.S. Department
of Transportation

**Federal Aviation
Administration**

New England Region

12 New England Executive Park
Burlington, Massachusetts 01803

JD

RECEIVED
APR 1 1993
MEPA

March 29, 1993

Secretary
Executive Office of Environmental Affairs
100 Cambridge Street 20th Floor
Boston MA 02202

Attention: MEPA Unit.

COMMENT ON GEIR FOR WETLANDS TREE CLEARING AT PUBLIC USE AIRPORTS-EOEA CERTIFICATE #8978

JOHN SILVA, FAA REGIONAL ENVIRONMENTAL PROGRAM MANAGER:

1. Section 6, Wetland Impact Evaluation Checklist, Step 6
   The need to consider mitigation measures is not supported by the analysis contained herein. If the removal of trees in wetlands causes no significant environmental impact, no mitigation should be necessary. Is mitigation required for the removal of trees in uplands ?

2. Appendix A, the following exhibits depict wetland resource areas contrary to surveys and/or MEPA certificates of findings on record:

   Figure A-4, Beverly Municipal- R/W 16 safety zone
   Figure A-29, Norwood Memorial- R/W 17 safety zone
   Figure A-34, Pittsfield Municipal- proposed parallel taxiway to runway 8-26
   Figure A-36, Provincetown Muni- Depicted wetland areas do not appear to be emergent wetlands.
   Figure A-41, Stow-Minute Man Airfield, Additional wetland areas bordering the existing runways require depiction.
   Figure A-46, Worcester Municipal- MEPA certificate of finding and ongoing EA show wetland areas not depicted on the exhibit.

WEEDON PARRIS, AIRPORT PLANNER:

1. Appendix B- An addendum to paragraph 609b should be added to reference more detailed ATCT line of sight parameters are contained in FAA Order 6480.4

cc: Muench, MAC
Cullen, Massport

INSTRUMENT FLYING
AERIAL PHOTOGRAPHY
STUDENT AND CHARTER FLIGHTS

BERKSHIRE *Aviation* ENTERPRISES, Inc.

F.A.A. APPROVED FLYING SCHOOL #5042

GREAT BARRINGTON AIRPORT -- GREAT BARRINGTON, MASS. 01230 -- TELEPHONE 413-528-1010 & 1061

PIPER AUTHORIZED SERVICE CENTER
PIPER SALES & SERVICE
PIPER FLITE CENTER

F.A.A. REPAIR STATION #1335

March 19, 1993

Susan F. Tierney, Secretary
Executive Office of Environmental Affairs
10 Cambridge Street
Boston, MA 02202

Dear Secretary Tierney:

The purpose of this letter is to express my support of GEIR - EOEA No. 8978.

I have reviewed the above stated GEIR document and find it to be most thorough and prudent in content. The GEIR fairly states the FAA requirements for aviation safety and the related need to remove trees which are obstacles in airport PZ's as well as being rightly protective of our wetland resources.

The GEIR, while providing guidelines for local conservation commissions, does not usurp their respective authority yet provides for uniform project evaluation throughout the state. The GEIR document gives evidence to monetary savings to both airport operators and local commissions through its recommended filing documents and evluation procedures.

As an airport operator one of my primary concerns has to be public safety as it related to aviation. To insure aviation safety, the FAA has developed several regulations with which public-use airports must comply. These regulations include: 14 CFR Part 77; FAA Advisory Circular 150/5300-13; FAA Order 6480.4 and FAA Order 6750.16B.

I support the strict obstruction-free requirements as set forth in the FAA regulations and believe they can be adhered to without jeopardizing our wetland resources.

As owner of the Great Barrington Airport since 1947, I have always been committed to the sound development of our community and the protection of our wetland resources. This GEIR has thoroughly researched and identified the wetlands surrounding the forty-six public use airports in Massachusetts. The identification of the wetland areas has been based on the foot prints of both a 20 and 100 foot elevation which are critical to aviation safety.

We support the stated guidelines which enforce preservation of the wetland resources while allowing selective tree cutting projects and the implementation of vegetation management programs.

In conclusion, thank you for the opportunity to express my support and observations of this document.

Sincerely,

Walter Koladza
President and Treasurer

c: Steve Muench

5

ORANGE MUNICIPAL AIRPORT

One Airport Street • Orange, MA 01364-2031
(508) 544- 8189

March 18, 1993

Secretary of the Executive Office
Environmental Affairs
100 Cambridge Street
Boston, MA 02202

Dear Sirs,

The Orange Airport Commission and Manager would like to express our support for the Generic Environmental Impact Report for Tree Clearing in Wetlands at Public Use Airports (GEIR).

Our two most important goals at Orange are, 1) To provide for the public safety. 2) To maintain an environmentally sound facility.

In the interest of safety all approach and transition zones must be clear of obstructions such as trees penetrating this airspace. We feel the GEIR is the tool that public use airports need to expedite the removal of such trees with little or no impact on our wetlands resources.

We applaud the efforts of the FAA, MAC, Massport, DEP and Camp Dresser & McKee Inc. for a job well done.

Orange Airport Commission

Airport Manager,
Leonard Bedaw Leonard Bedaw

TELEPHONE BEVERLY
(508) 921-6072

D Dion
HEPA

FAX
508-921-6071

BEVERLY AIRPORT COMMISSION
BEVERLY MUNICIPAL AIRPORT
(JOHN MOUNTAN FIELD)
L. P. HENDERSON ROAD
BEVERLY, MASSACHUSETTS 01915

March 23, 1993

Secretary
Executive Office of Environmental Affairs
100 Cambridge St.
Boston, MA. 02202

Subject: GEIR EOEA No. 8978
Tree Clearing in Wetlands at Public Use Airports

The Beverly Municipal Airport Commission supports the proposed GEIR without reservation.

The penetration of airspace by normally growing trees presents an obvious hazard to flight safety as well as to public safety in the areas surrounding airports.

A not so obvious hazard is the growth of trees that interferes with FAA Control Tower sightlines. This hazard developed at Beverly and it required four (4) years to complete the permitting process and remove the trees. With the help of FAA and MAC, the Airport Commission replanted the entire area with 400 low-growth trees and shrubs.

During our previous projects with the Conservation Commissions of Beverly, Danvers and Wenham, we have usually succeeded in negotiating satisfactory compromises and project controls and procedures with these Commissions. In these cases, the Airport Commission was able to preserve wetland resources while meeting the safety standards of FAA and MAC.

Based on these experiences, we feel that it will be invaluable to have DEP guidelines to use as a basis for the initiation of discussions with the local Conservation Commission on future projects.

Sincerely,

Robert C. Farmer

Robert C. Farmer
Chairman, Beverly Airport Commission

cc: Mr. R. Jenney, MAC
Mr. S. Muench, MAC

JD

RECEIVED
APR 13 1993
MEPA

Secretary
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

6 April 1993

Reference: EOEA No. 8978 - GEIR for Tree Clearing in Wetlands at Public Use Airports

Dear EOEA Secretary:

As a former chairman of a local Conservation Commission and former student of David Kittredge's Coverts forestry seminar, I feel qualified to comment upon the subject GEIR.

Page 2-25, condition number 12 requiring 48 hours notice given prior to viewing operations is excessive. It conflicts with condition number 8 which requires immediate action to contact airport personnel to resolve problems. Immediate does not mean waiting 48 hours to view wetland activities to determine if real or potential problems exist in protecting wetland interests.

Chapter 5 appears to have been written by someone who was born with the belief that technology would solve any problem. The draconian technology suggested to remove wetland vegetation is very frightening. The belief that herbicides are necessary to kill or limit vegetative growth in a wetland area surrounded by other biota is absurd. One of the most serious problems facing our world is the bioaccumulation of herbicides, pesticides and other chlorinated compounds. I find it difficult to believe that with all of the information available to the consultants that assembled this GEIR, it is not apparent to them that any application of chemicals to plants, especially wetland variety, is counter the most recent published literature in the field. Recertification of existing pesticides and herbicides is currently delayed due to new test data suggesting additional impacts to biota surrounding the target species is occurring.

Pages 7-15, 7-16, 7-17; Although well intended, these guidelines for herbicide application are seldom followed. As such, the EPA is currently examining the herbicide regulations and educational programs to provide added safety. At this time EPA is also on a campaign to find better ways of properly disposing the empty herbicide containers. It seems that even if the application of the herbicide/pesticide was applied as directed, the resultant empty bag, can, pail, etc., is not disposed of safely and harmful chemical concentrations enter the environment.
Ask yourself, why use herbicides if they pose additional risks to human and non human species?

April 6, 1993

RECEIVED
APR 8 1993
MEPA

Secretary, EOEA
20th Floor
ATTN: MEPA Unit
100 Cambridge Street
Boston, MA 02202

Ref: EOEA #8978, Draft GEIR
Airport Wetlands Tree Clearing

Dear Secretary Tierney,

I do not agree with Section 2, paragraph 2.9.2, 12: "... the commission will notify the applicant at least 48 hours ..."

This recommendation also is made in Appendix G, Model Order of Conditions, paragraph 24.

There may be unique safety concerns at some of our Massachusetts airports, but I do not believe that a site visit by a member of a conservation commission to verify or assure compliance with an order of conditions should require such an exorbitant waiting period.

An inordinate amount of wetland damage could be done in 48 hours; violations of orders of conditions could be corrected in substantially less than 48 hours.

Conceivably, it could require a day, or greater time, to arrange a visit for a large group to a tree clearing site. However for it to require anything longer than - at most - a few hours to arrange for one or two members to visit could appear to be a stall.

I believe the time requirement for site visit should be reconsidered, and decreased.

Very truly yours,

John A. McGuiness
14 Circuit Avenue East
Worcester, MA 01603

cc: Stephen R. Muench
Mass. Aeronautics Commission

Laurie Cullen
Mass. Port Authority

Jam/

Massachusetts Airport Management Association

President
Barbara Patzner, Manager
Hanscom Field
617-274-7200

Vice President
Gregory E. Chapman, Manager
Beverly Municipal Airport
508-921-6072

Secretary-Treasurer
Benjamin C. Jones, Manager
Barnstable Municipal Airport
508-775-2020

Ms. Trudy Coxe
Secretary of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

RECEIVED
APR 1 [illegible] 199[illegible]
MEPA

April 14, 1993

Dear Ms. Coxe:

On behalf of the Massachusetts Airport Management Association, I'd like to express our strong support for the Generic Environmental Impact Report for " Tree Clearing in Wetlands at Public Use Airports "- EOEA No. 8978. The passage of this GEIR is vital for the operational safety of our Airports with particular concern to tree, tall shrub and vegetation removal in obstruction-free zones. The solution, which this GEIR proposes, is to revise the MWPA to allow vegetation removal for safety reasons under "limited projects".

A total of 46 Massachusetts airports will be affected by the proposed regulatory revision and we expect the amendment to provide us with the following:

* A clear definition of the potential environmental impacts and appropriate mitigation measures,

* Provide a model NOI to assist airport operators, and ensure that vital environmental data is collected and presented to conservation commissions,

* Define appropriate long-term vegetation management options to eliminate the need for future large-scale projects,

* Ensure that environmental impacts from vegetation removal in wetlands are minimized through careful selection of appropriate vegetation removal,

* Most importantly, to promote public safety by allowing removal of obstruction from PZs in wetland in a timely and less costly manner.

Obviously, there is a desperate need to develop a reasonable solution that will allow airports to clear obstructions in wetlands while ensuring wetlands protection. In our view, the proposed amendment will give us the means to accomplish these goals.

Again, we ask your favorable support in the passage of this GEIR. It helps minimize costs to airport operators and promotes public safety at all Massachusetts Airports.

Sincerely,
Massachusetts Airport Management Assoc.

Barbara Patzner, President

cc: Steve Muench - MAC

SM

April 6, 1993

3

Secretary, EOEA
20th Floor
ATIN: MEPA Unit
100 Cambridge Street
Boston, MA 02202

Ref: EOEA #8978, Draft GEIR
Airport Wetlands Tree Clearing

Dear Secretary Tierney,

I do not agree with Section 2, paragraph 2.9.2, 12: "... the commission will notify the applicant at least 48 hours ..."

This recommendation also is made in Appendix G, Model Order of Conditions, paragraph 24.

There may be unique safety concerns at some of our Massachusetts airports, but I do not believe that a site visit by a member of a conservation commission to verify or assure compliance with an order of conditions should require such an exorbitant waiting period.

An inordinate amount of wetland damage could be done in 48 hours; violations of orders of conditions could be corrected in substantially less than 48 hours.

Conceivably, it could require a day, or greater time, to arrange a visit for a large group to a tree clearing site. However for it to require anything longer than - at most - a few hours to arrange for one or two members to visit could appear to be a stall.

I believe the time requirement for site visit should be reconsidered, and decreased.

Very truly yours,

John A. McGuiness
14 Circuit Avenue East
Worcester, MA 01603

cc: Stephen R. Muench
Mass. Aeronautics Commission

Laurie Cullen
Mass. Port Authority

Jam/

April 8, 1993

Secretary Trudy Coxe
Executive Office of Environmental Affairs
100 Cambridge Street
Boston, MA 02202

ATTN: MEPA Unit

RE: Draft Generic Environmental Impact Report (DGEIR) for Tree Clearing in Wetlands at Public Use Airports in Massachusetts. EOEA # 8978

Dear Secretary Coxe:

Staff of the Massachusetts Historical Commission have reviewed the Draft Generic Environmental Impact Report for the proposed project referenced above and have the following comments.

The information provided in the draft GEIR on tree clearing methods should prove very helpful in assessing the potential effects of vegetation removal and management plans on historic and archaeological resources. Archaeological sites are unique and non-renewable resources. Once a site has been adversely impacted, it cannot be restored. Section 6.6.8, Historic and Archaeological Resources, provides a good summary of the types of impacts that tree clearing projects may have on historic and archaeological resources and the need to consider on a case by case basis ways of avoiding, minimizing or mitigating any adverse effects to cultural resources. Also, it appears that vegetation management options, which would result in minimal ground disturbance, and therefore would be less likely to adversely affect archaeological sites, are also less costly than options which would result in substantial ground disturbance.

Because the GEIR is intended to substitute for the filing of individual project ENFs and EIRs, there needs to be provision for MHC's review and comment on individual projects in accordance with Massachusetts General Laws, Chapter 9, Section 26-27C as ammended by Chapter 254 of the Acts of 1988 (950 CMR 71). The MHC requests that changes be made to Section 6.6.8 Massachusetts Historical Commission Review Requirements p. 6-62 to make it clear that the MHC needs to review <u>all</u> "airport vegetation removal limited projects" (AVRLPs) as individual projects. In addition, the Evaluation Checklist, following p. 6-66, should reference the need to notify MHC of the project early on and to follow the instructions (Section 6.6.8) for filing a Project Notification Form. The MHC looks forward to reviewing a revised GEIR.

These comments are offered to assist in compliance with Section 106 of the National Historic Preservation Act of 1966 (36 CFR 800), Massachusetts General Laws, Chapter 9, Sections 26-27C, as amended by Chapter 254 of the Acts of 1988 (950 CMR 71) and MEPA.

If you have any questions, please feel free to call Connie Crosby at this office.

Sincerely,

Brona Simon

Brona Simon
State Archaeologist
Deputy State Historic Preservation Officer
Massachusetts Historical Commission

xc: Stephen R. Muench, Massachusetts Aeronautics Commission
Laurie Cullen, Massachusetts Port Authority
Deborah Mackie, Camp Dresser & McKee, Inc.
Kate Atwood, ACE
FAA
Ron Lyberger, DEP
John Felix, DEP/ Northeast Regional Office
DEP/ Southeast Regional Office
DEP/ Central Regional Office
DEP/ Western Regional Office

Section Two

2.0 EXECUTIVE SUMMARY

2.1 PROJECT NAME AND EOEA NUMBER

GEIR for Vegetation Removal in Wetlands at Public Use Airports
EOEA Number 8978

2.2 PROJECT DESCRIPTION AND BACKGROUND

2.2.1 PROJECT OVERVIEW

Public safety is a primary concern of everyone involved in the aviation industry. In order to promote aviation safety, the Federal Aviation Administration (FAA) has developed numerous regulations, orders, and advisory circulars related to areas that must be maintained free of obstructions. These regulations, which are described in greater detail in Section 3.3.1 of the GEIR, include:

- 14 CFR Part 77 - Objects Affecting Navigable Airspace. This regulation defines imaginary surfaces at airports that must remain obstruction-free in order to allow safe landings and takeoffs, as well as airfield movements.
- FAA Advisory Circular (AC) 150/5300-13 - Airport Design. This AC describes design and siting criteria for airport facilities, including airport traffic control towers (ATCT), and navigational aids (NAVAIDS). Of particular concern for this project are the clearance requirements to ensure adequate visibility for the ATCT and to minimize interference on NAVAID performance.
- FAA Order 6480.4 - Airport Traffic Control Tower Siting Criteria. This order defines additional criteria for siting ATCT, and also defines clearance requirements to allow adequate lines of sight from the ATCT to aircraft on the ground and approaching the airport from the air.
- FAA Order 6750.16B - Siting Criteria for Instrument Landing Systems. This order defines specific siting criteria for instrument landing systems including clearance requirements around the equipment.

The areas that must be maintained free of obstructions in compliance with these regulations are collectively called Protection Zones (PZs). At public use airports, PZs must be maintained in order for the airports to remain eligible for FAA funding for airport improvement projects. Even natural features such as vegetation are considered obstructions if they penetrate these areas.

When the obstructing vegetation is located in wetlands, its removal poses a two-fold problem. First, from an ecological standpoint, vegetation removal can impact the functions and values of wetland areas if conducted improperly. Second, from a regulatory standpoint, lengthy and costly environmental reviews continuing for up to 2 years are required for extensive vegetation removal in wetlands. A solution to this problem is urgently needed that will balance the need to ensure public safety at Massachusetts airports with the need to minimize ecological impacts to the state's wetland resources.

The Massachusetts Aeronautics Commission (MAC) and the Massachusetts Port Authority (Massport), in cooperation with FAA and the Massachusetts Department of Environmental Protection (DEP) have taken one step toward solving this problem through the development of the new limited project provision proposed as part of the Massachusetts Wetlands Protection Act (MWPA) regulatory amendments. The amendment creates a "limited project" provision for airport vegetation removal projects, thereby allowing airport vegetation removal limited projects (AVRLPs) of any scale to be approved by the local conservation commission.

In order for this limited project provision to become effective, a Generic Environmental Impact Report (GEIR) must be prepared, and must be approved by the Massachusetts Environmental Policy Act (MEPA) Unit of the Executive Office of Environmental Affairs (EOEA) and adopted as policy by DEP. This document is intended to fulfill this requirement.

The GEIR includes the following components, each of which is summarized in this executive summary:

- Project background
- Project need and objectives
- Proposed regulatory revision
- Existing conditions at public use airports in Massachusetts
- Alternatives analysis focusing on various tree clearing options and possible operational changes at airports
- Impact assessment describing the general and maximum potential statewide impacts of AVRLPs
- Guidelines for conducting site-specific wetland impact assessments
- Mitigation measures for short-term and long-term impacts
- Guidelines for preparing long-term vegetation management plans focusing on eliminating large-scale clearing projects in the future
- Guidelines for preparing Notices of Intent (NOIs) for airport vegetation removal limited projects (AVRLPs) to assist operators and ensure that critical environmental information is collected and presented to conservation commissions
- Guidelines for development of Orders of Conditions to assist conservation commissions in project reviews

MEPA approval of the GEIR will then eliminate the need to file individual Environmental Notification Forms (ENFs) or Environmental Impact Reports (EIRs) (when more than one acre of wetlands will be altered) for AVRLPs.

The regulations most pertinent to this project are those associated with the Massachusetts Wetland Protection Act (MWPA) (310 CMR 10.00) which prohibits alterations in wetland resource areas above the following thresholds:

- 5,000 square feet of bordering vegetated wetland
- 2,000 linear feet of bank
- 10 acres of land subject to flooding

These resource areas are described in greater detail in Section 6.2. In addition, the Massachusetts Environmental Policy Act (MEPA) requires preparation of a lengthy Environmental Impact Report (EIR) for alterations of more than one acre of bordering vegetated wetlands or ten or more acres of any other resource area protected by MEPA.

2.2.2 PROJECT BACKGROUND

In late 1991, MAC and Massport identified tree growth in PZs as a critical issue. It was estimated that most of the state's 46 public use airports require vegetation removal to remove obstructions in accordance with FAA guidelines. It was also determined that for most, if not all, of the airports, some work would be required in wetlands, and that typical tree clearing projects would not meet MWPA performance standards. Thus, the proponent would be required to obtain a variance from the regulations. MAC and Massport, recognizing the urgency in maintaining safe, manageable airspace while complying with environmental regulations, and the potential economic burden that could be placed on the airports and DEP, began discussions with DEP and FAA to develop a workable and environmentally sensible action plan. Based on those discussions, DEP drafted a proposed regulatory amendment to MWPA that was originally published together with several other amendments in the Environmental Monitor on February 7, 1992. The regulatory amendment would create a "limited project" provision for safety-related vegetation removal projects at airports. A "limited project" is an activity that is subject to review under the MWPA regulations, but does not have to meet the performance standards for work in a wetland resource area. Currently, there are limited project provisions for electric generating facilities, utilities such as gas, water and sewer lines, and roadways, as defined in 301 CMR 10.24 and 10.53.

In September, 1992, based on extensive public and agency comments on the other proposed amendments, the Environmental Notification Form (ENF) for all of the regulatory changes was withdrawn. Subsequently, the proposed amendments to the MWPA were revised and a second draft was submitted and published in the Environmental Monitor on November 20, 1992. Revisions included in the second draft of the airport-related provisions were minor, including an additional step involving adoption of the GEIR as policy by DEP and clarification that the provision does not apply to projects that may impact rare species. Independent of these ENFs, an ENF was filed by MAC and Massport in March 1992 to identify a scope for the GEIR. The Draft GEIR was prepared in accordance with the Secretary's Certificate for this project which was issued on April 8, 1992, and this Final GEIR was prepared in accordance with the April 15, 1993 Secretary's Certificate.

2.2.3 PROJECT NEED AND OBJECTIVES

Faced with increasing concerns about public safety, particularly as a result of tree or tall shrub growth, vegetation removal is a necessity at Massachusetts public use airports. These airports must either remove vegetation that is or soon will be an obstruction, or they will be in breach of previous federal grants and they will face difficult operational changes and likely elimination of future federal grant funds. Meshing compliance with FAA guidelines with state environmental regulations requiring detailed analysis before vegetation removal activities in wetlands are allowed to proceed has become increasingly difficult. Thus, there is an overwhelming public need to develop a reasonable solution that would allow airports to clear obstructions in wetlands while ensuring wetlands protection. That solution is a revision to the MWPA to allow vegetation removal for safety reasons under a "limited project" provision.

The objectives of the regulatory revisions are:

- To promote public safety by allowing removal of obstructions from PZs in wetlands in a timely and less costly manner

- To ensure that environmental impacts from vegetation removal in wetlands are minimized through careful selection of appropriate vegetation removal and mitigation methods

The most appropriate means to achieve these objectives is through the development of this GEIR. The GEIR will also accomplish other objectives:

- To provide a clear definition of potential environmental impacts and appropriate mitigation measures
- To provide a model NOI to assist airport operators, and ensure that vital environmental data is collected and presented to conservation commissions
- To provide guidelines for Orders of Conditions to assist conservation commissions in their reviews
- To define appropriate long-term vegetation management options to eliminate the need for future large-scale removal projects

2.2.4 DESCRIPTION OF PROPOSED REVISION

The proposed regulatory revision, 310 CMR 10.24(7) and 10.53(3)(n), will create a new "limited project" for airport vegetation removal projects. The limited project provision is exclusively for removal of vegetation from wetlands in order to comply with FAA requirements. In fact, the revised regulations specifically note that the provision does not include vegetation removal for any reason other than to maintain FAA-required PZs; thus, wetland alterations related to runway or airport expansions are not covered. The limited project provision stipulates four conditions that airport vegetation projects must meet. They are:

1. There shall occur no change in the existing topography or the existing soil and surface water levels except for temporary access roads as necessary;
2. The removal of trees shall occur only during those periods when the ground is sufficiently frozen, dry, or otherwise stable to support the equipment used;
3. 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, Field Office Technical Guide of Standard Practices (Section IV), as amended; and

4. 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 the water body.

As part of the regulatory revision, the NOI filing fee is set at $725 for AVRLPs. The proposed regulatory revision is printed in its entirety in Section 3.4.1 of the GEIR.

2.3 EXISTING CONDITIONS

2.3.1 AFFECTED AIRPORTS AND THE STUDY LIMITS

A total of 46 airports will be affected by the proposed regulatory revision. These airports are public use airports that are either publicly- or privately-owned and certified by MAC or operated by Massport. The approximate location of each airport is shown in Figure 2-1, and the affected airports are listed in Table 2-1.

The study limits at each airport are defined as the 100-foot elevation and the 20-foot elevation of the PZs. These limits were defined based on the following assumptions:

- Trees in forested wetlands rarely exceed 70 feet in height. However, in order to allow leeway to account for trees of unusual height, it has been conservatively assumed that trees may extend up to 100 feet above the runway end elevations. Therefore, forested wetlands located within the 100-foot elevation study area limits may require vegetation removal.

- Shrubs in scrub-shrub wetlands around the airports may extend up to 20 feet above the runway end elevations. (Wetlands with vegetation extending beyond this height are considered forested wetlands.) Therefore, scrub-shrub wetlands located within the 20-foot study area limits may require vegetation removal.

- Vegetation emergent wetlands immediately adjacent to the airports will generally not extend above the runway end elevations. Therefore, vegetation removal in emergent wetlands will generally not be required.

For the purposes of this study, forested wetlands are considered wetlands that are dominated by tree species, scrub-shrub wetlands are considered wetlands that are dominated by woody shrub species, and emergent wetlands are considered wetlands that are dominated by herbaceous species. Wetlands around the airports were categorized into these wetlands types based on available maps and data.

2.3.2 WETLAND RESOURCE AREAS

All state-protected wetland resource areas were identified at each affected airport using US Fish and Wildlife Service National Wetland Inventory (NWI) maps, US Soil Conservation Service (SCS) soil surveys, aerial photographs, Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM), and DEP Wetlands Conservancy Program orthophotos. Based on this information, bordering vegetated wetlands within the study limits were mapped as either forested, scrub-shrub, or emergent wetlands. Banks and land under waterbodies and water ways were not specifically mapped because they are already identified on the USGS topographic maps used as base maps. Bordering land subject to flooding, otherwise known as the 100-year floodplain, was identified at each airport but could not be mapped at the base map scale. The maps showing the mapped wetland resources at each airport are presented in Appendix A. Table 2-2 summarizes the wetland resources that are present within the study area limits at each airport, and Table 2-3 summarizes the area of each wetland type at each airport.

2.3.3 OTHER ENVIRONMENTAL ELEMENTS

Other environmental elements that were identified and mapped for each airport are the estimated habitats for state-listed rare wetlands wildlife, and inland and coastal Areas of Critical Environmental Concern (ACECs). The rare species habitats were mapped based on the Massachusetts Natural Heritage Program's (NHESP's) 1992 Atlas of Estimated Habitats of Rare Wetlands Wildlife. ACECs were identified and mapped based

information provided by the Massachusetts Coastal Zone Management (CZM) and the Massachusetts Department of Environmental Management (DEM).

Other environmental elements that are discussed in the GEIR, but which must be assessed on a case-by-case basis, include the following:

- Topography, geology, and soils
- Surface water and groundwater hydrology and quality
- Plant and animal species and ecosystems
- Traffic, air quality, and noise
- Socioeconomic issues
- Scenic qualities, open space, and recreational resources
- Historic and archaeological resources
- The built environment and man's uses of the area
- Rare or unique features of the site and its environs

2.4 ALTERNATIVES ANALYSIS

2.4.1 VEGETATION MANAGEMENT ALTERNATIVES

The objective of vegetation management at airports is to eliminate or discourage the growth of woody vegetation that would extend upward into the PZs. Management techniques seek to accomplish this by first eliminating all existing obstructions, and then encouraging development of the remaining plant community so that it will not grow high enough to penetrate the PZs. A total of 19 vegetation removal options were evaluated in terms of environmental impacts, economic implications, and short- and long-term maintenance requirements. The options evaluated, which are described in detail in Section 5.2 of the GEIR, include:

- Physical Methods

  - Push Trees Over
  - Pull Trees Down
  - Shear Trees with Bulldozer
  - Mechanized Felling
  - Clearing and Grubbing
  - Build an Impoundment
  - Remove Trees by Helicopter

- Chemical Methods

  - Fell/Lop/Cut-Surface Treatment
  - Fell/Frill-and-Inject Treatment
  - Fell/Selective Basal Treatment
  - Selective Foliar Treatment

- Combination Methods

  - Frill-and-Inject/Pull Trees Down
  - Frill-and-Inject/Push Trees Over
  - Mechanized Felling/Cut-Surface Treatment
  - Shear Trees with Bulldozer/Cut-Surface Treatment

- Small Equipment/Non-Equipment/Non-Chemical Method

  - Fell Trees and Lop Slash
  - Girdling
  - Tree Topping
  - Prescribed Burning

In addition, combinations of any of these methods can be used. Table 2-4 summarizes the environmental, economic, and maintenance considerations associated with each option of this alternative.

2.4.2 "NO ACTION" ALTERNATIVE

The "No Action" alternative, in terms of airport vegetation removal projects, means not removing vegetation that penetrates a PZ such that FAA must impose one or more operational restrictions on the airport. Although such an action is not really considered a viable alternative in terms of airport operations or public safety, it is discussed in this

document to ensure full consideration of all potential alternatives. The specific "no action" options that are discussed include the following:

- Displace or relocate the runway threshold
- Relocate, displace, or extend the runway
- Close the runway
- Relocate NAVAIDs
- Raise approach minimums
- Modify or relocate the airport traffic control tower
- Obtain a waiver from FAA

Table 2-5 summarizes wetland, economic, and maintenance considerations associated with each option.

2.4.3 GUIDELINES FOR SELECTION OF VEGETATION REMOVAL ALTERNATIVES

Detailed guidelines are provided regarding selection of vegetation removal alternatives for each AVRLP. The process for selecting an appropriate removal method should be based on the following considerations:

- Size of the area requiring vegetation removal
- Density of trees and understory in the vegetation removal area
- Ability of the soils to support heavy equipment
- Presence of environmentally sensitive conditions (e.g., rare species habitat, Areas of Critical Environmental Concern, public water supply protection areas)
- Available funding

For each vegetation removal area, an alternatives analysis should be conducted to select the most appropriate vegetation removal method. The goal of this analysis should be to select the method that is both feasible and causes the least environmental impact given the project-specific constraints. The vegetation removal options are ranked according to level of impact, and the project proponent is instructed to sequentially evaluate each "tier" of options before proceeding to tiers with increasing impact. Before dismissing each

tier, the proponent should briefly document the reason(s) for not selecting those options. Table 2-6 summarizes the ranking of the vegetation removal options and provides additional information regarding the applicability of each option. Figure 2-2 illustrates the modified alternative selection process that should be followed in environmentally sensitive areas where alternatives involving use of herbicides or heavy equipment are generally discouraged.

2.5 IMPACT ASSESSMENT

2.5.1 WETLAND IMPACT ASSESSMENT

There is a wide range of potential wetland impacts with varying degrees of significance associated with vegetation removal. They range from direct impacts such as soil disturbance and loss of canopy-related wildlife habitat, to indirect impacts such as erosion, changes in community structure, altered hydrologic balances, increased soil and water temperatures, and increased turbidity levels. The extent of these impacts can vary widely depending on the type of vegetation removal method used and the specific site conditions. In general, though, if appropriate techniques and mitigation measures are employed, the wetland impacts can generally be minimal and/or short-term. The impacts can be considered temporary because wetlands are not filled or lost due to tree removal. Further, in most cases the wetlands requiring vegetation removal were originally emergent or scrub-shrub communities that met FAA clearance requirements. Thus, the alteration will restore many of these wetlands to their original condition. It is important to select a vegetation removal method that is appropriate for a given site, and will result in minimal wetland impacts while maintaining airport safety.

In addition to the potential wetland impacts that result from vegetation removal, if an access road is constructed in wetland areas to transport vegetation removal equipment, additional impacts may occur. If the access road is temporary (as required by the proposed limited project provision), is constructed using best management practices, and the area is restored as soon as the road is removed, the wetland impacts will be temporary.

Table 2-7 summarizes the potential direct and indirect impacts that could result from vegetation removal activities in wetlands.

2.5.2 METHODOLOGY FOR ASSESSING SIZE AND EXTENT OF ALTERATION

The wetland alterations associated with a given AVRLP should be quantified according to the following three steps:

1) Identify the specific vegetation that must be removed using the tree-top aerial photogrammetry method, engineering field survey plan, or a similar method.

2) Identify and delineate the state-protected wetland resource areas within the proposed vegetation removal area(s) using appropriate DEP methodologies and guidelines as summarized in Section 6.3.3.

3) Measure the alteration within each affected wetland resource area using the guidelines presented in Section 6.3.4. When quantifying the impact of selective tree removal from a wetland, the measurement most appropriate for determining square footage of actual alteration is the tree canopy or crown area. For determining the linear feet of alteration (e.g., along banks), the crown width or portion thereof that overlaps the bank is most appropriate. This method allows for measurement of the direct impacts of tree removal, as well as of less direct impacts, such as loss of wildlife habitat or shading associated with the tree.

Once the likely wetland impacts have been quantified, they can be evaluated according to the methodology presented in Section 6.4 of the GEIR. The methodology is presented in the form of a Wetland Impact Evaluation Checklist that outlines the evaluation guidelines, similar to the Wildlife Habitat Evaluation Checklists issued by DEP. The purpose of this checklist is to provide a consistent framework and format for the impact evaluation at each airport where vegetation removal in wetlands is required. The checklist can be used by airport managers and their consultants (proponents), and conservation commissioners (reviewers), to ensure that all appropriate information has been incorporated into the impact evaluation. The wetland impact evaluation, prepared using the checklist in the GEIR, will then be incorporated into each NOI submittal.

2.5.3 ESTIMATED STATEWIDE WETLAND IMPACT

The maximum potential impacts to emergent, scrub-shrub, and forested wetlands at each airport are summarized in Table 2-8. The locations and extent of each wetland type at each airport are shown on the maps in Appendix A. In all, the maximum area of wetlands that could be affected by vegetation removal operations is approximately 1,348 acres. Of this area, 1,282 acres are forested wetlands and 66 acres are scrub-shrub wetlands. Emergent wetlands and salt marshes are not expected to be significantly affected by vegetation removal because trees and tall shrubs rarely or never grow in these areas. Most of the impacts will be short-term, related to a change in plant species composition rather than to an actual loss of wetland resources.

The estimated maximum potential impact is based on the mapped wetland resources within the study limits as described in Section 2.3.1 of this Executive Summary. These maximum wetland impact estimates are considered conservative, "worst case" estimates for the following reasons:

- Trees in forested wetlands rarely exceed 70 feet in height, and many scrub-shrub wetlands do not reach heights of 20 feet.
- Wetlands, by definition, are typically located at a low elevation in the landscape. Thus, most wetlands around airports will be located below the base airport elevations.
- If selective vegetation removal is conducted, the actual wetland area impacted (based on the methodologies presented in Section 6.3 of the GEIR) will be significantly less than the total area of vegetation removal.

Despite these considerations, the estimates are valuable because they provide a worst case appraisal of the maximum area of wetlands that could be affected by AVRLPs. In addition, they indicate which airports are likely to require vegetation removal from wetlands, as well as the extent of these removal needs.

These 1,348 acres of wetlands that could be altered by AVRLPs represent less than 0.29% of Massachusetts' freshwater wetland resources. It is important to note that the proposed regulatory revision will not in any way increase the extent or magnitude of the wetland impacts at Massachusetts airports as a result of airport vegetation removal projects. The proposed airport vegetation removal projects are required in order to comply with FAA regulations, regardless of whether or not they are allowed under a limited project provision. Approval of the provision, however, will help to streamline the process and allow project approval at the local level for most AVRLPs.

2.5.4 OVERALL ENVIRONMENTAL IMPACT EVALUATION

Table 2-9 summarizes the potential environmental impacts of vegetation removal activities on various elements of the environment. In general, the environmental impacts associated with vegetation removal from wetlands around airports are short-term and relatively minor. Most of the short-term impacts, such as impacts to air quality, noise, traffic and water quality, are related directly to the vegetation removal operation. These localized impacts generally dissipate shortly after the removal activities are completed. In addition, both long-term and short-term benefits may result from tree removal projects. These benefits include the short-term socioeconomic benefit from the creation of several jobs to remove the vegetation, and the indirect long-term benefit that removal of the obstructing vegetation will enable the airports to comply with FAA regulations and maintain eligibility for FAA airport improvement funding. Indirectly, this funding leads to a variety of socioeconomic benefits to the community.

2.6 MITIGATION MEASURES

2.6.1 SHORT-TERM IMPACT MITIGATION MEASURES

Most wetland impacts from vegetation removal will be temporary and readily mitigated. Potential short-term impact mitigation measures are identified and discussed in terms of

feasibility, economic implications, and effectiveness in Section 7.0 of the GEIR. These are briefly described below.

- **Erosion and sedimentation controls** - One of the most common impacts of vegetation removal activities is erosion of soils and sediments that are exposed by various aspects of the operation. Once exposed, they are prone to erosion, which can lead to a variety of secondary impacts on the affected or nearby wetlands. Erosion and sedimentation controls that are evaluated include:

  - siltation barriers
  - runoff diversion measures
  - sediment traps or basins
  - vegetated buffer strips
  - revegetation of disturbed areas
  - construction timing
  - construction specifications

- **Wetland restoration** - Any wetlands that are disturbed as a result of vegetation removal operations should be restored so that they can continue to function as a wetland. If the original wetland was forested, it is not practical to replant trees or shrubs similar to those removed which would ultimately grow into the PZs. However, disturbed wetlands should be revegetated with some type of wetland vegetation that will allow them to continue to function as a wetland. In many cases, this will involve the planting of herbaceous wetland plants (i.e., hydroseeding, seeds in erosion control mats) such as those noted in Section 7.2.1 of the GEIR. In some cases where the soil has been disturbed, regrading disturbed soils to the original grade will be necessary prior to revegetating the area. If the hydrology in the area was disturbed, it should be restored as well.

- **On-site wetland enhancement** - In some cases, it may be desirable to provide additional enhancement of a disturbed wetland so that its value more closely approximates its value as a forested wetland. In the context of mitigation for airport vegetation removal projects, on-site wetland enhancement may involve planting shrubs in the disturbed area. This mitigation measure should only be considered when economically feasible, when the maximum shrub height will not encroach on the PZ, and when either: 1) the vegetation removal technique involves clear cutting broad areas, leaving no shrubs in the area; or 2) the vegetation removal technique is limited to selected trees, but there is no natural shrub community in the area.

- **Herbicide application guidelines** - If herbicides will be used to control vegetative growth, it is critical that they be handled and applied properly to minimize the possibility of environmental contamination, and to protect the person applying the herbicide.

- **Spill containment plans** - If fuel-powered equipment or herbicides will be used for AVRLPs, a spill containment plan should be implemented as protocol for prompt and proper containment of any spills. The plan should include a list of materials that should be present on the site in case a spill occurs, a description of spill prevention and responsive action procedures, and guidelines for removal or containment materials from the site.

Figure 2-3 summarizes the general wetland impacts that are likely to be mitigated by each of these measures. Table 2-10 summarizes the relative economic implications, and the applicability of each measure to AVRLPs.

2.6.2 LONG-TERM IMPACT MITIGATION MEASURES

Potential long-term impact mitigation measures are identified and discussed in terms of feasibility, economic implications, and effectiveness. The most feasible measures are briefly described below.

- **Wetland replication** - Wetland replication is essentially creating a wetland at a nearby off-site location to mitigate the permanent loss (e.g., filling) of wetland area or functions. Extensive literature is available on the logistics of designing and implementing wetland creation projects. Studies evaluating mitigation effectiveness in Massachusetts indicate that properly planned wetland replication projects have been mostly successful, at least in terms of establishing and supporting wetland vegetation. Additional investigations at older replication sites are needed to determine the extent to which the replacement areas perform the functions and values of the original wetland areas.

- **Off-site wetland enhancement** - Off-site wetland enhancement is an option for mitigating permanent wetland alterations or losses, particularly when on-site mitigation is not feasible. In terms of AVRLPs, this mitigation measure would be most appropriate when the conversion of a forested wetland to an emergent or scrub-shrub wetland will significantly impact a unique habitat or vegetation community.

- **Mitigation banking** - "Mitigation banking" is a term generally applied to an off-site wetland creation, restoration, or enhancement project that is undertaken not only to compensate for wetland impacts from a particular project, but also to compensate for future wetland impacts. For AVRLPs, the mitigation banking concept would probably be most feasible as "joint projects," in which a

group of airport managers agree to implement a joint project in order to mitigate for wetland impacts at each of their airports. Mitigation banking may also be feasible in terms of tree planting in both wetland and upland areas to compensate for the loss of trees as a result of AVRLPs.

- **Development restrictions** - One means of indirectly compensating for losses in wetland functions and values involves placing development restrictions on remaining wetlands so as to protect them from future impacts. While this does not directly compensate for wetland losses, it can achieve overall wetland protection goals. Development restrictions can be for a specified period of time or in perpetuity and can be in the form of a restriction, easement, covenant, or condition in any legally executed document.

- **Monitoring** - One indirect mitigation measure often required by conservation commissions is a monitoring program to assess the short-term and long-term success of a restored or created wetland. Such a program is considered an indirect mitigation measure because while it does not in itself mitigate any impacts, it can play a significant role in maximizing the success of other direct mitigation measures. At a minimum, a monitoring program should consist of visual inspections of the restoration or replication area. A full-scale monitoring program should involve detailed field measurements and observations, and should consist of documentation of monitoring objectives, organizational and technical responsibilities, reporting and quality assurance procedures, and an implementation schedule.

- **Compensatory flood storage** - Any AVRLP that involves filling within bordering land subject to flooding should provide compensatory storage for the lost floodwater storage capacity. This storage area should meet specific DEP requirements specified in 310 CMR 10.57(4)(a). This measure is expected to rarely be necessary since permanent access roads and filling in BVW are not allowed under the proposed limited project provision.

The general wetland impacts likely to be mitigated by each of these measures are summarized in Figure 2-3. The relative cost, and applicability of each measure to AVRLPs, are summarized in Table 2-10.

2.7 VEGETATION MANAGEMENT PLANS

2.7.1 OBJECTIVES OF VEGETATION MANAGEMENT PLANS (VMPs)

A Vegetation Management Plan (VMP) could be considered a strategy to be employed by

airport operators for removing vegetation which currently penetrates protection zones (PZs) and for preventing other vegetation from penetrating the PZ in the future so as to avoid repetitive, large-scale vegetation removal projects. A well prepared VMP will carefully integrate the environmental, economic and operational considerations of the vegetation removal projects likely to occur at a given airport. In addition, implementation of a VMP would enhance an airport's efforts to comply with applicable federal and state regulations, advisories and orders.

While individual VMPs will differ for each airport, they will have similar objectives. These objectives include:

- Ensure that PZs remain free of naturally-occurring obstructions
- Minimize impacts on wetlands within the vegetation removal areas
- Preserve existing herbaceous and low-lying vegetation that will not grow high enough to penetrate PZs and thus will not require subsequent removal
- Minimize the cost associated with maintaining the PZs free of obstructions
- Minimize impact on wildlife habitat

A VMP is intended to be general in nature. However, sections of a VMP pertaining to vegetation removal in wetlands should rely as much as possible on the information contained in this GEIR. It should be noted that development of a VMP is not required within the current or proposed Massachusetts Wetlands Protection Act (MWPA) regulations. However, MAC is currently pursuing development of a program that will require airports, as appropriate, to prepare long-term VMPs for both wetland and upland areas. If a VMP is prepared, it should be attached to the NOI for an AVRLP for information purposes.

2.7.2 ELEMENTS OF A VEGETATION MANAGEMENT PLAN

Based on these objectives, this section describes the elements of a VMP. The VMP

should address vegetation management in all of the PZs at an airport including both upland and wetland areas.

Typical sections of a VMP include:

- **General information.** This section contains information such as the airport name; the community(ies) where the airport is located; the name, address and telephone number of the airport owner and operator, (and the name and title of the contact person if different from the airport owner); name, address and telephone number of the chairperson of the airport commission, if any; and the name, address and telephone number of the airport manager.

- **Identification of PZs.** This section of the VMP provides a brief description and generalized map of all PZs at the airport. The PZs would be divided logically based on the facilities at the airport. This section would also include a discussion of the existing natural and man-made obstructions within each identified PZ based on a detailed survey.

- **Identification of vegetation management areas (VMAs).** This section of the VMP provides a brief description and generalized map of specific VMAs within the PZs. Each area with similar plant communities should be identified and delineated as a VMA. For the initial VMP, this section would include a discussion of the existing conditions within the VMAs prior to clearing. However, in later updates of the VMP, this section will be revised to reflect current conditions based on succession of various plant species and the effectiveness in promoting growth of more low-growing vegetation. In some cases, the VMA boundaries may need to be re-defined after initial clearing based on altered vegetation management needs.

- **Identification and prioritization of future vegetation removal projects.** This section of the VMP outlines the vegetation removal projects that are anticipated over the next five or so years. This section should include a description for each of the future vegetation removal projects anticipated. Each project description should include identification of the PZ(s) where vegetation removal is or will be necessary, the area of each VMA within the designated PZ(s) where work will be conducted, the vegetative communities within each VMA that will be impacted, the amount of wetlands, if any, within the project area that may be affected by the removal work, and the anticipated year of removal. The project description should distinguish new clearing activities versus maintenance of previously cleared areas. This section should include a figure that illustrates the location of the PZ(s), the VMA(s) and the project area(s) with respect to each other.

- **Identification of the VMP preparer.** This section of the VMP should identify the preparer(s) and should include pertinent short resumes.

2.7.3 UPDATING THE PLANS

It is recommended that VMPs be reviewed and updated as necessary based on airport specific conditions. These updates may require field visits to determine the success of the previous clearing activities, as well as to document the current condition of the VMAs. The update of the initial VMP may be extensive since the VMAs will likely have changed considerably over the previous 5 years. However, subsequent updates should be relatively minor, requiring limited field verification and minimal text changes.

2.7.4 CONCLUSIONS

Development of a VMP for AVRLPs is not required under either the current or proposed MWPA regulations. However, a VMP can be a useful planning tool to help airport operators avoid repetitive, large-scale vegetation removal projects in the future and enhance the airport's compliance with applicable federal and state regulations, advisories and orders. It is generally in the best interests of the airports to conduct small-scale annual or biannual maintenance projects that cost substantially less than extensive vegetation removal projects. In addition, VMPs can be considered a voluntary extension of the mitigation plan since proper long-term maintenance will result in fewer impacts to wetland functions and values.

2.8 NOTICE OF INTENT GUIDELINES

2.8.1 OVERVIEW OF NOI PREPARATION AND FILING PROCESS

A Notice of Intent (NOI) must be filed for any AVRLP in Massachusetts that involves work in a protected wetland resource area or within the 100-foot buffer zone associated with many wetland resource area types. Under the proposed limited project provision (310 CMR 10.53(3)(n)), most airport vegetation removal projects will be permitted by an

Order of Conditions issued by the local conservation commission. Exceptions to this process may occur in cases where the local conservation commission issues a negative Order of Conditions denying the project, or where the Order of Conditions issued by the conservation commission is appealed. In such cases, DEP will issue the permit for the AVRLP as a Superseding Order of Conditions or an adjudicatory hearing will be required. Regardless of how the project is finally approved, the NOI will be prepared according to the guidelines provided, which are summarized below.

2.8.2 GUIDELINES FOR NOI PREPARATION AND FILING

Explicit guidelines were developed for the preparation of NOIs for AVRLPs. These guidelines, which are described in Section 9.0 of the GEIR, address the following NOI components:

- **Filing form selection** - In most cases, the standard NOI form (Form 3) will be used. For certain limited tree removal projects, an abbreviated NOI form (Form 4) or a Request for a Determination of Applicability (Form 1) may be filed.

- **Field work and data collection requirements** - Field work, data collection, and environmental evaluation requirements related to the NOI preparation include the following:

  - identify vegetation requiring removal
  - delineate and assess affected wetland resource areas
  - select appropriate vegetation removal method(s)
  - quantify the likely environmental impacts
  - evaluate the likely environmental impacts
  - select appropriate mitigation measures

- **NOI form preparation** - Specific guidelines are provided for completing each portion of the standard NOI form. These guidelines include provision of a model project description, filing fee information, recommended sources for the requested information, a list of recommended NOI attachments, and recommended graphic and plan contents.

A model NOI was prepared, based on the guidelines developed, for a sample AVRLP. This model is presented in Appendix D.

2.9 ORDER OF CONDITIONS GUIDELINES

2.9.1 OVERVIEW OF ORDER OF CONDITION ISSUANCE AND COMPLIANCE PROCESS

Once a conservation commission has completed their review of the NOI and closed the public hearing, an Order of Conditions approving or denying the AVRLP will be issued within 21 days. When the Order permits the AVRLP, it provides specific conditions for the proposed work that must be followed. Since the AVRLP approval is contingent on these conditions, it must be followed precisely. For AVRLPs, it is imperative, then, that the stipulated conditions ensure wetland protection without compromising airport operations or navigational safety. For example, conditions that require restoration of cleared areas with pre-existing vegetation or that grant conservation commissioners the right to inspect the project site without adequate notice are not feasible. As summarized below in Section 2.9.2, specific conditions are recommended that will balance navigational safety and airport operational considerations with wetland resource protection.

Once issued, an Order is generally valid for three years. Prior to the commencement of work, the Order must be recorded in the Registry of Deeds or the Land Court in which the affected land is located. Once all required vegetation removal is completed, a Certificate of Compliance should be requested from the local conservation commission or other issuing authority.

2.9.2 RECOMMENDED CONDITIONS

After exhaustive review and evaluation, as described in Section 10.0, the following special conditions are recommended for inclusion, as appropriate, in Orders of Conditions for AVRLPs:

1. There shall occur no change in the existing surface topography or the existing soil and surface water levels except for temporary access roads as necessary.

2. Wherever possible, the removal of trees shall occur only during those periods when the ground is sufficiently frozen, dry, or otherwise stable to support the mechanized equipment used.

3. 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, Field Office Technical Guide of Standard Practices (Section IV), as amended.

4. 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 the water body.

5. All work shall conform to the following submitted support documentation and narrative plans, unless otherwise specified in this Order: [list supporting documentation]

6. Any changes made in the above-described plans, unless specified otherwise in this order, which will alter an area subject to protection under the Wetlands Protection Act, or any changes in activity subject to the regulations under G.L. Ch. 131, § 140, shall require the applicant to inquire from this conservation commission in writing whether the change(s) is significant enough to require the filing of a new Notice of Intent. Any errors in the plans or information submitted by the applicant shall be considered changes, and the above procedures will be followed.

7. This document shall be included in all construction contracts and subcontracts dealing with the work proposed, and shall supersede any conflicting contract requirements.

8. If any unforeseen problem occurs during construction which affects any of the statutory interests of the Wetlands Protection Act, upon discovery, the conservation commission or its agent shall notify the applicant immediately, and an immediate meeting shall be held between the conservation commission (or its agent), the applicant (or the applicants representative), and other concerned parties to determine the correct measures to be employed. The applicant shall then act to correct the problems using the corrective measures agreed upon.

9. With respect to all conditions except _____ the conservation commission designates the conservation administrator as its administrative agent with full powers to act on its behalf in administering and enforcing this Order.

10. Any order not recorded by the applicant before work commences may be recorded by the conservation commission at the applicant's expense.

11. Prior to any work on site, the proposed limit of work shall be clearly marked with stakes, flags, or plastic construction fences and shall be confirmed by the conservation commission. Such markers will be maintained until all construction on the site's perimeter is complete. Workers shall be informed that no construction activity is to occur beyond this line at any time.

12. The conservation commission and its agents shall have the right to enter and inspect the property for compliance with the Order, the Act, and the Wetlands Protection Regulations (310 CMR 10.00). Because of unique safety concerns at airports, the commission shall provide the applicant with appropriate advance notice of an intended inspection within the confines of airport safety and environment protection so that proper arrangements can be made.

13. This Order shall pertain to the access roadways, their appurtenances, and drainage facilities directly related to approved tree removal activities. Additional construction of roadways or removal of trees in any area subject to the conservation commission's jurisdiction, shall require the filing of another Notice of Intent and/or Request for Determination or, if appropriate, amendment to this Order following notification of and review by the conservation commission.

A model Order of Conditions was prepared, based on the recommended conditions identified, for the model AVRLP. This model is presented in Appendix G.

2.10 SUMMARY OF FINANCIAL ASSISTANCE AND PERMIT REQUIREMENTS

2.10.1 FUNDING AND APPROVALS RELATED TO GEIR

Preparation of this GEIR is being funded by an FAA grant (AIP Project No. 3-25-0000-S692). Approval of the Final GEIR by MEPA (i.e., certification by the Secretary of the Executive Office of Environmental Affairs that the project adequately and fully complies with MEPA, and adoption of the guidelines presented in the GEIR by DEP as Departmental policy) are required in order for the proposed regulatory revision to become effective.

2.10.2 FUNDING AND APPROVALS RELATED TO VEGETATION REMOVAL PROJECTS

AVRLPs at public use airports in Massachusetts will be eligible for partial FAA funding if the proposed clearing areas were not previously cleared under an FAA grant. Otherwise, this cost is borne by the airport owner and the Commonwealth.

AVRLPs in wetlands will require an Order of Conditions from the local conservation commission(s) in accordance with the Massachusetts Wetlands Protection Act.

Other potential permit or approval requirements include the following:

- If the wetland soils will be disrupted by vegetation removal equipment, or if the area will be cleared and grubbed, an Army Corps of Engineers permit will be needed pursuant to Section 404 of the Clean Water Act.
- If a Section 404 permit is needed, then a Water Quality Certification will be needed in accordance with Section 401 of the Clean Water Act.
- If an access road to the vegetation removal areas will be conducted off of a local roadway, a curb cut permit will be needed from the local department of public works.
- If the AVRLP requires a federal or state agency action (i.e., permit, issuance, or funding), the project will need to be reviewed by the Massachusetts Historical Commission in terms of impacts to historic or archaeological resources and by the Massachusetts Natural Heritage Program in terms of impacts to rare or endangered species.

In addition, the vegetation removal may require other local, state or federal permits or approvals, which will vary by project.

2.11 CONCLUSIONS AND RECOMMENDATIONS

Massachusetts public use airports must comply with FAA regulations related to maintenance of PZs. Removal of vegetation to comply with these regulations could impact up to 1,348 acres of the total freshwater wetlands within the study limits at 46

airports. Most of the impacts will be short-term, related to a change in plant species composition rather than to an actual loss of wetland resources. It is important to note that the proposed regulatory revision achieves the goal of the proponents, the maintenance of PZs, and in no way increases the extent or magnitude of wetland impacts at Massachusetts airports as a result of vegetation removal activities. The proposed vegetation removal is required in order to comply with FAA regulations, regardless of whether or not it is allowed under a limited project provision. The limited project provision will simply help to streamline the process and allow project approval at the local level for most AVRLPs.

In addition to evaluating the potential generic and statewide impacts associated with AVRLPs, this GEIR provides detailed guidance related to all aspects of AVRLPs. By following the guidance contained in this GEIR, the following primary objectives will be accomplished:

- Public safety will be promoted by allowing removal of obstructions from PZs in wetlands in a timely and cost-effective manner
- Environmental impacts from vegetation removal in wetlands will be minimized through careful selection of appropriate removal techniques and mitigation measures

Once the GEIR receives a Certificate of Compliance with MEPA from the Secretary of the Executive Office of Environmental Affairs, and DEP adopts the GEIR guidance as Department policy, then the proposed limited project provision will become effective.

By following the guidelines and recommendations documented throughout this GEIR, AVRLPs will be able to proceed under a streamlined environmental review process without significantly impacting Massachusetts wetland resources. In fact, the maximum extent of wetlands that will be impacted by AVRLPs represents approximately 0.29% of Massachusetts total wetland resources. These impacts will be almost always minor and short-term in nature. Because of the critical public need for AVRLPs, they would invariably be able to pass the public interest test and would ultimately be permitted

through the variance process. The proposed regulatory revision, which will allow AVRLPs to be approved at the local level, will greatly expedite approval of these critical projects, provided AVRLP proponents and local conservation commission adhere to the process set forth in this GEIR. This expedited approval will enhance the airports' ability to protect public safety, protect important wetland resources, and lessen the review burden on Massachusetts state agencies.

TABLE 2-1

TOTAL AREA WITHIN STUDY LIMITS AT EACH AIRPORT

AIRPORT	AREA WITHIN STUDY LIMITS (acres)	
	20' ELEVATION	100' ELEVATION
Barnstable Municipal	392	1,488
Barre-Tanner-Hiller	34	231
Bedford-L.G. Hanscom Field	408	1,365
Beverly Municipal	322	923
Boston-Logan Int'l	1,056	2,885
Chatham Municipal	48	265
Edgartown-Katama Airpark	88	384
Fall River Municipal	132	456
Falmouth	35	229
Fitchburg Municipal	182	567
Gardner Municipal	79	284
Great Barrington	49	227
Hanson-Cranland	29	202
Haverhill-Riverside	28	200
Hopedale-Draper	84	295
Lawrence Municipal	245	823
Mansfield Municipal	76	326
Marlboro	24	191
Marshfield Municipal	79	284
Marston Mills	66	438
Martha's Vineyard	326	1,054
Montague-Turners Falls	58	250
Nantucket Memorial	355	1,230
New Bedford Municipal	337	1,081
Newburyport	73	271
Norfolk	34	199
North Adams-Harriman and West	44	275
Northampton	60	262
Norwood Memorial	149	523
Orange Municipal	194	626
Oxford	28	205

TABLE 2-1 (CONTINUED)
TOTAL AREA WITHIN STUDY LIMITS AT EACH AIRPORT

AIRPORT	AREA WITHIN STUDY LIMITS (acres)	
	20' ELEVATION	100' ELEVATION
Palmer Metropolitan	81	281
Pepperell	34	237
Pittsfield Municipal	256	816
Plymouth Municipal	148	560
Provincetown Municipal	156	585
Shirley	43	262
Southbridge Municipal	58	277
Spencer	17	174
Sterling	39	216
Stow-Minuteman	79	348
Taunton Municipal	106	416
Tewksbury-Tew-Mac	106	382
Westfield-Barnes	406	1,344
Westover AFB/ Metropolitan	519	1,817
Worcester Municipal	503	1,343
TOTALS	7,666	27,097

TABLE 2-2

WETLAND AND SENSITIVE ENVIRONMENTAL RESOURCES LOCATED WITHIN STUDY LIMITS AT EACH AIRPORT

AIRPORT	INLAND WETLAND RESOURCE AREAS				COASTAL WETLAND RESOURCE AREAS											
	BORDERING VEGATATED WETLAND	BANK	LAND UNDER WATER	BORDERING AND ISOLATED LAND SUBJECT TO FLOODING*	SALT MARSH	LAND UNDER OCEAN	COASTAL BEACH	DESIGNATED PORT	COASTAL DUNE	BARRIER BEACH	COASTAL BANK	ROCKY INTERTIDAL SHORE	LAND UNDER SALT POND	LAND CONTAINING SHELLFISH	RARE SPECIES HABITAT	AREA OF CRITICAL ENVIRONMENTAL CONCERN
Barnstable Municipal	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-
Barre-Tanner-Hiller	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Bedford-L.G. Hanscom Field	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Beverly Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Boston-Logan Int'l	X	-	-	-	X	X	X	X	-	-	X	-	-	X	X	-
Chatham Municipal	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	X
Edgartown-Katama Airpark	X	-	-	-	-	X	X	-	X	-	X	-	X	X	X	-
Fall River Municipal	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Falmouth	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Fitchburg Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Gardner Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Great Barrington	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Hanson-Cranland	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Haverhill-Riverside	-	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Hopedale-Draper	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Lawrence Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Mansfield Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X
Marlboro	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Marshfield Municipal	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-
Marston Mills	-	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-
Martha's Vineyard	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
Montague-Turners Falls	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Nantucket Memorial	X	-	-	-	-	X	X	-	X	-	X	X	-	X	X	-

* e.g., inland 100-year floodplain.

** Note - An "X" indicates that a particular resource is located within the study limits. It does not necessarily indicate that an impact is likely.

TABLE 2-2 (CONTINUED)

WETLAND AND SENSITIVE ENVIRONMENTAL RESOURCES LOCATED

WITHIN STUDY LIMITS AT EACH AIRPORT

AIRPORT	INLAND WETLAND RESOURCE AREAS				COASTAL WETLAND RESOURCE AREAS										RARE SPECIES HABITAT	AREA OF CRITICAL ENVIRONMENTAL CONCERN
	BORDERING VEGATATED WETLAND	BANK	LAND UNDER WATER	BORDERING AND ISOLATED LAND SUBJECT TO FLOODING*	SALT MARSH	LAND UNDER OCEAN	COASTAL BEACH	DESIGNATED PORT	COASTAL DUNE	BARRIER BEACH	COASTAL BANK	ROCKY INTERTIDAL SHORE	LAND UNDER SALT POND	LAND CONTAINING SHELLFISH		
New Bedford Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Newburyport	X	X	X	-	X	-	-	-	-	-	-	-	X	X	X	X
Norfolk	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
North Adams-Harriman and West	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-
Northampton	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Norwood Memorial	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
Orange Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Oxford	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Palmer Metropolitan	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Pepperell	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Pittsfield Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Plymouth Municipal	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-
Provincetown Municipal	X	-	-	X	X	-	X	-	X	X	X	-	-	X	X	-
Shirley	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Southbridge Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Spencer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sterling	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stow-Minuteman	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Taunton Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Tewksbury-Tew-Mac	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Westfield-Barnes	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Westover AFB/ Metropolitan	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Worcester Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-

* e.g., inland 100-year floodplain.

** Note - An "X" indicates that a particular resource is located within the study limits. It does not necessarily indicate that an impact is likely.

TABLE 2-3

ESTIMATED WETLAND RESOURCES WITHIN STUDY LIMITS AT EACH AIRPORT*

AIRPORT	EMERGENT WETLANDS (acres)	SCRUB-SHRUB WETLANDS (acres)	FORESTED WETLANDS (acres)	TOTAL WETLANDS (acres)	BANK (feet)
Barnstable Municipal	0.0	2.8	8.1	11.0	12,900
Barre-Tanner-Hiller	0.0	8.5	4.2	12.7	25,000
Bedford-L.G. Hanscom Field	4.2	30.2	166.0	200.5	59,600
Beverly Municipal	5.5	25.7	98.7	129.9	25,000
Boston-Logan Int'l	9.6	0.0	0.0	9.6	0
Chatham Municipal	1.7	0.0	0.0	1.7	12,100
Edgartown-Katama Airpark	0.0	8.7	0.0	8.7	0
Fall River Municipal	0.0	3.3	6.7	9.9	18,300
Falmouth	0.8	0.0	0.0	0.8	0
Fitchburg Municipal	1.8	2.2	0.0	4.0	37,900
Gardner Municipal	0.0	47.9	34.3	82.1	15,200
Great Barrington	0.0	4.7	27.8	32.5	9,200
Hanson-Cranland	26.7	0.1	19.2	45.9	3,100
Haverhill-Riverside	0.0	0.0	0.0	0.0	7,300
Hopedale-Draper	0.6	0.0	10.8	11.4	12,900
Lawrence Municipal	0.0	0.4	12.1	12.5	43,300
Mansfield Municipal	5.2	27.5	9.3	42.0	21,700
Marlboro	0.5	3.2	17.0	20.7	14,000
Marshfield Municipal	6.4	5.3	134.7	146.4	18,300
Marston Mills	0.0	0.0	0.0	0.0	3,800
Martha's Vineyard	0.0	0.0	**0.0	**0.0	0
Montague-Turners Falls	6.5	5.2	0.0	11.7	1,500
Nantucket Memorial	0.0	6.5	0.0	6.5	0
New Bedford Municipal	49.6	47.5	260.5	357.7	35,400
Newburyport	1.1	21.7	12.9	35.7	600
Norfolk	0.0	3.8	30.8	34.7	10,000
North Adams-Harriman and West	0.0	0.0	1.4	1.4	9,600

* Note - These estimates indicate the area or linear feet of a resource that is within the study limits. They do not indicate the extent to which an area is likely to be impacted.

** Area of wetlands is less than 0.1 acres.

TABLE 2-3 (CONTINUED)
ESTIMATED WETLAND RESOURCES WITHIN STUDY LIMITS AT EACH AIRPORT*

AIRPORT	EMERGENT WETLANDS (acres)	SCRUB-SHRUB WETLANDS (acres)	FORESTED WETLANDS (acres)	TOTAL WETLANDS (acres)	BANK (feet)
Northampton	0.0	0.0	0.0	0.0	2,100
Norwood Memorial	7.5	214.8	41.2	263.4	48,300
Orange Municipal	1.9	3.8	5.9	11.5	12,500
Oxford	0.8	5.4	3.5	9.7	7,500
Palmer Metropolitan	2.5	36.3	21.4	60.1	14,400
Pepperell	2.4	5.7	3.3	11.4	15,800
Pittsfield Municipal	10.3	29.5	62.5	102.4	42,700
Plymouth Municipal	0.9	5.8	1.7	8.5	3,300
Provincetown Municipal	143.9	4.9	0.0	148.8	0
Shirley	0.1	5.4	10.9	16.5	9,200
Southbridge Municipal	0.0	0.0	8.6	8.6	10,800
Spencer	0.0	0.0	0.0	0.0	0
Sterling	0.0	1.6	35.4	36.9	0
Stow-Minuteman	1.1	9.2	66.5	76.8	30,000
Taunton Municipal	2.9	11.4	26.8	41.1	39,600
Tewksbury-Tew-Mac	6.8	38.1	38.2	83.2	16,300
Westfield-Barnes	0.0	2.0	22.5	24.5	6,700
Westover AFB/ Metropolitan	0.0	17.5	66.9	84.4	51,900
Worcester Municipal	2.3	13.9	12.1	28.3	55,000
TOTALS	303.7	660.2	1,282.0	2,245.9	762,800

* Note - These estimates indicate the area or linear feet of a resource that is within the study limits. They do not indicate the extent to which an area is likely to be impacted.

Sources: U.S.G.S. topographic maps, U.S. Fish and Wildlife Service National Wetland Inventory maps, DEM Wetlands Conservancy Program orthophotos.

TABLE 2-4
SUMMARY OF WETLAND, ECONOMIC AND MAINTENANCE CONSIDERATIONS OF VEGETATION MANAGEMENT OPTIONS

OPTIONS	WETLAND IMPACT*	ECONOMIC FEASIBILITY	MAINTENANCE REQUIREMENTS
1. Mechanical Methods			
Push Trees Over	Moderate to severe impact from vehicle tracks Causes pit-mound topography Causes visual impacts Impacts from burial of vegetation from downed trees/slash can be mitigated	Costs are high for small clearing areas and low for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches
Pull Trees Down	Impacts from vehicle tracks can be mitigated Causes pit-mound topography Causes visual impacts Impacts from burial of vegetation from downed trees/slash can be mitigated	Costs are high for small clearing areas and low for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches or from ineffective removal of sprouting species
Sheer Trees with Bulldozer	Moderate to severe impact from vehicle tracks Causes visual impacts Moderate to severe impact from elimination of desirable species Impacts from burial of vegetation from downed trees/slash can be mitigated	Costs are high for small clearing areas and moderate for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches
Mechanized Felling	Impacts from vehicle tracks can be mitigated Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated	Costs are moderate for small clearing areas and moderate for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches or from ineffective removal of sprouting species
Clearing and Grubbing	Moderate to severe impact from vehicle tracks Causes visual impacts Impacts from elimination of desirable species can be eliminated	Costs are moderate for small clearing areas and moderate for large clearing areas	Limited short-term measures required
Build Impoundment to Flood Area**	Causes pit-mound topography Moderate to severe impacts on vegetation from downed trees/slash Causes visual impacts Moderate to severe impact from elimination of desirable species	Costs are high for small clearing areas and high for large clearing areas	Likely to require short-term maintenance to eliminate growth from dead standing trees and possible maintenance of dam structures
Remove Trees by Helicopter	Visual impacts can be mitigated	Costs are high for small clearing areas and high for large clearing areas	Limited short-term measures required
2. Chemical Methods			
Fell/Lop/Cut-Surface Treatment	Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are mod./high for small clearing areas and moderate for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species

TABLE 2-4 (CONTINUED)
SUMMARY OF WETLAND, ECONOMIC AND MAINTENANCE
CONSIDERATIONS OF VEGETATION MANAGEMENT OPTIONS

OPTIONS	WETLAND IMPACT*	ECONOMIC FEASIBILITY	MAINTENANCE REQUIREMENTS
2. Chemical Methods (Continued)			
Fell/Frill-and-Inject Treatment	Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are low for small clearing areas and low for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species
Fell/Selective Basal Treatment	Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are low for small clearing areas and low for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species
Selective Foliar Treatment	Causes visual impacts Impacts from introduction of herbicides can be mitigated Impacts from elimination of desirable species can be eliminated	Costs are low/mod. for small clearing areas and low/mod. for large clearing areas	Likely to require short-term maintenance to eliminate growth from dead standing trees May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species
3. Combined Mechanical-Chemical Methods			
Frill-and-Inject/Pull Trees Down	Impacts from vehicle tracks can be mitigated. Causes pit-mound topography Causes visual impacts Impacts from burial of vegetation from downed trees/slash can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are high for small clearing areas and high for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species
Frill-and-Inject/Push Trees Over	Moderate to severe impact from vehicle tracks Causes pit-mound topography Causes visual impacts Impacts from burial of vegetation from downed trees/slash can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are high for small clearing areas and high for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species
Mechanized Felling/Cut-Surface Treatment	Impacts from vehicle tracks can be mitigated. Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are high for small clearing areas and high for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species

TABLE 2-4 (CONTINUED)
SUMMARY OF WETLAND, ECONOMIC AND MAINTENANCE
CONSIDERATIONS OF VEGETATION MANAGEMENT OPTIONS

OPTIONS	WETLAND IMPACT*	ECONOMIC FEASIBILITY	MAINTENANCE REQUIREMENTS
3. Combined Mechanical-Chemical Methods (Continued)			
Shear Trees with Bulldozer/Cut-Surface Treatment	Moderate to severe impact from vehicle tracks Causes visual impacts Moderate to severe impact from elimination of desirable species Impacts from burial of vegetation from downed trees/slash can be mitigated	Costs are high for small clearing areas and high for large clearing areas	May require short-term maintenance to eliminate growth from downed trees
4. Small Equipment/Non-Equipment/Non-Chemical Methods			
Fell Trees and Lop Slash	Causes visual impacts Impacts from burial of vegetation from downed trees/slash can be mitigated	Costs are low for small clearing areas and moderate for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches or from ineffective removal of sprouting species
Tree Topping	Impacts from vehicle tracks can be mitigated	Costs are high for small clearing areas and high for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches, ineffective removal of sprouting species, and removal of dead standing trees
Girdling	Causes pit-mound topography Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated	Costs are low for small clearing areas and low for large clearing areas	Likely to require short-term maintenance to eliminate dead standing trees and may require removal of sprouting species.
Prescribed Burning	Causes visual impacts Moderate to severe impact from elimination of desirable species	Costs are high for small clearing areas and mod.high for large clearing areas	Limited short-term measures required

Note: The vegetation management options are discussed in more detail in Section 5.2.1.

* Environmental impacts inherent to all vegetation management alternatives (e.g., elimination of tree canopy leads to increase soil and water temperatures) are not listed.

** Note that if construction of impoundment involves wetland filling, the limited project provision will not apply.

TABLE 2-5
SUMMARY OF WETLAND, ECONOMIC AND MAINTENANCE CONSIDERATIONS OF "NO ACTION" OPTIONS

OPTIONS	WETLAND IMPACT*	ECONOMIC FEASIBILITY	MAINTENANCE REQUIREMENTS
Displace or Relocate Runway Threshold	None	Costs are high in comparison to vegetation management options	None
Construct New Runway / Extend Existing Runway	Possible impacts depending on length of extension and environmental conditions	Costs are high in comparison to vegetation management options	None
Closure of Runway	None	Costs are high in comparison to vegetation management options	None
Relocate NAVAIDS	Possible impacts depending on new locations of NAVAID and environmental conditions.	Costs are high in comparison to vegetation management options	None
Raise Approach Minimums	None	Costs are low for all airports types	None
Modify or Relocate the ATCT	Possible impacts depending on new locations of ATCT and environmental conditions.	Costs are high in comparison to vegetation management options	None
FAA Waiver	None	Costs are low for all airports types	None

Note: The "No Action" Alternatives are discussed in more detail in Section 5.3.1.

TABLE 2-6
SUMMARY OF ALTERNATIVE ANALYSIS
TIERS AND RELATED INFORMATION

ALTERNATIVE ANALYSIS TIERS	ADDITIONAL INFORMATION OR COMMENT
TIER 1: MINIMAL IMPACT OPTIONS	
• Tree Topping • Remove Trees with Helicopter • Fell Trees and Lop Slash • Girdling	• Most appropriate for selective vegetation removal over small areas. • Most appropriate for use in environmentally sensitive area (e.g. rare species habitats, ACECs, in wetlands, near public water supplies).
TIER 2: LOW IMPACT OPTIONS	
• Fell/Lop/Cut-surface Treatment • Fell/Frill-and-inject Treatment • Fell/Selective Basal Treatment	• Most appropriate for selective vegetation removal, particularly if species have high sprouting potential. • Any option involving chemical use should comply with 333 CMR 11.00 and related Department of Food and Agriculture guidance.
TIER 3: MODERATE IMPACT OPTIONS	
• Selective Foliar Treatment • Pull Trees Down • Mechanized Felling • Frill-and-inject/Pull Trees Down • Mechanized Felling/Cut-surface Treatment	• May be acceptable if wetland soils are capable of supporting heavy equipment. • May be most cost-effective for use over large areas. • May be preferred option when removal of dense vegetation is required. • Any option involving chemical use should comply with 333 CMR 11.00 and related Department of Food and Agriculture guidance.
TIER 4: HIGH IMPACT OPTIONS	
• Clearing and Grubbing • Push Trees Over • Shear Trees with Bulldozer • Build an Impoundment • Frill-and-inject/Push Trees Over • Shear Trees with Bulldozer/Cut-surface Treatment • Prescribed Burning	• May be preferred option only if Tier 1-3 options are infeasible and wetland soils are capable of supporting heavy equipment. • May be most cost-effective for use over large areas. • Any option involving chemical use should comply with 333 CMR 11.00 and related Department of Food and Agriculture guidance.

TABLE 2-7
POTENTIAL DIRECT AND INDIRECT IMPACTS
RELATED TO VEGETATION REMOVAL ACTIVITIES IN WETLANDS

Potential Direct Impacts:

- Loss of habitat related to removal of tree trunks and canopy.
- Wetland sediment disturbance and/or compression by vegetation removal equipment.
- Disturbance and/or destruction of herbaceous and shrub vegetation layers.
- Displacement of organisms.
- Altered habitat due to increased penetration of sunlight/decreased shading.
- Chemical release into wetlands (e.g., accidental releases of equipment fuels or herbicides).

Potential Indirect Impacts:

- Localized increases in soil, water, and air temperature.
- Destabilized soils and erosion, potentially leading to sedimentation in nearby wetland areas.
- Changes in community structure (e.g., loss of light intolerant plants and organisms) and food chain dynamics.
- Altered surface water drainage and groundwater flow patterns (due to removal of tree trunk and root systems).
- Increase in groundwater level due to loss of evapotranspiration associated with removed trees.
- Invasion and colonization of cleared areas by opportunistic (and often less valuable) plant species.
- Increase in species diversity (in areas with monotypic forest stands).
- Decrease in primary productivity and nutrient cycling.
- Biotoxicity/bioaccumulation/bioconcentration of contaminants and subsequent ecotoxicological effects.

TABLE 2-8

MAXIMUM POTENTIAL WETLAND IMPACTS AT EACH AIRPORT*

AIRPORT	EMERGENT WETLANDS (acres)	SCRUB-SHRUB WETLANDS (acres)	FORESTED WETLANDS (acres)	TOTAL WETLANDS (acres)	BANK (feet)
Barnstable Municipal	0.0	0.0	8.1	8.1	12,900
Barre-Tanner-Hiller	0.0	0.0	4.2	4.2	25,000
Bedford-L.G. Hanscom Field	0.0	0.0	166.0	166.0	59,600
Beverly Municipal	0.0	1.3	98.7	100.0	25,000
Boston-Logan Int'l	0.0	0.0	0.0	0.0	0
Chatham Municipal	0.0	0.0	0.0	0.0	12,100
Edgartown-Katama Airpark	0.0	0.2	0.0	0.2	0
Fall River Municipal	0.0	2.8	6.7	9.5	18,300
Falmouth	0.0	0.0	0.0	0.0	0
Fitchburg Municipal	0.0	2.1	0.0	2.1	37,900
Gardner Municipal	0.0	6.8	34.3	41.1	15,200
Great Barrington	0.0	3.0	27.8	30.8	9,200
Hanson-Cranland	0.0	0.0	19.2	19.2	3,100
Haverhill-Riverside	0.0	0.0	0.0	0.0	7,300
Hopedale-Draper	0.0	0.0	10.8	10.8	12,900
Lawrence Municipal	0.0	0.0	12.1	12.1	43,300
Mansfield Municipal	0.0	0.0	9.3	9.3	21,700
Marlboro	0.0	0.0	17.0	17.0	14,000
Marshfield Municipal	0.0	3.3	134.7	138.0	18,300
Marston Mills	0.0	0.0	0.0	0.0	3,800
Martha's Vineyard	0.0	0.0	**0.0	**0.0	0
Montague-Turners Falls	0.0	0.0	0.0	0.0	1,500
Nantucket Memorial	0.0	0.0	0.0	0.0	0
New Bedford Municipal	0.0	9.6	260.5	270.1	35,400
Newburyport	0.0	3.2	12.9	16.1	600

* Note - Estimates are based on forested wetlands located within the 100-foot elevation study limits and scrub-shrub wetlands located within the 20-foot elevation study limits presumably could require vegetation removal. These estimates of the maximum potential impact are a worst-case scenario.

** Area of potential wetland impacts is less than 0.1 acres.

TABLE 2-8 (CONTINUED)
MAXIMUM POTENTIAL WETLAND IMPACTS AT EACH AIRPORT*

AIRPORT	EMERGENT WETLANDS (acres)	SCRUB-SHRUB WETLANDS (acres)	FORESTED WETLANDS (acres)	TOTAL WETLANDS (acres)	BANK (feet)
Norfolk	0.0	0.0	30.8	30.8	10,000
North Adams-Harriman and West	0.0	0.0	1.4	1.4	9,600
Northampton	0.0	0.0	0.0	0.0	2,100
Norwood Memorial	0.0	19.9	41.2	61.1	48,300
Orange Municipal	0.0	2.0	5.9	7.9	12,500
Oxford	0.0	0.0	3.5	3.5	7,500
Palmer Metropolitan	0.0	2.3	21.4	23.7	14,400
Pepperell	0.0	0.0	3.3	3.3	15,800
Pittsfield Municipal	0.0	0.3	62.5	62.8	42,700
Plymouth Municipal	0.0	0.0	1.7	1.7	3,300
Provincetown Municipal	0.0	0.0	0.0	0.0	0
Shirley	0.0	0.2	10.9	11.1	9,200
Southbridge Municipal	0.0	0.0	8.6	8.6	10,800
Spencer	0.0	0.0	0.0	0.0	0
Sterling	0.0	0.2	35.4	35.5	0
Stow-Minuteman	0.0	3.0	66.5	69.5	30,000
Taunton Municipal	0.0	0.2	26.8	27.0	39,600
Tewksbury-Tew-Mac	0.0	6.2	38.2	44.4	16,300
Westfield-Barnes	0.0	0.0	22.5	22.5	6,700
Westover AFB/ Metropolitan	0.0	0.0	66.9	66.9	51,900
Worcester Municipal	0.0	0.0	12.1	12.1	55,000
TOTALS	0.0	66.4	1,282.0	1,348.4	762,800

* Note - Estimates are based on forested wetlands located within the 100-foot elevation study limits and scrub-shrub wetlands located within the 20-foot elevation study limits presumably could require vegetation removal. These estimates of the maximum potential impact are a worst-case scenario.

Sources: U.S.G.S. topographic maps, U.S. Fish and Wildlife Service National Wetland Inventory maps, DEM Wetlands Conservancy Program orthophotos.

TABLE 2-9
SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS
RELATED TO VEGETATION REMOVAL

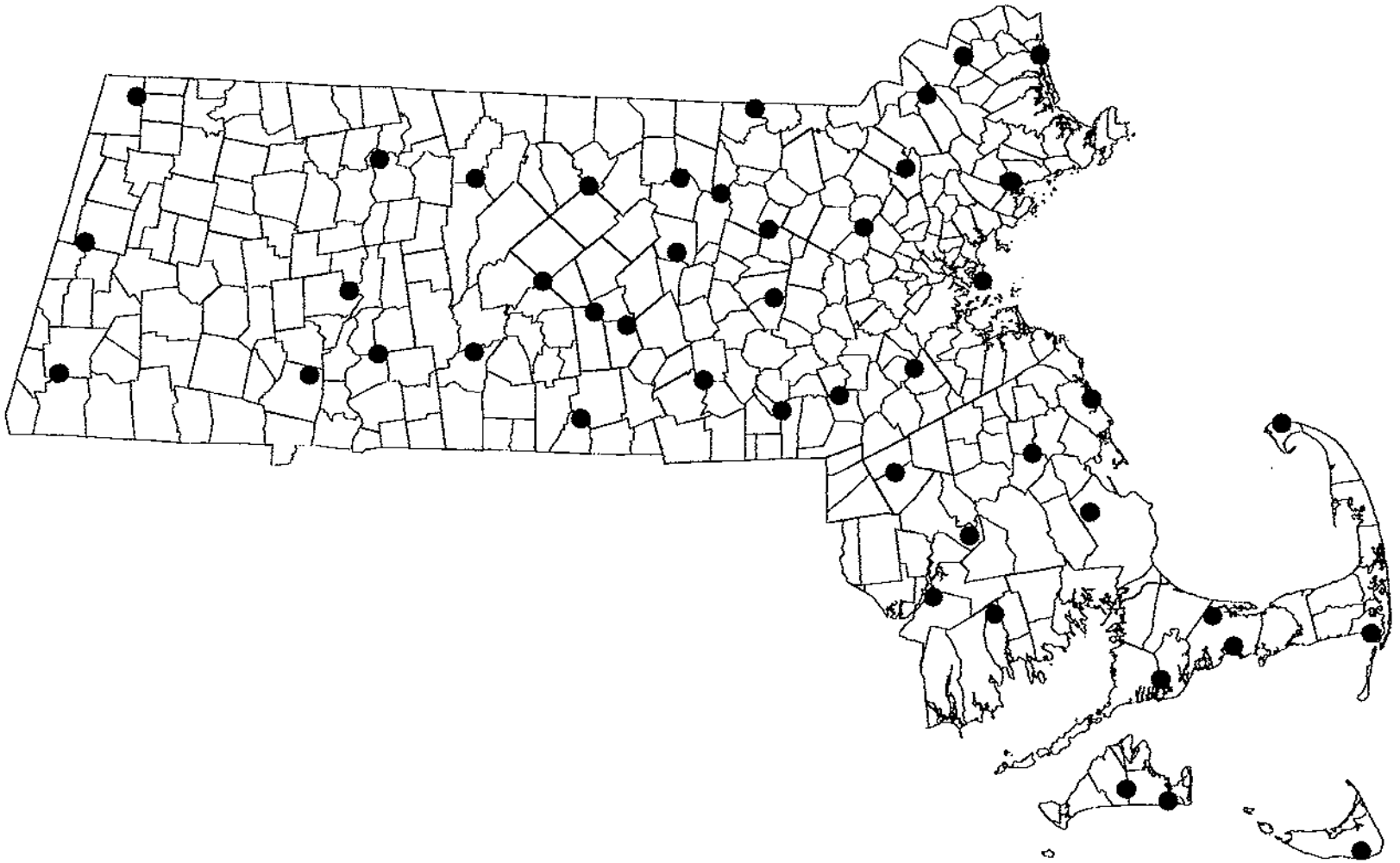
Environmental Characteristic	Short-Term Impact	Long-Term Impact
Topography	o	o
Geology	o	o
Soils	-	o
Surface Water Hydrology and Quality	-	-
Groundwater Hydrology and Quality	-	o
Plant Species and Ecosystems	-/--	o/-/--
Wildlife Species and Ecosystems	-/--	o/-/--
Traffic	-	o
Air Quality	-	o
Noise	-	o/-
Socioeconomic Issues	+	+
Scenic Qualities	o	o
Open Space	o	o
Recreational Resources	o	+
Historic and Archaeological Resources	o/-	o/-
Built Environment and Man's Uses of the Area	o	+
Rare or Unique Site Features	o/-	o/-

Key:

++ = significant positive effect is likely
+ = minor positive effect may occur
o = no significant positive or negative effects are likely
- = minor negative effect may occur
-- = significant negative impact is likely

TABLE 2-10
RELATIVE COST AND APPLICABILITY OF MITIGATION MEASURES

Mitigation Measure	Relative Cost	Applicability to Airport Vegetation Removal Projects
Short-Term Impacts:		
Siltation Barriers	low	Should be used whenever significant soil disturbance will occur.
Runoff Diversion Measures	low	Should be considered, in conjunction with other erosion control measures, when soils on steep slopes will be disturbed.
Sediment Traps or Basins	low to moderate	Should be considered, generally in conjunction with runoff diversion measures, when significant soil disturbance and erosion is likely.
Vegetated Buffer Strips	low	Should be considered, if it will not impede an airport's ability to comply with FAA requirements, in areas adjacent to waterbodies and waterways, particularly if the surface water is significant as a water supply, rare species habitat, or migratory fish run.
Revegetation of Disturbed Areas	moderate	Should be conducted whenever significant soil disturbance will occur.
Construction Timing	low	Whenever possible, vegetation removal activities should occur when the ground is frozen, or at least after a period of dry weather.
Construction Specifications	low	Should be used as appropriate.
Wetland Restoration	moderate to high	Any wetlands disturbed by vegetation removal should be restored to as close to their original condition as possible.
On-Site Wetland Enhancement	moderate to high	Should be used where appropriate and where economically feasible.
Herbicide Application Guidelines	low	Should be used when herbicides are used for vegetative control.
Containment Spill Conting. Plan	low	Should be used when herbicides and/or fuel-powered equipment are used.
Long-Term Impacts:		
Wetland Replication	high	Should be conducted, on a 1:1 basis, for permanently lost wetland functions and values.
Off-Site Wetland Enhancement	moderate to high	Should be considered if tree removal constitutes a significant impact, e.g., to a rare species habitat or a unique vegetational community.
Mitigation Banking	moderate to high	"Joint projects " may be considered if multiple airports in nearby communities require extensive wetland mitigation e.g., replication.
Development Restrictions	low	Can be considered if direct mitigation is infeasible.
Monitoring	low to moderate	Should be conducted if extensive wetland restoration or any wetland creation is proposed.
Compensatory Flood Storage	low to moderate	Compensatory flood storage should be provided if any permanent filling occurs in the 100-year floodplain (bordering land subject to flooding).

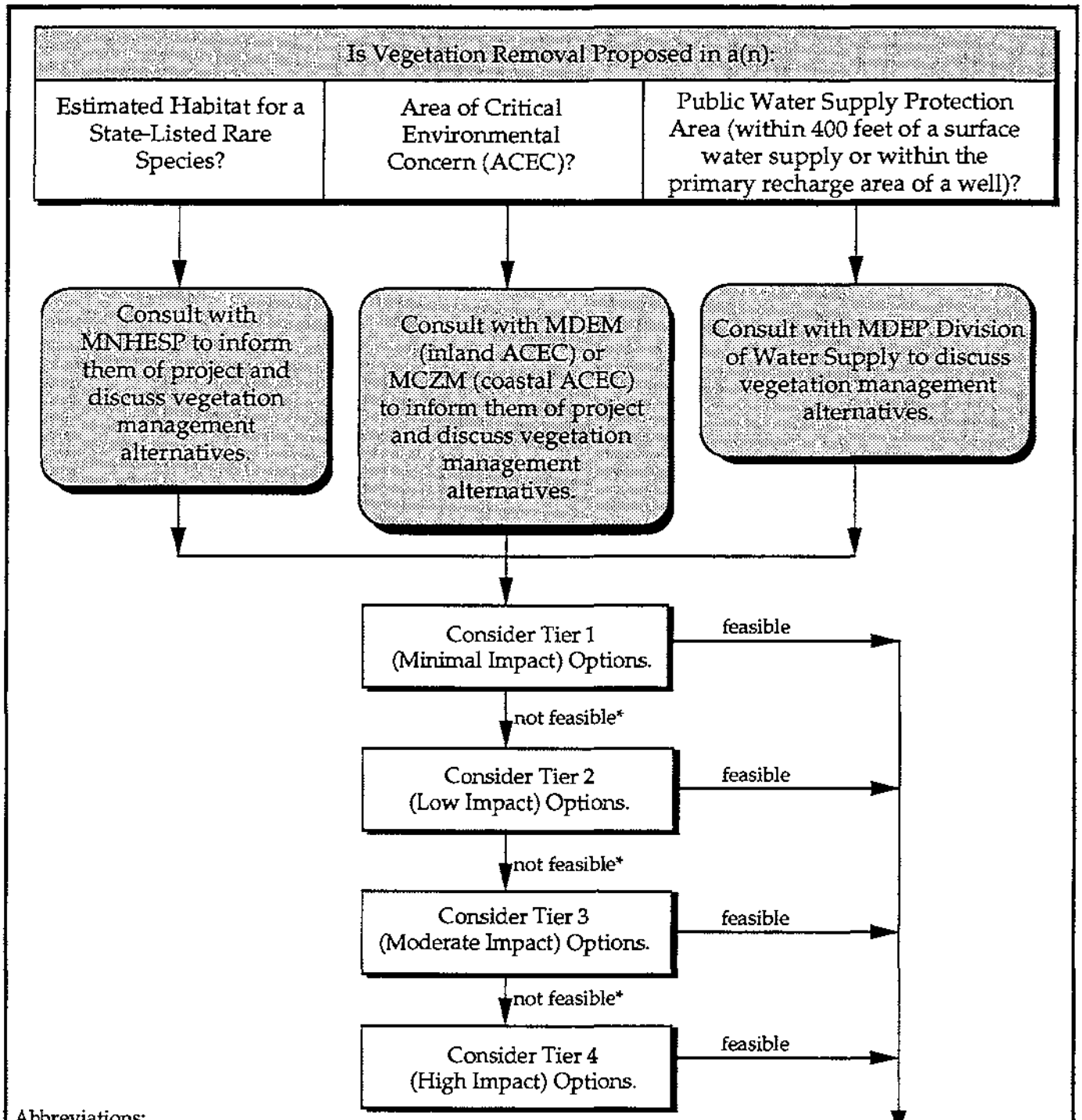


GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

CDM Camp Dresser & McKee Inc.
Cambridge, Massachusetts

August 31, 1993

FIGURE 2-1
MASSACHUSETTS PUBLIC USE AIRPORTS



Abbreviations:

AVRLP	- Airport Vegetation Removal Limited Project
MCZM	- Massachusetts Coastal Zone Management
MDEM	- Massachusetts Department of Environmental Management
MDEP	- Massachusetts Department of Environmental Protection
MNHESP	- Massachusetts Natural Heritage and Endangered Species Program

* *Document infeasibility of each tier of options before considering next tier.*

GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

CDM Camp Dresser & McKee Inc. Cambridge, Massachusetts August 31, 1993

FIGURE 2-2
MODIFIED ALTERNATIVE SELECTION METHODOLOGY FOR SENSITIVE AREAS

FIGURE 2-3
IMPACT MITIGATION MATRIX

KEY:

● = Impact likely to be directly mitigated

○ = Impact likely to be indirectly mitigated

POTENTIAL MITIGATING MEASURES	GENERAL WETLAND IMPACTS									
	Decrease in Wildlife Habitat or Food Source	Soil Erosion	Sedimentation/Siltation in Nearby Wetlands	Permanent Loss of Wetland Resources	Decrease in Flood Storage Capacity	Decrease in Shaded Fishery Habitat	Decrease in Ability to Attenuate Flood Flows	Chemical Release into Wetlands	Turbidity Increases in Open Waters	Bank Destabilization
Siltation Barriers		●	●						●	○
Runoff Diversions		●	●						●	○
Sediment Traps/Basins		●	●						●	○
Vegetated Buffers/Revegetation	●	●	●			○	●		●	●
Construction Timing	○	○	○						○	
Construction Specifications	○	○	○	○	○	○	○	○	○	○
On-Site Wetland Enhancement	●	○	○			●	○			○
Wetland Restoration	●	○	○			○	○			○
Herbicide Application Guidelines								●		
Spill Containment Plan								●		
Wetland Replication	●			●			○			
Off-Site Wetland Enhancement	○			○						
Mitigation Banking				●						
Development Restrictions	○			○						
Monitoring	○			○						
Compensatory Flood Storage					●		●			

Section Three

3.0 PROJECT BACKGROUND AND DESCRIPTION

3.1 PROJECT OVERVIEW

Public safety is a primary concern of everyone involved in the aviation industry. Consequently, the Federal Aviation Administration (FAA) has developed numerous regulations, orders, and advisory circulars designed to promote aviation safety. These documents cover all aspects of airport and aircraft operations including the provision of areas on the ground extending into the airspace above and around each airport where natural and man-made objects are not allowed. These areas, collectively called "Protection Zones" (PZs), are described in greater detail in Section 3.3. At many airports, including those in Massachusetts, vegetation around the airport runways encroaches on the PZs creating potential aviation safety concerns. These natural obstructions create unsafe operating conditions which impede the airports' ability to comply with FAA regulations and to remain eligible for FAA funding for airport improvement projects. Thus, it is imperative that any vegetation that encroaches on the PZs, or will encroach on the PZs in the near future, be removed.

In many cases, obstructing vegetation can be removed by one of many vegetation removal techniques by obtaining few, if any, permits or approvals. However, vegetation removal in wetland areas is more complex because of the many regulations that govern wetland alterations including vegetation removal. The current regulations most pertinent to this project are those associated with the Massachusetts Wetland Protection Act (MWPA), which prohibits alternations in wetland resource areas above the following thresholds:

- 5,000 square feet of bordering vegetated wetland
- 2,000 linear feet of bank
- 10 acres of land subject to flooding

These resource areas are described in greater detail in Section 6.2. In addition, the Massachusetts Environmental Policy Act (MEPA) requires preparation of a lengthy

Environmental Impact Report (EIR) for alterations of more than one acre of bordering vegetated wetlands or ten or more acres of any other resource area protected by the MWPA. Thus, any current vegetation removal activity in wetlands is likely to require extensive and costly environmental reviews at both the local and state levels. (Federal wetland permits may also be required, although they are not the focus of this document.) In some cases, the review process could take as long as two years. Such lengthy permitting processes could lead to significant public safety concerns as the obstructing vegetation continues to grow in height. In addition, these reviews are associated with significant economic implications, both to the airports and their host communities and to the agencies reviewing the permit applications and related documents.

In order to expedite the review process to ensure compliance with FAA regulations related to aviation safety while protecting wetland resources from unnecessary impacts, the Massachusetts Department of Environmental Protection (DEP) has issued proposed amendments to the MWPA. These amendments would allow approval of airport vegetation removal limited projects (AVRLPs) in wetlands at the local level through a streamlined permitting process. The proposed regulatory amendments are described in greater detail in Section 3.4.

The proposed regulatory revisions for airport vegetation removal projects require a GEIR to be developed prior to implementation. MEPA regulations (301 CMR 11.14)(1) recommend the development of a Generic Environmental Impact Report (GEIR) to evaluate environmental impacts and provide an opportunity for the public and other state agencies to review and comment on the proposal. This document is intended to fulfill this requirement.

3.2 BACKGROUND

In late 1991, the Massachusetts Aeronautics Commission (MAC) and the Massachusetts Port Authority (Massport) identified tree growth into PZs as a critical issue at Massachusetts' airports. It was estimated that most of the Commonwealth's 46 public use airports require, or will soon require, vegetation removal to remove obstructions in accordance

with FAA guidelines. It was also determined that for most, if not all, of the airports, some work would be required in wetlands, and that typical vegetation removal projects would not meet MWPA review thresholds. Thus, the proponents would be required to follow an extensive permitting process through the local conservation commission and DEP, eventually resulting in obtaining a variance from the regulations. MAC and Massport, recognizing the potential economic burden and potentially increased risk that could be placed on the airports and DEP, began discussions with DEP and FAA to develop a workable and environmentally sensible action plan. Based on those discussions, DEP drafted a proposed regulatory amendment to the MWPA that was originally published together with several other amendments in the *Environmental Monitor* on February 7, 1992. The regulatory amendment would create a "limited project" provision for safety-related vegetation removal at airports, herein referred to as the airport vegetation removal limited project, or AVRLP. A "limited project" is an activity that is subject to review under the MWPA regulations, but does not have to meet the performance standards for work in a wetland resource area. Currently, there are limited project provisions for electric generating facilities, utilities such as gas, water and sewer lines, and roadways, as defined in 301 CMR 10.24 and 10.53.

In September, 1992, based on extensive public and agency comments on the other proposed amendments that were combined with those for airport vegetation removal projects, the Environmental Notification Form (ENF) for all of the regulatory changes was withdrawn. Subsequently, the proposed amendments to the MWPA were revised and a second draft was submitted and published in the *Environmental Monitor* on November 20, 1992. Revisions in the second draft of the airport-related provisions included an additional step involving adoption of the GEIR as policy by DEP, and placed greater emphasis on protection of rare and endangered species.

Independent of these ENFs, an ENF was filed by MAC and Massport in March 1992 to identify a scope for the GEIR. The Secretary's Certificate on this ENF, which was issued on April 8, 1992, is contained in Section 1.0 of this document along with any related public and agency comments. The Draft GEIR, prepared in accordance with this Certificate, was submitted to MEPA on March 1, 1993. This document was found to adequately

and properly comply with MEPA and its implementing regulations, as recorded in the April 15, 1993 Secretary's Certificate. This Final GEIR has been prepared in response to the April 15, 1993 Certificate and any related comments, all of which are presented in Section 1.0.

3.3 PROJECT NEED AND OBJECTIVES

Massachusetts airports are faced with a complex dilemma: balancing airport operational requirements with compliance with environmental regulations. Airports are required by FAA to maintain PZs to ensure public safety. These areas must be kept free of obstructions to comply with previous federal grants and to remain eligible for FAA future funding. However, current state environmental regulations, particularly those related to wetland alterations, prevent prompt compliance with FAA regulations. In order to fully describe these conflicting requirements, this section briefly describes FAA and state environmental regulations, focusing on the need for the proposed regulatory changes. In addition, the objectives of these changes are presented here.

3.3.1 FAA REQUIREMENTS

The FAA has adopted four key regulations, orders, and advisory circulars (AC) (referred to as regulations for the remainder of this document) regarding the maintenance of PZs at, above, and around airports including:

- 14 CFR Part 77 - Objects Affecting Navigable Airspace
- FAA Advisory Circular 150/5300-13 - Airport Design
- FAA Order 6480.4 - Airport Traffic Control Tower Siting Criteria
- FAA Order 6750.16B - Siting Criteria for Instrument Landing Systems

Each of these regulations is described below.

14 CFR Part 77

14 CFR Part 77 establishes standards for determining whether or not an object or structure is an obstruction, by defining a number of imaginary surfaces above and around airports. The imaginary surfaces include:

- **Primary Surface** - a horizontal plane extending 200 feet from each end of the runway and 125 feet to 500 feet from the centerline of the runway (depending upon type of runway) at the same elevation as the runway end.
- **Approach Surface** - an inclined plane of varying width extending from the end of the primary surface. The slope of the approach surface is a function of the type of runway and the type of landing system (precision instrument or visual approach).
- **Horizontal Surface** - a horizontal plane 150 feet above the established airport elevation.
- **Transition Surface** - an inclined surface with a 7:1 (Horizontal:Vertical) slope connecting the primary and approach surfaces to the horizontal surface.
- **Conical Surface** - an inclined plane with a slope of 20:1 (Horizontal:Vertical) extending from the edge of the horizontal surface out for a horizontal distance of 4000 feet.

An illustration of each surface is shown in Figure 3-1. If an object or structure extends from the ground and penetrates a Part 77 surface, it is considered an obstruction, as shown in Figure 3-2. Part 77 does not make specific recommendations for actions by the airport operator. Rather, it provides the geometric specifications for the imaginary surfaces. If an object penetrates a so-called "Part 77 surface," then the airport has one of two options: remove the object, or modify the airport operations (as discussed in Section 5.0).

Airport Traffic Control Tower (ATCT) Lines of Sight

FAA Order 6480.4 set standards for determining the clearance requirements for ATCTs. The AC requires that there be:

- Maximum visibility of the airfield traffic movement from the ATCT.
- Clear, unobstructed, and direct line of sight to the approaches and all runways, landing areas, and taxiways from the ATCT.

Clearance requirements are established during the planning and design stage of ATCT construction. However, vegetation growth on the non-paved areas of the airfield, particularly on the airfield edge, can impair lines-of-sight of ground movement. In addition, vegetation growth at and beyond runway ends can impair ATCT lines-of-sight to approaching aircraft.

Navigational Aids (NAVAIDS) Clearance Areas

FAA AC 150/5300-13 also describes siting criteria and clearance requirements for NAVAIDS including:

- Microwave Landing Systems (MLS)
- Instrument Landing Systems (ILS)
- Nondirectional Beacons (NDB)
- Very High Frequency Omnirange (VOR)
- Approach Lighting Systems (ALS)
- Omnidirectional Approach Lighting Systems (ODALS)
- Lead-in Lighting Systems (LDIN)
- Airport Rotating Beacons

In addition, FAA Order 6750.16B presents siting criteria for ILSs. Typical NAVAID clearance area requirements are described in Appendix B. The NAVAIDS available at each public use airport in Massachusetts are discussed in Section 4.2.

The ATCT and NAVAIDS regulations are intended to ensure that towers and navigational aids are placed in appropriate locations away from obstructions during initial

construction or installation. In addition, these regulations are used to determine whether or not an object is or will be an obstruction to ATCT or NAVAID operations. Regulation 14 CFR Part 77 is used to determine whether or not an object is an obstruction to air navigation. While the ATCTs and NAVAIDS at Massachusetts airports were originally constructed according to these regulations and any obstructing vegetation was removed, trees and shrubs have since grown into these areas.

These regulations do not specifically require airport operators to eliminate obstructions from PZs. However, compliance with the regulations is an integral part of previous federal grants. If the obstructions are not removed, operators face restrictions on flights or the type of aircraft allowed to use the airports, increased safety concerns, and in some cases, elimination of federal grants for construction projects. In many cases, these restrictions and/or the loss of federal funds would cripple airport operations and possibly force closure of some airports.

3.3.2 STATE ENVIRONMENTAL REGULATIONS

Vegetation removal in wetlands is strictly regulated under MWPA and MEPA. In accordance with MWPA, any project that alters more than 5,000 square feet of wetlands currently requires the proponent to pass through a very lengthy process of reviews and denials leading to a decision by the DEP Commissioner to either allow or deny a variance to the regulation. The current process is summarized below:

- Proponent prepares and submits Notice of Intent (NOI) to local conservation commission
- Site visit and public hearing with local conservation commission
- Conservation commission issues Order denying project
- Proponent requests Superseding Order of Conditions from the DEP regional office
- DEP Issues Superseding Order Denying Project

- Proponent Requests variance from the MWPA performance standards from the DEP Commissioner

- DEP reviews the project and issues a variance

Typically, this process can take up to two years to complete. In addition, any vegetation removal project that involves more than one acre of wetland alterations requires preparation of an EIR under MEPA. The process to complete an EIR generally requires approximately 12 to 18 months.

3.3.3 SUMMARY OF PROJECT NEED

Vegetation removal in order to comply with FAA regulations related to aviation safety is estimated to be presently necessary at most of Massachusetts public use airports. These airports must either remove vegetation that is or soon will be an obstruction, or face difficult operational changes or possible elimination of federal grant funds. When extensive vegetation removal is required in wetlands, existing wetland regulations make compliance with the FAA regulations an unnecessarily costly and lengthy process. Thus, there is an overwhelming public need to develop a streamlined process that would allow airports to remove obstructions from wetlands while minimizing wetland impacts. That solution is a revision to the MWPA to allow vegetation removal for public safety purposes under a "limited project" provision.

3.3.4 OBJECTIVES OF THE PROPOSED REVISION

The objectives of the regulatory revisions are:

- To promote public safety by allowing removal of obstructions from PZs in wetlands in a timely manner

- To ensure that environmental impacts from vegetation removal in wetlands are minimized through careful selection of appropriate clearing techniques and mitigation measures

The most appropriate means to achieve these objectives is through the development of this GEIR. The GEIR will also accomplish other objectives:

- Provide a clear definition of potential environmental impacts and appropriate mitigation measures
- Provide a model NOI to assist airport operators, and ensure that vital environmental data is collected and presented to conservation commissions
- Provide guidelines for Orders of Conditions to assist conservation commissions in their reviews
- Define appropriate long-term vegetation management options to eliminate the need for future large-scale clearing projects

3.4 DESCRIPTION OF PROPOSED REVISION

This section describes the proposed regulatory revision, including changes in the permitting procedures and the long-term implications of these amendments.

3.4.1 PROPOSED REGULATORY REVISION

The proposed regulatory amendment creates a new "limited project" as part of 310 CMR 10.24 and 10.53. The proposed amendment would be added to the existing regulations as sections 10.24(7) and 10.53(3), and is shown below:

> 310 CMR 10.24(7)(d): General Provisions
>
> Notwithstanding the provisions of 310 CMR 10.25 through 10.35, the issuing authority may issue an Order of Conditions and impose such conditions as will contribute to the protection of the interests of the Act permitting airport vegetation removal projects (although no such project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.37). Said projects are limited to those projects which the Federal Aviation Administration (FAA) has confirmed in writing as being undertaken in order to comply with 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), as amended, on airports managed by the Massachusetts Port Authority and those

airports subject to certification by the Massachusetts Aeronautics Commission pursuant to M.G.L. c. 90 §39B.

Any order issued under this section shall contain the following conditions, in addition to any other conditions deemed necessary by the issuing authority:

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

2. the removal of trees shall occur only during those periods when the ground is sufficiently frozen, dry, or otherwise stable to support the equipment used;

3. 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, Field Office Technical Guide of Standard Practices (Section IV), as amended; and,

4. 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 the water body.

The provisions of these regulations shall become effective upon Certification from the Secretary of Environmental Affairs of the Final Generic Environmental Impact Report (GEIR) and the formal adoption by the Department of a Division of Wetlands and Waterways policy based on the GEIR findings.

This regulation does not apply to the construction of new airport facilities or to the expansion of existing airport uses.

10.53: General Provisions

(3) Notwithstanding the provisions of 310 CMR 10.54 through 10.57 and 10.60, the issuing authority may issue an Order of Conditions and impose such conditions as will contribute to the interests identified in the Act permitting the following limited projects (although no such project may be permitted which will have any adverse effect on specified habitat sites of rare vertebrate or invertebrate species, as identified by procedures established under 310 CMR 10.59):

(n) Airport vegetation removal projects which the Federal Aviation Administration (FAA) has confirmed in writing as being undertaken in order to comply with 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) as amended, on airports managed by the Massachusetts Port Authority and those airports subject to certification by the Massachusetts Aeronautics Commission pursuant to M.G.L. c. 90 §39B. Any order issued under this section shall contain the

following conditions, in addition to any other conditions deemed necessary by the issuing authority:

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

2. the removal of trees shall occur only during those periods when the ground is sufficiently frozen, dry, or otherwise stable to support the equipment used;

3. 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, Field Office Technical Guide of Standard Practices (Section IV), as amended; and

4. 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 the water body.

The provisions of these regulations shall become effective upon Certification from the Secretary of Environmental Affairs of the Final Generic Environmental Impact Report (GEIR) and the formal adoption by the Department of a Division of Wetlands and Waterways policy based on the GEIR findings.

This regulation does not apply to the construction of new airport facilities or to the expansion of existing airport uses.

The amendment only covers clearing trees and shrubs within PZs as part of a program to comply with FAA regulations. This amendment will allow local conservation commissions to issue an Order of Conditions for projects that would currently require a variance by the state DEP.

3.4.2 COMPARISON OF EXISTING AND PROPOSED REGULATORY REVIEW PROCESS

MWPA Regulations

As currently written, the MWPA regulates vegetation removal projects the same as any other projects that affect wetlands. Essentially, these projects must meet the performance standards for individual "wetland resource areas" as defined in the regulations.

If the removal project cannot meet the performance standards, the project cannot be approved by the conservation commission by an Order of Conditions. Rather, after being denied an Order of Conditions from the local conservation commission and a Superseding Order of Conditions by the regional DEP office, the proponent must file for and obtain a variance to the regulations from the Commissioner of DEP.

Under the proposed regulatory revision, the proponent would be required to submit a Notice of Intent in accordance with the MWPA (with additional information as described in Section 9.0) to the conservation commission for review. The project would be reviewed by the conservation commission as they would for all "limited projects" and an Order of Conditions would be issued as long as the conservation commission agrees that the proposed project will not adversely impact the functions and values of the affected wetland(s). (If the AVRLP has been designed in accordance with the GEIR guidelines and recommendations, the functions and values of the affected wetlands should not be adversely affected.) DEP will only be involved if the Order of Conditions or Superseding Order of Conditions is appealed or denied (e.g., if a rare species will be impacted).

MEPA Regulations

Currently, any vegetation removal project that involves alteration of more than one acre of bordering vegetated wetlands or more than 10 acres of any other state-protected wetland resource area requires submittal of an ENF and EIR. However, once the GEIR is approved, a proponent will not be required to submit either an ENF or EIR for the project in accordance with 301 CMR 11.14(2). The only exception to this regulation is when the Secretary of the Executive Office of Environmental Affairs invokes the Fail-Safe Provision, as described in 301 CMR 11.03(6), to require additional MEPA review. It should also be noted that 301 CMR 11.14(2) requires submission of a new ENF within two years of submission of this final GEIR.

3.4.3 LIMITATIONS AND IMPLICATIONS

Limitations

As noted in the proposed regulatory revision, there are several limitations on the type and nature of the AVRLPs covered by the amendment. These limitations include:

- These provisions apply to public use airports (airports managed by Massport or subject to certification by MAC)
- The need for each vegetation removal project must be confirmed in writing by FAA as being undertaken to comply with FAA regulations
- The amendment does not apply to construction of new or expansion of existing facilities
- Changes in topography, soils, or surface water levels are not allowed except for temporary access roads
- Tree removal can only occur when the ground is frozen, dry, or able to support equipment
- Steps must be taken to prevent erosion
- All cut materials must be kept more than 25 feet from the bank of a water body
- The AVRLP may not cause an adverse impact on rare or endangered species or ACECs.

In addition, in order for the AVRLP provision to become effective, this GEIR must be approved by the Secretary of the Executive Office of Environmental Affairs (EOEA), and approved and accepted as Departmental policy by DEP.

It should also be emphasized that AVRLPs are still subject to all other applicable state and federal regulations. The burden is on each project proponent to ensure that all applicable permits and approvals are obtained prior to commencing vegetation removal activities. A list of likely permit and approval requirements for AVRLPs is presented in Section 2.10.2.

Implications

The implications of the proposed regulatory amendment to the statewide wetland resources is one focus of this GEIR. The potential statewide wetland impact associated with AVRLPs, as estimated in Section 6.5, would likely occur with or without the regulatory revision. Thus, in reality, the overall impact to statewide wetland resources would not be different, whether or not the revisions are accepted. The revisions, however, ensure a more timely response to aviation safety issues while also affording greater local control over airport vegetation removal projects.

In addition, wetland resource protection for AVRLPs may actually be strengthened through development of this GEIR. This GEIR presents a comprehensive evaluation of the impacts of vegetation removal on wetlands, identifies appropriate vegetation removal methods, defines effective mitigation measures, and provides guidance both in preparation of the NOI for project proponents and development of effective Orders of Condition for conservation commissions. The document provides a comprehensive assessment of potential wetland impacts and specific guidance for ensuring their protection.

3.5 GEIR CONTENTS AND REVIEW PROCESS

This GEIR is a diverse document that provides guidelines and recommendations related to all aspects of airport vegetation removal projects in addition to an assessment of the environmental impacts related to these projects. Specifically, the document includes the following:

- A description of the project background, need and objectives
- A description of the existing conditions at the affected airports, including the estimated number and extent of likely airport vegetation removal projects in wetlands

- An alternatives analyses focusing on various vegetation removal options, and possible operational changes at airports

- An impact assessment describing the general and maximum potential statewide wetland impacts related to AVRLPs

- Guidelines for conducting site-specific wetland impact assessments for AVRLPs.

- A discussion of potential short- and long-term impact mitigation measures

- Guidelines for preparing long-term vegetation management plans, focusing on eliminating large-scale vegetation removal projects in the future

- Guidelines for preparing NOIs for vegetation removal projects to assist airport operators and ensure that critical environmental information is collected and presented to conservation commissions

- Guidelines for development of Orders of Conditions to assist conservation commissions in project reviews

While portions of this report are applicable to vegetation removal in upland areas, the document focuses on vegetation removal in wetlands.

The GEIR review process and approval is identical to the normal EIR review conducted by EOEA through the MEPA Unit. The process involves:

- Development of a Draft GEIR by the proponent, in this case the Massachusetts Aeronautics Commission (MAC) and the Massachusetts Port Authority (Massport), in cooperation with DEP and FAA.

- Review and comment by the public, local and state officials.

- Issuance of the Secretary's Certificate on the Draft GEIR, including requirements for revision of the draft document and response to comments on the draft document.

- Development of a Final GEIR based on the Secretary's Certificate and the comments.

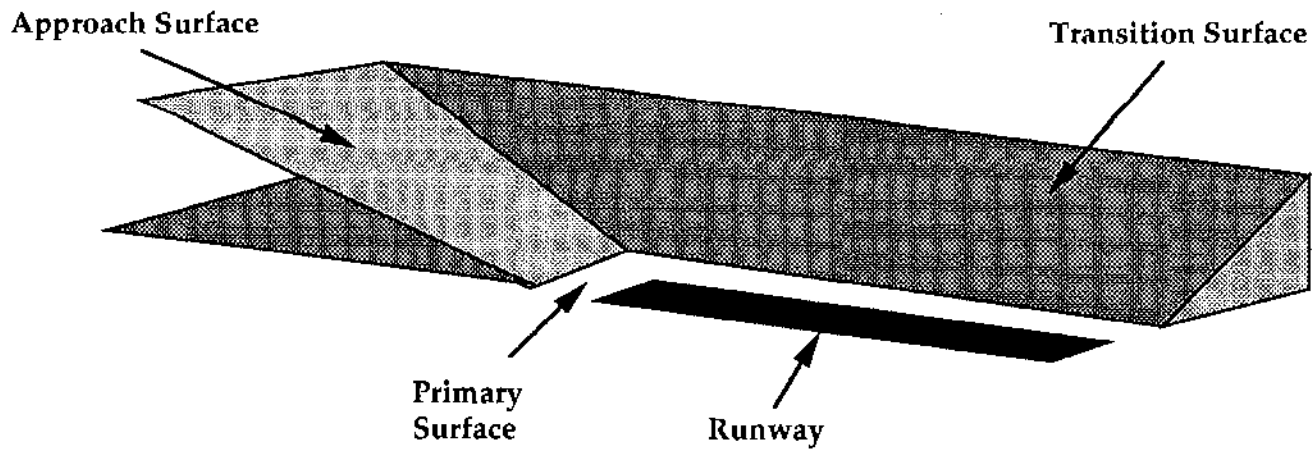
- Review and comment on the final GEIR by the public, and local and state officials.

- Issuance of the Secretary's Certificate on the Final GEIR, stating that the Final GEIR complies with MEPA and no further action is required; that the Final GEIR

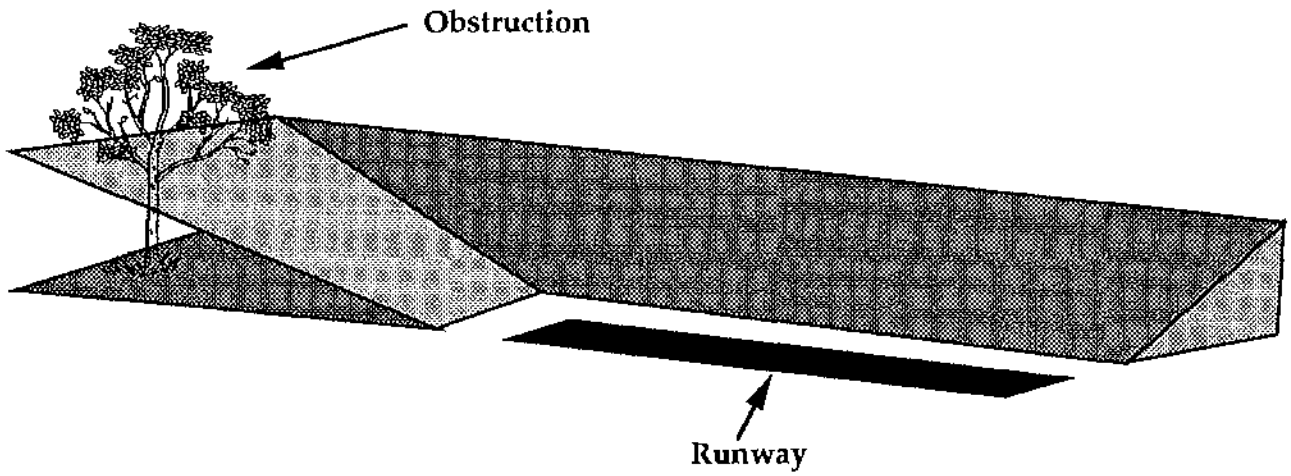
complies with MEPA but additional responses to comments are required; or that a Supplemental GEIR is required to respond to comments and address outstanding issues.

Once the GEIR has been approved, and its recommendations and guidelines are adopted by DEP as policy, airports requiring vegetation removal in wetlands will be required to submit an NOI to the local conservation commission. In accordance with 301 CMR 11.14(2), the proponent will no longer be required to submit an Environmental Notification Form or an EIR for vegetation removal projects in PZs.

It should be noted that the proposed regulatory revision will not affect the type or extent of wetland impacts that will result from airport vegetation removal projects. Airports must seek approval for their vegetation removal projects under both the existing and the proposed regulations. Because of the urgent public need for these projects, airport vegetation removal projects would ultimately be allowed under either process. The proposed regulatory revision merely offers a streamlined mechanism for their review and approval.



TYPICAL PART 77 SURFACES



OBSTRUCTION PENETRATING APPROACH SURFACE

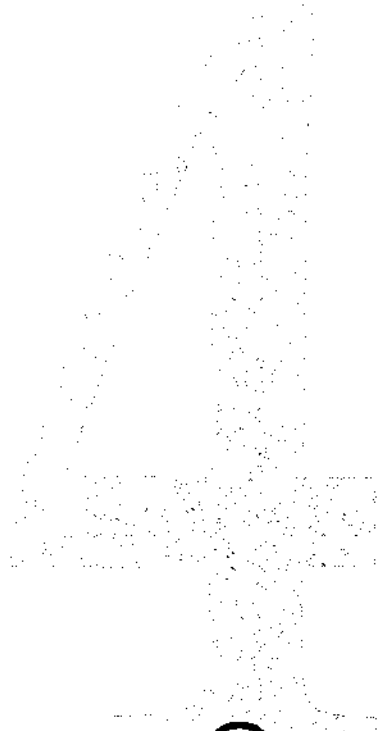
GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

CDM Camp Dresser & McKee Inc.
Cambridge, Massachusetts

August 31, 1993

FIGURE 3-1

TYPICAL PART 77 SURFACES AND OBSTRUCTIONS



Section Four

4.0 EXISTING CONDITIONS

4.1 INTRODUCTION

A typical existing conditions section of an environmental impact report (EIR) presents a detailed assessment of the current environmental setting at an individual site or a small group of sites. Because this generic EIR was developed to evaluate the proposed impact of vegetation removal at 46 different sites, most of the existing conditions are described on a generic basis only. In order to evaluate the nature of the statewide resources, the potentially affected areas at each airport and the location and extent of wetland resources within these areas are identified.

This section first identifies the affected airports and the potential vegetation removal areas at each airport. Next, wetland areas within the potential clearing areas are identified and quantified. This information is then used in Section 6.5 to assess the potential statewide wetland impact related to airport vegetation removal limited projects (AVRLP).

4.2 AFFECTED AIRPORTS

A total of 46 airports are currently affected by the proposed regulatory revision. All 46 are public use airports, including two airports owned by the Massachusetts Port Authority (Massport) (Boston-Logan International Airport and L.G. Hanscom Field) and 44 airports that are subject to certification by the Massachusetts Aeronautics Commission (MAC). The airports range in size from very large facilities with numerous runways to small, single-runway, general aviation facilities. The airports that are the subject of this GEIR are generally termed public use airports, meaning that they are either publicly-owned, or privately-owned but allow public use. Each airport is listed in Table 4-1, and the approximate location of each airport is shown in Figure 4-1. The facilities

that are available at each airport, including the number of runways, an air traffic control tower (ATCT), or navigational aids (NAVAIDS), are summarized in Table 4-2.

4.3 POTENTIAL TREE CLEARING ACTIVITIES

As discussed in Section 3.3, FAA developed a series of regulations designed to promote aviation safety by identifying and eliminating objects from Protection Zones (PZs). These regulations include:

- **14 CFR Part 77** - Objects Affecting Navigable Airspace. This regulation defines imaginary surfaces at airports that must remain obstruction-free in order to allow safe landings and takeoffs, as well as airfield movements.
- **FAA Advisory Circular (AC) 150/5300-13** - Airport Design. This AC describes design and siting criteria for airport facilities, including ATCTs and NAVAIDS. Of particular concern for this project are the clearance requirements to ensure adequate visibility for the ATCT and to minimize interference on NAVAID performance.
- **FAA Order 6480.4** - Airport Traffic Control Tower Siting Criteria. This order defines additional criteria for siting ATCT, and also defines clearance requirements to allow adequate lines of sight from the ATCT to aircraft on the ground and approaching the airport from the air.
- **FAA Order 6750.16B** - Siting Criteria for Instrument Landing Systems. This order defines specific siting criteria for instrument landing systems including clearance requirements around the equipment.

The PZs were identified at each airport according to these regulations, and then the potential vegetation removal areas were identified. It should be emphasized that this section identifies those areas that may at some time require vegetation removal. It does not necessarily mean that all of these areas currently require vegetation removal, or even that they will all eventually require vegetation removal. In other words, it is a worst-case estimate of the potential extent of the need for vegetation removal around airports.

In order to determine the extent of potential vegetation removal areas, first the PZs were determined for each airport as shown in Figure 4-2a. Of the five Part 77 surfaces, only the primary, approach, and transition surfaces begin at the ground and reach up to and exceed 100 feet. Thus, only these three Part 77 surfaces were used in this assessment.

Also, each airport with an ATCT was evaluated to determine required clearance areas for proper lines-of-sight. However, it was determined that in all 11 cases of ATCTs, the clearance areas did not extend beyond the Part 77 surfaces. Thus, ATCT lines-of-sight are not delineated on Figure 4-2a. In addition, only two airports have NAVAID clearance areas that extend beyond the Part 77 surfaces. For these areas, the mapped PZs include both the Part 77 surfaces and the NAVAID clearance areas.

The next step was to define the study area limits, which are the areas within the mapped PZs where vegetation removal from wetlands could be necessary. The study area was defined based on the following assumptions:

- Trees in forested wetlands rarely exceed 70 feet in height. However, in order to allow leeway to account for trees of unusual height, it has been conservatively assumed that trees may extend up to 100 feet above the runway and elevations. Therefore, forested wetlands located within the 100-foot elevation may require vegetation removal.

- Shrubs in scrub-shrub wetlands around the airports may extend up to 20 feet above the runway and elevations. (Wetlands with vegetation extending beyond this height are considered forested wetlands.) Therefore, scrub-shrub wetlands located within the 20-foot limit may require vegetation removal.

- Emergent wetlands immediately adjacent to the airports will generally not extend beyond the runway and elevations. Therefore, vegetation removal in emergent wetlands will generally not be required.

Thus, the study limits for the project were defined as the 100-foot PZ elevation for forested wetlands and the 20-foot PZ elevation for scrub-shrub wetlands. Figure 4-2b shows the study limits for a typical Massachusetts airport. The study limits for all 46 airports are shown on the maps in Appendix A.

These areas are considered a conservative, "worst case" estimate for the following reasons:

- Even the tallest trees in most forested wetlands do not reach heights of 100 feet (few grow taller than 50 feet); and many scrub-shrub wetlands do not reach heights of 20 feet.
- Wetlands, by definition, are typically located at a low elevation in the landscape. Thus, most wetlands around airports will be located below the base airport elevations.
- If selective vegetation removal is conducted, as may be the case at many airports, the actual wetland areas impacted (based on the methodologies presented in Section 6.3) will be significantly less than the total area of vegetation removal noted here.

Summary of Potential Vegetation Removal Areas

Four FAA Orders, ACs, and regulations that set minimum standards for clearance requirements at airports have been described. The most restrictive of these requirements is the Part 77 surfaces, with some additional removal requirements for NAVAIDS. Compliance with these regulations is required under prior federal grants. However, FAA applies operating rules and terminal instrument procedures (TERPS) to determine and enforce removal of obstructions. If identified obstructions are not removed, FAA will change the airport operating procedures, or withhold funding for other development or maintenance projects, until the objects are removed.

The study limits at each of the 46 airports were determined using a 100-foot ceiling as a conservative estimate of maximum tree growth, and a 20-foot ceiling as the maximum shrub height. The study limit areas are summarized in Table 4-3 and shown for each airport in Appendix A.

4.4 RESOURCE AREAS

This section describes both federally- and state-defined wetland resource and rare species habitat areas, as well as Areas of Critical Environmental Concern (ACEC) near each of the public use airports. The delineation of each area is described below.

4.4.1 WETLAND RESOURCE AREAS

State- and federally-protected wetland resource areas were identified, and mapped where feasible, at each of the 46 airports based on available data. The primary information source for these resources was the US Fish and Wildlife Service National Wetland Inventory (NWI) maps, the US Soil Conservation Service (SCS) soil surveys and the Federal Emergency Management Agency (FEMA) Flood Insurance Rate Maps (FIRM) because they were available for all of the affected airports. In addition, aerial photographs, town wetland maps, and DEP Wetlands Conservancy Program orthophotos were used, where available. Table 4-4 summarizes the inland and coastal wetland resource areas that were identified within the study area limits at each airport. As shown by this table, a total of 44 airports have wetlands or wetland resource areas within the study limits.

For the purposes of this study, wetlands were divided into two main categories: "wetlands," defined here as those areas that meet both the federal wetland criteria and the state's criteria for bordering vegetated wetlands (BVW) (a more detailed explanation is contained in Section 6.0); and other state "wetland resource areas" such as banks, land under water, and land subject to flooding. "Wetlands" were then subdivided into three categories -- forested, scrub-shrub, and emergent -- based on information provided by the NWI maps and the DEP orthophotos. Forested, scrub-shrub, and emergent wetlands were mapped to approximately one-half mile beyond the study area, as shown in Figure 4-3 and the maps in Appendix A. The approximate boundaries of land under water bodies and waterways, inland bank, and many of the coastal wetland resource areas, are also shown on these maps. Table 4-5 summarizes the approximate area of forested,

scrub-shrub, and emergent wetlands, and the approximate length of bank, within the study area limits at each airport. As noted in Table 4-5, a total of approximately 1,282 acres of forested wetlands, 660 acres of scrub-shrub wetlands, 304 acres of emergent wetlands, and 762,800 linear feet of bank are located within the study limits. An assessment of the potential impact to these areas is presented in Section 6.5.

It should be noted that the locations or extent of the mapped wetland resource areas were not field verified. Thus, the mapping was used only as a tool to identify the approximate locations and extent of wetlands that may require AVRLPs around Massachusetts public use airports. The maps should not be used to determine whether or not jurisdictional wetlands are present at any given airport.

4.4.2 OTHER SENSITIVE RESOURCE AREAS

Rare and Endangered Species

Rare species habitats near the potentially affected airports were identified and mapped using the 1992 Atlas of Estimated Habitats of State-listed Rare Wetlands Wildlife. As shown in Table 4-4, and on the maps in Appendix A, rare species habitat was identified within the study area at 20 of the 46 airports. As discussed in Sections 6.0 and 9.0, the type of species located at each of these airports, and whether or not they will be affected by a given AVRLP, must be assessed on a case-by-case basis. This assessment should be conducted through consultation with the Massachusetts Natural Heritage and Endangered Species Program (NHESP). Further, since the estimated habitat maps are continually updated, and since the maps do not address rare plants, NHESP and/or the local conservation commission should be contacted during the planning stage of any AVRLP to identify potentially affected rare species.

Areas of Critical Environmental Concern

Areas of Critical Environmental Concern (ACECs) were identified and mapped through a review of records at the Massachusetts Coastal Zone Management Office (CZM) for coastal areas, and the Massachusetts Department of Environmental Management (DEM) for inland areas. As shown in Table 4-4, potential vegetation removal areas are located within ACECs at four airports.

4.5 OTHER ENVIRONMENTAL ELEMENTS THAT MAY BE AFFECTED

Typical EIRs evaluate the impacts on a variety of environmental issues as noted below:

- Topography, geology and soils
- Surface water and groundwater hydrology and quality
- Plant and animal species and ecosystems
- Traffic, air quality and noise
- Socioeconomic issues
- Scenic qualities, open space, and recreational resources
- Historic and archaeological resources
- The built environment and man's uses of the area
- Rare or unique features of the site and its environs

Because of the generic nature of this document, it is impossible to describe these elements on a site-by-site basis. The general impacts that may occur as a result of tree clearing activities are discussed in Section 6.6.

4.6 SUMMARY OF EXISTING CONDITIONS

PZs were identified and mapped at each of the 46 public use airports, including Part 77 surfaces, ATCT lines-of-sight, and NAVAID clearance requirements. In order to characterize the type of wetland that may be affected by tree clearing, two elevations

corresponding to the 20- and 100-foot contours were used to define the study limits. Based on available maps and other information, 45 of the 46 airports are estimated to have some type of wetland resource area or other sensitive environmental resource within the study area limits, as shown in Table 4-4. Further, a total of approximately 2,246 acres of wetlands are located within the study limits. Several issues should be noted here:

- These values represent the maximum amount of potential vegetation removal in wetlands around the public use airports. It does not mean that vegetation will be removed in each area.
- This analysis only identified whether or not an area is forested. It does not account for tree height, and thus does not account for areas where trees have not or will not penetrate PZs.
- Even the tallest trees in most forested wetlands do not reach heights of 100 feet; and many scrub-shrub wetlands do not reach heights of 20 feet.
- Wetlands, by definition, are typically located at a low elevation in the landscape. Thus, most wetlands around airports will be located below the base airport elevations.
- If selective vegetation removal is conducted, as may be the case at many airports, the actual wetland areas impacted (based on the methodologies presented in Section 6.3) will be significantly less than the total area of vegetation removal noted here.
- The analysis relied on existing data, and could not account for areas that appear forested but have been cleared since the original data was gathered, or wetland areas that are not indicated as wetlands on the available maps.

Essentially, the analysis presented here provides a very conservative, "worst case" estimate of the area potentially affected by vegetation removal.

Finally, there are 20 airports where rare or endangered species have been identified, and there are four airports where PZs fall within ACECs.

TABLE 4-1

AIRPORTS AND AFFECTED COMMUNITIES

AIRPORT	AIRPORT I.D. No.	COMMUNITIES AFFECTED
Barnstable Municipal	HYA	Barnstable Hyannis
Barre-Tanner-Hiller	8B5	Barre
Bedford-L.G. Hanscom Field	BED	Bedford Concord Lexington Lincoln
Beverly Municipal	BVY	Beverly Danvers Wenham
Boston-Logan Int'l	BOS	Boston Winthrop
Chatham Municipal	0B6	Chatham
Edgartown-Katama Airpark	1B2	Edgartown
Fall River Municipal	FLR	Fall River
Falmouth	5B6	Falmouth
Fitchburg Municipal	FIT	Fitchburg Leominister
Gardner Municipal	GDM	Gardner Hubbardston
Great Barrington	GBR	Great Barrington
Hanson-Cranland	MA02	Hanson
Haverhill-Riverside	MA04	Haverhill
Hopedale-Draper	1B6	Hopedale
Lawrence Municipal	LWM	Lawrence North Andover
Mansfield Municipal	1B9	Mansfield Norton
Marlboro	9B1	Marlboro
Marshfield Municipal	3B2	Marshfield
Marston Mills	2B1	Marston Mills
Martha's Vineyard	MVY	Edgartown West Tisbury
Montague-Turners Falls	OB5	Montague
Nantucket Memorial	ACK	Nantucket
New Bedford Municipal	EWB	Dartmouth New Bedford

TABLE 4-1 (CONTINUED)

AIRPORTS AND AFFECTED COMMUNITIES

AIRPORT	AIRPORT I.D. No.	COMMUNITIES AFFECTED
Newburyport	2B2	Newburyport
Norfolk	MA07	Norfolk
North Adams-Harriman and West	2B6	North Adams
Northampton	7B2	Northampton
Norwood Memorial	OWD	Norwood
Orange Municipal	ORE	Athol Orange
Oxford	MA08	Oxford
Palmer Metropolitan	PMX	Palmer
Pepperell	MA09	Pepperell
Pittsfield Municipal	PSF	Pittsfield
Plymouth Municipal	PYM	Carver Plymouth
Provincetown Municipal	PVC	Provincetown
Shirley	9B4	Shirley
Southbridge Municipal	3B0	Southbridge Charlton
Spencer	MA10	Spencer
Sterling	3B3	Sterling
Stow-Minuteman	6B6	Stow Boxboro
Taunton Municipal	TAN	Taunton
Tewksbury-Tew-Mac	B09	Tewksbury
Westfield-Barnes	BAF	Westfield
Westover AFB/ Metropolitan	CEF	Chicopee Granby Ludlow
Worcester Municipal	ORH	Leicester Worcester

TABLE 4-2

AIRPORT FACILITIES SUMMARY

AIRPORT	NUMBER OF RUNWAYS	AIR TRAFFIC CONTROL TOWER	NAVAIDS	
			APPROACH LIGHTS	WIND DIR.
Barnstable Municipal	2	X	X	X
Barre-Tanner-Hiller	1		X	X
Bedford-L.G. Hanscom Field	2	X	X	X
Beverly Municipal	3	X	X	X
Boston-Logan Int'l	5	X	X	X
Chatham Municipal	1		X	X
Edgartown-Katama Airpark	3		X	X
Fall River Municipal	2		X	X
Falmouth	1		X	X
Fitchburg Municipal	2		X	X
Gardner Municipal	1		X	X
Great Barrington	1		X	X
Hanson-Cranland	1			X
Haverhill-Riverside	1			X
Hopedale-Draper	1		X	X
Lawrence Municipal	2	X	X	X
Mansfield Municipal	2		X	X
Marlboro	1			X
Marshfield Municipal	1		X	X
Marston Mills	3			X
Martha's Vineyard	2		X	X
Montague-Turner Falls	1		X	X
Nantucket Memorial	3	X	X	X
New Bedford Municipal	2	X	X	X
Newburyport	1		X	X
Norfolk	1		X	X
North Adams-Harriman and West	1		X	X
Northampton	1		X	X
Norwood Memorial	2	X	X	X
Orange Municipal	2		X	X
Oxford	1		X	X

TABLE 4-2 (CONTINUED)

AIRPORT FACILITIES SUMMARY

AIRPORT	NUMBER OF RUNWAYS	AIR TRAFFIC CONTROL TOWER	NAVAIDS	
			LIGHTING	WIND DIR.
Palmer Metropolitan	1		X	X
Pepperell	1			X
Pittsfield Municipal	2		X	X
Plymouth Municipal	2		X	X
Provincetown Municipal	1		X	X
Shirley	1		X	X
Southbridge Municipal	1		X	X
Spencer	1			X
Sterling	1		X	X
Stow-Minuteman	2		X	X
Taunton Municipal	2		X	X
Tewksbury-Tew-Mac	2		X	X
Westfield-Barnes	2	X	X	X
Westover AFB/ Metropolitan	2	X	X	X
Worcester Municipal	2	X	X	X

TABLE 4-3

TOTAL AREA WITHIN STUDY LIMITS AT EACH AIRPORT

AIRPORT	AREA WITHIN STUDY LIMITS (acres)	
	20' ELEVATION	100' ELEVATION
Barnstable Municipal	392	1,488
Barre-Tanner-Hiller	34	231
Bedford-L.G. Hanscom Field	408	1,365
Beverly Municipal	322	923
Boston-Logan Int'l	1,056	2,885
Chatham Municipal	48	265
Edgartown-Katama Airpark	88	384
Fall River Municipal	132	456
Falmouth	35	229
Fitchburg Municipal	182	567
Gardner Municipal	79	284
Great Barrington	49	227
Hanson-Cranland	29	202
Haverhill-Riverside	28	200
Hopedale-Draper	84	295
Lawrence Municipal	245	823
Mansfield Municipal	76	326
Marlboro	24	191
Marshfield Municipal	79	284
Marston Mills	66	438
Martha's Vineyard	326	1,054
Montague-Turners Falls	58	250
Nantucket Memorial	355	1,230
New Bedford Municipal	337	1,081
Newburyport	73	271
Norfolk	34	199
North Adams-Harriman and West	44	275
Northampton	60	262
Norwood Memorial	149	523
Orange Municipal	194	626
Oxford	28	205

TABLE 4-3 (CONTINUED)
TOTAL AREA WITHIN STUDY LIMITS AT EACH AIRPORT

AIRPORT	AREA WITHIN STUDY LIMITS (acres)	
	20' ELEVATION	100' ELEVATION
Palmer Metropolitan	81	281
Pepperell	34	237
Pittsfield Municipal	256	816
Plymouth Municipal	148	560
Provincetown Municipal	156	585
Shirley	43	262
Southbridge Municipal	58	277
Spencer	17	174
Sterling	39	216
Stow-Minuteman	79	348
Taunton Municipal	106	416
Tewksbury-Tew-Mac	106	382
Westfield-Barnes	406	1,344
Westover AFB/ Metropolitan	519	1,817
Worcester Municipal	503	1,343
TOTALS	7,666	27,097

TABLE 4-4

WETLAND AND SENSITIVE ENVIRONMENTAL RESOURCES LOCATED

WITHIN STUDY LIMITS AT EACH AIRPORT

AIRPORT	INLAND WETLAND RESOURCE AREAS				COASTAL WETLAND RESOURCE AREAS											
	BORDERING VEGATATED WETLAND	BANK	LAND UNDER WATER	BORDERING AND ISOLATED LAND SUBJECT TO FLOODING*	SALT MARSH	LAND UNDER OCEAN	COASTAL BEACH	DESIGNATED PORT	COASTAL DUNE	BARRIER BEACH	COASTAL BANK	ROCKY INTERTIDAL SHORE	LAND UNDER SALT POND	LAND CONTAINING SHELLFISH	RARE SPECIES HABITAT	AREA OF CRITICAL ENVIRONMENTAL CONCERN
Barnstable Municipal	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-
Barre-Tanner-Hiller	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Bedford-L.G. Hanscom Field	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Beverly Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Boston-Logan Int'l	X	-	-	-	X	X	X	X	-	-	X	-	-	X	X	-
Chatham Municipal	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	X
Edgartown-Katama Airpark	X	-	-	-	-	X	X	-	X	-	X	-	X	X	X	-
Fall River Municipal	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Falmouth	X	-	-	X	-	-	-	-	-	-	-	-	-	-	-	-
Fitchburg Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Gardner Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Great Barrington	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Hanson-Cranland	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Haverhill-Riverside	-	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Hopedale-Draper	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Lawrence Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Mansfield Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X
Marlboro	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Marshfield Municipal	X	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-
Marston Mills	-	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-
Martha's Vineyard	-	-	-	-	-	-	-	-	-	-	-	-	-	-	X	-
Montague-Turners Falls	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Nantucket Memorial	X	-	-	-	-	X	X	-	X	-	X	X	-	X	X	-

* e.g., inland 100-year floodplain.

** Note - An "X" indicates that a particular resource is located within the study limits. It does not necessarily indicate that an impact is likely.

TABLE 4-4 (CONTINUED)

WETLAND AND SENSITIVE ENVIRONMENTAL RESOURCES LOCATED

WITHIN STUDY LIMITS AT EACH AIRPORT

AIRPORT	INLAND WETLAND RESOURCE AREAS				COASTAL WETLAND RESOURCE AREAS										RARE SPECIES HABITAT	AREA OF CRITICAL ENVIRONMENTAL CONCERN
	BORDERING VEGATATED WETLAND	BANK	LAND UNDER WATER	BORDERING AND ISOLATED LAND SUBJECT TO FLOODING*	SALT MARSH	LAND UNDER OCEAN	COASTAL BEACH	DESIGNATED PORT	COASTAL DUNE	BARRIER BEACH	COASTAL BANK	ROCKY INTERTIDAL SHORE	LAND UNDER SALT POND	LAND CONTAINING SHELLFISH		
New Bedford Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Newburyport	X	X	X	-	X	-	-	-	-	-	-	-	X	X	X	X
Norfolk	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
North Adams-Harriman and West	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-
Northampton	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Norwood Memorial	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	X
Orange Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Oxford	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-	-
Palmer Metropolitan	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Pepperell	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Pittsfield Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Plymouth Municipal	X	X	X	-	-	-	-	-	-	-	-	-	-	-	X	-
Provincetown Municipal	X	-	-	X	X	-	X	-	X	X	X	-	-	X	X	-
Shirley	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Southbridge Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Spencer	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sterling	X	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Stow-Minuteman	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Taunton Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Tewksbury-Tew-Mac	X	X	X	X	-	-	-	-	-	-	-	-	-	-	-	-
Westfield-Barnes	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Westover AFB/ Metropolitan	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-
Worcester Municipal	X	X	X	X	-	-	-	-	-	-	-	-	-	-	X	-

* e.g., inland 100-year floodplain.

** Note - An "X" indicates that a particular resource is located within the study limits. It does not necessarily indicate that an impact is likely.

TABLE 4-5

ESTIMATED WETLAND RESOURCES WITHIN STUDY LIMITS AT EACH AIRPORT*

AIRPORT	EMERGENT WETLANDS (acres)	SCRUB-SHRUB WETLANDS (acres)	FORESTED WETLANDS (acres)	TOTAL WETLANDS (acres)	BANK (feet)
Barnstable Municipal	0.0	2.8	8.1	11.0	12,900
Barre-Tanner-Hiller	0.0	8.5	4.2	12.7	25,000
Bedford-L.G. Hanscom Field	4.2	30.2	166.0	200.5	59,600
Beverly Municipal	5.5	25.7	98.7	129.9	25,000
Boston-Logan Int'l	9.6	0.0	0.0	9.6	0
Chatham Municipal	1.7	0.0	0.0	1.7	12,100
Edgartown-Katama Airpark	0.0	8.7	0.0	8.7	0
Fall River Municipal	0.0	3.3	6.7	9.9	18,300
Falmouth	0.8	0.0	0.0	0.8	0
Fitchburg Municipal	1.8	2.2	0.0	4.0	37,900
Gardner Municipal	0.0	47.9	34.3	82.1	15,200
Great Barrington	0.0	4.7	27.8	32.5	9,200
Hanson-Cranland	26.7	0.1	19.2	45.9	3,100
Haverhill-Riverside	0.0	0.0	0.0	0.0	7,300
Hopedale-Draper	0.6	0.0	10.8	11.4	12,900
Lawrence Municipal	0.0	0.4	12.1	12.5	43,300
Mansfield Municipal	5.2	27.5	9.3	42.0	21,700
Marlboro	0.5	3.2	17.0	20.7	14,000
Marshfield Municipal	6.4	5.3	134.7	146.4	18,300
Marston Mills	0.0	0.0	0.0	0.0	3,800
Martha's Vineyard	0.0	0.0	**0.0	**0.0	0
Montague-Turners Falls	6.5	5.2	0.0	11.7	1,500
Nantucket Memorial	0.0	6.5	0.0	6.5	0
New Bedford Municipal	49.6	47.5	260.5	357.7	35,400
Newburyport	1.1	21.7	12.9	35.7	600
Norfolk	0.0	3.8	30.8	34.7	10,000
North Adams-Harriman and West	0.0	0.0	1.4	1.4	9,600

* Note - These estimates indicate the area or linear feet of a resource that is within the study limits. They do not indicate the extent to which an area is likely to be impacted.

** Area of wetlands is less than 0.1 acres.

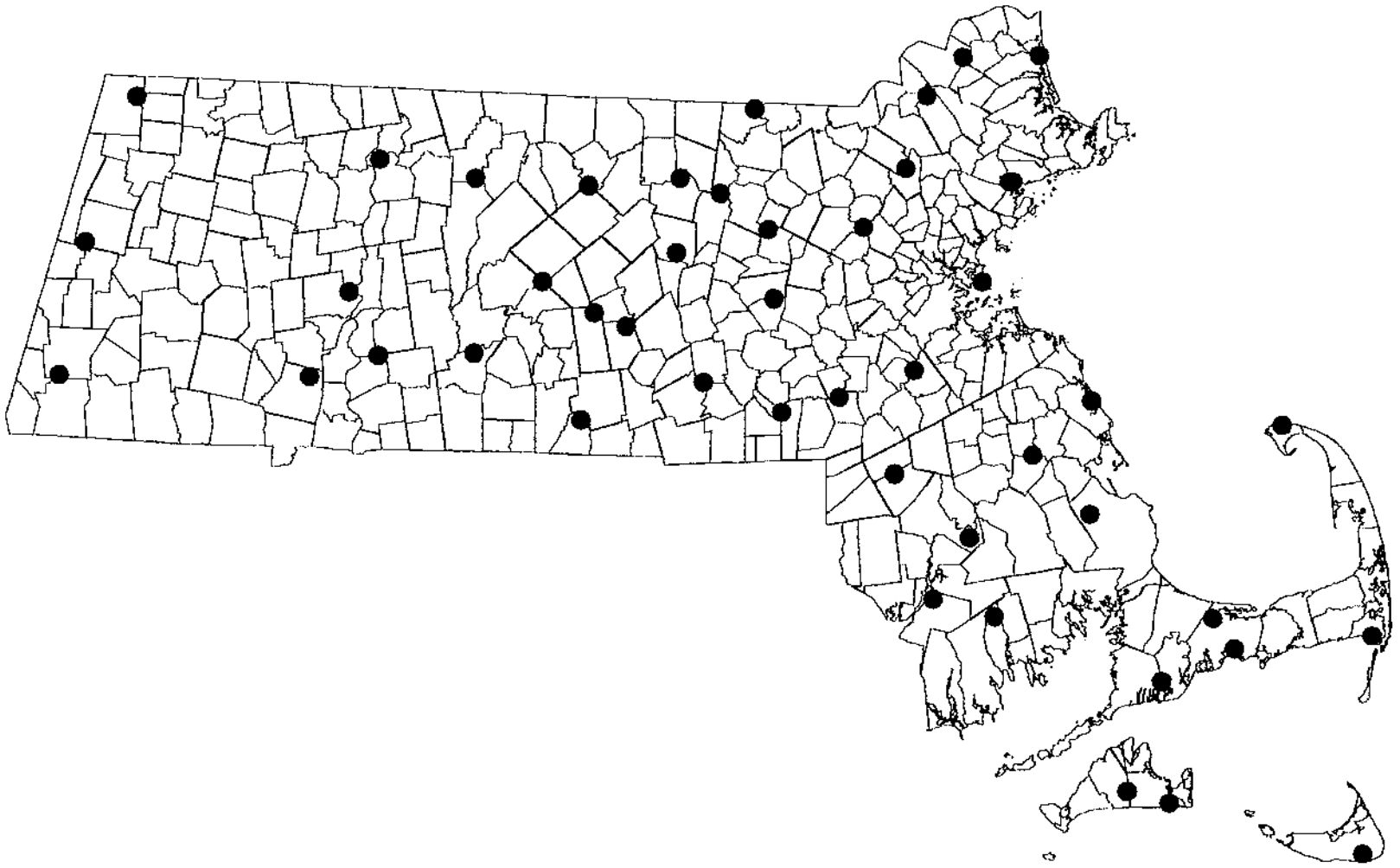
TABLE 4-5 (CONTINUED)

ESTIMATED WETLAND RESOURCES WITHIN STUDY LIMITS AT EACH AIRPORT*

AIRPORT	EMERGENT WETLANDS (acres)	SCRUB-SHRUB WETLANDS (acres)	FORESTED WETLANDS (acres)	TOTAL WETLANDS (acres)	BANK (feet)
Northampton	0.0	0.0	0.0	0.0	2,100
Norwood Memorial	7.5	214.8	41.2	263.4	48,300
Orange Municipal	1.9	3.8	5.9	11.5	12,500
Oxford	0.8	5.4	3.5	9.7	7,500
Palmer Metropolitan	2.5	36.3	21.4	60.1	14,400
Pepperell	2.4	5.7	3.3	11.4	15,800
Pittsfield Municipal	10.3	29.5	62.5	102.4	42,700
Plymouth Municipal	0.9	5.8	1.7	8.5	3,300
Provincetown Municipal	143.9	4.9	0.0	148.8	0
Shirley	0.1	5.4	10.9	16.5	9,200
Southbridge Municipal	0.0	0.0	8.6	8.6	10,800
Spencer	0.0	0.0	0.0	0.0	0
Sterling	0.0	1.6	35.4	36.9	0
Stow-Minuteman	1.1	9.2	66.5	76.8	30,000
Taunton Municipal	2.9	11.4	26.8	41.1	39,600
Tewksbury-Tew-Mac	6.8	38.1	38.2	83.2	16,300
Westfield-Barnes	0.0	2.0	22.5	24.5	6,700
Westover AFB/ Metropolitan	0.0	17.5	66.9	84.4	51,900
Worcester Municipal	2.3	13.9	12.1	28.3	55,000
TOTALS	303.7	660.2	1,282.0	2,245.9	762,800

* Note - These estimates indicate the area or linear feet of a resource that is within the study limits. They do not indicate the extent to which an area is likely to be impacted.

Sources: U.S.G.S. topographic maps, U.S. Fish and Wildlife Service National Wetland Inventory maps, DEM Wetlands Conservancy Program orthophotos.

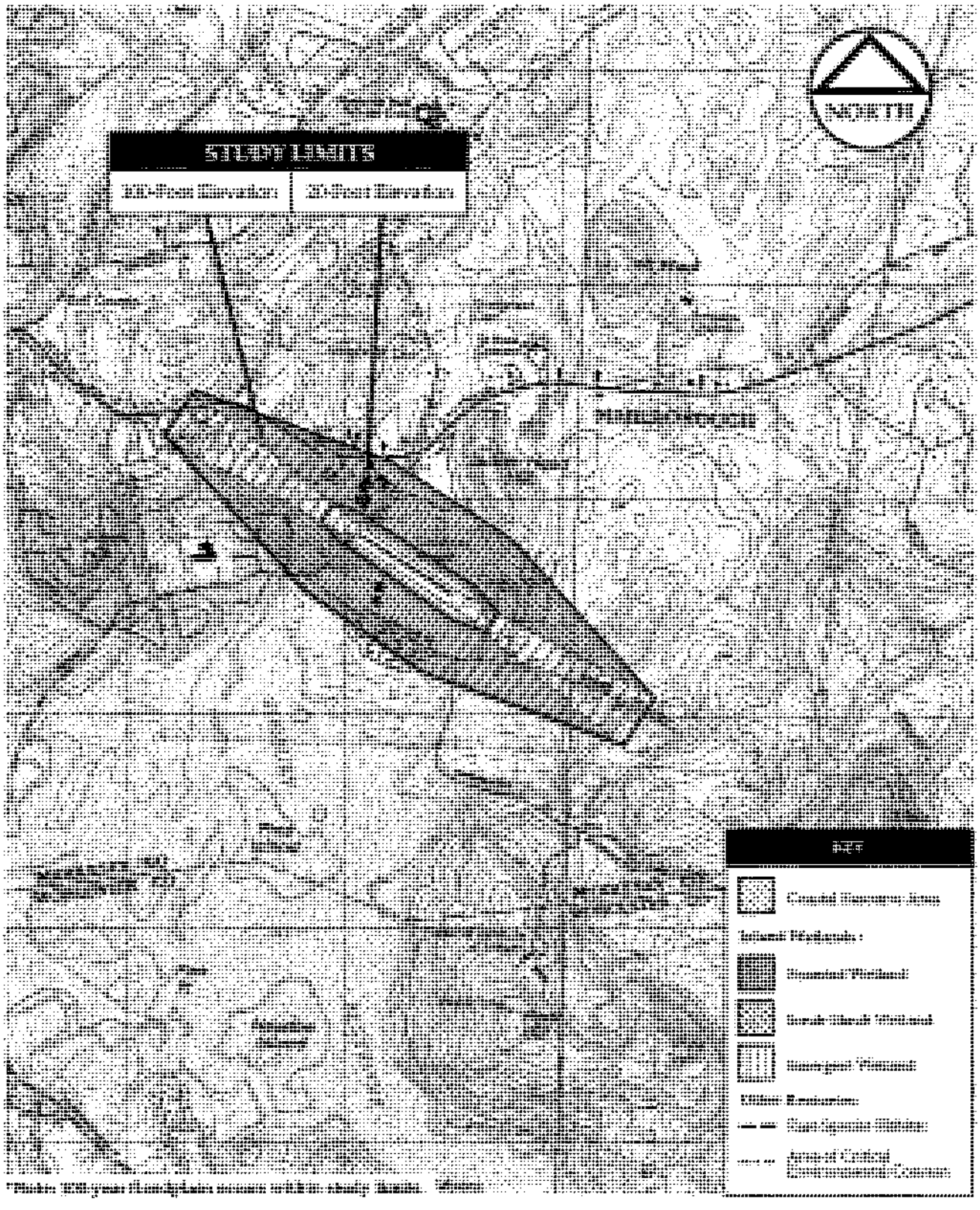


GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

CDM Camp Dresser & McKee Inc.
Cambridge, Massachusetts

August 31, 1993

FIGURE 4-1
MASSACHUSETTS PUBLIC USE AIRPORTS



GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

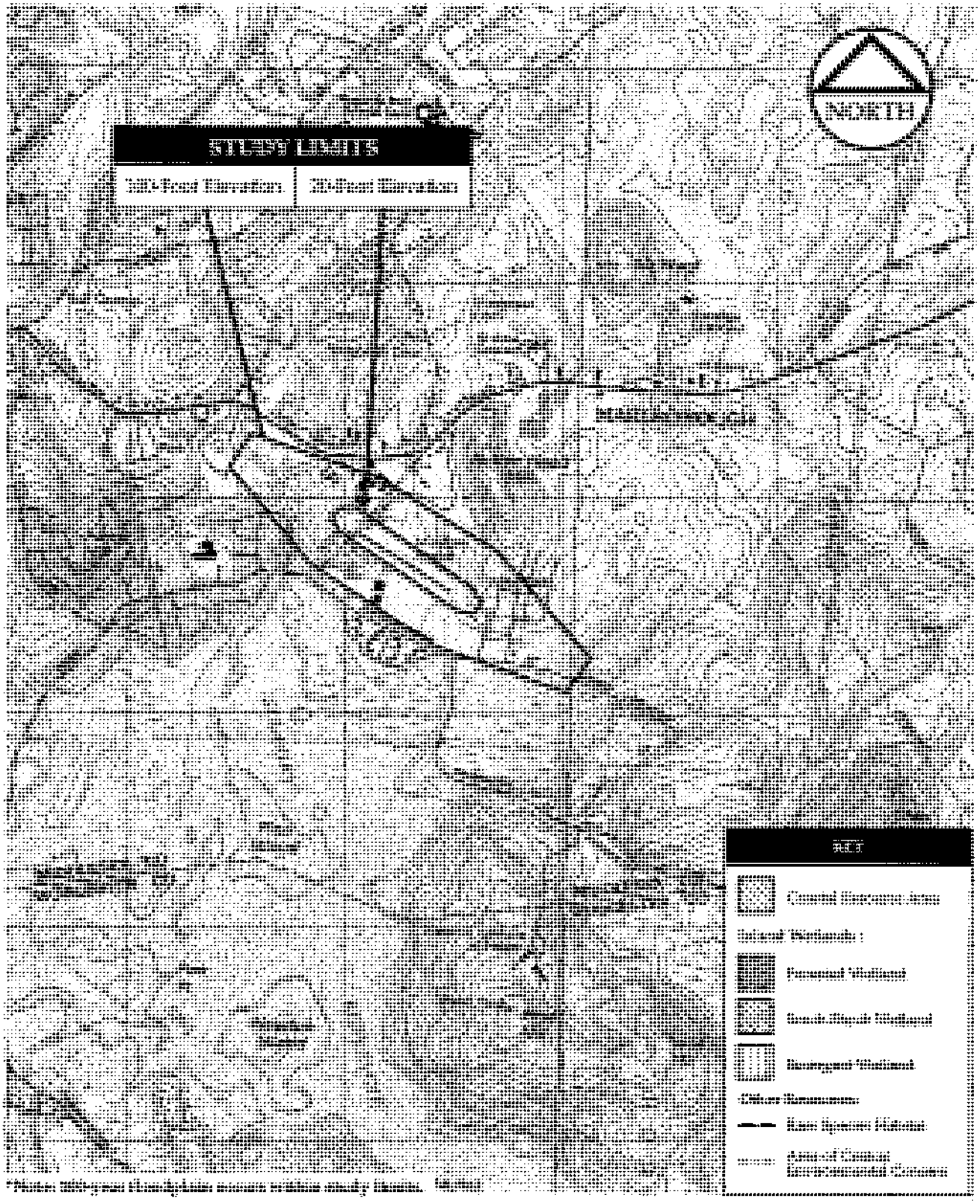
0 .25 .50 1.0

Scale In Miles

CDM Camp Dresser & McKee Inc.
Cambridge, Massachusetts

August 31, 1993

FIGURE 4-2A
TYPICAL PART 77 SURFACES



GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

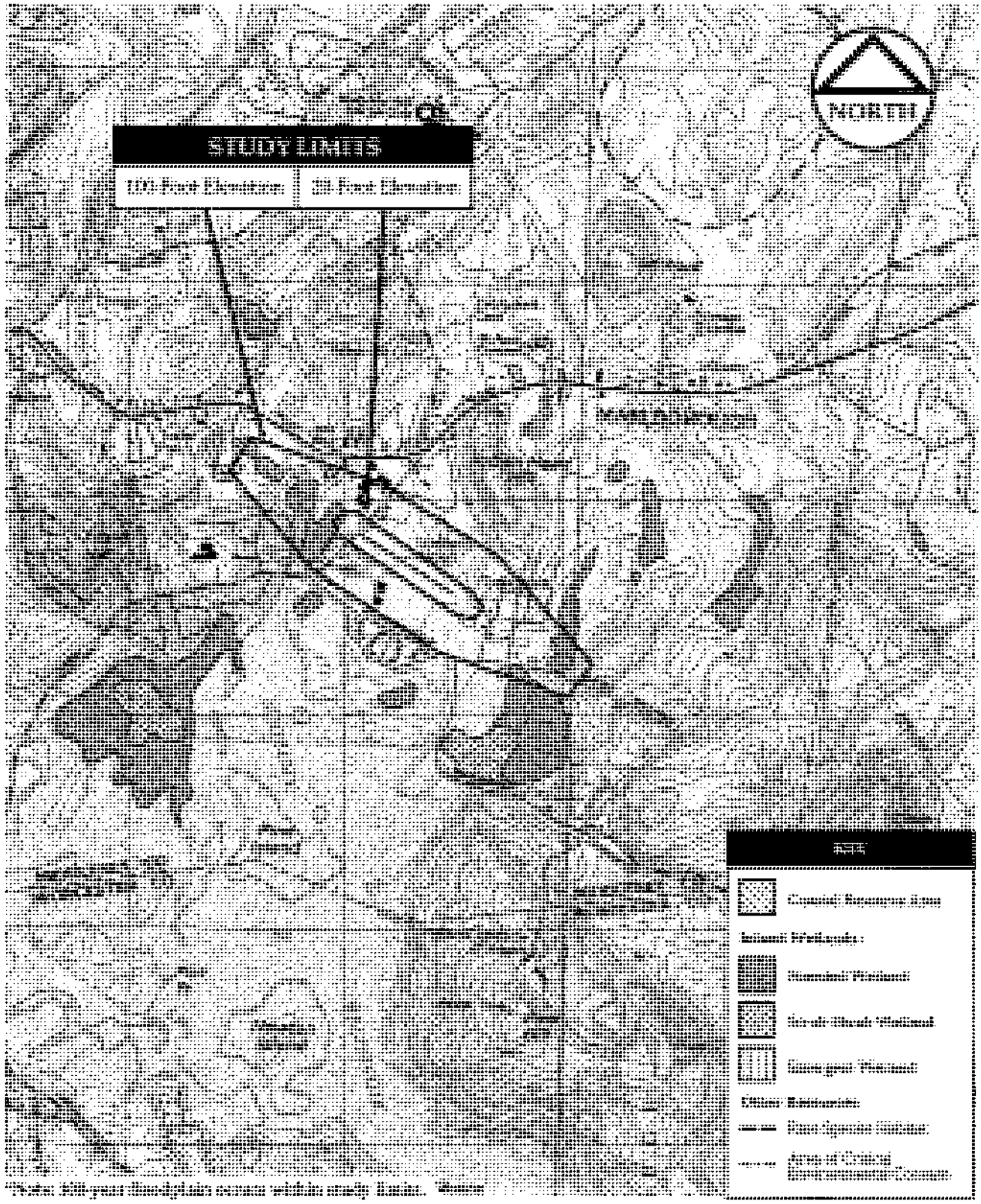
0 .25 .50 1.0

Scale In Miles

CDM Camp Dresser & McKee Inc.
Cambridge, Massachusetts

August 31, 1993

FIGURE 4-2B
TYPICAL 20-FOOT & 100-FOOT ELEVATIONS



GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

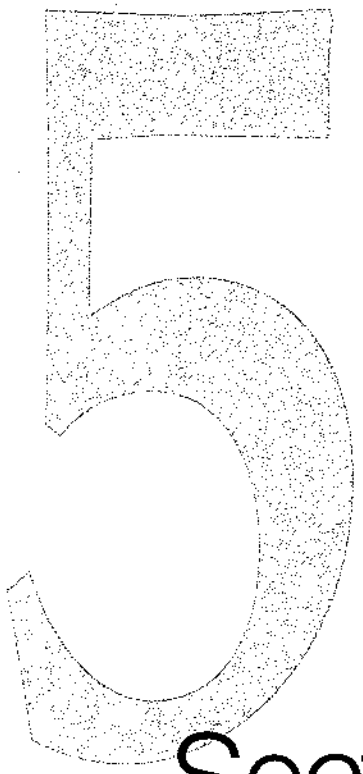
0 .25 .50 1.0

Scale In Miles

CDM Camp Dresser & McKee Inc.
Cambridge, Massachusetts

August 31, 1993

FIGURE 4-3
WETLANDS AND CRITICAL RESOURCES AT A PUBLIC USE AIRPORT



Section Five

5.0 ALTERNATIVES ANALYSIS

5.1 INTRODUCTION

This section provides a discussion and evaluation of the two major alternatives for maintaining the required Protection Zones (PZs), in terms of tree and tall shrub growth, at public use airports. They are:

1) Remove vegetation that penetrates or threatens to penetrate the PZs using one of various vegetation removal methods.

2) Do not remove the vegetation that penetrates or threatens to penetrate the PZs; the "No Action" alternative which places the airport owner/operator in default of previous federal grant assurances, prevents the airport from receiving future federal grants, results in the imposition of severe operating and navigation constraints and poses an increased threat to public health and safety.

For the first alternative, a series of options have been identified that would accomplish the same objective, i.e., provide safe PZs. For the second alternative, there is a detailed discussion of the types (or options) of financial and operational modifications that may be required under the Federal Aviation Administration (FAA) advisories, regulations or orders. Available options of both alternatives are then compared based on environmental impacts, economic implications, and requirements for additional maintenance.

This alternatives assessment is unique in that no single preferred option is selected. Rather, the analysis provides a range of feasible options within the vegetation removal alternative; these options may then be determined as more or less appropriate by each airport. Another unique element of this analysis is that the only realistic alternative to comply with FAA regulations is the first alternative: remove the trees from the PZs. These areas must remain free of obstructions. In the majority of cases, airports had previously received federal grants which imposed on the airports an obligation to maintain the PZs. If the trees are not removed, at a minimum, safety-related operational or facility changes will be imposed on the airports. Thus, the operators do not really have a viable choice of alternatives -- they must either remove the trees or face operating restrictions and loss of funding and/or certification, potentially causing substantial economic harm to the owner and/or the community served by the

airport. However, as noted above, all possible airport operations modifications within the "no action" alternative are evaluated.

5.2 VEGETATION MANAGEMENT OPTIONS

The objective of vegetation management at airports is to eliminate or discourage the growth of woody vegetation that would extend upward into the PZs. Management techniques are designed primarily to eliminate existing obstructions, and then to implement procedures which would prevent other trees from penetrating the PZs. It is assumed here that all vegetation currently penetrating a PZ will be immediately removed using one of the options discussed in this section. Those trees or shrubs that do not yet extend into an PZ but have the potential to grow to a specified height will be either physically removed or killed and left standing so that they will not reach the PZ surface.

One important concern in vegetation management is the potential for resprouting of individual plants. For example, red maple will not be killed by severing the stem. It will sprout prolifically from a stump or from previously dormant buds within the downed stem. Thus, for most species it is assumed that additional vegetation management will be required after the initial removal to ensure that the plant is eliminated. This additional management step is considered in this evaluation.

5.2.1 DESCRIPTION OF VEGETATION MANAGEMENT OPTIONS

Three categories of vegetative management techniques, including a total of nineteen management options, were evaluated as part of this analysis. These options include:

- Physical Methods
  - Push Trees Over
  - Pull Trees Down
  - Shear Trees with Bulldozer
  - Mechanized Felling
  - Clear and Grub
  - Build an Impoundment
  - Remove Trees by Helicopter

- Chemical Methods

  - Fell/Lop/Cut-surface Treatment
  - Fell/Frill-and-inject Treatment
  - Fell/Selective Basal Treatment
  - Selective Foliar Treatment

- Combination Methods

  - Frill-and-Inject/Pull Trees Down
  - Frill-and-Inject/Push Trees Over
  - Mechanized Felling/Cut-surface Treatment
  - Shear Trees with Bulldozer/Cut-surface Treatment

- Small Equipment/Non-Equipment/Non-Chemical Method

  - Tree Topping
  - Fell Trees and Lop Slash
  - Girdling
  - Prescribed Burning

Each method is described below, followed by a comparison of environmental impacts, costs, and short- and long-term maintenance requirements.

Physical Methods

Push Trees Over. Blow-down of trees in high winds is a common natural disturbance in a forest ecosystem, especially in soils with a high water table and shallow-rooted trees. It is possible to simulate these natural disturbances by using equipment to push trees over. A bulldozer is normally used for this technique, in which the tree is pushed down by the bulldozer blade. In larger trees (pole-size or larger) a specialized attachment known as a "tree pusher" or "knock down beam" can be secured to the bulldozer blade. The attachment raises the point of contact on the stem, thereby increasing leverage and pushing the tree over. Figure 5-1 illustrates this attachment.

Pull Trees Down. This technique requires a rubber-tired cable skidder or bulldozer with a winch, a length of cable up to a maximum of 300 feet (a 300-foot cable could cover a semicircle area of more than three acres), choker chains and sliders, and a ladder or arborist's

climbing equipment. First, a climber/setter would place the cable 15 to 20 feet high in the tree, which is generally high enough to gain sufficient leverage to pull down most wetland trees (this method is effective for all sizes of wetland-tolerant trees). In pole-sized (4- to 9-inch diameter) red maple, it is possible to put a single cable on multiple stems and sometimes around multiple clumps simultaneously. Next, operating from the edge of the wetland where possible, the tree(s) are pulled down. This method is shown in Figure 5-2.

Shear Trees with Bulldozer. This technique uses either a shearing (K-G) blade or a V-blade attached to the bulldozer blade, as shown in Figure 5-3. With a shearing blade, the operator would cut the tree or clump off at ground level, using the combined force of cutting and pushing to sever the stem from the stump. A sharp "stinger," integral to the blade, allows the operator to split larger trees and weaken them prior to shearing. The mounting angle of a shearing blade allows the operator to easily pile the felled material into narrow windrows or long piles.

A V-blade is essentially two bulldozer blades mounted so as to form a point. The bottom edge of a V-blade is serrated and acts to both saw and shear. A "stinger" is mounted at the bottom of the blade at the point of the "V." V-blades are more efficient than shearing blades, requiring less equipment movement. When a V-blade is used, work proceeds from the outside of the clearing area toward the center in either a circular or rectangular pattern. Newly felled material is placed to the outside by the V-blade.

Mechanized Felling. This technique uses a front-mounted felling head -- either a shear or a chain saw operated hydraulically from a remote cab. The vehicle type can be either small or large, and the vehicle can be either rubber-tire-wheeled or tracked.

Mechanical fellers are divided into three categories:

- Feller-buncher
- Feller-director
- Multi-function harvester

Feller-bunchers allow the operator to cut several stems at one time and use an accumulator to carry cut trees together to a single location where they are placed in a bunch, as shown in Figure 5-4a. In an operation where trees are to be felled but not removed from the site, this allows greater efficiency, and minimizes scattering of debris. If the felling head is on a knuckle boom (normally available only on larger tracked machines), many trees can be reached from a single location and work can proceed systematically and efficiently. Limbing would be done by chain saw. A feller-director can only cut one tree at a time and must bring individual trees to a bunch, as shown in Figure 5-4b. This necessitates significantly more travel through the clearing area.

Multi-function harvesters allow an operator to fell, delimb, and buck (cut-to-length) trees from a remote cab, as shown in Figure 5-4c. However, these machines are uncommon in southern New England and work best with conifers.

Clear and Grub. This technique generally involves cutting all vegetation, then removing stumps and remaining roots. Typically, trees are felled with one of the physical methods described here. Stumps and roots are pulled out using a winch or cable attached to a bulldozer. This can be a time-consuming method since the tree is first felled, then the stump and roots are removed in a second operation.

Build an Impoundment. Many of the tree species common to wooded wetlands of Massachusetts are not adapted to long periods of inundation where oxygen transfer to the root system is severely restricted. Even red maple will be killed if the water table is raised significantly for more than a year. The process involves constructing a dam or series of dams in strategic locations at various elevations, depending on site topography, to raise the standing water. The size and number of dams is dependent not only on the acreage of the wetland, but also on its shape, the size of the watershed feeding the wetland, and the wetland substrate.

Construction activities would generally include clearing areas slated for dam placement, carrying and placing fill material, and compaction and grading. As the water builds up in the wetland, oxygen to the root system is reduced dramatically and the vegetation dies or is replaced by aquatic vegetation. Trees remain standing initially, and they will eventually fall during strong winds or heavy icing conditions.

It should be noted that although this alternative is technically feasible, the limited project provision will not apply if construction of the impoundment involves wetland filling.

Remove Trees by Helicopter. This technique involves chain saw felling, hookup of transport cable to a downed tree or bunch of trees, and helicopter removal of cut stems as shown in Figure 5-5. Productivity of helicopter logging crews depends primarily on two variables: turn time (the length of time to hook to a stem or bunch, transport it to a drop location and return to the logging site), and the stem size of the material being removed (larger stems result in lower productivity).

Chemical Methods

Chemical vegetation management methods are designed to kill vegetation and control the sprouting of tree species through the application of herbicides. Repeated selective application of herbicides to woody vegetation can encourage the dense establishment of herbaceous and shrubby plant communities, and reduce the rate of subsequent re-growth by trees.

It should be noted that herbicide application by utilities such as power and railroad companies is regulated under the Right of Way Management (ROW) Regulations (333 CMR 11.04) administered by the Massachusetts Department of Food and Agriculture (DFA). Although work in airport PZs is not subject to ROW regulations or any related DFA decisions, the ROW guidelines are recommended for use in airport PZs. Specific regulations, decisions and guidance that should be applied, as appropriate, to work in airport PZs include the following:

- **ROW Management Regulations (333 CMR 11.01-11.04)** - These regulations provide standards, requirements and procedures necessary to minimize the risk of unreasonable effects on human health and the environment associated with herbicide use. These regulations prohibited herbicide use in or within 10 feet of a wetland and restricted herbicide use within 10 to 100 feet of a wetland until an approved study was conducted demonstrating that herbicide use would result in less wetland impacts than a mechanical control program (333 CMR 11.04(4)(c). This study was completed in 1991, as described below.

- **August 29, 1991 DFA Decision Concerning the Wetland Impact Study Conducted Pursuant to 333 CMR 11.04(4)(c)(2)** - This decision, based on the study referenced above, found that herbicides could be used for long-term vegetation management in wetlands provided that certain conditions are met. One of these conditions is that herbicides cannot be applied such that they drift to within 10 feet of standing or flowing water in a wetland.

- **December 31, 1992 DFA/DEP Memorandum Updating the Status of Herbicides Which are Reviewed for Use in Sensitive Areas on ROWs** - This memorandum provides a list of herbicides that are recommended by DFA for application in wetlands and other sensitive areas. In addition, herbicides that are specifically not recommended or are still under consideration are listed in this memorandum.

A copy of each of these documents is included in Appendix C. In addition, specific guidance for herbicide application in airport PZs, based on these documents, is provided in Section 7.2.4. Any revisions to or updates of any of these DFA/DEP documents should be applied as appropriate to airport vegetation removal projects.

The ROW regulations allow herbicides to be applied in wetlands, strictly for vegetation management, using the following applications:

- Basal
- Cut stump (cut-surface)
- Low volume foliar treatment

The specific vegetation removal options involving herbicides are described below.

Fell/Lop(Cut off)/Cut-surface Treatment. In this method, trees are felled and the slash (tree limbs, etc.) is lopped. Trees of all species are cut down with chain saws. Stumps are cut as low as possible to the ground. All limbs, branches, and other resulting slash (i.e., from other smaller woody stems or woody shrubs that are not cut but are damaged from the felling) would be lopped.

Trees that are known to sprout, as shown in Table 5-1, would have their stump surfaces treated with the appropriate herbicide immediately after they are cut. It is not necessary to treat the stumps of species that will not sprout (e.g., eastern white pine). The "cut-stump" treatment with herbicide can take place at any time of year, although optimal effect is achieved during the growing season (except during times of high sap flow in the early spring). The herbicide is applied directly to the outermost 2 to 3 inches of the cut stump surface and is translocated through the phloem to the roots. Normally, a hand-held squirt bottle, sprayer, or small brush is used to apply the herbicide.

Fell/Frill-and-inject Treatment. This technique involves a combination of felling trees and injecting other trees that will sprout. Trees that do not sprout but penetrate the PZ may be felled with a chain saw, lopped, and cut into sections to minimize visual impact and hasten decomposition. Trees that do not sprout and do not yet penetrate the PZ would be either felled or injected with herbicide. White pine is the principal exception to herbicide injection, since it does not translocate the recommended chemicals well. (As noted in Section 7.2.4, herbicides should not be applied to any conifers in wetland areas.) Smaller trees that are injected with herbicide may be left standing to break up and decay naturally. Trees that sprout and are tall enough to penetrate the PZ would be injected and subsequently felled.

The herbicide treatment is done using a specially designed device for tree injection (e.g., "Jim-Gem," "Hypo-Hatchet," "Silvaxe") or a sharp hatchet to make closely spaced or continuous cuts into the bark penetrating through the cambium and into the wood. The recommended amount of herbicide is injected into these cuts using a squirt bottle if an injector is not used. For optimal results, the frill-and-inject method would be applied after full leaf expansion, and during periods of active growth.

Fell/Selective Basal Treatment. This treatment involves a combination of felling trees and applying herbicide to individual stems of species that sprout, as described above. Herbicide is applied near ground level to the bark of target trees. A backpack sprayer and small nozzle or wand attachment is used. Normally, the herbicide is diluted in light oil or kerosene, except in wetland areas where a non-petroleum carrier should be used. The entire lower 6 to 8 inches of the targeted stem is covered. Basal application may be used during both the dormant and growing seasons.

It is possible that some treated stems will sprout in spite of the herbicide treatment. Re-inspection of the area two years after treatment will reveal the extent of subsequent sprouting; sprouts can then be treated with a foliar application of herbicide.

Selective Foliar Treatment. In this technique, herbicide is applied to the foliage of the targeted plants which translocates the herbicide from the leaf to the roots and kills the tree. The foliage is lightly wetted with an herbicide solution by using a motorized backpack sprayer, or a tractor-mounted hydraulic unit. Vegetation as high as 12 feet can be treated using a backpack sprayer. As noted in Section 7.2.4, foliar applications must include the use of a drift-reduction agent, and they may only be used when basal or cut-surface treatments are not appropriate.

Combination Methods

Frill-and-inject/Pull Trees Down - Push Trees Over. These combined-method techniques involve killing target trees with herbicide application, followed by either pushing the trees over or pulling the trees down, as described above.

Mechanized Felling/Cut-surface Treatment. This technique involves felling individual trees using one of the mechanized fellers described above, followed by herbicide treatment of the stumps of sprouting species.

Shear Trees with Bulldozer/Cut-surface Treatment. This method involves shearing trees with one of the two bulldozer shearing techniques, followed by herbicide treatment of the stumps of sprouting species.

Small Equipment/Non-Equipment/Non-Chemical Methods

Fell Trees and Lop Slash. This method involves directional felling using a chain saw followed by lopping the slash to comply with the Massachusetts Slash Law (MGL c.48 S.16A) requirements. If conducted in late summer, this method minimizes subsequent regrowth. Winter felling leads to vigorous spring regrowth, although it does afford greater protection of the lower vegetation that is dormant and therefore less susceptible to impacts. In addition, the falling tree may cause less soil compaction during the winter since the soils may be more stable. In order to minimize wetland impacts, winter felling is recommended.

Tree Topping. Tree topping is a variation of the felling method, but requires a worker to climb the tree and cut off the top segment. In sprouting species, this will result in extensive growth at the top, requiring additional treatment within a year after the original cutting. In some cases, a bush-like top will develop creating an even greater hazard than the original stem.

Girdling. Girdling involves cutting a continuous ring around the tree to sever the cambium. This stops the flow of sap to the roots and the flow of water to the crown, and the tree dies if it is not prone to sprouting. Girdling can be done with a hatchet, ax, or chain saw, or by exposure to extremely high temperatures. This technique is difficult in areas where numerous clumps prevent the worker from circling the entire stem. In some cases, a double girdle is required. Trees penetrating the PZ are felled, while trees not penetrating the PZ are girdled and left standing in place, until naturally felled by wind or ice.

For vigorous sprouting species, sprouts may arise from the girdle, the root system, or the base of the tree.

Prescribed Burning. This technique, which involves burning selected areas, is a proven method used in southern and western United States. However, the fact that this technique is not allowed and is not practical in wetlands in Massachusetts eliminates the need for further evaluation.

5.2.2 ENVIRONMENTAL CONSIDERATIONS ASSOCIATED WITH VEGETATION MANAGEMENT OPTIONS

This section addresses the environmental impacts associated with each vegetation management option. As noted previously, the focus is on environmental impacts that differ among the options. Environmental impacts that are common to all vegetation removal options (e.g., loss of wildlife habitat or shading associated with removed trees) are addressed in Section 6.0.

The environmental impacts that generally occur immediately after vegetation removal, and which are likely to differ depending on the vegetation removal method, include the following:

- Creation of vehicle tracks
- Creation of pit and mound topography
- Elimination of low-growing vegetation
- Burial of vegetation under felled trees
- Visual impacts
- Introduction of herbicides into the environment

Each of these impacts is described below.

Creation of Vehicle Tracks

As heavy equipment, including rubber-tired and steel-tracked vehicles, travel on saturated soils in a wetland area, tracks are created. The size and depth of the track is dependent on the soil pressure of the vehicle (rubber-tired vehicles have higher soil pressure than tracked vehicles because there is less surface area covered by the tire footprint), the moisture content and type of soil, and the weight and maneuverability of the vehicle (more maneuverable vehicles cause less soil disturbance). Use of heavy equipment in wetlands may create tracks of varying depth that will crush the underlying vegetation, and the tracks will fill with water. Depending on whether or not there is normally standing water in the area, the tracks may become revegetated with either indigenous or invasive species. Until the tracks revegetate, some erosion can occur during high flow periods, possibly leading to sedimentation in downgradient wetland areas. In wetlands, the use of vehicles will likely create tracks

unless the work is properly conditioned to require use of swamp mats or limiting timing of operations to periods when the ground is frozen or dry enough to support the equipment (as required by the limited project provision).

Creation of Pit and Mound Topography

When a tree is pushed down or pulled over, either mechanically or naturally (e.g., by the wind), a pit and mound are created. The root ball forms the mound and can provide an environment for a variety of herbaceous and woody plants. As the root ball settles and the organic part of the stump rots, newly established trees may grow. However, these trees will have much less support and be susceptible to high winds because roots will not grow deep enough to anchor the tree. The pit is formed where the tree had been rooted, and subsequently fills with water for extended periods of time. Since the portion of the soil profile containing most of the organic matter is displaced as part of the mound, plant growth is slow. If groundwater is near the surface, the pit would contain water for extended periods of time, potentially precluding regrowth of vegetation leaving the site characterized by hummocks and wet depressions. The soil exposed in the disturbed areas may be prone to erosion during high flow periods, possibly leading to sedimentation in downgradient wetland areas.

Elimination of Low-Growing Vegetation

Any tree removal method that is non-specific (i.e., removal methods that do not target individual species) may cause the disturbance or elimination of low-growing shrub and herbaceous species, which are desirable species around airports as they are unlikely to ever penetrate the PZs. This would result in a substantial loss of wildlife habitat in the short term, and would increase the likelihood of significant erosion during high runoff periods. In the long term, revegetation of the area would likely be by both tall trees and desirable low growth species. Following this regrowth, there may be need to re-enter the clearing area and conduct extensive clearing activities to again remove the tree species. However, this type of clearing may actually improve habitat for some species.

Burial of Vegetation Under Felled Trees

When trees are felled, they crush the underlying vegetation when they hit the ground. The area will suffer only short-term impacts if the trees are removed immediately upon felling. Longer-term impacts will occur if the trees are felled and left in place. However, the impacted area will be limited to the area under the downed tree, which will eventually decompose and provide new habitat similar to naturally-caused tree felling. If a group of trees are felled and bunched into larger piles, a larger area underneath the bunch will be affected, and decomposition will be slow. Also, when the slash is lopped, the remaining pile will continue to crush underlying vegetation, inhibiting regrowth until the slash pile has decomposed. Both the bunch and the slash piles take several years to decompose, precluding revegetation beneath them. However, these areas would generally be very small in comparison to the overall clearing area.

Visual Impacts

Tree clearing will likely cause some form of visual impacts to the surrounding community. Activities causing the greatest visual impacts include clear cutting or burning, where all vegetation in an area is eliminated or crushed. Creating large tree bunches or slash piles, or leaving large numbers of trees to die in place may also cause visual impacts.

Introduction of Herbicides into the Environment

Historically, herbicides have been associated with a variety of environmental impacts depending on how much care is taken in their use, the type of herbicide, and the amount and application method used. The general types of potential environmental impacts associated with herbicide use include the following:

- Because herbicides tend to be non-specific in the types of species they affect, non-targeted species may be removed;
- Some herbicides may be mobile in soils allowing the material to be transported into surface water or groundwater supplies;

- Herbicides may be toxic to or may bioaccumulate in mammals and fish;
- Some herbicides are persistent and remain in the environment for extended periods of time.

The herbicides recommended by DFA for use in sensitive areas, however, have been found to be associated with minimal environmental impacts, particularly if they are used in accordance with the guidelines presented in Section 7.2.4. The environmental impacts associated with the herbicides referenced in Table 5-1 are discussed at length in the herbicide fact sheets in Appendix C. Similar fact sheets are available from DFA for any other recommended herbicides.

Impact Summary and Ranking

Figure 5-6 summarizes the potential environmental impacts of each vegetation management option. The impacts fall into four general categories or tiers:

1. Tier 1, or Minimal Impact Options, which involve use of hand held equipment only;
2. Tier 2, or Low Impact Options, which involve use of hand-held equipment and chemicals approved by DFA for use in sensitive areas;
3. Tier 3, or Moderate Impact Options, which involve limited use of heavy equipment and/or herbicides; and
4. Tier 4, or High Impact Options, which involve significant use of heavy equipment and/or herbicides.

The Minimal Impact Options (Tier 1) that would cause the least environmental impact include:

- Tree Topping
- Remove Trees with Helicopter
- Fell Trees and Lop Slash
- Girdling

The Low Impact Options (Tier 2) include:

- Fell/Lop/Cut-surface Treatment
- Fell/Frill-and-inject Treatment
- Fell/Selective Basal Treatment

The Moderate Impact Options (Tier 3) include:

- Selective Foliar Treatment
- Pull Trees Down
- Mechanized Felling
- Frill-and-inject/Pull Trees Down
- Mechanized Felling/Cut-surface Treatment

The High Impact Options (Tier 4) include:

- Clearing and Grubbing
- Push Trees Over
- Shear Trees with Bulldozer
- Build an Impoundment
- Frill-and-inject/Pull Trees Over
- Shear Trees with Bulldozer/Cut-surface Treatment
- Prescribed Burning

5.2.3 COST COMPARISON

In order to assess the economic implications of the options described above, two types of forested wetlands were used:

- A small forested wetland (up to 2 acres) with approximately 150-300 trees/acre to be treated or removed.
- A large forested wetland (~20 acres) with approximately 150-300 trees/acre to be treated or removed.

Figure 5-7 shows a comparison of costs. The costs shown in this table are based on recent vegetation removal projects. They do not account for long-term maintenance requirements. The lowest cost options for small clearing projects involve limited or no use of heavy equipment, such as the chemical and small equipment methods.

Higher cost methods involve heavy equipment use. However, for larger clearing areas, using heavy equipment becomes more cost effective.

5.2.4 MAINTENANCE

This section describes the maintenance required to minimize growth of undesirable woody vegetation and encourage growth of more desirable herbaceous and low-lying vegetation that will not interfere with airport operations. For discussion purposes, maintenance requirements are divided into short-term requirements to re-enter the clearing area within one to two years, and long-term requirements to re-enter between two and ten years after clearing.

Short-term Maintenance

The type and extent of maintenance activities depend on the effectiveness of the initial clearing method to eliminate sprouting woody vegetation and promote growth of low-lying and herbaceous vegetation. The conditions described below that may result from initial clearing will likely require short-term (1-2 years) maintenance.

Growth from downed trees. When trees are either pushed over or pulled down, the roots remain attached to the stem and some remain in contact with the soil. As a result, existing branches may remain alive and form new stems. Previously dormant buds within the stem may sprout, causing the formation of additional stems.

In addition, when sprouting woody vegetation is cut down, but the stump is not treated, sprouts may develop at the stump and grow. Maintenance activities would include severing the roots from the downed stem with cut surface treatment; and either foliar

spraying and cut-surface treatment or felling without herbicide use. Simple felling will continue to be required annually or biannually, unless the cut surface is treated.

Dead trees remaining upright. If trees are killed in-place, falling trees may pose safety risks for people entering the wetland area.

Also, under certain conditions with prolific sprouting species, sprouts may grow out of the stem of a dead tree, particularly at frilled or girdled locations on the stem. Maintenance may include foliar spraying or cut-surface treatment; or felling without herbicide application. Felling would be necessary to eliminate the risk of falling trees.

Ineffective deadening because of dense clump growth or excessive slash. In areas dominated by multiple-stemmed sprout clumps, dense tree growth, or where large amounts of slash are created, complete elimination of sprouting species may be difficult during the first clearing activity. Maintenance would involve the use of other physical methods, girdling, or felling, depending on the ability to reach remaining individuals.

The short-term maintenance requirements for each vegetation management option are shown in Figure 5-8.

The methods requiring the least amount of maintenance are:

- Chemical methods, with the exception of Selective Foliar Treatment
- Clearing and Grubbing
- All of the combination methods

All of the other methods are likely to require moderate amounts of short-term maintenance, depending on the effectiveness of the initial clearing method.

Long-Term Maintenance

Long-term maintenance requirements are strongly dependent on the effectiveness of the initial and short-term removal efforts, and the extent to which a community of low-growing plants develops and occupies the clearing area. It is expected that the majority of long-term maintenance efforts will be focused on untreated regrowth of sprouting woody vegetation that grows either from downed trees or stumps, or from new growth that was not removed during the initial stages. The ability of herbaceous vegetation to become dominant is dependent on soil conditions, the type of understory vegetation present, and the degree of damage to existing vegetation that occurs during initial treatment.

In most cases, maintaining the height of the plant community in order to remain outside or below the PZs will require periodic cutting or killing of sprouts and new trees. Stems up to 3 inches in diameter can be effectively treated by cutting with a chain saw to avoid the use of herbicides. Otherwise, basal herbicide treatment or foliar spraying may be used. Stems of non-sprouting species that grow too tall can be felled with a chain saw. Frequency of long-term maintenance will depend on previous short- and long-term measures.

5.2.5 SUMMARY

Nineteen vegetative management methods were compared in terms of potential environmental impacts, cost, and maintenance requirements as shown in Table 5-2. In general, impacts to wetlands can be reduced by minimizing the use of heavy equipment and by removal of larger piles of stems or slash. However, for large clearing areas, the use of small equipment can become impractical, unsafe because of the amount of trees and slash on the ground, and expensive because of the extensive maintenance requirements. Thus, a balance between minimizing immediate environmental impacts and short- and long-term maintenance must be considered.

5.3 "NO ACTION" ALTERNATIVE

This section will address what is commonly referred to as the "No Build" or "No Action" alternative. In this case, the "No Action" alternative would mean not removing the vegetation that is penetrating the protected airspace.

Federal and state regulations, standards, guidelines and advisories require airports to maintain protected airspace free from obstructions including vegetation. In addition to regulatory obligations, many airports are further bound by federal and/or state grant assurances to maintain the protected airspace free from obstructions. Therefore, any action by an airport to not remove obstructions from protected airspace would involve a violation of one or more of the regulations, standards, guidelines, advisories or grant assurances. With this in mind, airports must make every effort to maintain protected airspace free from obstructions. It is important to note that this GEIR does not apply to new airport facilities or the expansion of existing airport uses which alter wetlands. This GEIR is designed to assist the airports in their efforts to fulfill their aeronautical responsibilities pertaining to existing airport facilities while complying with state environmental regulations.

The failure of any airport to maintain protected airspace free from obstructions will ultimately lead to the imposition of one of more operational restrictions on the airport in addition to the loss of eligibility for future federal and state grants plus potential fines or financial penalties. Except in very rare cases, these operational restrictions, described in more detail below, are the results of airports failing to maintain protected airspace free from obstructions rather than alternatives to vegetation removal projects. The selection of the operational restriction(s) that may be used at a given airport requires specific knowledge of the individual circumstances.

The operational restrictions and/or modifications described and evaluated in this section include:

- Displace or relocate the runway threshold
- Relocate threshold and extend the runway

- Close the runway
- Relocate navigational aids (NAVAIDs)
- Raise approach minimums
- Modify or relocate the airport traffic control tower
- Obtain a waiver from FAA

The following definitions are provided to aid in the understanding of this section:

- **Displaced Threshold** - A threshold located at a point other than the physical end of the runway in which the portion of pavement preceding the threshold is available for taxiing prior to takeoff.

- **Instrument Flight Rules (IFR) Weather Conditions** - These rules are used when there is less than a 1,000-foot cloud ceiling and 3 miles visibility.

- **Non-Precision Instrument Runway** - A runway with an existing instrument procedure using air navigation facilities with only horizontal guidance, for which a non-precision instrument procedure has been approved.

- **Precision Instrument Runway** - A runway with an Instrument Landing System (ILS), or a Precision Approach Radar (PAR). These systems provide both horizontal and vertical guidance.

- **Relocated Threshold** - A threshold located at a point other than the physical end of the runway in which the portion of pavement outboard of the threshold is not available for any use.

- **Utility Runway** - A runway that is constructed for and intended to be used by propeller-driven aircraft of 12,500 pound maximum takeoff weight.

- **Visual Flight Rules (VFR) Weather Conditions** - Used when there is more than a 1,000-foot cloud ceiling and 3 miles visibility.

- **Visual Runway** - A runway intended solely for the operation of aircraft using visual approach procedures, with no instrument approach procedure.

5.3.1 DESCRIPTION OF OPTIONS

Displace or Relocate the Runway Threshold

The threshold of a runway indicates the point from which the runway is available for landing. When the threshold is located at a point other than the physical end of the pavement, it is referred to as either a displaced or a relocated threshold. Because certain FAA clearance requirements are based on the location of the threshold, obstructions to air navigation may be eliminated by displacing or relocating the threshold. The primary impact of displacing or relocating a runway threshold is the reduction of available runway length for landing or take off. This often results in operating restrictions on the aircraft using the runway, especially during hot or wet weather conditions. (During hot weather conditions aircraft require more runway length to take off. Similarly, during wet weather conditions aircraft require more runway length to land.) Additionally, if the runway has an instrument procedure, displacing or relocating the threshold would reduce the margin of safety for operation during IFR weather conditions due to the decreased runway length available for landing. In the long term, this option would detract from the airport's usefulness and its ability to become self-sufficient as required under previous grants.

Construct New Runway/Extend Existing Runway

For this option, the airport would be required to either construct a new runway in a location that would serve the same function as the existing runway but would not require clearing to meet FAA requirements; or the runway would be extended in the opposite direction of the wetlands so that the threshold could be relocated and FAA requirements could be met. This option requires clearing new areas for the runway, extensive grading, paving, signing, and lighting. It should be noted that wetlands are located within PZs at the majority of the 46 airports. Thus, it is very likely that construction of a new runway or a runway extension would impact wetland resources. In addition, this option would be very expensive and would not be eligible for FAA grants for construction. Overall, this option is very unlikely to be environmentally and/or economically feasible.

Closure of the Runway

The impacts of closing a runway are airport-specific. In general, this alternative should be viewed as an extreme measure with significant implications. Airports provide community access to the national air transportation system. Investment in airport facilities is made based on the assumption that the benefits outweigh the costs. Closing a runway will result in a loss of airfield capacity, decreased airport access under various wind conditions, and possibly result in the loss of an instrument approach or the primary runway. Loss of an instrument runway at an airport may prevent use of the airport during IFR weather conditions. Closing a runway would significantly limit the capability of the airport to operate, especially during construction, repair, or snow removal. Because of these circumstances, closing a runway could also mean displacement of aircraft, particularly if the runway is the only instrument approach runway, which would result in considerable negative economic impacts to the airport and the community. Approximately one-half of the public use airports in this state have only one runway. In those cases, closing the runway would mean closing the airport. Closing a primary runway would lead to significant negative impacts on airport operations. Since runways constructed with federal and/or state funds can only be closed permanently with federal and/or state approval and for valid aeronautical reasons, this is not considered a feasible option.

Relocate NAVAIDs

If the obstruction is within the required obstruction clearance area for NAVAIDs, the airport could be required to relocate the NAVAID. This requires clearing new areas and moving and installing the equipment.

It should be noted that certain NAVAIDs at an airport may provide information to aircraft that are not arriving at that airport. These are considered enroute NAVAIDs. If obstructions interfere with enroute NAVAIDs, relocating the NAVAID could mean relocating entire air routes. Use of such an alternative would, in most cases, generate greater environmental impacts than removing vegetation from wetland resources. At many airports, relocating the NAVAIDs is not technically or economically feasible.

Raise Approach Minimums

One alternative to obstruction removal is to raise the approach minimums for the runway end impacted by an obstruction. To determine the aeronautical effect of an obstruction, the FAA evaluates the obstructions impact on Terminal Instrument Procedures (TERPs) criteria. The primary approach minimums that are impacted by obstructions to TERPs criteria are the cloud ceiling and visibility. Raising approach minimums reduces airport availability during IFR weather conditions at an airport.

When evaluating the impact of an obstruction to VFR operations, it is common to consider both terminal approach procedures and airport traffic patterns. When evaluating the impact of an obstruction to IFR conditions, common considerations include flight altitudes, air navigation, terminal approach procedures, communication aids existing at the airport, and any unique characteristics of the airport environment. Generally, the minimum cloud ceiling is determined by the height of the critical obstruction to runway approach based on TERPs criteria. Thus, an alternative to removing an obstruction is raising the minimum cloud ceiling. The visibility minimum relates to the approach lighting systems, including lead-in lights and other available airport NAVAIDS. It should be noted, however, that FAA is responsible for determining the final disposition of approach minimums, which ultimately must be recorded in published approach charts. In the long term, this option would detract from the airport's usefulness and its ability to become self-sufficient as required under previous grants.

Modify or Relocate the Airport Traffic Control Tower

If an obstruction falls within an airport traffic control tower (ATCT) line-of-sight, in rare cases the ATCT can be modified or relocated. Similar to the alternative of relocating, displacing, or extending the runway, this alternative can be extremely expensive and can often create other operational problems. and environmental impacts. In many cases, relocating the ATCT is infeasible from a technical standpoint because the criteria for the location and design of the tower are so restrictive. Airports have no control over modification or relocation of ATCTs.

FAA Waiver

Unique local conditions may allow a waiver of FAA standards if the FAA determines that the safety and efficiency of the airport is not compromised by non-compliance with FAA standards. Since the airspace regulations are intended to safeguard public safety, modifications to technical standards that fail to comply with the airspace regulations are almost always unsafe by definition. By current standards, objects that penetrate 14 CFR Part 77 imaginary surfaces are considered objects which should be removed or marked and lighted in accordance with FAA Advisory Circular 70/7460-1 "Obstruction Marking and Lighting." Objects that penetrate approach and transitional surfaces should be removed. If unique local conditions exist with respect to obstructions, the airport sponsor can request an FAA waiver as an alternative to removing the obstruction. The waiver may be granted if FAA determines that the modification will provide an acceptable level of safety, economy, durability and workmanship. It is highly unlikely that FAA would waive safety regulations to allow an obstruction to remain in a PZ, particularly when that obstruction is a tree that will continue to grow and pose an increasingly significant hazard to air navigation. Neither MAC nor Massport is aware of a single FAA waiver that has been granted to allow an obstruction to remain in a PZ at a Massachusetts public use airport.

5.3.2 ENVIRONMENTAL IMPACTS

Environmental impacts associated with displacing or relocating thresholds, closing runways and raising minimums would generally be minimal since most require work only on existing paved or cleared surfaces. However, runway extensions, relocation of NAVAIDs, and relocation of ATCTs may have varying degrees of environmental impacts. For example, construction in upland areas may cause increased short-term noise from equipment, as well as dust emissions and possible ill effects on rare or endangered species and archaeological/historical features, if they are present. Runway extension may increase long-term noise levels for areas under the new flight path.

If construction were required in a wetland area, the impacts associated with it would be compared to those from tree removal activities to identify the alternative with the lowest degree of impact. This assessment could only take place on a site-specific basis.

5.3.3 COSTS

There are two levels of costs addressed here: construction costs, and long-term impacts on the financial viability of a particular airport. Costs for each option can only be determined accurately on a site-specific basis. However, qualitative construction cost estimates for each option are provided in Table 5-3.

The costs were estimated for three types of airports:

- **Utility Airports** - Airports with a single runway up to 3,200 feet in length.
- **General Utility Airports** - Airports with a primary runway longer than 3,200 feet in length.
- **Transport Airports** - Airports designed to accommodate large commercial aircraft, with several runways ranging upwards from 5,000 feet in length, precision approaches and an ATCT.

Actual construction costs will vary depending on a number of factors including the amount of grading and new runway required, the amount of re-marking, the number of lights and other NAVAIDs that must be moved, and the height of the ATCT to be relocated.

The long-term economic effects on a community can be moderate to very high as a result of operational modifications. Both displacement and raising minimums put additional restrictions on operations and limit the number and type of flights at the airport. This in turn renders the airport less cost-effective, eliminating a revenue stream for the community. Closing a runway is a drastic measure, and in some cases could lead to airport closure with the same economic effects.

On the other hand, for most community airports construction of new runways and runway extensions, as well as construction of new towers, will place an enormous burden on the owner/operator. Again, these options may not allow the airport to remain profitable and could cause it to close.

5.3.4 MAINTENANCE

Other than normal operation-related maintenance, there are essentially no long-term maintenance requirements for any of the airport operation modification options.

5.3.5 CONCLUSIONS

The "No Action" alternative means not removing vegetation that penetrates the protected airspace such that one or more operational restrictions are imposed on the airport by FAA. Table 5-3 summarizes the wetland and economic impacts, and maintenance requirements for the "No Action" options. For airports where vegetation already or soon will penetrate the PZs, it means changing the airport's operating characteristics, a reduction in transportation capacity, and/or loss of federal funds for future grants. In addition, when an airport receives funding from FAA, they have a continuing obligation to maintain the runways and navigational airspace in compliance with FAA rules and regulations or face potential litigation to recover earlier grant funds due to a breach of assurances and the loss of employment opportunities. When an airport is owned by the municipality, this obligation falls on the city or town resulting in a significant economic burden. Because of this economic impact, in addition to the environmental impact or technical infeasibility of the various "No Action" options, this alternative is not considered further in this GEIR.

5.4 SUMMARY OF ALTERNATIVES ANALYSIS

Two alternatives including 19 vegetation management options and 7 "No Action" options were evaluated based on environmental impacts, economic implications, and maintenance requirements. In general, the "No Action" alternative is considered infeasible since it does not provide airport owners/operators with viable options to meet previous federal grant commitments, poses severe financial hardship, and reduces the level of public safety at the airport.

Several of the vegetation management options were determined to be cost-effective while causing limited environmental impacts to wetlands. However, to minimize maintenance requirements, some form of chemical treatment with herbicides may be required. While

vegetation removal in airport PZs is not subject to the ROW regulations, it is recommended that airports use these ROW regulations and any subsequent decisions as guidelines in their use of herbicides for vegetation management.

Modifications to airport operations may or may not have as many environmental impacts as the vegetation management options. However, operational changes would be economically detrimental to the airport owner or host community. In some cases, operational changes can be so expensive or can so limit the type of aircraft that can use the airport, that the facility becomes too expensive to operate.

In summary, cost-effective, environmentally safe vegetation management options are available for use in wetlands to maintain safe operations at airports throughout the state. Operational modifications, while possibly involving less environmental risk, can have dramatic economic impacts on owners and operators, and should be used only as a last resort.

5.5 GUIDELINES FOR SELECTION OF VEGETATION REMOVAL ALTERNATIVES

Selection of a method or methods for vegetation removal must be conducted on a case-by-case basis at each airport. In many cases, more than one vegetation removal method will be used for a given vegetation removal project. The process for selecting an appropriate removal method should be based on the following considerations:

- Size of the area requiring vegetation removal
- Density of trees and understory in the vegetation removal area
- Ability of the soils to support heavy equipment
- Presence of environmentally sensitive conditions (e.g., rare species habitat, ACEC, or public water supply protection area)
- Available funding

For each vegetation removal area, an alternatives analysis should be conducted to select the most appropriate vegetation removal method. The goal of this analysis should be to select the method that causes the least environmental impact and is feasible given the project-

specific constraints. The analysis should be consistent with the state's "no net loss" sequencing guidelines whereby the proponent must first seek to avoid, then minimize, and lastly mitigate any wetland impacts. Since the "No Action" alternative is infeasible, fully avoiding wetland impacts is not possible. Thus, the selection process focuses on minimizing and ultimately mitigating impacts.

The project proponent should consider the potential vegetation management alternatives in the following sequence:

1. Tier 1: Minimal Impact Options
2. Tier 2: Low Impact Options
3. Tier 3: Moderate Impact Options
4. Tier 4: High Impact Options

Before dismissing each lower impact tier of options, the project proponent must briefly document why those options were not selected based on environmental, operation and maintenance, and/or economic considerations. The information provided throughout Section 5.0 as well as other available technical and site-specific information should be used to support this analysis. In addition, Table 5-4 summarizes options within the four tiers and provides additional technical information regarding appropriate uses of each option.

When vegetation removal is required in an environmentally sensitive area, the alternative selection process should be modified slightly to ensure adequate protection. Environmentally sensitive areas include:

- Areas within the estimated habitat of a rare species, as mapped on the most recent edition of the Atlas of Estimated Habitats of State-Listed Rare Wetlands Wildlife
- Areas of Critical Environmental Concern (ACECs), as designated by the Massachusetts Coastal Zone Management Office (coastal) or the Massachusetts Department of Environmental Management (inland)
- Areas within the primary recharge area of a public drinking water supply well or within 400 feet of a public surface water supply.

Because these areas are particularly sensitive, additional consideration and agency consultation should be given to selection of vegetation removal methods. The flowchart in Figure 5-9 illustrates the modified alternative selection process related to vegetation removal in these areas. As shown, the primary modifications are that:

- The project proponent should consult with an appropriate agency to inform them of the project and gain input related to selection of the vegetation removal method.
- Except in rare instances, the selected vegetation removal method in sensitive areas should not involve herbicides or heavy equipment. In order to select one of the Tier 2-4 options (low, moderate and high impact, respectively), the proponent must demonstrate that the Tier 1 options are not feasible and/or that the selected method will not lead to a significant impact on the sensitive area.

5.6 REFERENCES

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FAA Handbook 7400.2, Procedures for Handling Airspace Matters.

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TABLE 5-1
TREE SPECIES IN MASSACHUSETTS WETLANDS,
THEIR SPROUTING POTENTIAL, AND HERBICIDES USED TO CONTROL THEM

SPECIES	POTENTIAL TO SPROUT	HERBICIDE/ APPLICATION[1]
1. red maple (*Acer rubrum L.*)	Yes	R-F, R-SF; A-F, A-SF, PF-S,PF-B,G3-F, G3-SF, G4-F, G4-SB
2. silver maple (*A. saccharinum L.*)	Yes	A-F, A-SF, R-S, PF-S, PF-B, G3-F, G3-SF G4-F, G4-SB
3. green ash (*Fraxinus pennsylvanica Marsh.*)	Yes	A-F, R-F, PF-B, PF-S, G3-F, G4-F, G4-SB
4. white ash (*Fraxinus americana L.*)	Yes	A-F, R-F, PF-B, PF-S, G3-F, G4-F, G4-SB
5. black ash (*Fraxinus nigra Marsh.*)	Yes	A-F, R-F, G3-F, G4-F, G4-SB
6. black tupelo (*Nyssa sylvatica Marsh. var. sylvatica*)	Yes	A-F
7. pin oak (*Quercus palustris Muenchh.*)	Yes	A-SF, A-F, R-SF, R-F, G3-F, G3-SF, G4-F, G4-SB
8. swamp white oak (*Quercus bicolor Willd.*)	Yes	A-SF, A-F, R-SF, G3-F,G3-SF,G4-F, G4-SB
9. yellow birch (*Betula alleghaniensis Britton*)	Yes (slight)	A-F, G3-F, G4-F, G4-SB
10. paper birch (*Betula papyrifera Marsh.*)	Yes	A-F, R-F, PF-S, PF-B, G3-F, G4-F, G4-SB

TABLE 5-1 (continued)
TREE SPECIES IN MASSACHUSETTS WETLANDS,
THEIR SPROUTING POTENTIAL, AND HERBICIDES USED TO CONTROL THEM

SPECIES	POTENTIAL TO SPROUT	HERBICIDE/ APPLICATION[1]
11. sweet or black birch (*Betula lenta L.*)	Yes	A-F, R-F, PF-S PF-B, G3-F, G4-F, G4-SB
12. gray birch (*Betula populifolia*)	Yes	A-F, R-F, PF-B, PF-S, G3-F, G4-F, G4-SB
13. river birch (*Betula nigra L.*)	Yes	A-F, R-F, G3-F, G4-F, G4-SB
14. black spruce (*Picea mariana (Mill.) B.S.P.*)	No	Herbicides should not be applied to conifers in wetlands per DFA guidance
15. eastern hemlock (*Tsuga canadensis L.*)	No	Herbicides should not be applied to conifers in wetlands per DFA guidance
16. tamarack (*Larix laricina (Du Roi) K. Koch*)	No	Herbicides should not be applied to conifers in wetlands per DFA guidance
17. atlantic white cedar (*Chamaecyparis thyoides (L.) B.S.P.*)	No	Herbicides should not be applied to conifers in wetlands per DFA guidance
18. eastern white pine (*Pinus strobus L.*)	No	Herbicides should not be applied to conifers in wetlands per DFA guidance

NOTE:

[1]HERBICIDES * (active ingredient in parentheses)

A: Accord (glyphosate)
G3: Garlon 3 (triclopyr)
G4: Garlon 4 (triclopyr)
PF: Pathfinder (triclopyr)
RU: Roundup (glyphosate)
R: Rodeo (glyphosate)

APPLICATION METHODS

B: Basal
F: Foliar
SF: Cut-surface, Frill
S: Cut stump

* These herbicides have been recommended by the Massachusetts Department of Food and Agriculture (DFA) for use in sensitive areas. Other herbicides recommended for use in sensitive areas are listed in Appendix C; additional herbicides may be added to or deleted from this list in the future.

TABLE 5-2
SUMMARY OF WETLAND, ECONOMIC AND MAINTENANCE
CONSIDERATIONS OF VEGETATION MANAGEMENT OPTIONS

OPTIONS	WETLAND IMPACT*	ECONOMIC FEASIBILITY	MAINTENANCE REQUIREMENTS
1. Mechanical Methods			
Push Trees Over	Moderate to severe impact from vehicle tracks Causes pit-mound topography Causes visual impacts Impacts from burial of vegetation from downed trees/slash can be mitigated	Costs are high for small clearing areas and low for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches
Pull Trees Down	Impacts from vehicle tracks can be mitigated Causes pit-mound topography Causes visual impacts Impacts from burial of vegetation from downed trees/slash can be mitigated	Costs are high for small clearing areas and low for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches or from ineffective removal of sprouting species
Sheer Trees with Bulldozer	Moderate to severe impact from vehicle tracks Causes visual impacts Moderate to severe impact from elimination of desirable species Impacts from burial of vegetation from downed trees/slash can be mitigated	Costs are high for small clearing areas and moderate for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches
Mechanized Felling	Impacts from vehicle tracks can be mitigated Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated	Costs are moderate for small clearing areas and moderate for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches or from ineffective removal of sprouting species
Clearing and Grubbing	Moderate to severe impact from vehicle tracks Causes visual impacts Impacts from elimination of desirable species can be eliminated	Costs are moderate for small clearing areas and moderate for large clearing areas	Limited short-term measures required
Build Impoundment to Flood Area**	Causes pit-mound topography Moderate to severe impacts on vegetation from downed trees/slash Causes visual impacts Moderate to severe impact from elimination of desirable species	Costs are high for small clearing areas and high for large clearing areas	Likely to require short-term maintenance to eliminate growth from dead standing trees and possible maintenance of dam structures
Remove Trees by Helicopter	Visual impacts can be mitigated	Costs are high for small clearing areas and high for large clearing areas	Limited short-term measures required
2. Chemical Methods			
Fell/Lop/Cut-Surface Treatment	Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are mod./high for small clearing areas and moderate for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species

TABLE 5-2 (CONTINUED)
SUMMARY OF WETLAND, ECONOMIC AND MAINTENANCE
CONSIDERATIONS OF VEGETATION MANAGEMENT OPTIONS

OPTIONS	WETLAND IMPACT*	ECONOMIC FEASIBILITY	MAINTENANCE REQUIREMENTS
2. Chemical Methods (Continued)			
Fell/Frill-and-Inject Treatment	Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are low for small clearing areas and low for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species
Fell/Selective Basal Treatment	Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are low for small clearing areas and low for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species
Selective Foliar Treatment	Causes visual impacts Impacts from introduction of herbicides can be mitigated Impacts from elimination of desirable species can be eliminated	Costs are low/mod. for small clearing areas and low/mod. for large clearing areas	Likely to require short-term maintenance to eliminate growth from dead standing trees May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species
3. Combined Mechanical-Chemical Methods			
Frill-and-Inject/Pull Trees Down	Impacts from vehicle tracks can be mitigated. Causes pit-mound topography Causes visual impacts Impacts from burial of vegetation from downed trees/slash can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are high for small clearing areas and high for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species
Frill-and-Inject/Push Trees Over	Moderate to severe impact from vehicle tracks Causes pit-mound topography Causes visual impacts Impacts from burial of vegetation from downed trees/slash can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are high for small clearing areas and high for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species
Mechanized Felling/Cut-Surface Treatment	Impacts from vehicle tracks can be mitigated. Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated Impacts from introduction of herbicides can be mitigated	Costs are high for small clearing areas and high for large clearing areas	May require short-term maintenance to eliminate growth from downed trees or from ineffective removal of sprouting species

TABLE 5-2 (CONTINUED)
SUMMARY OF WETLAND, ECONOMIC AND MAINTENANCE
CONSIDERATIONS OF VEGETATION MANAGEMENT OPTIONS

OPTIONS	WETLAND IMPACT*	ECONOMIC FEASIBILITY	MAINTENANCE REQUIREMENTS
3. Combined Mechanical-Chemical Methods (Continued)			
Shear Trees with Bulldozer/Cut-Surface Treatment	Moderate to severe impact from vehicle tracks Causes visual impacts Moderate to severe impact from elimination of desirable species Impacts from burial of vegetation from downed trees/slash can be mitigated	Costs are high for small clearing areas and high for large clearing areas	May require short-term maintenance to eliminate growth from downed trees
4. Small Equipment/Non-Equipment/Non-Chemical Methods			
Fell Trees and Lop Slash	Causes visual impacts Impacts from burial of vegetation from downed trees/slash can be mitigated	Costs are low for small clearing areas and moderate for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches or from ineffective removal of sprouting species
Tree Topping	Impacts from vehicle tracks can be mitigated	Costs are high for small clearing areas and high for large clearing areas	Likely to require short-term maintenance to eliminate growth from downed trees and branches, ineffective removal of sprouting species, and removal of dead standing trees
Girdling	Causes pit-mound topography Impacts from burial of vegetation from downed trees/slash can be mitigated Visual impacts can be mitigated	Costs are low for small clearing areas and low for large clearing areas	Likely to require short-term maintenance to eliminate dead standing trees and may require removal of sprouting species.
Prescribed Burning	Causes visual impacts Moderate to severe impact from elimination of desirable species	Costs are high for small clearing areas and mod.high for large clearing areas	Limited short-term measures required

Note: The vegetation management options are discussed in more detail in Section 5.2.1.

* Environmental impacts inherent to all vegetation management alternatives (e.g., elimination of tree canopy leads to increase soil and water temperatures) are not listed.

** Note that if construction of impoundment involves wetland filling, the limited project provision will not apply.

TABLE 5-3
SUMMARY OF WETLAND, ECONOMIC AND MAINTENANCE
CONSIDERATIONS OF "NO ACTION" OPTIONS

OPTIONS	WETLAND IMPACT*	ECONOMIC FEASIBILITY	MAINTENANCE REQUIREMENTS
Displace or Relocate Runway Threshold	None	Costs are high in comparison to vegetation management options	None
Construct New Runway / Extend Existing Runway	Possible impacts depending on length of extension and environmental conditions	Costs are high in comparison to vegetation management options	None
Closure of Runway	None	Costs are high in comparison to vegetation management options	None
Relocate NAVAIDS	Possible impacts depending on new locations of NAVAID and environmental conditions.	Costs are high in comparison to vegetation management options	None
Raise Approach Minimums	None	Costs are low for all airports types	None
Modify or Relocate the ATCT	Possible impacts depending on new locations of ATCT and environmental conditions.	Costs are high in comparison to vegetation management options	None
FAA Waiver	None	Costs are low for all airports types	None

Note: The "No Action" Alternatives are discussed in more detail in Section 5.3.1.

TABLE 5-4
SUMMARY OF ALTERNATIVE ANALYSIS
TIERS AND RELATED INFORMATION

ALTERNATIVE ANALYSIS TIERS	ADDITIONAL INFORMATION OR COMMENT
TIER 1: MINIMAL IMPACT OPTIONS	
• Tree Topping • Remove Trees with Helicopter • Fell Trees and Lop Slash • Girdling	• Most appropriate for selective vegetation removal over small areas. • Most appropriate for use in environmentally sensitive area (e.g. rare species habitats, ACECs, in wetlands, near public water supplies).
TIER 2: LOW IMPACT OPTIONS	
• Fell/Lop/Cut-surface Treatment • Fell/Frill-and-inject Treatment • Fell/Selective Basal Treatment	• Most appropriate for selective vegetation removal, particularly if species have high sprouting potential. • Any option involving chemical use should comply with 333 CMR 11.00 and related Department of Food and Agriculture guidance.
TIER 3: MODERATE IMPACT OPTIONS	
• Selective Foliar Treatment • Pull Trees Down • Mechanized Felling • Frill-and-inject/Pull Trees Down • Mechanized Felling/Cut-surface Treatment	• May be acceptable if wetland soils are capable of supporting heavy equipment. • May be most cost-effective for use over large areas. • May be preferred option when removal of dense vegetation is required. • Any option involving chemical use should comply with 333 CMR 11.00 and related Department of Food and Agriculture guidance.
TIER 4: HIGH IMPACT OPTIONS	
• Clearing and Grubbing • Push Trees Over • Shear Trees with Bulldozer • Build an Impoundment • Frill-and-inject/Push Trees Over • Shear Trees with Bulldozer/Cut-surface Treatment • Prescribed Burning	• May be preferred option only if Tier 1-3 options are infeasible and wetland soils are capable of supporting heavy equipment. • May be most cost-effective for use over large areas. • Any option involving chemical use should comply with 333 CMR 11.00 and related Department of Food and Agriculture guidance.

Adapted from Stenzel, et. al. (1985)

GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

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FIGURE 5-1

PHYSICAL CLEARING METHODS-
PUSH TREES OVER

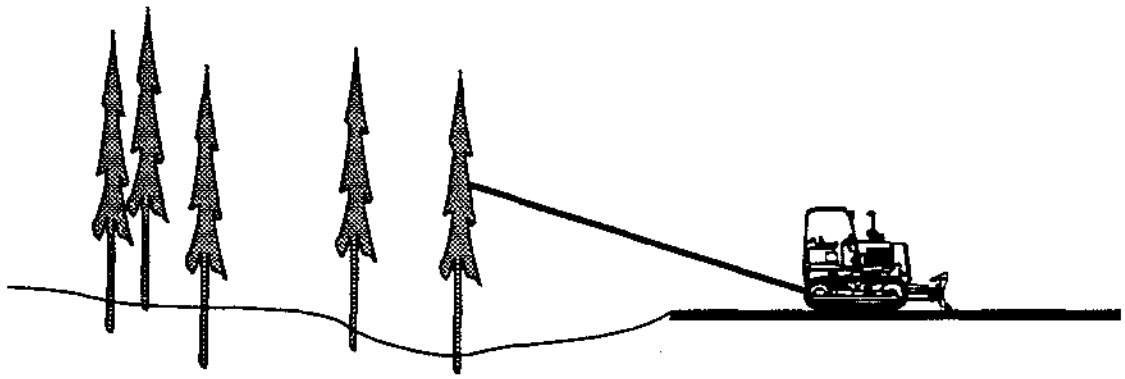

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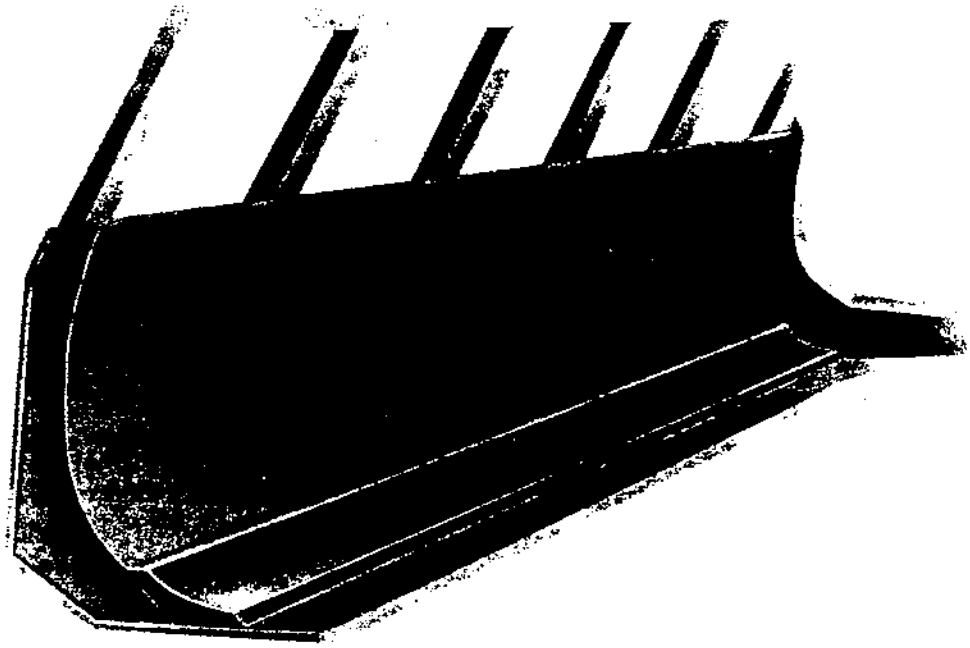
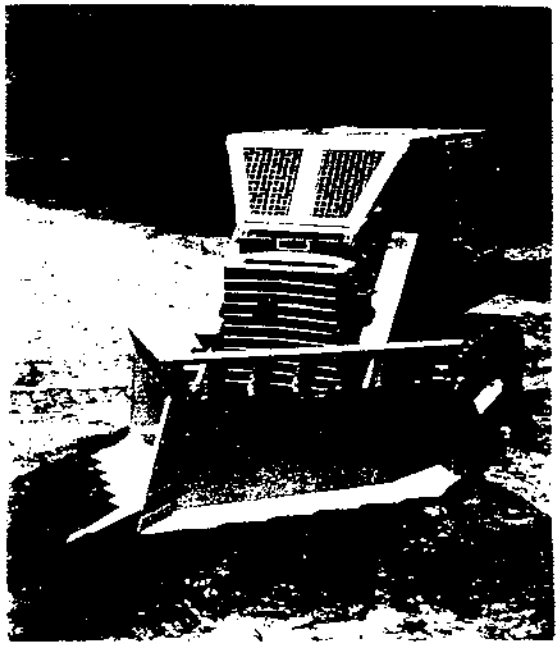
FIGURE 5-2

PHYSICAL CLEARING METHODS-
PULL TREES DOWN



Shearing Blade



V-Blade

Adapted from Lawson (1980)

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FIGURE 5-3

PHYSICAL CLEARING METHODS-
SHEAR TREES WITH BULLDOZER

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Adapted from Stenzel, et. al. (1985)

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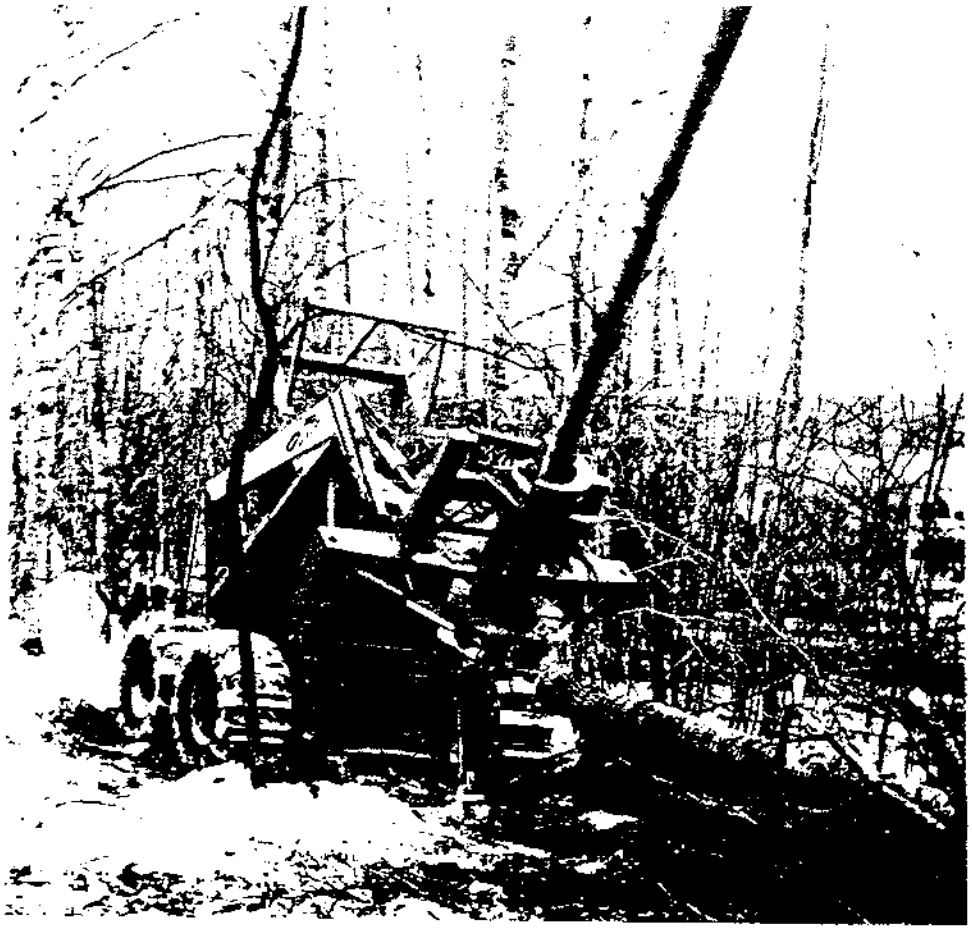
FIGURE 5-4A

PHYSICAL CLEARING METHODS-
FELLER-BUNCHER



Adapted from Stenzel, et. al. (1985)

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FIGURE 5-4B

PHYSICAL CLEARING METHODS-
FELLER-DIRECTOR

Adapted from Stenzel, et. al. (1985)

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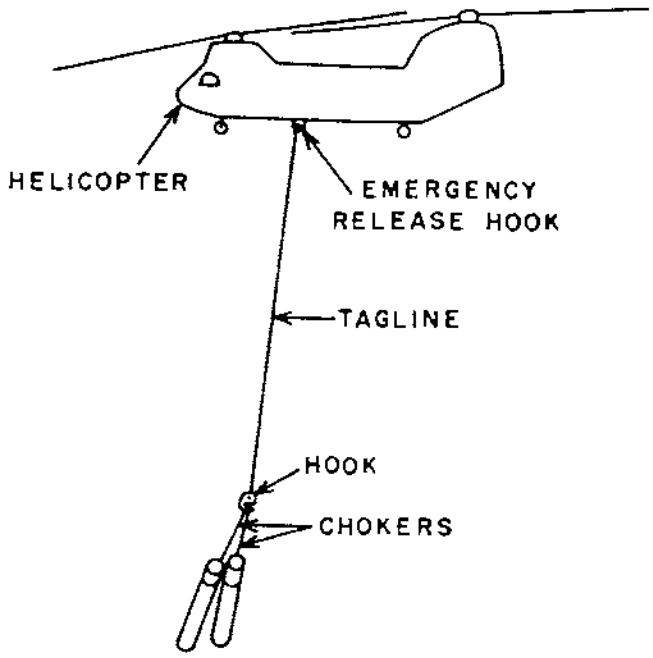
FIGURE 5-4C

PHYSICAL CLEARING METHODS-MULTI-FUNCTION HARVESTOR



Adapted from Stenzel, et. al. (1985)

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FIGURE 5-5

PHYSICAL CLEARING METHODS-
REMOVE TREE BY HELICOPTER

FIGURE 5-6

POTENTIAL ENVIRONMENTAL IMPACTS FROM VEGETATION MANAGEMENT OPTIONS

Vegetation Management Options	Environmental Impacts					
	Causes Vehicle Tracks	Creates Pit-Mound Topography	Burial of Vegetation Under Downed Trees	Visual Impacts from Clearing	Introduction of Herbicides	Elimination of Desirable Species
PHYSICAL METHODS						
Push Trees Over	●	●	◒	●	N/A	○
Pull Trees Down	◒	●	◒	●	N/A	○
Shear Trees with Bulldozer	●	○	◒	●	N/A	●
Mechanized Felling	◒	○	◒	◒	N/A	○
Clearing and Grubbing	●	○	○	●	N/A	◒
Build an Impoundment	○	●	●	●	N/A	●
Remove Trees by Helicopter	○	○	○	◒	N/A	○
CHEMICAL METHODS						
Fell/Lop/Cut-Surface Treatment	○	○	◒	◒	◒	○
Fell/Frill-and-Inject Treatment	○	○	◒	◒	◒	○
Fell/Selective Basal Treatment	○	○	◒	◒	◒	○
Selective Foliar Treatment	○	○	○	●	◒	◒
COMBINATION METHODS						
Frill-and-Inject / Pull Trees Down	◒	●	◒	●	◒	○
Frill-and-Inject / Push Trees Over	●	●	◒	●	◒	○
Mechanized Felling / Cut-Surface Treatment	◒	○	◒	◒	◒	○
Shear Trees with Bulldozer / Cut-Surface Treatment	●	○	◒	●	◒	●
SMALL EQUIPMENT / NON-EQUIPMENT / NON-CHEMICAL METHODS						
Fell Trees and Lop Slash	○	○	◒	●	N/A	○
Tree Topping	◒	○	○	○	N/A	○
Girdling	○	◒	◒	◒	N/A	○
Prescribed Burning	○	○	○	●	N/A	●

● Causes moderate to severe impact

◒ Impact could be mitigated with proper use of equipment/chemicals or removal of felled trees and slash

○ Minimal impact

N/A Not Applicable

FIGURE 5-7

COST COMPARISON OF VEGETATION MANAGEMENT OPTIONS

Vegetation Management Options	Small Forested Wetlands	Large Forested Wetlands
PHYSICAL METHODS		
Push Trees Over	High	Moderate
Pull Trees Down	High	High
Shear Trees with Bulldozer	High	Moderate
Mechanized Felling	Moderate	Moderate
Clearing and Grubbing	Moderate	Moderate
Build an Impoundment	High	High
Remove Trees by Helicopter	High	High
CHEMICAL METHODS		
Fell/Lop/Cut-Surface Treatment	Moderate/High	Moderate
Fell/Frill-and-Inject Treatment	Low	Low
Fell/Selective Basal Treatment	Low	Low
Selective Foliar Treatment	Low/Moderate	Low/Moderate
COMBINATION METHODS		
Frill-and-Inject / Pull Trees Down	High	High
Frill-and-Inject / Push Trees Over	High	High
Mechanized Felling / Cut-Surface Treatment	High	High
Shear Trees with Bulldozer / Cut-Surface Treat	High	High
SMALL EQUIPMENT / NON-EQUIPMENT / NON-CHEMICAL METHODS		
Fell Trees and Lop Slash	Low	Moderate
Tree Topping	High	High
Girdling	Low	Low
Prescribed Burning	High	Moderate/High

Low Cost <$500/acre
Moderate Cost $500 - $1000/acre
High Cost >$1000/acre

FIGURE 5-8

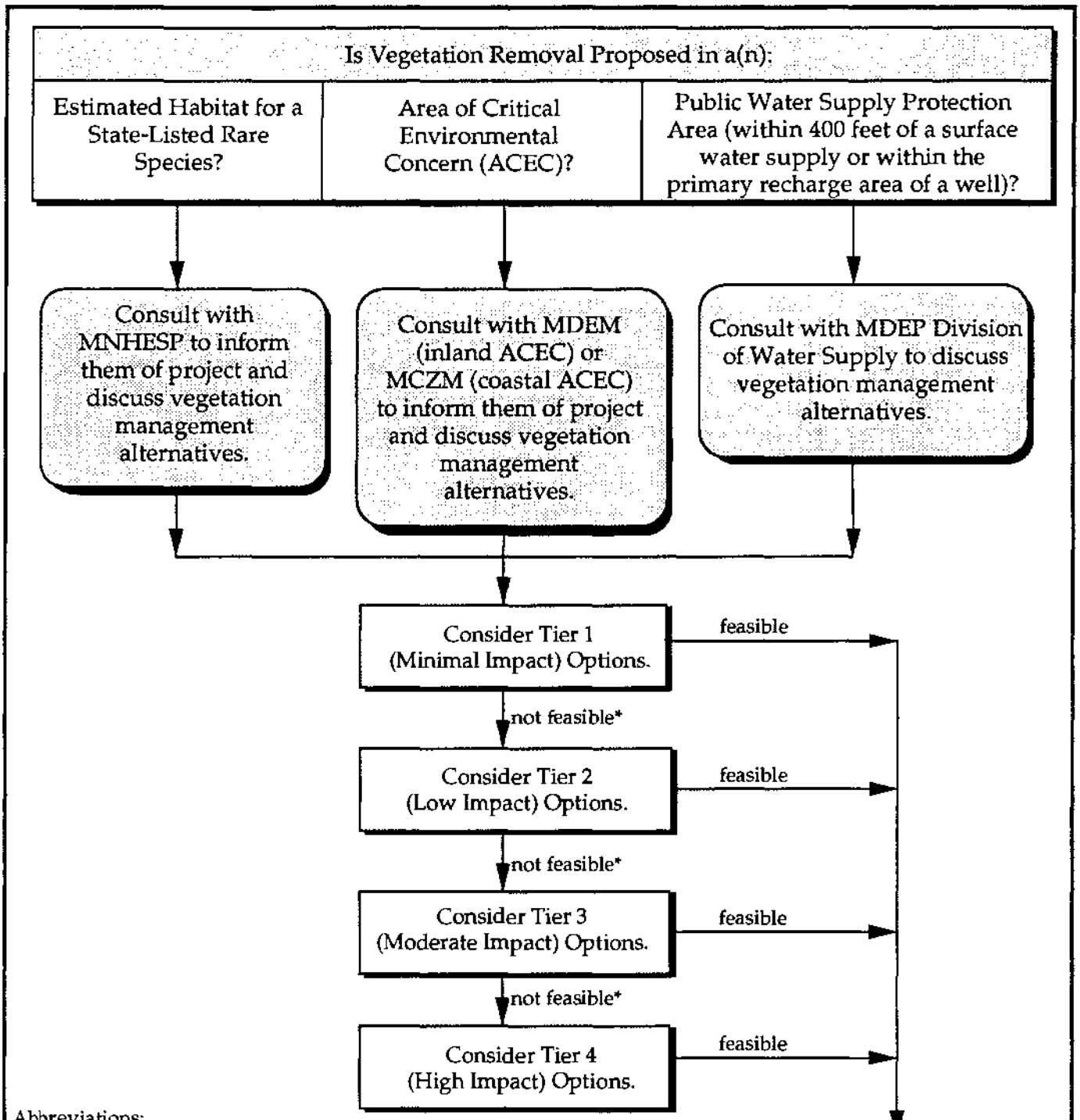
RESULTS OF INITIAL CLEARING
REQUIRING SHORT-TERM MAINTENANCE

Vegetation Management Options	When Maintenance is Required		
	Growth from Downed Trees	Dead Trees Remain Standing	Ineffective Removal
PHYSICAL METHODS			
Push Trees Over	●	○	○
Pull Trees Down	●	○	◒
Shear Trees with Bulldozer	●	○	○
Mechanized Felling	●	○	◒
Clearing and Grubbing	○	○	○
Build an Impoundment	○	●	○
Remove Trees by Helicopter	○	○	○
CHEMICAL METHODS			
Fell/Lop/Cut-Surface Treatment	◒	○	◒
Fell/Frill-and-Inject Treatment	◒	○	◒
Fell/Selective Basal Treatment	◒	○	◒
Selective Foliar Treatment	◒	●	◒
COMBINATION METHODS			
Frill-and-Inject / Pull Trees Down	◒	○	◒
Frill-and-Inject / Push Trees Over	◒	○	◒
Mechanized Felling / Cut-Surface Treatment	◒	○	◒
Shear Trees with Bulldozer / Cut-Surface Treatment	◒	○	○
SMALL EQUIPMENT / NON-EQUIPMENT / NON-CHEMICAL METHODS			
Fell Trees and Lop Slash	●	○	◒
Tree Topping	●	●	●
Girdling	○	●	◒
Prescribed Burning	○	○	○

● Likely

◒ Possible

○ Unlikely



Abbreviations:

AVRLP	- Airport Vegetation Removal Limited Project
MCZM	- Massachusetts Coastal Zone Management
MDEM	- Massachusetts Department of Environmental Management
MDEP	- Massachusetts Department of Environmental Protection
MNHESP	- Massachusetts Natural Heritage and Endangered Species Program

* *Document infeasibility of each tier of options before considering next tier.*

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FIGURE 5-9
MODIFIED ALTERNATIVE SELECTION METHODOLOGY FOR SENSITIVE AREAS

Section Six

6.0 IMPACT ASSESSMENT

6.1 INTRODUCTION

Section 6.0 provides an assessment of the environmental impacts associated with vegetation removal in wetlands, with particular focus on wetland resources containing trees or tall shrubs. In addition, this section outlines specific guidelines for conducting site-specific wetland impact assessments related to airport vegetation removal limited projects (AVRLPs). Finally, included is an estimate of the likely statewide impact of the proposed regulatory revision.

A detailed description of each subsection follows. Section 6.2 provides a comprehensive evaluation of the impacts, including short-term and long-term, direct and indirect, and positive and negative effects of various vegetation removal activities on the functions and values of each state-protected wetland resource area. This evaluation is based on current scientific literature, as referenced throughout the subsection. Section 6.3 provides a discrete methodology for quantifying the wetland area that is altered by various vegetation management techniques, and Section 6.4 provides a methodology for assessing site-specific impacts associated with vegetation removal. Based on these methodologies, and on the wetland and Protection Zone (PZ) mapping presented in Section 4.0 and Appendix A, Section 6.5 provides an estimate of the maximum potential statewide impact of AVRLPs. This estimate puts the regulatory revision into perspective on a statewide basis. Finally, Section 6.6 provides an overall environmental impact assessment of vegetation removal activities in wetlands around airports. This subsection, intended to fulfill the requirements of the MEPA regulations (301 CMR 11.07), addresses impacts to topography, soils, traffic, noise, archaeological resources, and scenic qualities. Many of these issues were considered in Section 5.0, the analysis of alternatives; they are discussed in greater detail in this section.

6.2 WETLAND IMPACT ASSESSMENT

The Massachusetts Wetlands Protection Act (MWPA) (M.G.L. c. 131 § 40) and Regulations (310 CMR 10.00) define what constitutes a wetland resource in the Commonwealth. Wetlands are broadly classified as either inland or coastal, and are specifically defined based on features such as vegetation or wildlife species, topography, and/or hydrologic measurements. There are five inland resource areas (Bordering Vegetated Wetlands, Bank, Land Under Water Bodies and Waterways, Bordering Land Subject to Flooding, and Isolated Land Subject to Flooding) and eleven coastal resource areas [Land Under the Ocean, Designated Port Areas, Coastal Beaches, Coastal Dunes, Barrier Beaches, Coastal Banks, Rocky Intertidal Shores, Salt Marshes, Land Under Salt Ponds, Land Containing Shellfish, and Banks of or Land Under the Ocean, Ponds, Streams, Rivers, Lakes, or Creeks that Underlie an Anadromous/Catadromous Fish Run ("Fish Run")]. In addition, a 100-foot buffer zone in which activities are regulated surrounds many of these areas. The definitions of each of these resource areas, including the 100-foot buffer zone, are presented in Section 6.2.1. Each wetland resource area is assumed, unless proven otherwise, to possess or perform certain attributes or functions. These functions (known as the "interests" of MWPA), and the resource areas which are presumed to be significant for each function, are summarized in Section 6.2.2. Section 6.2.3 provides a discussion of the direct and indirect effects that tree removal from wetlands may have on each resource area and its functions. It should be noted that while this section focuses on those wetland resource areas where vegetation removal is likely to occur, each state-protected wetland resource area is discussed to ensure a thorough evaluation. Finally, Section 6.2.4 addresses the impact of construction of access roads for transportation of vegetation removal equipment.

6.2.1 DEFINITIONS OF WETLAND RESOURCE AREAS

Bordering Vegetated Wetlands

Bordering vegetated wetlands (BVW) are defined as "...freshwater wetlands which border on creeks, rivers, streams, ponds and lakes...where the topography is low and flat,

and where the soils are annually saturated" (310 CMR 10.55). Wet meadows, marshes, swamps, and bogs are all types of freshwater wetlands. The boundary of a BVW is the line within which 50 percent or more of the vegetational community consists of the wetland plant species identified in MWPA. The plants listed in MWPA are presented in Table 6-1.

In addition, DEP Wetland Program Policy 85-1 stipulates that even if not listed in MWPA, plant species generally recognized in the scientific community as indicators of wetland conditions are considered wetland plants for the purposes of defining an area as a BVW subject to regulation. The U.S. Fish and Wildlife Service (USFWS) publishes national, regional, and state lists of plant species and their wetland statuses. The wetland status of each plant is determined by the probability (percentage) of it existing in a wetland habitat. There are five wetland statuses: Obligate (OBL), Facultative Wetland (FACW), Facultative (FAC), Facultative Upland (FACU), and Upland (UPL) (plants which are not contained in the list are assumed to be UPL). Any species with a status of OBL, FACW, or FAC can be considered a wetland species. The defined probability range for each status is listed in Table 6-2. In addition, two modifiers can be placed at the end of each of FACW, FAC, and FACU to further refine the probability. A "+" modifier indicates that the plant is at the higher end of the probability range while a "-" modifier indicates that the plant is at the lower end of the probability range. For example, a plant whose status is FAC+ is more likely to be in a wetland than a plant whose status is FAC-. The most current list for Massachusetts is dated 1988 (USFWS, 1988).

BVW are those areas most commonly referred to as wetlands by the lay person. In many cases, the MWPA BVW edge approximates the edge of the federal wetlands boundary. (Federal jurisdictional wetlands are identified and delineated using a three-parameter approach which considers vegetation as well as indicators of hydrology and hydric or wetland soils. Section 404 of the Clean Water Act, which is administered by the U.S. Army Corps of Engineers, regulates placement of fill in federal jurisdictional wetlands. It should be noted that "clearing and grubbing" or any vegetation removal using heavy equipment that results in soil disturbance, is regulated as wetland filling under Section 404.)

Bank

Inland bank is defined in the regulations as the portion of the land surface which normally abuts and confines a water body or waterway. It occurs between a water body and a BVW or adjacent floodplain, or between a water body and an upland area when BVW and floodplain are not present. By definition, all water bodies and waterways, including intermittent streams, are bounded by a bank. The upper boundary of a bank is the first observable break in slope or the mean annual flood level, whichever is lower. The lower boundary of a bank is the mean annual low flow level, which is the upper boundary of the water body or waterway (310 CMR 10.54).

Land Under Water Bodies or Waterways

Land under water bodies or waterways (LUW) is defined in 310 CMR 10.56 as the land beneath any river, stream, creek, pond, or lake. The land underlying these waterways and water bodies may be composed of organic muck or peat, fine sediments, rocks, or bedrock. As noted above, the boundary of LUW is the mean annual low water level (310 CMR 10.56).

The regulations (310 CMR 10.04) further clarify LUW by defining the terms creek, river, stream, pond, and lake. These definitions are summarized below:

River - A flowing body of water that flows year-round and empties into the ocean, a lake, or another river.

Stream - A body of running water, including brooks and creeks, which moves in a definite channel in the ground due to a hydraulic gradient, and which flows within, into or out of an Area Subject to Protection under MWPA. A portion of a stream may flow through a culvert or beneath a bridge. Such a body of running water which does not flow throughout the year (i.e., which is intermittent) is a stream except for that portion upgradient of all bogs, swamps, wet meadows, and marshes.

Creek - The same as a stream.

Pond (inland) - Any open body of fresh water with a surface area observed or recorded within the last ten years of at least 10,000 square feet. Ponds may be either naturally occurring or man-made by impoundment, excavation, or otherwise. Ponds shall contain standing water except for periods of extended drought.

Lake - Any open body of fresh water with a surface area of [at least] ten acres. Note: Water bodies with an area of at least 10 acres in their natural state (e.g., prior to damming or excavation) have been known and protected as "Great Ponds" since colonial times (Colburn, 1992).

Bordering Land Subject to Flooding

Bordering Land Subject to Flooding (BLSF), which is defined as the 100-year floodplain, is an area with low, flat topography adjacent to and inundated by flood waters rising from the adjacent surface waters. BLSF provides a temporary storage area for flood water which has overtopped the bank of the main channel of a creek, river, or stream, or the basin of a pond or a lake. During periods of peak run-off, flood waters are both retained and detained by BLSF. Over time, incremental filling of these areas may cause increases in the extent and level of flooding by decreasing flood storage volume or by restricting flows, potentially leading to damage to public and private property. In addition, the area within BLSF that is either 10-year floodplain or is a certified vernal pool is likely to provide valuable wildlife habitat (310 CMR 10.57).

Isolated Land Subject to Flooding

Isolated Land Subject to Flooding (ILSF) is an isolated depression or a closed basin which serves as a ponding area for run-off or high groundwater levels. By definition, then, ILSF does not border any other resource areas. ILSF is defined as an area that at least once per year confines standing water to a volume of at least 1/4 acre-foot and to an average depth of at least six inches. The boundary of ILSF is the perimeter of the largest observed or recorded volume of water in the area, which in the absence of recorded observations can be estimated based on engineering calculations. ILSF may serve as a vernal pool, a confined basin that holds water in most years for two continuous months in the spring or summer and provides essential breeding habitat for various amphibian and invertebrate species. Because vernal pools have no inlet or outlet, there are no fish

present to feed on the young amphibians. Unless the existence and location of a vernal pool is certified by the Massachusetts Natural Heritage and Endangered Species Program (NHESP), it is not specifically protected under MWPA. Vernal pools may also occur within BLSF or BVW (310 CMR 10.57).

Banks of or Land Under the Ocean, Ponds, Streams, Rivers, Lakes, or Creeks that Underlie an Anadromous/Catadromous Fish Run ("Fish Run")

Banks of or land under fish runs are defined as the area underlying estuaries, ponds, streams, creeks, rivers, lakes, or coastal waters which provides a spawning or feeding ground or passageway for anadromous or catadromous fish, and which is identified by DMF or has been mapped on the Coastal Atlas of the Coastal Zone Management Program. (Anadromous fish are fish that enter fresh water from the ocean to spawn, such as alewives, shad, and salmon; catadromous fish are fish that enter salt water from fresh water to spawn, such as eels.) Fish runs include areas which have historically served as spawning or passageways for migratory fish and are either being restored or are planned to be restored (310 CMR 10.35). Although 310 CMR 10.35 notes that the regulated portion of a fish run extends inland only to the boundary of the coastal zone, it is DEP policy that the remainder of a fish run outside of the coastal zone be given the same level of protection as those within the coastal zone (Department of Environmental Quality Engineering, 1979).

Barrier Beaches

Barrier beaches are defined in the regulations as a narrow low-lying strip of land that extends roughly parallel to the trend of the coast and is separated from the mainland by a narrow body of water or a marsh system. Barrier beaches generally consist, at least in part, of coastal beaches and coastal dunes A barrier beach may be joined to the mainland at one or both ends (310 CMR 10.29).

Coastal Dunes

A coastal dune is any natural mound or ridge of sediment deposited by wind action or storm overwash, and located landward of a coastal beach. Artificially-deposited sediment that provides storm damage prevention or flood control is also regulated as a coastal dune (310 CMR 10.28).

Coastal Banks

Coastal banks are defined as the seaward face or side of any elevated landform, other than a coastal dune, which lies at the landward edge of a coastal beach, land subject to tidal action, or other coastal wetland. Coastal banks may consist of rock or fairly loose sediment, and may be steep or gently sloping. The landward boundary of a coastal bank is the top of or the first major break in the slope of the bank (310 CMR 10.30).

Salt Marshes

Salt marshes are coastal wetlands that extend from above the mean low tide line landward to the highest high tide line. Salt marshes are characterized by plants that are adapted to and/or prefer living in saline soils. Dominant plants within New England salt marshes include salt meadow cord grass (*Spartina patens*) and/or salt marsh cord grass (*Spartina alterniflora*). A salt marsh may contain tidal creeks, ditches, and pools (310 CMR 10.32).

Land Under Salt Ponds

Land under salt ponds is defined as the land area underlying a shallow enclosed or semi-enclosed body of saline water that may be partially or totally restricted by barrier beach formation. Salt ponds may receive fresh water from small streams emptying into their upper reaches and/or springs in the salt pond itself (310 CMR 10.33).

Land Under the Ocean

Land Under the Ocean (LUO) is defined in 310 CMR 10.25 as the land beneath the ocean waters extending seaward from the mean low water line to the boundary of the municipality's jurisdiction. LUO includes land under estuaries. Nearshore Areas of LUO refers to the land extending from the mean low water line to the seaward limit of a municipality's jurisdiction, but in no case beyond the point where the land is 80 feet (or less in certain defined areas) below the level of the ocean at mean low water (310 CMR 10.25).

Coastal Beaches

Coastal beaches are defined in the regulations as areas of unconsolidated sediment subject to wave, tidal, and coastal storm action which form the gently sloping shore of a body of salt water. By definition, coastal beaches include tidal flats. Coastal beaches extend from the mean low water line (the upper boundary of LUO) landward to whichever of the boundaries is closest to the ocean: the dune line, coastal bank line, or the seaward edge of existing man-made structures, when these structures replace either of the first two boundaries. "Tidal flat" means any nearly level part of a coastal beach which usually extends from the mean low water line landward to the more steeply sloping face of the coastal beach, or which may be separated from the beach by LUO (310 CMR 10.27).

Land Containing Shellfish

Land containing shellfish is defined as LUO, tidal flats, rocky intertidal shores, salt marshes, and land under salt ponds when any of these resource areas contain shellfish. Thus, land containing shellfish always overlaps at least one other coastal wetland resource area. "Shellfish" includes but may not be limited to the following species: bay scollop (*Agropecten irradians*); blue mussel (*Mytilus edulis*); ocean quahog (*Arctica islandica);* oyster (*Crassostrea virginica*); quahog (*Mercenaria mercenaria*); razor clam (*Ensis directus*); sea clam (*Spisula solidissima*); sea scallop (*Placopecten magellanicus*); and soft shell clam (*Mya arenaria*). The location of land containing shellfish within any

of the coastal wetland resource areas can generally be determined by consultation with the city or town's shellfish constable or by consultation with the Division of Marine Fisheries (DMF)(310 CMR 10.34).

Rocky Intertidal Shores

Rocky intertidal shores are naturally occurring rocky areas, such as bedrock or boulder strewn areas, located between the mean high water line and the mean low water line (310 CMR 10.31).

Designated Port Areas.

Designated port areas are portions of developed harbors that are specifically designated pursuant to the Massachusetts Waterways Law (M.G.L. c.91). These resources are almost completely developed areas where few or no natural land forms or vegetation remains. They tend to be located in estuaries, overlapping other protected coastal wetland resource areas, and they tend to be associated with elevated levels of contamination from point and non-point source discharges (310 CMR 10.26).

Other Protected Areas

In addition to the above wetland resource areas, two other protected areas are worth noting: the 100-foot buffer zone that surrounds many wetland resource areas, and Land Subject to Coastal Storm Flowage. Their definitions follow.

Buffer Zones. Certain wetland resource areas are surrounded by a 100-foot buffer zone within which activities are regulated under MWPA. These areas include: BVW, inland and coastal bank, coastal beaches and dunes, barrier beaches, rocky intertidal shores, salt marshes, and fish runs. Work within 100 feet of these areas, because of its proximity to the actual resource area, can significantly affect the resource area. There are no performance standards for work in the buffer zone. Rather, activities in these areas are

evaluated in terms of the likelihood that they will affect the functions of the adjacent resource areas.

Land Subject to Coastal Storm Flowage. Land subject to coastal storm flowage, or the 100-year floodplain in coastal areas, is a protected coastal wetland resource area. However, there are no performance standards for work in this area. Rather, DEP policy presumes that if a project meets the state building code for construction in floodplains (780 CMR 744), and if the performance standards for the other coastal resource areas are met, then the storm damage prevention interests under MWPA will be met. For this reason, this resource area is not specifically discussed further in this document.

6.2.2 WETLAND FUNCTIONS AND VALUES

Wetlands have been recognized for years to perform a wide range of functions. MWPA addresses and categorizes these functions and values as eight public interests:

- Protection of public and/or private water supply
- Protection of groundwater supply
- Flood control
- Storm damage prevention
- Prevention of pollution
- Protection of fisheries habitat
- Protection of wildlife habitat
- Protection of land containing shellfish

Not all resource areas perform all of the functions protected by MWPA; however, the regulations stipulate which interests are presumed significant for each resource area. Each of these functions or interests is described below. Where appropriate, similar interests are combined for discussion purposes. Figure 6-1 summarizes the wetland resource areas that are presumed to be significant for each of these interests.

It should be noted that in addition to the above functions which are specifically protected by MWPA, wetlands are also valuable in terms of a variety of other recreational, aesthetic, and economic interests.

Protection of Public and/or Private Water Supply and Groundwater Supply

Wetland resource areas contribute to both the quality and quantity of drinking water supplies. In terms of quality, wetlands help to prevent pollution (discussed in greater detail below). During dry periods, the water retained in wetlands helps to maintain base flows in rivers and streams which may be used for public water supplies. Some wetlands function as groundwater recharge areas, allowing water to seep slowly into underlying aquifers. At other times, wetlands serve as discharge areas for surfacing groundwater, allowing stored groundwater to sustain base flows in streams during dry seasons. Any of these cases may be significant to protection of water supplies -- both public and private supplies, and surface water and groundwater supplies. It should be noted that the wetland resource areas listed in Table 6-1 as significant to protection of public and private water supplies are so regarded unless proven otherwise. Thus, even if a given wetland resource is not adjacent to a water supply, it may still actually protect public or private water supplies.

Inland bank, BVW, and LUW are all deemed significant to protection of public and/or private surface water and groundwater supplies. In addition, when ILSF are underlain by pervious material they are likely to be significant to protection of water supplies. Further, the peat layer in salt marshes may provide a barrier between fresh groundwater and the ocean, thus helping to maintain the level of groundwater and ultimately to protect groundwater supplies.

Flood Control and Storm Damage Prevention

The dense vegetation and low, flat topography in wetlands slows and reduces the passage of flood waters during periods of peak flows, provides temporary flood water storage, and facilitates water removal through evaporation and transpiration. This

reduces downstream flood crests and resulting damage to private and public property. Wetland vegetation and vegetation root systems also hold sediments in place, minimizing sediment and shoreline erosion.

All of the inland wetland resource areas, in addition to coastal beaches, dunes and banks, barrier beaches, nearshore areas of land under the ocean, and rocky intertidal shores, perform valuable functions related to flood control and storm damage prevention. In addition, salt marsh grasses and underlying peat resist erosion and dissipate wave energy, thereby minimizing wave damage.

Prevention of Pollution

Wetland plant communities, soils, and typically flat topography help to remove or detain sediments, nutrients, and toxic substances from surface runoff and floodwaters. Plant root systems and wetland soils may hold nutrients and toxic substances for years, or they may release these pollutants in the fall and winter as the plants decay. When nutrients and other pollutants are released in the fall and winter rather than in the growing season, they are less likely to degrade water quality; they tend to settle into the sediments or to be flushed out of the system rather than contribute to plant or algal growth.

Inland bank, BVW, LUW, salt marshes, and ILSF in certain cases, are all significant to prevention of pollution.

Protection of Fisheries and Wildlife Habitat

The hydrologic regime, plant communities, soil composition and structure, topography, and water chemistry of wetlands provides needed food, shelter, migratory and overwintering areas, and breeding areas for many birds, mammals, amphibians, and reptiles. In addition, wetland vegetation provides shade that helps to moderate water temperatures, which is important to fish life. Wetlands flooded by adjacent water bodies and waterways provide food, breeding habitat, and shelter for fish.

Inland bank, BVW, LUW, rocky intertidal shores, salt marshes, land under salt ponds, and barrier beaches in certain cases, are significant to protection of both fisheries and wildlife habitat. Land under the ocean, land containing shellfish, fish runs, and in some cases coastal beaches, are presumed significant to protection of fisheries. Coastal beaches, and in some cases land under the ocean and coastal dunes, are presumed significant to protection of wildlife habitat. Areas of BLSF that are either vernal pool habitat or on the 10-year floodplain (or within 100 feet of the bank or BVW, whichever is further from the water body or waterway), and areas of ILSF that are vernal pools, are significant to protection of wildlife habitat.

Protection of Land Containing Shellfish

Protection of Land Containing Shellfish is one of the interests of MWPA, and Land Containing Shellfish is one of the protected resource areas. Shellfish are a valuable, renewable resource. Productive shellfish beds not only ensure their own continued viability, but they also play a direct role in supporting fish stocks by providing a major food source. When shellfish are present in a coastal area, wetlands may help to protect this resource by minimizing shoreline erosion (resulting turbidity in nearshore waters) and preventing pollution which could harm the shellfish population.

By definition, Land Containing Shellfish is significant to protection of land containing shellfish. In addition, if shellfish are present, LUO, Coastal Beaches, Barrier Beaches, Rocky Intertidal Shores, Salt Marshes, and Land Under Salt Ponds are all presumed to be significant to protection of land containing shellfish.

6.2.3 WETLAND IMPACTS ASSOCIATED WITH VEGETATION REMOVAL

This subsection provides an assessment of the likely effects of vegetation removal on the various wetland resource areas. As with the previous subsections, the emphasis of this section is on resource areas that tend to be vegetated by trees or tall shrubs and are therefore likely to be directly impacted by vegetation removal. However, both direct and

indirect impacts to each of the resource areas are discussed, with regard to the likely impacts to the wetland functions protected by MWPA. In an attempt to focus this section, the impacts discussed deal only with wetland impacts due to vegetation removal, rather than with related activities such as construction of access roads or differences between the various removal techniques (Section 6.2.4 and Section 5.0, respectively). Table 6-3 lists the potential direct and indirect impacts associated with vegetation removal in wetlands. The more likely impacts to each resource area are discussed in the subsequent text. Figure 6-2 summarizes the potential impacts to the interests associated with each wetland resource area. This assessment focuses on impacts associated with the initial vegetation removal activities at each airport. Impacts associated with subsequent maintenance activities would be similar, though greatly reduced.

Bordering Vegetated Wetland

Removal of trees from bordering vegetated wetlands has the potential to impact each of the interests protected by MWPA that are significant to this resource area. Of these, the function most likely to be affected by vegetation removal is the ability of the BVW to protect wildlife habitat. Impacts to each function are discussed below.

Protection of Wildlife Habitat. The importance of forested wetlands as a habitat for broad assemblages of wildlife species has been well documented. For example, Forsythe and Roelle (1990) note that the hydrologic regime, plant community composition and structure, soil composition and structure, topography, and water chemistry of BVW provide important food, shelter, migratory and over wintering areas, and breeding areas for many birds, mammals, amphibians, and reptiles. A wide variety of vegetated wetland plants, the nature of which are determined primarily by the depth and duration of water, as well as soil and water composition, are utilized by varied species for mating, nesting, brood rearing, shelter, and food. The diversity and interspersion of the vegetative structure is also important in determining the nature of wildlife habitat. Different habitat characteristics are used by different wildlife species during summer, winter, and migratory seasons (DeGraff and Rudis, 1983).

Vegetation removal can have positive, negative, or neutral effects on wildlife habitat depending on the life requirements of the species inhabiting the area. Kirkland (1990) reviewed 21 published studies on small mammal community change in North American temperate forests after clear cutting, to assess the typical impact on these species. Based on these studies, he found significant increases in various measures of small mammal abundance and diversity, and he found slight (though not statistically significant) increases in species richness, diversity (Shannon index), and population density. In general, the responses of small mammals to clear cutting were found to be similar in various types of deciduous and coniferous forests.

Along similar lines, Patton (1992) conducted an extensive literature review related to the effects of vegetation removal from forested areas on wildlife in various locations across the United States. He found documentation of a wide range of effects. Some highlights of these effects are as follows:

- Some animal populations (e.g., red squirrels, various bird species, white-tailed deer) increased habitation and/or foraging in clearcut areas while other animal populations (e.g., grey squirrels, other bird species) decreased use and habitation of these areas.

- Thinning of trees in a southeast forest increased bird diversity by stimulating understory growth.

- Logged areas in a northeast forest were found to have greater numbers and diversity of songbirds. This increase was positively correlated with logging intensity.

- In a southwest forest, the number of bird species increased when a mixed conifer forest was selectively cut, but the total bird density was reduced slightly.

- Thinning a northeast forest by about 50 percent had no significant effect on survival, reproduction, or density of gray squirrels.

As these and other results show, there is no common conclusion regarding the impact of vegetation removal on wildlife and wildlife habitat -- instead the impact must be assessed on a case-by-case basis. Based on his literature survey, Patton concluded that the most important aspect of timber harvesting in relation to wildlife impacts is not how

many trees are removed or how they are removed, but rather how much and what type of vegetation remains for food and cover for the wildlife species inhabiting the area.

AVRLPs will result in the loss of the habitat associated with the tree canopy and trunks. Removal of vegetation may cause microclimatic changes in the wetland, since localized temperature increases in the air, water, and sediment may occur due to the decrease in shading. In addition, one or more of the impacts listed in Table 6-3 may occur. The magnitude and likelihood of these effects occurring, and ultimately the likelihood and extent that the wetland's ability to protect wildlife habitat will be impacted, depends on various site-specific conditions, including the following:

- The number of trees or other vegetation that will be removed, the areal extent of their canopies, and their relative contribution to the overall plant community cover.
- The type and canopy cover of vegetative species that will remain.
- The vegetation removal method that will be employed (e.g., selective cutting vs. clear cutting, extent of soil disturbance, types of chemicals that will be used).
- The availability of similar habitat in nearby wetland areas.
- The size of the affected area(s).
- The types and tolerances of the wildlife species (including rare species) in the area.
- The types and tolerances of the plant species that will remain (tolerance to sunlight, ability to revegetate disturbed areas, wildlife habitat value).

All of these factors must be considered on a case-by-case basis to determine whether an AVRLP will affect the ability of a given wetland to protect wildlife habitat. It should also be noted that the removal of the trees in many cases will restore the areas to their conditions when the PZs were first cleared.

Pollution Prevention and Protection of Water Supplies. It is well documented that the plant communities, soils, and associated low, flat topography of BVW remove or detain sediments, nutrients (such as nitrogen and phosphorus), and toxic substances (such as

heavy metal compounds) that occur in surface water runoff and flood waters. Some nutrients and toxic substances are detained for years in plant root systems or in the soils, or are biochemically converted and released to the atmosphere. Others are held by plants during the growing season and released as the plants decay in the fall and winter. This latter phenomenon delays the impacts of nutrients and toxins until the cold weather period, when they are less likely to affect water quality. The ability of wetlands to prevent pollution, the key to their ability to protect public and private water supplies and groundwater, is largely inherent in the plant and soil characteristics of the system.

As long as the soils are not significantly altered by vegetation removal, they will continue to filter pollutants from passing waters and provide a growth medium for bacteria which help to mediate pollutant removal. Likewise, as long as herbaceous and shrub vegetation remains in the affected area it will filter pollutants, and bacteria will attach to the submerged plant and root surfaces. The impact to these wetland functions, then, will depend on the type and extent of cover by vegetation remaining in the area and on the extent of soil disturbance by the removal activities.

Many BVW provide a connection between groundwater and surface waters, allowing for recharge and protection of both public and private groundwater supplies. During dry periods, the water retained in BVW can be essential to the maintenance of base flow levels in rivers and streams, which is important to the protection of the quality and volume of surface water supplies. The ability of BVW to perform these functions is unlikely to be significantly impacted by removal of individual trees, particularly if there is a significant low-growing plant community.

Flood Control and Storm Damage Prevention. The typically dense vegetation and the low, flat topography of BVW slows passing flood waters during periods of peak flows, provides temporary flood water storage, and facilitates water removal through evaporation and transpiration. This reduces downstream flooding and resulting damage to private and public property. In addition, the root systems of wetland vegetation help to hold soils in place, minimizing erosion and related storm damage.

Removal of trees or other vegetation will not affect the ability of a wetland to detain flood waters or to facilitate water removal by evaporation. However, depending on the extent of vegetation remaining in the area, it could reduce the wetland's ability to slow passing waters, control erosion, and facilitate water removal by transpiration. If the affected area will be vegetated after the trees are removed, then the overall impact on flood control and storm damage prevention should be minimal.

Protection of Fisheries. The canopy from wetland trees provides shade that moderates water temperatures important to fish life. Wetlands flooded by adjacent water bodies and waterways provide food, breeding habitat, and cover for fish. Fish populations in the larval stage are particularly dependent upon food provided by over-bank flooding which occurs during peak flow periods, because river and stream channels often do not provide sufficient quantities of the microscopic plant and animal life necessary for food.

Removal of trees from a wetland is unlikely to have a significant impact on the ability of BVW to perform these functions as long as there is a significant lower strata plant community. However, if there is not a low-growing plant community, or if the removal activities lead to erosion and sedimentation into nearby waters, then activities could impact fishery resources.

Inland Bank

Impacts to inland banks due to vegetation removal can be discussed in terms of impacts to protection of fisheries and wildlife, and impacts to protection of water supplies, flood control, and storm damage prevention.

Protection of Fisheries. By confining water to an established channel during storms, banks help to maintain water temperatures and depths necessary for the protection of fisheries. The maintenance of cool water temperatures during warm weather is critical to the survival of important game species such as brook trout (*Salvelinus gairdneri*) and brown trout (*Salmo trutta*). Banks may also provide shade that moderates water temperatures at the lower end of the bank, as well as providing breeding habitat, escape

cover, and food. Banks which drop off quickly or overhang the water's edge often contain numerous undercuts which provide significant shelter for important game species such as largemouth bass (*Micropterus salmoides*). All of these features contribute to the significance of inland banks to protection of fisheries.

If the stability of the bank is not affected by removal of the vegetation, then the physical features of the bank that provide fishery habitat will remain and the channel will still confine water during storms. Removal of the tree canopy, however, may reduce or eliminate shading that moderates water temperatures and provides cool habitat. The extent of this impact would depend on the percent of the tree canopy that would be removed, and on the extent of shading provided by low growing plants that will not be removed.

Protection of Wildlife Habitat. The topography, plant community and structure, and soil composition of banks together provide important food, shelter, migratory and over wintering areas and breeding areas for wildlife. Topography plays a role in determining the suitability of banks to serve as burrowing or feeding habitat. Soil structure is also a factor in determining the suitability for burrowing, hibernation, and other cover. Bank topography and soil structure affect the bank's vegetative structure, as well. Bushes and other undergrowth, trees, vegetation extending from the bank into the water, and vegetation growing along the water's edge are also important as food sources and shelter to a wide variety of wildlife species.

Forsythe and Roelle (1990) noted that forested corridors along watercourses, particularly those connecting upland habitats with forested wetlands, are important in allowing movement of wildlife species. Movements between blocks of habitat are important for several reasons, including re-populating disturbed areas, exchanging genetic material, and allowing large, mobile species access to a variety of resources. Many species tend to follow watercourses in these movements. Corridors connecting forested wetlands to upland habitats may be important as escape routes during floods and in providing alternate food sources.

Removal of trees from a bank will result in a change of related food and habitat, potentially affecting the ability of the area to protect wildlife habitat. As previously discussed, as long as the physical stability of the bank is not impaired by the removal activity or the loss of vegetation, then the physical habitat characteristics of the bank should remain intact. The change of food and habitat associated with the tree trunks and canopy, however, could lead to displacement of certain species that rely on this portion of the resource. The extent and significance of this impact will vary depending on the number of trees removed, the existence of similar habitats in the surrounding area, the type of vegetation and canopy cover remaining, and the specific habitat requirements of the species inhabiting the area. The magnitude of the impact may range from insignificant if low-growing vegetation can provide many of the habitat values associated with the removed trees, to significant if the tree canopy is used by a rare species with specific habitat requirements and if there is minimal undergrowth or similar habitats nearby.

Protection of Water Supplies, Flood Control and Storm Damage Prevention. Banks can be defined as areas where groundwater discharges to the surface and where, under some circumstances, surface water recharges the groundwater. The bank slopes confine peak water flows, helping to minimize flooding and storm damage. Additionally, where banks are partially or totally vegetated, the vegetation helps maintain the bank's stability, which in turn protects water quality by reducing erosion and siltation. If vegetation removal from a bank compromises the stability of the bank, then the ability of the bank to provide protection of private/public water supplies, protection of groundwater supply, flood control, storm damage prevention, and prevention of pollution may be impacted. The ability of a bank to perform most of these functions lies largely in the stability of the bank slopes, and partly in the ability of the vegetation to slow flood waters. If the bank sediments will not be significantly disturbed, and the bank will remain vegetated, then these functions are unlikely to be significantly impacted.

Land Under Water Bodies or Waterways

Trees do not generally grow directly in waterways or water bodies, so their removal is unlikely to have a direct impact on land under waterways or water bodies (LUW). However, the canopy of trees along the banks of water bodies and waterways often overlap the water and indirectly contribute to the ability of water bodies and waterways to perform the functions or interests considered significant for this resource area. The most likely direct impact associated with removal of trees that overhang LUW would be a loss of shading, which could result in changes to the fishery habitat, increases water temperature, and changes in the community structure and food chain. In addition, removal of the overhanging trees would reduce the amount of organic material (e.g., leaves, twigs, fruit structures) that enters the system from the trees, which could have both positive and negative effects on the system. The function of LUW most likely to be affected by removal of trees along the shoreline is the ability of the area to protect fisheries.

Trees along the banks of inland water bodies and waterways shade the water and the underlying land, providing shaded habitat and playing a role in temperature regulation. The relative amount of shading provided to waterways (e.g., rivers, streams, and creeks) is generally greater than that provided to water bodies (e.g., lakes and ponds) because typically a larger percent of the surface in waterways is shaded by trees growing along the banks. The relative significance of shading to each water body or waterway in terms of temperature regulation depends largely on the depth and surface area of the water, and on the percent of the surface area that is shaded. In waterways with shallow depths, sunlight has a much greater effect on water temperature than it does in deep water bodies. Thus, removal of the tree canopy overhanging a narrow, shallow channel is likely to lead to increased water temperatures, but removal of the tree canopy overhanging the edge of a wide, deep pond is unlikely to have a significant effect on water temperature. Naturally, other site-specific factors play a role in temperature regulation as well, such as the extent of shading by other low growing vegetation (that will not be removed) or the extent of the water body that is fed by groundwater.

Changes in water temperature, as well as the loss of shaded habitat, can lead to alterations in the community structure in the waterway or water body. If the waterway or water body provides habitat for cold water fisheries or organisms that cannot withstand direct sunlight, loss of shaded habitat and increased water temperatures may result in a shift to a warm water community and/or a community of organisms that are tolerant of direct sunlight. Such shifts may occur at various ecosystem levels (e.g., producers, primary or secondary consumers, etc.) and could ultimately affect the overall community structure and foodchain relationships. Other species may remain in the ecosystem, but may shift position. For example, phytoplankton that cannot withstand direct sunlight may shift to a lower point in the water column; mobile benthic species that prefer cooler sediment temperatures may relocate closer to the shoreline where shaded habitat is still available, or to deeper water where light intensity is lower.

Trees also provide organic matter to the water body or waterway through the loss of leaves, fruit structures, and other organic debris. When organic matter falls into the water, it serves as a food source for a variety of organisms, which in turn provide a food source for other consumers. As the matter sinks to the bottom, it serves as a food source for detritovores and other organisms, and it may provide shelter for invertebrates and small fish. Finally, as the organic matter decomposes, nutrients are released to the water column for use by primary producers in synthesizing new organic matter and biomass. While it is unlikely that shifts in species will occur from the decreased organic matter input, a reduction in the productivity (primary and secondary) of the aquatic community is possible. Reduction in this organic input can also be considered a beneficial effect, as it will delay the natural process of eutrophication which eventually results in degraded water quality and excessive algal growth.

The overall impact to fisheries caused by the removing of trees from a bank depends on site-specific conditions. If the tree canopy overhanging the water does not provide significant areas of shading, or if underlying vegetation layers (e.g., shrubs) that will remain provide shade to the resource, it is unlikely that the fishery resource will be significantly affected.

Land Subject to Flooding

The impact of AVRLPs on BLSF and ILSF can be discussed in terms of impact on flood control and storm damage prevention, impact on protection of wildlife habitat, and impact on ability to prevent pollution and protect surface and groundwater supplies (ILSF only). Each of these potential impacts is discussed below.

Flood Control and Storm Damage Prevention. Removal of vegetation will not significantly alter the ability of BLSF/ILSF to provide temporary storage for flood waters, primarily because it will not lead to a decrease in flood storage capacity. In fact, removal of tree trunks from these resource areas may somewhat increase the flood storage capacity.

Since the vegetation in BLSF/ILSF helps to reduce the velocity of stormwaters and to hold the sediments in place, removal of this vegetation could reduce the ability of these areas to prevent storm damage. The extent of this impact relates to the type and coverage of vegetation that remains. For example, if dense shrub and/or herbaceous vegetation will remain after the trees are removed, then minimal erosion or loss in floodwater attenuation would be expected. If sparse or no vegetative growth will remain after vegetation removal, then mitigation measures such as erosion controls and revegetation with low-growing species would likely be required to avoid permanent impacts to the resource area.

Protection of Wildlife Habitat. Certain areas of both BLSF and ILSF may be significant in terms of protection of wildlife habitat. As discussed in relation to BVW impacts, removal of trees may have a positive, negative, or neutral effect on wildlife habitat.

As with BVW, the magnitude of impact to the wildlife habitat will be determined by the type of trees to be removed, the shrub and herbaceous community that will remain, the type of vegetation removal technique selected, the relative contribution the trees to be removed make to the overall plant community areal cover and productivity, and the availability of other similar vegetation communities in nearby areas. The potential to

impact wildlife habitat in BLSF/ILSF is of particular concern if the area is a certified vernal pool. Such areas not only provide essential breeding habitat for amphibians, but many birds, mammals, and reptiles feed in these areas.

Pollution Prevention and Protection of Water Supplies. As previously discussed, when ILSF is underlain by a pervious layer, it serves as a point of exchange between groundwater and the ground surface, helping to recharge public and private groundwater supplies. In addition, when ILSF is underlain by pervious material covered by a mat of organic muck or peat, the surface organic soils detain and remove contaminants that otherwise might seep into the groundwater. Removal of trees from ILSF is unlikely to significantly affect its ability to perform these functions, particularly because this function is related more to the soil type then to the vegetation.

Banks of or Land Under Fish Run

Banks of or Land Under Fish Run is the only coastal wetland resource area in which vegetation removal may be required to maintain PZs. This is because fish runs often extend inland to areas that are vegetated by trees. These areas would also be regulated as Inland Banks or LUW, and likewise the impacts to a fish run due to vegetation removal would be similar to those discussed for Inland Bank and LUW. In summary, these impacts may include:

- Decrease or loss of shaded habitat in the fish run. Also, increased sun exposure to the water surface may lead to increased water temperatures and ultimately to an altered community structure.

- Decrease in organic matter in the fish run waters due to the decrease in amount of leaves falling into the water. This may result in a decrease in the food source for migratory fish or their prey, but it may also have a beneficial effect by averting high levels of suspended solids and depleted dissolved oxygen levels that can result from bacterial and invertebrate metabolism of the organic matter.

- Disturbance of soils along the banks, or loss of vegetative root systems that hold soil in place, may lead to erosion and destabilization of the bank. Eroded soils may flush into fish run waters leading to increased turbidity and/or shoaling.

If some or all of these effects occur, they could impact the ability of the fish run to protect fisheries due to decreased water quality in the fish run, impeded migratory fish passage, impacts on spawning habitat or viability, or decreased juvenile survival.

Other Coastal Wetland Resource Areas

Other than banks of or land under a fish run, most of the coastal wetland resource areas in Massachusetts do not typically support tree or shrub communities. Thus, there would be no need for AVRLPs in these areas. In fact, it is unlikely that tree or shrub canopies would even extend over most of these areas. In certain conditions, trees or shrubs may occur on a barrier beach or even a coastal bank or dune. However, this situation is somewhat unusual; these plants would more likely be low growing varieties that would not penetrate PZs of nearby airports. If vegetation removal in one of these coastal resource areas were required, though, the most likely impact if proper mitigation measures were not employed would be destabilization of the sediments, which tend to be highly unstable in these areas. This could lead to erosion by both wind and wave action (during storms) and an overall decline in the ability of these resources to provide flood control and minimize storm damage. In addition, removal of trees or shrubs in these areas would result in a decrease or loss of a source of food and shelter for wildlife, and therefore a decrease in the resources' ability to protect wildlife habitat. It should be noted, however, that the likelihood of a significant impact to any of the coastal wetland resources other than fish runs is considered unlikely, primarily because of the general lack of AVRLPs required in these areas.

100-Foot Buffer Zone

The Preface to the Wetland Regulations (310 CMR 10.00) states that "any project undertaken in close proximity to a wetland resource area has a high likelihood of resulting in some alteration of that area, either immediately, [or] as a consequence of daily operation of the completed project." This is true for unmitigated vegetation removal as well, for which the most likely wetland impact is erosion and sedimentation into the adjacent

resource area. In addition, if the vegetation removal alternative involves use of chemicals or fuels, and is not properly executed, these chemicals could spill or migrate into the adjacent wetland area. In the worst case, this could impact the ability of the adjacent wetland to protect surface water or groundwater supplies, protect fisheries and wildlife habitat, prevent pollution, and prevent storm damage. However, properly mitigated activities within the buffer zone should not have any measurable effect on the adjacent resource area(s).

This likelihood and extent that vegetation removal in the buffer zone will impact the adjacent wetland varies depending primarily on the type of mitigation measures proposed. To a lesser degree, the impact also depends on the type of vegetation present in each vegetation layer in the buffer zone and the vegetation removal method. Use of proper mitigation measures, primarily erosion and sedimentation control such as those described in Section 7.0, should minimize if not eliminate wetland impacts associated with AVRLPs in the buffer zone.

6.2.4 WETLAND IMPACTS DUE TO ACCESS ROAD CONSTRUCTION

In some cases, an access road may be needed to transport vegetation removal equipment to the proposed vegetation removal area. The proposed regulatory revision includes a provision for construction of temporary access roads. Construction of a temporary access road would result in more direct and quantifiable impacts than removal of vegetation. Depending on which resource areas are affected and the specific site conditions, these effects may include the following:

- Altered surface water and groundwater flow patterns.
- Compression of wetland soils beneath roadway.
- Loss of wildlife food source and habitat.
- Creation of a barrier to passage of certain species across wetland area.
- Erosion and sedimentation into adjacent wetland areas.

- Loss of flood storage capacity.
- Loss of fishery habitat, food source, and spawning ground.
- Disturbance of soils and vegetation adjacent to road.
- Displacement and/or burial of slow moving or stationary species.

In addition, each of these direct impacts is associated with a variety of indirect impacts. The functions of any wetland resources covered by the road will cease, in either the short- or long-term, depending on the nature of the road. In addition, the functions and values of the wetland resources that abut the road may be impacted.

If the access road is constructed according to best management practices and removed as soon as vegetation removal is completed, and the area is restored properly, then the impacts will be short-term, and over time the wetland will resume its original functions. If the road is permanent, however, then the wetland areas impacted, and their associated functions and values, will be permanently altered. (It should be emphasized, however, that construction of a permanent access road is not allowed under the proposed limited project provision. Thus, construction of a permanent access road would require filing of an NOI as a non-limited project.) It is recommended that all access roads be sited to minimize wetland impacts, constructed according to the guidelines in Appendix E, and removed as soon as the work is completed.

6.2.5 CONCLUSIONS

There is a wide range of potential impacts with varying degrees of significance associated with vegetation removal in wetland areas. They range from direct impacts such as soil disturbance and loss of canopy-related wildlife habitat, to indirect impacts such as erosion, changes in community structure, altered hydrologic balances, increased soil and water temperatures, and increased turbidity levels. The extent of these impacts can vary widely depending on the type of vegetation removal method used, as discussed in Section 5.0, and depending on the specific site conditions, as discussed throughout this section. While wetlands may be altered, if appropriate techniques and mitigation

measures are employed, the impact to the functions and values will generally be minimal and/or temporary. No wetlands will be filled or lost due to vegetation removal, and in many cases, the wetlands will be restored to a condition similar to when the airport was constructed (e.g., an emergent or scrub-shrub community that met FAA clearance requirements). It is important to select a vegetation removal method that is appropriate for a given site, and will result in minimal wetland impacts while maintaining airport safety.

In addition to the potential wetland impacts that result from AVRLPs, if an access road is constructed in wetland areas to transport vegetation removal equipment, additional impacts may occur. If the access road is temporary and is constructed using best management practices, and the area is restored as soon as the road is removed, the wetland impacts will be temporary. (As discussed, only temporary access roads are permitted under the proposed limited project provision.)

Overall, the most likely direct and quantifiable impacts related to AVRLPs include the following:

- Decrease in wildlife habitat or food
- Soil erosion
- Sedimentation or siltation into nearby wetlands
- Permanent loss of wetland resources
- Decrease in flood storage capacity
- Decrease in shaded fishery habitat
- Decrease in ability to attenuate flood flows
- Potential for chemical release into wetlands
- Potential for turbidity increases in open water areas
- Potential for destabilization of banks

Sections 6.3 and 6.4 provide guidance on assessing the likelihood that any of these impacts will occur for a given AVRLP. Section 7.0 addresses specific mitigation measures for these potential impacts.

6.3 METHODOLOGY FOR IDENTIFYING SIZE OF ALTERATION

6.3.1 INTRODUCTION

The current wetlands protection regulations of the Commonwealth limit the amount of alteration allowed in any given wetland type. It is therefore necessary, when assessing site-specific impacts from vegetation removal, to quantify the impact a proposed project will have on each wetland resource area affected. Since wetland tree clearing projects at airports will be covered under the new limited project provision, they will no longer be subject to these limits. However, it will still be important to quantify the impact as part of the Notice of Intent (NOI) filing, particularly so that the appropriate level of mitigation, if any, can be determined for each project.

This section provides a methodology for quantifying the size of wetland alteration associated with a given vegetation removal project. This quantification involves three steps:

1) Identify the specific vegetation that needs to be removed to comply with FAA regulations;

2) Identify and delineate the state-protected wetland resource areas within the proposed vegetation removal area(s); and

3) Measure the alteration within each affected wetland resource area.

Defined methodologies exist for steps 1 and 2, and are summarized in Sections 6.3.2 and 6.3.3, respectively. Section 6.3.4 focuses on step 3 above, measuring the alteration within the affected wetland resource areas. Since vegetation removal will rarely be necessary in coastal wetlands around Massachusetts public use airports, most of this section will focus on quantifying impacts to freshwater wetlands. However, the methodology presented can be used to assess impacts to coastal wetlands as well.

6.3.2 IDENTIFYING VEGETATION FOR REMOVAL

As described in Section 3.2, there are a number of surfaces around each airport that must be kept free of obstructions in order to comply with FAA regulations. The dimensions and elevations of these surfaces are determined mathematically, either by hand or by using one of many computer programs; however, the actual process of identifying specific trees that penetrate these surfaces can be complicated.

There are several methods of identifying trees and other obstructions that encroach on the PZs. They range in complexity from relatively simple visual surveys using obstruction charts provided by the National Oceanic and Atmospheric Administration (NOAA), where available, to site-specific tree-top aerial photogrammety surveys of the elevations of individual trees. (Obstruction charts are currently available for 14 of the 46 public use airports in Massachusetts.) Two common methods for identifying vegetation to be removed are described below.

Aerial Survey Method

In this method, a survey based on aerial photographs is conducted of the airport and surrounding areas, providing coordinate and topographic information regarding the location and elevation of all objects that protrude above the ground surface. This information is compiled into a comprehensive data base, which may be supplemented with data from the NOAA obstruction chart for the airport. Then each object is analyzed using a computer-based three-dimensional obstruction analysis program to determine which objects penetrate the PZs.

Photoslope Method

This method involves using a camera mounted on an engineer's transit set at the appropriate slope to photograph the Part 77 approach and/or transitional surfaces. Several "monuments" are then placed in the camera's view along the left, right, and midpoints of the surface. Photographs are taken from various locations along the

appropriate surfaces, and the photographs are analyzed using a program known as "PHOTOSLOPE" to graphically display the airport's obstructions.

The method selected for identifying trees that penetrate the PZs depends largely on the size of the airport and their available resources. Whether one of the above methods or an alternative method is used, each tree that is identified for removal should be flagged in the field or, if large groupings of trees will be removed, noted on an aerial photograph or plan.

6.3.3 IDENTIFICATION OF MASSACHUSETTS WETLAND RESOURCE AREAS

MWPA and its implementing regulations provide guidelines for identifying and delineating the boundary of state-protected wetland resource areas. These guidelines are supplemented by policies and publications such as the following:

- Guide to Inland Vegetated Wetlands in Massachusetts: Inland Wetlands Boundary Delineation and Plant Identification under the Massachusetts Wetlands Protection Act (Massachusetts Department of Environmental Quality Engineering, 1988).
- DEP Wetlands Program Policy 85-1.
- A Guide to Understanding and Administering the Massachusetts Wetlands Protection Act (Massachusetts Audubon Society, 1992).
- Environmental Handbook for Massachusetts Conservation Commissioners (Massachusetts Association of Conservation Commissions, 1991).
- A Guide to the Coastal Wetland Regulations (Massachusetts Department of Environmental Quality Engineering and Coastal Zone Management Office, 1979).

The four inland wetland resource areas in Massachusetts where vegetation removal is most likely to be necessary are BVW, Bank, and BLSF and ILSF. Vegetation removal may also occur at the edge of, and possibly slightly within, LUW. The methodology for identifying and delineating each of these resource areas is summarized below. For more detailed information, the reader is referred to the regulations (310 CMR 10.50) and to the above references. Since the need for vegetation removal in Massachusetts coastal

wetland resource areas is far less (primarily because few trees grow in these areas, and also because few of the 46 public use airports are near coastal wetland resource areas), the guidelines for delineation of these areas are not included in this section. The reader is referred to the above sources should identification of coastal wetland resource areas be necessary.

Bordering Vegetated Wetlands

BVW are those areas bordering any creek, river, stream, pond, or lake where greater than 50 percent of the plant species are identified as wetland plants by MWPA, or are considered wetland species in generally accepted scientific or technical publications. Generally, plants that are designated as (OBL), (FACW), (FAC) on the USFWS regional list of plant species which occur in wetlands are considered wetland species. It is important to note that these areas must border some surface water body or waterway. To delineate the BVW boundary in the field, it is necessary to walk through the wetland, identify the plants that are present, and determine where half or more of the plants are wetland indicator species. Plant identification can occur along a transect (a line across the wetland), or within quadrats (usually square or circular plots). The boundary of the BVW is the approximate line where more than half of the plants on one side are wetland species, and more than half of the plants on the other side are upland species. In order to accurately estimate the impact area, it is generally necessary to flag and survey the boundary. As part of this boundary delineation, observations about the hydrology and soil conditions in the area should be documented.

Inland Bank

The upper boundary of bank is identified as the first observable break in slope or the mean annual flood level, whichever is lower. The lower boundary of bank is the mean annual low flow level. While there are several methods for identifying inland bank, the preferred method is generally to observe the break in slope in the field. This slope change can be verified by comparison with mapped topographic information of the area (elevation contours at 1 foot intervals or less is desired) and with field observations of

annual high water indicators, such as water marks on trees, water stained leaves, or flood debris levels. Alternatively, historic hydrologic data or engineering calculations may be used to determine annual flood elevations. For a perennial stream, the bank along each side of the waterway should be measured separately; for an intermittent stream, the bank length approximates the stream length (e.g., the bank along each side of the stream is not counted separately). (Colburn, 1992)

Land Subject to Flooding

Land Subject to Flooding is divided into two categories, Bordering and Isolated. BLSF is the 100-year floodplain as identified on the National Flood Insurance Rate Maps (FIRM) prepared by the Federal Emergency Management Agency (FEMA). When this information is not available, the boundary of BLSF is the maximum lateral extent of flood water which has been observed or recorded. In the event of a conflict, the boundary may be determined by engineering calculations which are:

- Based upon a design storm of seven (7) inches of precipitation in twenty four (24) hours (i.e., a Type II Rainfall, as defined by the U.S. Soil Conservation Service);
- Based upon the standard methodologies set forth in U.S. Soil Conservation Service Technical Release No. 55. Urban Hydrology for Small Watersheds and Section 4 of the U.S. Soil Conservation Service, National Engineering Hydrology Handbook; and
- Prepared by a registered professional engineer or other professional competent in such matters.

ILSF is an isolated depression or closed basin without an inlet or outlet. It is an area which at least once a year confines standing water to a volume of at least 1/4 acre-feet and to an average depth of at least 6 inches. The boundary of ILSF is the perimeter of the largest observed or recorded volume of water confined in said area. Determine the boundary using engineering calculations similar to those for BLSF, where the maximum extent of the water shall be based upon the total volume (rather than peak rate) of

run-off from the drainage area contributing to the ILSF, and shall be further based upon the assumption that there is no infiltration of run-off into the soil within the ILSF.

Land Under Water Bodies and Waterways

The boundary of LUW is defined as the mean annual low water level. From a practical perspective, this boundary is often difficult to determine. If detailed hydrologic data is available, use it to determine the boundary of this resource area. In the absence of this data, the approximate boundary can be determined from field observations, particularly during low flow months of the year.

6.3.4 MEASURING ALTERATIONS RESULTING FROM VEGETATION REMOVAL

Introduction

This subsection provides guidelines for quantifying alterations resulting from AVRLPs. As with the previous subsection, it focuses on the inland wetland resource areas, because the need for AVRLPs will be far less in coastal wetlands around Massachusetts public use airports. The methodology presented can be broken down into three general categories:

1) Alteration due to selective cutting, in which only selected trees or shrubs are removed;

2) Alteration due to clear cutting or other methods which involve significant alteration to widespread areas; and

3) Alteration due to other related activities, such as access road construction or stockpiling of felled vegetation.

Because the extent of impact associated with removal of one tree is not clearly defined, there are numerous possible methods for measuring alterations resulting from selective removal of trees or shrubs. Several of the more reasonable methods are outlined in this section; then, the recommended methodology is described in detail. The methodologies for quantifying alterations due to clear cut removal methods, and activities such as

access road construction, are jointly presented at the end of this section. Since the limits of such alterations are more easily defined, these alterations are easily quantified. Thus, only a brief discussion of this methodology is necessary.

Measuring Alteration Due to Selective Cutting

Alternative Impact Measurement Techniques. Forestry publications provide a variety of standard tree measurements that apply, in one way or another, to vegetation removal activities. These measurements include canopy cover, crown width, diameter at breast height (dbh), basal area, tree height, tree volume, stand density index, tree area ratio, and spacing index. Each of these measurements is briefly defined below and discussed in terms of its suitability for measuring the extent of wetland alterations.

Canopy cover or crown cover is the vertical projection of the crown or shoot area of a tree to the ground surface. Often, canopy cover is expressed as a fraction or percent of a reference area. Mueller-Dombois and Ellenberg (1974) determined that canopy cover provides an ecologically significant and useful measure of plant distribution. First, plant cover gives a better measure of plant biomass than does the number of individual plants, and the amount and characteristics of the plant biomass are of direct importance to the animals associated with the vegetation because the plant biomass provides their shelter and food. A second advantage of using cover as a quantitative measure is that nearly all plant life forms, from trees to mosses, can be evaluated by the same parameter and thereby in comparable terms. There are numerous methods for measuring canopy cover (Clutter *et. al.*, 1983; U.S. Forest Service, 1984; Mueller-Dombois and Ellenberg, 1974). The recommended method is that described by Mueller-Dombois and Ellenberg (1974), which involves measuring the crown width (see below) in the field and calculating the canopy cover using the equation:

$$CC = (\pi/4)(CW)^2$$

where CC is canopy cover and CW is average crown width.

Crown width is the average width of the canopy of a tree. Although this measurement does not directly relate to the impact from removing a tree, it can be directly correlated with canopy cover. As noted above, canopy cover does provide an ecologically significant estimate of the alteration area. As with canopy cover, there are numerous methods for estimating crown width based on various other measurements and scientific data. The preferred method, however, is to measure the crown width in the field with a tape measure. The tape measure should be laid on

the ground from one end of the canopy perimeter, across the center, to the other side of the crown perimeter. This results in a single measurement of the diameter. To compensate for inconsistencies in the canopy shape, a second crown-diameter measurement roughly perpendicular to the first one should be taken. The crown width is then calculated as the average of these measurements. The canopy cover (CC), or crown cover, can be obtained using the formula:

$$CC = ((D_1 + D_2)/4)^2 * \pi$$

where D_1 equals the first measured crown diameter and D_2 equals the second measurement. (Obviously, this formula can be easily modified to include more than two measurements.)

Diameter at breast height is a measurement of tree diameter at 4.5 feet above ground level. This measurement by itself has little ecological value since it does not indicate anything about how much habitat a tree can provide, the amount of photosynthesis and primary production capabilities of a tree, or how much shading area a tree provides. However, it is strongly correlated to tree measurements which are indicative of these attributes. Figure 6-3 illustrates the correlation between tree diameter at breast height and canopy cover.

Basal area is the cross sectional area of a tree stem at breast height (4.5 feet above ground level). Clutter *et. al.*, (1983) state that basal area can be calculated according to the following equation:

$$B = \pi D^2 / 576$$

where B is the basal area and D is the diameter at breast height.

If an individual tree is removed, the obvious, direct impact may be confined to the basal area. This measurement, however, fails to account for the numerous direct and indirect impacts to the area around the cut tree stem. These impacts, documented in Section 6.2, may include loss of shaded habitat and subsequent temperature increases, loss of arboreal habitat, decrease in evapotranspiration from the wetland system, etc. Basal area can be correlated, however, to other tree measurements that indicate alteration measurements.

Tree height can be measured by a inclinometer or other similar device. This measurement alone is not very useful for determining the extent of alteration. Additionally, tree height varies widely both between and among species. Thus, it may not correlate well with other more ecologically meaningful measurements of estimating the extent of alteration. It should be noted that although tree height is not useful for alteration measurements, it is useful in determining how close a tree is to penetrating a PZ.

Tree volume generally refers to the volume of the commercially marketable portion of the tree. It does not directly provide a measure of the extent of shading capacity, area available for primary production, or area available for nesting. Thus, it is not a useful measurement for quantifying the area of alteration due to removal from a wetland system.

Stand density index is a measure of the average number of trees per acre. The index (measure) is based on a predetermined limiting relationship between the number of trees per acre and the average tree size (Clutter *et. al.*, 1983). In other words, depending on their size, there is a limit to the number of trees a given area of land can sustain. The stand density index is not particularly useful in measuring the alteration from removal of individual trees -- it is more a relative index of land capacity for tree growth, and indicates nothing of the ecological benefit from a tree to a given system. Also, this measurement is generally used only for a group of trees of the same age; it would not be useful in areas where the trees are of different ages.

Tree area ratio is a measure of stand density that relies on a predetermined relationship, as does stand density index, except its use is not restricted to trees of the same age (Clutter *et. al.*, 1983). This measurement is somewhat complicated and is generally used only in yield estimations. It indicates nothing of the ecological characteristics such as a group of trees' primary productivity, or trees that are available for nesting.

Spacing index or relative spacing is a density measurement that is defined as the average distance between trees per the average height of the dominant canopy. As a density measurement, the spacing index has some ecological significance. However, it indicates nothing about the effects of vegetation removal. Further, it can be time consuming to collect all the height and distance measurements needed to compute the averages.

Of all the measurements available, canopy cover seems to offer the most useful and ecologically-sound information regarding the extent of alterations that result from vegetation removal. This measurement addresses both the direct and indirect wetland impacts that were identified in Section 6.2. As discussed above, crown width should be measured in the field and used to estimate canopy cover. Other useful measurements include basal area and diameter at breast height.

The recommended methodology for quantifying impacts of selective cutting within each resource area is presented below.

Recommended methodology for Quantifying Alterations. Alterations resulting from vegetation removal can be measured by the CC of a tree in any given resource area, and will account for both the direct and indirect impacts. For a bank, this would be a linear measurement (e.g., feet or yards) of the bank beneath the canopy that overlaps it. The measurement should be taken along the top of the bank. (For a perennial stream, the bank along both sides of the stream should be measured; for an intermittent stream, the length of the bank is approximately the length of the stream.) For all other resource areas, this would be an areal measurement (e.g., square feet or acres) of the resource area beneath the canopy that overlaps it.

When a tree is entirely within a resource area, estimation of the CC area will be relatively simple, based on the previously described field measurements and simple calculations. When the canopy overlaps the boundary of one or more resource areas, though, the calculations become more complex. Figure 6-4 illustrates the areas that must be measured for a hypothetical situation where the canopy overlaps several resource areas. In these cases, the estimate should be developed using a modified version of the recommended method in conjunction with either detailed field measurements and drawings, site plans, and/or aerial photographs.

Alterations Resulting From Clear Cutting

Alterations resulting from clear cutting or from other methods that involve significant alterations to widespread areas are relatively easy to quantify because the limits of the area of disturbance are relatively easily defined. The extent of the alteration is the outer limits of the canopy of the trees along the edge of the disturbance. As with the selective cutting methodology, the area of alteration resulting from clear cutting is expressed in terms of area (e.g., square feet or acres) for all resource areas except bank, which is expressed in linear feet or yards.

Alterations Resulting From Related Activities

As discussed in Section 6.2, certain activities related to vegetation removal may result in additional wetland impacts beyond those directly associated with removal of the vegetation. These activities include construction of access roads, construction of bridges, and stockpiling of felled vegetation. Because the limits of these activities are relatively easy to identify, the alterations can be readily measured. The extent of the alteration is the outer limits of any direct or indirect disturbance. For example, the alteration associated with construction of an access road includes the footprint of the road in addition to the area along both sides of the road that are disturbed during the construction activities. As with the methodologies described above, the extent of alteration is expressed in terms of area (e.g., square feet or acres) for all resource areas except bank, which is expressed in linear feet or yards.

6.3.5 CONCLUSIONS

The process of quantifying the alteration due to AVRLPs involves identifying the trees that need to be removed, delineating the wetland resources in these areas, and estimating the actual area of alteration. For the purposes of quantifying selective vegetation removal from a wetland, the measurement most appropriate for determining square footage of alteration is the tree canopy or crown area. For determining the linear feet of alteration (e.g., along banks), the crown width or portion thereof that overlaps the bank is most appropriate. This method allows for measurement of the direct impacts of vegetation removal, as well as of less direct impacts such as loss of wildlife habitat or shading associated with the tree.

Section 6.4 will explore differences in the degree of impact to the area under the canopy cover. For example, cutting a tree down with a chain saw results in minimal disturbance to the soil or vegetation around the tree, while pulling a tree down with cables and a winch results in greater disturbance to the vegetation and soils around the tree. These differences are then assessed according to the impact evaluation methodology described in Section 6.4. When more extensive alterations are proposed, such as clear

cutting of vegetation or construction of access roads, the area of alteration can be directly measured as the extent of the area of disturbance, using the outer limits of any vegetation removed to define the outer limit of alteration.

6.4 METHODOLOGY FOR ASSESSING SITE-SPECIFIC IMPACTS

6.4.1 INTRODUCTION

Once the area of alteration has been quantified, as described in Section 6.3, the type and extent of the impact must be assessed in order to determine the level of mitigation that is required. This section includes a discussion of the recommended methodology for making this assessment. The methodology, presented in Section 6.4.3, is designed to require a level of wetland expertise commensurate with the expertise required to prepare an NOI for most AVRLP area(s). The methodology is also flexible, allowing for its application to both large and small airports, and to a variety of site-specific conditions such as the presence of a rare species habitat within the proposed vegetation removal areas. Preceding the site-specific methodology, Section 6.4.2 presents an overview of the impact assessment requirements under the MWPA. This discussion provides a context for the recommended methodology.

6.4.2 OVERVIEW OF IMPACT ASSESSMENT REQUIREMENTS

General Impact Assessment Requirements

The NOI preparation process and the MWPA regulatory performance standards focus on quantifying alterations to each resource area type rather than on assessing the type or extent of each impact. Wetland impact assessment is part of the process, but it is not the primary focus. Any wetland alteration, whether minor or major, short-term or long-term, is regulated according to the same thresholds and performance standards. The term "alter" is broadly defined in 310 CMR 10.04 to mean:

...to change the condition of any Area Subject to Protection Under the Act. Examples of alterations include, but are not limited to, the following:

(a) the changing of pre-existing drainage characteristics, flushing characteristics, salinity distribution, sedimentation patterns, flow patterns and flood retention areas;

(b) the lowering of the water level or water table;

(c) the destruction of vegetation; or

(d) the changing of water temperature, biochemical oxygen demand (BOD), and other physical, biological or chemical characteristics of the receiving water.

Using this definition, projects are reviewed under MWPA more in terms of the size of the area of wetland that they will alter, rather than on the nature of the impact. In fact, with the exception of "limited projects," it is often much more difficult to get approval to temporarily and minimally alter a large area (e.g., more than 5,000 square feet) of wetland than it is to permanently and significantly alter a smaller area (e.g., less than 5,000 square feet) of wetland. Perhaps for this reason, neither the MWPA nor its implementing regulations provide specific guidance on how to conduct wetland impact assessments.

Despite this lack of specific guidance, there is at least one important reason to assess the type and extent of wetland impacts associated with each project -- to determine if, what type of, and what extent of mitigation is necessary for each project. For a project with minor, short-term impacts, little or no impact mitigation would be necessary; however, a project with significant, long-term impacts may require more significant mitigation. Thus, in order to select appropriate mitigation measures, it is important to determine the following:

1) Whether an impact is short-term or long-term;

2) The nature and magnitude of the impact; and

3) Which of the interests of MWPA, if any, will be impacted by the alteration.

As described in Sections 5.0 and 6.2, the impacts due to vegetation removal can vary widely depending on the removal method selected, the type of wetland resource area, and the site-specific characteristics of the wetland. Unless the removal method involves permanent filling of the wetland, though, wetland impacts due to vegetation removal are generally short-term and/or mitigatable. In most cases, the wetland will be changed (e.g., from a forested wetland to a scrub-shrub or emergent wetland) but not permanently lost (e.g., converted to non-wetland). The methodology presented in Section 6.4.3 focuses on assessing the nature and extent of each impact, including whether the impact is temporary or permanent, so that appropriate mitigation measures can be selected.

Wildlife Habitat Evaluation Requirements

As discussed in Section 6.2, one of the significant potential impacts of vegetation removal on wetlands, in terms of the interests protected by MWPA, relates to protection of wildlife habitat. Evaluation of wildlife habitat is one wetland function for which the DEP provides specific guidance. DEP Wetlands Program Policy 88-1 and Wetlands Wildlife Advisory #2 provides a specific policy related to conducting wildlife habitat evaluations. The main component of this policy is a series of checklists that can be used to assess compliance with all aspects of the wildlife habitat protection regulations (310 CMR 10.60). It should noted, however, that according to DEP Wetlands Program Policy 88-1, wildlife habitat evaluations are not required for "limited projects" unless the work will occur within an estimated habitat for a rare species. Thus, wildlife habitat evaluations will not be required for airport tree clearing projects that meet the requirements under 310 CMR 10.24(8) and 10.53(6). However, there are certain site-specific conditions, in addition to the presence of rare species habitat, that may trigger the need for a wildlife habitat evaluation. Figure 6-5 indicates when a wildlife habitat evaluation should be conducted in relation to vegetation removal activities in either a fish run, a designated vernal pool, or an Area of Critical Environmental Concern (ACEC). In other cases, a less detailed evaluation of likely impacts to wildlife habitat, such as that proposed in Section 6.4.3, should be used.

In cases where a detailed wildlife habitat evaluation is required, the evaluation should be conducted using a methodology that is consistent with the DEP policies referenced above. There are numerous wetland evaluation methodologies available, some of which focus exclusively on assessing wildlife habitat (such as the Golet Wetland-Wildlife Habitat Evaluation model), and others which evaluate a broad range of wetland functions and values (such as Wetland Evaluation Technique II). One of the more common methods is the USFWS Habitat Evaluation Procedure (HEP). HEP provides a means of evaluating the quality of wildlife habitat in the existing wetland resource areas, and for predicting the quality of habitat which may be expected after the proposed alterations, either with or without mitigation. The HEP analysis uses "suitability indices" for reproductive and feeding habitats based upon information contained in the USFWS data base for various wildlife species.

6.4.3 IMPACT ASSESSMENT METHODOLOGY

This section provides a methodology for assessing the major wetland impacts associated with airport tree clearing projects. To simplify the methodology, it is presented in the form of a Wetland Impact Evaluation Checklist that outlines the evaluation guidelines, similar to the Wildlife Habitat Evaluation Checklists issued as part of Wetlands Program Policy 88-1 and Wetlands Wildlife Advisory #2. The purpose of this checklist is to provide a consistent framework and format for the impact evaluation at each airport where vegetation removal in wetlands is required. The checklist can be used by airport managers and their consultants (proponents) and conservation commissioners (reviewers) to ensure that all appropriate wetland information has been incorporated into the impact evaluation. Some questions are primarily for documentation (for example, to document the types of vegetation that will be removed from the site and the types of vegetation that will remain), while others require the preparer to evaluate specific impacts or justify selection of certain removal methods or mitigation measures.

Specific detailed guidance for every aspect of the impact assessment is presented throughout this GEIR, as referenced within the checklist. The overall impact assessment

methodology, and the specific GEIR text references for each step, are summarized in Figure 6-6.

Site-specific wetland impact evaluations, prepared according to the checklist, will be attached to the NOIs submitted to individual conservation commissions for each project. It should be noted that Step 5 of the checklist incorporates a decision flowchart that can be used by the impact evaluators to determine when a more detailed site-specific evaluation is warranted. The checklist is presented at the end of this section.

Appendix D to the GEIR contains a model impact evaluation, attached to the model NOI, that was prepared according to the Wetland Impact Evaluation Checklist.

6.4.4 CONCLUSIONS

The methodology presented in the Wetland Impact Evaluation Checklist outlines the field data collection requirements and decision-making process involved in assessing the wetland impact resulting from vegetation removal at airports. The impact evaluation process may vary somewhat depending on site-specific conditions both at and between each airport, but in most cases can be conducted with limited field investigations and measurements. The results from this impact assessment process can then be used to identify the type(s) and extent of mitigation measures necessary for each vegetation removal project. Potential mitigation measures are identified and evaluated in Section 7.0.

6.5 ESTIMATED STATEWIDE WETLAND IMPACT

6.5.1 INTRODUCTION

The Secretary's Certificate for the proposed project stipulates that the GEIR should identify which airport facilities are likely to require vegetation removal from wetlands, and the general types of wetlands that will be affected. In addition, since this GEIR is for a regulatory revision to allow airport vegetation removal projects to be considered as

"limited projects," it is important to assess the area of wetlands that may be affected by this revision. Section 6.5 provides this information, and presents the maximum statewide wetland impact in the context of Massachusetts' overall wetland resources.

6.5.2 MAXIMUM WETLAND IMPACT AT EACH AIRPORT

The maximum potential impacts to emergent, scrub-shrub, and forested wetlands at each airport are summarized in Table 6-6. The locations and extent of each wetland type at each airport are shown on the maps in Appendix A. In all, the maximum area of wetlands that could be affected by AVRLPs is approximately 1,348 acres. Of this area, 1,282 acres are forested wetlands and 66 acres are scrub-shrub wetlands. (Emergent wetlands and salt marshes are not expected to be significantly affected by vegetation removal.) In addition, up to approximately 762,800 linear feet of bank could be affected by vegetation removal. As discussed in Section 6.2, most of these impacts will be short-term, related to a change in plant species composition rather than to an actual loss of wetland resources.

As shown in Table 6-6, the only airports that are not expected to require vegetation removal from any wetland resources are the following:

- Boston-Logan International Airport
- Martha's Vineyard Airport
- Nantucket Memorial Airport
- Provincetown Municipal Airport
- Spencer Airport

The airports listed below are not expected to require vegetation removal from forested or scrub-shrub wetlands, although they may require vegetation removal from other state-protected wetland resource areas (shown in parentheses):

- Chatham Municipal Airport (bank)

- Falmouth Airport (bordering land subject to flooding)
- Haverhill-Riverside Airport (bank and bordering land subject to flooding)
- Mansfield Municipal Airport (bank and bordering land subject to flooding)
- Marston Mills Airport (bank)
- Montague-Turners Falls Airport (bank and bordering land subject to flooding)
- Northampton Airport (bank and bordering land subject to flooding)

A total of 34 airports may require vegetation removal from a forested or scrub-shrub wetland. In addition, 20 airports may require vegetation removal from wetlands that provide habitat for rare wetlands wildlife, and four airports may require vegetation removal from an ACEC.

These estimates are based on the mapped wetland resources at each airport (as discussed in Section 4.4.1 and summarized in Table 4-3) and on the following assumptions:

- Trees in forested wetlands rarely exceed 70 feet in height. However, in order to allow leeway to account for trees of unusual height, it has been conservatively assumed that trees may extend up to 100 feet above the runway end elevations. Therefore, forested wetlands located within the 100-foot elevation study area limits may require vegetation removal.
- Shrubs in scrub-shrub wetlands around the airports may extend up to 20 feet above the runway end elevations. (Wetlands with vegetation extending beyond this height are considered forested wetlands.) Therefore, scrub-shrub wetlands located within the 20-foot study area limits may require vegetation removal.
- Emergent wetlands immediately adjacent to the airports will generally not extend beyond the runway end elevations. Therefore, vegetation removal in emergent wetlands will generally not be required.

These areas are considered a conservative, "worst case" estimate for the following reasons:

- Even the tallest trees in most forested wetlands do not reach heights of 100 feet; and many scrub-shrub wetlands do not reach heights of 20 feet.

- Wetlands, by definition, are typically located at a low elevation in the landscape. Thus, most wetlands around airports will be located below the base airport elevations.

- If selective vegetation removal is conducted, as may be the case at many airports, the actual wetland area impacted (based on the methodologies presented in Section 6.3) will be significantly less than the total area of vegetation removal noted here.

Despite these considerations, the estimates are valuable because they provide a worst case appraisal of the maximum area of wetlands that could be affected by airport vegetation removal projects. In addition, they indicate which airports are likely to require vegetation removal from wetlands, as well as the extent of these removal needs.

6.5.3 COMPARISON WITH STATEWIDE WETLAND RESOURCES

As noted above, up to 1,348 acres of freshwater wetlands, and virtually no coastal wetlands, could be affected by AVRLPs in order to comply with FAA regulations. In comparison, estimates developed by Tiner (1989) indicate that there are approximately 470,500 acres of freshwater wetlands and 118,000 acres of coastal wetlands in Massachusetts. Therefore, less than 0.29% of Massachusetts' freshwater wetland resources and essentially 0% of its coastal wetland resources would be altered by airport vegetation removal projects. This alteration will represent a short-term impact to these resources -- no wetlands are expected to be permanently lost as a result of vegetation removal operations.

6.5.4 CONCLUSIONS

Up to 1,282 acres of forested wetlands and 66 acres of scrub-shrub wetlands could be affected by AVRLPs at public use airports in Massachusetts. These wetlands, which could be temporarily altered, represent less than 0.29% of Massachusetts' freshwater wetland resources. It is important to note that the proposed regulatory revision will not in any way increase the extent or magnitude of the wetland impacts at Massachusetts airports as a result of AVRLPs. The proposed AVRLPs are required in order to comply

with FAA regulations, regardless of whether they are allowed under a limited project provision. The approval of a limited project provision, however, will help to streamline the process and allow project approval at the local level for most airport removal projects.

6.6 OVERALL ENVIRONMENTAL IMPACT ASSESSMENT

6.6.1 INTRODUCTION

This GEIR focuses on wetland impacts related to vegetation removal activities. In order to fully comply with MEPA, though, this section provides a general assessment of the overall environmental impacts that could result from vegetation removal activities. Specifically, impacts to the following environmental characteristics are addressed:

- Topography, geology, and soils
- Surface water and groundwater hydrology and quality
- Plant and animal species and ecosystems
- Traffic, air quality, and noise
- Socioeconomic issues
- Scenic qualities, open space, and recreational resources
- Historic and archaeological resources
- The built environment and man's uses of the area
- Rare or unique features of the site and its environs

Some of these issues were discussed in Section 5.0, which compared the environmental impacts associated with various types of vegetation removal techniques, and others were addressed in Section 6.2, which focuses on impacts to wetland functions and values. The environmental impact assessment in Section 5.0 was comparative in nature, intended to differentiate between the removal alternatives on the basis of environmental considerations. The impact assessment in this section, while still somewhat generic, addresses overall environmental impacts related to the recommended removal alternatives.

6.6.2 TOPOGRAPHY, GEOLOGY, AND SOILS

Depending on the type of vegetation removal method proposed, the effects of vegetation removal on soil can range from slight surficial disturbances that require no mitigation, to significant disturbance of surface and underlying soils that require mitigation (e.g., erosion and sedimentation controls, site grading) to avert long-term impacts. Potential soil impacts may include the following:

- **Disturbance of surficial and/or underlying soils, potentially leading to erosion of soils and sedimentation into nearby wetlands and surface waters.** Minimal soil disturbance, mostly related to felling of trees, would result from vegetation removal by chainsaws or other hand-held equipment. Vegetation removal by heavy equipment may result in more extensive soil disturbance, although the extent of this disturbance can be minimized by use of tracks or mats to support the equipment. In addition, transporting the vegetation out of the wetland, if necessary, can result in significant soil disturbance. Use of herbicides is generally considered insignificant soil disturbance.

- **Soil compaction, which can affect groundwater flow through the wetland and/or lead to water-filled depressions in the wetland.** The degree of soil compaction varies with the type of harvesting equipment, removal techniques, cutting intensity, topography, weather, and physical soil properties such as moisture content and texture (DEM, 1992). Any removal technique that involves felling the trees can lead to some degree of soil compaction caused by the felled trees striking the ground. In addition, any heavy equipment that is used can lead to more significant soil compaction, although it can be minimized by using tracks or mats to support the equipment.

- **Creation of ruts and other depressions in the wetland sediments.** As discussed above, various aspects of vegetation removal activities can lead to soil compaction and depressions in the wetland sediments. Any removal technique that involves uprooting the trees can result in formation of depressions where the root ball was located. In addition, if heavy equipment is used in wetland sediments without tracks or mats, deep ruts can be formed in the sediments. All of these depressions in a wetland can become water-filled, potentially leading to changes in the vegetative community. In some cases, this may provide an indirect benefit by leading to greater diversity in the community.

- **Creation of mounds in the wetland topography.** Any removal technique that involves uprooting trees leads to formation of mounds from the deposition of sediments bound in the root ball and decomposition of the root material.

Combined with the depression formed where the roots were located, this leads to a "pit and mound" topography that is common in many forested wetlands in Massachusetts. In natural wetlands, this distinct microtopography develops from the blowdown of mature trees which often have shallow root systems in wetland areas.

All of these impacts will be minimized by implementing the conditions included in the proposed regulatory revision -- specifically, no change in the existing topography and soil levels (except for temporary access roads as necessary) will be allowed, US Department of Agriculture guidelines for preventing erosion and sedimentation will be followed, and removal activities will occur only when the ground is frozen, dry, or otherwise stable enough to support any equipment used. Section 7.0 provides additional guidance on mitigation measures to minimize soil exposure and control erosion and sedimentation.

No significant topographic or geologic impacts are likely to result from AVRLPs because contractors will be required to restore the area to the original contours.

6.6.3 SURFACE WATER AND GROUNDWATER HYDROLOGY AND QUALITY

Although AVLRPs have the potential to directly and indirectly affect surface water and groundwater, for the most part these impacts are short-term, minor, and/or can be easily controlled using best management practices. The potential impacts to surface water and groundwater hydrology and quality were discussed in terms of wetland functions and value in Section 6.2. Potential direct and indirect impacts include the following:

- **Localized turbidity increases in surface waters and, to a lesser degree, in groundwater.** As discussed above, sediments exposed by vegetation removal activities can erode, leading to increased turbidity levels in surface waters near the site. Soil erosion can occur as a result of disturbance by heavy equipment, construction of access roads, transportation of felled trees out of the wetland, and sediment and/or bank destabilization due to loss of the vegetative support layer. Soil erosion and subsequent water quality impacts can be minimized through use of proper erosion control measures.

- **Increased groundwater levels and streamflows because of the decreased ability of harvested areas to absorb water during storm events.** Documented streamflow increases range from 0% to 1% in selectively harvested areas to as high as 66% in

clear cut forests. Even in clear cut areas, though, these increases do not appear to significantly affect downstream flooding (Massachusetts Department of Environmental Management, 1992).

- **Increased water temperatures due to decreased shading, which decreases the oxygen carrying capacity of the water and increases the solubility of many chemicals in the water.** The solubility of oxygen in water is largely a function of temperature and pressure, with water of higher temperatures having a lower oxygen saturation concentration (Hem, 1970). Many fish species and the macroinvertebrates on which they feed require relatively high dissolved oxygen levels (Cooperrider *et. al.*, 1986, Pennak, 1978). The extent of the temperature increase depends on the amount and percent of shade canopy removed, the volume and velocity of the water, and the configuration of the stream or waterbody channel (EPA, 1976).

- **Trees felled across small streams may divert streamflow for a short distance.** Eventually, the felled trees would decompose, restoring natural streamflows. This potential impact, which would only occur when vegetation is removed along streambanks, can be easily averted by felling trees away from the stream.

- **Improper application of herbicides, or accidental spills of fuels or other chemicals, can lead to contamination of surface water or groundwater.** Any vegetation removal technique that involves herbicide application or use of fuel-powered equipment has the potential to introduce chemicals into nearby surface waters or groundwater. Use of proper herbicide application techniques, proper storage and use of fuels, and implementation of a spill contingency plan can greatly reduce the likelihood and extent of this potential impact.

Most of these potential surface water and groundwater impacts are short-term in nature. The extent of the impacts can be greatly minimized and mitigated by using the best management practices and mitigation measures described in Section 7.0.

6.6.4 PLANT AND ANIMAL SPECIES AND ECOSYSTEMS

The impacts to plant and animal species and ecosystems is discussed in Section 6.2. In general, these impacts are related to the conversion of forested wetlands to scrub-shrub or emergent wetlands. While this change in habitat may lead to shifts in wildlife species and community structure, in many cases it may lead to positive changes such as increases in species diversity.

The nature and extent of the impact to plants and wildlife depends on the following factors:

- **The type of removal method proposed.** Removal methods that involve minimal soil disturbance and minimal disturbance to low-growing vegetation will generally have less impact on plant and wildlife species. Further, if the felled trees will be left in place, the brush may continue to provide many of the wildlife food and habitat values that were provided by the standing trees.

- **The type of vegetation community present on the site, and the type of community that will remain once the vegetation removal is completed.** If the affected area is characterized by a shrub layer that will not be removed and that can replace many of the wildlife food and habitat values of the tree layer, then the impact on wildlife will be minimal. If, however, there is no appreciable shrub or herb layer, or the shrub and herb layer will be removed with the trees, then the impact on wildlife habitat will likely be more significant.

- **The type of species that inhabit or frequent the area, and their specific habitat requirements and sensitivity.** In the short-term, most wildlife species will leave the affected areas. Once the vegetation removal is completed, though, any species with a broad range of habitat tolerances will likely adapt to the new community. Species that have more stringent habitat requirements will likely relocate to a nearby forested community. In terms of vegetation, if the understory is relatively light tolerant, then it is less likely to be affected by the loss in the overstory. If the shrub and herb layers are dominated by light-intolerant species, however, then the existing understory may gradually become dominated by more light-tolerant plants.

The site-specific impact to wildlife habitat as a result of airport vegetation removal projects will be assessed as part of the NOI process, as described in Section 6.4. In most cases, this will involve a qualitative assessment except when the affected area contains rare species or other sensitive environmental resources. When the affected areas contain estimated habitats for rare plants or wildlife, NHESP should be contacted to evaluate the likelihood that the species will be impacted by the proposed vegetation removal activities. If rare wildlife may be impacted, a wildlife habitat evaluation must be conducted per DEP guidance. Known habitats for rare wetlands wildlife, as of the time of publication of this document, are shown on the maps in Appendix A. The local conservation commission(s) and/or the NHESP should be contacted regarding the presence of known habitat for any wildlife or plant species when filing an NOI. If

vegetation removal will occur within a rare species habitat, potential impacts on the species must be evaluated on a case-by-case basis. Whether or not rare species impacts are anticipated, a copy of the NOI should be sent to NHESP if work is proposed within the estimated habitat of a rare species

6.6.5 TRAFFIC, AIR QUALITY AND NOISE

Traffic, air quality, and noise impacts related to AVRLPs s are primarily expected to be minor and short-term in nature.

The only additional traffic that would likely be generated is related to the daily ingress and egress of small work crews for the duration of the project, as well as the initial arrival and departure of any removal equipment. It is assumed that any heavy equipment would be left on site for the duration of the project, and that the only vehicles added to local daily traffic throughout the project would be for the transportation of approximately five or fewer workers. For small AVRLPs, airport staff may be responsible for removing the trees using hand-held equipment, in which case little or no additional traffic would be generated. If the harvested trees are removed from the site, additional traffic would be generated for a short time by log trucks leaving the site.

Minor, short-term, and localized impacts to air quality would occur during the removal operation due to exhaust emissions from any equipment used. Large diesel engines are typically used to power the heavy equipment which might be employed in mechanized tree clearing. Most chain saws are equipped with two-cycle gasoline engines which emit more smoke and fumes than comparably sized four-cycle engines. Air quality impacts from the use of this equipment would be present throughout the duration of the project, but would be localized to the immediate work areas at any given time. Because only a few machines are likely to be utilized at any given airport site, the overall impact to air quality at any one site is not expected to be significant. In addition, because of the moist nature of the wetland soils in the project areas, dust generation by heavy equipment would not be expected to be significant at any of the sites.

Short-term, localized noise impacts would also be expected during vegetation removal due to operation of mechanized equipment or chainsaws. This impact is expected to be insignificant, particularly in comparison to the high noise levels typically generated by airport operations (e.g., plane takeoffs). In addition, most of the vegetation removal activities will occur in undeveloped areas adjacent to the airport runways. Depending on site-specific conditions, conversion of a forested area to an area with low-growing vegetation may lead to increased noise levels around the airport due to the decreased noise buffering ability of the area.

6.6.6 SOCIOECONOMIC ISSUES

AVRLPs, whether in wetland or non-wetland areas, can be beneficial in terms of socioeconomic issues. First, there would be a minor, short-term benefit of additional jobs during the vegetation removal operation. More important is the indirect benefit that removing the obstructing trees will enable the airport to comply with FAA regulations, and to continue to receive FAA funding for airport improvements. This will result in a continued source of jobs and revenue to the community and enhance public safety.

6.6.7 SCENIC QUALITIES, OPEN SPACE, AND RECREATION RESOURCES

In general, the impacts of AVRLPs on scenic qualities, open space, and recreational resources will be minimal.

Depending on the existing site conditions, the type of vegetation removal technique employed, and the visual accessibility of the affected areas, short-term aesthetic impacts may result from airport vegetation removal projects. Some studies have shown that people dislike seeing slash, stumps, and soil disturbance that may result from vegetation removal operations, yet other studies have shown that people prefer to see clearings and sparse understories over densely forested areas (DEM, 1992). If the felled trees are left to decay, the tree trunks, slash piles, and visible stumps could be considered a short-term visual impact. However, in most cases, public access to and views of these areas are

restricted. In cases where cleared areas are visible, the visual impact will be minimal and possibly beneficial if a scrub-shrub wetland or improved view remains after removal of the trees. In clear cut areas, the short-term visual impact may be somewhat more significant.

The long-term use of the affected areas as open space or conservation land would not be significantly altered by their conversion from forested wetland to a scrub-shrub or emergent wetland. In most cases, the land will remain undeveloped and suitable for any of its current uses.

Because most of the affected areas are located near airport runways, public access to many of these areas is restricted for safety reasons, limiting recreational uses. If access to the affected areas is not restricted, the recreational value of forested wetlands could include both passive and consumptive use of the areas. Passive recreational activities could include hiking and nature study, and many consumptive recreational activities, such as hunting, are not likely to be permitted in the vicinity of an airport runway. If recreational access to the areas is allowed, the vegetation removal activities would likely preclude recreational use in the immediate vicinity while the work was underway. Once the removal activities are completed, however, the area would generally be available for comparable recreational activities. If felled trees are left on the ground, foot passage through the areas could become more difficult. It should also be noted that the vegetation removal activities may have an indirect benefit on recreation if the obstruction-free areas that are being maintained are associated with a runway that is used for recreational flying.

6.6.8 HISTORIC AND ARCHAEOLOGICAL RESOURCES

General Cultural Resource Impact Assessment

Because the affected areas are largely undeveloped and near water, it is likely that certain areas where vegetation removal may be required contain historic or archaeological resources. Any method of vegetation removal that results in disturbance of the soil

could impact subsurface cultural resources. For the most part, this includes any mechanized felling techniques or any removal technique that involves uprooting the vegetation. In addition, any activity that results in impacts to the ground surface or any surface features could impact aboveground resources. Any mechanized removal technique has great potential for impacting surface features. To a lesser degree, any technique that involves felling trees may impact surface features because of the weight of the falling trees.

With regard to historic properties and architectural resources, in some cases actual removal of a tree from the property could represent an impact if the landscape is part of the listed resource. In general, potential direct impacts of vegetation removal that can lead to secondary impacts on cultural resources include soil compaction, soil erosion, streambank erosion, surface mixing of soils, and direct damage to aboveground resources (DEM, 1992). If significant cultural resources are identified on a site, the primary methods of impact mitigation are site avoidance, directional felling of trees, selection of vegetation removal techniques that do not involve heavy equipment, use of pre-existing roads, and use of best management practices when constructing new roads (DEM, 1992).

Site-Specific Cultural Resource Impact Assessment

By their nature, impacts to cultural resources must be assessed on a site-specific basis. The key issues to consider in evaluating the likelihood and extent of such impacts include the following:

- The presence and location of cultural resources with respect to the proposed vegetation removal activities;
- The type and vertical location (e.g., above-ground or below-ground) of cultural resource(s); and
- The type of vegetation removal technique(s) proposed.

The presence, location, and type of resource(s) must be determined through consultation with the Massachusetts Historical Commission (MHC). Certain areas, either because they have been previously surveyed or because of specific geological and environmental conditions, may be considered to have a low sensitivity for cultural resources. In other words, these areas would be considered unlikely to contain significant cultural resources, and MHC would generally not recommend site-specific investigations or use of non-mechanized removal techniques. In areas with a moderate or high potential for significant cultural resources, or where known cultural resources are located, MHC may recommend site-specific investigations. In most cases, these investigations can be phased so that the investigation can be focused on the most sensitive areas. Typical phases, listed in increasing order of specificity, include:

- Reconnaissance survey, which generally includes background research, identification of sensitive areas, field walkovers, and identification of additional study needs.
- Phase I, intensive field survey, which is to determine whether any significant cultural resources are present on the site.
- Phase II, site examination, which seeks to determine the significance of any artifacts discovered and to define the boundaries of any archaeological sites.
- Phase III, data recovery, which takes place if the state consultation process results in a determination that avoidance is not possible, and the site or portions of the site will be destroyed by the project.

It would be unlikely for an airport vegetation removal project to proceed to Phase III, because in most cases the work can be conducted in a manner that would avoid impacting cultural resources.

Once the type and location of any significant resources are identified, the likely impact can be assessed. The extent of impact depends largely on the type of vegetation removal technique and related activities (e.g., construction of access roads) that are proposed. In fact, discussions with MHC indicate that if the selected removal techniques involve minimal soil disturbance (e.g., felling trees by hand-held equipment such as chainsaws, use of herbicides), MHC would be unlikely to require a Phase I intensive field survey.

Massachusetts Historic Commission Review Requirements

Any AVRLP that involves an action (e.g., grant, permit issuance, loan, property transfer) by a federal or state agency must be reviewed by MHC with respect to potential impacts to cultural resources. Review related to federal agency actions is required under Section 106 of the National Historic Preservation Act of 1966 and 36 CFR Part 800; and review related to state agency actions is required under the State Antiquities Act (M.G.L. Ch.9, Sec. 26-27C) and Regulation (950 CMR 71.00). Thus, for all AVRLPs the proponent shall notify MHC using its 2-page project notification form which is included in Appendix H. Once MHC is notified, they can review the entire project (i.e., their review is not limited to the project components that involve agency actions) in terms of likely impacts to historical and archaeological resources, and determine if further investigation is necessary. Within 30 days of receipt of this notification, MHC is required to determine whether significant adverse impacts to cultural resources are unlikely, or whether additional investigations are necessary in order to make this determination. As noted above, in many cases the decision as to whether additional site specific investigations are required will depend on the type of removal method proposed.

6.6.9 THE BUILT ENVIRONMENT AND MAN'S USES OF THE AREA

Most of the affected areas are forested or scrub-shrub wetlands located alongside and at the end of airport runways where building heights are restricted. The majority of these areas are not developed and are unlikely to be developed in the future, both because of strict federal and state wetland protection laws, and because of FAA regulations. Human uses of these areas are also generally restricted, as previously discussed, for safety reasons. In cases where public access is not restricted, removal of vegetation should not significantly affect use of the areas. Therefore, vegetation removal from wetlands around airports is not expected to significantly impact the built environment or human use of the area. It should be noted, however, that failure to remove vegetation that encroaches on the PZs could significantly impact the built environment and use of

airport facilities by restricting use of runways, closure of the airport, or loss of eligibility to apply for federal assistance for airport development.

6.6.10 RARE OR UNIQUE FEATURES OF THE SITE AND ITS ENVIRONS

The affected areas mostly consist of undeveloped forested or scrub-shrub wetlands. Therefore, the most likely rare or unique features to be encountered on these sites would be rare, endangered, or threatened species of plants or animals or cultural resources. In addition, some of the public use airports evaluated are located within designated Areas of Critical Environmental Concern (ACECs). Other rare or unique features that could occur within the affected areas include unique vegetational communities or unique geological formations. The presence of any rare or unique features, and the likelihood that they will be impacted by vegetation removal activities, must be evaluated on a case-by-case basis.

6.6.11 CONCLUSIONS

Table 6-7 summarizes the potential environmental impacts of AVRLPs. In general, the environmental impacts associated with vegetation removal from wetlands around airports are short-term and relatively minor. Most of the short-term impacts, such as impacts to air quality, noise, traffic and water quality, are related directly to the vegetation removal operation. These localized impacts generally dissipate shortly after the removal activities are completed. In addition, both long-term and short-term benefits may result from AVRLPs. These benefits include maintaining the safe use of the airport, the short-term socioeconomic benefit from the creation of jobs to remove the vegetation, and the indirect long-term benefit that removal of the obstructing vegetation will enable the airports to comply with FAA regulations to maintain eligibility for FAA airport improvement funding and to enhance public safety. Indirectly, this funding leads to a variety of socioeconomic benefits to the community.

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WETLAND IMPACT EVALUATION CHECKLIST

- for vegetation removal projects at airports -

General Instructions: Provide the following information based on a field assessment of the areas where vegetation removal or related activities are expected to occur within the Protection Zones (PZs). Completion of this form should fulfill most if not all of the requirements of a Notice of Intent (NOI) for vegetation removal within wetlands at public use airports.

This Wetland Impact Evaluation Checklist has been designed to be completed sequentially. Each step relies on information provided in the preceding step. Step 1 requests information on how the clearing areas have been identified. Step 2 requests a description of the clearing areas in terms of the resource areas listed in 310 CMR 10.00. Step 3 provides a table for selecting a removal method. Step 4 requires quantifying the extent of potential impacts. Step 5 evaluates the impacts in terms of the 8 statutory wetland functions protected under MGL Chapter 131 Section 40. Step 6 provides for a description of measures proposed to mitigate potential impacts identified in the previous step. Users are advised to refer to Section 9.0 of the Generic Environmental Impact Report (GEIR) for Vegetation Removal in Wetlands at Public Use Airports regarding preparation of the NOI and related plans and calculations. The evaluation conducted using this checklist should be attached to the NOI as supporting documentation.

Please attach additional information where adequate space has not been provided, or revise the spacing available for responses according to the information requirements at individual airports.

Step 1 - Identify Vegetation Requiring Removal

Using the guidelines in Section 6.3.2 of the GEIR, identify all vegetation that must be removed in order to comply with FAA requirements.

__ 1.1 How was the vegetation to be removed identified?

__ 1.2 Document all PZs requiring vegetation removal on a plan that will be incorporated into the NOI submittal.

Step 2 - Delineate and Assess Affected Wetland Resource Areas

Following the guidelines in Section 6.3.3 of the GEIR, identify and delineate all wetland resource areas within and within 100 feet of the PZs that require vegetation removal or any related activities. Identify any site-specific conditions that may affect the selection of vegetation removal techniques or the impact evaluation.

__ 2.1 Circle each wetland resource area which is within or partially within the PZs and which will require vegetation removal:

a. Bordering Vegetated Wetland (BVW)
b. Inland Bank
c. Bordering Land Subject to Flooding (BLSF)
d. Isolated Land Subject to Flooding (ILSF)
e. Land Under Water Body or Waterway (LUW)
f. Banks of or Land Under a Fish Run (fish run)
g. Barrier Beach or Coastal Bank or Dune, in unusual cases
h. Buffer zone to BVW, bank, and fish run

__ 2.2 Describe all potentially affected wetland resource areas identified above. If the areas include resource areas with different vegetational communities (e.g., a red maple swamp BVW and an atlantic white cedar swamp BVW), discuss each area separately. For each area identified, provide the following information:

a. Dominant vegetation and approximate percent cover at the tree, shrub, and herb layer
b. Qualitative description of wildlife habitat and food value associated with identified vegetative communities
c. Depth of standing or flowing water, if any (note whether this appears to be characteristic of hydrologic conditions in area)
d. Depth to groundwater
e. General description of soils
f. Observations of erosion

__ 2.3 Document the approximate locations of the areas described, including differing vegetational communities, on a plan that can be incorporated into the NOI.

__ 2.4 Are any of the wetland resource areas related to a public or private water supply (i.e., do any of the affected areas or adjacent areas recharge a groundwater supply or flow into a surface water supply)? (Contact the town/city board of health or public works department, and/or the Massachusetts Department of Environmental Management.) Discuss and note data sources.

__ 2.5 Are any of the wetland resource areas that will be affected located within an estimated habitat for a rare species, a vernal pool, or a designated fish run? (Review estimated habitat maps located at local conservation commission office(s) and contact the Massachusetts Natural Heritage and Endangered Species Program.) Discuss and note data sources.

__ 2.6 Are any of the wetland resource areas that will be affected located within an Area of Critical Environmental Concern (ACEC)? (Contact the Massachusetts Coastal Zone Management (CZM) Office for information on locations and boundaries of coastal ACECs, and the Department of Environmental Management (DEM) for locations and boundaries of inland ACECs.) Discuss and note data sources.

Step 3 - Select Appropriate Vegetation Removal Method(s)

Using the guidelines provided in Section 5.5 of the GEIR, select (a) vegetation removal method(s) based on environmental, economic, and maintenance considerations.

__ 3.1 Using Table 6-4, identify which vegetation removal alternatives were considered for each PZ requiring vegetation removal.

__ 3.2 What removal method(s) was selected for each area and why? Briefly document the environmental, economic, and maintenance considerations involved in the selection process. (Note that it may be appropriate to use more than one removal method for each tree clearing project. In such cases, document where each method will be used, and discuss each method separately.)

__ 3.3 Using the environmental evaluation presented in Section 5.0 of the GEIR, and site-specific observations, provide general information about the removal method. Specifically, provide the following:

a. Type of equipment that will be used, if any.

b. Expected extent of soil disturbance.

c. Expected extent of undergrowth disturbance or removal.

d. Whether or not trees will be removed from open water areas.

e. Whether or not an access road will be constructed, and whether it will be temporary or permanent.

f. Type of herbicides to be used, if any.

Step 4 - Quantify Wetland Impacts

__ 4.1 Identify the number of trees to be removed within each resource area. Note whether the number of trees listed is an actual count or an estimation. If count is an estimate, specify method used. [Suggested method: count trees within a representative sample plot (or plots if appropriate), and extrapolate the no. trees/unit area to the entire affected area. Sample plots of 100 feet X 100 feet, or 10,000 square feet, are recommended to simplify the calculation.]

__ 4.2 Using the methodology described in Section 6.3.4 of the GEIR, estimate the extent of short-term and long-term alterations to each resource area. For the purposes of this estimate, long-term alterations should be considered impacts that result in the conversion of a wetland area to a non-wetland area (e.g., construction of a permanent access road). Impacts should be quantified in areal measurements (e.g., square feet or acres) for all resource areas except bank, which should be expressed in linear feet.

Step 5 - Evaluate Wetland Impacts

__ 5.1 Qualitatively discuss impacts in terms of soil erosion, sedimentation into nearby wetlands, bank stabilization, and attenuation of flood flows.

__ 5.2 Using the flowchart presented in Figure 6-5 of the GEIR, determine whether a detailed rare species wildlife habitat evaluation (WHE) is necessary. If a site-specific WHE according to DEP policies is needed, present a summary herein and attach the report to the NOI

__ 5.3 If a detailed WHE is not needed, provide a qualitative assessment of the likely impact on the capacity of the affected wetland resource areas to provide the following important wildlife habitat functions.

a. Plant community composition and structure
b. Topography
c. Soil composition and structure
d. Hydrologic regime and proximity to water
e. Degree of shaded habitat
f. Availability of similar habitats in nearby areas

__5.4 Section 6.0 of the GEIR discusses the range of potential direct and indirect impacts related to vegetation removal activities. These potential impacts are summarized below. Indicate which impacts are likely to occur in each vegetation removal area. Indicate long-term impacts with an "*". Each potential impact is then cross-referenced to the wetland function(s), as listed in MWPA, that may be affected.

Vegetation Removal Area	Potential Direct Impacts	Wetland Functions*
_____	decrease of wildlife habitat in trunk and canopy	8
_____	decrease of shrub or herbaceous layer	3,4,5,8
_____	soil erosion	5,7
_____	soil compaction	3,4
_____	sedimentation	5,7
_____	decrease of flood storage from fllling	3,4
_____	decrease in shading	7,8
_____	displacement in organisms	7,8
_____	changes in water quality	1,2,5,7
_____	chemical releases	1,2,5,7
_____	change in attenuation of flood flows	3,4

Potential Indirect Impacts

_____	changes in soil/water temp.	5,6,7
_____	sedimentation	5,7
_____	changes in plant community	5,7,8
_____	altered surface drainage	1,2,3
_____	introduction of invasive species	5,8
_____	altered groundwater flow or elevation	1,2,3,4
_____	changes in species diversity	8
_____	change in primary productivity	5,8
_____	bioconcentration of contaminants	1,2,5,6,7,8

*The functions are those public interests specifically protected under the Wetlands Protection Act (MGL Ch. 131 Section 40). These functions are:

- **FUNCTION 1** - Protect Public or Private Water Supply
- **FUNCTION 2** - Protect Groundwater Supply
- **FUNCTION 3** - Flood Control
- **FUNCTION 4** - Storm Damage Prevention
- **FUNCTION 5** - Prevention of Pollution
- **FUNCTION 6** - Protection of Land Containing Shellfish
- **FUNCTION 7** - Protection of Fisheries
- **FUNCTION 8** - Protection of Wildlife Habitat

Step 6 - Select Appropriate Mitigation Measures

To the extent possible, all impacts identified under Step 5 should be mitigated. Use the guidelines presented in Section 7.0 of the GEIR to identify appropriate mitigation measures. The extent of mitigation necessary should reflect the nature and extent of the impact expected. If there are impacts that cannot be mitigated, please describe and note why mitigation is infeasible.

__6.1 What mitigation measures are expected to be employed to mitigate short-term and long-term impacts? Check each measure which will be used.

MITIGATION MEASURES
for Short-Term Impacts

_____ siltation barriers
_____ runoff diversions
_____ sediment traps/basins
_____ vegetated buffers
_____ revegetation of disturbed areas
_____ wetland restoration
_____ timber mats

_____ herbicide application guidelines
_____ on-site wetland enhancement
_____ construction timing
_____ construction specifications
_____ containment spill contingency plan
_____ other

MITIGATION MEASURES
for Long-Term Impacts

_____ wetland replication
_____ off-site wetland enhancement
_____ development restrictions
_____ monitoring program
_____ mitigation banking
_____ compensatory flood storage
_____ wildlife enhancement
_____ other

__6.2 Use Table 6-5 to summarize the wetland functions that may be affected in each vegetation removal area and the mitigation measures that are proposed in each area, and provide a brief discussion.

__6.3 What mitigation measures were considered that will not be used? List and briefly discuss reason(s) that these measures were not selected.

__6.4 Are there likely to be any impacts that cannot be mitigated? Describe, and note why mitigation is infeasible.

(It should be noted that if significant, unmitigatable impacts are likely, or if the necessary mitigation measures are prohibitively expensive, it may be appropriate to reconsider the selected vegetation removal method(s) and, if possible, select a less environmentally damaging removal method.)

** end of checklist **

TABLE 6-1
PLANT SPECIES LISTED IN THE MASSACHUSETTS WETLANDS PROTECTION ACT

BVW Type	Vegetation (Common and Scientific names)
Bog	sphagnum moss (*Sphagnum*), aster (*Aster nemoralis*), azaleas (*Rhododendron canadense* and *R. viscosum*), black spruce (*Picea mariana*), bog cotton (*Eriophorum*), cranberry (*Vaccinium macrocarpon*), high-bush blueberry (*Vaccinium corymbosum*), larch (*Larix laricina*), laurels (*Kalmia angustifolia* and *K. polifolia*), leatherleaf (*Chamaedaphne calyculata*), orchids (*Arethusa, Calopogon, Pogonia*), pitcher plants (*Sarracenia purpurea*), sedges (*Cyperaceae*), sundews (*Droseraccae*), sweet gale (*Myrica gale*), and white cedar (*Chamaecyparis thyoides*).
Swamp	alders (*Alnus*), ashes (*Fraxinus*), azaleas (*Rhododendron canadense* and *R. viscosum*), black alder (*Ilex verticillata*), black spruce (*Picea mariana*), buttonbush (*Cephalanthus occidentalis*), American or white elm (*Ulmus americana*), white Hellebore (*Veratrum viride*), hemlock (*Tsuga canadensis*), high-bush blueberry (*Vaccinium corymbosum*), larch (*Larix laricina*), cowslip (*Caltha palustris*), poison sumac (*Toxicodendron vernix*), red maple (*Acer rubrum*), skunk cabbage (*Symplocarus foetidus*), sphagnum moss (*Sphagnum*), spicebush (*Lindera benzoin*), black gum tupelo (*Nyssa sylvatica*), sweet pepperbush (*Clethra alnifolia*), white cedar (*Chamaecyparis thyoides*), and willow (*Salicaceae*).
Wet meadow	blue flag (*Iris*), vervain (*Verbena*), throughwort (*Eupatorium*), dock (*Rumex*), false loosestrife (*Ludwigia*), hydrophyllic grasses (*Gramincae*), loosestrife (*Lythrum*), marsh fern (*Dryopteris thelypteris*), rushes (*Juncaceae*), sedges (*Cyperaceae*), sensitive fern (*Onoclea sensibilis*), and smartweed (*Polygonum*).
Marsh	arums (*Araceae*), bladder worts (*Utricularia*), bur reeds (*Sparganiaceae*), button bush (*Cephalanthus occidentalis*), cattails (*Typha*), duck weeds (*Lemnaceae*), eel grass (*Vallisneria*), frog bits (*Hydrocharitaceae*), horsetails (*Equisetaceae*), hydrophyllic grasses (*Gramincae*), leatherleaf (*Chamaedaphne calyculata*), pickerel weeds (*Pontederiaceae*), pipeworts (*Eriocaulon*), pond weeds (*Potamogeton*), rushes (*Juncaceae*), sedges (*Cyperaceae*), smartweeds (*Polygonum*), sweet gate (*Myrica gale*), water milfoil (*Halcragaceae*), water lilies (*Nymphaeaceae*), water starworts (*Callitrichaceae*), and water willow (*Decodon verticillatus*)

TABLE 6-2
STATUSES AND PROBABILITY RANGES OF WETLAND PLANTS

Status	Probability Range
OBL	>99% of the time found in wetlands
FACW	67-99% of the time found in wetlands
FAC	34-66% of the time found in wetlands
FACU	67-99% of the time found in non-wetlands
UPL	>99% of the time found in non-wetlands

TABLE 6-3
POTENTIAL DIRECT AND INDIRECT IMPACTS
RELATED TO VEGETATION REMOVAL ACTIVITIES IN WETLANDS

Potential Direct Impacts:

- Loss of habitat related to removal of tree trunks and canopy.
- Wetland sediment disturbance and/or compression by vegetation removal equipment.
- Disturbance and/or destruction of herbaceous and shrub vegetation layers.
- Displacement of organisms.
- Altered habitat due to increased penetration of sunlight/decreased shading.
- Chemical release into wetlands (e.g., accidental releases of equipment fuels or herbicides).

Potential Indirect Impacts:

- Localized increases in soil, water, and air temperature.
- Destabilized soils and erosion, potentially leading to sedimentation in nearby wetland areas.
- Changes in community structure (e.g., loss of light intolerant plants and organisms) and food chain dynamics.
- Altered surface water drainage and groundwater flow patterns (due to removal of tree trunk and root systems).
- Increase in groundwater level due to loss of evapotranspiration associated with removed trees.
- Invasion and colonization of cleared areas by opportunistic (and often less valuable) plant species.
- Increase in species diversity (in areas with monotypic forest stands).
- Decrease in primary productivity and nutrient cycling.
- Biotoxicity/bioaccumulation/bioconcentration of contaminants and subsequent ecotoxicological effects.

TABLE 6-4
VEGETATION MANAGEMENT ALTERNATIVE SUMMARY TABLE

VEGETATION MGT. OPTIONS	AREA No.	AREA No.	AREA No.	AREA No.	AREA No.	AREA No.
TIER 1: MINIMAL IMPACT OPTIONS						
Tree Topping						
Remove Trees with Helicopter						
Fell Trees and Lop Slash						
Girdling						
TIER 2: LOW IMPACT OPTIONS						
Fell/Lop/Cut-surface Treatment						
Fell/Frill-and-inject Treatment						
Fell/Selective Basal Treatment						
TIER 3: MODERATE IMPACT OPTIONS						
Selective Foliar Treatment						
Pull Trees Down						
Mechanized Felling						
Frill-and-inject/Pull Trees Down						
Mechanized Felling/Cut-surface Treatment						
TIER 4: HIGH IMPACT OPTIONS						
Clearing and Grubbing						
Push Trees Over						
Shear Trees with Bulldozer						
Build an Impoundment						
Frill-and-inject/Push Trees Over						
Shear Trees with Bulldozer/Cut-surface Treatment						
Prescribed Burning						

TABLE 6-5

AFFECTED WETLAND FUNCTION AND MITIGATION MEASURE SUMMARY TABLE

AREA	WETLAND FUNCTIONS THAT MAY BE AFFECTED:								PROPOSED MITIGATION MEASURES
	Protection of Private/ Public Water Supply	Protection of Groundwater Supply	Flood Control	Storm Damage Prevention	Prevention of Pollution	Protection of Land Containing Shellfish	Protection of Fisheries	Protection of Wildlife Habitat	

TABLE 6-6

MAXIMUM POTENTIAL WETLAND IMPACTS AT EACH AIRPORT*

AIRPORT	EMERGENT WETLANDS (acres)	SCRUB-SHRUB WETLANDS (acres)	FORESTED WETLANDS (acres)	TOTAL WETLANDS (acres)	BANK (feet)
Barnstable Municipal	0.0	0.0	8.1	8.1	12,900
Barre-Tanner-Hiller	0.0	0.0	4.2	4.2	25,000
Bedford-L.G. Hanscom Field	0.0	0.0	166.0	166.0	59,600
Beverly Municipal	0.0	1.3	98.7	100.0	25,000
Boston-Logan Int'l	0.0	0.0	0.0	0.0	0
Chatham Municipal	0.0	0.0	0.0	0.0	12,100
Edgartown-Katama Airpark	0.0	0.2	0.0	0.2	0
Fall River Municipal	0.0	2.8	6.7	9.5	18,300
Falmouth	0.0	0.0	0.0	0.0	0
Fitchburg Municipal	0.0	2.1	0.0	2.1	37,900
Gardner Municipal	0.0	6.8	34.3	41.1	15,200
Great Barrington	0.0	3.0	27.8	30.8	9,200
Hanson-Cranland	0.0	0.0	19.2	19.2	3,100
Haverhill-Riverside	0.0	0.0	0.0	0.0	7,300
Hopedale-Draper	0.0	0.0	10.8	10.8	12,900
Lawrence Municipal	0.0	0.0	12.1	12.1	43,300
Mansfield Municipal	0.0	0.0	9.3	9.3	21,700
Marlboro	0.0	0.0	17.0	17.0	14,000
Marshfield Municipal	0.0	3.3	134.7	138.0	18,300
Marston Mills	0.0	0.0	0.0	0.0	3,800
Martha's Vineyard	0.0	0.0	**0.0	**0.0	0
Montague-Turners Falls	0.0	0.0	0.0	0.0	1,500
Nantucket Memorial	0.0	0.0	0.0	0.0	0
New Bedford Municipal	0.0	9.6	260.5	270.1	35,400
Newburyport	0.0	3.2	12.9	16.1	600

* Note - Estimates are based on forested wetlands located within the 100-foot elevation study limits and scrub-shrub wetlands located within the 20-foot elevation study limits presumably could require vegetation removal. These estimates of the maximum potential impact are a worst-case scenario.

** Area of potential wetland impacts is less than 0.1 acres.

TABLE 6-6 (CONTINUED)

MAXIMUM POTENTIAL WETLAND IMPACTS AT EACH AIRPORT*

AIRPORT	EMERGENT WETLANDS (acres)	SCRUB-SHRUB WETLANDS (acres)	FORESTED WETLANDS (acres)	TOTAL WETLANDS (acres)	BANK (feet)
Norfolk	0.0	0.0	30.8	30.8	10,000
North Adams-Harriman and West	0.0	0.0	1.4	1.4	9,600
Northampton	0.0	0.0	0.0	0.0	2,100
Norwood Memorial	0.0	19.9	41.2	61.1	48,300
Orange Municipal	0.0	2.0	5.9	7.9	12,500
Oxford	0.0	0.0	3.5	3.5	7,500
Palmer Metropolitan	0.0	2.3	21.4	23.7	14,400
Pepperell	0.0	0.0	3.3	3.3	15,800
Pittsfield Municipal	0.0	0.3	62.5	62.8	42,700
Plymouth Municipal	0.0	0.0	1.7	1.7	3,300
Provincetown Municipal	0.0	0.0	0.0	0.0	0
Shirley	0.0	0.2	10.9	11.1	9,200
Southbridge Municipal	0.0	0.0	8.6	8.6	10,800
Spencer	0.0	0.0	0.0	0.0	0
Sterling	0.0	0.2	35.4	35.5	0
Stow-Minuteman	0.0	3.0	66.5	69.5	30,000
Taunton Municipal	0.0	0.2	26.8	27.0	39,600
Tewksbury-Tew-Mac	0.0	6.2	38.2	44.4	16,300
Westfield-Barnes	0.0	0.0	22.5	22.5	6,700
Westover AFB/ Metropolitan	0.0	0.0	66.9	66.9	51,900
Worcester Municipal	0.0	0.0	12.1	12.1	55,000
TOTALS	0.0	66.4	1,282.0	1,348.4	762,800

* Note - Estimates are based on forested wetlands located within the 100-foot elevation study limits and scrub-shrub wetlands located within the 20-foot elevation study limits presumably could require vegetation removal. These estimates of the maximum potential impact are a worst-case scenario.

Sources: U.S.G.S. topographic maps, U.S. Fish and Wildlife Service National Wetland Inventory maps, DEM Wetlands Conservancy Program orthophotos.

TABLE 6-7
SUMMARY OF POTENTIAL ENVIRONMENTAL IMPACTS
RELATED TO VEGETATION REMOVAL

Environmental Characteristic	Short-Term Impact	Long-Term Impact
Topography	o	o
Geology	o	o
Soils	-	o
Surface Water Hydrology and Quality	-	-
Groundwater Hydrology and Quality	-	o
Plant Species and Ecosystems	-/--	o/-/--
Wildlife Species and Ecosystems	-/--	o/-/--
Traffic	-	o
Air Quality	-	o
Noise	-	o/-
Socioeconomic Issues	+	+
Scenic Qualities	o	o
Open Space	o	o
Recreational Resources	o	+
Historic and Archaeological Resources	o/-	o/-
Built Environment and Man's Uses of the Area	o	+
Rare or Unique Site Features	o/-	o/-

Key:

++ = significant positive effect is likely
+ = minor positive effect may occur
o = no significant positive or negative effects are likely
- = minor negative effect may occur
-- = significant negative impact is likely

FIGURE 6-1
INTERESTS OF THE ACT PRESUMED SIGNIFICANT FOR EACH RESOURCE AREA

Key:
○ = Not Presumed Significant
◒ = May be Significant
● = Presumed Significant

Wetland Resource Area / Interests of the Act	Protection of Private/Public Water Supply	Protection of Groundwater Supply	Flood Control	Storm Damage Prevention	Prevention of Pollution	Protection of Land Containing Shellfish	Protection of Fisheries	Protection of Wildlife Habitat
Inland:								
Bordering Vegetated Wetland	●	●	●	●	●	○	●	●
Bank	●	●	●	●	●	○	●	●
Land Under Water Bodies or Waterways	●	●	●	●	●	○	●	●
Bordering Land Subject to Flooding	○	○	●	●	○	○	○	◒*
Isolated Land Subject to Flooding	◒	◒	●	●	◒	○	○	●**
Coastal:								
Fish Run	○	○	○	○	○	○	●	○
Barrier Beaches	○	○	●	●	○	◒	◒	◒
Coastal Dunes	○	○	●	●	○	○	○	◒
Coastal Banks	○	○	●	●	○	○	○	○
Salt Marshes	○	◒	○	◒	●	◒	●	●
Land Under Salt Ponds	○	○	○	○	○	◒	●	●
Land Under the Ocean	○	○	◒	◒	○	◒	●	◒
Coastal Beaches	○	○	●	●	○	◒	◒	●
Land Containing Shellfish	○	○	○	○	○	●	●	○
Rocky Intertidal Shores	○	○	●	●	○	◒	●	●
Designated Port Areas	○	○	◒	◒	○	○	◒	○

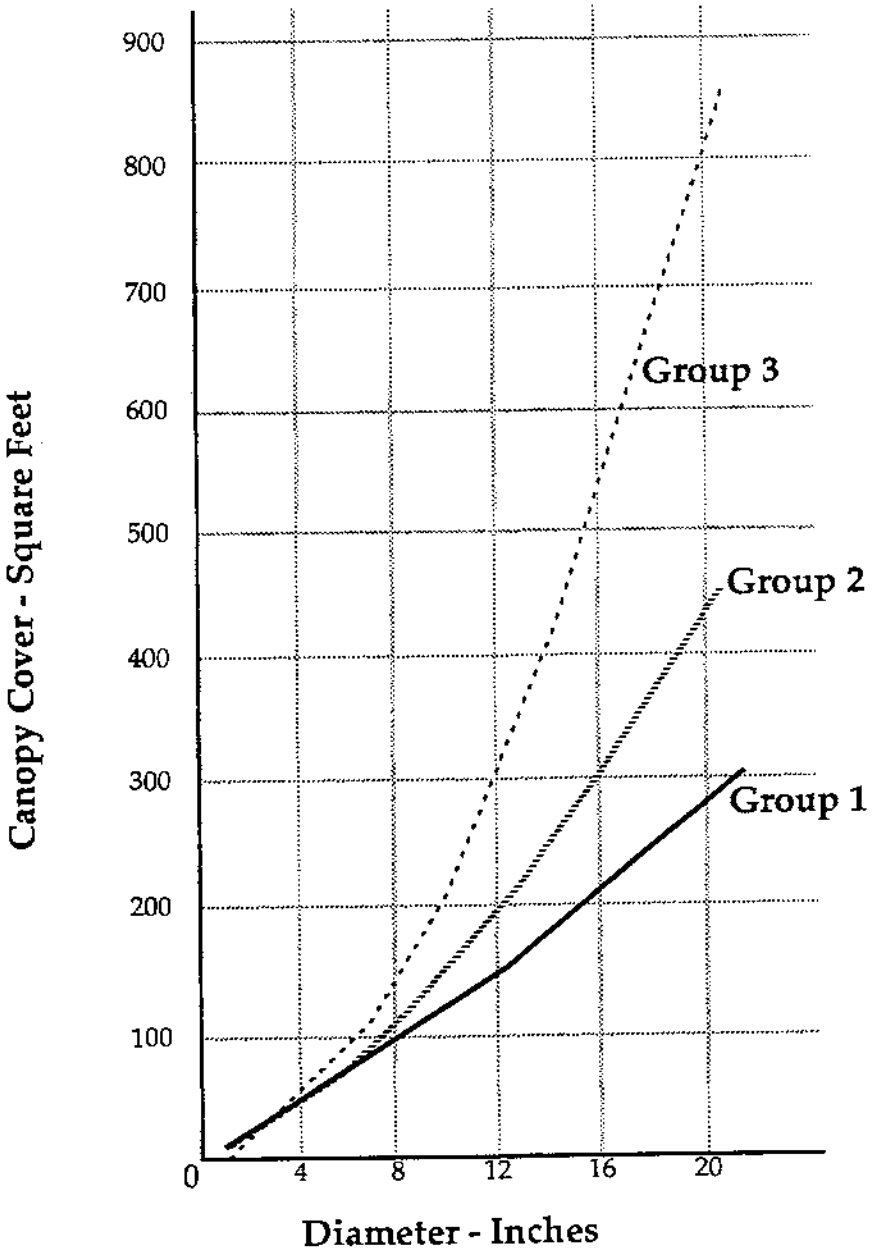
* Presumed significant only when there is a vernal pool habitat or when removal occurs within the 10-year floodplain or within 100 feet of bank or bordering vegetated wetland.

** Presumed significant only when there is a vernal pool habitat.

FIGURE 6-2
POTENTIAL IMPACTS OF VEGETATION REMOVAL ON THE INTERESTS PROTECTED BY THE ACT

Key:
N/A = Not Presumed Significant for this Resource Area
○ = Unlikely to have an Impact
◒ = Potential Impacts (depends on site-specific conditions)
● = Significant Impact may Occur

Wetland Resource Area / Interests of the Act	Protection of Private/Public Water Supply	Protection of Groundwater Supply	Flood Control	Storm Damage Prevention	Prevention of Pollution	Protection of Land Containing Shellfish	Protection of Fisheries	Protection of Wildlife Habitat
Inland:								
Bordering Vegetated Wetland	◒	◒	◒	◒	◒	N/A	◒	●
Bank	◒	◒	◒	◒	◒	N/A	◒	●
Land Under Water Bodies or Waterways	○	○	○	○	○	N/A	◒	○
Bordering Land Subject to Flooding	N/A	N/A	◒	◒	N/A	N/A	N/A	◒
Isolated Land Subject to Flooding	○	○	◒	◒	○	N/A	N/A	◒
Coastal:								
Fish Run	N/A	N/A	N/A	N/A	N/A	N/A	◒	N/A
Barrier Beaches	N/A	N/A	○	○	N/A	○	○	○
Coastal Dunes	N/A	N/A	○	○	N/A	N/A	N/A	○
Coastal Banks	N/A	N/A	○	○	N/A	N/A	N/A	N/A
Salt Marshes	N/A	○	N/A	○	○	○	○	○
Land Under Salt Ponds	N/A	N/A	N/A	N/A	N/A	○	○	○
Land Under the Ocean	N/A	N/A	○	○	N/A	○	○	○
Coastal Beaches	N/A	N/A	○	○	N/A	○	○	○
Land Containing Shellfish	N/A	N/A	N/A	N/A	N/A	○	○	N/A
Rocky Intertidal Shores	N/A	N/A	○	○	N/A	○	○	○
Designated Port Areas	N/A	N/A	○	○	N/A	N/A	○	N/A



Group 1 - Black Cherry, White Ash, Yellow-Poplar

Group 2 - Red Maple, Red Oak, All other species not in groups 1 or 3

Group 3 - Sugar Maple, American Beech, Striped Maple, All Oaks except Red Oak

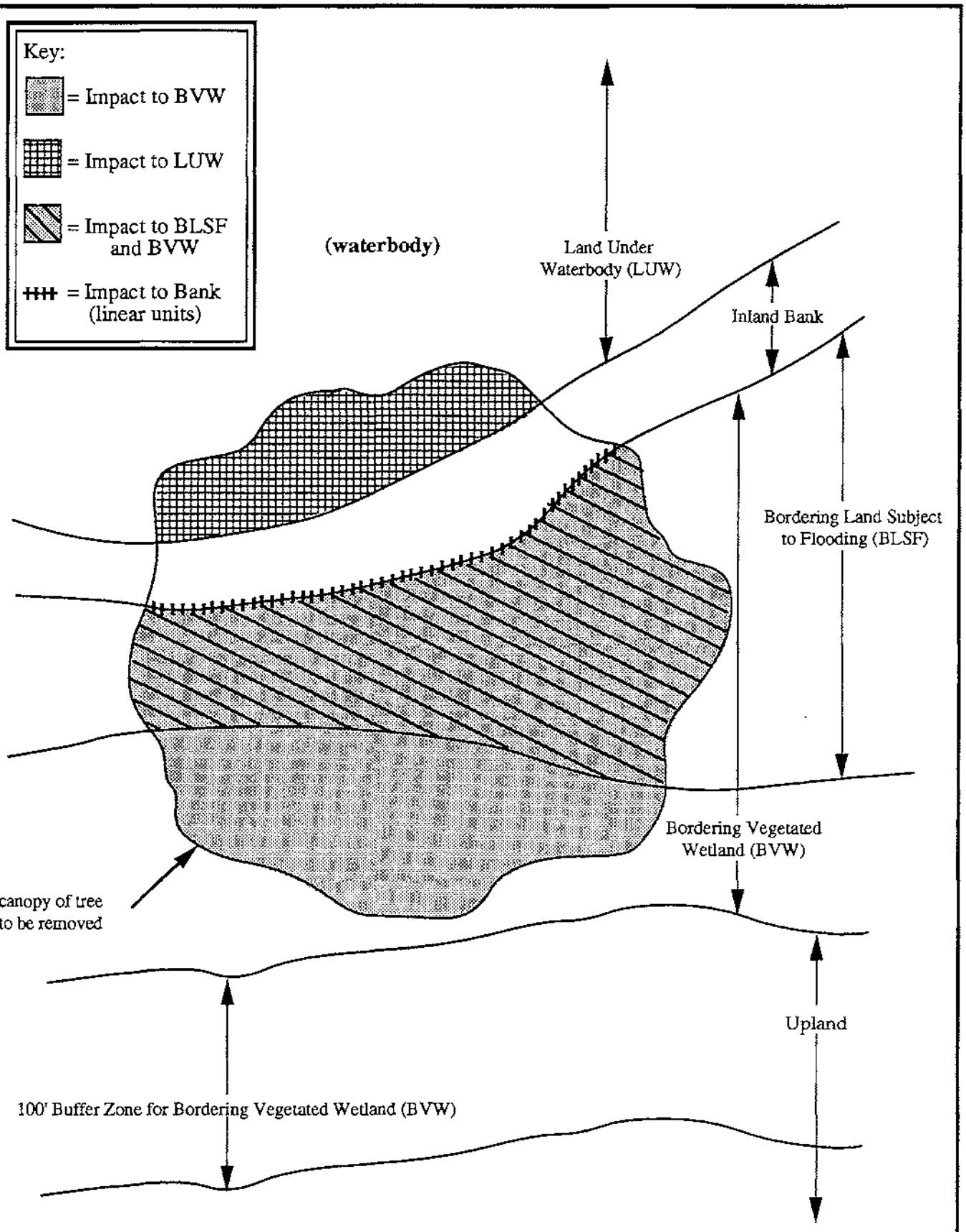
Source: U.S. Forest Service, 1984.

GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

CDM Camp Dresser & McKee Inc. Cambridge, Massachusetts

August 31, 1993

FIGURE 6-3
RELATIONSHIP BETWEEN TREE DIAMETER AT BREAST HEIGHT AND CANOPY COVER



GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

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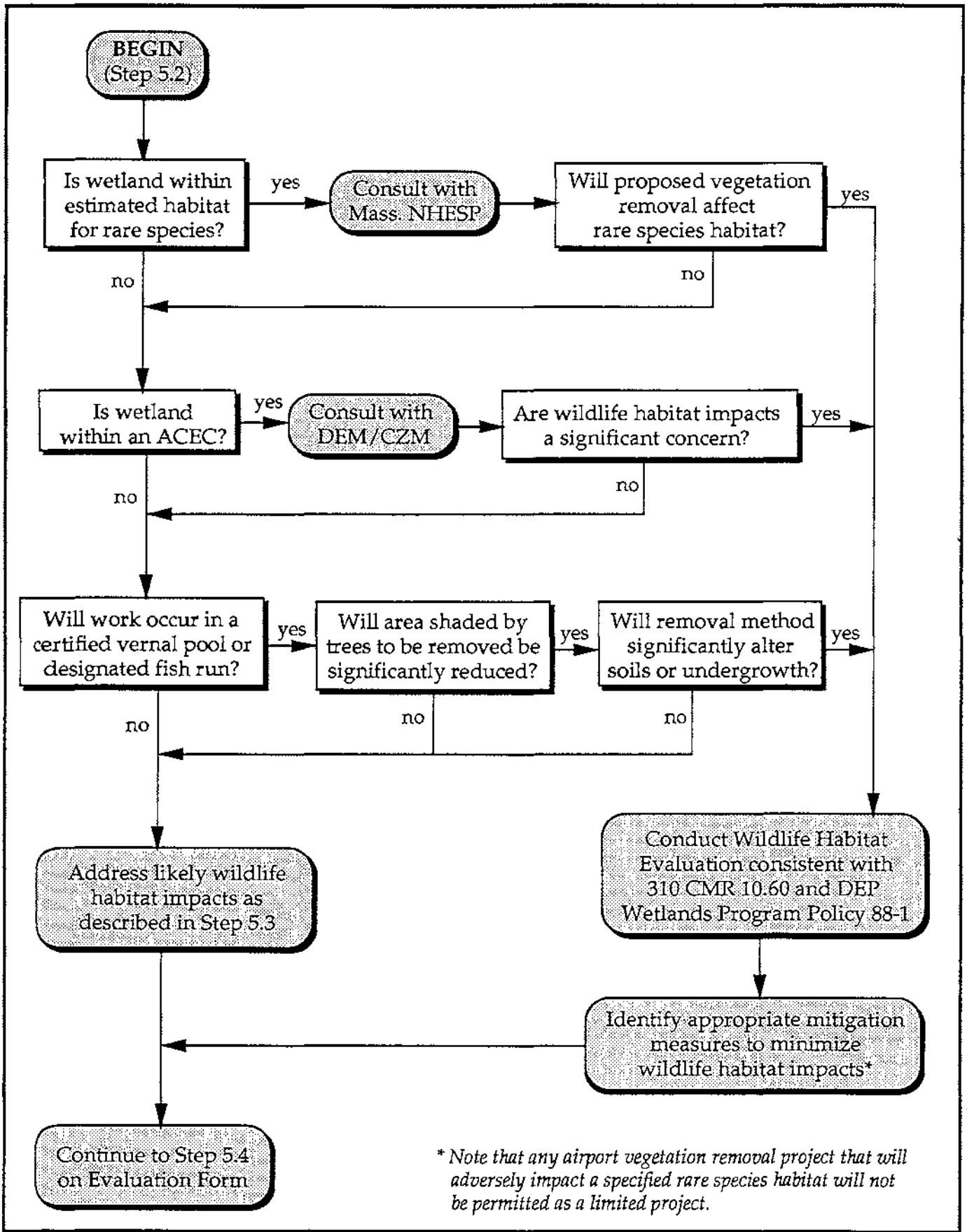
August 31, 1993

FIGURE 6-4
MEASUREMENT OF WETLAND IMPACTS DUE TO TREE REMOVAL



GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

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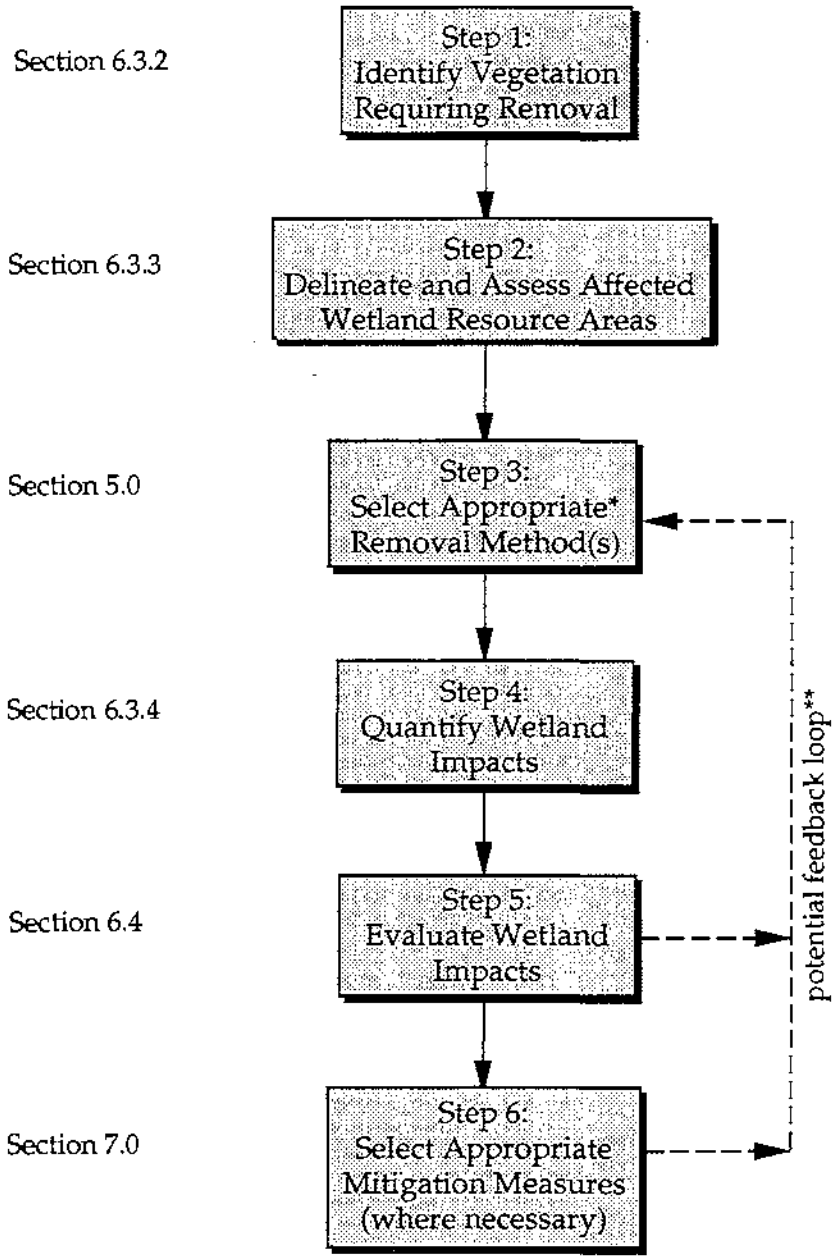
FIGURE 6-5
FLOWCHART FOR ASSESSING IMPACT OF VEGETATION REMOVAL

GEIR text reference:



* Based on wetland, economic, and maintenance considerations.

** If the likely wetland impacts are extensive or the necessary mitigation measures are prohibitively expensive, it may be necessary to reconsider other vegetation removal alternatives.

GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

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FIGURE 6-6
FLOWCHART OF OVERALL IMPACT ASSESSMENT METHODOLOGY

Section Seven

7.0 MITIGATION MEASURES

7.1 INTRODUCTION

The impacts associated with vegetation removal activities can vary significantly depending on the type of removal method and existing site conditions (e.g., vegetative cover, soil type, depth to groundwater, time of year). In many cases, the ultimate nature and extent of the impact will depend largely on the types of mitigation measures used during the removal operation. With selection and use of removal techniques and mitigation measures appropriate for the impact, most impacts will be minimal and short-term.

This section presents an overview of measures to mitigate both short-term and long-term impacts of vegetation removal operations. Mitigation measures for short-term impacts include minimizing construction-related impacts, providing post-construction restoration, and enhancing wetlands that have not been permanently filled. Mitigation measures for long-term impacts, on the other hand, address permanent losses of wetland areas and/or functions. Each measure is discussed in terms of feasibility, effectiveness, and economic implications. The measures discussed are:

Mitigation Measures for Short-Term Impacts:

- Erosion and sedimentation controls
- On-site wetland enhancement
- Wetland restoration
- Herbicide application guidelines
- Spill containment plans

Mitigation Measures for Long-Term Impacts:

- Wetland replication
- Off-site wetland enhancement
- Mitigation banking
- Development restrictions
- Monitoring
- Compensatory flood storage

Figure 7-1 summarizes the impacts likely to be mitigated by the measures discussed in this section. Table 7-1 summarizes the relative cost and applicability of each mitigation measure.

7.2 SHORT-TERM IMPACTS

7.2.1 EROSION AND SEDIMENTATION CONTROLS

The most likely impact of vegetation removal activities is erosion of soils and sediments exposed by various aspects of the operation. Once soils or sediments are exposed, they are prone to erosion which can lead to a variety of secondary impacts on the affected or nearby wetlands. Soil exposure can occur, for example, when trees are uprooted, when soils are disturbed by mechanized equipment used in removing vegetation or transporting removed vegetation, or when sediments are destabilized by loss of vegetation. Kittredge and Parker (1989) estimate that as much as 800 tons of sediment per year can erode from poorly designed access roads, and even greater sediment loads can erode from poorly controlled vegetation clearing activities. For the most part, however, these losses are preventable. It should also be noted that certain soils are more prone to erosion than others. For example, soils that contain a high proportion of silt and very fine sand are the most "erodible" because of their smaller particle size. Soils with a higher percentage of clay or organic matter, on the other hand, are less likely to erode since clay and organic matter tend to bind the soil particles together. In addition to the clay and organic matter content, the "erodability" of soils is influenced by the average particle size and distribution, the soil structure, and the soil permeability (US Department of Agriculture, 1983a).

The publication entitled *Massachusetts Best Management Practices: Timber Harvesting Water Quality Handbook* (Kittredge and Parker, 1989), which is available from the University of Massachusetts Cooperative Extension Service, provides information on erosion control during vegetation removal activities. This publication outlines guidelines and best management practices (BMPs) for timber harvesting, with the basic goals of minimizing soil erosion and preventing sediments from entering streams.

The key to achieving these goals is to divert water off of areas with exposed soils, or at the least to minimize its velocity in these areas, since slower moving water has less erosive energy.

The most effective and/or common erosion and sedimentation control measures are discussed below, and include:

- Siltation barriers
- Runoff diversion measures
- Sediment traps or basins
- Vegetated buffer strips
- Revegetation of disturbed areas
- Construction timing
- Construction specifications

Siltation Barriers

The most common means of controlling sedimentation from a site is to line the downgradient limits of the disturbed areas with siltation barriers, such as staked haybales or siltation fences. These barriers help to remove sediments from and slow the velocity of stormwater runoff. Siltation barriers are most useful for preventing sedimentation in nearby wetland areas; they are considerably less effective in actually preventing erosion. Standard specifications for staked haybales and siltation fences are provided in Appendix E.

The installation of siltation barriers is relatively inexpensive. The cost of a 100-foot row of staked haybales ranges from $150 to $350, and the cost of 100 feet of installed siltation fence ranges from $80 to $150. Siltation barriers should be installed at the down-gradient limit of clearing whenever soil is disturbed during the vegetation removal operation.

Runoff Diversion Measures

Diverting stormwater runoff can either decrease its velocity, thereby decreasing its erosive force, or reroute it to less erosion-prone areas. In some cases, diversions may be used to route stormwater into a sedimentation basin. Diversions may consist of a dike, a ditch, a row of staked haybales, or any combination of these options. (Obviously the soil in any dike or ditch structure must be stabilized so that it does not erode.) The cost for diversions is relatively low, roughly equivalent to the construction costs for building a dike, ditch, or row of haybales (between $300 and $700). They should be installed upslope of disturbed areas to divert stormwater runoff around the exposed soils. Appendix E provides construction details and specifications for runoff diversions.

Sediment Traps or Basins

Sediment traps or basins decrease the runoff velocity and detain the runoff to allow the suspended soil particles to settle. Sediment traps can be constructed in existing drainageways by placing sandbags, haybales, or earthen dikes across the channel. Alternatively, runoff can be diverted, using the measures described above, to a basin constructed of sandbags or haybales. As with the runoff diversion measures, the cost of sediment traps across an existing drainageway is relatively low (roughly $500 to $1,000). The cost of building larger sedimentation basins may be somewhat higher (roughly $2,500 to $10,000). Sediment traps or basins are better used for sedimentation control than for erosion control, as they do not actually hold the soil in place. In areas where significant soil disturbance and erosion is anticipated, construction of sediment traps or basins should be considered. Appendix E provides construction details and specifications for sediment traps and basins.

Vegetative Cover

Vegetative cover is extremely important in erosion control, both in terms of retaining vegetated buffer strips around water bodies and waterways, and in terms of revegetating disturbed areas as quickly as possible. Retaining vegetated buffer strips around water

bodies and waterways can be a natural way to prevent sedimentation into the water. As water from the disturbed areas enters the strip, its velocity is reduced and the sediments suspended in the runoff fall out of solution. The runoff then either infiltrates the soil or passes through to the water body or stream. In addition, vegetative cover shields the soil surface from the impact of falling rain, holds the soil particles in place, and maintains the soil's capacity to absorb water.

Both vegetated buffer strips and revegetating disturbed areas are discussed below.

Vegetated Buffer Strips. The Massachusetts Forest Cutting Practices Act calls for maintaining a 50-foot vegetated strip, known as a filter strip, along the bank of water bodies. In the filter strip:

1) No more than 50 percent of the basal area should be removed at any one time.

2) Soil disturbance should be minimized.

3) No logging equipment should be run over the strip except at a stream crossing or along an access road.

Airport vegetation removal limited projects (AVRLPs) are not subject to these requirements. However, implementation of these guidelines wherever feasible can help to protect the water quality in surface waters near vegetation removal areas. It should be noted that AVRLPs cannot retain a vegetated filter strip if any of the vegetation encroaches on the Protection Zones (PZs).

Retaining vegetated buffer strips may not be feasible in many AVRLPs. Since public safety must be the first and foremost concern, a tree that penetrates a PZ should not be retained just to maintain a vegetated filter strip. However, in some cases it may be possible to retain the undergrowth (e.g., shrubs and herbaceous vegetation) within a 50-foot strip along surface water bodies and waterways. The cost of maintaining a vegetated strip is minimal, related mostly to the increased labor effort associated with selective clearing. It should be noted that the airport may not own or control sufficient land outside of the PZ to provide for vegetated buffer strips.

Revegetation of Disturbed Areas. Prompt revegetation of areas with exposed soils is critical to minimizing erosion and sedimentation. Grasses and legumes are the most commonly used plant materials for reestablishing vegetation in an area, as they are relatively inexpensive and easy to grow (US Department of Agriculture, 1983a). Species that are commonly used for establishing vegetative cover in wetland areas include:

meadow foxtail *(Alopercurus pratensis)*
"Niagara" big bluestem *(Andropogon gerardii)*
perrenial ryegrass *(Lolium perenne)*
rough bluegrass *(Poa trivialis)*
redtop *(Agrostis alba)*
reed canary grass *(Phalaris arundinacea)*
soft rush *(Juncus effusus)*
soft-stemmed bulrush *(Scirpus validus)*
switchgrass *(Panicum virginatum)*
wool grass *(Scirpus cyperinus)*

Four species should be avoided because of their tendency to dominate restoration areas: common reed *(Phragmites australis)*, purple loostrife *(Lythrum salicaria)*, and broad-leaved and narrow-leaved cattail *(Typha latifolia and T. angustifolia)*.

Following is a list of species that are commonly used for establishing vegetative cover in upland areas (including wetland buffer zones), and the recommended seeding dates for each type:

Species	Recommended Seeding Dates
Annual ryegrass *(Lolium multiflorum)*	March 1 June 15; Aug. 15 Sept. 15
Sudangrass *(Sorghum vulgare)*	May 15 July 15
Millet *(Panicum miliaceum)*	June 1 Aug. 1

Winter rye *(Secale cereale)*	Aug. 15 Oct. 15
Winter wheat *(Agropyron spp.)*	Aug. 15 Oct. 15
Oats *(Avena sativa)*	May 1 Sept 15
Buckwheat *(Fagopyrum esculentum)*	May 1 June 15

(US Department of Agriculture, 1983b)

These species and many more are suitable for establishing vegetative cover, and are available from a variety of commercial vendors. In most cases, a disturbed area should be replanted using seed mixtures that include species with varying tolerances to environmental conditions. For example, red top, which germinates very quickly, could be planted with reed canary grass, which tolerates a wide range of hydrological conditions.

Grasses can be planted by laying sod, hydroseeding, or mechanical or hand broadcasting or drilling. For large areas that have been clear cut, hydroseeding or mechanical seeding would be the most cost-effective planting method. However, since they involve the use of heavy equipment, these methods may also cause the greatest wetland impacts. Hydroseeding should be considered in areas where soils are relatively stable, where the area is initially cleared using heavy equipment, or where the equipment can be operated from an existing access road.

Suitable soil, proper grading, and adequate water, fertilizer, and lime are all required with each of these methods. In addition, temporary erosion control measures should be installed to protect the exposed surfaces before the seeds germinate. Depending on the site, these measures may include straw or woodchip mulch, or commercially available erosion control fiber blankets. Erosion control mats with seeds are also commercially available. (When vegetation removal occurs in the winter, this would hold the seeds in place until spring.) In areas with steep slopes, the mulch should be securely anchored with wooden stakes.

The actual species selected for planting in a given area will depend on the growing conditions (e.g., wetness, degree of shading), and on the species indigenous to the area. Where possible, it is generally advisable to replant indigenous species. In addition, the overall goals for an area should be considered when selecting revegetation species. For example, if the primary goal is to reestablish vegetation as quickly as possible, then fast sprouting species should be selected. If maintaining habitat value is also a consideration, then the combined goals of erosion control and habitat enhancement should be addressed by selecting species with a high wildlife food and habitat value that can be rapidly established. In most cases, this will mean selecting several different species.

The cost of revegetating an area can vary widely depending on the type of vegetation planted and the method used. In general, replanting an area by seed is relatively inexpensive, ranging from $600 to $1,000 per acre. As discussed in the wetland enhancement section below, costs increase substantially when live plant stocks, such as shrubs, are planted.

Construction Timing

The timing of vegetation removal operations is significant in controlling erosion, as well as in minimizing direct impacts to vegetation, soils and wildlife. For example, scheduling removal activities so that the area and the length of time of soil exposure are minimized can significantly reduce soil erosion and sedimentation. In addition, frozen ground or dry, stable soils are much less prone to erosion. Thus, vegetation removal and related activities in the winter months, or at least after a period of dry weather in the warmer months, can significantly reduce erosion (US Department of Agriculture, 1983). In fact, the Massachusetts Forest Cutting Practices Act stipulates that trees in wetlands should only be harvested when the ground is frozen, dry, or otherwise stable enough to support any equipment that is used. It should be noted, however, that wetland sediments often do not freeze sufficiently to support heavy equipment. In these cases, timber mats should be used to support the construction equipment.

Construction timing can also be significant in terms of minimizing impacts to remaining vegetation, wetland hydrology, and wildlife. Although there are some advantages to conducting vegetation removal activities in the summer months, overall it is recommended that the work be conducted in the winter. In the winter months, much of the wildlife will be dormant or will have migrated, minimizing direct and indirect impacts. In addition, the remaining vegetation will be dead or dormant and therefore will be less susceptible to damage by the vegetation removal activities. Finally, as noted above, the soils are more likely to be frozen or stable in the winter so that they will be less prone to compaction or rutting. Aside from the season of construction, construction phasing (e.g., conducting vegetation removal activities in phases over smaller areas rather than over the entire area at once) can also minimize overall wetland impacts.

Wherever possible, AVRLPs, particularly those that involve use of heavy equipment, should either be conducted in the winter months or at least after extended periods of dry weather in the warmer months. Any cost incurred in relation to construction timing would be indirect, related mostly to the loss in construction flexibility.

Construction Specifications

One way to ensure that vegetation removal activities occur in a manner that minimizes erosion and sedimentation is to follow relatively simple best management practices (BMPs). BMPs for stream crossings and construction of access roads are particularly important since these are two areas where erosion is likely to occur. Kittredge and Parker (1989) present construction BMPs for erosion control measures related to skid trails (e.g., the road used repeatedly by vegetation removal equipment), access roads, stockpile areas, stream crossings, filter strips, buffer strips, and seeding of disturbed areas. These BMPs, which are consistent with the Massachusetts Forest Cutting Practices Act (M.G.L. Ch. 132), include the following:

- Avoid driving vegetation removal equipment up steep slopes (e.g., 10 to 20 percent or greater slopes). Try to go up less steep slopes and come down the steeper slopes.

- On constructed access roads, avoid grades greater than 5 percent. Construct roadway so that the middle of the road is higher than the sides to direct water off the road surfaces and into ditches along the road.

- If areas of ponded water develop along an equipment trail, do not offset vehicular traffic to avoid the area. This would only increase the size of the wet spot. Rather, place several tree tops or branches into the ponded area and continue to use the trail.

- Where possible, stockpile cut vegetation in non-wetland areas with gentle slopes so that water will not pond or collect.

- Small streams should be crossed at right angles (i.e., perpendicular) to the direction of flow. This minimizes the chance that the direction of the stream will change when the water flows down a tire rut. Also, where possible, streams should be crossed at areas with gentle banks and firm bottom sediments.

- Larger streams and streams with soft bottoms and steep banks should be crossed using skidder bridges (i.e., small bridges constructed of logs and wooden planks). Skidder bridges offer the added advantage of keeping gas and oil from washing off the equipment as it passes through the stream.

It should be noted that these BMPs address work in both wetland and non-wetland areas. A copy of the Timber Harvesting Water Quality Handbook which describes BMPs related to vegetation removal is presented in Appendix E. In addition, Kittredge and Parker (1989) present several general standards for operation in wetland areas. These are:

1. No more than 50 percent of the basal area should be cut at any one time.

2. A waiting period of three years should elapse before an area is cut again (although ongoing vegetation management activities may be conducted in these areas).

3. Wetlands should be harvested or crossed only when the ground is frozen, dry, or otherwise stable enough to support the equipment used.

To the degree that these best management measures do not interfere with airport operations or FAA requirements for tree removal, they should be implemented. The cost of implementing these measures is related primarily to a decrease in work efficiency rather than to direct equipment or material costs.

7.2.2 WETLAND RESTORATION

Any wetlands that are temporarily disturbed as a result of AVRLPs should be restored so that they can continue to function as a wetland. If the original wetland was forested, it is not practical to replant trees or shrubs similar to those removed which would ultimately grow into the PZs. However, disturbed wetlands should be revegetated with some type of wetland vegetation that will allow them to continue to function as a wetland. In many cases, this will involve the planting of herbaceous wetland plants (e.g. by hydroseeding or seeds in erosion control mats) such as those noted in Section 7.2.1. In some cases where the soil has been disturbed, regrading disturbed soils to the original grade will be necessary prior to revegetating the area. If the hydrology in the area was disturbed, it should be restored as well.

The cost of wetland restoration to an emergent wetland (e.g., vegetation by herbaceous plants) ranges from about $600 to $1,000 per acre, as discussed in the revegetation subsection above. The cost of restoring a scrub-shrub wetland, which varies depending on the number, types, and ages of the shrubs planted, can be significantly higher. Costs for restoring a shrub wetland, range from $14,000 to $20,000 per acre at a planting density of about 1 shrub per 100 square feet.

7.2.3 ON-SITE WETLAND ENHANCEMENT

In some cases, it may be desirable to provide additional enhancement of a disturbed wetland so that its value more closely approximates its value as a forested wetland. In the context of mitigation for AVRLPs, on-site wetland enhancement may involve planting shrubs in the disturbed area. This mitigation measure should only be consid-

ered when economically feasible, when the maximum shrub height will not encroach on the PZ, and when either or both of the following conditions occur:

1) The vegetation removal technique involves clear cutting broad areas, leaving no shrubs in the area.

2) The vegetation removal technique is limited to selected trees, but there is no natural shrub community in the area.

If neither of these situations exists, and a shrub layer will remain after the necessary vegetation removal activities are completed, then planting of shrubs to enhance the wetland should not be necessary.

With respect to temporary disturbances of a wetland's function, replanting an area with shrubs can:

- Provide food and habitat for wildlife.
- Provide shade to moderate water and soil temperatures and protect plants, fish, and wildlife from direct exposure to sunlight.
- Stabilize soils in wetlands and along banks, helping to minimize erosion and sedimentation into nearby wetlands and surface waters.

However, it should be noted that the planting of any species that attracts birds to an airport is counter-productive to the improvement in safety that will be achieved as a result of the AVRLPs.

Wetland plants identified by Lorenz *et. al.* (1989) for their value to provide food and cover for wildlife are listed and briefly described below.

American cranberrybush ***(Viburnum trilobum)*** This species provides winter food for grouse, songbirds, and squirrels. It grows to a height of about 6 to 7 feet, producing fruit within 4 to 5 years of planting. The fruit remains late into the winter. American cranberrybush, also called highbush cranberry, should be planted when the seedlings are around 2 years old. It is tolerant of both shade and poorly drained soils.

American elderberry ***(Sambucus canadensis)*** This shrub grows to heights of about 12 feet and provides food for many species of songbirds, squirrels, and deer. It is generally planted in early spring with bareroot or container-grown seedlings (e.g., 1 to 2 years old), and it produces berries within 4 to 5 years of planting.

Red osier dogwood ***(Cornus stolonifera)*** **or silky dogwood** ***(C. amomum)*** Dogwood provides food and cover for gamebirds, songbirds, rabbits, raccoon, and other wildlife. These are also good species for stabilizing the lower slopes of banks. These species grow to a maximum height of 8 to 12 feet, and they bear fruit within 3 to 5 years after planting. Container grown or bareroot seedlings should be planted when they are 1 to 2 years old.

Niagara big bluestem ***(Andropogon gerardii)*** This grass, which provides cover for wildlife and is an excellent erosion control plant, can tolerate periodic flooding as well as dry conditions. The planted seeds are slow to germinate, but once established (generally 2 to 3 years) it provides excellent cover. It grows in a variety of soil types, but has poor shade tolerance.

Switchgrass ***(Panicum virginatum)*** Switchgrass provides food for songbirds, and food and cover for upland ground birds and small mammals. Its stiff stems persist throughout the winter, providing cover throughout the year. It grows in a wide variety of soil types and conditions, and is generally well established within 1 to 2 years of seed planting .

Willow ***(Salix spp.)*** There are a variety of species of low growing willows whose twigs and buds provide food for grouse, rabbits, beaver, muscrat, and other wildlife. Some of these species reach maximum heights of more than 40 feet, while others reach maximum heights as low as 6 to 10 feet (e.g., purple osier willow, *S. purpurea* ; bankers dwarf willow, *S. cotteti*). These species tend to form thick, dense covers and provide excellent bank stabilization. They can be easily established by planting rooted or unrooted cuttings.

Winterberry ***(Ilex verticillata)*** Winterberry provides food for songbirds throughout the year since its bright red berries persist throughout the winter months. It grows, under a wide variety of conditions, to reach heights up to 10 feet. This shrub is best established in the early spring or the late fall by planting bare-root or container-grown seedlings, and it generally bears fruit after 4 to 5 years.

These species, as well as most other wetland shrub species, will also effectively provide shade and stabilize soils. It should be noted that this list is only intended to provide an overview of potential species for wetland enhancement. If on-site wetland enhancement is selected as a mitigation measure for a given airport, appropriate species should

be selected based on site-specific conditions and constraints using current available literature.

Other wetland plants that are noted by Merrow and Myers (1991) for their moderate to high wildlife value include the following (with estimated maximum heights in parentheses):

- Arrowwood *(Viburnum recognitum)* (3 to 10 feet)
- Buttonbush *(Cephalanthus occidentalis)* (3 to 10 feet)
- Highbush blueberry *(Vaccinium canadensis)* (3 to 13 feet)
- Shadbush *(Amerlanchier spp.)* (15 to 20 feet)
- Softstem bulrush *(Scirpus validus)* (6 to 10 feet)
- Spicebush *(Lindera benzion)* (12 to 25 feet)

The shrub(s) selected should not only provide wildlife food and habitat value, but should have a maximum height that will not penetrate the PZs where they are planted. Thus, the base elevation in the wetland and the distance from the runway end must be considered, as they will determine the maximum shrub height allowed.

The cost of wetland enhancement can vary substantially depending on the species, ages, and numbers of species and shrubs that are planted. In general, the cost of wetland enhancement can be moderate to high. For example, planting 50, 2- to 3-foot-tall highbush blueberry and 400 other shrubs across an acre of restored emergent wetland is likely to cost approximately $17,000. Thus, the cost of restoring and enhancing a disturbed acre of wetland would cost between $14,000 and $20,000.

7.2.4 HERBICIDE APPLICATION GUIDELINES

If herbicides will be used to control vegetative growth, it is critical that they be handled and applied properly to minimize the possibility of environmental contamination. The herbicide application procedures listed below are recommended, based on Department of Food and Agriculture (DFA) regulations and guidelines to minimize impacts to plants and wildlife, as well as to the person applying the herbicide.

Recommended general herbicide application guidelines are as follows:

1. Read the label carefully to familiarize yourself with the herbicide that will be used. The label provides information on application, dose, methods, toxicity (e.g., to plants, wildlife, and humans), and registered uses approved by the US Environmental Protection Agency. An herbicide should not be used for any applications that are not specified on the label. Any non-labelled use is a misuse and represents an improper application of the herbicide.

2. Use common sense to avoid skin exposure to the herbicide during application -- wear gloves, long-sleeved shirts, eye protection, and long pants. Personal protection requirements are listed on the label of the herbicide. Avoid contact with skin or clothing. Wash thoroughly after using herbicides and do not eat or smoke during application.

3. Exercise caution and common sense when mixing or handling herbicides or filling their containers for application. Do not mix or fill in areas within 100 feet of a sensitive area. "Sensitive areas" are defined in 333 CMR 11.02 as any areas including but not limited to the following, in which public health, environmental or agricultural concerns warrant special protection to further minimize risks of unreasonable adverse effects:

   a) within the primary recharge area of a public drinking water supply well;
   b) within 400 feet of any surface water used as a public water supply;
   c) within 100 feet of any identified private drinking water supply well;
   d) within 100 feet of any standing or flowing water;
   e) within 100 feet of any wetland;
   f) within 100 feet of any agricultural or inhabited area.

4. Mix and apply herbicides in the specified proportions. This will ensure the proper desired effects, minimize adverse impacts, and be most cost-effective. Mix and use only the amount needed.

5. For stem injections or frill application, use a small squirt bottle or oil can to apply the herbicide to the desired target. Commercial tree injection applicators are available that inject the herbicide into the stem. Read the individual label for a detailed description of the specific application method.

6. For cut stump application, use a squirt bottle, oil can, or low-pressure backpack sprayer to apply the herbicide to recently cut stump surfaces. Use a dye to mark stumps that have already been treated. Stump treatments must be applied immediately after the tree is cut, as drying of the stump will inhibit the movement of the herbicide into the roots for effective action. For stump applications, only the cambium areas (i.e., the outermost 2 or 3 inches

of the stump surface) should be treated. Read the individual label for a detailed description of the specific application method.

7. For basal application, each target stem should receive a complete encircling treatment of the lower 12 to 24 inches of the stem from the ground line (including the root collar) up. Such basal stem treatments require use of an oil carrier and oil-soluble herbicide. Use the appropriate herbicide. Do not apply basal herbicide if the stem is saturated by recent rain. A backpack sprayer with a nozzle or wand applicator may be used to apply the herbicide directly to the stem surface. Read the individual label for a detailed description of the specific application method.

8. For foliar application, use a backpack sprayer. Apply the herbicide directly to the target foliar surfaces, and avoid drift of the herbicide as much as possible. Read the label for a detailed description of the specific application method.

9. In all cases of herbicide application, make sure that the herbicide goes directly on the target vegetation in the manner prescribed by the label. Follow application rates specified on the label.

10. Follow storage and disposal guidelines on the label. Partially used herbicide containers should be stored in a cool, dry, locked building in their original containers. Clean equipment as specified on the label. Wastewater from equipment should be disposed of properly.

11. The perimeter of any sensitive areas which are not readily identifiable shall be appropriately marked prior to any herbicide applications.

12. No foliar application of herbicides shall be used to control vegetation greater than 12 ft. in height except for side trimming.

13. No herbicide shall be applied when the wind velocity is such that there is a high propensity to drift off target and/or during measurable precipitation.

14. Herbicides shall not be applied within the following areas:

    a) within 400 feet of a public groundwater supply well;
    b) within 100 feet of a public surface water supply; or
    c) within 50 feet of any private drinking water supply.

15. Within the following areas, herbicides shall be applied no more than once every two years using selective low pressure foliar techniques or stem applications:

    a) within the primary recharge area of a public groundwater supply well;
    b) between 100 feet and 400 feet of a public surface water supply; or

c) between 50 feet and 100 feet of a private drinking water supply.

16. No foliar herbicide shall be applied within 100 feet of any inhabited area or any agricultural area during the growing season unless at least 12 months elapses between applications and selective low pressure foliar techniques or stem application is conducted.

The following guidelines shall be followed for herbicide application in or within 10 feet of a wetland:

1. Herbicides should be applied by basal, cut stump or low volume foliar methods. Foliar applications must include the use of drift reduction agents. Foliar applications may only be conducted in situations where basal and cut stump treatments are not appropriate based on the size of the vegetation and potential for off-target drift. Foliar applications must not result in the off-target drift to non-target species.

2. Herbicides should not be applied to conifer species (e.g., pine, spruce, fir, cedar or hemlock).

3. Carriers for herbicides should not contain any of the following petroleum based products: jet fuel, kerosene or fuel oil. Carriers should be approved by DFA and DEP through 333 CMR 11.04(1)(d).

5. Herbicides may only be applied by hand operated equipment containing no more than 5 gallons diluent.

6. No herbicides shall be applied such that they drift to any area within 10 feet of flowing or standing water.

It should be noted that a pesticide applicator's license is required from DFA under the Right-of-Way regulations to apply any herbicide, other than those available "over the counter." Certification for this license may be private (for use on the applicator's property) or commercial. Acquiring the proper certification involves reviewing manuals on proper application procedures and passing an exam. Any contractor hired to apply herbicides will have a commercial certification.

The cost of adhering to the recommended herbicide application guidelines is relatively low. In fact, any cost is due solely to a decrease in work efficiency that may result from following specific herbicide application and handling requirements. Any vegetation removal activities that use herbicides should comply with these guidelines.

7.2.5 SPILL CONTAINMENT PLAN

If fuel-powered equipment or herbicides will be used for AVRLPs, a spill containment plan should be prepared to provide a protocol for prompt and proper containment and mitigation of any spills. Recommended components of a spill containment plan include, but are not limited to, the following:

- ***Materials list*** a list of materials that should be present on the site in case a spill occurs. These materials generally include sheets of plywood and polyethylene plastic, haybales, chemical absorbent material (e.g., Speedy-Dry" or standard kitty litter), plastic pails, and dry barrels with lids.

- ***Spill prevention procedures*** a description of procedures related to arrangement of the spill containment materials, fuel storage, and fuel line and equipment monitoring.

- ***Responsive actions and procedures*** a description of procedures related to spill containment, on-site temporary storage of spilled fuels and contaminated absorbent materials, responsive action procedures, spill notification procedures, and off-site disposal of contained materials and spills.

- ***Removal of materials*** guidelines regarding the length of time that containment materials should remain on the site and their ultimate removal.

A sample spill containment plan is presented in Attachment F to the model NOI in Appendix D.

The cost of preparing a containment plan is minimal, particularly if the example plan presented in Appendix D is used as a prototype. In addition, most of the materials required to be on-site as part of the spill containment program are relatively low cost and can be available for future vegetation removal activities as well.

7.3 LONG-TERM IMPACTS

7.3.1 WETLAND REPLICATION

Overview

AVRLPs are intended to be performed in a manner which will not result in a loss of wetland resources. However, in those cases where long-term wetland impacts occur, it may be appropriate to mitigate this loss by creating a wetland of comparable size and function at a nearby upland location. This mitigation measure, known as wetland replication or wetland creation, is required for any wetland loss associated with a non-limited project. Since airport vegetation removal projects will be considered limited projects under the proposed regulatory revision, wetland replication is not inherently required to mitigate any losses in wetland function or value. However, it should be noted that DEP generally strives to replicate lost wetland resources wherever practical.

Wetland Replication Guidelines

Extensive literature is available on the logistics of designing and implementing wetland creation projects. Most of this literature concludes, at some point or another, that the key to successful establishment of created wetlands lies in restoring, establishing or developing and managing the appropriate hydrology (Hammer, 1992). The other key components to any created wetland are establishing and maintaining appropriate vegetation and soil types and conditions.

Because wetland replication is not expected to be required for most AVRLPs (since permanent wetland losses are not expected to occur), and because of the wealth of technical information available on wetland creation, this document does not attempt to provide specific guidance on designing wetland replication areas. Rather, the reader is referred to the following publications:

- Creating Freshwater Wetlands (Hammer, 1992)

- A Guide to Wetland Functional Design (Marble, 1992)
- Wetland Creation and Restoration (Kusler and Kentula, 1990)

For AVRLPs where replication is proposed, the replication design may consider the replication requirements stipulated in 310 CMR 10.55 for bordering vegetated wetlands. These requirements, which do not have to be met for limited projects such as AVRLPs, are:

- The surface area of the replacement wetland should be the same as that of the lost wetland.
- The groundwater and surface elevations must be approximately the same as in the lost area.
- The horizontal configuration and location of the replacement area in relation to the bank should be similar to that of the lost area.
- There must be an unrestricted hydraulic connection between the created wetland and the surface water that borders the lost wetland.
- The replication area should be in the same general area of the surface water as the lost wetland.
- The created wetland must be revegetated with at least 75% cover with indigenous wetland plant species within two growing seasons of the planting.
- The replication area must be consistent with the performance standards for all associated wetland resource areas.

In addition, specific guidelines are provided in 310 CMR 10.60 for replicating the wildlife habitat value of other wetland resource areas (e.g., bank, land under water bodies and waterways, land subject to flooding, and vernal pools) that are altered. These requirements (or goals, in the case of a limited project) that may be considered in the design include the following:

- The surface area (or length, in the case of bank) of the replacement resource area should be the same as that of the lost resource.
- The groundwater elevations should be approximately the same as in the lost area.

- The replication area should be in the same general area as the lost area. (Banks and land under water must be associated with the same water body; land subject to flooding must be located at the same distance from the water body; vernal pools must be in close proximity to the lost pool.)

- The plant community composition and structure, topography, hydrologic regime and water quality, and soil structure and composition, should be similar to that of the lost area to the extent necessary to maintain wildlife habitat functions.

- The replication area(s) must be consistent with the performance standards for all associated wetland resource areas.

Cost

The cost of wetland replication can vary widely depending on the suitability of and access to the site, the extent to which hydrological and soil conditions must be altered, and the types of vegetation selected. In addition to the actual cost of construction, other expenses to consider include the initial site planning and design, permitting, operation and maintenance, and post-construction monitoring. Clearly, wetland replication can be quite expensive. The cost to construct a wetland in an upland area ranges widely. Documented costs range from $2,000 to $60,000 per acre.

Effectiveness of Wetland Replication Efforts in Massachusetts

Since the 1983 revisions to the Massachusetts Wetlands Protection Regulations, it is estimated that more than 1,000 wetlands creation projects have been attempted, averaging 3,500 square feet in size (Doberteen, 1989). Despite the frequency with which wetland replication projects are proposed throughout Massachusetts and other states, though, there is significant controversy in the scientific community regarding whether created wetlands adequately replace the functions and values of the lost wetlands. The lack of follow-up data on most replication projects makes it difficult to fully assess the performance and success of wetland replication efforts in Massachusetts. Three notable studies that have evaluated the success of such efforts in Massachusetts and New England are:

- Evaluation of Freshwater Wetland Replacement Projects in Massachusetts (US Army Corps of Engineers, 1989)
- Evaluation of Created Freshwater Wetlands in Massachusetts (Jarman *et. al.*, 1991)
- Wetland Mitigation Effectiveness (Reimold and Cobler, 1986)

The results and conclusions of these studies are summarized herein.

In 1989, the US Army Corps of Engineers (ACOE) evaluated 100 wetland replication projects in 31 Massachusetts towns. (Six of the wetland replication areas were not completed at the time of the study). The replacement wetlands were assessed based on the general criteria for success outlined in 310 CMR 10.55. Thus, for the purposes of this study, a wetland replication project was considered successful if it had more than 75% cover by indigenous wetland species and its surface area equalled or exceeded that of the lost wetland. It should be noted that this study did not address whether the functional values of the wetlands were successfully restored (US Army Corps of Engineers, 1989).

Based on these evaluation criteria, 57% of the 94 completed wetland replication areas were rated as successful or conditionally successful and 43% were rated as unsuccessful and required additional site work. All of the unsuccessful wetlands appeared to fail because of inadequate site preparation, mostly related to either leaving the ground elevations too high or too low (US Army Corps of Engineers, 1989).

ACOE concluded that given proper grades and soils, successful herbaceous wetlands are almost certain to develop. One reason for this success is related to the practice of placing 6 to 8 inches of organic soil from the original wetland in the replacement wetland. This soil typically contains seeds and roots of the indigenous plant species. Although the study did not provide clear evidence that forested or scrub-shrub wetlands had been successfully restored, red maple seedlings were noted in several replication areas indicating that eventually a scrub-shrub and then a forested wetland may develop. They also noted that survival of transplanted shrubs was generally poor,

while survival of nursery stock shrubs was considerably higher (US Army Corps of Engineers, 1989).

Jarman *et. al.* (1991) evaluated six created wetlands in eastern Massachusetts, all of which were considered successful under the 310 CMR 10.55 guidelines within 1 to 2 years after planting. They found that herbaceous plant communities in all cases had been successfully established, while replication of tree and shrub communities had only been marginally successful. The key to successful restorations, they concluded, is an aggressive planting regime that uses both transplanted trees, shrubs, and herbs, and supplemental nursery stock where necessary. Consistent with the conclusions of the ACOE study, Jarman *et. al.* found high survival rates of nursery stock shrubs, and lower survival rates for transplanted shrubs and saplings. They also noted that survival rates for transplanted shrubs and saplings varied dramatically, depending on both species type and transplanting technique. For example, survival rates for northern arrowwood *(Viburnum recognitum)* and European buckthorn *(Rhamnus frangula)* were very high, while survival rates for red maple were generally low, unless the transplants were root pruned several months prior to planting. In addition, the authors felt that although hydric soil conditions had not developed in most of the wetlands evaluated at the time of the initial survey, they would develop over time. This hypothesis was supported by finding developing hydric soil conditions at the 2.5 year old wetland sites.

Based on a study of five created freshwater wetlands and various literature sources, Reimold and Cobler (1986) concluded that mitigation effectiveness is strongly correlated with the suitability of the selected mitigation site and the specificity and ecological accuracy of the wetland design and permit conditions. As a result of their study, they identified the following recommendations for successful wetland replications:

1. Select a suitable site that is isolated from human disturbance and in close proximity, to the extent possible, to the original wetland.

2. Excavate the wetland to an elevation that is appropriate for the wetland species that will be planted. This elevation should be determined based on a

detailed hydrologic analysis, and on data compiled from scientific literature regarding hydrology requirements of the selected species.

3. Avoid having point source discharges drain into the newly created wetland. While such pollution sources merely stress existing, established wetland systems, they can doom a newly created wetland to failure.

4. Replication plans should specify not only plant species, but also vegetation planting season, planting scheme, and propagule source. Where possible, plants from the original wetland should be carefully stockpiled and replanted in the created wetland.

5. Soils from the original wetland should be carefully stockpiled in an upland area according to original soils horizon, wherever possible, and used in the replacement wetland. Soil amendments (e.g., fertilizers and/or lime) should be applied to the soils in the created wetland, particularly if the original soils are not reused.

6. Gentle slopes of 1:5 to 1:15 (vertical:horizontal) should be used. Wetlands with steeper slopes of 3:1 and 5:1 tend to suffer from limited wetland vegetation habitat and increased likelihood of erosion.

7. Establish a monitoring program for the created wetland. At a minimum, this program should monitor vegetative species composition and density and hydrologic conditions. The monitoring program should be conducted for 2 to 5 years.

Incorporating these recommendations into a wetland mitigation plan with design specifications for construction and maintenance should increase the likelihood of successful mitigation, regardless of the complexity and size of the project (Reimold and Cobler, 1986).

These studies indicate that properly planned wetland replication projects in Massachusetts have been successful, at least in terms of establishing and supporting wetland vegetation. Additional investigations at older replication areas would be necessary to determine whether the replacement areas fully perform the functions and values of the original wetland areas.

7.3.2 OFF-SITE WETLAND ENHANCEMENT

Off-site wetland enhancement can be considered as mitigation for permanent wetland alterations or losses, particularly when on-site mitigation is not feasible. In terms of AVRLPs, this mitigation measure would only be appropriate when the conversion of a forested wetland to an emergent or scrub-shrub wetland will significantly impact a unique habitat or vegetation community. (The likelihood of this type of significant impact needs to be assessed on a case-by-case basis.) It is infeasible to replant trees in the cleared wetlands because they would ultimately only need to be removed again in the future. In those cases, site-specific solutions should be designed and implemented.

The need for and benefits of off-site wetland enhancement must be assessed on a case-by-case basis. In general, though, it should be considered as a mitigation measure for AVRLPs only in extenuating circumstances.

The cost of off-site wetland enhancement would vary depending on factors such as the type of enhancement measures that are implemented and the area of wetland that is enhanced. In most cases, it will be a costly mitigation alternative. As an example, planting 100 trees to convert an acre of scrub-shrub wetland to provide forested habitat could cost $9,000 to $15,000.

7.3.3 MITIGATION BANKING

"Mitigation banking" is a term generally applied to an off-site wetland creation, restoration, or enhancement project that is undertaken not only to compensate for wetland impacts from a particular project, but also to compensate for future wetland impacts. The credit for the mitigation efforts beyond those required for the particular project are essentially "banked" for use as mitigation for future projects. The idea is to provide compensation in advance for wetlands habitat losses caused by future development projects.

Wetland mitigation banking has become a highly controversial issue, and there are strong arguments both for and against its use. Arguments in favor of mitigation banking include the following, as highlighted by Kusler (1992):

- Mitigation banks encourage creation of large wetland areas, which generally have a higher success rate and lower cost per acre than smaller ones. One reason for their higher success rate is that larger replication efforts tend to be better planned and more closely monitored and cared for upon completion.

- Conducting large-scale wetland replication projects at prime locations (e.g., hydrologically and ecologically) can allow for optimization of specific wetland functions and values.

- Using banked mitigation credits ensures that wetland losses will be successfully mitigated because the mitigation areas are already established before the wetlands are impacted. This avoids the uncertainty of wetland replication projects associated with creating the mitigation area after the wetland losses have occurred.

Disadvantages to mitigation banking identified by Kusler (1992) include the following:

- Many wetland functions are site-specific and cannot be replaced at an off-site location.

- The value of one large wetland creation area may not be equal to the value of numerous, smaller wetland areas.

- Most wetlands created through mitigation banking programs are marshes or scrub-shrub wetlands because they tend to be less costly to build. Thus, banked mitigation credits may not adequately replace other wetland habitats (e.g., forested wetlands).

One alternative to mitigation banks is "joint projects," where a group of project proponents agree to implement a joint mitigation project in order to mitigate specific wetland impacts at multiple project sites (Kusler, 1992).

Several states have mitigation banking programs, including North Carolina, Virginia, and Mississippi (Howorth, 1991). Massachusetts does not currently have a formal mitigation banking program, in part because the mitigation banking concept is not

consistent with the replication requirements in 310 CMR 10.55. Specifically, these regulations require replication areas to be constructed in the same general vicinity and in hydraulic connection with the lost wetland. This situation could be further complicated by the fact that project review occurs at the local level, yet the impact mitigation in a mitigation banking program would probably occur in a separate municipality.

The cost of wetland creation or other mitigation through a mitigation banking program varies, but in all cases it will be lower than if the same impacts had been mitigated on a project-specific basis. For this reason, mitigation banking in the context of "joint projects" may be considered for AVRLPs that require wetland creation.

The mitigation banking concept has also been proposed by various state agencies to compensate for the statewide loss of trees as a result of airport vegetation removal projects. Since this mitigation measure would relate to all airport vegetation removal projects, not just AVRLPs in wetlands, the Massachusetts Aeronautics Commission (MAC) is considering this issue outside of the context of this Generic Environmental Impact Report (GEIR). For AVRLPs, it is recommended that each project proponent consider working with the local conservation commission to plant trees within the affected community (outside the PZs) in order to compensate for the tree loss. Alternatively, the project proponent may consider involvement with an organization such as the Massachusetts ReLeaf Program to mitigate for the proposed tree loss.

7.3.4 DEVELOPMENT RESTRICTIONS

One means of indirectly compensating for losses in wetland functions and values involves placing development restrictions on a portion of the remaining wetlands so as to protect them from future impacts. While this does not directly compensate for wetland losses, it can achieve overall wetland protection goals. Development restrictions can be valid for a specified period of time or in perpetuity, and can be in the form of a restriction, easement, covenant, or condition in any deed, will, or other legally executed document. Four types of development restrictions outlined in the Massachu-

setts Conservation Restriction Laws (G.L. Ch. 184, §3133; Ch. 40, §5(70); Ch. 44 §7(3)) are summarized below (Massachusetts Association of Conservation Commissions, 1991).

Conservation Restriction A conservation restriction is a development restriction that seeks to retain land or water areas predominantly in their natural, scenic, or open condition, or in agricultural or farming use. Certain activities, such as dumping, building construction, removal of trees, and excavation, are generally restricted in these areas.

Preservation Restriction This type of development restriction relates to preservation of a structure or site that is historically significant for its architecture or archaeology. Sites having this designation are restricted in terms of changes in the appearance or condition, alterations in the features of any structure, or other uses that are not historically appropriate.

Agricultural Preservation Restriction This type of restriction seeks to retain land or water areas predominantly in their agricultural farming or forest use. Restricted activities in these areas include excavation so as to adversely affect the land's overall future agricultural potential, and construction of buildings except for those used for agricultural purposes or related family living.

Watershed Preservation Restriction A watershed preservation restriction aims to retain water supply watersheds in such condition that they will protect the water supply or future water supply of the Commonwealth. Any acts that would be detrimental to the watershed are prohibited in these areas.

Of these restrictions, a conservation restriction would be most applicable to wetlands around airports. The cost of establishing a conservation restriction on airport-owned land would be minimal, however space on airport properties will generally not be available for this purpose. Furthermore, development restrictions would not be feasible if they conflict with state or federal grant assurances associated with the funding for the acquisition of the property.

7.3.5 MONITORING

One indirect mitigation measure often required by conservation commissions is that a restored or created wetland be monitored to assess its short-term and long-term success. A monitoring program is considered an indirect mitigation measure because while it

does not in itself mitigate any impacts, it can play a significant role in maximizing the success of other direct mitigation measures.

At a minimum, a monitoring program should consist of periodic visual inspections of the restoration or replication area based on the size and complexity of the program. Any unvegetated areas or areas with stressed vegetation should be noted for additional restoration efforts. In contrast, a full-scale monitoring program may consist of the following components:

- Field measurements (e.g., percent cover, stem counts standing crop biomass) of vegetative growth.
- Observations of wildlife, birds, fish, invertebrates, and other species that inhabit or frequent the wetland.
- Surface water and groundwater elevation measurements.
- Measurements of hydrologic flow through the wetland.

In addition, a full-scale monitoring program should include documentation of monitoring objectives; organizational and technical responsibilities; specific tasks, methods, and instructions; quality assurance procedures; implementation schedules; and reporting requirements (Hammer, 1992).

The cost of a monitoring program can be low to moderate depending on the scope, frequency, and longevity of the program. Any wetland creation project should have an associated monitoring program for at least two years.

7.3.6 COMPENSATORY FLOOD STORAGE

Any AVRLP that involves filling within bordering land subject to flooding (i.e., if an access road is constructed within the 100-year floodplain) should provide compensatory storage for any lost floodwater storage capacity. This storage area must meet the following DEP requirements (per 310 CMR 10.57(4)(a)):

- The compensatory storage area must have an unrestricted hydraulic connection with the adjacent water body or waterway.
- The volume of storage displaced at each 1-foot increment of elevation by the project filling must be replaced at the same 1-foot increments of elevation.
- The storage area provided must not have been previously used for floodwater storage.
- For waterways, the storage area must be provided within the same reach of the river, creek, or stream.

Once the storage area is created, it should be vegetated to minimize erosion of the sideslopes.

The cost of creating compensatory storage is relatively low since it primarily involves moving soil from one location to another. However, engineering costs to design the compensatory storage area and costs to rent equipment to relocate the soil may be moderate. AVRLPs should be designed so as to avoid the need for compensatory flood storage whenever possible. Since permanent wetland filling is not allowed under the limited project provision, this mitigation measure will rarely be applicable unless the 100-year floodplain extends beyond the BVW boundary and fill is placed in the floodplain.

7.4 CONCLUSIONS

As described throughout this section, there are a variety of potential mitigation measures that may be appropriate for AVRLPs. For each project, it is necessary to evaluate the likely short-term and long-term environmental impacts. Then, using the technical and general cost information provided in this section, appropriate mitigation measures can be selected.

7.5 REFERENCES

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TABLE 7-1
RELATIVE COST AND APPLICABILITY OF MITIGATION MEASURES

Mitigation Measure	Relative Cost	Applicability to Airport Vegetation Removal Projects
Short-Term Impacts:		
Siltation Barriers	low	Should be used whenever significant soil disturbance will occur.
Runoff Diversion Measures	low	Should be considered, in conjunction with other erosion control measures, when soils on steep slopes will be disturbed.
Sediment Traps or Basins	low to moderate	Should be considered, generally in conjunction with runoff diversion measures, when significant soil disturbance and erosion is likely.
Vegetated Buffer Strips	low	Should be considered, if it will not impede an airport's ability to comply with FAA requirements, in areas adjacent to waterbodies and waterways, particularly if the surface water is significant as a water supply, rare species habitat, or migratory fish run.
Revegetation of Disturbed Areas	moderate	Should be conducted whenever significant soil disturbance will occur.
Construction Timing	low	Whenever possible, vegetation removal activities should occur when the ground is frozen, or at least after a period of dry weather.
Construction Specifications	low	Should be used as appropriate.
Wetland Restoration	moderate to high	Any wetlands disturbed by vegetation removal should be restored to as close to their original condition as possible.
On-Site Wetland Enhancement	moderate to high	Should be used where appropriate and where economically feasible.
Herbicide Application Guidelines	low	Should be used when herbicides are used for vegetative control.
Containment Spill Conting. Plan	low	Should be used when herbicides and/or fuel-powered equipment are used.
Long-Term Impacts:		
Wetland Replication	high	Should be conducted, on a 1:1 basis, for permanently lost wetland functions and values.
Off-Site Wetland Enhancement	moderate to high	Should be considered if tree removal constitutes a significant impact, e.g., to a rare species habitat or a unique vegetational community.
Mitigation Banking	moderate to high	"Joint projects " may be considered if multiple airports in nearby communities require extensive wetland mitigation e.g., replication.
Development Restrictions	low	Can be considered if direct mitigation is infeasible.
Monitoring	low to moderate	Should be conducted if extensive wetland restoration or any wetland creation is proposed.
Compensatory Flood Storage	low to moderate	Compensatory flood storage should be provided if any permanent filling occurs in the 100-year floodplain (bordering land subject to flooding).

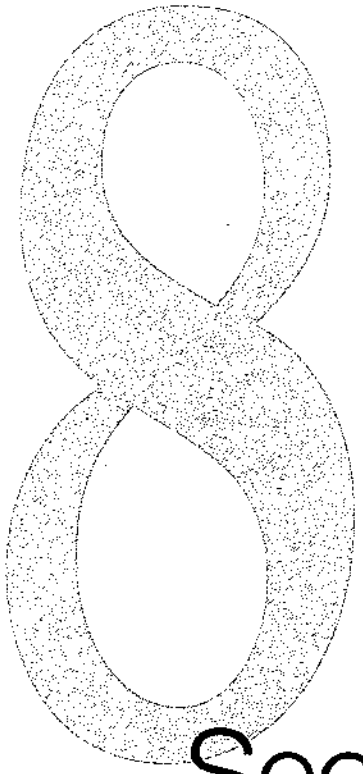
FIGURE 7-1
IMPACT MITIGATION MATRIX

KEY:

● = Impact likely to be directly mitigated

○ = Impact likely to be indirectly mitigated

POTENTIAL MITIGATING MEASURES	GENERAL WETLAND IMPACTS									
	Decrease in Wildlife Habitat or Food Source	Soil Erosion	Sedimentation/Siltation in Nearby Wetlands	Permanent Loss of Wetland Resources	Decrease in Flood Storage Capacity	Decrease in Shaded Fishery Habitat	Decrease in Ability to Attenuate Flood Flows	Chemical Release into Wetlands	Turbidity Increases in Open Waters	Bank Destabilization
Siltation Barriers		●	●						●	○
Runoff Diversions		●	●						●	○
Sediment Traps/Basins		●	●						●	○
Vegetated Buffers/Revegetation	●	●	●			○	●		●	●
Construction Timing	○	○	○						○	
Construction Specifications	○	○	○	○	○	○	○	○	○	○
On-Site Wetland Enhancement	●	○	○			●	○			○
Wetland Restoration	●	○	○			○	○			○
Herbicide Application Guidelines								●		
Spill Containment Plan								●		
Wetland Replication	●			●			○			
Off-Site Wetland Enhancement	○			○						
Mitigation Banking				●						
Development Restrictions	○			○						
Monitoring	○			○						
Compensatory Flood Storage					●		●			



Section Eight

8.0 VEGETATION MANAGEMENT PLANS

8.1 INTRODUCTION

A Vegetation Management Plan (VMP) could be considered a strategy to be employed by airport operators for prioritizing removal of vegetation which currently penetrates protection zones (PZs) and for preventing other vegetation from penetrating the PZ in the future so as to avoid repetitive, large-scale vegetation removal projects. In addition, implementation of a VMP would enhance an airport's efforts to comply with applicable federal and state regulations, advisories and orders.

The size and complexity of a VMP will vary by airport depending upon the size of the PZ, the types and amounts of vegetation to be removed from within the PZ, the type of removal equipment proposed, and the types and sizes of wetlands, if any, impacted by the vegetation removal projects. A well prepared VMP will carefully integrate the environmental, economic and operational considerations of the vegetation removal projects likely to occur at a given airport. Notwithstanding the site specific nature of VMPs, this section provides guidance on the objectives and typical elements of VMP for vegetation removal and maintenance at public use airports. It should be noted that although long-term vegetation removal needs should be considered when planning and designing an AVRLP, development of a VMP is not required within the current or proposed Massachusetts Wetlands Protection Act (MWPA) regulations. Nonetheless, separate from this Generic Environmental Impact Report (GEIR), the Massachusetts Aeronautics Commission (MAC) is currently pursuing development of a comprehensive VMP program for both wetland and upland areas. Once the GEIR is approved, it will become an important component of MAC's VMP program. In the meantime, the GEIR will provide interim guidelines for airports where preparation of a VMP is appropriate and economically feasible.

8.2 OBJECTIVES OF VMPs

While individual VMPs will differ for each airport, they will have similar objectives. These objectives include:

- Ensure that PZs remain free of naturally-occurring obstructions
- Minimize impacts on wetlands within the vegetation removal areas
- Preserve existing herbaceous and low-lying vegetation that will not grow high enough to penetrate PZs and thus will not require subsequent removal
- Minimize the cost associated with maintaining the PZs free of obstructions
- Minimize impact on wildlife habitat

A VMP is intended to be general in nature. However, sections of a VMP pertaining to vegetation removal in wetlands should rely as much as possible on the information contained in this GEIR. If a VMP is prepared, it may be attached to the NOI for an airport vegetation removal limited project (AVRLP) for information purposes.

8.3 ELEMENTS OF A VEGETATION MANAGEMENT PLAN

Based on these objectives, this section describes the elements of a VMP. The VMP should address vegetation management in all of the PZs at an airport including both upland and wetland areas.

Typical sections of a VMP include:

- General information
- Identification of PZs
- Identification of vegetation management areas (VMAs)
- Identification and prioritization of future vegetation removal projects

- Identification of the VMP preparer

Each of these sections is described below, and an outline of a typical VMP is presented in Table 8-1.

8.3.1 GENERAL INFORMATION

The general information section contains pertinent information about the airport, airport owner and other key persons. A typical general information section would be one page in length and include:

- Airport name
- Community(ies) where the airport is located
- Name, address and telephone number of the airport owner and operator, and the name and title of the contact person if different from the airport owner
- Name, address and telephone number of the chairperson of the airport commission, if any
- Name, address and telephone number of the airport manager

A suggested format for the general information section is shown in Figure 8-1.

8.3.2 IDENTIFICATION OF PROTECTION ZONES

This section of the VMP provides a brief description and generalized map of all PZs at the airport. The PZs would be divided logically based on the facilities at the airport. For example, for a single-runway airport, PZs may be divided as listed below and as shown in Figure 8-2:

- PZ1 - Approach surface for runway end "X"
- PZ2 - Approach surface for runway end "Y"
- PZ3 - Transition surface for left side of runway "XY"

- PZ4 - Transition surface for right side of runway "XY"

This section would also include a discussion of the existing natural and man-made obstructions within each identified PZ based on a detailed survey. This section would range in length from 1 to 5 pages.

8.3.3 IDENTIFICATION OF VEGETATION MANAGEMENT AREAS

This section of the VMP provides a brief description and generalized map of specific vegetation management areas (VMAs) within the PZs. Each area with similar plant communities should be identified and delineated as a VMA. For example, VMAs should generally be distinguished based on distinct vegetation communities in consideration of other factors that may affect the frequency or nature of vegetation removal activities (e.g., topography, soil type, geographic location). Figure 8-3 illustrates the possible delineation of VMAs in relation to the PZs. Each PZ could have more than one VMA depending on site-specific conditions.

For the initial VMP, this section would include a discussion of the existing conditions within the VMAs prior to clearing. However, in later updates of the VMP, this section will be revised to reflect current conditions based on succession of various plant species and the effectiveness in promoting growth of more low-growing vegetation. In some cases, the VMA boundaries may need to be re-defined after initial clearing based on altered vegetation management needs.

For each VMA, the following characteristics should be briefly addressed or noted:

- Acreage
- Area(s) within the VMA that currently or may soon penetrate the PZ
- Dominant plant species, related growth rate(s) and estimated maximum height(s)
- Height restrictions across the VMA

- Surface topography
- Hydrology and soil types
- Wildlife habitat
- Protected environmental features (e.g., wetland resources, areas of critical environmental concern, habitat for rare or endangered species)

Also, included in this section should be a map(s) showing the PZs, VMAs and wetland boundaries.

This section will range in size from 10 to 15 pages excluding the maps.

8.3.4 IDENTIFICATION AND PRIORITIZATION OF FUTURE VEGETATION REMOVAL PROJECTS

This section of the VMP outlines the vegetation removal projects, herein referred to as "projects," that are anticipated over the next five or so years. It is understood that minor modifications to the overall plan may be required to accommodate changing conditions or funding limitations each year. The defined project areas may coincide with or overlap PZs or VMAs depending on site specific conditions.

This section should include a description for each of the future vegetation removal projects anticipated. Each project description should include identification of the PZ(s) where vegetation removal is or will be necessary, the area of each VMA within the designated PZ(s) where work will be conducted, the vegetative communities within each VMA that will be impacted, the amount of wetlands, if any, within the project area that may be affected by the removal work, and the anticipated year of removal. The project description should distinguish new clearing activities versus maintenance of previously cleared areas. This section should include a figure that illustrates the location of the PZ(s), the VMA(s) and the project area(s) with respect to each other. Figure 8-4 illustrates the potential delineation of project areas in relation to the PZ(s) and VMA(s).

It is recommended that each airport work closely with MAC and the Federal Aviation Administration (FAA) to set the priorities for individual projects. When prioritizing the projects, it is important to consider the timing sequence required to meet the overall vegetation removal goals.

This section would be approximately 3 to 6 pages in length excluding the maps.

8.3.5 IDENTIFICATION OF THE VMP PREPARER

This section of the VMP should identify the preparer(s) and should include pertinent short resumes. This section would be between 2 and 5 pages depending on the number and size of the resumes included.

8.4 UPDATING THE PLANS

It is recommended that VMPs be reviewed and updated as necessary based on airport specific conditions. These updates may require field visits to determine the success of the previous clearing activities, as well as to document the current condition of the VMAs. The update of the initial VMP may be extensive since the VMAs will likely have changed considerably over the previous 5 years. However, subsequent updates should be relatively minor, requiring limited field verification and minimal text changes.

8.5 CONCLUSIONS

Development of a VMP for AVRLPs is not required under either the current or proposed MWPA regulations. However, a VMP can be a useful planning tool to help airport operators avoid repetitive, large-scale vegetation removal projects in the future and enhance the airport's compliance with applicable federal and state regulations, advisories and orders. It is generally in the best interests of the airports to conduct

small-scale annual or biannual maintenance projects that cost substantially less than extensive vegetation removal projects. In addition, VMPs can be considered a voluntary extension of the mitigation plan since proper long-term maintenance will result in fewer impacts to wetland functions and values.

A VMP, which is intended to be general in nature, consists of general information about the airport, identification of PZs, identification of VMAs, identification and prioritization of future projects, and identification of the VMP preparer(s). It is recommended that VMPs be prepared for an approximately 5-year planning period and be reviewed and updated, where necessary, based on airport specific conditions. If a VMP is prepared for an airport proposing an AVRLP, the VMP may be attached to the NOI to provide information to the conservation commission on the airport's long-term vegetation removal plans.

TABLE 8-1

TYPICAL TABLE OF CONTENTS
FOR A VEGETATION MANAGEMENT PLAN

SECTION	TITLE/DESCRIPTION	TYPICAL LENGTH (Excluding Maps) (Pages)
I	GENERAL INFORMATION	1
	- Provide completed summary sheet (Figure 8-1)	
II	IDENTIFICATION OF PROTECTION ZONES (PZs)	1-5
	- Delineate and describe PZs - Identify existing obstructions	
III	IDENTIFICATION OF VEGETATION MANAGEMENT AREAS (VMAs)	10-15
	- Delineate and note acreage of VMAs - Dominant plant species and related growth rate and maximum height information - Height restrictions across VMA - Surface topography - Hydrology and soil types - Wildlife habitat - Protected environmental features	
IV	IDENTIFICATION AND PRIORITIZATION OF FUTURE PROJECTS	3-6
	- Delineation of existing and potential obstruction areas - Delineation of individual project areas - Description and prioritization of projects - General information about vegetation, wetlands likely impacts, mitigation, and permits for each project	
V	IDENTIFICATION OF VMP PREPARER	2-5
	- Pertinent short resumes	

TABLE 8-2

TYPICAL GROWTH RATES AND
MATURITY HEIGHTS OF TARGET SPECIES

SPECIES	TYPICAL GROWTH RATE*	TYPICAL MAX. HEIGHT AT MATURITY (feet)
1. red maple (*Acer rubrum L.*)	Moderate/High	40 - 60
2. silver maple (*A. saccharinum L.*)	Moderate/High	50 - 70
3. green ash (*Fraxinus pennsylvanica Marsh.*)	Moderate/High	30 - 60
4. white ash (*Fraxinus americana L.*)	Moderate	60 - 70
5. black ash (*Fraxinus nigra Marsh.*)	Low/Moderate	60 - 70
6. black tupelo (*Nyssa sylvatica Marsh. var. sylvatica*)	Low/Moderate	20 - 50
7. pin oak (*Quercus palustris Muenchh.*)	Moderate	50 - 70
8. swamp white oak (*Quercus bicolor Willd.*)	Moderate	60 - 70
9. yellow birch (*Betula alleghaniensis Britton*)	Moderate	60 - 70
10. paper birch (*Betula papyrifera Marsh.*)	Moderate	60 - 70
11. sweet or black birch (*Betula lenta L.*)	Moderate	50 - 60
12. gray birch (*Betula populifolia*)	Moderate/High	20 - 30
13. river birch (*Betula nigra L.*)	Moderate	30 - 50

TABLE 8-2

TYPICAL GROWTH RATES AND
MATURITY HEIGHTS OF TARGET SPECIES
(cont'd.)

SPECIES	TYPICAL GROWTH RATE*	TYPICAL MAX. HEIGHT AT MATURITY (feet)
14. black spruce (*Picea mariana (Mill.) B.S.P.*)	Low	10 - 30
15. eastern hemlock (*Tsuga canadensis L.*)	Low/Moderate	60 - 70
16. tamarack (*Larix laricina (Du Roi) K. Koch*)	Low/Moderate	40 - 60
17. atlantic white cedar (*Chamaecyparis thyoides (L.) B.S.P.*)	Low/Moderate	50 - 70
18. eastern white pine (*Pinus strobus L.*)	Moderate	60 - 70

* Typical growth rates of individuals beyond seedling stage:

Low = 1 foot or less per year
Moderate = 1 to 2 feet per year
High = more than 2 feet per year

Note: Growth rate depends on site quality, species shade tolerance, and degree of overhead competition. For example, eastern hemlock will grow slowly while in the shade of taller trees. If shade is removed, hemlock can grow rapidly. Maximum height at maturity may vary depending on site-specific growing conditions.

Sources: Dwelley (1980); Niering (1988); Sutton and Sutton (1987)

FIGURE 8-1

PROPOSED GENERAL INFORMATION SUMMARY SHEET
FOR A VEGETATION MANAGEMENT PLAN

AIRPORT NAME: _____

AIRPORT LOCATION: _____
(list all municipalities in which the airport is located)

AIRPORT OWNER INFORMATION

Name: _____

Contact Person- Name: _____
Title: _____

Address: _____
_____
_____

Telephone No. ( ) _____

AIRPORT OPERATOR (If Different from Owner)

Name: _____

Contact Person- Name: _____
Title: _____

Address: _____
_____
_____

Telephone No. ( ) _____

AIRPORT COMMISSION INFORMATION

Commission Chairperson: _____

Address: _____
_____
_____

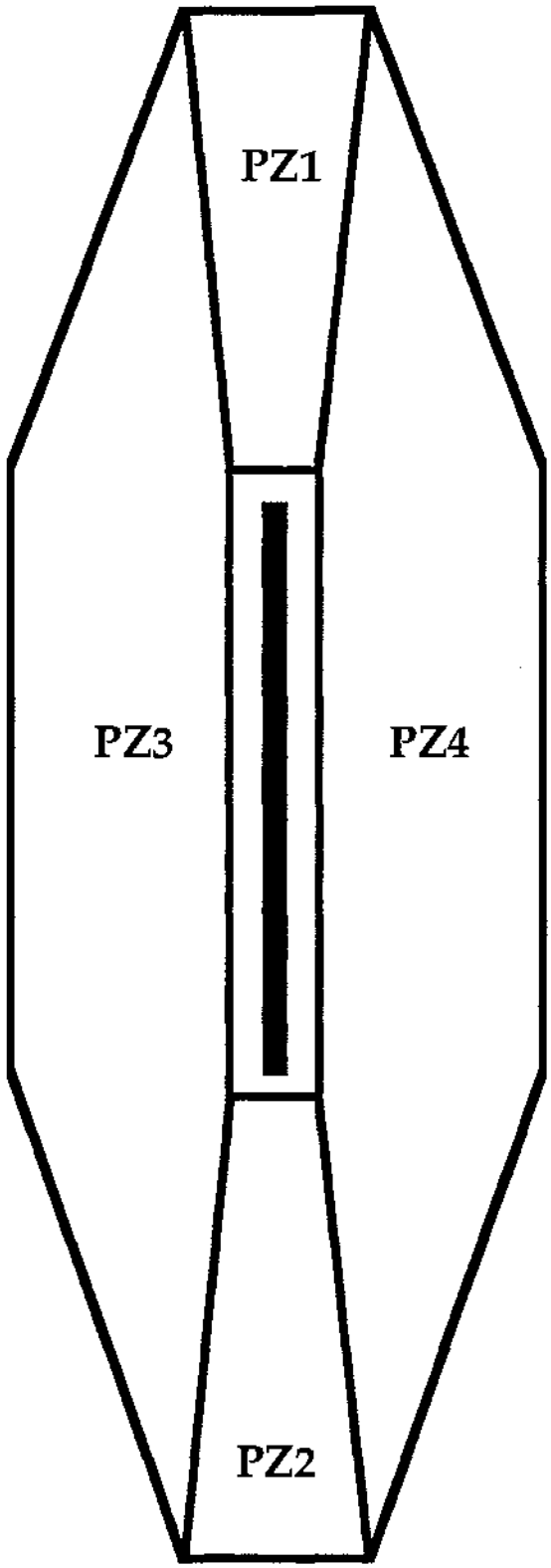
Telephone No. ( ) _____

AIRPORT MANAGEMENT INFORMATION

Airport Manager: _____

Address: _____
_____
_____

Telephone No. ( ) _____

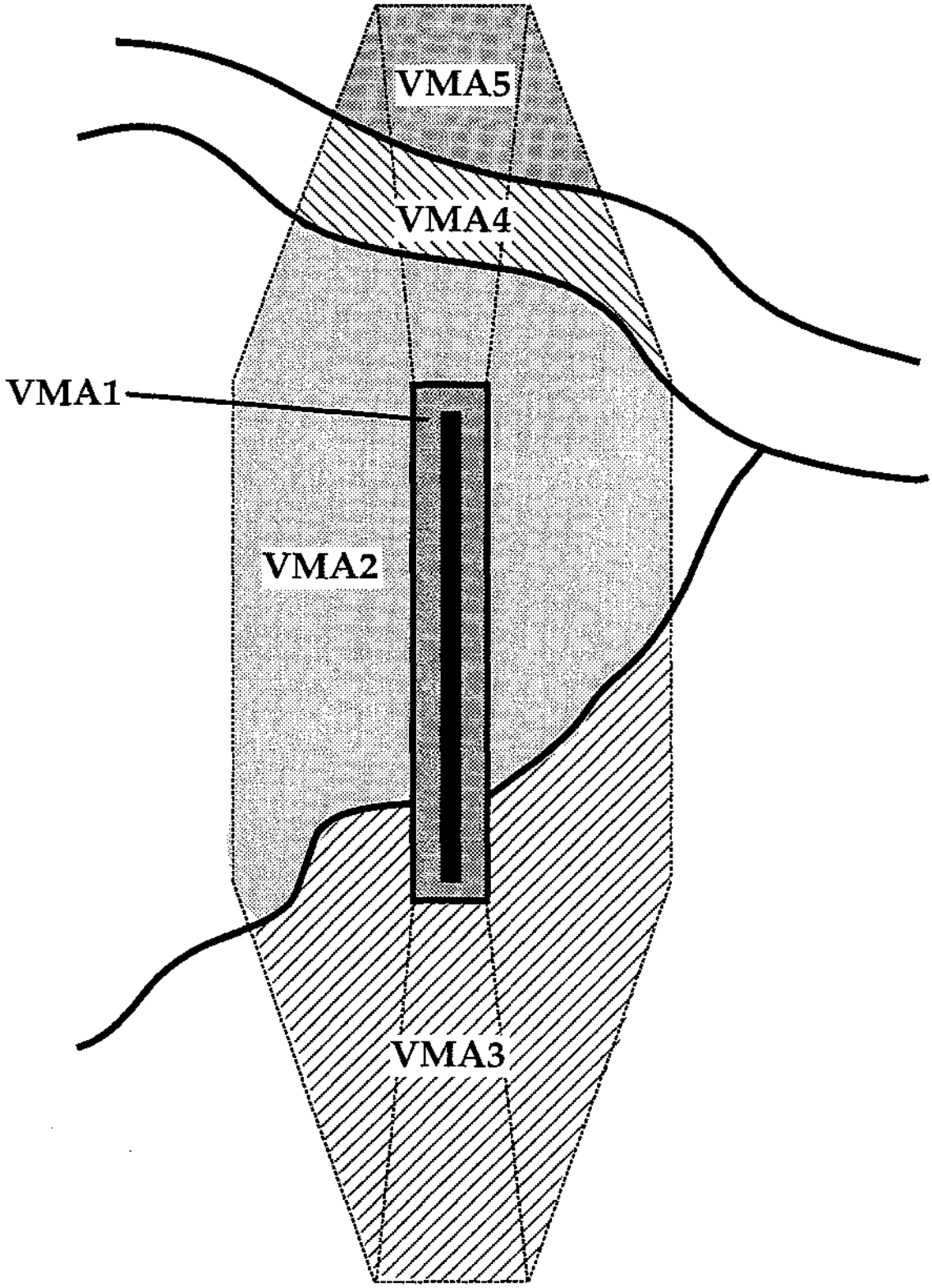


GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

CDM Camp Dresser & McKee Inc.
Cambridge, Massachusetts

August 31, 1993

FIGURE 8-2
TYPICAL PROTECTION ZONES (PZs)
AT A SINGLE-RUNWAY AIRPORT

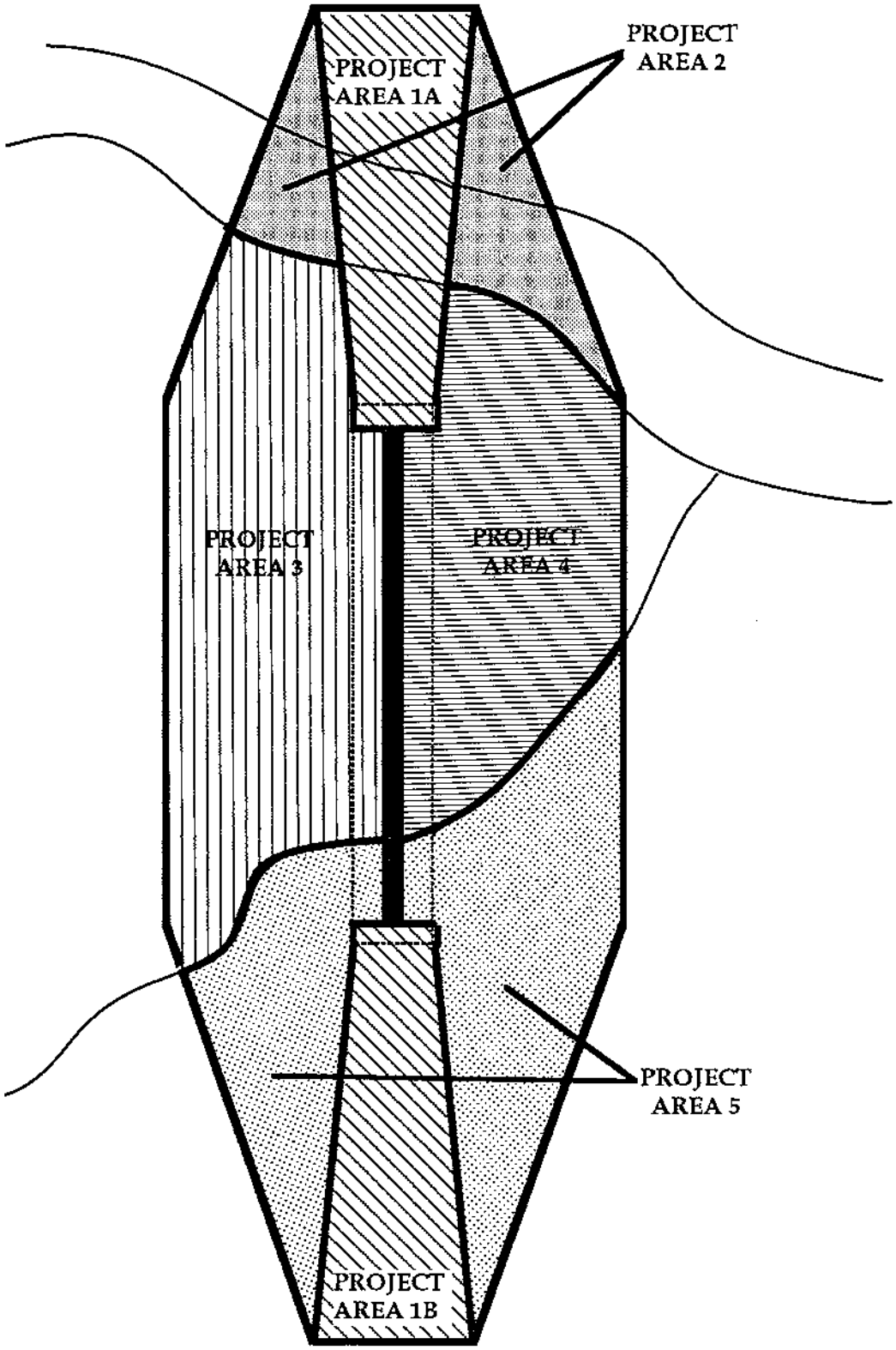


GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

CDM Camp Dresser & McKee Inc.
Cambridge, Massachusetts

August 31, 1993

FIGURE 8-3
TYPICAL PZs AND VEGETATION MANAGEMENT AREAS (VMAs)



GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

CDM Camp Dresser & McKee Inc.
Cambridge, Massachusetts

August 31, 1993

FIGURE 8-4
TYPICAL PZs, VMAs,
AND PROJECT AREAS

Section Nine

9.0 NOTICE OF INTENT GUIDELINES

9.1 INTRODUCTION

As discussed throughout this document, a Notice of Intent (NOI) must be filed for any airport vegetation removal limited project (AVRLP) in Massachusetts that involves work in a protected wetland resource area, or within the 100-foot buffer zone associated with many wetland resource area types. This section provides explicit guidelines for the preparation of NOIs for AVRLPs. These guidelines address field work requirements, specific information that should be included in the NOI, recommended formats, graphic and plan requirements, and filing fee requirements. In addition, by reference to other sections within the GEIR, the guidelines address steps for identifying vegetation removal requirements, delineating affected wetlands, selecting appropriate removal methods, quantifying and evaluating environmental impacts, and selecting appropriate mitigation measures. Although the guidelines are intended primarily for use by the project proponents, they will be useful to conservation commissions in evaluating the completeness of NOIs for AVRLPs.

A model NOI, prepared according to the guidelines presented in this section, is attached as Appendix D.

In addition to specific NOI preparation guidelines, this section provides an overview of the NOI preparation and filing process and NOI filing instructions.

9.2 OVERVIEW OF NOI PREPARATION AND FILING PROCESS

Under the proposed limited project provision (310 CMR 10.24(7)(d) and 10.53(3)(n)), most AVRLPs will be permitted by an Order of Conditions issued by the local conservation commission. The NOI preparation and filing process for such projects, and related time restrictions where appropriate, is summarized in Figure 9-1.

Exceptions to the process outlined in Figure 9-1 may occur in cases where the local conservation commission issues a negative Order of Conditions denying the project, or where the Order of Conditions issued by the conservation commission is appealed (e.g., by the applicant, the landowner or abutting landowner, any person negatively affected by the Order, any ten residents of the community, or DEP). In such cases, project approval authority will be passed to DEP, first to the regional office to issue a Superseding Order of Conditions, and then, if necessary, to an adjudicatory hearing process. If the DEP regional office is the appellant, then project review authority passes directly to the DEP Commissioner or the adjudicatory hearing process. The procedures related to these exceptions are not addressed in this section because it is assumed that most AVRLPs will receive final approval from the local conservation commission. Complete procedures related to the NOI preparation and filing process are specified in 310 CMR 10.05.(4)-(6). The appeal process for an AVRLP, which is the same as for any other project subject to MWPA, is presented in 310 CMR 10.05(7). A request for an appeal must be submitted in writing to DEP by certified mail or hand delivery within 10 days of issuance of the Order. All appeal requests should be submitted to the regional DEP office, the conservation commission, and the applicant if he is not the appellant.

9.3 GUIDELINES FOR NOI PREPARATION AND FILING

9.3.1 FILING FORM SELECTION

An NOI is a form that is used to provide the conservation commission and DEP with adequate and appropriate information for determining the impacts to wetland resource areas from proposed work. The NOI form, which was promulgated as part of the Massachusetts Wetland Protection Regulations (310 CMR 10.00), is found in 310 CMR 10.99 along with other forms necessary for administering the regulations. Blank copies of the NOI forms can be obtained from 310 CMR 10.99, the local conservation commission, or DEP.

Most NOIs for AVRLPs will require the standard NOI form (Form 3), which is the focus of the guidelines in this section. Certain small-scale tree removal projects may be able to use Form 4, the abbreviated NOI form. Form 4 may be used when all three of the following conditions can be met:

1) The proposed work is entirely within the buffer zone or bordering or isolated land subject to flooding (BLSF or ILSF);

2) The project will disturb less than 1,000 square feet of buffer zone or BLSF/ILSF; and

3) Neither an Army Corps of Engineers permit (Section 404 or Section 10) nor a Chapter 91 waterways license is required.

The abbreviated form requires project information similar to that of the standard form, though in less detail. It should be noted, however, that some conservation commissions require all applicants to file a standard form. For this reason, project proponents should contact the local conservation commission before completing and filing an abbreviated NOI.

In addition to the standard and abbreviated NOI forms, project proponents may prefer to file a Form 1 (Request for a Determination of Applicability). This form may be filed in cases where a project proponent is uncertain whether a vegetation removal project is regulated under the Massachusetts Wetlands Protection Act, or when the project is in the 100-foot buffer zone and is unlikely to impact the adjacent resource area.

The remainder of this section focuses on preparation and filing of the standard NOI form. It should be noted that if the proposed vegetation removal area is located within the jurisdictional limits of one or more communities, separate NOIs must be prepared and submitted for the work in each community. In such cases, each NOI should include a general project description that discusses the total wetland impact, in addition to a specific project description that addresses the work within the reviewing conservation commission's jurisdiction. A copy of each NOI should be submitted to each non-reviewing conservation commission for informational purposes only.

9.3.2 FIELD WORK AND DATA COLLECTION REQUIREMENTS

The major field work, data collection, and environmental evaluation tasks required before the NOI can be completed have been described in detail throughout this GEIR. These tasks, and the appropriate GEIR text references, include the following:

- Identify vegetation requiring removal (Section 6.3.2)
- Delineate and assess affected wetland resource areas (Section 6.3.3)
- Select appropriate vegetation removal method(s) (Section 5.5)
- Quantify the likely environmental impacts (Section 6.3.4)
- Evaluate the likely environmental impacts (Section 6.4)
- Select appropriate mitigation measures (Section 7.0)

Specific descriptions of these tasks will not be repeated in this section, although the tasks will be summarized and referenced as appropriate.

9.3.3 NOI PREPARATION

This subsection provides step-by-step guidelines for completing each portion of the NOI form for an airport vegetation removal project. Specific references to each portion of the form are in italics for easy reference. When reviewing or using the guidelines, it may be useful to concurrently review the model NOI provided in Appendix D. A blank NOI and fee worksheet are also included in Appendix H.

Part I: General Information

1. Location: Street Address and Lot Number

Fill in the street address and lot number for the property where the work is to take place. In most cases, the street address will be that of the airport. If the proposed vegetation removal operation is far removed from the airport street address, the street or streets nearest the proposed activities may be provided. The lot number can be obtained from airport property records or the local Board of Assessors. If no lot number is available, enter "N/A."

2. Project: Type and Description

The project type is "airport vegetation removal (limited project)". The project description must be brief due to the limited space provided. A model project description is provided here for assistance.

In order to comply with FAA regulations and to continue to ensure the highest level of public safety, (airport name) must remove wetland vegetation that is encroaching on (designated obstruction-free surfaces). Approximately (number of trees to be removed) trees (and (number of shrubs to be removed) shrubs) must be removed, resulting in an estimated short-term wetland impact of (area or linear feet of wetland impacts). The applicant seeks to remove these trees by (method). Specific measures proposed to mitigate for the likely impacts are provided in Part IV of this NOI. The proposed activities meet the limited project provision requirements of 310 CMR 10.53 (3)(n).

Additional detail regarding the project will be provided in the wetland impact evaluation attached to the NOI.

3. *Registry: County, Current Book & Page, and Certificate for Registered Land*

"Registry" refers to the county Registry of Deeds. Fill in the appropriate county name. The book, page, and certificate information can be obtained from airport property records or the Registry of Deeds.

4. *Applicant: Name and Address*

Fill in the name and address of the applicant or organization proposing the work. In most cases, this will be the individual airport with the airport manager as the contact person, the Massachusetts Port Authority (Massport), or the Massachusetts Aeronautics Commission (MAC).

5. *Property Owner: Name and Address*

If the property owner differs from the applicant, provide the name and address of the owner or owners.

6. *Representative: Name and Address*

The representative should be the person who has legal authority to act on behalf of the applicant or property owner. This can be legal counsel or an engineer or environmental consultant. Provide the name and address as appropriate.

7a. Have the Conservation Commission and the Department's Regional Office each been sent, by certified mail or hand delivery, 2 copies of completed Notice of Intent, with supporting plans and documents?

Since it is always necessary to provide two copies of the completed NOI to the conservation commission and DEP, this question should be answered "yes." Note that the completed NOIs should be sent by certified mail or hand delivery. Use the list provided in Appendix F to identify the address of the appropriate DEP regional office.

7b. Has the fee been submitted?

7c. Total Filing Fee Submitted.

7d. City/Town Share of Filing Fee ... State Share of Filing Fee...

7e. Is a brief statement attached indicating how the applicant calculated the fee?

The filing fees are established in regulations set by the Massachusetts Department of Administration and Finance (801 CMR 4.02). Municipalities (including municipally-owned airports), DEP, and the federal government are exempt from the filing fees for an NOI – all other persons or organizations, including state agencies, must pay the fee. If the project proponent is exempt from the filing fee, answer "no" to questions 7b and 7e and note on the form "N/A - applicant is exempt under 801 CMR 4.02." If the project proponent is subject to the fee, questions 7b and 7e should be checked "yes." In this case, the total fee amount will be $725 under fee category 4(j); the city/town share of this will be $375, and the state share will be $350. This calculation should be documented on the filing fee worksheet provided with the NOI, and the fee should be submitted to the DEP Lock Box at the address shown on the fee transmittal form. It should be noted that DEP will not issue a file number for the project until a check is received. The

conservation commission cannot issue the Order of Conditions until DEP issues a file number to the project.

8. Have all obtainable permits, variances, and approvals required by local by-law been obtaine?

All local permits that are required should be listed and the preparer should note whether the permits are obtained or being applied for. If no local approvals are needed, enter "N/A."

9. Is any portion of the site subject to a Wetlands Restriction Order pursuant to G.L. c. 131. §40A or G.L. c. 130. §105?

The Wetlands Conservancy Program, previously known as the Wetlands Restriction Program, has placed restriction orders on certain coastal and inland wetlands in various Massachusetts communities. Certain types of activities and development are restricted in these areas. Wetland restriction orders are recorded at the Registry of Deeds. Thus, this information can be acquired when obtaining information from the Registry regarding the current book and page number for a given property. When vegetation removal is required in an area with a Wetlands Restriction Order, the DEP Wetlands Conservancy Program should be contacted for information on specific restrictions.

Municipalities with restriction orders in place at the time of this GEIR publication are listed in Table 9-1. The Registry of Deeds or the DEP Wetlands Conservancy Program should be contacted for current, site-specific information on restriction orders.

10. List all plans and supporting documents submitted with this Notice of Intent.

List all documents and plans which are included with the Notice of Intent in the space provided. The plans and documents provided with the Notice of Intent should adequately describe the project so that the conservation commission and DEP can conduct their review. The plans and documents should describe existing conditions (both man-made and natural), the proposed activities, the likely wetland impacts, and the proposed mitigation measures. Most of this information will be documented within the wetland impact evaluation that will be attached to

the NOI. Attachments that should be included, as appropriate, for AVRLPs include the following:

Attachment A - Project Locus Map - Attach an 8-1/2" X 11" figure clearly showing the approximate location of the airport and the proposed vegetation removal areas. Where possible, use USGS Topographic Quadrangle Maps (7.5 minute series).

Attachment B - Project Plans - Plans showing the existing conditions (e.g., wetland boundaries, topography, limits of forested areas) in the project area and the proposed activities should be presented. If extensive restoration or off-site restoration is needed, additional plan sheets may be required. Table 9-2 lists the type of information that should be included on each of the plans.

Attachment C - Wetland Impact Evaluation - The wetland impact evaluation, prepared according to the checklist in Section 6.4, should be attached for all projects. While this attachment focuses on evaluating wetland impacts related to the vegetation removal activities, the evaluation will also include documentation of existing site conditions, selection of appropriate removal method(s), quantification and assessment of wetland impacts, and selection of appropriate mitigation measures.

Attachment D - Vegetation Management Plan - Attach a copy of a plan outlining long-term management of the proposed vegetation removal area such that large-scale tree removal activities will not be required in the future. This plan should be prepared according to the guidelines in Section 8.0.

Attachment E - Filing Fee Transmittal Information - If a filing fee is required, attach a brief explanation of how the fee was calculated and a copy of the NOI fee transmittal form. Note that the check to DEP should be sent separately to the DEP Lock Box.

Attachment F - Spill Containment Plan - If fuel-powered equipment or herbicides will be used, attach a containment plan that addresses spill prevention and clean-up as described in Section 7.2.5.

Attachment G - Construction or Restoration Specifications - Any specifications that are available regarding the vegetation removal activities or the restoration plan should be provided. Section 7.2.1 provides general guidance on information to be included in construction or restoration specifications.

Attachment H - Wildlife Habitat Evaluation - If a wildlife habitat evaluation (WHE) is required, the report should be attached to the NOI.

11. Check those resource areas within which work is proposed:

Check off the appropriate boxes for each resource area within which work will occur. This should include areas affected by access road construction or temporary storage of slash. Be sure to consider all areas including the buffer zone and floodplains (bordering land subject to flooding). This information will be included in the wetland impact evaluation which is Attachment "C" to the NOI.

12. Is the project within estimated habitat which is indicated on the most recent Estimated Habitat Map of State-Listed Rare Wetlands Wildlife (if any) published by the Natural Heritage and Endangered Species Program?

If yes, have you sent a copy of the Notice of Intent to the Natural Heritage and Endangered Species Program via the U.S. Postal Service by certified or priority mail (or otherwise sent it in a manner that guarantees delivery within two days) no later than the date of the filing of this Notice of Intent with the conservation commission and the DEP regional office?

The Massachusetts Division of Fisheries and Wildlife, Natural Heritage and Endangered Species Program (NHESP) identifies habitats of rare "state-listed" vertebrate and invertebrate animal species on USGS topographic quadrangles. These maps are updated annually. The official maps are available at local conservation commission offices or with NHESP in Boston. In addition to providing official maps to conservation commissions, NHESP annually publishes the *Atlas of Estimated Habitats of State-Listed Rare Wetlands Wildlife*, which contains reduced estimated habitat maps for the entire Commonwealth. Estimated rare species habitats around each public use airport, based on the 1992 atlas, are shown on the maps in Appendix A.

If any portion of the proposed vegetation removal area is located within an estimated habitat for state-listed rare wetlands wildlife, check "yes" under question 12 and submit the NOI to NHESP within 2 days of filing the NOI with the conservation commission. If there is no state-listed wetlands wildlife estimated habitat in the wetland proposed to be altered, indicate "no" under question 12. In both cases indicate the date of the NHESP map inspected.

Part II: Site Description

This section summarizes the availability and location of information on natural and man-made features throughout the NOI. Indicate the appropriate document, plan, figure, or set of calculations where each feature is located. All references indicated in this part should have been listed under Part I, question 10.

All of the information requested on this list should be provided on the project plans or in the wetland impact evaluation. Any information that is not applicable should be noted as "N/A."

Part III: Work Description

This section summarizes the availability and location of information related to the proposed activities. As in Part II, indicate the appropriate reference from the list in Part I question 10 regarding the location of each item.

Most vegetation removal projects will not involve construction of structures, subsurface sewage disposal systems, underground utilities, or point source discharges. Therefore, these items should be noted as "N/A." If an access road is constructed, filling may be involved, and compensatory storage areas may be required. (It should be noted that construction of permanent access roads are not allowed under the proposed limited project provision.) If so, these areas should be clearly shown on the plans, and supporting calculations (documenting the area and volume) should be provided. If wildlife habitat restoration or replication areas are required, supporting plans and documentation for these areas should be included in an attachment to the NOI.

Part IV: Mitigating Measures

1. Clearly, completely and accurately describe, with reference to supporting plans and calculations where necessary:

(a) All measures and designs proposed to meet the performance standards set forth under each resource area specified in Part II or Part III of the regulations; or

(b) why the presumptions set forth under each resource area specified in Part II or Part III of the regulations do not apply.

One box on the NOI form should be completed for each resource area checked under Part I questions 11b and c. At the top of each box, note whether the affected resource area is inland or coastal and the resource area type. (As noted in Section 6.2, vegetation removal will occur primarily in inland resource areas.)

Within each box, provide a brief description of the work that will occur within each resource area, and the measures proposed to mitigate any likely short- or long-term impacts. Also, indicate which supporting plans and documents provide detailed information on the potential impacts and proposed mitigation measures. The wetland impact evaluation should be referenced for detailed information in compliance with specific performance standards. To the extent possible, the performance standards specified in the regulations should be met. However, because AVRLPs are limited projects, they are not subject to the regulatory performance standards. If any performance standards will not be met (e.g., if more than 5,000 square feet of BVW will be altered), this regulatory exemption should be referenced.

2. *Clearly, completely and accurately describe, with reference to supporting plans and calculations where necessary:*

a) all measures and designs to regulate work within the Buffer Zone so as to ensure that said work does not alter an area specified in Part I, Section 10.02(1)(a) of these regulations; or

(b) if work in the Buffer Zone will alter such an area, all measures and designs proposed to meet performance standards established for the adjacent resource area specified in Part II or Part III of these regulations.

As above, the work proposed in the buffer zone, and the measures proposed to mitigate impacts to the adjacent resource area, should be briefly described. The performance standards that must be met are those for the nearest resource area. For example, if trees from the BVW buffer zone will be removed, then BVW performance standards should be met in the adjacent

BVW. If multiple buffer zones are involved, then performance standards for each resource area should be met. As previously noted, because AVRLPs are limited projects, they are not required to meet the performance standards. Any performance standards that cannot be met should be identified, referencing the limited project provision regulations that allow non-compliance with the performance standards.

Part V: Additional Information for a Department of the Army Permit

This section requests additional information for a permit from the US Army Corps of Engineers if the applicant chooses to jointly file the NOI with the Army Corps. Section 404 of the Clean Water Act, which is administered by the Army Corps, regulates placement of fill in wetlands. However, it should be noted that "clearing and grubbing," or any vegetation removal using heavy equipment that results in soil disturbance is regulated as wetland filling. (This interpretation of "wetland filling" is based on Army Corps Regulatory Guidance Letter No. 90-5.) Unless wetland filling is involved, vegetation removal projects do not require an Army Corps permit. If an Army Corps permit is needed, it is recommended that the applicant consult the Army Corps directly and submit a separate permit application.

Signature

The applicant and the applicant's representative should sign and date the form.

9.3.4 GENERAL FILING INSTRUCTIONS

Once the Notice of Intent is completed, two copies of the NOI with related plans and documents should be sent to both the conservation commission and the appropriate regional office of DEP (four copies in total). Some conservation commissions may require more than two copies. Proponents should contact their local conservation commission to determine the number of copies needed.

Once the Notice of Intent is received, the conservation commission has 21 calendar days to either schedule a hearing or return the NOI if they deem it incomplete. Conservation commis-

sion meeting schedules vary by community, and some commissions have filing deadlines for scheduling hearings. For this reason, it is recommended to contact each conservation commission as far in advance to filing an NOI as possible to ascertain any specific filing requirements and to ensure receiving the desired hearing date.

Another administrative requirement is that a notice of the hearing must be filed at least 5 business days before the hearing in a newspaper with circulation in the municipality where work is proposed. Some conservation commissions arrange for this directly with the newspaper, while others make the applicant responsible. In either case, the proponent pays for this notice. Conservation commissions and municipalities also have different requirements for notifying abutters. The conservation commission should be contacted to determine the procedures followed in their community.

9.3.5 ADDITIONAL FILING INSTRUCTIONS FOR AVRLPs IN SENSITIVE AREAS

As discussed, if any portion of an AVRLP is located within an estimated habitat for state-listed rare wetlands wildlife, the NOI must be submitted to NHESP within 2 days of filing the application with the conservation commission. Likewise, if any portion of an AVRLP is located within the primary recharge area of a public drinking water supply well or within 400 feet of a public surface water supply, the NOI should be submitted to DEP Division of Water Supply within 2 days of the filing. If any portion of an AVRLP is located within an Area of Critical Environmental Concern (ACEC), the NOI should be submitted to the Massachusetts Department of Environmental Management (for inland ACECs) or the Massachusetts Coastal Zone Management office (for coastal ACECs). Submission of the NOI to these agencies will allow them to review the project in terms of potential impact on the sensitive resources.

9.4 CONCLUSIONS

The Massachusetts Wetlands Protection Regulations (310 CMR 10.00) and related DEP policies provide guidance on preparing NOIs for work in and within the 100-foot buffer zone of protected wetland resource areas. These general guidelines apply to any project that could occur within or near a wetland. The step-by-step instructions provided in this section are

intended to provide additional, specific guidance for preparing NOIs for AVRLPs. The guidelines address field work requirements, graphic and plan requirements, format suggestions, and filing fee requirements. These guidelines are intended to assist airport managers in preparing thorough and consistent NOIs, and to enable conservation commissioners to efficiently evaluate the completeness of such applications.

A model NOI prepared according to the guidance in this section is provided in Appendix D.

TABLE 9-1
MUNICIPALITIES WITH WETLAND RESTRICTION ORDERS

Coastal Restrictions Act

Barnstable
Brewster
Chatham
Chilmark
Cohasset
Dennis
Duxbury
Edgartown
Essex
Falmouth
Gay Head
Gloucester
Hanover
Harwich
Ispwich
Marion
Marshfield
Mashpee
Nantucket
Newbury
Newburyport
Norwell
Oak Bluffs
Pembroke
Plymouth
Provincetown
Quincy
Rowley
Salisbury
Tisbury
Wareham
Wellfleet
Westport
Weymouth
West Tisbury
Yarmouth

Inland Restrictions Act

Dedham
Dover
Marlboro
Millis
Needham
Newton
Norfolk
Walpole
Waltham
Wellesley
Westwood

Both

Eastham
Hingham
Orleans
Truro
Sandwich

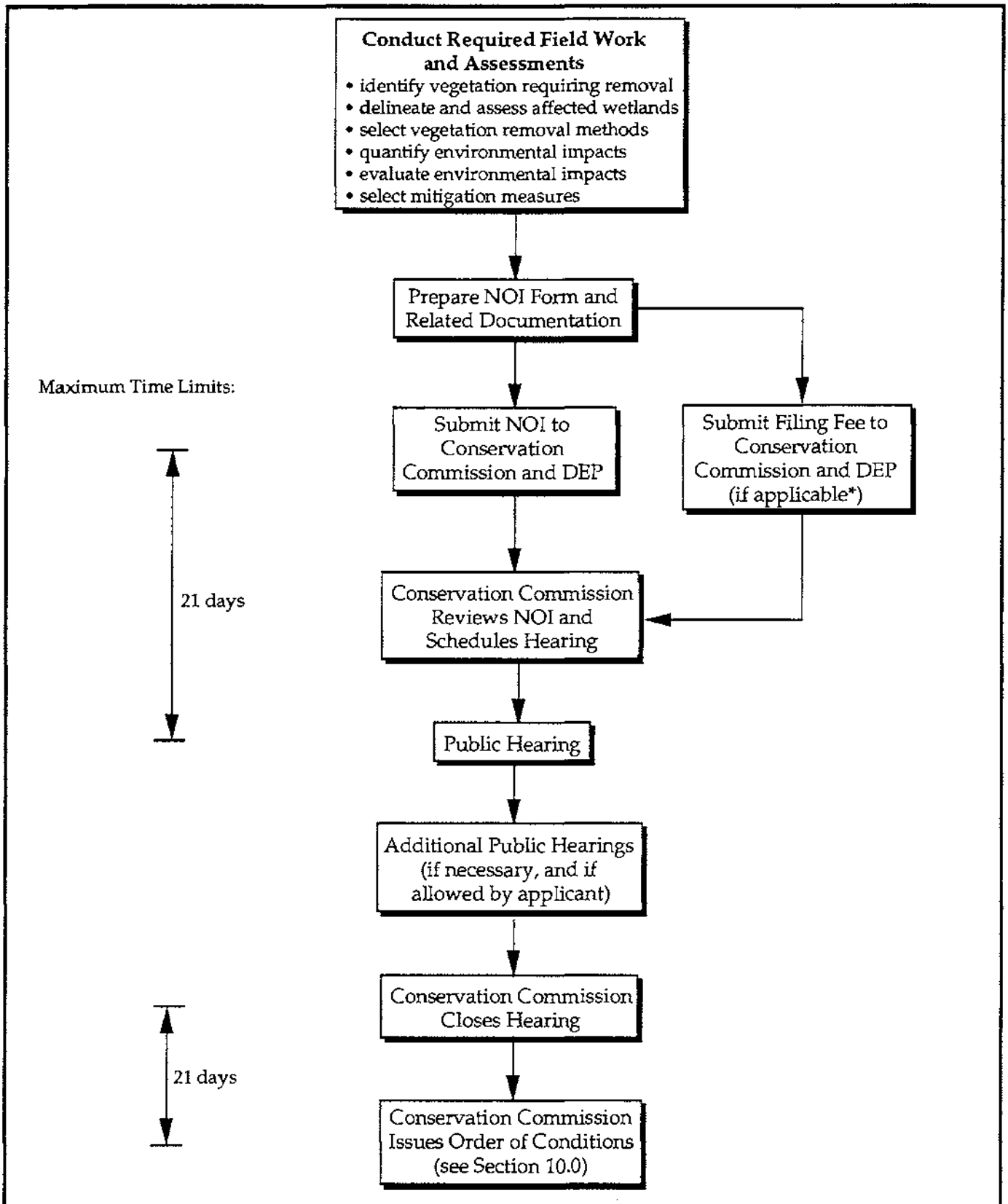
Source: Massachusetts Association of Conservation Commissions

TABLE 9-2
PLANS AND DESIRABLE INFORMATION
TO BE INCLUDED IN THE NOTICE OF INTENT

Plan	Desirable Information	Suggested Data Source
Existing Conditions	Existing topography, north arrow, scale, reference datum, property boundaries, and abutters.	Existing airport layout plans or site survey.
	Man-made structures including buildings, runways, drainage systems, subsurface sewerage disposal systems, underground utilities, easements and rights-of way, and radar complexes.	Existing airport layout plans.
	Wetland boundaries (within 100 feet of any proposed ~~boundary~~ activity).	Surveyed locations of wetland boundary flags; floodplain boundaries from FEMA maps.
Proposed Work	Proposed vegetation removal areas.	Identify areas where vegetation removal is required according to the methods in Section 6.3.2
	Location of access routes and roads, if necessary.	Needs to be determined based on site-specific conditions.
	Location and types of construction-related mitigation measures (e.g., siltation fences, temporary bridges or mats, runoff diversions, temporary drainage structures).	Needs to be determined based on site-specific conditions.
	Construction limits.	Needs to be determined based on site-specific conditions.

TABLE 9-2 (Continued)
PLANS AND DESIRABLE INFORMATION
TO BE INCLUDED IN THE NOTICE OF INTENT

Plan	Desirable Information	Source for Information
Proposed Work (continued)	Stockpiling areas.	Needs to be determined based on site-specific conditions.
	Herbicide and fuel storage and handling areas.	Needs to be determined based on site-specific conditions.
Restoration Plans (if needed)	Proposed replanting schemes. (Plan view and cross sections.)	See Section 7.2.
	Compensatory storage areas (location, topography).	See Section 7.3.6



* Municipalities, DEP and the federal government are exempt from NOI filing fees under 801 CMR 4.02

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CDM Camp Dresser & McKee Inc. Cambridge, Massachusetts

August 31, 1993

FIGURE 9-1
FLOWCHART OF NOI PREPARATION AND FILING PROCESS

10

Section Ten

10.0 ORDER OF CONDITIONS GUIDELINES

10.1 INTRODUCTION

Once a conservation commission has completed their review of the Notice of Intent (NOI) and closed the public hearing, an Order of Conditions approving or denying the project will be issued. When the Order permits the project, it provides specific conditions for the proposed work that must be followed. Since the project approval is contingent on these conditions, they must be followed precisely. It is imperative, then, that Orders of Conditions for airport vegetation removal limited projects (AVRLPs) balance navigation safety and airport operational considerations with wetland resource protection. Inappropriate conditions could jeopardize an airport's ability to meet FAA navigational safety requirements and/or its eligibility for funding.

The purpose of this section is to provide guidelines for developing Orders of Conditions that promote wetland protection without compromising airport operations or navigation safety. The focus of the discussion is on the potential impact of various types of conditions on airport operations or navigation safety considerations. The potential conditions are discussed in groups by subject (e.g., erosion and sedimentation control), resulting in a list of recommended conditions that balance the need for resource protection with navigation safety. A model Order of Conditions, prepared according to the guidelines in this section, is presented in Appendix G. To set the context for the evaluation of potential conditions, Section 10.2 provides an overview of the process for obtaining and complying with an Order of Conditions.

10.2 OVERVIEW OF ORDER OF CONDITION ISSUANCE AND COMPLIANCE PROCESS

Once the conservation commission closes the public hearing, they have 21 calendar days to issue an Order of Conditions approving or denying the project, or to issue a finding of non-significance. In reviewing AVRLPs, conservation commissions should consider whether or not the proposed project, including mitigation measures, will adversely impact the ability of the affected wetlands to protect the interests of the Massachusetts Wetlands Protection Act

(MWPA). If the AVRLP is designed according to the guidelines and recommendations presented in the GEIR, and the NOI is properly prepared, the long-term impacts to the wetland functions and values are not expected to be significant. Thus, it is expected that most AVRLPs will be approved by an Order of Conditions issued by the local conservation commission.

The standard Order of Conditions contains 12 general conditions. Conservation commissions and/or DEP can add "special conditions" for site- and project-specific work. Sites may have complex issues that require imposition of specific conditions to ensure compliance with the performance standards and protection of statutory interests (Colburn, 1992).

There are two common sources of general conditions that conservation commissions use when preparing an Order of Conditions:

- Environmental Handbook for Massachusetts Conservation Commissioners (MACC, 1991); and
- A Guide to Understanding and Administering the Massachusetts Wetlands Protection Act (Colburn, 1992).

The conditions recommended in these two publications were reviewed in terms of their applicability to AVRLPs. Recommended conditions from these sources, revised where necessary, are presented throughout this section. In addition, the conditions that are incompatible with airport management objectives or navigation safety are identified and discussed. In most cases, potential conditions are omitted because they do not apply to AVRLPs.

Once issued, an Order of Conditions is generally valid for three years. Under special circumstances, the conservation commission can issue an Order for up to five years. In addition, the conservation commission may extend an Order for one or more periods of up to three years each. Requests for extensions must be made at least 30 days prior to the expiration of an Order.

Prior to the commencement of work, the Order must be recorded in the Registry of Deeds or the Land Court for the district in which the affected land is located. Certification of recording shall be sent to the conservation commission using the form at the end of the NOI (Form 5).

Once the AVRLP is completed and all of the conditions of the Order have been met, a Certificate of Compliance should be requested in writing from the conservation commission. The conservation commission has 21 days to review the request, inspect the site, and either issue or deny a Certificate of Compliance. If the conservation commission denies the request, they must clearly outline the reasons for the denial so that the applicant can remediate the situation. Once the Certificate of Compliance is issued, the proposed project is considered complete. In many cases, including AVRLPs where periodic vegetation maintenance will be required, the Certificate of Compliance may be issued contingent on specific maintenance conditions. It should be noted that in the rare cases where an AVRLP is permitted under a Superseding Order of Conditions or a variance, the Massachusetts Department of Environmental Protection (DEP) becomes the issuing authority.

The Order of Condition issuance and compliance process is summarized in the flowchart in Figure 10-1.

10.3 DISCUSSION OF POTENTIAL CONDITIONS

10.3.1 STANDARD CONDITIONS

The standard Order of Conditions presented as Form 5 in the regulations (310 CMR 10.99) lists the following general conditions to be included in every Order:

1. *Failure to comply with all conditions stated herein, and with all related statutes and other regulatory measures, shall be deemed cause to revoke or modify this Order.*

2. *This Order does not grant any property rights or any exclusive privileges; it does not authorize any injury to private property or invasion of private rights.*

3. *This Order does not relieve the permittee or any other person of the necessity of complying with all other applicable federal, state or local statutes, ordinances, by-laws or regulations.*

4. *The work authorized hereunder shall be completed within three years from the date of this Order unless either of the following apply:*
   (a) the work is a maintenance dredging project as provided for in the Act; or
   (b) the time for completion has been extended to a specified date more than three years, but less than five years, from the date of issuance and both that date and the special circumstances warranting the extended time period are set forth in this Order.

5. *This Order may be extended by the issuing authority for one or more periods of up to three years each upon application to the issuing authority at least 30 days prior to the expiration date of the Order.*

6. *Any fill used in connection with this project shall be clean fill, containing no trash, refuse, rubbish, or debris, including but not limited to lumber, bricks, plaster, wire, lath, paper, cardboard, pipe, tires, ashes, refrigerators, motor vehicles, or parts of any of the foregoing.*

7. *No work shall be undertaken until all administrative appeal periods from this Order have elapsed or, if such an appeal has been filed, until all proceedings before the Department have been completed.*

8. *No work shall be undertaken until the Final Order has been recorded in the Registry of Deeds or the Land Court for the district in which the land is located, within the chain of title of the affected property. In the case of recorded land, the Final Order shall also be noted in the Registry's Grantor Index under the name of the owner of the land upon which the proposed work is to be done. In the case of registered land, the Final Order shall also be noted on the Land Court Certificate of Title of the owner of the land upon which the proposed work is to be done. The recording information shall be submitted to the _____ on the form at the end of this Order prior to commencement of the work.*

9. *A sign shall be displayed at the site not less than two square feet or more than three square feet in size bearing the words, "Massachusetts Department of Environmental Protection, File Number _____."*

10. *Where the Department of Environmental Protection is requested to make a determination and to issue a Superseding Order, the Conservation Commission shall be a party to all agency proceedings and hearings before the Department.*

11. *Upon completion of the work described herein, the applicant shall forthwith request in writing that a Certificate of Compliance be issued stating that the work has been satisfactorily completed.*

12. *The work shall conform to the following plans and special conditions: [reference conditions on attached pages].*

The first 11 conditions are included in every Order of Conditions regardless of the project type. The 12th condition references any special conditions that the conservation commission may add. Although some of these conditions may not apply to AVRLPs, they do not impact airport operations in any way. Therefore, all of these conditions should be included in an Order for an AVRLP.

10.3.2 CONDITIONS OF PROPOSED LIMITED PROJECT PROVISION

The proposed regulatory revision stipulates that four conditions should be included in any Order issued for an AVRLP pursuant to 310 CMR 10.24 and 10.53. These conditions, and a brief discussion of each, are presented below.

Limited Project Condition No. 1: *There shall occur no change in the existing surface topography or the existing soil and surface water levels except for temporary access roads as necessary.*

This condition will minimize wetland impacts without compromising airport operations or safety, and should thus be included in all Orders for AVRLPs. This condition should be further qualified by defining "topography" as being "surface topography."

Limited Project Condition No. 2: *The removal of trees shall occur only during those periods when the ground is sufficiently frozen, dry, or otherwise stable to support the equipment used.*

Removal of vegetation when the ground is frozen, dry, or otherwise stable enough to support the equipment used may significantly reduce wetland impacts without impacting airport operations. However, many wetlands in Massachusetts rarely, if ever, freeze or dry sufficiently to support heavy equipment. This condition could be interpreted to preclude vegetation removal in such wetlands. It is recommended, therefore, that the condition be reworded to read:

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.

Unless and until the proposed regulations are revised, however, the condition should be used as originally worded.

Limited Project Condition No. 3: *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, Field Office Technical Guide of Standard Practices (Section IV), as amended.*

This condition will minimize wetland impacts without compromising airport operations or safety, and should thus be included in all Orders for AVRLPs. The recommendations for erosion and siltation control presented in Section 7.0 of this document are consistent with the U.S.D.A. guidelines.

Limited Project Condition No. 4: *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 the water body.*

This condition will not adversely affect airport operations, and may therefore be included in Orders for AVRLPs. However, this condition is not likely to significantly protect wetland resources. In some cases, leaving slash along the banks of water bodies and waterways may provide wildlife habitat value. In cases where such actions are desirable to maintain wildlife habitat, this activity should be permitted and therefore the conditions should not be included in the Order. Unless the proposed regulations are revised, the condition should be included in all Orders.

10.3.3 ADMINISTRATIVE SPECIAL CONDITIONS

In addition to the general conditions included in all Orders of Conditions, a number of other general administrative conditions are typically included by conservation commissions. Many of these administrative conditions seek primarily to clarify the standard conditions described above. Such conditions are generally acceptable and should be included in Orders for AVRLPs. However, the following conditions related to administrative issues should be avoided:

- **Unrestricted site access for conservation commissioners.** While the conservation commission should be allowed to inspect the vegetation management areas for compliance, unrestricted access for such inspections on airport property may pose significant safety or liability issues for the airport and the conservation commission. Thus, the condition allowing conservation commissioners to inspect sites for compliance must be carefully worded to include a requirement for prior notification of site inspection in order for the airport manager to arrange access for the conservation commission.

- **Open-ended conditions.** Since all necessary information is expected to be included in each NOI, open-ended conditions requiring additional submissions before work can begin should not be needed. Wherever possible, additional site-specific information requirements should be addressed during the hearing process rather than through an open-ended Order of Conditions. In cases where such conditions are necessary, they should be incorporated only to the extent that they do not delay the project and impede airport operations or navigation safety requirements.

- **Certified plan and document requirements for Certificate of Compliance.** Some potential administrative conditions require written statements from a professional engineer certifying that the work is conducted according to the submitted plans and set conditions, including submission of "as built" plans.

The following administrative conditions are recommended for inclusion in Orders for AVRLPs when applicable:

Administrative Condition No. 1: *All work shall conform to the following submitted support documentation and narrative plans, unless otherwise specified in this Order: [list supporting documentation].*

Administrative Condition No. 2: *Any changes made in the above-described plan unless specified otherwise in this order, which will alter an area subject to protection under the Wetlands Protection Act, or any changes in activity subject to the regulations under G.L. Ch. 131, § 140, shall require the applicant to inquire from this Conservation Commission in writing whether the change(s) is significant enough to require the filing of a new Notice of Intent. Any errors in the plans or information submitted by the applicant shall be considered changes, and the above procedures will be followed.*

Administrative Condition No. 3: *This document shall be included in all construction contracts and subcontracts dealing with the work proposed, and shall supersede any conflicting contract requirements.*

Administrative Condition No. 4: *If any unforeseen problem occurs during construction which affects any of the statutory interests of the Wetlands Protection Act, upon*

discovery, the Conservation Commission or its agent shall notify the applicant immediately, and an immediate meeting shall be held between the conservation commission (or its agent), the applicant (or the applicants representative), and other concerned parties to determine the correct measures to be employed. The applicant shall then act to correct the problems using the corrective measures agreed upon.

Administrative Condition No. 5: *With respect to all conditions except _____ the Conservation Commission designates the Conservation Administrator as its administrative agent with full powers to act on its behalf in administering and enforcing this Order.*

Administrative Condition No. 6: *Any order not recorded by the applicant before work commences may be recorded by the conservation commission at the applicant's expense.*

Administrative Condition No. 7: *Prior to any work on site, the proposed limit of work shall be clearly marked with stakes or flags or plastic construction fences, and shall be confirmed by the Conservation Commission. Such markers will be maintained until all construction on the site's perimeter is complete. Workers shall be informed that no construction activity is to occur beyond this line at any time.*

Administrative Condition No. 8: *The conservation commission and its agents shall have the right to enter and inspect the property for compliance with the Order, the Act, and the Wetlands Protection Regulations (310 CMR 10.00). Because of unique safety concerns at airports, the conservation commission shall provide the applicant with reasonable advance notice of an intended inspection within the confines of airport safety and environmental protection so that proper arrangements can be made.*

Administrative Condition No. 9: *This Order shall pertain to the access roadways, their appurtenances, and drainage facilities directly related to approved tree removal activities. Additional construction of roadways or removal of trees in any area subject to the conservation commission's jurisdiction, shall require the filing of another Notice of Intent and/or Request for Determination or, if appropriate, amendment to this Order following notification of and review by the conservation commission.*

10.3.4 SPECIAL CONDITIONS FOR EROSION AND SEDIMENTATION CONTROLS

Conservation commissions frequently add one or more special conditions related to the provision and maintenance of erosion and sedimentation controls. Specific measures to minimize erosion and sedimentation that are appropriate for AVRLPs were discussed in Section 7.0. Based on this discussion, site-specific erosion control measures will be proposed for each AVRLP as part of the NOI submission. As discussed in Section 7.0, the primary erosion control measures that should be avoided and that, therefore, should not be stipulated in an

Order of Conditions, relate to revegetation with species that may eventually encroach on the Protection Zones (PZs). Where appropriate, proposed vegetation removal areas will be revegetated with species that establish quickly, effectively control erosion, and do not typically grow to heights that will penetrate obstruction-free surfaces. This should be determined on a site-specific basis.

For most AVRLPs, the condition related to erosion control required by the proposed regulatory revision is sufficient. In addition, the following general condition may be added, referencing the erosion control measures proposed in the NOI:

> Erosion Control Condition No. 1: *Erosion and sedimentation controls described in the Notice of Intent and attached plans and documents will be implemented in a timely fashion to protect wetland resource areas.*

However, for AVRLPs that will involve extensive soil disturbance, the additional conditions listed below may be added.

> Erosion Control Condition No. 2: *Proposed erosion and sedimentation control measures shall be implemented and maintained throughout the entire construction phase, and until the site has become stabilized with an adequate vegetative cover.*
>
> Erosion Control Condition No. 3: *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 Condition No. 4: *All final earth gradings shall be permanently stabilized by the application of loam and seed, sod, or vegetation, except for the designated replication or enhancement area and any designated paved area (driveway, sidewalk).*
>
> Erosion Control Condition No. 5: *Where erosion controls have been placed in areas between uplands and certified vernal pools, exposed soils are to be stabilized, and silt fencing or other devices that could block migration of amphibians to and from the pools is to be removed, no later than March 1 if construction has been occurring during the winter, and no later than September 1 if construction has been occurring during the summer. If soils will not be stabilized by these dates, temporary stabilization measures shall be emplaced and sedimentation barriers shall be designed to provide a gradual slope or berm over which amphibians may pass. 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.

10.3.5 STORMWATER MANAGEMENT AND RUNOFF QUALITY CONDITIONS

Control of stormwater runoff volume and quality are important components of wetland protection. For that reason, many Orders contain conditions related to stormwater management and runoff control. Because the proposed activities, conducted according to best management practices outlined throughout this GEIR, will be associated with minimal water quality or flow impacts, such conditions are generally unnecessary and redundant. Two general conditions related to stormwater management and runoff quality that may be appropriate to include in Orders for AVRLPs are:

Stormwater Management Condition No. 1: *Wherever possible, runoff during removal activities shall be directed through vegetated swales before discharging into stormwater control structures.*

Stormwater Management Condition No. 2: *Drainage and flow patterns shall not be significantly altered. Water flow in perennial or intermittent streams shall be maintained at all times.*

10.3.6 FLOOD CONTROL CONDITIONS

Flood control conditions should be included in the Order when bordering or isolated land subject to flooding will be permanently filled, resulting in lost floodwater storage capacity. In such cases, compensatory floodwater storage must be provided according to the guidelines in Section 7.3.6. As previously discussed, loss of floodwater storage capacity related to AVRLPs is unlikely as there will be no permanent filling associated with these projects.

Nonetheless, the following conditions should be incorporated when compensatory storage will be provided:

Flood Control Condition No. 1: *Prior to placement of any fill within the 100-year floodplain, the compensatory flood storage area(s) will be constructed to final grade.*

Flood Control Condition No. 2: *The project must be designed so that the amount of flood storage provided after development is at least equal to that which presently exists under the 2, 10, 25, and 100 year storm. Compensatory storage must be equivalent to that lost at each elevation in one-foot increments, and must be new flood storage in the same reach of the river.*

Flood Control Condition No. 3: *Flood storage must be designed so that a major portion of the detention is provided in areas which have been set aside specifically for that purpose, and which are suitably protected from public access.*

10.3.7 WETLAND RESTORATION AND REPLICATION CONDITIONS

As discussed in Section 6.2 and 7.0, wetland replication will rarely be necessary because AVRLPs will rarely involve permanent loss of wetland functions or values. Some degree of restoration of the disturbed wetland areas may be necessary, though.

The primary issue in terms of wetland restoration conditions is the re-planting of species that will not encroach on the PZs. Thus, conditions requiring affected wetlands to be revegetated with the species which previously encroached on the PZs are unacceptable. Rather, the restoration plans will focus on restoring a low-growing community. In areas near the runway end, herbaceous species may be used to restore the wetland. In areas further from the runway end, herbaceous species and/or low-growing shrubs may be planted. Restoration plans should be developed for disturbed areas, as appropriate, according to DEP guidelines and the guidelines presented in this GEIR. These plans will be included in the NOI. If restoration of disturbed areas is part of the proposed mitigation plan, the Order should stipulate conditions that refer to these plans.

When wetland restoration (or enhancement) is proposed, the following condition should be incorporated in the Order:

Wetland Restoration Condition No. 1: *The wetland restoration or enhancement areas shall be established according to the plans and procedures outlined in the Notice of Intent submitted for this project. Disturbed wetlands should be stabilized and seeded within 30 days of final grading.*

If wetland replication is required, the following conditions should be included in the Order:

Wetland Replication Condition No. 1: *The proposed replacement area shall meet or exceed those General Performance Standards outlined in Section l0.55 (4)(b)l-7 of the Wetlands Protection Act Regulations. Should the replacement area fail to meet any of these standards, the conservation commission may require those measures necessary to achieve compliance.*

Wetland Replication Condition No. 2: *Seasonal groundwater elevations shall be determined for the replacement area by a qualified professional. If adequate groundwater elevations do not exist, a perched groundwater substrate should be created.*

Wetland Replication Condition No. 3: *The proposed wetland replication area of _____ square feet shown on the revised plan maps of _____, sheet ____ of ____, shall be designed and installed according to DEP performance standards (310 CMR 10.55(4)(b)). Construction of the wetland replication area should be supervised by a professional wetlands consultant experienced in wetlands replication.*

Wetland Replication Condition No. 4: *Replicated or enhanced areas shall be monitored on a quarterly basis to ensure that establishment of vegetation has been successful. Monitoring shall occur for a minimum of three years. Results of all monitoring shall be submitted to the Conservation Commission within 14 days after monitoring has occurred.*

10.3.8 CONSTRUCTION CONDITIONS

In addition to the conditions mentioned above, there are a number of general construction conditions that will minimize wetland impacts without compromising navigational safety or airport operations.

One such condition, which should be placed on any AVRLPs, is the following:

Construction Condition No. 1: *During construction for this project, an on-site foreman, directing engineer, or designated construction manager shall have a copy of this Order at the site, shall familiarize himself or herself with the conditions of this permit, and shall adhere to said conditions. The subcontractor shall also have a copy of this Order on site, shall familiarize himself or herself with the conditions of this permit, and shall adhere to said conditions.*

The following conditions should be incorporated if heavy equipment will be used for the vegetation management activities:

Construction Condition No. 2: *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 Condition No. 3: *Construction debris and used petroleum products resulting from maintenance of construction equipment shall be collected and disposed of off-site. No on-site disposal of these items is allowed.*

Construction Condition No. 4: *Servicing equipment (fueling, changing, adding or applying lubricants or hydraulic fluids) must be done outside the Buffer Zone. Equipment must be maintained to prevent leakage or discharge of pollutants. Overnight storage of equipment must be a minimum of 50 feet from the wetland boundary.*

Construction Condition No. 5: *All stream crossings shall be conducted in accordance with the Massachusetts Best Management Practices Timber Harvesting Water Quality Handbook.*

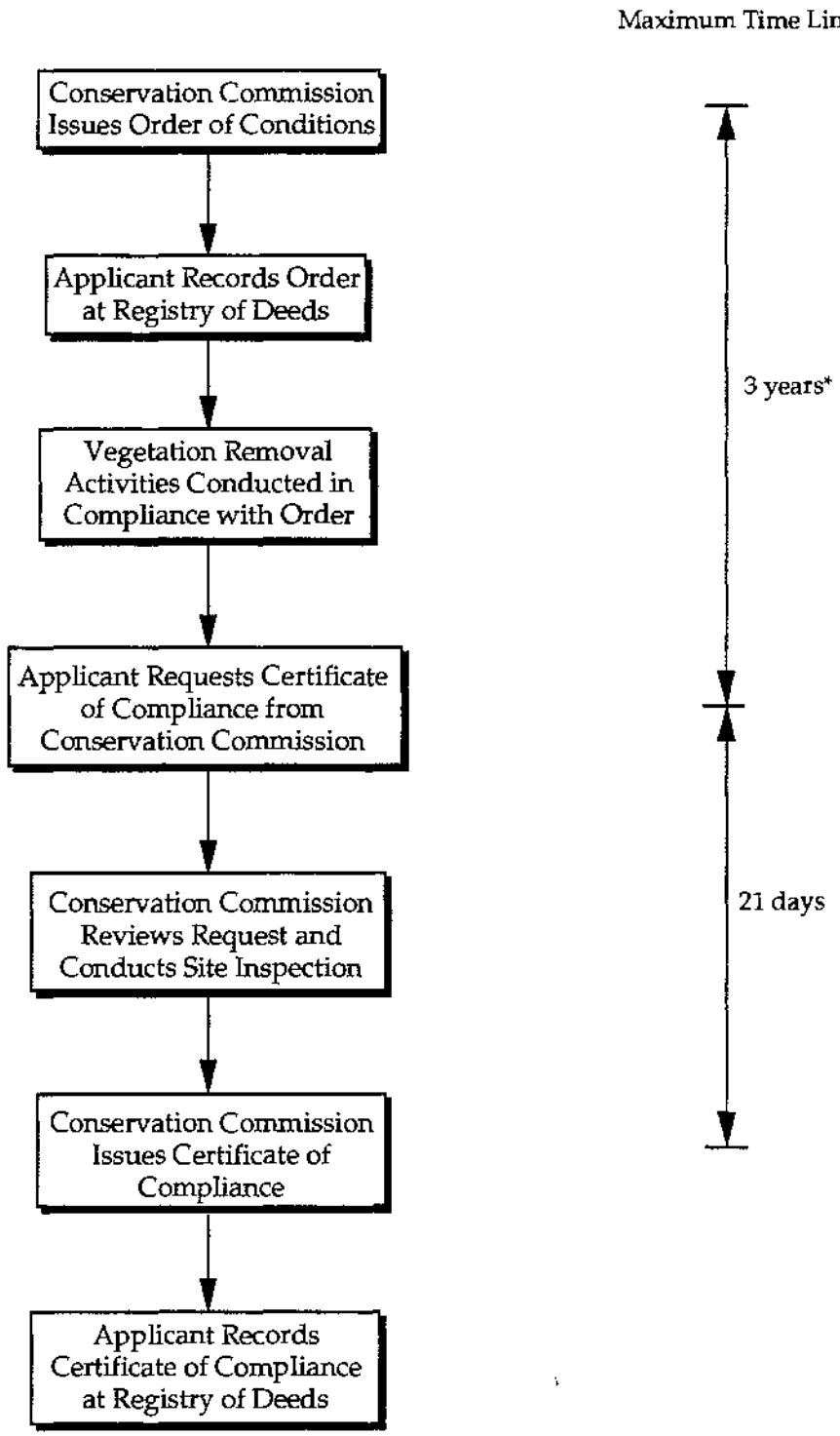
The following condition should be incorporated in the Order if fill material will be used, as in the construction of a temporary access road:

Construction Condition No. 6: *All fill must be stockpiled outside the resource area at least 50 feet from the wetland edge or bank. Precautions shall be taken as necessary to prevent erosion of the stockpiled material.*

10.4 CONCLUSIONS

The conditions presented above will provide the necessary protection for wetland resource areas while allowing airport operators to maintain their PZs and comply with FAA requirements related to navigation safety. It is recommended that these conditions be incorporated directly, as appropriate, into the Order of Conditions for each AVRLP.

A model Order of Conditions, based on the guidelines in this section, is presented in Appendix G for the hypothetical AVRLP described in the model NOI.



* An Order of Conditions is typically valid for three years from its date of issuance, or up to five years if special circumstances warrant. In addition, an Order may be extended for one or more three year periods.

GEIR FOR VEGETATION REMOVAL IN WETLANDS AT PUBLIC USE AIRPORTS

CDM Camp Dresser & McKee Inc. Cambridge, Massachusetts

August 31, 1993

FIGURE 10-1
ORDER OF CONDITION ISSUANCE AND COMPLIANCE PROCESS

Section Eleven

11.0 CONCLUSIONS AND RECOMMENDATIONS

Massachusetts public use airports must comply with FAA regulations related to maintenance of Protection Zones (PZs). Removal of vegetation to comply with these regulations could affect up to 1,348 acres of freshwater wetlands at public use airports, representing approximately 0.29% of Massachusetts total wetland resources. It should be emphasized that this is a worst case estimate of the potential area of alteration. Of this potentially affected area, approximately 1,282 acres are forested wetlands and 66 acres are scrub-shrub wetlands. Most of the alterations from airport vegetation removal limited projects (AVRLPs) will be related to a change in plant species composition rather than to an actual loss of wetland resources. Emergent wetlands and salt marshes are not expected to be significantly affected by these projects.

It is important to note that the proposed regulatory revision will not in any way increase the extent or magnitude of wetland impacts at Massachusetts airports from the vegetation removal activities. The proposed vegetation removal is required in order to comply with federal and state regulations, regardless of whether or not it is allowed under a limited project provision. Since AVRLPs will invariably be able to meet the overriding public interest test described in 310 CMR 10.58, they would inevitably be allowed under the variance process. Approval of the provision will simply help to streamline the process and allow project approval at the local level for most airport vegetation removal projects.

In addition to evaluating the potential generic and statewide impacts associated with AVRLPs, this GEIR provides detailed guidance related to all aspects of AVRLPs. Specifically, this guidance includes the following components:

- **Guidelines for identifying vegetation removal needs at each airport.** Section 6.3.2 of this document provides an overview of potential methods for identifying obstructing vegetation that must be removed in order to comply with FAA regulations.

- **Guidelines for identifying and delineating wetland resource areas that will be affected by vegetation removal activities.** All wetland areas located in or within 100 feet of the vegetation removal areas must be identified and delineated using appro-

priate DEP methodologies and policies, which are summarized in Section 6.3.3 of the GEIR.

- **A detailed discussion of potential vegetation removal alternatives, and guidelines for selection of an appropriate removal method.** Section 5.0 addresses various vegetation management and the "No Action" alternatives. Each alternative is evaluated in terms of the environmental, economic implications, and maintenance considerations. Specific guidelines are provided in Section 5.5 for selecting an appropriate method at each airport. In addition, modified guidelines are provided for AVRLPs in sensitive areas.

- **Guidelines for quantifying and assessing site-specific wetland impacts.** Section 6.3.4 provides guidelines for quantifying the impacts due to vegetation removal and related activities such as access road construction; and Section 6.4 provides a methodology for evaluating site-specific wetland impacts. As part of this methodology, a wetland impact evaluation checklist is provided. The evaluation prepared by following this checklist will become an integral component of each airport vegetation removal NOI.

- **A detailed discussion of potential short-term and long-term impact mitigation measures that may be applicable to AVRLPs.** The following potential measures are discussed in Section 7.0 in terms of economic implications, effectiveness, and feasibility:

  Short-Term Impact Mitigation Measures:
  - Erosion and sedimentation controls
  - Wetland restoration
  - On-site wetland enhancement
  - Herbicide application guidelines
  - Contaminant spill contingency plans

  Long-Term Impact Mitigation Measures:
  - Wetland replication
  - Off-site wetland enhancement
  - Mitigation banking
  - Development restrictions
  - Monitoring
  - Compensatory flood storage

  The short-term impact mitigation measures are expected to be most applicable to AVRLPs, as most wetland impacts from these projects will be short-term. Table 7-1 and Figure 7-1 provide specific guidance for selecting mitigation measures to control the anticipated impacts.

- **Guidelines for preparing Notices of Intent (NOIs) for AVRLPs.** These guidelines, which are provided in Section 9.0, address field work and data collection requirements, filing form selection and preparation, and graphic and attachment needs. A model NOI for a sample AVRLP, prepared according to these guidelines, is presented in Appendix D.

- **Recommended conditions for inclusion in Orders of Conditions for AVRLPs.** These conditions achieve a balance between wetlands protection, airport operations, and navigation safety requirements. A model Order of Conditions for the sample airport, prepared using the recommended list of conditions in Section 10.0, is presented in Appendix G.

- **An overview and typical outline for vegetation management plans (VMPs), addressing the long-term vegetation management needs in airport PZs.** Because FAA will not fund a large-scale vegetation removal project in an area that was previously cleared using FAA funds, long-term vegetation maintenance must be provided in all cleared areas. Section 8.0 of the GEIR details the objectives of a VMP, typical elements and an outline of a VMP, and guidelines for updating the plan and preparing yearly operational plans.

By following the guidance contained in this GEIR, the following primary objectives will be accomplished:

- Public safety will be promoted by allowing removal of obstructions from PZs in wetlands in a timely and cost-effective manner.

- Environmental impacts from vegetation removal in wetlands will be minimized through careful selection of appropriate removal techniques and mitigation measures.

Once the Secretary of the Executive Office of Environmental Affairs approves the GEIR, and DEP adopts the GEIR guidance as Department policy, then the proposed limited project provision will become effective.

After the limited project provision becomes effective, managers (or their representatives) of those airports requiring vegetation removal in wetlands will begin preparing NOIs and conducting related field work and assessments, according to the guidance in this document. In addition, where appropriate, vegetation management plans may be prepared using the recommended guidelines for long-term vegetation maintenance in the affected areas. When the

NOIs are submitted to the local conservation commissions, the commission members should review them in the context of this GEIR. Once their review is completed, the Order of Conditions should be prepared in accordance with the recommendations and guidance in this document.

By following the guidelines and recommendations documented throughout this GEIR, AVRLPs will be able to proceed under a streamlined environmental review process, without significantly impacting Massachusetts wetland resources. Because of the critical public need for airport vegetation removal projects, they would ultimately be allowed through the variance process. The ultimate benefit of the proposed regulatory revision, which will allow AVRLPs to be approved at the local level, can be achieved only if the revision greatly expedites the approval of these critical projects without unwarranted conditions. This expedited approval will enhance the airports' ability to protect public safety, and will lessen the review burden on Massachusetts state agencies.