Massachusetts Best Management Practices and Guidance for Freshwater Mosquito Control

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Compiled and edited by:

University of Massachusetts - Amherst
Department of Natural Resources Conservation

Massachusetts Department of Agricultural Resources
State Reclamation and Mosquito Control Board

Massachusetts Department of Environmental Protection
Bureau of Resource Protection

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The design of this manual draws extensively from the *Massachusetts Forestry Best Management Manual* developed by Kittredge and Parker (1995). We wish to thank these authors for their permission to use materials from this manual. Additionally, this manual draws extensively from the ditch maintenance procedures and policies developed by the Northeast and Norfolk Mosquito Control Districts.

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1. WHY BMPs (BEST MANAGEMENT PRACTICES)?

Mosquito control in Massachusetts is overseen by the State Reclamation and Mosquito Control Board (SRMCB) (http://www.mass.gov/agr/mosquito/). Mosquito control is conducted in communities that are members of a regional mosquito control district. Mosquito Control Districts (MCDs),[1] acting under the authority of the SRCMB and MGL Chapter 252, work directly with local communities to control mosquito infestations and thereby alleviate a nuisance, protect public health and promote quality of life for those communities. Recognizing the various public benefits of mosquito control programs, there is also the need to understand and minimize unnecessary impacts to wetland resources that may result from these activities. Integrated Pest Management (IPM) techniques for mosquito control may involve wetlands management, including, but not limited to, physical alterations to resource areas. Wetlands management, as an IPM technique, is designed to minimize wetland impacts. Mechanical and hand clearing techniques are implemented on a site-specific basis and while some techniques may eliminate areas of temporary standing water, others may simply improve drainage and ebb flows through the surrounding floodplain. These activities may sometimes disturb stream banks and/or the surrounding resource areas.

The purpose of this guidance is two-fold. First, it is designed to provide recommended practices for proper planning of freshwater mosquito control activities, consistent with applicable regulations. Second, it provides MCD personnel with a set of *Best Management Practices* (BMPs) for freshwater mosquito control activities involving wetlands management that will help minimize disturbance to stream banks and surrounding resource areas and control sediment discharges that may cause unnecessary impacts to:

- Wetland resources and adjacent areas,
- Drinking water supplies, and
- Fish and wildlife habitats**.**

The need for this manual was identified, in part, from recommendations made in the 1998 Generic Environmental Impact Report (GEIR) developed for mosquito control by the State Reclamation and Mosquito Control Board within the Department of Agricultural Resources, (DAR). The Final GEIR was required of the SRMCB by the Massachusetts Environmental Policy Act (MGL Ch.30A § 61). The Secretary's certificate on the GEIR required that the SRMCB provide periodic updates on issues involving source reduction methods, including the results of working with the water quality certification program and Natural Heritage and Endangered Species Program to improve notice and record keeping practices and minimize potential negative impacts from source reduction activities in wetlands and other resource areas. This guidance serves as an update on the dialogue between these programs.

[1] The term Mosquito Control District (MCD) includes those entities established as Mosquito Control Projects by their enabling legislation e.g. Norfolk County Mosquito Control Project.

It also outlines agreed upon steps that can be taken to allow these programs to achieve their respective goals and legislative mandates. In addition to providing better protection for wetland resources, BMPs for freshwater mosquito control activities by MCDs involving wetland management may also reduce the need for other kinds of mosquito management activities such as larviciding and adulticiding.

This document is designed for use by mosquito control personnel to guide them in planning and implementing freshwater mosquito control activities. The attached appendices provide standardized documents for site plans, notification, and documenting complaints and/or evidence of mosquitoes.

The success and effectiveness of these BMPs depends on mutual cooperation between MCD's, the SRMCB, local governments, and the regulatory community. Timely and responsive communication among these groups is important to the success of these efforts.

2. PLANNING

Comprehensive mosquito control planning is the **most important BMP, and the first to consider**: For any freshwater mosquito control activity that involves mechanical wetlands management, the following five steps are recommended to MCDs:

A. Complete the Mosquito Control *Complaint and Documentation Form* (Appendix 1) to document the presence or conditions likely to support mosquito breeding;

B. Review legal requirements for the proposed work site;

C. Prepare a *Site Plan* as described on page 10 (see sample *Site Plan* in Appendix 2);

D. Notify affected property owners and local, state, and federal agencies of the planned activity. (See sample Appendix 3); and

E. Monitor the effectiveness of the activity and environmental impacts of mosquito control work.

Following these five steps will help to ensure that all applicable regulatory requirements are met and that the activity implements the appropriate BMPs to minimize impacts to wetland resource areas. Proper notification will promote better communication among MCDs and environmental agency staff, as well as the general public interested in the benefits of the MCD activity. Monitoring provides a means to evaluate the success of the activity and information for how to improve future activities.

A. Identifying the Need for the Mosquito Control Activity in Freshwater Wetlands

Documentation of the need for mosquito control at a particular activity site should include:

- Description of the causes and effects of the mosquito breeding habitat on site (i.e., sediments, blocked culverts);
- Evidence as recorded in Mosquito Control *Complaint and Documentation Form* (Appendix 1) of mosquito breeding or infestation from one or more of the following sources:
  - Previous larviciding site records;
  - Larvae / adult data from field sampling and dip counts;
  - Aspirations of adult mosquitoes or landing counts (at the discretion of the field technician);
  - Complaints from residents or public officials; and
  - Observations from mosquito control personnel as recorded including site conditions that are conducive to mosquito breeding.

B. Review of Legal Requirements for Proposed Activities in Freshwater Wetlands

Once the need for the activity has been established, the legal requirements for mosquito control activities in wetland resource areas should be evaluated.

The State Reclamation and Mosquito Control Board (SRMCB) was established by MGL Ch.252 (Improvement of Lowlands and Swamps statute) and incorporated provisions of Ch. 199 and 699 of the Acts of 1960. This state board is housed within the MA Department of Agricultural Resources (DAR) and has authority under this law to:

1. To drain or flow a meadow, swamp, marsh, beach or other low land held by two or more proprietors,

2. To remove obstructions in rivers or streams leading thereto or there from, and

3. To eradicate mosquitoes in **any** area infested thereby, including, in respect to each such purpose, purposes incidental thereto, such improvements may be made as provided in this chapter.

Many state environmental statutes specifically exempt mosquito control work authorized under the provisions of M.G.L. c. 252, including, most notably, M.G.L. c. 131, § 40 (Wetlands Protection Act) and M.G.L. c. 40, § 8C, (Conservation Commission Authority).

MDCs should also review the applicability of legal and regulatory requirements of other programs, such, but not limited to, the following:

1. Federal Law:

The U.S. Army Corps of Engineers (USACE) regulates and requires a permit for all work in navigable (tidal) waters under Section 10 of the Rivers and Harbors Act, with almost all work requiring written authorization. Activities subject to Section 10 (33 U.S.C. 403) include construction, excavation, or deposition of materials in, over, or under such waters, or any work, which would affect the course, location, condition, or capacity of those waters. In addition, the Corps regulates and requires a permit for the discharge of fill in waters of the U.S. under Section 404 of the Clean Water Act, which includes fill associated with mosquito ditches in tidal and non-tidal wetlands under Corps jurisdiction. Waters of the U.S. include jurisdictional wetlands as defined in 33 CFR 328.3(b). (See: http://www.usace.army.mil/cw/cecwo/reg/33cfr328.htm) Fill material is defined in 33 CFR 323.2 (e) (1). (See:http://www.usace.army.mil/cw/cecwo/reg/laws/Def_of_Fill_Rule.pdf)

In Massachusetts, the mosquito control activities under jurisdiction of the Corps are subject to the terms and conditions outlined in the Massachusetts Programmatic General Permit (PGP). (See: http://www.nae.usace.army.mil/reg/mapgp.pdf)

A Corps July 2004 mosquito-ditching letter (See: http://www.nae.usace.army.mil/reg/MosquitoDitchingGuidanceLetter.pdf) provides guidance on regulated vs. non-regulated activities commonly employed by the mosquito control districts.

For a complete review of specific 404 requirements and additional guidance, contact the New England District of the United States Army Corps of Engineers at: http://www.nae.usace.army.mil/reg/index.htm

2. State Law:

a. 401 Water Quality Certificate

Section 401 of the Clean Water Act requires States to confirm that federally permitted projects comply with state water quality standards. Such confirmations are issued in the form of "401" Water Quality Certificates.
Work in freshwater wetlands is exempt from the requirements of a Section 401 Water Quality Certificate IF:

- The activity does not involve fill (e.g. side-casting) ***OR***
- The activity involves fill in "waters of the US" but the activity qualifies as a Category 1 (i.e. < 5,000 square feet of fill) activity under the Corps'

Massachusetts Programmatic General Permit (the "PGP"). See the PGP requirements at: (http://www.nae.usace.army.mil/reg/mapgp.pdf)

Work in freshwater wetlands is subject to the requirements of Section 401 Water Quality Certificate IF:

- The activities alter or temporarily impact wetland areas that do not qualify for Category I (e.g. > 5,000 square feet of fill or in stream activities conducted between October 1 and June 30) under the Massachusetts Programmatic General permit (Note: some areas < 5,000 square feet may be regulated by the USACOE if the wetlands are considered to be historically significant or constitute federal special aquatic sites)
- Any activity resulting in any discharge of dredged or fill material to any Outstanding Resource Water, isolated vegetated wetland identified as habitat for rare and endangered species per 314 CMR 9.04 (see: http://www.massgov/dep/water/laws/regulati.htm#wqual)

Outstanding Resource Waters (ORWs)

Water Quality Certificates are also required for activities involving the discharge of dredged or fill materials in water resources classified as *Outstanding Resource Waters* (ORWs) by the MA Department of Environmental Protection (MassDEP) at 314 CMR 4.04. ORWs include those waters deemed to comprise outstanding socio-economic, recreational, ecological and/or aesthetic values. Any new or increased discharge into an ORW is prohibited unless a 401 *Water Quality Certification* is obtained from MassDEP. Specific restrictions to work in ORWs include:

- No discharge of dredge or fill material into wetlands or waters are allowed within 400 ft of the high water mark of a Class A surface water that is used as a source of public drinking water.

- No discharge of dredge or fill material is allowed to a *Certified* vernal pool.

- Wetlands bordering Class A, B, SB or SA *Outstanding Resource Waters* are designated as ORWs to the boundary of the defined area.

The locations of designated ORWs (http://www.state.ma.us/mgis/orw.htm) should be reviewed by MCD personnel to determine if the site falls within an area designated as an ORW. When required, a 401 *Water Quality Certification* is issued by the appropriate regional MassDEP office. The MCD and the appropriate MassDEP Regional Office should work cooperatively to effectuate project objectives and compliance with permit conditions. For regional office addresses, see: http://www.mass.gov/dep/about/region/findyour.htm)

b. Rare and Endangered Species

The Massachusetts Endangered Species Act (M.G.L. c.131A) and its implementing regulations (MESA, 321 CMR 10.00) establish procedures for the listing and protection of state-listed plants and animals. The MESA regulations include project review filing requirements for projects or activities that are located within a Priority Habitat of State-listed Rare Species ("Priority Habitat"). The MESA is administered by the Natural Heritage and Endangered Species Program (NHESP) of the MA Division of Fisheries & Wildlife, and prohibits the "take" of state-listed species. The "take" of state-listed species is defined as "in reference to animals, means to harass, harm, pursue, hunt, shoot, hound, kill, trap, capture, collect, process, disrupt the nesting, breeding, feeding or migratory activity or attempt to engage in any such conduct, or to assist such conduct, and in reference to plants, means to collect, pick, kill, transplant, cut or process or attempt to engage or to assist in any such conduct. Disruption of nesting, breeding, feeding or migratory activity may result from, but is not limited to, the modification, degradation or destruction of Habitat" (321 CMR 10.02).

MDCs should consult the most recent edition of the *MA Rare & Endangered Species Habitat Atlas* to determine if a proposed project will occur within *Priority Habitat* and the relevant NHESP guidance information to determine if direct filing with pursuant to the MESA is required.

If a filing with the NHESP is required, filing should consider access, egress, spoil/soil deposition or spreads or other activities related to the project occur within *Priority Habitat*, and then the MCD should send the required information to the NHESP review pursuant to the MESA. In general, the Site Plan should include sufficient detail and mapping to clarify the location of all work areas and the form of work (e.g., mechanical work or hand work).

- Within 30 days of receiving a filing, the NHESP will provide a response letter indicating whether or not the submission is complete. If the submission is complete, the NHESP will provide a letter determining if the project will result in a "take" within 60 days of the date of posting of the first letter. (321 CMR 10.18)**.**

- In this letter, the NHESP will determine whether or not a project, as currently proposed, will (a)avoid a "take" as proposed, or with conditions and may proceed without further review, or (b) will result in a "take" of State-listed Rare Species and cannot proceed as proposed (321 CMR 10.23).

- If a project is determined to result in a "take" then it may be possible to redesign the project to avoid a "take". If such revisions are not possible, then projects resulting in a "take" may only be permitted if they qualify for a MESA Conservation & Management Permit (321 CMR 10.23).

- The *MA Rare &Endangered Species Habitat Atlas* is currently available as a bound book, a compact disk with electronic viewer technology, as downloadable data for Arc View from MassGIS, and online using the MassGIS viewer. Details are available at: http://www/mass/gov/dfwele/dfw/nhesp/publications/nhesp_pubs.htm

- The NHESP's mailing address for MESA reviews can be found at: http://www.mass.gov/dfwele/dfw/nhesp/regulatory_review/reg_review_contats.htm

c. Certified Vernal Pools

A vernal pool is a confined basin depression which, at least in most years, holds water for at least two continuous months during the spring and/or summer, and which is free of adult fish populations. These areas often provide essential breeding habitat for amphibians such as wood frogs and spotted salamanders as well as for certain kinds of invertebrates. Certified vernal pools are classified as *Outstanding Resource Waters*, and, as such, require a *Water Quality Certification* from Mass DEP when work resulting in a discharge of dredged or fill material is proposed in them. Certified vernal pools are those that have been verified through fieldwork and certified by NHESP. For certified vernal pool locations, MCDs should review the most recent edition of the "*Massachusetts Natural Heritage Atlas*" http://www.mass.gov/dfwele/dfw/nhesp/nhesp.htm.

- Typical permit conditions will require that MCDs avoid all work in certified vernal pools and establish a 50-foot filter strip around vernal pools in which no disturbance to the ground vegetation is allowed. Creation of ruts deeper than 6 inches within 200 feet of a vernal pool should also be avoided as they represent barriers to amphibian migration.

d. Water Supplies

For work within the watersheds of the Quabbin, Ware River, or Wachusett Reservoir water supplies, a permit may be required from the Department of Conservation and Recreation (DCR) Division of Water Supply Protection (see: http://www.mass.gov/dcr/aboutDCR.htm). For watershed locations, see: http://www.mass.gov/dcr/waterSupply/watershed/water.htm.

e. Areas of Critical Environmental Concern

An *Area of Critical Environmental Concern* (ACEC) is an area containing concentrations of highly significant environmental resources that has been formally designated by the Secretary of Energy and Environmental Affairs. Environmental features that these critical areas may include range from wetlands and water supply areas to rare species habitats and agricultural areas. The designation directs state

environmental agencies to take actions to preserve, restore and enhance the resources of an ACEC, and is intended to encourage and facilitate stewardship.

As required by the ACEC regulations, state environmental agencies are directed to administer programs, revise regulations, and review Project Sites subject to their jurisdiction in order to preserve, restore, and enhance the resources of an ACEC. The *Massachusetts Environmental Policy Act* (MEPA) and the associated regulations (301 CMR 11.00) require review of activities within ACECs that need certain state permits, use state funding, or involve state agency actions. The purpose of a MEPA review within an ACEC is to ensure that the proposed projects will avoid or minimize adverse impacts to the resources of the ACEC. As of October 2007, 28 ACECs covering approximately 241,000 acres in 73 municipalities have been designated. Special care should be taken to protect these sensitive areas. http://www.mass.gov/dcr/stewardship/acec/acecs.htm.[2]

f. Massachusetts Environmental Policy Act

An Environmental Notification Form (ENF) must be obtained from the MA Executive Office of Environmental Affairs, in accordance with the Massachusetts Environmental Policy Act (MEPA), 301 CMR 11.00, if:

- The activity is within an *Area of Critical Environmental Concern* (See: http://www.mass.gov/dcr/waterSupply/watershed/water.htm) and a state permit or funding is required for the activity.
- If a state permit or funding as described above is required and a MEPA threshold, found at 301 CMR 11.03, is exceeded, (see MEPA regulatory thresholds at: http://www.mass.gov/envir/mepa/thirdlevelpages/meparegulations/meparegulations.htm) For example, new ditch construction exceeding 5,000 square feet of BVW would likely require submittal of an ENF. Maintenance of existing ditches is likely exempt from this requirement as Corps jurisdiction for ditch maintenance projects is determined on a site by site basis, using best professional judgment, and taking into account the wetland functions and values.

g. Chapter 91: Waterways Regulations

As provided in the waterway regulations at 310 CMR 9.04(1)(e), projects require review if they occur below the high water mark of any non-tidal river or stream on which public funds have been expended for stream clearance, channel improvement, or any form of flood control or prevention work, either upstream or downstream within the river basin, except for any portion of any such river or stream which is not normally navigable during any season, by any vessel including canoe, kayak, raft, or

[2] The original ACEC designations or subsequent ACEC Resource Management Plans and wetland restoration plans for these areas should be reviewed. Those covering large marsh or wetland area may specifically include mosquito control activities as part of their respective management plans.

rowboat. If mosquito control activities are subject to these provisions, see: http://www.mass.gov/dep/water/approvals/ch91wo.doc for instructions and http://www.mass.gov/dep/water/approvals/ch91apwo.doc for a copy of the applicable waterway license application form.

C. Completing the Site Plan

The next step in the planning process is for MCD personnel to complete the *Site Plan* (Appendix 2) for each site where mechanized wetlands management activities are proposed. The purpose of the *Site Plan* is to guide mosquito control personnel in planning and implementing work in freshwater wetlands whose objective is to control mosquitoes. The *Site Plan* also should provide sufficient information to determine whether the activity meets regulatory requirements. The *Site Plan* can include site-specific information on the following: project purpose, sensitive areas, current and proposed site conditions, proposed alteration, BMPs, and plan map.

1. Site Information and History

This section of the *Site Plan* provides information on the MCD proposing the management activity in freshwater wetlands and general background information on the site including:

- Location;
- MCD preparing the *Site Plan*;
- Present and Past (if known or different) land use in the area of activity (i.e., suburban, industrial, agricultural, open space).

If known, the history of prior work (i.e., ditch maintenance or previous freshwater wetlands management activities) at the site location is helpful to determine U.S. Army Corps of Engineer jurisdiction over ditch maintenance activities. Evidence of previous ditch maintenance may be demonstrated to be "reasonably evident" from one or more of the following sources:

- Physical evidence, such as spoil deposits, soil profiles, tree stumps, structures, etc.
- Historical evidence such as municipal, state, or mosquito control records, aerial photographs, or maps; evidence of historic stream channel.
- Documented recollection of residents, abutters, or public officials, etc.

2. Purpose of Freshwater Wetland Work

- Identify the type of work proposed;
- Mosquito breeding documentation

3. Identification of Sensitive Area

- Identify the presence of sensitive areas that may trigger regulatory review.

4. Documentation of Site Conditions

A variety of pre-existing site conditions should be documented on the *Site Plan*, including:

- Natural stream **channel** or constructed **ditch**
- Channel/Ditch type (main, lateral, sub-lateral);
- Hydrology of channel/ditch flow (intermittent or perennial, if known)
- Wetland vegetation present (i.e., forested, shrub, emergent, wet meadow or open water);
- Cross section dimensions of current channel/ditch profile at no greater than 100 foot intervals, but in all cases a minimum of two profiles, including:
  a. Top and bottom channel/ditch widths;
  b. Depth of channel/ditch from top of bank;
  c. Side slope ratios;
  d. Locations of existing spoil deposits.

- Soil profile within the channel to depths sufficient to document the depth of organic and, if applicable, mineral layers. Core samples to be taken at 100 ft intervals with hand auger.
- Indicate staging areas, access points, and locations where removed material will be disposed if deposited within wetland resource areas.
- Representative, dated photographs of the site taken from established, fully recoverable set points depicted on accompanying maps.

5. Proposed Alteration and BMPs

This section of the *Site Plan* provides a description of the proposed work at the site, detailing the following:

- Tentative proposed start assumed to be 30 days from the written notice date or the stated specific date or date range;
- Estimated length/area and type of each ditch/wetland resource area being altered (length expressed in feet and area in square feet);
- An estimate of the amount of spoil to be removed from each ditch, expressed in cubic feet;
- Location of spoil deposition if left in wetland resource areas;
- Estimated cross section dimensions of finished ditch profile, including:
  a. Top and bottom channel widths;
  b. Depth of channel from top of bank;
  c. Side slope ratios if altered from original profile;

Identify all BMPs to be used for vegetation removal, sediment disposal, erosion and sedimentation control. Indicate location of BMPs on the site map.

6. Site Plan Maps

Two maps are needed as part of the *Site Plan*. The first map is a section of the USGS quadrangle map of the area showing the location of the proposed site. Additionally, a plan, aerial photo from MassGIS, or computer-generated map of the site should be included (See Appendix 2). This map should include:

- Named cross streets, gravel or paved roads (annotated);
- Known feeder streams or water conveyances into the site;
- All set-points (i.e. location and orientation) used for photographs;
- Known natural and human-made hydrologic connections (i.e., pond outflows, streams, culverts);
- Location of certified vernal pools, if present;
- Aerial and/or ground-based photographs or digital images depicting features requiring mediation. Location and direction or bearing (north, south, east, or west – upstream or downstream) of photographs should be marked on the accompanying maps.

D. Notification

Notification of the appropriate parties regarding the proposed activity serves to:

- Enhance communications between property owners and abutters, and local, state and federal agencies;
- Save time by avoiding misunderstandings;
- Build public support for mosquito control work in the community.

Notification of mechanical wetlands management activities should consist of:

- Sending a *Standard Notification* by mail and / or e-mail thirty (30) calendar days prior to initiating work. The Notification should include a narrative, an aerial photograph or other site plan map, and the section of the USGS topographic map depicting the site location (See: Appendix 3) and any supporting documentation to:

  a. Conservation Commission: Voluntary notification to the applicable Conservation Commissions is recommended even though MCD work is exempt as authorized by Chapter 252 MGL;
  b. Public Water Supply Authority, if necessary;
  c. Appropriate Regional MassDEP office to the attention of the Wetlands & Waterways Program http://www.mass.gov/dep/about/regional.htm;
  d. District Office of the U.S. Army Corps of Engineers;
  e. Natural Heritage and Endangered Species Program, if applicable.

- Relevant notification information is also recommended to be sent to the following:

a. All property owners or persons legally in control of property where work is to be conducted;
b. Dig Safe and any non-member utility companies (e.g. Municipal Water/Sewer Departments and State Highway Departments) prior to excavation.

- Posting of a sign at the site, visible from the nearest public way, will include the MCD name, pertinent contact information and a reference that work is being conducted pursuant to MGL Chapter 252

3. BEST MANAGEMENT PRACTICES

A. Vegetation Disturbance

An important BMP goal of any wetlands management activity is to minimize unnecessary disturbance to vegetation. This will reduce the potential for erosion and sedimentation into the water body and help to maintain water quality and wildlife and fisheries habitats.

- Locate access and travel pathways where feasible to avoid steep slopes, wetland resource areas, and certified vernal pools, while minimizing loss of vegetation.
- All reasonable efforts should be made to minimize soil erosion and loss of bank stability.

It may be more cost effective and efficient to maneuver along a longer access path to minimize erosion. The pathway with the least impact may involve having the machinery work from opposite banks along different segments. To the extent possible and practical:

- Use environmentally sensitive low-ground pressure equipment and hand clearing when and where feasible for the purpose of equipment and work access.
- Minimize tree cutting and, if possible, focus access areas in grass and shrub areas.
- If at all possible, avoid the operation of heavy equipment directly within the channel.
- Work should proceed with appropriate sediment control structures in place. See the section relating to sediment containment in channels for more information. Excavation of the channel is limited to the historic grade, dimensions and channel course as described in *Site Plan.*

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- All disturbed banks and access pathways should be graded and stabilized by reseeding and / or planting with native species and /or mulching to resist erosion after the activity is completed. See the section on *Erosion and Sedimentation Control* below for more information.

As part of any MCD's effort to control mosquitoes by the improvement of stream flow and restoration of stream channel characteristics, and to the extent practicable, consideration should be given to preserving natural conditions and promoting fish habitat. Naturally deposited wood in streams is very important to stream ecology and can provide fish habitat to promote natural predation. If MCD activities involve placement of a new culvert, construction standards are required to conform to the stream crossing standards contained in Appendix E: Massachusetts River and Stream Crossing Standards of the Massachusetts Wildlife Habitat Protection Guidance for Inland Wetlands –, March 2006. See link: http://www.mass.gov/dep/water/laws/wldhab.pdf. While not required, consideration should also be given to these standards for activities involving culvert replacement, maintenance and repair.

B. Cut Vegetation

- Trees and brush (slash) should only be cut as necessary to allow safe transport and work space for mechanized equipment and personnel during mosquito control activities. If feasible, cut vegetation should be removed from the wetland. Slash that cannot be removed from the site should be placed on upland areas rather than wetland areas, unless removal will result in significant additional wetland impacts as defined by the ACOE, or cause significant additional slash. Because piles of slash represent a fire danger, slash should be spread out or chipped instead of piled. In proximity to stream channels, slash should be chipped or deposited in a manner or location where movement towards the waterway is unlikely. Consideration should also be given to slash disposal that avoids the spread of invasive species. To reduce negative aesthetic impacts, slash should not be left in close proximity to the outer edge of a highway.

C. Sediment Disposal

- Sediments excavated from the channel or bank should be deposited in such a manner to prevent reentry into the water body.
- If possible, excavated sediments should be deposited on an adjacent upland and the deposition of excavated sediments in wetlands should be avoided. Sediment deposition on adjacent wetlands may trigger federal 404 jurisdiction and possible state 401 reviews. The following practices are recommended for soil management beyond wetland jurisdiction:
  - Mineral soils should not be removed from channels unless they impede the water flow and cause the channel to deviate from the original configuration. If excavated, these mineral soils should be deposited off site. Alternatively, they may be placed on *upland* areas, spread thinly and graded for proper runoff.
  - Road sand removed from channels should be deposited off site. On-site sand disposal may be placed on upland areas outside wetland

resource areas (e.g. 200 feet beyond stream banks if possible), spread thinly, and graded for proper runoff.

- On-site upland stockpiling of sediments is not recommended, however, provided appropriate erosion control structures are used when necessary - stockpiles for the purpose of dewatering for removal or stockpiling of material while waiting for the availability of equipment for relocation is acceptable. See the next section on *Erosion Control* for more information.

D. Erosion & Sedimentation Control

Wetland management activities for mosquito control may result in impacts to adjacent and downstream wetland resources. Increased turbidity and loss of vegetative cover could affect water quality as well as the habitat for a variety of organisms. Erosion control measures are recommended when necessary, to reduce the potential for sediments entering the water body during the work phase, inactive periods (e.g., overnight, on weekends or during down times), and the post-work phase. Numerous erosion control techniques are available, some of which are described in the *Western Massachusetts Streambank Protection Guide: Handbook for Controlling Erosion in Western Massachusetts Streams.* Franklin, Hampden, & Hampshire Conservation District, Northampton, MA 1998. The *Massachusetts Erosion and Sediment Control Guidelines for Urban and Suburban* Areas may also be consulted. See: http://www.mass.gov/dep/water/esfull.pdf. The appropriate erosion control measure should be selected to prevent the potential for erosion and increased turbidity into nearby water bodies.

The use of checkdams is recommended when necessary, for in-channel sediment control. A variety of materials may be used for checkdams depending upon site-specific conditions. These materials include stone, coir, rice, straw or other fiber rolls, burlap and straw or hay bales. The proper selection of the checkdam composition should be based upon the water velocity in the channel. For example, the use of stone checkdams is recommended for higher velocity channels. For lower velocity channels, it may be feasible to block a downstream culvert with a permeable barrier. Filter material such as burlap fencing or piled burlap will decrease the velocity enough to cause sediments to be deposited upstream of the barrier while allowing the water to pass. If straw or hay bales are used, they should be placed in trenches about 4 inches deep, staked to the ground in two places, and placed with there ends (just not corners) abutting each other. If silt fencing is used, the lower edge should be placed in a 4-inch trench, which is then backfilled with soil. Straw or hay bales and silt fence may be used down slope of a disturbed area to keep water-carrying sediments from entering the water body.

- If sediment builds up behind the sediment control structures during construction, it must be removed periodically to maintain necessary effectiveness.

- Inspection of the site should occur during or immediately after a rainstorm to determine the effectiveness of sediment control measures and to correct or repair the controls if they are ineffective or have need of repair.
- After the disturbed site is stabilized, clean out collected sediments before removing all sediment control structures.

E. Monitoring Project Effectiveness

Although disturbed areas typically re-vegetate naturally, site restoration and stabilization may be accelerated by reseeding or mulching. . The following erosion control and soil stabilization measures are encouraged and may be employed based upon specific site conditions such as steepness of slopes, soil types, vegetation, thickness of soil deposits, and proximity of deposits to the channel. Stabilization methods may include:

- Mulching limits surface erosion, suppresses weeds, retains soil moisture and can add some organic material to soil. As a major source of invasive exotic species, the use of hay should be discouraged unless it is certain that it was obtained from a local site free of invasive species. A thin layer of wood chips or straw (if available)-may be used. Straw is effective for erosion control and can be spread by hand or broadcast from machine. However, straw can be blown by the wind so in exposed areas should be anchored. It can be punched or crimpled into the soil by hand with a rake or mechanically.

- When possible a small-vegetated buffer strip (approximately 3-4 feet wide) should be left between the channel bank and the spoil deposits.

- Silt fencing or straw bales may be used site specifically (see previous recommendations). Do not leave the bales or fence in place as a permanent erosion control structure as these may serve as a barrier to wildlife movements.

- Disturbed soils may be reseeded. Grasses and other herbaceous cover can stabilize bare soil and minimize erosion. Native seed source is preferable for re-seeding. A compromise alternative is to use plants that germinate quickly to stabilize soils, but are not highly aggressive and will not persist or spread. In the meantime, the soil is immediately stabilized, and the regrowth of native vegetation is allowed to progress. Several options are commercially available:

Seed mixture[a]	Lbs/acre	Lbs/1,000ft^2	Soil pH range
Domestic ryegrass	20	0.45	4.5-7.5
Creeping red fescue, Redtop, Tall fescue	20 2 20	0.45 0.05 0.45	4.5-7.5

Recommended seeding times are from April 15 to June 15 or August 1 to September 15. However, winter rye may be used as a temporary cover and seeds between August 15 and October 15.

- MCD staff should conduct periodic inspections during the first two months after completion of the activity to document any deficiencies in erosion control and to recommend maintenance requirements.

- As part of each periodic inspection, MCD staff shall correct all deficiencies promptly.

In addition to monitoring the stability of the BMPs, the MCDs will survey the project site during their standard site inspections to insure the BMP practice is effective in the short and long term. The MCDs and other state agencies will continue to work towards augmenting the post-project monitoring data they currently collect to addresses environmental concerns.

E. Stormwater Best Management Practices and Mosquito Breeding

Thorough review of proposed designs, proper implementation during the construction phase, routine inspections of operation, and regular maintenance will not only provide better stormwater protection but also discourage the use of these areas by vector species. In addition, scheduled maintenance intervals provide an opportunity to control mosquitoes at the site by the use of effective larvicides by credentialed professionals. For a list of specific stormwater design, operation, and maintenance practices to reduce the likelihood of mosquitoes breeding in Stormwater treatment BMPs, see: *Stormwater Management: Volume Two Stormwater Technical Handbook* (2008). http://www.mass.gov/dep/water/laws/policies.htm#storm

As discussed in MassDEP's 2008 Stormwater Management handbooks and in the Wetlands Protection regulations (310 CMR 10.05(6)(k)9), the owners of the property that develop the stormwater BMPs, or municipalities that "accept" them through local subdivision approval, are responsible for their operation and maintenance to insure that the stormwater BMPs are operating effectively. Although the SRMCB and its mosquito control districts and projects are not responsible for the operation and maintenance of stormwater BMPs, these structures can be included in the MCDs larvicide treatment plans. MCDs will alert local Municipalities when they encounter poorly maintained BMPs.

4. Acknowledgments

Curtice R. Griffin – University of Massachusetts
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Thomas Maguire – Massachusetts Department of Environmental Protection (DEP)
Michael Stroman - Massachusetts Department of Environmental Protection (DEP)
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John Kenny – Massachusetts Department of Agricultural Resources (DAR)
Mark S. Buffone – Massachusetts Department of Agricultural Resources (DAR) & State Reclamation and Mosquito Control Board (SRMCB)
Timothy Deschamps – Central Massachusetts Mosquito Control Project
Nicole Granger – Central Massachusetts Mosquito Control Project
Caroline E. Haviland – Norfolk County Mosquito Control Project
David Henley - East Middlesex County Mosquito Control Project
Amanda Hope – Central Massachusetts Mosquito Control Project
Priscilla Matton – Bristol County Mosquito Control Project
Walter Montgomery – Northeast Massachusetts Mosquito Control & Wetlands Management District
Gabrielle Sakolsky - Cape Cod Mosquito Control Project
Emily DW Sullivan – Northeast Massachusetts Mosquito Control & Wetlands Management District

5. Literature Cited

Department of Environmental Protection, Commonwealth of Massachusetts. 1997. Stormwater Management, Volume II: Stormwater Technical Handbook. Publication No. 1781–250–1800–4/97-6.52-C.R. Boston. http://www.state.ma.us/MassDEP/brp/stormwtr/files/swmpolv2.pdf

Department of Food and Agriculture, Commonwealth of Massachusetts. 1998. Final Generic Environment Impact Report.

Appendix 1
Mosquito Control Complaint and Documentation Form

Larviciding Records ☐ Mapped Larviciding Site ☐

Field Personnel's Observation Notes ☐

_____

_____

_____

_____

_____

Residents/Public Officials Complaints ☐

Name Date

_____

_____

_____

Subject of Complaint (Comments)

_____

Larvae or Adult Mosquitoes Observed at Site ☐
Dipper Data (see attached sheets) ☐

Comments / Date(s)

_____

_____

Appendix 2

Site Plan for Mechanized Wetlands Management Activities

Date: / /

Site Information:

Location Preparer of Plan

Town(s) _____ District/Project name _____

Road(s) _____ Mailing address _____

_____

Contact _____

Approx. start date: ____/____/____ Phone: _____

Work Purpose *(check all that apply)*

❑ Mosquito Control ❑ Sediment removal ❑ Culvert replacement

❑ Drainage or flood control ❑ Stream bank Restoration ❑ Obstruction removal

Mosquito Observation Data **(check all that apply)**

❑ Previous Larviciding ❑ Dip counts ❑ Landing counts ❑ Complaints

❑ Observations of field personnel

Additional comments:

_____

Sensitive Areas

Site work area checked for occurrence of:

- ❑ Rare & endangered species - *MA Natural Heritage Atlas*
- ❑ Certified vernal pools - *MA Natural Heritage Atlas*
- ❑ Outstanding Resource Waters – MassGIS *Map of Outstanding Resource Waters* (http://www.state.ma.us/mgis/orw.htm)
- ❑ Areas of Critical Environmental Concern – Appendix 7

If any of these sensitive areas occur at the work site, refer to regulatory requirements section of the *MA Mosquito Control BMP and Guidance for Freshwater Mosquito Controll* and indicate location on site work map.

Erosion Control, Soil Stabilization & Sediment Containment (ESS)

Indicate location on map →	**ESS-1**	**ESS-2**	**ESS-3**	**ESS-4**
Straw bales				
Silt fences				
Reseeding				
Mulching				
Straw/Hay bales in water channel				
Water quality swales				
Sediment traps				
Planting				
Other:				

Additional Comments:

_____

_____

_____

_____

Proposed Alteration

Total length (ft) _____ Total spoil removed _____ (approx. cubic yards)
Mineral: _____ (c.y.) Organic: _____ (c.y.)

Location of proposed spoil deposits: (indicate on site plan map)

_____

Approximate Area (sq. ft) of spoil displaced to wetland

_____

Site Conditions

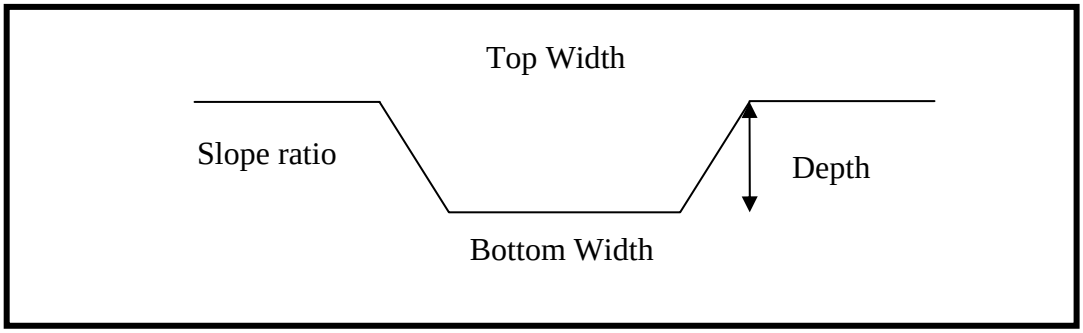
Ditch type _____Linear ft _____ Flow _____Wetland type(s) _____

Codes: **Ditch type:** **Flow:** **Wetland type:**

MA Main IT Intermittent FO Forested EM Emergent OW Open water

LA Lateral PE Perennial SH Shrub WM Wet meadow

SL Sub lateral



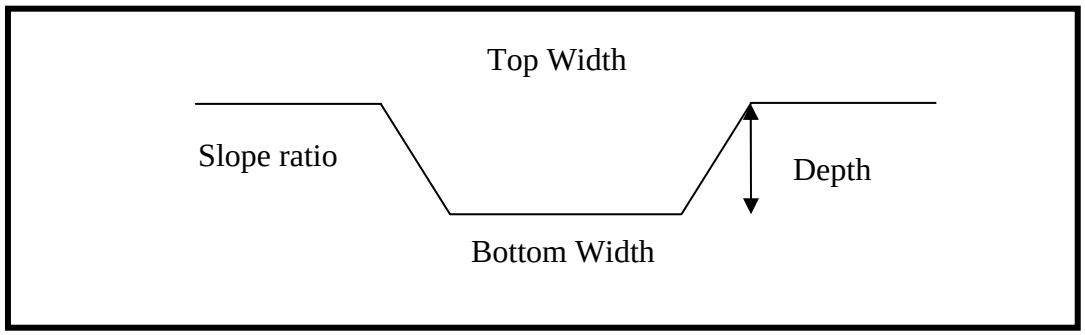
Dimensions	Existing	Proposed
Top width		
Slope ratio		
Depth		
Bottom width		

Comments:

Site Conditions

Ditch type _____ Linear ft _____ Flow _____ Wetland type(s) _____

Codes:	**Ditch type:**	**Flow:**	**Wetland type:**		
	MA Main	IT Intermittent	FO Forested	EM Emergent	OW Open water
	LA Lateral	PE Perennial	SH Shrub	WM Wet meadow	SL Sub lateral



Dimensions	Existing	Proposed
Top width		
Slope ratio		
Depth		
Bottom width		

Comments:

_____

_____

_____

_____

Proposed Alteration Summary (Include if more than 1 ditch)

Ditch Type	Number	Total Cubic Yards Displaced	
		On Wetland	On Upland

Total Cubic Yards Displaced _____ On Wetland
Total Cubic Yards Displaced _____ On Upland

Comments:
_____
_____
_____
_____
_____
_____
_____

Soil Profile (representative)

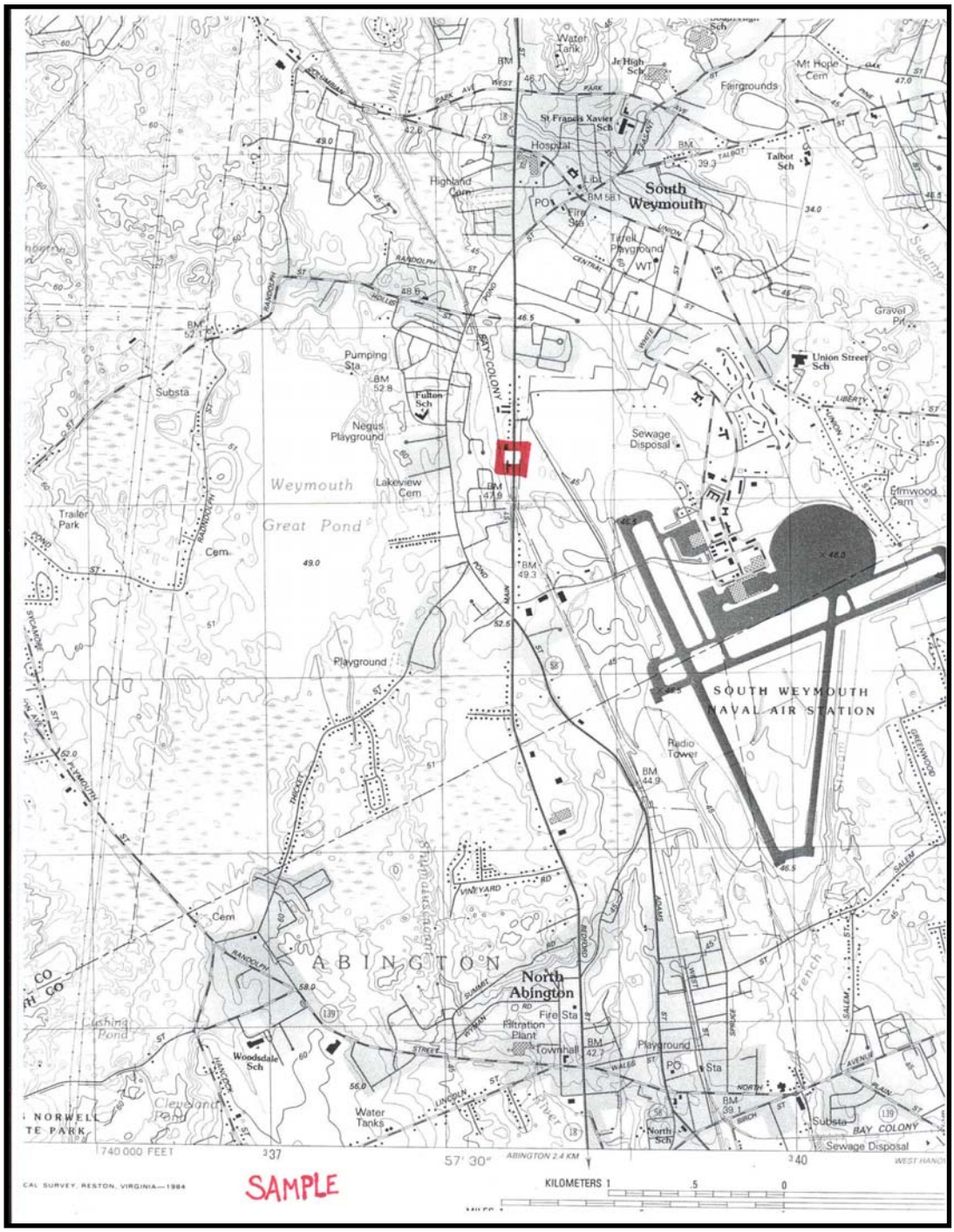
Organic Depth: _____ (inches) Mineral (if applicable): _____ (inches)

Notes: (Types, Colors, Hydrology, etc)

_____
_____
_____
_____

Site Plan Map

Submit both a copy of the USGS Topographic map with site circled and attach a copy of the Site Plan Map (i.e. aerial photograph or MassGIS if available) depicting the site location and proposed work with the Standard Notification Form to the appropriate Department. The photo should include the following information marked on it at a minimum: equipment access points (name nearby streets), approximate locations of all work areas, locations of erosion control (ESS) measures implemented (from previous section above), and locations of dredge spoil deposits.



Appendix 3

MCD Letterhead

Date

Municipal Conservation Commission
Street
City/Town, MA Zip

Re: Site # Mechanized Ditch Maintenance Project

Dear _____,

The (Specific MC District/Project) is proposing wetlands management activities as described below in compliance and accordance with Chapter 252 of the General Laws of the Commonwealth of Massachusetts on the site indicated on the attached topographic map in City/Town, Massachusetts.

Site number i.e. (NW0801 or 524A Methuen) involves a brief, but detailed description of the freshwater activity including: the reason for site selection (i.e. Public Official/Municipal Department or Commission, Resident, MCD Personnel) location (Town, street names, direction of ditch or stream in relation to street) estimated length of ditch to be maintained, and any additional information each district/project deems necessary.

The Notification may include a unique statement [i.e. although exempt from the Commission's jurisdiction, we invite inspection and comments, welcoming the opportunity to address any concerns that the Commission may have in regards to the proposed activity on this site. Please feel free to call me at the number listed above.]

If we do not hear from the Department / Commission within 30 days after the date of this notice, we will assume that there are no concerns regarding the proposed activity on this site and work will tentatively commence thereafter / specific date / date range.

Respectfully,

Name
Title (ex. Wetlands Project Coordinator)

Enclosed Location Map and Site Plan Map

Additional Notification furnished to:
US Army Corps of Engineers
MA Department of Environmental Protection (proper) Regional Office