

February 15, 2010

Secretary Ian Bowles.
Executive Office of Energy and Environmental Affairs
Attn: MEPA Office
100 Cambridge Street, Suite 900
Boston, MA 02114

**Subject: Final Environmental Impact Report
Aberjona River Flood Mitigation Program
Winchester, Massachusetts
EEA File No. 13046**

Dear Secretary Bowles,

On behalf of the Town of Winchester Board of Selectmen, we are pleased to submit this Final Environmental Impact Report (FEIR) for public review and comment in accordance with 301 CMR 11.07 and the EEA Secretary's Certificate on the SDEIR dated April 20, 2007. The proposed Flood Mitigation Program consists of a set of structural measures and best management practices intended to reduce the frequency and intensity of backwater flooding of the Aberjona River in Winchester while mitigating potential impact to downstream communities. The proposed improvement detailed in Alternative 8, or the FEIR Alternative, of the enclosed document will also help alleviate flooding in downstream communities and establish a set of regulatory and BMP measures intended to prolong the life of the structural elements proposed.

Enclosed are three copies of the FEIR each containing existing conditions information, alternatives analyses, impact analyses, and mitigation measures. Also enclosed in each document (Appendix A) is the FEIR distribution list. The FEIR is being circulated per the requirements of 301 CMR 11.16(3), the Secretary's Certificate on the SDEIR, and MEPA policy regarding the distribution of electronic and paper copies of filings. A copy of the letter sent to the recipients of digital copies is enclosed.

Should you have any questions, please feel free to contact me. Requests for public copies should also be directed to me at 978-589-3000.

Yours sincerely,



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Senior Wetland Scientist
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cc: FEIR Distribution List (FEIR Appendix A)
Mel Kleckner, Town Manager, Winchester
Winchester Board of Selectman
Mark Twogood, Asst. Town Manager, Winchester
Wade Welch, Town Counsel, Winchester



Environment

Prepared for:
Town of Winchester
Winchester, Massachusetts

Submitted by:
AECOM
Westford, MA
60133265
February 12, 2010

Massachusetts Environmental Policy Act
Final Environmental Impact Report
EOEA File No. 13046
Aberjona River Flood Mitigation Program
Town of Winchester, MA

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Final Environmental Impact Report
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Town of Winchester, MA**



Prepared By Jacob San Antonio, PE



Reviewed By Beth E. Rudolph, PE
Winchester Assistant Town Engineer



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April 20, 2007

CERTIFICATE OF THE SECRETARY OF ENERGY AND ENVIRONMENTAL AFFAIRS
 ON THE
 SUPPLEMENTAL DRAFT ENVIRONMENTAL IMPACT REPORT

PROJECT NAME : Aberjona River Flood Control Program
 PROJECT MUNICIPALITY : Winchester
 PROJECT WATERSHED : Mystic River
 EOE A NUMBER : 13046
 PROJECT PROPONENT : Town of Winchester
 DATE NOTICED IN MONITOR : February 20, 2007

As Secretary of Energy and Environmental Affairs (EOEEA), I hereby determine that the Supplemental Draft Environmental Impact Report (SDEIR) submitted on this project **adequately and properly complies** with the Massachusetts Environmental Policy Act (G. L. c. 30, ss. 61-62H) and with its implementing regulations (301 CMR 11.00). The proponent may submit the Final EIR for MEPA review.

Project Description

Low-lying areas adjacent to the Aberjona River in Winchester have been subject to flooding throughout history. This flooding has been exacerbated by an increase in stormwater flows resulting from development (upstream and within Winchester) over the past 20 to 30 years and a number of structures that restrict the River's flow, including dams, culverts and siphon chambers. The Town of Winchester estimates that 5 storms in the past 10 years have caused approximately \$20 million in flood damage. The goal of this project is to minimize economic losses from damaging floods by eliminating constrictions and undertaking projects to improve flow and capacity

The Aberjona River source waters begin in Reading and flow southward through Woburn and Winchester. It drains approximately 27.5 square miles of urban land. Horn Pond Brook is its largest tributary and its water level is controlled by Scalley dam. Farther downstream, it flows into the Upper Mystic Lake, where its level is controlled by a series of 6 spillways owned and operated by the Department of Conservation and Recreation (DCR). The Aberjona River is classified among the most polluted water bodies in the state and is considered a High Stress basin by the Water Resources Commission (WRC). Pollution sources include unionized ammonia, nutrient enrichment and low dissolved oxygen and pathogens. Within Winchester, the watershed is generally 20-40 feet wide and ranges from wide, flat natural areas to constricted flow through culverts. During normal, dry-weather flow, the typical depth in the river is 1 to 3 feet and less than one foot in the flattest part of the River. The flow of the river is lower upstream (about .5 feet per second (fps)) and higher downstream (about 1 fps in some locations).

The SDEIR presents a program of 10 flood improvement projects. The projects consist of a range of structural solutions including widening and deepening the river channel and replacing bridge spans and installing and/or replacing culverts to facilitate water flow. Projects 3, 5, 12 and 13, described below, have been completed or partially completed and are included in the baseline modeling. Since the filing of the ENF, five of the previously proposed widening projects and Project #15 Davidson Park Upstream were eliminated. Except where noted, the Town of Winchester is the project proponent. The SDEIR indicates that proposed projects should be constructed from downstream to upstream to minimize impacts.

#1 Wedgemere Train Station: Widening of the channel from 19 feet to 30 feet by relocating a Massachusetts Water Resources Authority (MWRA) siphon. The project will be funded and constructed by the MWRA.

#2 Waterfield Road to Bacon Street: Widening and deepening of the channel to a uniform 39-ft bottom width (from the current 10 to 20 ft width) for 1,210 linear feet from Waterfield Road to Manchester Road. The U.S. Army Corps of Engineers (ACOE) will design and permit this project for the Town and is evaluating design alternatives. The project has been revised to eliminate widening, and associated wetland impacts, from Manchester Road to Bacon Street. The design will include a low-flow channel and bank restoration.

#3 Center Falls Dam: Replacement of two existing 30-inch gate valves and discharges located on either side of the Center Falls Dam with 5-foot by 5-foot butterfly gates and 4-foot by 6-foot discharge boxes. This project was permitted in 2002, prior to the filing of the ENF, and one valve has been replaced.

#4 Mount Vernon Street Bridge Improvements: Installation of a 9-foot by 12-foot by-pass culvert within the riverbank to improve flow without changes to the structure of the historic bridge.

#5 Shore Road: Addition of an 8-foot by 4-foot culvert adjacent to existing 6-foot by 15-foot culverts to reduce constrictions. This project was completed in 2002 prior to the filing of the ENF.

#6 High School Playing Field: Installation of an additional 7-foot by 15-foot box culvert beneath the playing fields.

#8 Swanton Street Bridge Improvement: Expansion of the existing 10-foot by 16-foot bridge opening to a 10-foot by 25-foot opening either by rebuilding the structure or constructing a parallel culvert.

#10 Railroad Bridge Near Muraco School: Installation of two 7-foot diameter conduits under the MBTA railroad to supplement the exiting 6.5-foot by 7-foot bridge openings.

#12 Dam Upstream of Railroad Bridge Near Muraco School: Removal of the dam. This was completed in 2002 prior to the filing of the ENF.

#13 Cross Street Culvert: Installation of a 5-foot by 12-foot supplemental box culvert.

The SDEIR indicates that the projects, without adequate mitigation, would increase the 100-year flood elevation by .2 feet in the Lower Mystic and Alewife Brook over existing conditions. Such an increase is likely to have significant impacts on the extent of the floodplain. The SDEIR identifies four off-site projects that can mitigate the impacts of this flood control project and address existing flooding problems along the Mystic River and Alewife Brook. These include: a doubling in size of the spillway of the Scalley Dam (owned by the City of Woburn), to manage peak flows more effectively and prevent overtopping; removal of constrictions at Craddock Locks (Main Street Bridge) in Medford, which is owned by the Department of Conservation and Recreation (DCR) and the City of Medford; redesign of the outlet structure at the Mystic Lakes Mid-Lakes Dam (replacement of existing stop log bays with two 7x6 foot sluice gates and incorporation of a fish ladder), owned by DCR; and operational changes to pumping at the Amelia Earhart Dam, also owned and operated by DCR. Based on modeling presented in the SDEIR, implementation of the project and proposed mitigation could reduce flood stages along Alewife Brook below existing conditions.

The project, as proposed, will alter approximately 1,000 sf of bordering vegetated wetlands (BVW), 1,720 sf of inland bank, 87,720 sf of land under water (LUW), and 21,500 sf of riverfront area. The alteration of BVW is entirely associated with Project #2. In addition, Project #2 is located entirely within land owned by DCR adjacent to the Mystic Valley Parkway which is listed on the National Register of Historic Places. The widening of the channel will result in a change in use and physical control to Article 97 parkland owned by the Commonwealth.

Permits and Jurisdiction

The project is undergoing MEPA review and requires the preparation of an EIR pursuant to Section 11.03 (3)(a)(1)(a) and 11.03 (3)(a)(2) because it requires a state permit and it may require a variance in accordance with the Wetlands Protection Act (WPA). The project requires a 401 Water Quality Certification from the Department of Environmental Protection (DEP), Access Permits from DCR, disposition or a change in use of parkland in accordance with Article 97, and 8M permits from the Massachusetts Water Resources Authority (MWRA). A Section 404 permit is required under the Federal Clean Water Act (CWA) from the ACOE. Also, it

requires an Order of Conditions from the Winchester Conservation Commission (and a Superseding Order of Conditions from DEP if the Order is appealed) and a variance under the Wetlands Protection Act (WPA).

Because the project is funded, in part, by the state, MEPA jurisdiction extends to all aspects of the project that may cause significant Damage to the Environment including wetlands, water quality, drainage, dredging and dredged materials management, wildlife habitat, open space, historic resources and construction period impacts.

Procedural History

An ENF for this project was filed in May, 2003. The ENF proposed 17 flood improvement projects including five projects that would widen the river channel to 30 to 40 feet. Also, the proponent requested a Phase I waiver for three of the proposed projects (4, 13 and 17) which, if granted, would have allowed Phase I of the project to proceed prior to preparing the EIR for the entire project. A Certificate was issued on June 30, 2003 detailing the Scope for the EIR and denying the waiver request.

In November, 2003, the proponent filed a Notice of Project Change (NPC) requesting a Phase I waiver for a single project (13). The NPC provided additional analysis of potential impacts and mitigation. The Secretary's Certificate on the NPC was issued on February 23, 2004 and a Final Record of Decision (FROD) was issued on March 26, 2004 allowing Phase I to proceed prior to the filing of the DEIR.

In February, 2006, the proponent filed the Draft EIR. The proponent was required to develop the SDEIR to address insufficient information regarding wetland impacts, Article 97 impacts, stormwater management and dredging.

Review of the SDEIR

The SDEIR provides an improved understanding of the proposed project, its benefits and its environmental impacts. It provides an updated project description and identifies the permits and approvals required for each individual project. The SDEIR includes an assessment of existing conditions including: topography, geography and soils; wetland resource areas; sediments; water quality; rare species and wildlife habitat; open space and recreational resources; and historic and archaeological resources. It identifies environmental impacts and describes efforts to significantly reduce wetlands and dredging impacts and an increased commitment by the Town of Winchester to evaluate and implement flood storage projects and stormwater management to ensure that the benefits provided by the flood reduction project are not eroded over time.

The hydrologic/hydraulic model for the entire Mystic River Basin has been refined based on comments and ongoing peer review conducted by an independent consultant for the Federal Emergency Management Agency (FEMA). A model verification run was performed for the May 2006 storm event and was calibrated to the USGS Alewife gauge. With the exception of the observed and simulated discharge at Alewife Brook, it appears that model predictions closely match observations. The SDEIR indicates that FEMA, using this model as a basis, will distribute

a flood study report and maps illustrating the revised floodplain for public review in May or June of 2007. While the model may require further refinement, it appears that it can be used with reasonable confidence to assess the relative impacts of project alternatives and identify the need for and effectiveness of mitigation measures.

The SDEIR includes additional analysis of project alternatives, provides maps illustrating the impacts on Winchester's floodplain for the 50-year and 100-year storm and characterizes the effects of predicted floodplains on the community based on a Level of Service (LOS) analysis (similar to that used for traffic analysis) for buildings, roadways and channels. For the LOS analysis, LOS C is considered acceptable while LOS F represents a poor LOS or where flooding is predicted for all design storms considered. Of the 50 locations studied, 22 (44%) were identified as LOS D or F, 10 (20%) were identified as LOS C and 19 (36%) were identified as LOS A.

As required, the following alternatives were analyzed: 1. No Action (Existing Conditions); 2. Upstream Watershed Management; 3. Complete 100-year Flow Conveyance; 4. Aberjona River Conveyance Improvement (ENF Alternative); 5. Modified Aberjona River Conveyance Improvement (DEIR Alternative); 6. BMP Alternative; 7. SDEIR Alternative; 7a. SDEIR without Project #2; 7b. SDEIR without Upstream and Downstream Mitigation; 7c. SDEIR Alternative without Scalley Dam; and 7d. SDEIR Alternative with and without Winchester BMPs. The SDEIR Alternative, which includes the suite of flood control projects, modifications to Scalley Dam, removal of constrictions at Craddock's Locks, re-design of the Upper Mystic Lakes Dam planned by DCR, operational changes at the Amelia Earhart Dam and stormwater BMPs, is identified as the Preferred Alternative.

The modeling clearly identifies the benefits of various alternatives and identifies the effectiveness of mitigations strategies. It indicates that the SDEIR Alternative will provide equivalent benefits to the DEIR Alternative in terms of reducing the effects of predicted floodplains while significantly reducing environmental impacts. Implementation of the Preferred Alternative will decrease the locations identified as LOS D or F from 22 to 13 (44% to 26%) and of the 13 elements, 10 elements will improve from an F to a D. It indicates that a watershed wide BMP Alternative alone would not effectively address flooding impacts and would not eliminate or reduce the need for the proposed structural improvements. The BMP Alternative would decrease the elements identified as F or D from 22 to 20 (44% to 40%) and of the 20 elements, only 1 element would improve from an F to a D. It indicates that the SDEIR Alternative without Project #2 would decrease the number of substandard elements from 22 to 16 (44% to 32%) and of those 16 elements, only 6 elements improve from an F to a D. Compared to the Preferred Alternative that provides a to a 1.5 foot decrease in the 100-year floodplain in downtown Winchester, it would provide a .5 foot decrease.

The modeling indicates that without the upstream and downstream mitigation projects, flood elevations would increase in the lower Mystic and Alewife Brook by at least .2 feet over existing conditions and floodplain benefits within Winchester are reduced compared to Alternative 7. It would decrease the number of substandard elements from 22 to 15 and of those 15, 10 will improve from an F to a D. It shows that the Scalley Dam project can reduce flood stages along the Aberjona downstream of the confluence with Horn Pond Brook by .3 feet in the 100-year flood and can reduce flood stages within Horn Pond Brook by approximately 0 to 1

foot. The SDEIR indicates that the proponent is committed to implementing the Scalley Dam project, in coordination with the City of Woburn.

The modeling demonstrates that the Craddocks Locks is a source of backwater flooding on the Alewife. Removal of the steel gate mechanisms would decrease the backwater effect and allow flows to enter the portion of the Mystic River which is regulated by the pumps at the Amelia Earhart Dam to decrease flooding to levels below existing conditions. The SDEIR indicates that this project must be paired with operational changes at the Amelia Earhart Dam to avoid increased flooding in reach downstream of the Craddocks Locks. Model results also indicate that, while not necessary to directly mitigate impacts of the Preferred Alternative, the addition of a fourth pump (three operating and one in reserve) at the Amelia Earhart Dam could significantly decrease elevations for a 100-year storm in this reach.

The SDEIR identifies several preliminary designs for Project 2 that have emerged from the US Army Corps of Engineers (ACOE) Feasibility Study for the channel-widening project and indicates that the downstream reach (from Manchester Road to Bacon Street) associated with the 11,000 sf of BVW alteration has been eliminated from the project. The SDEIR describes wetlands resources impacts for the overall project and each project element and identifies wetland resource areas on a reasonably scaled plan. The SDEIR includes an assessment of the project's impact on water quality and low flow conditions and a commitment to incorporate a low flow channel (20-foot wide by 2 feet deep) into the project. It has eliminated the BVW alteration associated with Project #2 and, therefore, did not discuss how the project meets the requirements for a variance of the Wetlands Protection Act.

The Certificate on the DEIR indicated that any approvals for this project from EOEEA or its agencies would be predicated on the Town's commitment to minimize impacts and take all necessary steps to reduce existing stormwater flows and ensure that benefits provided by these improvements are not eroded by increased stormwater flows associated with future development. Accordingly, the SDEIR demonstrates that the Town understands that the long-term success of the proposed flood mitigation program outlined in this SDEIR is dependent upon the Town implementing programs to improve stormwater management for new and redevelopment projects and reduce existing flows. The SDEIR provides additional information regarding commitments to and alternatives for improved stormwater management and flood storage. It includes a copy of the Town of Winchester's Stormwater Management Plan in compliance with Phase II of the National Pollutant Discharge Elimination System (NPDES) Program and includes a revised water and sewer regulation proposed for adoption by the Town to reduce and manage stormwater flows from development and redevelopment projects.

The removal of the downstream section of Project #2 will reduce the amount of dredging from 32,000 cf to 16,000 cf. The SDEIR provides general information regarding dredging and dredged materials management. It indicates that dredging will be conducted in the dry and that a mechanical dredging process will be used because of the narrow channel width, shallow depth and hard substrate.

As required, the SDEIR describes and provides plans showing the location of all MWRA structures that may be affected by the project and reflects efforts to minimize impacts. The preliminary preferred alternative for Project #2 avoids work within the western bank of the River

(where MWRA sewer infrastructure is located closer to the River) to further minimize conflicts with and impacts to sewer lines.

The SDEIR provides additional information on impacts to open space and DCR land; however it does not address the permanent loss of Article 97 land or identify how the project is consistent with the EOEEA Article 97 policy. The proponent asserts that the project is not subject to Article 97. The DEIR includes a detailed assessment of historic and archaeological sites that could be affected by the project including an assessment of impacts for the Winchester Center Historic District (Mt Vernon Street Bridge and the Kelleway Landscape between Mount Vernon Street and Main Street), the remainder of the Kelleway Landscape that generally follows the Aberjona River and the Mystic Valley Parkway.

Based on a review of the SDEIR, consultation with public agencies and a review of the comment letters, I am satisfied that outstanding issues can be addressed in the Final EIR; however, to facilitate a better understanding of the project and its environmental impacts, the Final EIR should not be filed until the ACOE has selected a Preferred Alternative for Project # 2. In addition, the Final EIR should be filed after FEMA has distributed the revised floodplain maps to downstream communities unless significant delays to this distribution ensue. I stress that analysis of Article 97 impacts and consistency of the project with the Article 97 Policy is a critical element of the FEIR and a failure to address it substantively would likely extend the review period for this project.

As many commenters continue to note, Winchester is one of many communities within the Mystic River Basin that is suffering the impacts of flooding, and responsibility for addressing these impacts is the responsibility of each community and the state, to the extent that state infrastructure and/or operations may contribute to the impacts under existing conditions and potential benefits of proposed mitigation. As demonstrated by information provided in the DEIR and SDEIR, a concerted and coordinated effort to address flooding within this watershed could provide significant relief. As Winchester develops further information about the preferred alternative and proposed mitigation, as directed by the following Scope, DCR should work with Winchester and other affected communities so Winchester can achieve a coordinated approach to proposed or required modifications to DCR infrastructure and/or operations related to the project.

SCOPE for the FINAL EIR

The SDEIR should follow Section 11.07 of the MEPA regulations for outline and content, as modified by this scope.

Project Description

The SDEIR should include an updated and complete discussion of how the project will meet the requirements and performance standards of each state permit required.

Alternatives Analysis

The City of Cambridge, Arlington Conservation Commission, Winchester Conservation Commission, ABC Flooding Board and Steve Kaiser continue to express concern with the downstream impacts of the project, the proponent's commitment to identified mitigation, and validity of the model. DCR comments state that all identified mitigation projects, including the addition of a fourth pump at the Amelia Earhart Dam, should be completed prior to construction of the project. I note that the modeling demonstrates that adequate mitigation can be achieved through operational changes at Amelia Earhart Dam; however, I agree that additional information is needed regarding Winchester's specific mitigation commitments and the scheduling and commitment of mitigation that will be implemented by DCR and/or MassHighway.

As noted previously, the modeling used to evaluate alternatives has been revised based on comments on the DEIR and the peer review process. The Final EIR should address comments on the accuracy of the model. To the extent that ongoing peer review results in changes, these should be reflected in the modeling used in the FEIR and for project permitting. To the extent that any changes identify the need for additional mitigation, the proponent should identify projects that can effectively mitigate the impact. The proponent should consult with MassDEP and DCR regarding the model prior to the filing of the FEIR to identify any outstanding issues regarding its accuracy and effectiveness as a tool for evaluating the impacts of this project and proposed mitigation.

While the revised modeling continues to demonstrate that impacts associated with the Preferred Alternative can be mitigated, it underscores the importance of the mitigation projects to increase its overall effectiveness and adequately address downstream impacts, including Scalley Dam, Mystic Lake Mid-Lakes Dam, Craddock Locks and operational changes at the Amelia Earhart Dam; however, I agree additiona The Final EIR must provide more concrete commitments to mitigation and, where Winchester is not the project proponent, provide a level of confidence that the mitigation will occur prior to construction of the proposed improvements. The Final EIR should include confirmation from DCR regarding funding, design and scheduling of the Mystic Lakes project and indicate that it will support and can implement the operational changes required at the Amelia Earhart Dam. Also, it should include confirmation from the Massachusetts Highway Department (MassHighway) and the City of Medford regarding the funding, design and schedule for the Craddock Locks improvements. The Final EIR should include confirmation from MassHighway and/or City of Medford regarding the feasibility of removing the constrictions at Craddock's Locks separate from reconstruction of the bridge. In addition, the Town should make a commitment to fund its fair share of the Craddock Locks project to support its implementation.

The SDEIR indicates that Projects 4, 8, and 10 may be studied further to determine whether they can proceed prior to downstream projects, without causing flooding. The Final EIR should provide the results of this analysis.

The SDEIR indicates that increase in peak velocities associated with the Preferred Alternative will change but are primarily depositional consistent with current conditions. It indicates that large scale scouring is not anticipated, although increases in velocities at bridges may require mitigation. DCR has requested additional information regarding flow velocities at

the Mystic River Bridge and MassDEP has indicated that alternatives to proposed armoring at bridge locations be considered (e.g. in-stream structures such as cross-vanes and J-hooks).

Wetlands/Variance Requirement

The SDEIR presents a significant reduction in impacts to BVW (from 11,000 to approximately 1,000) associated with the revision of Project #2. This change will preserve more of the vegetated, riparian buffer habitat and the mature tree and shrub canopy in this area. Where widening is proposed, Project #2 will include rebuilding and re-vegetating the bank. Although alterations have been reduced, DCR, MassDEP, MRWA and other commentors remain concerned with the removal of bank and mature upland vegetation and trees associated with the riverine habitat. Its removal could impact water quality in this stressed basin through increased water temperatures.

MassDEP comments indicate that the project may still require a variance based on impacts to riverfront area. The Wetlands Protection Act regulations provide that within 200-foot riverfront areas, issuing authorities may allow up to 5,000 square feet of alteration or 10 percent of the riverfront area within the lot, whichever is greater. The proponent should prepare an analysis indicating whether the riverfront area threshold of 5,000 square feet or 10 percent disturbance of the riverfront area within a lot is exceeded to determine whether a Variance is required, and should consult with MassDEP regarding its findings prior to the filing of the FEIR. A variance may be permitted if it is demonstrated that: 1) the project serves an overriding public purpose, 2) there are no feasible alternatives to the project that would meet the regulatory standards, and 3) that the project design incorporates maximum feasible mitigation for any impacts found unavoidable. If a variance is required, the SDEIR must address the project's consistency with these criteria.

MassDEP notes that additional information is required regarding the design of the low-flow channel and the design of wildlife habitat improvements to ensure that they adequately promote wildlife habitat, including fish passage. The Final EIR should include commitments to time-of-year restrictions on construction to avoid impacting the spawning of herring (once the Mid-Lakes Dam improvements are implemented. Finally, the Final EIR should address any change in wetlands jurisdiction resulting from the widening of the river and therefore the riverfront area and address whether the Town will make commitments to acquire and preserve the area that will be redefined as BLSF to ensure that new construction is not allowed within BLSF and that no new stormwater discharges to the River will be proposed.

Stormwater/Water Quality Improvements

The SDEIR presents progress by Winchester in planning and implementing stormwater controls. The SDEIR indicates that the Town has revised its water and sewer regulation to apply Standards 2, 3, 4 and 7 of the Massachusetts Stormwater Policy to new and redevelopment projects and includes a prohibition on increases in post-development runoff volume. In addition, the Town is introducing a rain barrel program to offer the sale of rain barrels to residents at reduced rates. The SDEIR describes ongoing infrastructure projects and other opportunities for increasing flood storage and protected open space. These changes could provide increased

recharge to the River to augment low-flows and attenuate peak flows during more frequent events.

The SDEIR indicates that approximately 90 acre-feet of flood storage could be incorporated into the project. The Kraft Foods, West Side Field and Winter Pond appear to be effective and feasible projects. In addition, the SDEIR identifies a potential development parcel, the Marotta Property, that abuts the Aberjona River and is partially located within the floodplain. I urge the Town to work diligently towards implementation of the potential flood storage projects and to reconsider how existing undeveloped land, such as the Marotta Property, could be acquired for permanent protection. **The SDEIR should assess the potential for flood storage and infiltration associated with these sites and consider implementation of these projects as mitigation commitments.**

Dredging and Dredged Material Management

The project involves the dredging of approximately 16,000 cy of material associated with Project #2, #4, #6, #8 and #10. The SDEIR indicates that dredging is proposed to take place in the dry for all projects and indicates that projects will comply with the Massachusetts Surface Water Quality Standards (310 CMR 4.00). MassDEP comments indicate that more detailed information regarding the project's consistency with the revised 401 Water Quality Certification regulations for dredging (314 CMR 9.00) is necessary to determine whether the projects will be permissible. The Final EIR should identify the Preferred Alternative associated with Project #2 at which time more specific information regarding dredging techniques and materials management can be developed.

Open Space/Article 97 Land

As noted in previous Certificates, the project, as currently proposed, would remove and permanently change the use of DCR parkland, which is protected by Article 97 of the Amendments to the State Constitution. DCR comments indicate that the land was acquired for parkland and parkway purposes, not for flood control purposes and the conveyance of an easement for this purpose would result in a change of use and physical control to Article 97 parkland owned by the Commonwealth. Before such an impact on public open space can be considered, the proponent demonstrate that no other alternative with less environmental impact is feasible, and that any impacts found unavoidable receive maximum feasible mitigation. The SDEIR identifies impacts to protected parkland but it does not adequately address how these impacts will be avoided, minimized and mitigated consistent with the EOE A Article 97 Land Disposition Policy. This analysis is critical to the ability to determine whether or not this project adequately avoids, minimizes and mitigates Damage to the Environment and failure to include this analysis could render the Final EIR inadequate.

The Town must identify and assess the feasibility of compensatory open space land and/or parkland in Winchester (at a 1:1 basis, at a minimum, of replacement land to converted land) that could be permanently protected. The Final EIR should provide a detailed description of the land area(s) and/or projects proposed as Article 97 compensation and should also discuss the value of the land in terms of the resources they provide and the opportunities for active and/or passive recreation they afford. Compensatory mitigation for previous projects reviewed

by MEPA has been at a higher than 1:1 basis (and as high as 7:1). DCR also notes that the proponent should indicate whether conveyance of an easement or the fee interest is the appropriate vehicle for the project.

DCR comments indicate interest in the proposed public access improvements. DCR has requested additional information regarding these improvements including maintenance responsibilities and design details. Comments from the Winchester Historical Commission note that the proponent has identified funding for a tri-town bikeway that will enhance recreational opportunities along the Aberjona River. The Final EIR should provide additional information on the proposed bikeway and identify any other park enhancements that will be incorporated into this project. The proponent should consult with DCR after developing baseline Article 97 materials including conceptual plans of potential mitigation.

Historic and Archaeological Resources

The Winchester Historical Commission comments note the proponent's efforts to consult and coordinate with the Commission prior to the filing of the SDEIR and indicate that the SDEIR addresses the Commission's requests for detailed descriptions and analysis of project impacts for the Winchester Center Historic District (Mt Vernon Street Bridge and the Kelleway Landscape between Mount Vernon Street and Main Street), the remainder of the Kelleway Landscape that generally follows the Aberjona River and the Mystic Valley Parkway. In addition, these comments identify outstanding issues that should be addressed in the FEIR, including design details for the Mount Vernon Street Bridge and the design of the path associated with Project #2.

Consistent with DCR comments, the Final EIR should address how the proposed alterations are consistent with the EOEEA Historic Parkway Guidelines and include the results of the Intensive (Locational) Archaeological Survey for the **areas that may contain intact** archaeological resources.

These comments should be addressed in the Final EIR.

Construction Period Impacts

The SDEIR indicates that the proponent will work with DCR and the MassHighway to coordinate construction management for work adjacent to the Mystic Valley Parkway, Route 16 and Route 38. The SDEIR indicates that the proponent will require contractors to participate in DEP's Clean Construction Equipment Initiative, consisting of an EPA certified engine retrofit equipment and/or use of low sulfur fuel to reduce exposure to diesel exhaust fumes and particulate emissions during construction. The Final EIR should indicate what specific requirements contractors will be required to meet.

Mitigation

The Final EIR should include a summary of all mitigation measures to which the proponent has committed, including mitigation for construction period impacts. The Final EIR should also include Draft Section 61 Findings for use by the state permitting agencies.

Response to Comments

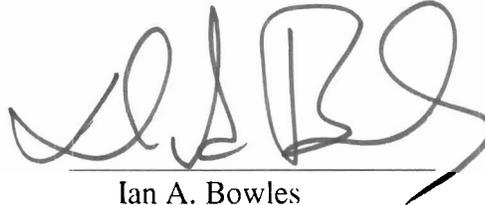
The Final EIR should include a copy of this Certificate and of each comment received. It should provide additional technical analysis as necessary to address issues raised in the comment letters. The proponent should address the comments to the extent that they are within MEPA jurisdiction.

Circulation

The proponent should circulate the Final EIR to those who commented on the SDEIR, and to any state agencies from which the proponent will potentially seek permits or approvals. A copy should be provided to the Conservation Commissions in Medford, Arlington and Cambridge. A copy should be provided to the public library in Winchester, Medford, Arlington and Cambridge.

April 20, 2007

Date



Ian A. Bowles

Comments received:

4/10/07	Department of Conservation and Recreation
4/6/07	Department of Environmental Protection/Northeast Regional Office (DEP/NERO)
3/23/07	Massachusetts Water Resources Authority (MWRA)
4/6/07	Senator Patricia D. Jehlen
4/6/07	Town of Arlington/Board of Selectmen
4/5/07	Town of Arlington/Conservation Commission
4/5/07	City of Cambridge/Executive Department
4/5/07	Town of Winchester/Planning Board
3/19/07	Town of Winchester/Conservation Commission
4/5/07	Town of Winchester/Historical Commission
4/6/07	ABC Flooding Board
4/6/07	Mystic River Watershed Association
3/9/07	Water Supply Citizens Advisory Committee (WSCAC)/Massachusetts Association of Conservation Commissions (MACC)
3/14/07	Henry J. Curtis, Jr.
4/6/07	Stephen H. Kaiser
3/17/07	Ellen Knight
3/13/07	Jean M. Marrone

3/9/07	John and Gay Mohrbacher
3/22/07	George Murphy
3/19/07	Robert C. Pasciuto
3/14/07	Anthony Perrotta
3/21/07	John F. Shawcross
3/13/07	Paul J. Welliver

IAB/CDB/cdb

Executive Summary

Since 1996, the Town of Winchester has experienced several devastating floods which have imperiled public safety, disrupted businesses and schools, and led to significant economic losses. During these events (October 1996, June 1998, March 2001, April 2004, and May 2006), economic losses have totaled more than \$25 million. The frequency and severity of the flooding along the Aberjona River has prompted the Town of Winchester to investigate the causes of, and possible flood mitigation projects to reduce the problem.

The proposed flood mitigation projects evaluated as part of this Final Environmental Impact Report (FEIR) consists of both structural and non-structural measures intended to reduce the 100-year floodplain, primarily in downtown Winchester where much of the economic damage due to flooding occurs. The proposed projects also serve to reduce flooding during more frequent events (e.g., 25-year storms); the effects of the projects during the 10-, 25-, 50-, and 100-year storms were evaluated in the current study. The Executive Office of Energy and Environmental Affairs (EOEEA, formerly EOE) Secretary's Certificates on the Environmental Notification Form (ENF), Draft Environmental Impact Report (DEIR), and Supplemental Draft Environmental Impact Report (SDEIR) placed emphasis on integrating conveyance improvements with stormwater detention, infiltration, non-structural measures, and watershed-wide mitigation projects. Studies conducted on these issues in preparation of this FEIR have resulted in a preferred alternative which does integrate these three elements into an overall flood mitigation program for Winchester that also has benefits to upstream and downstream communities.

The FEIR Alternative or the Preferred Alternative includes Projects 2, 3, 4, 6, 8, and 10. Project 2 has been significantly revised since the SDEIR to include a smaller, 35-foot channel bottom width; the remaining projects have not changed. A summary of the FEIR Alternative is provided below:

- **Project 2: Waterfield Road to Bacon Street** – Widening of the Aberjona River channel between Waterfield Road and Manchester Road from an average bottom width of 15 to 20-feet to approximately 35-feet and addition of a low flow channel. Re-grading and deepening of the channel between Manchester Road and Bacon Street, and continuation of the 8-foot wide low flow channel. Removal and replacement the USGS gage and associated weir.
- **Project 3: Center Falls Dam** – Replacement of the remaining 30-inch gate valve at the Center Falls Dam with 5 by 5-foot butterfly gates and 4 by 6-foot discharge boxes (the other gate was replaced in 2003).
- **Project 4: Mount Vernon Street Bridge Improvements** – Expansion of the hydraulic opening at the Mount Vernon Street Bridge.
- **Project 6: High School Playing Field** – Construction of a parallel 7 by 15-foot box culvert adjacent to the three existing culverts under the High School playing field.
- **Project 8: Swanton Street Bridge Improvement** – Replacement of the existing 10 by 16-foot bridge opening under Swanton Street with a 10 by 25-foot bridge opening.
- **Project 10: Railroad Bridge Near Muraco School** – Installation of two seven-foot diameter conduits under the MBTA railroad near the Muraco School to supplement the two existing 6.5 by 7-foot bridge openings.

The FEIR Alternative includes still includes three significant mitigation projects in the watershed that help manage floodwaters more effectively and reduce flood impacts throughout the watershed. These projects, which were also included in the SDEIR Alternative, are:

- Craddock Locks in Medford
- Upper Mystic Lake Dam in Arlington and Medford
- Scalley Dam in Woburn

Studies performed on the Craddock Locks and Scalley Dam outlet structure resulted in modifications to the mitigation proposed in the SDEIR. The Scalley dam outlet structure is proposed to be larger and structural analysis indicated that the concrete panel remnants of the Craddock Locks can be removed without impacting the integrity of the Main Street Bridge in Medford.

Revisions Since the SDEIR

The following bullets describe the major changes that have occurred since the issuance of the SDEIR:

- US Army Corps of Engineers (USACE) is no longer participating in the design or construction of Project 2, which will now be funded completely by the Town of Winchester (Section 3.3.2).
- Baseline Conditions flood model has been used and accepted by DCR and the calibration has been accepted by DEP (Section 2.1.2).
- A Riverfront Area analysis has been developed, as requested in the Secretary's certificate on the SDEIR (Section 4.2.4).
- FEMA completed the review of the watershed model, produced mapping for the communities within the watershed, publicly reviewed these maps, and made revisions. The new maps are scheduled to become effective in June 2010. This process verified the veracity of the model used in Winchester's Flood Mitigation Program (Section 2.1.1).
- Winchester Board of Selectman officially adopted the "Rules and Regulations Regarding the Use of Public Sewers and Stormdrains in the Town of Winchester, Massachusetts".
- Implementation of a rain barrel program in Winchester. In addition to the ongoing infiltration projects being installed by the Town and local developers, the Town has run a successful rain barrel program for its residents since 2007.

Summary of Permitting Required

Table 1 shows a summary of the local, state, and federal permitting processes potentially required for the preferred FEIR Alternative.

Table1: Project Permitting Summary

Issuing Authority, License or Permit	License, Permit or Approval
Winchester Conservation Commission	WPA Orders of Conditions, Local By-Law Approvals
Woburn Conservation Commission	WPA Orders of Conditions, Local By-Law Approvals
Medford Conservation Commission	WPA Orders of Conditions, Local By-Law Approvals
Massachusetts Department of	Water Quality Certification (CWA Section 401)

Issuing Authority, License or Permit	License, Permit or Approval
Environmental Protection	
Massachusetts Department of Environmental Protection	Waterways (MGL Chapter 91) License or Permit
Division of Conservation and Recreation	Chapter 253 Dam Safety Permit
Massachusetts Historical Commission	Memorandum of Agreement
Division of Conservation and Recreation	Access Permit to work on DCR property
Massachusetts Bay Transit Authority	MBTA License Agreement
Massachusetts Water Resources Authority	Plan review and approval for work near sewer easement (8M Permit)
U.S. Army Corps of Engineers	Clean Water Act Section 404 Permitting/NEPA Compliance
USEPA	NPDES Stormwater Permitting
FEMA	Letter of Map Revision

Summary of Potential Environmental Impacts and Mitigation Measures

The impacts of the projects with respect to wetland resource areas and compliance of the projects with the Massachusetts Wetland Protection Act performance standards has been a primary concern of many commenters since the filing of the ENF. The FEIR Alternative further seeks to minimize impacts to resource areas and includes mitigation which will effectively improve the habitat along significant reaches of this urbanized stream. Table 2 presents a summary of resource area impacts by project for the FEIR Alternative.

Table 2: Summary of Resource Area Impacts, FEIR Alternative

Project No.	Bank (l.f.) ¹	LUW (s.f.)	BVW (s.f.)	Riverfront Area (s.f.) ²	BLSF (s.f.)
2	1,540	98,990	0	53,720	53,720
3	50	540	0	670	670
4	100	200	0	1500	1500
6	100	300	0	1000	1000
8	100	300	0	1000	1000
10	320	1000	1,000	4000	4000
Craddock Locks	0	0	0	0	0
Scalley Dam	30	640	0	1500	1500
Sum	2,240	101,970	1,000	63,390	63,390

¹ All in town projects involve the temporary alteration of Bank which will be restored in-place and in-kind resulting in no loss.

² All projects that involve impacts to the Riverfront Area will, in most cases, result in the replacement in-kind in a slightly different location due to the relocation of the river channel.

All projects meet the performance standards as set forth in the Regulations, as described in FEIR Section 4.2. Mitigation of impacts includes creation of approximately 2,000 square feet of Bordering Vegetated Wetland replacement area, 2,240 linear feet of Bank restoration, and 125,000 square feet of Land under Waterways restoration, and over 40,000 square feet of Riverfront Area restoration. None of

the projects propose any additional fill in a floodplain, nor will they act as a restriction to flow. Therefore it has been determined that there are no permanent impacts to BLSF even though work is being performed in floodplains. The alteration areas have been minimized to the greatest extent feasible and all mitigation is in excess of 1:1. A comprehensive stormwater control plan that includes cofferdams, silt curtains, dewatering/filtration areas, and haybale/silt fence barriers will help to avoid alterations to federal and state resource areas.

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1.0 Project Description

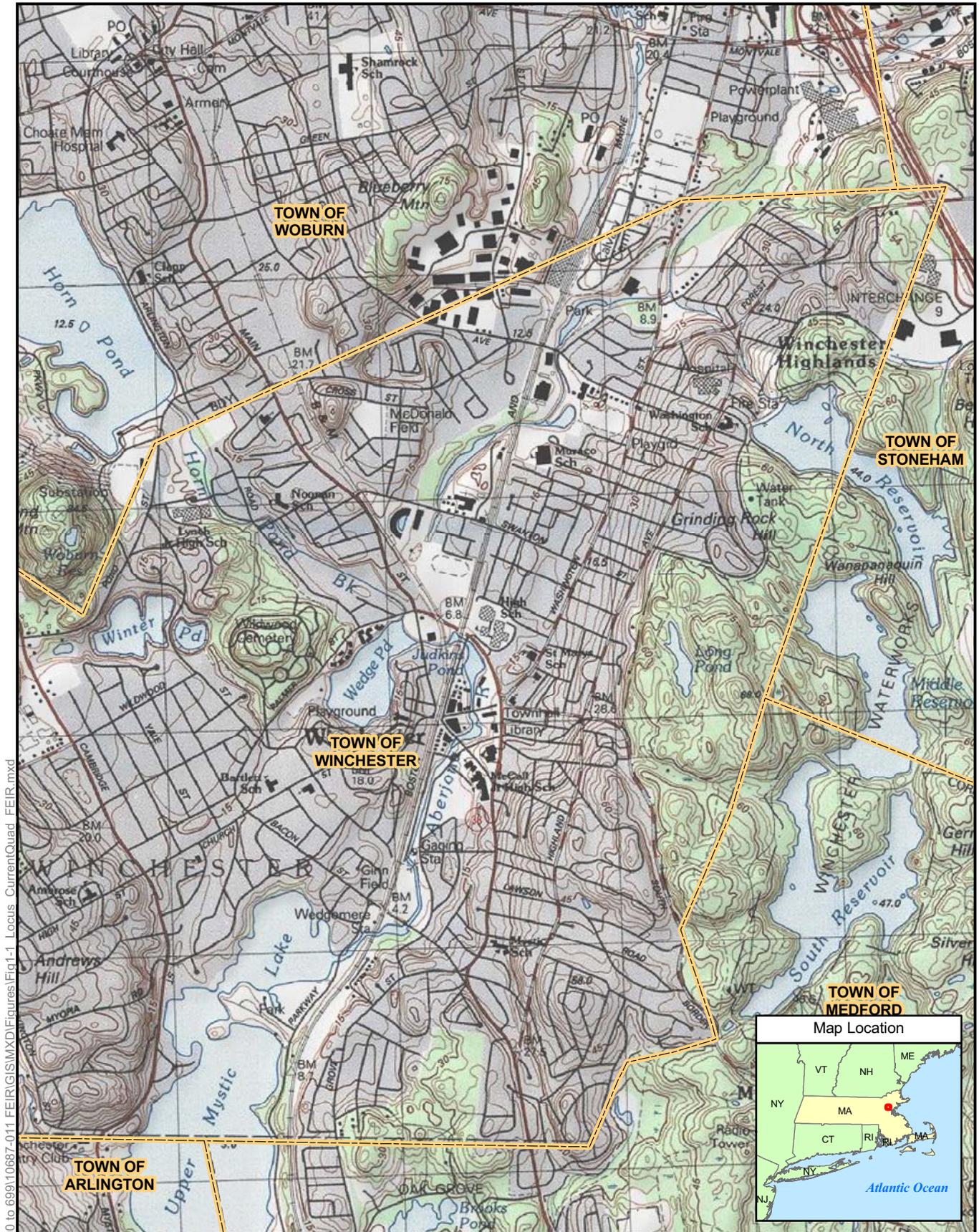
1.1 Introduction

The Aberjona River, a major tributary of the Mystic River, flows from Woburn in the north, south through the Town of Winchester, and empties into the Upper Mystic Lake at the south end of Town. The river flows directly through the densely-developed town center and several heavily populated residential neighborhoods (Figures 1-1 and 1-2). Winchester is about 6.5 square miles in area and has a population of approximately 21,000 people. Flooding along the Aberjona River impacts a large portion of the Town's population, as well as infrastructure, services, and business.

The Aberjona River has been significantly altered throughout most of its length, with previous widening, straightening, and filling projects in many locations. Many of these projects have resulted in a diminution of river conveyance capacity, at the same time as river flows have increased due to development. Figures 1-3 and 1-4 are reprints of portions of the 1903 and 1946 USGS topographic maps for Winchester. Figure 1-1 is a reprint of the current (1986) map showing the same area. Comparing these maps is instructive and shows the extent of river and pond modification that has occurred in the past century. The maps show that some of the areas experiencing flood losses were clearly in the more natural floodplain of the river, or even within the river itself early in the last century. A comparison of the maps also shows the significant amount of development within the last half century. This development contributes to increased stormwater runoff which exceeds the conveyance capacity of the river. One of the primary causes of severe flooding in Winchester is the Aberjona River's inability to convey the increased stormwater contributions during significant storm events. This lack of capacity in the Aberjona River causes the river to over-top its banks with alarming frequency.

Since 1996, the Town of Winchester has experienced several devastating floods which have imperiled public safety, disrupted businesses and schools, and led to significant economic losses. During these events (October 1996, June 1998, March 2001, April 2004, and May 2006), economic losses have totaled more than \$25 million. The frequency and severity of the flooding along the Aberjona River has prompted the Town of Winchester to investigate the causes of, and possible solutions to, the problem.

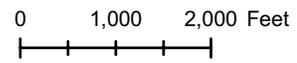
The proposed flood mitigation projects evaluated as part of this Final Environmental Impact Report (FEIR) consists of both structural and non-structural measures intended to reduce the 100-year floodplain, primarily in downtown Winchester where much of the economic damage due to flooding occurs. The proposed projects also serve to reduce flooding during more frequent events (e.g., 25-year storms); the effects of the projects during the 10-, 25-, 50-, and 100-year storms were evaluated in the current study. The Executive Office of Energy and Environmental Affairs (EOEEA, formerly EOEA) Secretary's Certificates on the Environmental Notification Form (ENF), Draft Environmental Impact Report (DEIR), and Supplemental Draft Environmental Impact Report (SDEIR) placed emphasis on integrating conveyance improvements with stormwater detention, infiltration, non-structural measures, and watershed-wide mitigation projects. Studies conducted on these issues in preparation of this FEIR have resulted in a preferred alternative which does integrate these three elements into an overall flood mitigation program for Winchester that also has benefits to upstream and downstream communities.

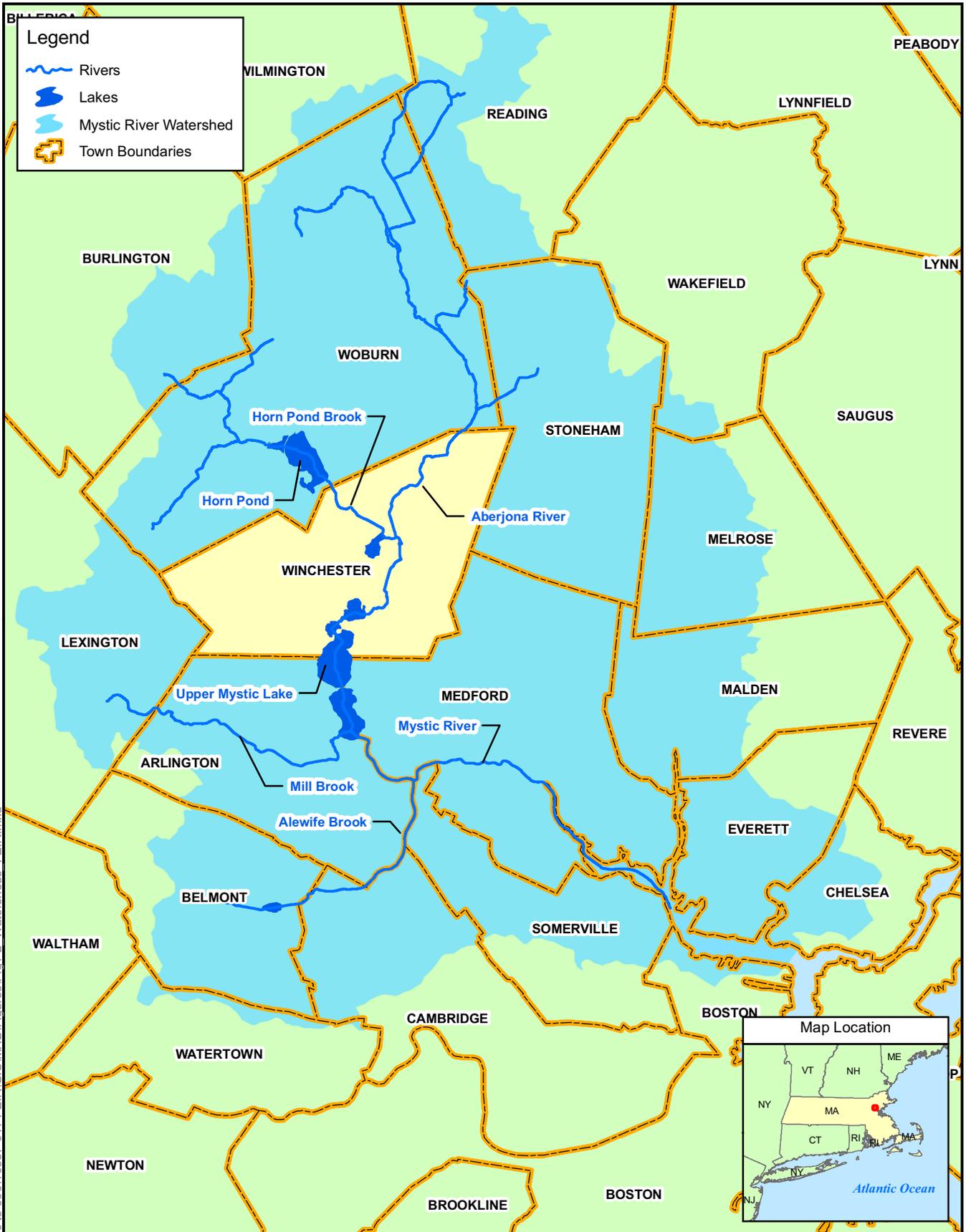


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Figure 1-1 Site Location Map
 Aberjona River Flood Mitigation program
 FEIR, EOEA File No. 13046

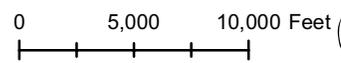




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Figure 1-2 Mystic/Aberjona River Watershed
Aberjona River Flood Mitigation program
FEIR, EOA File No. 13046



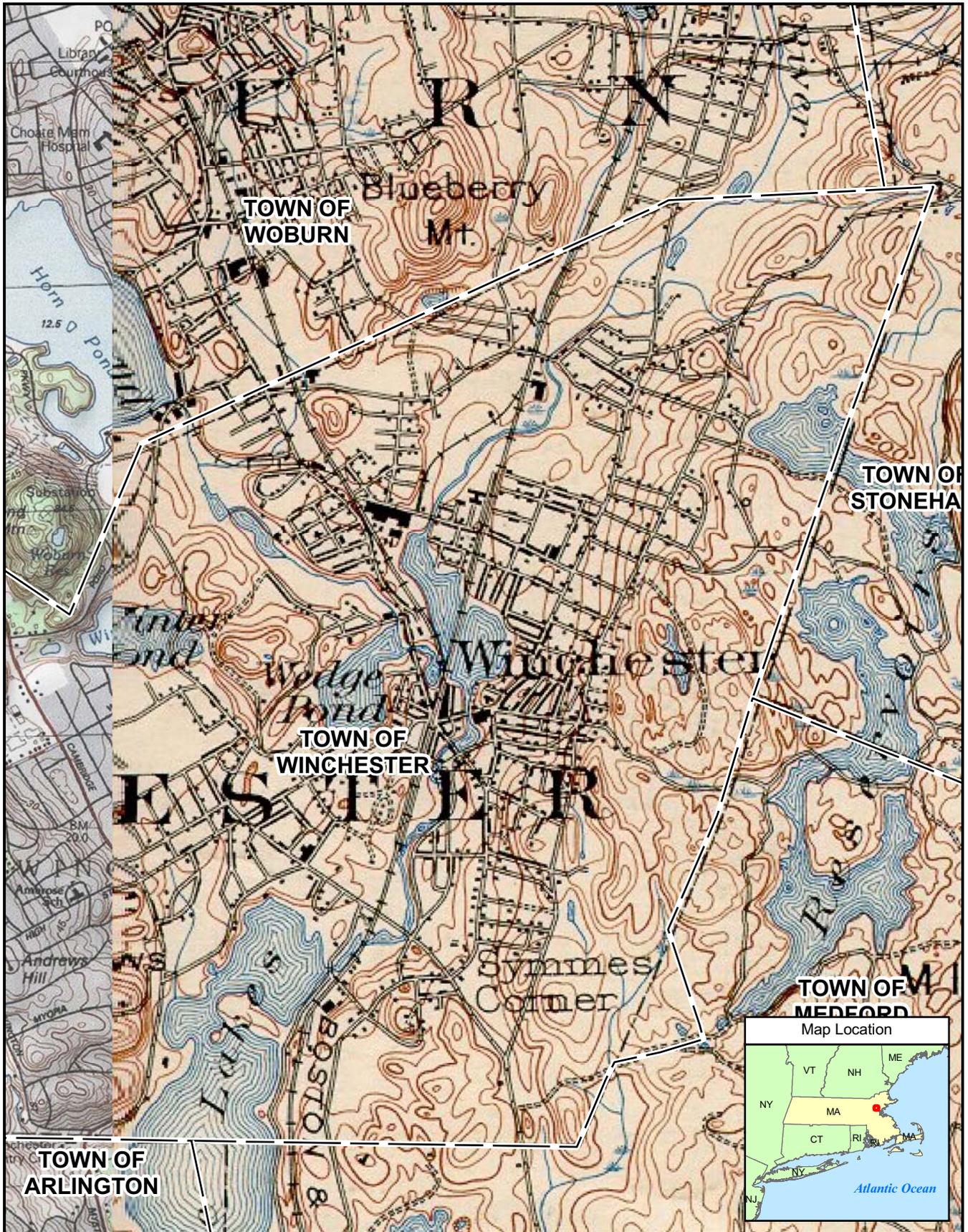
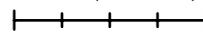
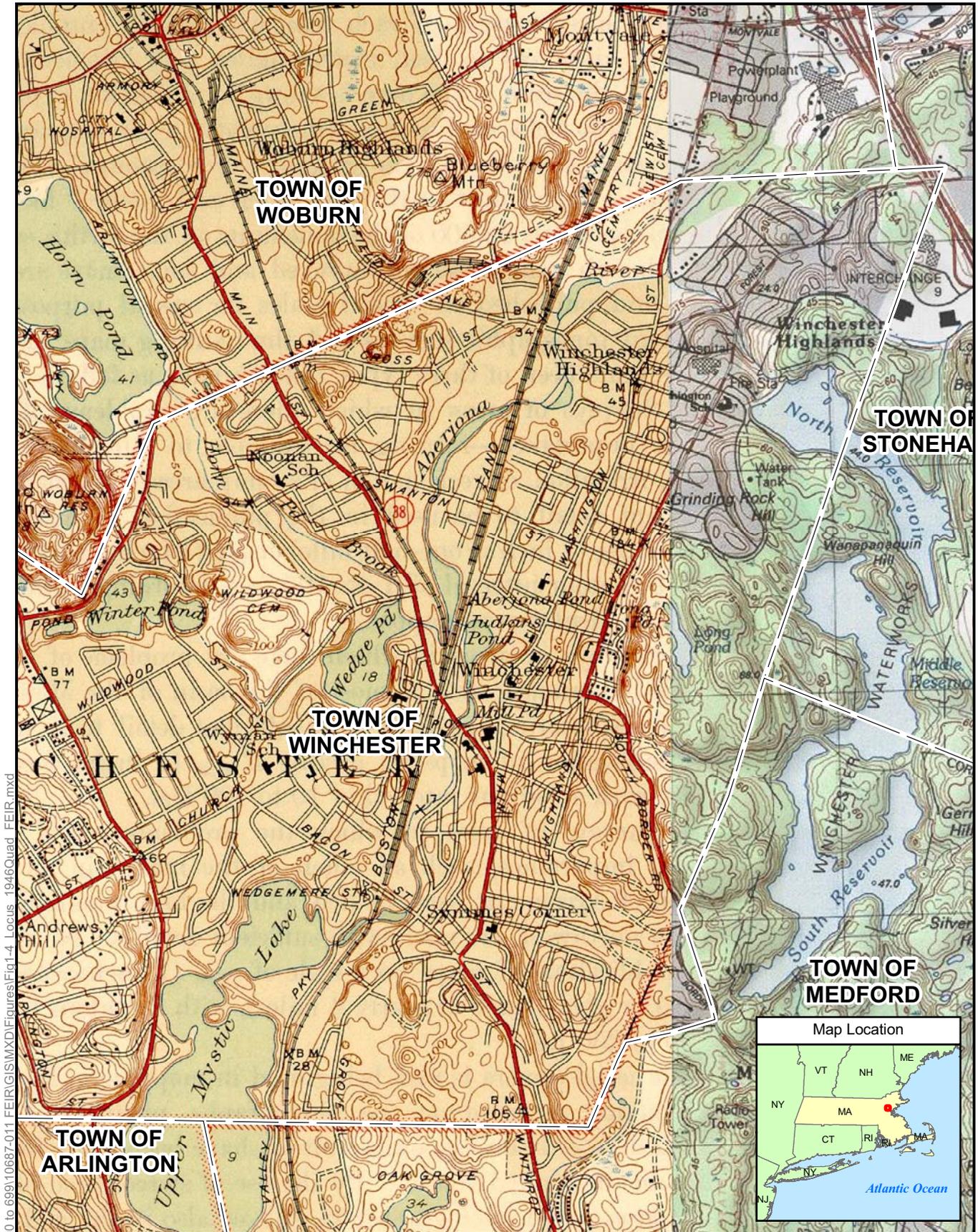


Figure 1-3 Site Location Map
 1903 Reprinted 1942 USGS Boston Quadrangle
 Aberjona River Flood Mitigation program
 FEIR, EOA File No. 13046

0 1,000 2,000 Feet



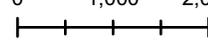


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Figure 1-4 Site Location Map
 1946 Reprinted 1950 USGS Lexington Quadrangle
 Aberjona River Flood Mitigation program
 FEIR, EOE File No. 13046

0 1,000 2,000 Feet



1.2 Project History

In July 1999, a Town-funded study (Aberjona River Flood Study, Final Report by Camp Dresser & McKee Inc.) was released. This study took a quantitative look at the causes of flooding along the Aberjona River through the creation of a steady state model of the river reaches in the Town. Based on the results of this modeling, a set of 17 projects was identified to mitigate flooding throughout the Town, as described below:

- **Project 1: MWRA Siphon Relocation near Wedgemere Train Station** – Reconstruction of the Massachusetts Water Resources Authority (MWRA) sewer siphon near the Wedgemere Train Station to widen the constriction from approximately 19-feet to 30-feet.
- **Project 2: Channel Widening, Waterfield Road to Bacon Street** – Widening of the Aberjona River channel between Waterfield Road and the United States Geological Survey (USGS) gage from an average of 15 to 20-feet to approximately 40-feet. Re-grading and deepening the channel between Waterfield Road and Bacon Street. Removal and replacement of the USGS gage and associated weir and replace the pedestrian bridge near Ginn Field.
- **Project 3: Center Falls Dam** – Replacement of two existing 30-inch gate valves on either side of Center Falls Dam with 5 by 5-foot butterfly gates and 4 by 6-foot discharge boxes.
- **Project 4: Mount Vernon Street Bridge Improvements** – Expansion of the hydraulic opening at the Mount Vernon Street Bridge.
- **Project 5: Culvert Addition, Shore Road** – Construction of an 8 by 4-foot culvert adjacent to the existing 6 by 15-foot culverts under Shore Road.
- **Project 6: High School Playing Field** – Construction of a parallel 7 by 15-foot box culvert adjacent to the three existing culverts under the High School playing field.
- **Project 7: Channel Widening, Swanton Street to High School Playing Field** – Widening the river channel between Swanton Street and the High School playing field from 20 to 25-feet to a uniform 30-foot width.
- **Project 8: Swanton Street Bridge Improvement** – Replacement of the existing 10 by 16-foot bridge opening under Swanton Street with a 10 by 25-foot bridge opening.
- **Project 9: Channel Widening, Railroad Bridge Near Muraco School and Swanton Street** – Widening of the channel between the Railroad Bridge near Muraco School and Swanton Street from a 20 to 25-foot bottom width to a uniform 30-foot width.
- **Project 10: Railroad Bridge Near Muraco School** – Installation of two seven-foot diameter conduits under the MBTA railroad near the Muraco School to supplement the two existing 6.5 by 7-foot bridge openings.
- **Project 11: Channel Widening, Leonard's Pond to Railroad Bridge** – Widening of the channel between Leonard's Pond and the railroad bridge near Muraco School from a 20 to 25-foot bottom width to approximately 30-feet.
- **Project 12: Removal of Dam** – Removal of the dam near Muraco School.
- **Project 13: Cross Street Culvert** – Installation of a 5 by 12-foot supplemental box culvert next to the existing 6.5 by 16-foot opening under Cross Street.
- **Project 14: Davidson Park, Downstream** – Reconstruction of the dam and pedestrian bridge at the downstream end of Davidson Park.

- **Project 15: Davidson Park, Upstream** – Removal of the dam at the upstream end of Davidson Park.
- **Project 16: Channel Widening, Washington Street to Davidson Park** – Widening of the channel between Washington Street and Davidson Park from a 20 to 25-foot bottom width to approximately 30-feet.
- **Project 17: Localized Drainage Improvements** – Storm drain improvements to the system servicing Bacon Street, Stowell Road, and Town Way.

Two of the projects were completed in 2002 (Project 5 - Culvert Addition Shore Road and Project 12 - Removal of Dam near Muraco School).

Due to the potential environmental impacts of the 15 remaining projects, the Town of Winchester was required to file an ENF with the state under the Massachusetts Environmental Policy Act (MEPA). On June 24, 2002, the Town submitted an Expanded ENF, which grouped the remaining 15 projects into three phases. The Town also requested a waiver for Phase I of the project, which was to include three of the 15 flood projects (Project 4: Mount Vernon Street Bridge Improvements, Project 13: Cross Street Culvert, and Project 17: New Storm Sewers, Bacon Street to Town Way). The Town's waiver request was denied by the EOE Secretary on June 30, 2003. The Certificate on the ENF stated that the Town was required to file a full EIR. The ENF Certificate did, however, allow the relocation of the MWRA siphon near the Wedgemere Train Station (Project 1), a project to be completed entirely by the MWRA, to proceed subject to any applicable MEPA review and permitting. That project was completed in 2008.

On December 1, 2003 the Town filed a Notice of Project Change with MEPA for completion of the Cross Street culvert project (Project 13). Following the granting of a MEPA Phase I Waiver by the EOE Secretary, a new culvert was installed at Cross Street in 2005. In addition, one of two proposed gate valves were installed at the Center Falls Dam in 2003 (Project 3), and the Town upgraded several storm sewer systems and installed infiltrators in several locations, including on Town Way and Bacon Street (Project 17).

In 2004, the Town of Winchester contracted with a team of engineering consultants lead by ENSR Corporation (now AECOM) to prepare the DEIR. ENSR was also the lead consultant for the flood map modernization project undertaken by the Federal Emergency Management Agency (FEMA) for the Mystic River watershed, which includes the Aberjona River and its tributaries. The current FEMA floodplain modeling and mapping for the Aberjona River dates from the late 1970s. This mapping has proven inaccurate by comparison to the extent of flooding experienced in the past decade. Therefore, the intent of FEMA's work is to re-evaluate the extent of flooding in the watershed using new topographic information, new hydrologic information and models, and a sophisticated unsteady state flow model which more accurately predicts flood elevations.

Using the new FEMA model, the floodplain of the Aberjona River was re-evaluated by ENSR in preparation of the DEIR, as were the restrictions to flow along the river and its tributaries; a DEIR was filed by the Town of Winchester in February 2006. As part of the DEIR analysis, the model was used to evaluate the effectiveness of the remaining 12 projects from the 1999 study, look at additional structural alternatives within the Town, and evaluate the influence of upstream sources and effects on downstream receiving waters. The evaluation indicated the need for a watershed-wide solution to the flooding problems in Winchester. As a result of that study, the DEIR Alternative (Alternative 5) included conveyance improvements, infiltration and detention Best Management Practices (BMPs), and upstream and downstream mitigation proposals.

The EOECA Secretary's Certificate on the DEIR issued in April 2006 called for the preparation of a Supplemental DEIR (SDEIR) that looked at increased evaluation of BMPs, additional mitigation measures, and re-evaluation of the proposed conveyance improvements. The importance of non-structural and regulatory measures was also re-evaluated in the SDEIR, as were reductions in the need for conveyance improvements examined in light of expansion of these BMPs. As discussed in the SDEIR the studies indicated that although both structural and non-structural BMPs are certainly helpful in mitigating flooding impacts, they alone cannot significantly reduce the extent of the 100-year floodplain and associated economic losses in Winchester. Combined with the conveyance improvements these BMPs would, however, help augment low-flows in the river and provide additional flood relief during more frequent storm events. They also serve to prolong the lifespan of the conveyance improvements. The SDEIR resulted in the inclusion of seven structural improvement projects within Winchester, and three mitigation projects in other communities, which were carried forward for further study.

The resulting alternatives, including proposals to perform upstream and downstream mitigation, were presented in detail in the SDEIR in February 2007. The resulting EOECA Secretary's Certificate on the SDEIR (April 20, 2007) required the Town to more completely evaluate the engineering feasibility and environmental impact of the proposed projects and to work with other watershed communities and state agencies in this effort. The potential impacts of Project 2, the widening and dredging of the river downstream of downtown Winchester again engendered most of the comments and FEIR scope items.

1.3 Project Description

The following section describes the six projects remaining which comprise the preferred FEIR Alternative or Alternative 8. In addition, the three flood mitigation projects are described below as well as the other Town commitments.

1.3.1 FEIR Alternative 8

The FEIR Alternative or the Preferred Alternative includes Projects 2, 3, 4, 6, 8, and 10. Project 2 has been revised since the SDEIR to include a 35-foot channel bottom; the remaining projects have not changed. A summary of the FEIR Alternative is provided below:

- **Project 2: Waterfield Road to Bacon Street** – Widening of the Aberjona River channel between Waterfield Road and Manchester Road from an average bottom width of 15 to 20-feet to approximately 35-feet and addition of a low flow channel. Re-grading and deepening of the channel between Waterfield Road and Bacon Street. Removal and replacement the USGS gage and associated weir.
- **Project 3: Center Falls Dam** – Replacement of the remaining 30-inch gate valve at the Center Falls Dam with 5 by 5-foot butterfly gates and 4 by 6-foot discharge boxes (the other gate was replaced in 2003).
- **Project 4: Mount Vernon Street Bridge Improvements** – Expansion of the hydraulic opening at the Mount Vernon Street Bridge.
- **Project 6: High School Playing Field** – Construction of a parallel 7 by 15-foot box culvert adjacent to the three existing culverts under the High School playing field.
- **Project 8: Swanton Street Bridge Improvement** – Replacement of the existing 10 by 16-foot bridge opening under Swanton Street with a 10 by 25-foot bridge opening.

- **Project 10: Railroad Bridge Near Muraco School** – Installation of two seven-foot diameter conduits under the MBTA railroad near the Muraco School to supplement the two existing 6.5 by 7-foot bridge openings.

Projects completed prior to the filing of this FEIR have been included in the “baseline” or existing conditions model. These include Project 1 – MWRA Siphon Relocation, Project 3 – Center Falls Dam (partial completion), Project 5 – Shore Road Culvert Addition, Project 12 – Dam Removal near Muraco School, Project 13 – Cross Street Culvert, and Project 17 – Localized Drainage Improvements.

1.4 Watershed Based Mitigation Projects

The Town of Winchester accounts for less than 10% of the Mystic River watershed; therefore, creating a watershed-wide awareness of stormwater management issues is a key component of the Town’s focus. Without the cooperation of upstream and downstream stakeholders the flood reduction benefits gained as a result of the projects proposed in this FEIR would be in jeopardy. The regulation of flood flows in the Mystic River Basin requires active oversight and a coordinated effort between the City of Woburn, Town of Winchester, and the Massachusetts Department of Conservation and Recreation (DCR) and effects all the downstream communities in the Mystic River watershed, including Arlington, Belmont, Cambridge, and Medford.

The FEIR Alternative includes three significant mitigation projects in the watershed that can help these entities manage floodwaters more effectively. These projects, which were also included in the SDEIR Alternative, are:

- Craddock Locks in Medford
- Upper Mystic Lake Dam in Arlington and Medford
- Scalley Dam in Woburn

As discussed in subsequent sections of this document, the proposed mitigation projects at Craddock Locks and Scalley Dam have been refined since the filing of the SDEIR based on feasibility studies funded by the Town of Winchester. Design and permitting of the Mystic Lakes Dam project, which is under the jurisdiction of DCR, has been completed. Construction is currently underway and is expected to be finished by the 2011 recreation season.

It should be noted that the FEIR Alternative does not include proposed improvements to the DCR-owned Amelia Earhart Dam. While certain improvements to this facility, such as the addition of a fourth pump, have the potential to improve the management of flooding issues in the Mystic River Basin as a whole, they are not required mitigation for the improvements proposed as part of the FEIR Alternative.

1.4.1 Craddock Locks, Medford

The removal of the remaining obstructions under the Main Street Bridge in Medford will have the result of lowering the floodplain upstream of the bridge while not negatively impacting downstream development. The Town of Winchester identified this bottleneck in the system and has funded the analysis of its resolution to date. The Town of Winchester has incorporated the improvements at the Craddock Locks into the downstream mitigation measures included in the FEIR preferred alternative.

The Craddock Locks in Medford (Main Street) are owned by the DCR. A joint project between the DCR, MassDOT (formerly MassHighway), and the City of Medford calls for the rebuilding of the Main Street Bridge. The project envisioned in this FEIR is a smaller-scale that includes removing the remaining lock mechanisms from under the bridge, which does not necessitate the rebuilding of the bridge.

Discussions are underway with all parties regarding the scheduling and funding of the MassDOT-led bridge replacement project. It is important to note, however, that if the bridge reconstruction project does not move forward, the Town of Winchester, City of Medford, and DCR will still pursue modifications to the Craddock Locks structure that would increase the hydraulic opening, and therefore improve flood conditions in the upper Mystic River and Alewife Brook. A structural analysis performed as part of this MEPA process shows that this option is feasible and cost-effective.

1.4.2 Upper Mystic Lake (Mid-Lakes) Dam, Arlington and Medford

The replacement of the control structure at the Upper Mystic Lake Dam in Arlington and Medford is currently under construction and when complete will allow the DCR to regulate storm flows through the Mystic Lakes. The Mid-Lakes Dam, also known as the Upper Mystic Lake Dam, is the impoundment that forms the boundary between the Upper and Lower Mystic Lakes. The structure is located partially in Arlington and partially in Medford. It is owned, operated, and maintained by DCR. This revised control structure will help manage pre-storm water elevations in order to optimally move flood flows out of the basin. The Town of Winchester has incorporated the improvements at the Mid-Lakes Dam into the downstream mitigation measures included in the FEIR preferred alternative. The new structure will be able to more effectively regulate flood flows from Upper Mystic Lake to Lower Mystic Lake and will eliminate the overtopping of the dam across adjacent private property. Similar to the process currently used by Woburn in the operation of Horn Pond and Winchester in the operation of Mill Pond, DCR may drawdown water levels in the Upper Lake prior to a predicted precipitation/snowmelt event to provide additional flood storage.

The project is expected to be complete in 2011. Construction of the project will be completed in two phases – Phase I began in Fall 2009 and will continue through Memorial Day 2010. Phase II will run between Labor Day 2010 and Memorial Day 2011. Construction is not allowed during the summer recreation season. Phase I of the project includes construction of the secondary spillway on the Medford side of the Dam, construction of the fish ladder (which will allow herring to migrate into Upper Mystic Lake) and eel-way, and rehabilitation of the east embankment. No access to the dam from the Arlington side is required during Phase I. Phase II of the project includes construction of the sheet pile cutoffs, rehabilitation of the existing primary spillway, construction of the new spillway bridge, and construction of the west-side lake wall. Temporary sheet pile cofferdams will be used to ensure that there is no lake drawdown during construction. DCR estimates the Phase I and II construction costs at approximately \$5 million. The project is fully funded through state resources.

1.4.3 Scalley Dam, Woburn and Winchester

Currently, the undersized outlet control structure at the Scalley Dam in Woburn and Winchester results in storm flow overtopping the dam in an uncontrolled fashion. By almost tripling the size of the outlet, the City of Woburn can release water from Horn Pond in advance of a storm and use the buffering capacity of the 100-acre pond to mitigate flood flows during a storm event. The Town of Winchester has incorporated the proposed improvements at the Scalley Dam into the upstream mitigation measures included in the FEIR preferred alternative.

1.4.4 Other Town Mitigation Commitments

Other smaller-scale stormwater management improvements in the watershed upstream of Winchester and in the Town of Winchester will help alleviate flooding in Winchester and other downstream communities. It is important to note, however, that these improvements alone will not solve the flooding problems in the Town of Winchester. As discussed in subsequent sections of this FEIR, the Town is reliant upon a suite of channel conveyance improvements coupled with increased BMPs for

improvements to the current flooding problems. These are discussed in greater detail in Section 3 and include:

- NPDES Phase II Stormwater Permit
- Infrastructure Capital Improvement Program
- Engineering Department and Conservation Commission Project Review
- Rain Barrel Program
- Measures to reduce existing flows
- Improvements for new or redevelopment projects
- Implementation of Water and Sewer Regulations

1.5 Revisions Since the SDEIR

The following bullets describe the major changes that have occurred since the issuance of the SDEIR:

- US Army Corps of Engineers (USACE) is no longer participating in the design or construction of Project 2, which will now be funded completely by the Town of Winchester (Section 3.3.2).
- Baseline Conditions flood model has been used and accepted by DCR and the calibration has been accepted by DEP (Section 2.1.2).
- A Riverfront Area analysis has been developed, as requested in the Secretary's certificate on the SDEIR (Section 4.2.4).
- FEMA completed the review of the watershed model, produced mapping for the communities within the watershed, publicly reviewed these maps, and made revisions. The new maps are scheduled to become effective in June 2010. This process verified the veracity of the model used in Winchester's Flood Mitigation Program (Section 2.1.1).
- Winchester Board of Selectman officially adopted the "Rules and Regulations Regarding the Use of Public Sewers and Stormdrains in the Town of Winchester, Massachusetts".
- Implementation of a rain barrel program in Winchester. In addition to the ongoing infiltration projects being installed by the Town and local developers, the Town has run a successful rain barrel program for its residents since 2007.

1.6 Development of Key Studies

Since publication of the SDEIR, the Town has spent a considerable amount of time and money performing several key studies, as noted below:

- **The 25% design of Project 2.** As originally proposed in the DEIR and SDEIR, Project 2 was to be partially funded by the US Army Corps of Engineers (USACE). However, based on comments received during the review of the SDEIR, the Town of Winchester chose to explore additional alternatives beyond those presented by the USACE to see if the size of the proposed channel could be further reduced from the SDEIR proposed 39-foot bottom width to further minimize impacts to the environment. AECOM ran a series of optimization models that showed that widening the river to a bottom width of 35-feet from Waterfield Road downstream approximately 1,300 feet to where the channel was already at least that wide (across from Manchester Road) proved to be a feasible option, which achieved a balance between the need

for flooding improvements and environmental and recreational benefits. However, the USACE determined that this channel width could not pass the required cost-effectiveness and stand-alone tests of the USACE; as a result, the federal funding option was withdrawn in October 2009. Using the proposed 35-foot bottom width, the Town evaluated several cross-section options with various stakeholders including the DCR (the property owner) and funded a land survey and preliminary (25% or conceptual) design of the preferred option. The results of that design effort are detailed in this FEIR (Section 3.3.2).

- **Evaluation of the soils and sediment along Project 2.** With its industrial history, and the history of having moved the river to its current location, several questions concerning sediment quality, handling, and disposal in the context of Project 2 were raised in the comments on the SDEIR. The Town chose to perform an extensive study of the Aberjona River soils and sediment from Waterfield Road to Bacon Street to answer these questions. The results of this study and the implications for project design and execution are presented in this FEIR (Section 2.4).
- **Evaluation and preliminary design of the Scalley Dam (Horn Pond, Woburn) outlet.** As detailed in the SDEIR, the outlet control structure on Horn Pond is inadequately sized to effectively allow pre-storm releases and to control discharges during storm events. The result is that the dam overtops in an uncontrolled fashion which exacerbates downstream flooding along Horn Pond Brook and the Aberjona River in Winchester. The Town of Winchester (working in cooperation with the City of Woburn) funded an engineering study of the Scalley Dam outlet structure. A new opening was optimized by modeling and a structural analysis of installing a new outlet structure was performed. The results of this study are included in the FEIR (Section 3.3.3).
- **Evaluation of modifications to Craddock Locks (Main Street Bridge in Medford).** The Town of Winchester funded an engineering study of the openings under the Main Street Bridge in Medford where the remnants of the Craddock Locks cause an obstruction to flow. Working with MassHighway (now MassDOT), the DCR, and the City of Medford the Town's structural engineering consultants reviewed the feasibility of removing the obstructions which, in turn, will help alleviate flooding upstream of the bridge. An evaluation of the potential for increased flooding downstream was also performed. These studies are discussed in detail in this FEIR (Section 3.3.4).

1.7 Objectives and Anticipated Benefits of the Flood Mitigation Program

The Winchester Flood Mitigation Program (FMP) has several objectives, the primary goal of which is to develop a set of structural and non-structural solutions that will improve the existing flooding conditions along the Aberjona River and its tributaries, and thereby reduce the economic losses experienced by businesses, residents, and the Town itself. Reducing flood losses in Winchester is a focal point of the Board of Selectmen, local residents, and State Representatives. With over \$25 million in losses due to five major storms in a 10-year period, an evaluation of the feasibility of minimizing future losses was essential. Based on the results of the modeling, the storms in question (October 1996, June 1998, March 2001, April 2004, and May 2006) represent storms with return frequencies of 55 to 75 years. Therefore, the losses during a 100-year event could be significantly higher than those experienced during these storms. Of particular concern are the areas which have experience repetitive losses. Evaluating the feasibility of preventing additional losses in these areas was a key component of the study.

The creation of an accurate model calibrated to known flooding events was crucial to form an understanding of the causes of flooding and the effectiveness of proposed remedies. A new baseline

model which accurately predicted flooding in all reaches of the Aberjona and Mystic Rivers was essential to evaluating alternative flood mitigation projects and to evaluating the benefits of the proposed mitigation projects. By using and fine tuning the new FEMA model for the Mystic River basin this objective has been reached.

1.8 Local, State, and Federal Agency Involvement

The Town of Winchester's Flood Mitigation Program involves the coordination and participation of numerous local, state, federal agencies, a summary of which is provided below.

1.8.1 Town of Winchester

The construction of the six remaining projects within Winchester will require coordination with many groups within the Town. All six projects will require filing a Notice of Intent with the Conservation Commission. Projects 2 and 4 have the potential to have an adverse effect on historic properties and districts, and may require a Memorandum of Agreement between the Town of Winchester, DCR, Massachusetts Historical Commission (MHC), and Winchester Historical Commission (WHC).

1.8.2 City of Woburn

The installation of a new control structure at Horn Pond (Scalley Dam) in Woburn is a joint project between the City of Woburn and the Town of Winchester. State Representatives from both communities have been actively involved in seeking State funding assistance for this project.

1.8.3 City of Medford

The modifications to Main Street Bridge (Craddock Locks) will require coordination with the City of Medford.

1.8.4 Massachusetts Water Resources Authority

The MWRA has made alterations to the sewer siphon chambers just upstream of the Wedgemere Train Station Bridge. This project (Project 1) was on a separate track from the other projects in the MEPA process and has been completed. Project 2 and Project 6 do not have any direct impacts to the MWRA, but projects are in close proximity to MWRA sewer lines, so the projects will involve coordination with MWRA and will require an 8m Permit.

1.8.5 Massachusetts Department of Conservation and Recreation

DCR owns the land and/or structures associated with Project 2, Craddock Locks, and the Mid-Lakes Dam. In addition, DCR is a permitting agency as the project requires DCR Access Permits and may require a Memorandum of Agreement between the Town of Winchester, DCR, MHC, WHC relative to the effects on the projects on historical properties

1.8.6 Massachusetts Historical Commission

Two of the proposed projects included in the FEIR Alternative (Project 2 and 4), have the potential to directly impact historic properties. A Memorandum of Agreement between the Town of Winchester, DCR, MHC, and WHC relative to these effects may be required.

1.8.7 Massachusetts Department of Environmental Protection

Pursuant to Section 401 of the state and federal Clean Water Acts, a Water Quality Certificate (WQC) is required for placement of fill or dredging within waters of the US. This approval is issued by the MADEP. It is anticipated that most of the projects will require a WQC, specifically Projects 2, 8, 10, and Scalley Dam. If the work involves less than 5,000 square feet of fill and/or 100 cubic yards of dredging, then the Order of Conditions will serve as the WQC.

1.8.8 Massachusetts Bay Transportation Authority

Project 10, will require a licensing agreement with the MBTA for the installation of the additional culverts near Muraco School.

1.8.9 United States Army Corps of Engineers

The USACE New England Division had previously committed to funding the proposed channel conveyance improvements from Waterfield Road downstream to Bacon Street (Project 2). However, as previously discussed, in October 2009 the USACE determined that the 35-foot bottom channel width proposed by the Town of Winchester after an independent alternatives analysis did not meet their required cost-effectiveness criteria, as had the 39-foot option proposed in the SDEIR Alternative. Consequently, the USACE is no longer partnering with the Town of Winchester and the Town has lost the opportunity for USACE-derived federal funding for the project. The USACE would have funded the analysis and design phase of project on a 50% federal to 50% Town cost sharing basis, and the construction phase on a 65% federal to 35% Town basis.

The USACE is also a permitting agency, pursuant to Section 404 of the federal Clean Water Act, approval is required for placement of fill, structures, or dredging within waters of the US. It is anticipated that most of the projects will require Section 404 approval, specifically Projects 2, 8, 10, and Scalley Dam.

1.8.10 United States Geological Survey

Project 2 will require additional coordination with USGS on replacement of the current stream gaging station. The Town of Winchester has already had several meetings with the USGS and has worked out the preliminary details regarding the gage relocation. Further coordination and funding from the Town will be required prior to removal of the existing gage.

1.9 Public Outreach Efforts

A significant scope item for the Town of Winchester during the MEPA process has been the development of an extended stakeholder outreach program. Because improvements in Winchester have the potential to cause adverse impacts on downstream communities, and because the actions of upstream communities play a large role in flooding in Winchester, the Town has developed an extensive list of stakeholders in the watershed, hosted several public and legislative information sessions, participated in a symposium hosted by Tufts University and the Mystic River Watershed Association, and met with representatives from each community.

During the DEIR process, the Winchester Board of Selectmen hosted a Stakeholder Outreach Meeting. Just prior to the release of the DEIR, a legislative briefing hosted by former State Representative Paul Casey was held at the State House and the Winchester Board of Selectmen hosted a second Stakeholder Outreach Meeting to update the watershed communities on the results of the FEMA and DEIR studies. The scope, attendees, and results of these meetings were reported on in the DEIR. Prior

to the release of the SDEIR Senator Jahlen hosted another legislative meeting and subsequent to the release of the SDEIR Representative Brownsberger from Belmont hosted a watershed-wide forum at the statehouse with the communities and the DCR. Winchester participated in all of those meetings.

Prior to filing the DEIR, SDEIR, and now the FEIR, technically-oriented meetings were also held with the City of Woburn and the DCR to discuss the operations at Scalley Dam and the Craddock Locks. These meetings also include the subjects of upstream storage and infiltration, the Mid-lakes Dam, and the Amelia Earhart Dam. Winchester has also met separately with the DCR on several occasions to discuss the design of and mitigation for Project 2.

Since filing the SDEIR this public outreach effort has continued. Table 1-1 provides a list of the meetings coordinated and attended by the Town of Winchester and its flood mitigation consultants where the scope of the EIR alternatives, impacts, and mitigation efforts were reviewed. In addition to the meetings listed in this table, numerous technical meetings, reviews, and tele-conferences were held with the USACE, MWRA, DCR, Winchester Conservation Commission, Woburn City Engineer, FEMA, MassDOT, Dr. Stephen Kaiser of Cambridge, private landowners and developers, and consultants for other projects. The Town proposes to continue these efforts during the FEIR review period with the Tri-Community Flooding Board, and will also develop a public outreach process to be implemented during the permitting phase for each project.

Table 1-1: Major Public Outreach Meetings Held Since the SDEIR Filing (February 15, 2007) Anticipated Project Sequencing

Meeting	Attendees	Date
USGS Gage Coordination	USGS AECOM Town of Winchester	3/22/07
USGS Gage Coordination	USGS AECOM Town of Winchester	4/12/07
MEPA	EEA MEPA Town of Winchester Greenberg Traurig LLP Kearney, Donovan & McGee, PC	6/12/07
DEP NERO, SDEIR Comment Letter Clarification	AECOM USACE DEP NERO Greenberg Traurig LLP	6/19/07
Senator Jehlen	Town of Winchester AECOM Greenberg Traurig LLP Kearney, Donovan & McGee, PC	11/28/07
Scalley Dam Improvements	Town of Winchester AECOM Weston and Sampson Woburn City Engineering Staff	8/14/2008

Meeting	Attendees	Date
Craddock Lock Improvements	Town of Winchester AECOM Weston and Sampson Medford DPW Commissioner Medford Assistant City Engineer	8/14/2008
MEPA Project Update	EEA MEPA DCR Arthur Ullian Town of Winchester Greenberg Traurig LLP Kearney, Donovan & McGee, PC	11/19/08
DCR Staff	Town of Winchester AECOM Ilyas Bhatti Greenberg Traurig LLP Kearney, Donovan & McGee, PC	3/19/09
Project 2 Improvements	Town of Winchester AECOM Weston and Sampson Department of Conservation and Recreation	5/28/2009
USGS Gage Coordination	USGS AECOM Town of Winchester	9/2/2009
Project 2 Improvements	Town of Winchester AECOM Coneco Engineers and Scientists Pressley Associates Department of Conservation and Recreation	9/29/2009
Discussions with Steve Kaiser	Town of Winchester AECOM Steven Kaiser, PhD	10/13/2009
DEP NERO, Riverfront Analysis Discussions	AECOM Coneco Engineers and Scientists Department of Environmental Protection	11/2/2009
MEPA Project Update	Town of Winchester AECOM Coneco Engineers and Scientists Kearney, Donovan & McGee, PC Greenberg Traurig LLP MEPA	12/11/2009
DEP NERO, Riverfront Analysis Discussions	AECOM Coneco Engineers and Scientists Department of Environmental Protection	12/16/2009

Meeting	Attendees	Date
Winchester Conservation Commission Project Update	Town of Winchester AECOM Coneco Engineers and Scientists	2/9/2010
Arlington, Belmont, Cambridge (ABC) Flooding Board	Town of Winchester AECOM Coneco Engineers and Scientists ABC Members	2/9/2010
Arlington, Belmont, Cambridge (ABC) Flooding Board Project Update	Town of Winchester AECOM Coneco Engineers and Scientists ABC Members	3/9/2010 (Scheduled)
Cultural Resources MOA Discussions	MHC WHC Ellen Knight AECOM Coneco Engineers and Scientists Town of Winchester Public Archeological Lab	TBD

The proposed conveyance, storage, infiltration, and flow regulation measures discussed in this FEIR should be viewed as a “package” of efforts designed to relieve flooding in Winchester. The capital costs and construction-related disruptions of implementing all of these individual projects preclude their being constructed at the same time. Many of the projects (including those described as flood flow mitigation) are being proposed and built by jurisdictions other than the Town of Winchester.

As stated in the SDEIR, it is generally recommended that the proposed improvements be built with both upstream and downstream mitigation completed first, and then the in-Town flood mitigation projects from downstream to upstream. However, as part of the FEIR, several projects were evaluated for their potential to be constructed ahead of the Scalley Dam and Craddock Locks mitigation projects, but with Upper Mystic Lakes Dam being completed. The prior project sequencing analysis performed for the SDEIR did not investigate the option of completing Upper Mystic Lakes Dam improvement project first. This additional analysis determined that Project 2 (Waterfield Road to Bacon Street) could be built ahead of the Scalley Dam and Craddock Locks mitigation projects with no adverse effect. Projects 4 (Mount Vernon Street Bridge Improvements), Project 8 (Swanton Street Bridge Improvements), and Project 10 (Railroad Bridge near Muraco School) were evaluated but each required that other projects and/or the Scalley Dam/Craddock Locks projects be completed first. Craddock Locks becomes required as the flows released from Project 4 (Mount Vernon Street Bridge) come into play. Section 4.8.5 presents the proposed sequence for project completion.

1.10 Project Funding

The Town of Winchester is exploring a variety of funding mechanisms for the projects discussed in this FEIR. Federal matching funds through the USACE are no longer available to the Town and this has left a \$2 million deficit in potential funding. The Town hopes to enlist the financial assistance of the DCR, MassDOT, and the City of Medford for the Craddock Locks project. The reconstruction of the control structure at Scalley Dam is a joint effort of the City of Woburn and the Town of Winchester, and both communities are seeking state financial assistance. The installation of a new control structure and fish

ladder at the mid-lakes dam at Upper Mystic Lake are DCR projects (state funded). The Town may also seek state and federal financial assistance for the in-Town projects discussed in this FEIR, such as grants provided through FEMA's Flood Hazard Mitigation Program. Finally, the Town will self-fund several projects through the issuance of municipal bonds.

2.0 Existing Conditions

2.1 Floodplains, Watershed Hydrology, and Riverine Hydraulics

Chapter 3 of the DEIR and Chapter 2 of the SDEIR provided a comprehensive view of the existing conditions within the project area and watershed. The Secretary's Certificate on the SDEIR did not identify any deficiencies in the compilation of the existing conditions information. Several of the detailed studies performed as part of the FEIR process added knowledge concerning existing conditions so those results are presented in this Chapter. Baseline information that has not changed since filing the DEIR and SDEIR is not repeated in this document and the reader is referred to those documents for that information.

As in the SDEIR, the evaluation of existing and alternative flood improvements and their associated impacts prepared for this FEIR were performed using a hydrologic/hydraulic model of the Mystic River Basin. This model was originally developed by AECOM (formerly ENSR) as part of a comprehensive Flood Insurance Study (FIS) of the Mystic River Basin under contract to FEMA. Section 2.3.4.1 and Appendix B1 of the SDEIR contain a detailed explanation of the model setup and modeling technique. For the purposes of this FEIR, the model built for the FEMA flood study was further refined to include projects completed since the development of the original model, since submittal of the DEIR and SDEIR, and additional survey detail in the vicinity of Project 2; the following modifications were included:

- Project 1: Wedgemere Train Station – MWRA Siphon Relocation (completed 2008);
- Project 2: Channel Widening, Waterfield Road to Bacon Street – Additional survey performed between Bacon Street and Waterfield Road;
- Project 3: Center Falls Dam (partial completion) – Replacement of one gate valve at Center Falls Dam;
- Project 5: Culvert Addition, Shore Road – Shore Road culvert project (completed 2002);
- Project 12: Removal of dam upstream of railroad bridge near Muraco School (completed 2002);
- Project 13: Cross Street Culvert project (completed 2005); and
- Elimination of the footbridge near the Wedgemere Train Station, which was removed by the Town of Winchester in summer 2006 due to structural failure. This modification was made since the analysis performed for the DEIR.

This refined model is what is referred to as the FEIR “existing conditions” or “baseline” model in this document.

2.1.1 Status of FEMA Flood Insurance Rate Maps

Since the filing of the SDEIR, FEMA provided Middlesex County communities with preliminary copies of the Flood Insurance Study (FIS) report and Flood Insurance Rate Maps (FIRMs). These maps were initially provided to all the communities on September 28, 2007. A few of the FIRMs and portions of the FISs were revised to correct errors, and reissued on May 29, 2008; these changes did not affect the Town of Winchester. The corrections made were minor and did not require any modifications to the model or additional model runs.

On December 4, 2009, Letters of Final Determination (LFDs) were issued by FEMA to the communities of Middlesex County, which includes the Mystic Basin. The letters stated that the statutory appeal period has ended, and that FEMA did not receive any appeals of the proposed Base Flood Elevation (BFEs). Therefore the BFE's for the Mystic River communities are considered final, and will become effective June 4, 2010. The Town of Winchester will be updating its floodplain bylaw at the Spring 2010 Town Meeting to reflect the new effective FIS and FIRM information.

2.1.2 Peer Review and Model Accuracy

As discussed in the SDEIR, the FEMA FIS process is governed by a standardized set of principles and methodologies as presented in their multi-volume *Guidelines and Specifications for Flood Hazard Mapping Partners*. One of the integral parts of any study is that all data development, modeling, and mapping is subject to independent QA/QC review for compliance with the *Guidelines and Specifications* before it is accepted for use in a FIS. Once accepted by FEMA, preliminary FIS and FIRMs are prepared and submitted for public review.

The issuance of the preliminary FIS and FIRMs by FEMA starts a timeline for public comment, appeals, and adoption. FEMA then holds a final community meeting, of which six meetings were held in Middlesex county in early November 2007. The proposed BFEs are then published at least twice in a local newspaper and in the Federal Register. Upon the second publication in the local newspaper, a minimum 90-day appeal begins. During the appeal period communities and owners of property in the affected communities have the opportunity to submit information on whether the BFEs are scientific or technically correct. FEMA then works to resolve any appeals and finalize the FIRMs. For the Mystic Basin FIS, no appeals of the proposed BFEs were received. FEMA then issues a LFD. Once issued, the FIRMs need to be adopted by the communities within six months of the date of the LFD, before the FIRMs become effective.

During the FEMA public review process, FEMA made the Mystic Basin HEC-HMS/HEC-RAS model and supporting information available on-line for those who were interested in downloading. Several communities and interested parties obtained the model. The City of Cambridge retained the services of SEA Consultants, Inc. who spent a considerable amount of time and effort reviewing the FIRMs and FIS. Based on the City of Cambridge's research and review performed by SEA, Cambridge issued a letter, dated September 9, 2008, to FEMA in which they stated "we [City of Cambridge] are satisfied that the Preliminary FIRMS and FIS have been conducted in a reasonable fashion and with reasonable assumptions." This letter is available on City of Cambridge's web page (<http://www.cambridgema.gov/TheWorks/stormwater/fema.html>), and included as Appendix B.

AECOM (formerly ENSR), also worked with the MassDOT and the DCR to provide full copies of the Mystic River Basin model developed for FEMA. MassDOT extracted portions of the model which served as a basis for their analysis of the Main Street Bridge in Medford. DCR worked with their consultant GZA, who used the model for the DCR's study of the Upper Mystic Lake Dam rehabilitation project. In addition to these state agencies, numerous consultants are using the model to assess various projects along segments of rivers and streams included in the model.

In addition to working with the DCR and MassDOT to provide the model and answer questions, AECOM worked with DEP to ensure they felt comfortable with the model and calibration. DEP's comment letter on the SDEIR requested that a comparison of discharges between the model and the USGS Aberjona gage for various return period storm events. The following section describes this analysis and results.

2.1.3 Model and Gage Peak Flow Comparison

The U.S. Geological Survey (USGS) currently operates one flow gaging station on the Aberjona River (Station ID: 01102500). This station is located in Winchester along Mystic Valley Parkway, approximately 0.5-miles upstream of the confluence with the Upper Mystic Lake. The period of discharge records runs from April 1939 to the present.

AECOM performed a Log-Pearson Type III flood frequency analysis for the USGS Gage 01102500, Aberjona River at Winchester, MA in accordance with the procedures outlined in *Guidelines for Determining Flood Flow Frequency, Bulletin 17B of the Hydrology Subcommittee, Interagency Advisory Committee on Water Data, March 1982*.

For the analysis the maximum annual water year instantaneous peak stream flow was acquired from the USGS in WATSTORE format (http://nwis.waterdata.usgs.gov/ma/nwis/peak?site_no=01102500&agency_cd=USGS&format=hn2). Many of the water year records were flagged with qualification codes. Most of the records were flagged with Code 5- *Discharge affected to unknown degree by Regulation or Diversion*. Two records were also flagged with different qualification codes, 1972 with Code 2- *Discharge is an estimate* and 1979 was flagged with Code 7 – *Discharge is a Historic Peak*. Although Bulletin 17B states that Log-Pearson Type III flood frequency analysis is generally not applicable to regulated rivers, Bulletin 17B methodology has been used in previously published studies to evaluate flood frequencies on regulated rivers. A Log-Pearson Type III flood frequency analysis was used because there was no better alternative, long-term gage records were available, and the data fit the distribution. The qualification code of 7 was removed from the record, in discussions with USGS it was determined not to apply.

The USGS PeakFq version 5.20 was used for the analysis, which is designed to be used with USGS WATSTORE format files and to follow the Bulletin 17B guidelines. For the analysis the entire available gage record was used, covering water years 1940 – 2006. No low or high outliers were identified in the data. Table 2-1 summarizes the results of the flood frequency analysis for the station. Appendix C includes the full flood frequency calculations.

Table 2-1: Model Results and Log Pearson Type III Peak Flow Comparison for USGS Gage 01102500 Aberjona River at Winchester, MA

Return Period (years)	Model (cfs)	Peak Fq Bul 17b ¹ (cfs)	95 Percent Confidence	
			Lower	Upper
2	400	350	310	400
5	560	610	530	710
10	730	830	710	1,000
25	990	1,180	980	1,490
50	1,370	1,500	1,220	1,960
100	1,830	1,880	1,490	2,540
500	3,500	3,020	2,270	4,400

1. Period of Record analyzed 1940-2006

Table 2-1 also presents the instantaneous peak flows simulated at the USGS gage in the baseline model for various return period storm events. In general, the calibrated model results match well with those of the gage flood frequency analysis. Peak model flows were within 3 to 16 percent of the Bulletin 17B estimate for the various return periods, and all peak model flows were within the Bulletin 17B 95 percent confidence limits.

2.1.4 Low-Flow Conditions

AECOM evaluated the historical streamflow record along the subject reach using daily flow data recorded at the USGS stream gage (01102500 period of record: 1939 - 2008). The stream gage is located along the subject reach. AECOM determined that the critical low flows during the Alewife migration season occur during the month of May. AECOM determined that the critical low flows during the dry season occur during the month of September.

Figure 2-1 illustrates the average daily discharge of the Aberjona River for each month during the period of record at USGS gage 01102500. The average daily discharge for all months exceeds the bank-full capacity of the low-flow channel proposed as part of Project 2.

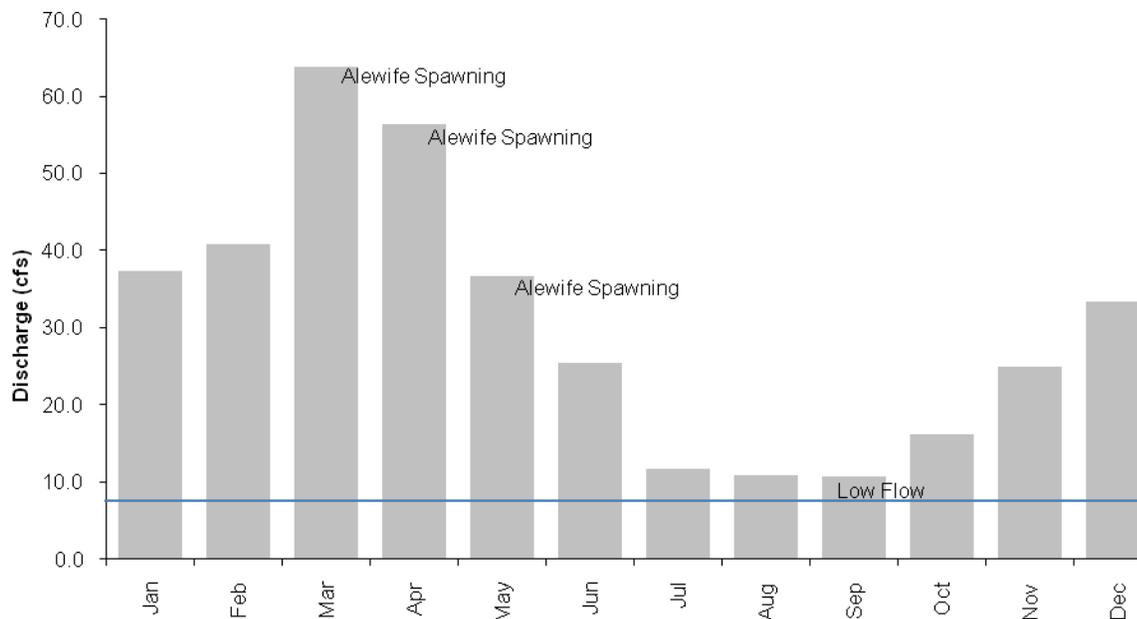


Figure 2-1: Average Daily Flow by Month (1939-2008)

2.2 Wetland Resource Areas

The following sections present the existing wetland resource areas and the additional riverfront area analysis, as requested in the Secretary’s certificate on the SDEIR.

2.2.1 Previous Wetland Information

The DEIR and SDEIR contained a significant amount of information on the wetland resource areas pursuant to the Massachusetts Wetland Protection Act (M.G.L. C. 131, S. 40) and Regulations (310 CMR 10.00) in the vicinity of the in-Town projects and Mitigation Projects. The reader is referred to Section 2.4 of the SDEIR for additional information.

2.2.2 Riverfront Area Analysis

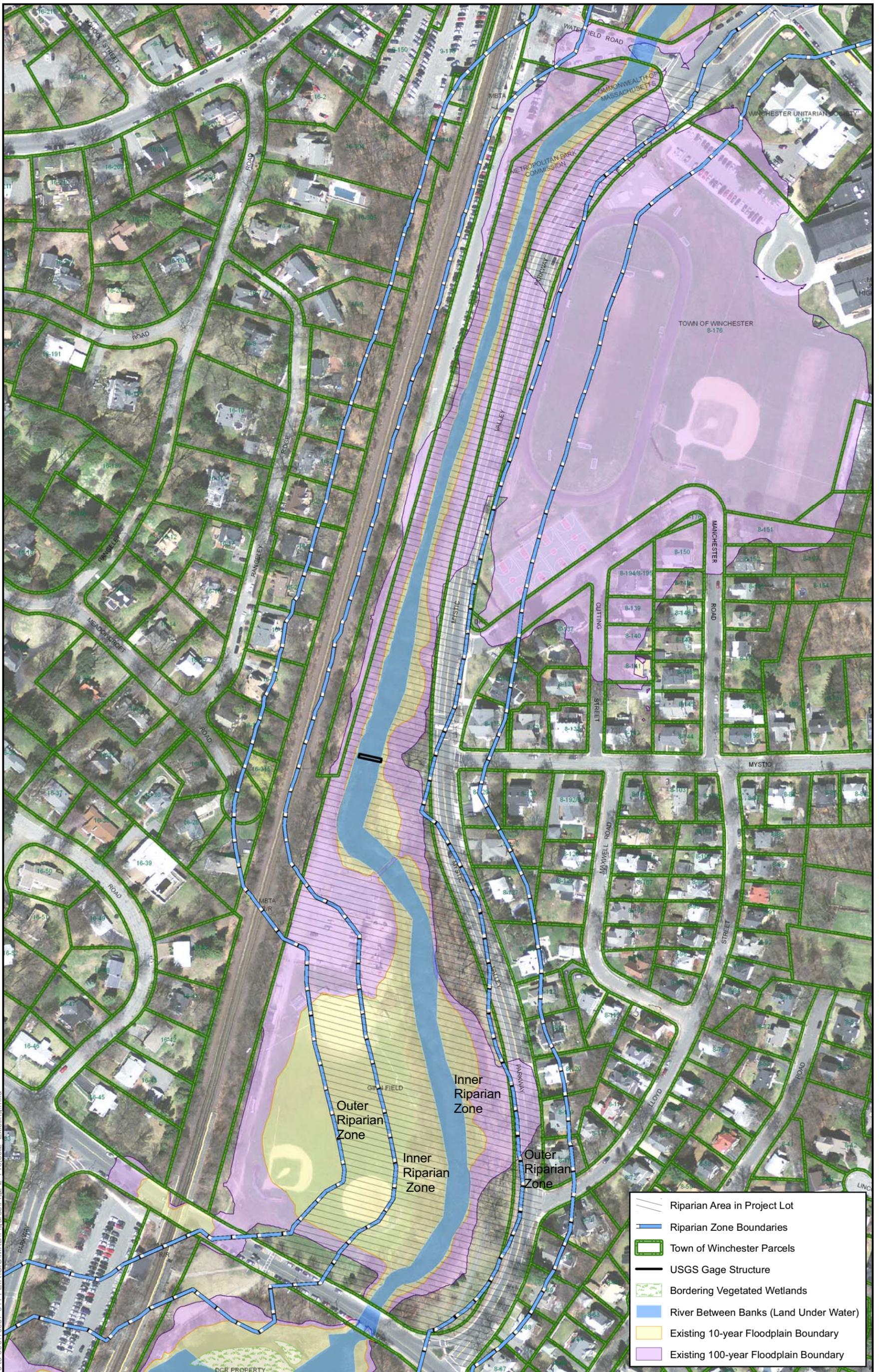
Following the review of the SDEIR, one of the remaining questions concerned the size of the Riverfront Area and whether the proposed projects would exceed the threshold of Riverfront Area disturbance allowed under 310 CMR 10.58(4)(d)1 of 5,000 s.f. or 10% of the Riverfront Area on the "lot", whichever is greater. For some of the work proposed in this FEIR there is an exemption from the Wetlands Protection Act for Riverfront Area. This exemption states that if the area or work is subject to Chapter 91 then that project is exempt from the requirements for Riverfront Area [310 CMR 10.58(6)(i)]. The Chapter 91 regulatory issues are discussed in Section 2.3.

As part of this FEIR (and despite a potential exemption under the Rivers Act) the Town performed an analysis of Riverfront Area for each project. This analysis is reported on in Chapter 4 of this FEIR, but a discussion of the baseline condition is warranted here.

To perform the analysis, the area of the "lot" encompassing each of the projects in the FEIR Alternative first had to be defined. Since these projects occur on public lands and right-of-way as opposed to conventional lots, an arbitrary boundary of each lot had to be drawn. For example for Project 2 (which runs along the river from Waterfield Road to Bacon Street) the land on which the project is located is owned by the DCR. But the actual boundary of the DCR owned "lot" extends both upstream and downstream of the project area. Therefore, to be conservative, lines were drawn across the DCR land at Waterfield Road and at Bacon Street perpendicular to the river and only the area between those two lines were included in the Riverfront Area calculations. Similar decisions were made at the other project locations and this analysis results in a conservative estimate of the total amount of Riverfront Area at each project location. Therefore, any potential impacts (on a percentage basis) of each project will be overstated (conservatively estimated). Table 2-2 and Figures 2-2 to 2-8 show the results of this baseline analysis and depict the existing condition resource areas.

Table 2-2: Riverfront Area Analysis

Project	Parcel	Inner Riparian Zone (acres)	Outer Riparian Zone (acres)	Total Riparian Area (acres)
2	DCR Property	7.17	1.95	9.11
2	Mystic Valley Parkway	2.29	2.31	4.61
TOTAL 2		9.46	4.26	13.72
TOTAL 3	Mill Pond 9-18	0.58	0.00	0.58
4	Mt. Vernon Street	0.27	0.27	0.53
4	9-49	1.46	0.04	1.50
4	Mill Pond 9-18	0.58	0.00	0.58
TOTAL 4		2.31	0.31	2.62
TOTAL 6	Winchester Ciarcia Field 10-182/10-212	1.09	0.02	1.11
8	Swanton Street	0.27	0.25	0.52
8	Winchester Ciarcia Field 10-182/10-212	1.09	0.02	1.11
TOTAL 8		1.36	0.27	1.63
10	MBTA	0.59	0.69	1.28
10	Unnamed Parcel north of River	2.87	3.36	6.23
10	Unnamed Parcel along River	2.89	0.15	3.04
10	Muraco School 13-192*	0.40	0.40	0.80
10	11-262*	0.54	0.53	1.08
TOTAL 10		7.29	5.14	12.43
Total Scalley	Horn Pond	39.65	0.00	39.65

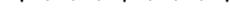


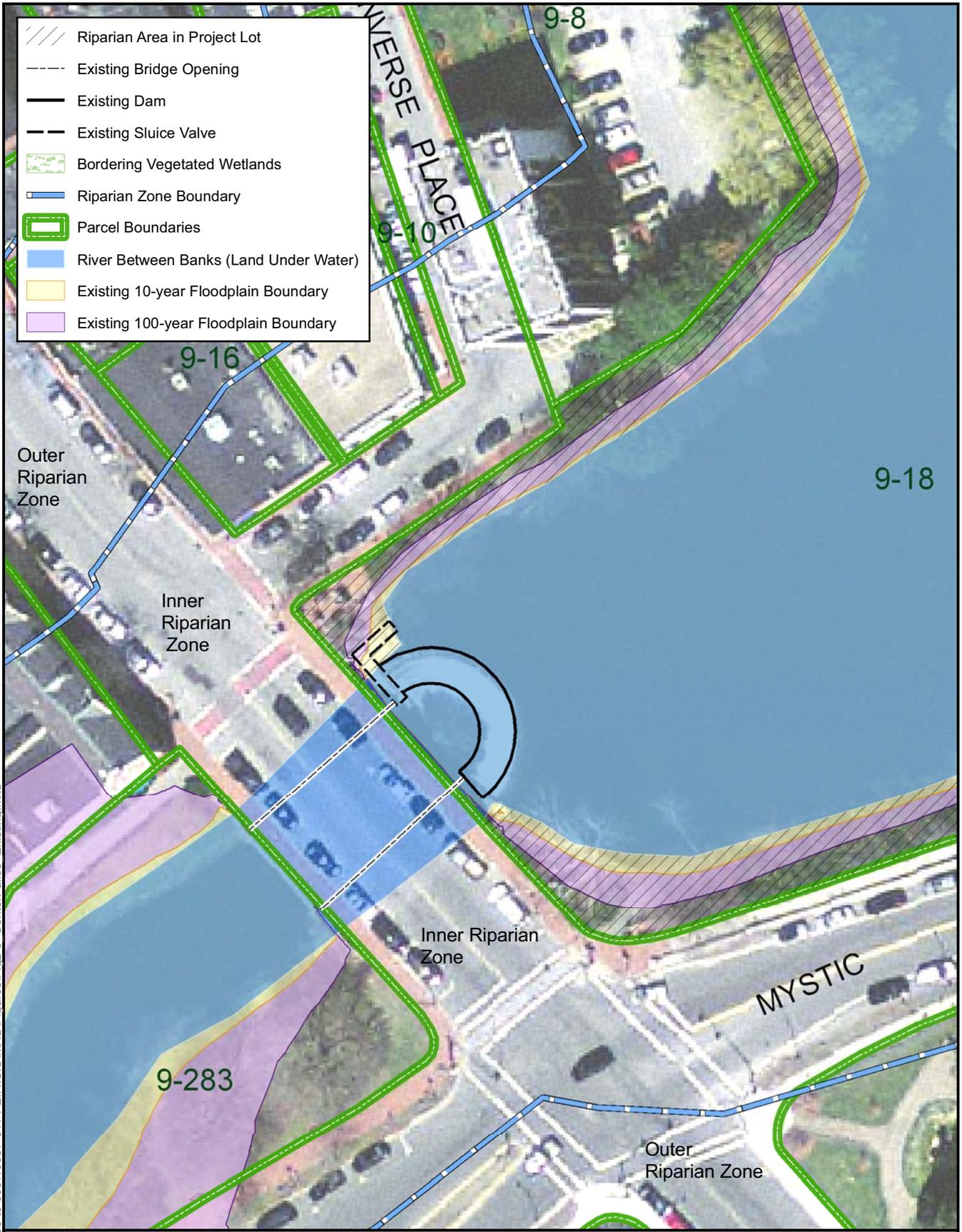
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Figure 2-2 Project 2 Waterfield Road to Bacon Street
Existing Resource Areas
Including: Riverfront Area, Area within Banks, Bordering
Vegetated Wetlands, and Floodplain Boundaries

0 50 100 200 Feet





-  Riparian Area in Project Lot
-  Existing Bridge Opening
-  Existing Dam
-  Existing Sluice Valve
-  Bordering Vegetated Wetlands
-  Riparian Zone Boundary
-  Parcel Boundaries
-  River Between Banks (Land Under Water)
-  Existing 10-year Floodplain Boundary
-  Existing 100-year Floodplain Boundary

Outer
Riparian
Zone

Inner
Riparian
Zone

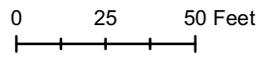
Inner Riparian
Zone

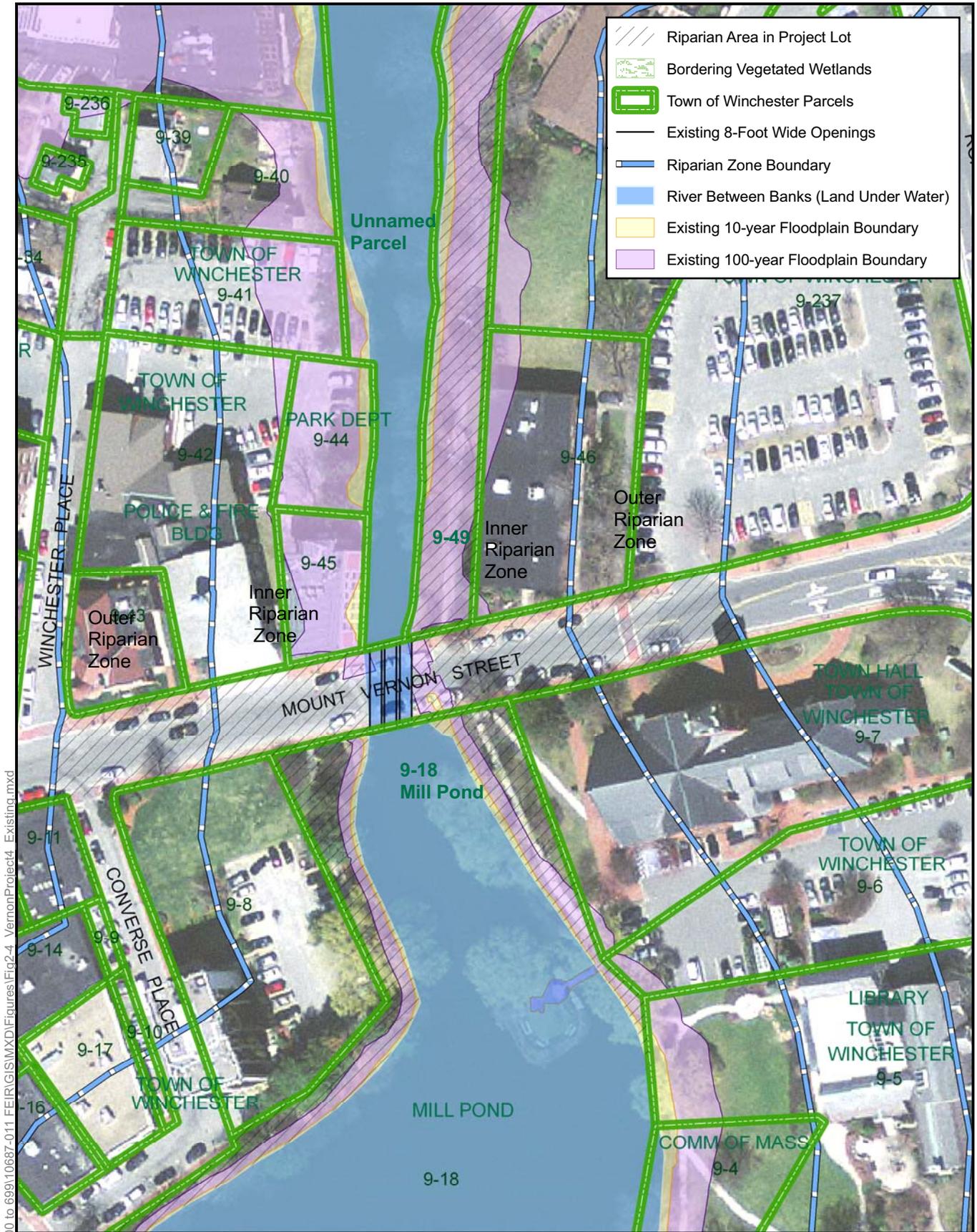
Outer
Riparian
Zone

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Figure 2-3 Project 3 Center Falls Dam
Existing Resource Areas
Including: Riverfront Area, Area within Banks, and Bordering
Vegetated Wetlands, and Floodplain Boundaries

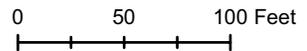


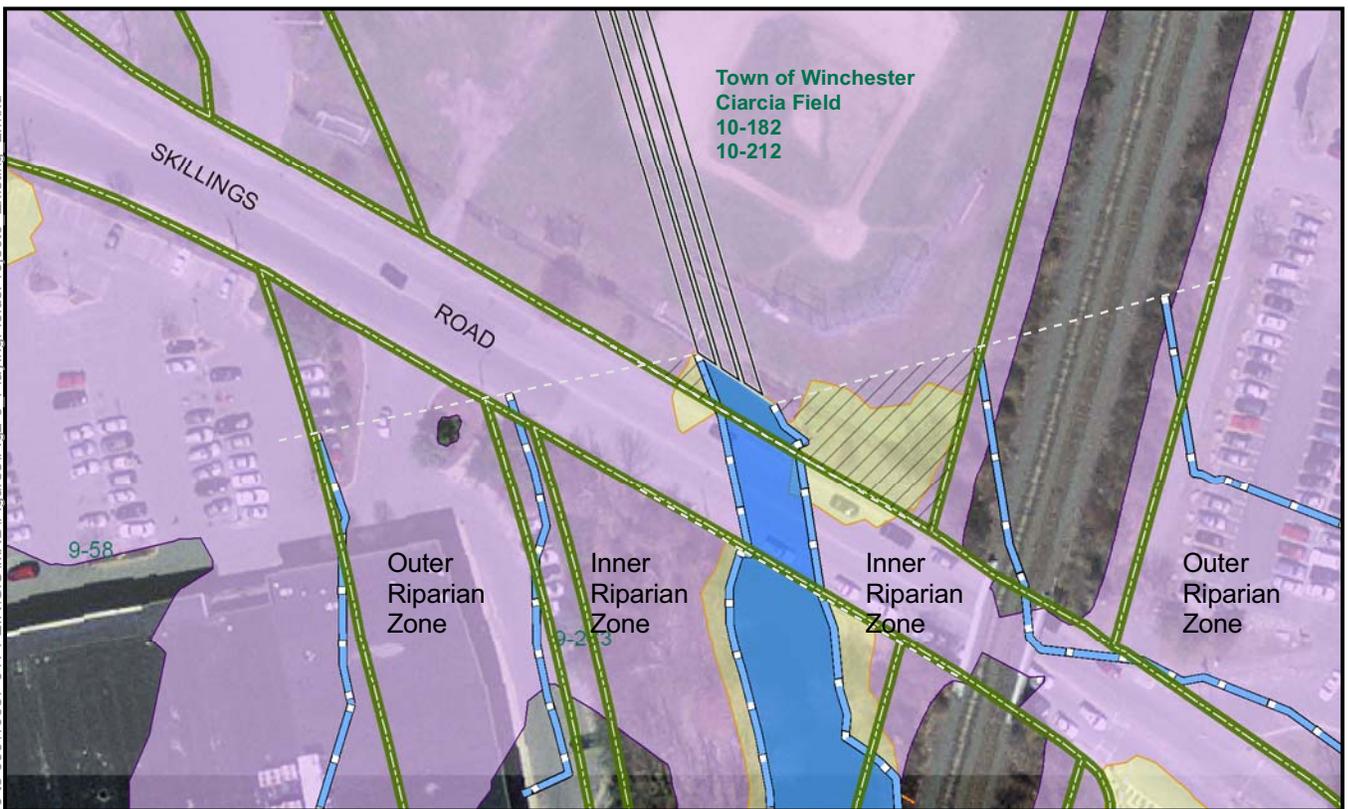
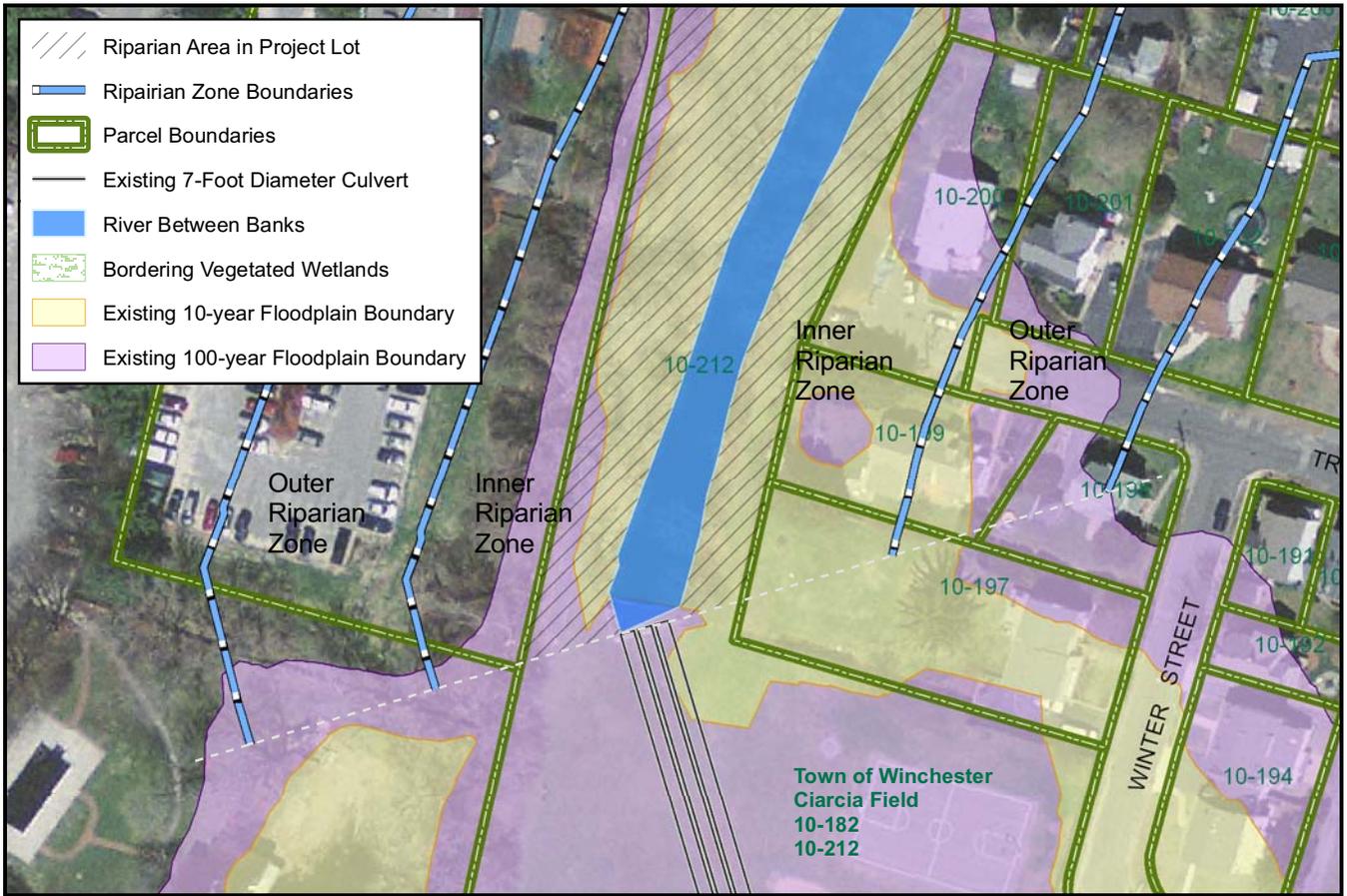


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Figure 2-4 Project 4 Mt. Vernon Street Bridge
Existing Resource Areas
Including: Riverfront Area, Area within Banks, Bordering
Vegetated Wetlands, and Floodplain Boundaries

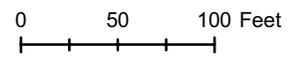




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Figure 2-5 Project 6 High School Playing Fields
Existing Resource Areas
Including: Riverfront Area, Area within Banks, Bordering
Vegetated Wetlands, and Floodplain Boundaries





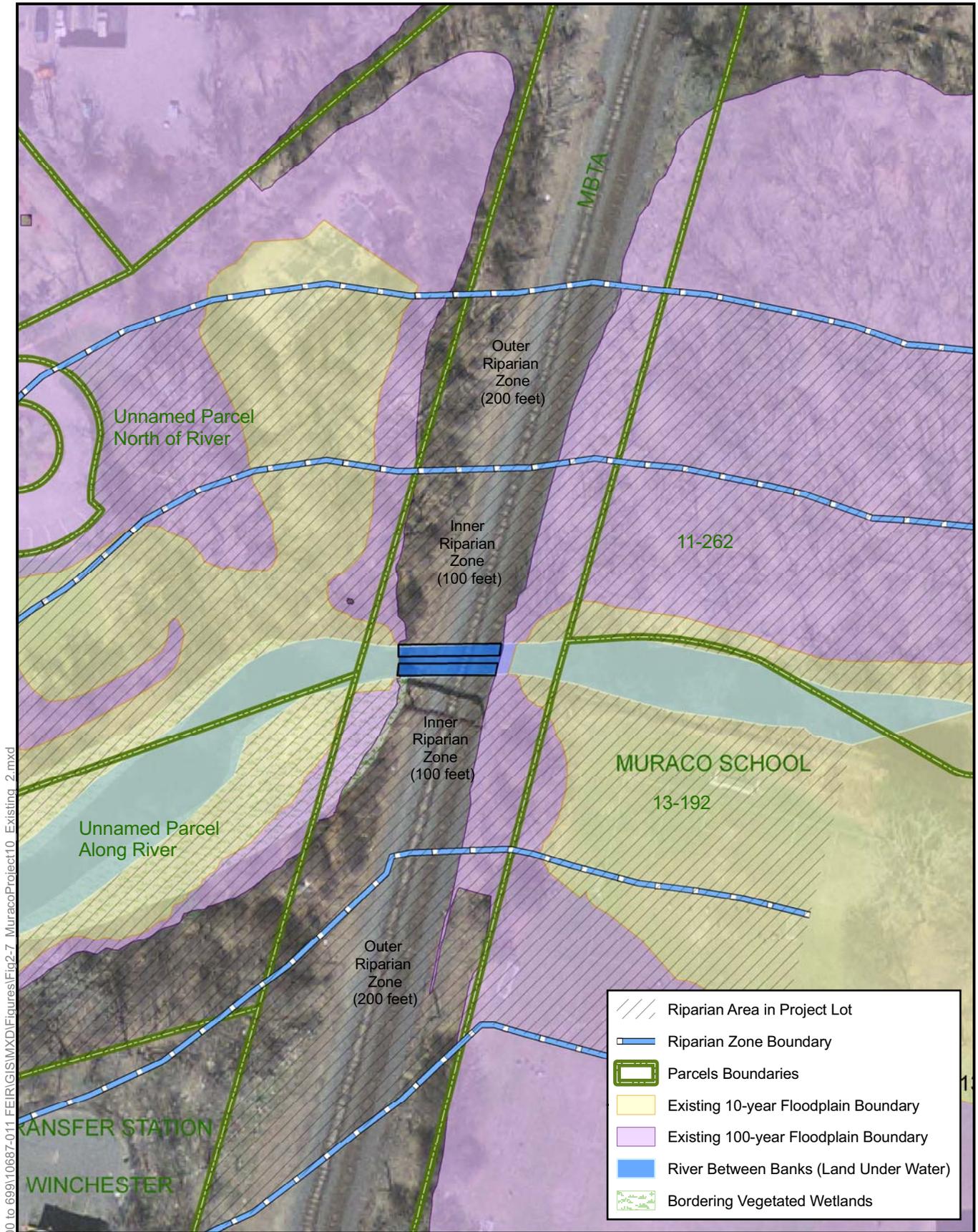
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Figure 2-6 Project 8 Swanton Street Bridge
Existing Resource Areas
Including: Riverfront Area, Area within Banks, Bordering
Vegetated Wetlands, and Floodplain Boundaries

0 50 100 Feet

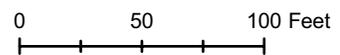




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Figure 2-7 Project 10 Railroad Bridge at Muraco School
Existing Resource Areas
Including: Riverfront Area, Area within Banks, Bordering
Vegetated Wetlands, and Floodplain Boundaries



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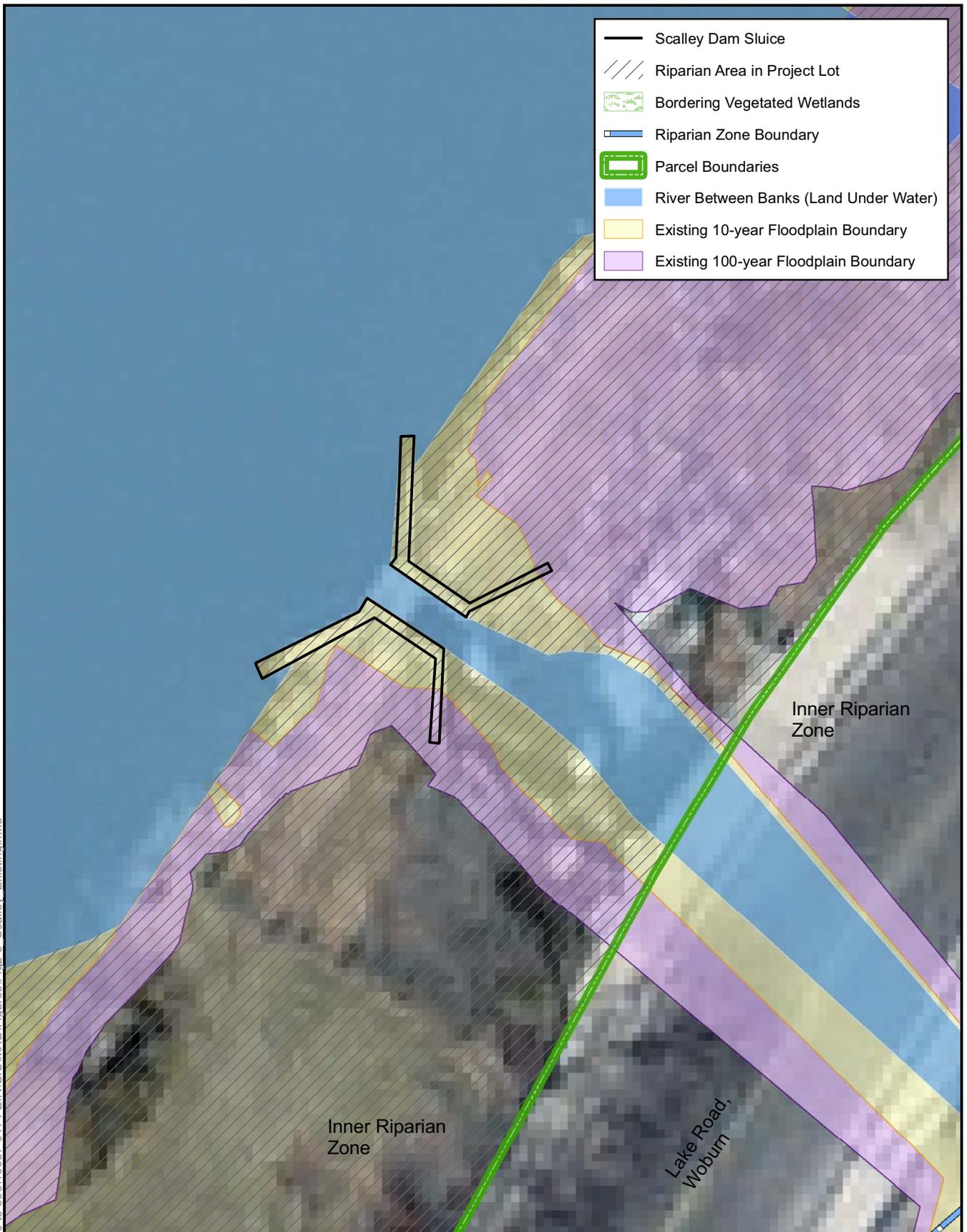
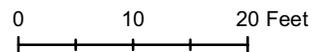


Figure 2-8 Scalley Dam
Existing Resource Areas
Including: Riverfront Area, Area within Banks, Bording
Vegetated Wetlands, and Floodplain Boundaries



2.3 Waterways

Pursuant to the Massachusetts Public Waterfront Act (M.G.L. C. 91) and Regulations (310 CMR 9.00) ("Chapter 91"), DEP has jurisdiction over waterways that are navigable and where public funds have been expended. The proposed projects have impacts below the top of banks along the Aberjona River which are subject to Waterways Licensing or Permitting as Water-Dependent Projects are:

- Project 2 (channel enlargement, adverse slope removal, and USGS gage replacement)—Waterways Permit
- Project 3 (Center Falls Dam new sluice gate)—Waterways License
- Project 4 (Mount Vernon Street Bridge culvert)—Waterways License
- Project 8 (Swanton Street bridge replacement)—Waterways License
- Project 10 (new culverts at the Railroad bridge near Muraco School)—Waterways License

2.4 Sediment, Soil and Water Quality

At the time of the SDEIR filing available sediment, soil and water quality data for the Aberjona River included the following studies:

- Sediment investigation of areas upstream and downstream of Davidson Park Dam conducted in 2001 for the Town by GEI Consultants, Inc.;
- Sediment investigations conducted by the Woods Hole Group (WHG) in 2003 in support of the USACE's Aberjona River Flood Control Feasibility Study; and
- Baseline Risk Assessment conducted by the USEPA in 2003 and 2004 in conjunction with investigations for the Wells G & H Superfund Site located in Woburn.

These studies are summarized in Appendix D, Existing Sediment, Soil and Water Quality Reports. Current conditions for these media in the area of Project 2 are detailed in the following subsections based on additional data collected during 2008 by AECOM where present. Conditions for these media in areas of the other Projects were summarized in the SDEIR.

2.4.1 Sediment Quality

In August 2008, AECOM implemented a sediment sampling program in support of the design phase of Project 2. This work was performed in accordance with the Aberjona River Sediment Sampling Analysis Plan (SSAP) that provided the methods and protocols for the sampling, analysis, and characterization of potential dredge spoils from the river. The first portion of this sediment sampling program included a Sediment Reconnaissance Survey (SRC) on August 5, 2008. The SRC was performed along 29 transects between Waterfield Road and Bacon Street and included collection of width of the channel, water depth, flow, sediment depth and composition, riparian conditions, outfall locations and non-point source (NPS) drainage sources. This data was used to refine the SSAP and maximize the different depositional zones sampled.

The SSAP was implemented in September 2008 and included sediment sampling at nine locations to meet the requirements of the Clean Water Act Section 401 Water Quality Certificate (314 CMR 9.07(2)(a)), as specified under 314 CMR 9.07: *Criterion for the Evaluation of Applications for Dredging and Dredged Material Management*. This initial sediment sampling effort was used to evaluate the

current physical and chemical characteristics of sediments in this reach of the Aberjona River and to support changes, as applicable, in the number of sediment samples and parameters analyzed to support the Final Design. The results of the SSAP are discussed below and summarized in Appendix E, Sediment Sampling and Riparian Soil Analysis Report for Aberjona River Flood Mitigation Program Project #2 – 25% Design Phase. Sediment sampling locations are provided on Figure 2-8.

Field Screening Results

As part of the sediment collection protocol, sediments were visually inspected for odor and sheens and composited sediment materials were screened with a Photoionization Detector (PID). Although odors were noted at four locations and sheen was noted at one location, PID measurements of composited sediments were generally zero.

Metals Results

Metals analytical results indicated that the sediments along this reach contain low to moderate concentrations of metals and are consistent with levels typical found in rivers within urban watersheds. In general, sediment metal levels tended to be higher below the USGS gage weir.

Sediment arsenic (As) levels ranged from 1.4 to 32.7 mg/kg with an average of 11.7 mg/L. No samples exceeded the As criterion of 100 mg/kg identified in 314 CMR 9.07(2)(b) for potential toxicity characteristic leaching procedure (TCLP) testing. Sediment cadmium (Cd) levels ranged from 0.38 to 2.9 mg/kg, with an average of 1.1 mg/kg. No sediment samples exceeded the sediment testing criterion of 20 mg/kg for potential TCLP testing.

Sediment chromium (Cr) concentrations were from 9.5 to 119 mg/kg, with an average of 40.2 mg/kg. Sediment SDISCA-1 was the only sediment which exceeded the 100 mg/kg criterion for TCLP testing. Sediment copper (Cu) levels were from 10.4 to 197 mg/kg with an average of 57.0 mg/kg. Sediment mercury (Hg) concentrations were 0.01 to 1.4 mg/kg, with an average of 0.30 mg/kg. None exceeded the sediment testing criterion of 4 mg/kg for potential TCLP testing.

Sediment lead (Pb) ranged from 10.5 to 191 mg/kg, with an average of 78 mg/kg. Two sediments (SDISCA-1, SDISCA-3) exceeded the sediment testing criterion of 100 mg/kg. Sediment nickel (Ni) ranged from 7.0 to 25.0 mg/kg, with an average of 12 mg/kg. Sediment zinc (Zn) levels ranged from 46.4 to 703 mg/kg.

Polyaromatic hydrocarbons (PAHs) Results

Polyaromatic hydrocarbons (PAHs) results using both 8270C and DEP EPH 5/2004 R analytical methods indicated that the sediments along this reach contain total PAHs (tPAH) between 1.08 to 46.9 mg/kg, with an average of 18.2 mg/kg for method 8270C; and 0.92 to 33.5 mg/kg, with an average of 14.02 mg/kg (method DEP EPH 5/2004 R). Individual PAHs found at elevated levels include fluoranthene, phenanthrene, and pyrene. There is agreement between the individual PAH and tPAH results of the two methods.

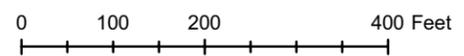
These sediment analyses indicated that the sediments contain low to moderate concentrations of PAHs and are consistent with levels typical found in rivers within urban watersheds. As would be expected for hydrophobic compounds, the tPAH levels are highly correlated with pattern of the total organic carbon contents of the sediments. In general, sediment tPAH levels were significantly higher in the downstream portions of this stretch of the Aberjona River.



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Figure 2-9 Project 2 Waterfield Road to Bacon Street
 Existing Resource Areas
 Including: Riverfront Area, Area within Banks, Bordering
 Vegetated Wetlands, and Floodplain Boundaries



Polychlorinated biphenyls (PCBs) Results

Polychlorinated biphenyls (PCBs) results using total PCBs (tPCBs) calculated by the National Oceanic and Atmospheric Administration (NOAA) summation of congeners indicated that concentrations of tPCBs ranged from below detection (in 4 of 9 sediments) to 0.0195 mg/kg. These trace amounts of PCBs are not uncommon in most urban river sediments due to historic spills and releases associated with electric transformer fluids. The results indicate that there should be no concern with regard to disposal of these sediments due to PCBs.

Extractable Petroleum Hydrocarbon (EPH) Results

Extractable petroleum hydrocarbon (EPH) results ranged from 21 to 395 mg/kg, with an average of 171 mg/kg. The various EPH fractions were generally higher in the downstream sediments.

Volatile Organic Compounds (VOCs) Results

Volatile organic compounds (VOCs) results included detection of four compounds (acetone, 2-butanone, carbon disulfide, and toluene). Acetone was detected in two sediments at 0.094 to 0.393 mg/kg; carbon disulfide in three sediments from 0.001 to 0.028 mg/kg; 2-butanone in three sediments from 0.020 to 0.150 mg/kg; and toluene in four sediments from 0.0012 to 0.0094 mg/kg. The VOCs levels were slightly higher in the downstream sediments. These low levels of detected VOCs, including several which are common laboratory contaminants (acetone, 2-butanone, carbon disulfide), do not pose a disposal concern for sediment disposal.

Other Parameters Results

Sediments were analyzed for several other parameters including total organic carbon (TOC), percent solids, and grain size. TOC ranged from below detection at 0.01% to 2.26%. There is a greater percentage of TOC in the sediments below the USGS Weir structure. This pattern corresponds well with the location of coarser-grained material (sand, cobble, etc) in the upstream reaches. As would be expected, the percent solids were distributed in the reverse of sediment TOC. Higher percent solids were found upstream at 74.3 to 88% while in the downstream sediments, the range was 51.3 to 67.2% (neglecting SDISCA-5).

Toxicity Characteristic Leaching Procedure (TCLP) Results

As specified under 314 CMR 9.07: *Criteria for the Evaluation of Applications for Dredging and Dredged Material Management*, sediments which exceed the criteria for As, Cr, Hg or Pb require further characterization through TCLP testing. Due to the exceedence of the testing criteria for Pb and/or Cr, TCLP testing was conducted on sediments SDISCA-1 and SDISCA-3. The TCLP method consists of applying a strong acid to the material and sampling the contents of the leachate to mimic possible changes in the environmental availability of metals subjected to strong organic acids, such as those found in a landfill.

The TCLP results indicated that lead leached out from these two sediments at 0.43 to 0.85 mg/L. These results indicate that the lead in the Aberjona River sediments is not particularly leachable and should not provide a limitation to possible dredging or disposal options.

In accordance with 314 CMR 9.07(4)(c) these results were screened against the RCS-1 criteria. Levels of select compounds were identified to exceed the RCS-1 criteria as defined in 310 CMR 40.0933 and

40.1600. Consequently, dredged material stored for more than 24 hours at the site shall be managed in accordance with the provisions of 314 CMR 9.07(4)(c) as discussed in Section 4.4.2.

In general the compounds detected during the sediment sampling program were consistent with levels typically found in rivers within urban watersheds. As such, the dredged material will likely be disposed of in accordance with 314 CMR 9.07(11) at a licensed receiving facility. Based on a comparison of analytical results to acceptance criteria for the receiving facilities detailed in section 2.4.2 this presents a viable disposal alternative. However, additional reuse options for disposal of dredged sediments, as detailed in 314 CMR 9.07, may be explored during the final design.

2.4.2 Soil Quality

As part of the September 2008 SSAP, AECOM implemented a soil sampling program in support of the design phase of Project 2. Soil sampling was conducted to obtain a comprehensive analytical chemistry data set in the area of the Aberjona River where an easterly side cut is being considered between Waterfield Road and to the northwest of the corner of Manchester Road and Mystic Valley Parkway. The SSAP included soil sampling at five locations to meet the analytical requirements outlined by the following three potential receiving facilities; American Reclamation Corporation (Soil Analysis Criteria for Acceptance of Petroleum Contaminated Soils), ESMI of NH (Urban Fill parameters) and Massachusetts Landfills (Policy #COMM-97-001: Reuse & Disposal of Contaminated Soils at Massachusetts Landfills). This initial soil sampling effort was used to evaluate the current physical and chemical characteristics of soils in this area of the Aberjona River and to support changes, as applicable, in the number of soil samples and parameters analyzed to support the Final Design. The results of the SSAP are discussed below and summarized in Appendix E, Sediment Sampling and Riparian Soil Analysis Report for Aberjona River Flood Mitigation Program Project #2 – 25% Design Phase. Soil sampling locations are provided on Figure 2-8.

In accordance with the Massachusetts Contingency Plan (310 CMR 40.0000), the analytical results were compared to applicable Reportable Concentrations (RCs) based on current land use. Results were compared to RCS1 standards to determine if any reporting conditions existed as outline in 310 CMR 40.0300. Results were below RCS1 standards except Cadmium in SBUSCA-5 in the 8 to 12 foot interval. In accordance with reporting exemptions outline in 310 CMR 40.0317(9), releases associated with coal, coal ash, or wood ash, the cadmium concentration at this location is exempt from the notification requirements set forth in 310 CMR 40.0300 due to the presence coal, coal ash, or wood ash. Additional discussion of the soil analytical results in the context of receiving criteria of three potential receiving facilities is provided in Section 4.4.2.4.

2.4.3 Water Quality

Over the past several decades, the Aberjona River watershed has experienced significant development, much of which occurred without adequate mitigation for stormwater impacts. This has resulted in considerable alternations to the natural hydrology of the watershed, which has in turn contributed to decreased baseflow conditions and increased flood levels in the River. In addition to the water quantity problems, the Aberjona River is plagued by poor water quality. According to the "Massachusetts Year 2004 Integrated List of Waters", the Aberjona River from its source in Reading to the inlet at the Upper Mystic Lake in Winchester is listed as impaired for the following pollutants: metals, unionized ammonia, nutrients, organic enrichment/low dissolved oxygen, and pathogens. Many of the water quality problems are directly related to the river's low flow.

The DEIR presented a summary of the existing water quality data available for the Aberjona River, which is not repeated in this document. As this project proceeds into design and permitting, additional surface

water quality sampling may be required to more completely characterize physical and chemical water quality as part of the permitting for dredging or other structural improvement projects.

2.5 Wildlife Habitat

Wildlife habitat located within the project areas is varied due to human alterations. Detailed wildlife habitat evaluations were provided in the SDEIR and field forms were included in Appendix E of the SDEIR. The following sections provide a summary of the wildlife habitat specific to the six projects being proposed relative to riverine and riparian habitats.

2.5.1 Riverine Wildlife Habitat

The Aberjona River is an urban stream corridor within a densely developed urban watershed. Compared to natural streams, much of the Aberjona River contains degraded wildlife habitat due to historical neglect, indiscriminate disposal of debris, and local and upstream runoff from non-point and point source discharges. The Aberjona River within the study area (Washington Street to the Mystic Lakes) is characterized by relatively fast flowing water (Metcalf and Eddy 2004). Long sections of the river are straightened and channelized with stone rip-rap and poured concrete banks that limit the available habitat for wildlife. In addition, the lack of shade cover along the riverbanks due to residential development, maintained lawns and urban parks, and stormwater runoff from adjacent impervious surfaces contribute to warmer water temperatures that impair species diversity of fish and aquatic invertebrates. Fish species commonly associated with warm water habitats were collected in the Aberjona River from Davidson Park down to the Mystic Lakes during research conducted by Metcalf and Eddy (2004) including white sucker, brown bullhead, pumpkinseed, and largemouth bass. Additional sampling conducted by USGS (2000) in the Aberjona River, near the head of the Mystic Lakes, found largemouth bass, white sucker, yellow perch, bluegill, pumpkinseed, American eel, and golden shiner. Finally, the lack of riverbed structure (i.e., riffle and pool complexes) due to historical manipulation and channelization of the Aberjona River and poor water quality associated with a densely developed watershed, strongly limits breeding and feeding areas for fish and amphibians (SDEIR).

The upstream reach of Project 2 (from Waterfield Road to Manchester Road) is approximately 1,300 feet in length and is narrower (15 to 20 feet wide) than typically observed throughout the river corridor elsewhere in Winchester (typically 30 to 40 feet wide). This section is generally limited with respect to wildlife habitat because it is straightened and channelized with 3 to 4 foot tall banks of soil and granite block which lacks diverse habitat structure or complexity (e.g., undercut banks, coarse woody debris). In addition, the river bottom is primarily a mix of stone with embedded silt lacking any pool or riffle complexes.

The downstream reach of Project 2 (from Manchester Road to Bacon Street) exhibits similar characteristics as the upstream reach for the first 480 linear feet (l.f.) (Manchester Road to the footbridge upstream of Ginn Field). From that point downstream to Bacon Street (960 l.f.) the river reach exhibits some of the more diverse and complex habitats along the Aberjona River within Winchester. A cursory habitat evaluation conducted in August of 2005 identified natural vegetated banks with good structure (i.e., undercut with stones and coarse woody debris) and a mix of depositional environments ranging from sand and silt to large cobbles.

At the proposed location of Projects 3 and 4 the river is heavily influenced by the backwater of Center Falls Dam and the adjacent urban parkland setting. In this area the river takes on more lacustrine characteristics but vegetation on the banks does offer some wildlife (primarily songbird) habitat. At the Project 6 location the river has been routed through box culverts under the High School Playing fields

and offers little in the way of fish or wildlife habitat. Projects 8 and 10 are bridge sections over the river which also do not provide much in the way of wildlife habitat.

2.5.2 Riparian Wildlife Habitat

Riparian habitat is that associated with the lands containing the riverway and may include wetlands, uplands, banks, and floodplains. The following is a discussion of the riparian habitat located at each project location.

- **Project 2: Channel Widening, Waterfield Road to Bacon Street** - This section is generally limited with respect to wildlife habitat because it is straightened and channelized with three to four foot tall banks of soil and granite block that lacks diverse habitat structure or complexity (e.g., undercut banks, coarse woody debris). Although this reach is degraded with respect to wildlife habitat, it is still considered significant within the context of available riverine and riparian habitats throughout the remainder of the Aberjona River corridor, that is, compared to parts of the watershed that are completely developed. The stream channel itself could potentially function as a sole connector for fisheries to move between habitats. Although riparian zones are often viewed as corridors for connectivity between habitats, this system does not provide a direct connection between adjacent areas of significant wildlife habitat and therefore does not function as a 'corridor'. The riparian zone through this reach serves more as an island of habitat in an otherwise developed landscape, which is still important and would be critical to the animals that happen to reside there. A detailed wildlife habitat assessment of this area was provided in the SDEIR.
- **Project 3: Center Falls Dam** - The area adjacent to Center Falls Dam consists of a small park with a mixture of natural plants and planted landscape material including invasive species. Much of the Bank consists of poured concrete associated with the bridge abutments and the "stair-step" dam. However, earthen banks with vegetation do occur within 25 to 30 feet upstream of Main Street. Plants observed in the water and on the Bank. As Bank impacts are minimal in this area, a detailed wildlife habitat assessment was not required. Nonetheless, due to the developed nature of the landscape, habitat is limited to those species that are adapted to urban environments.
- **Project 4: Mount Vernon Street Bridge Improvements** - The Bank along the upstream side of Mount Vernon Street is adjacent to a building on the west side and vertical stone and concrete bank that supports a bikeway on the east bank. Immediately downstream of Mount Vernon Street are steep vegetated Banks on both sides of the river/pond impoundment. Vegetation is a mix of native and invasive species. As Bank impacts are minimal in this area, a detailed wildlife habitat assessment was not required. Nonetheless, due to the developed nature of the landscape, habitat is limited to those species that are adapted to urban environments.
- **Project 6: High School Playing Field** - At the upstream and downstream ends of the proposed project site, where the culverts are merged into the Aberjona River, Bank consists of poured concrete and rip-rap with little or no vegetation observed. As Bank impacts are minimal in this area, a detailed wildlife habitat assessment was not required. Nonetheless, due to the developed nature of the landscape, habitat is limited to those species that are adapted to urban environments.
- **Project 8: Swanton Street Bridge Improvements** - Bank adjacent to Swanton Street is primarily poured concrete associated with the bridge abutments and a 15 foot high retaining wall on the eastern Bank south of Swanton Street. Steep three to four foot tall rip-rap Banks

continue up and down gradient from where the concrete walls terminate. Non-paved areas beyond the Bank are vegetated with native and invasive species. Because this complex is directly associated with the Aberjona River corridor, its landscape setting is narrow and linear in fashion with densely developed land to the northwest and an active transfer station to the southeast that sits atop approximately 40 feet of fill material extending upward from edge of the river. The stream channel itself could potentially function as a sole connector for fisheries to move between habitats. Although riparian zones are often viewed as corridors for connectivity between habitats, this system does not provide a direct connection between adjacent areas of significant wildlife habitat and therefore does not function as a 'corridor'. The riparian zone through this reach serves more as an island of habitat in an otherwise developed landscape, which is still important and would be critical to the animals that happen to reside there. A detailed wildlife habitat assessment of this area was provided in the SDEIR.

- **Project 10: Railroad Bridge at Muraco School** - The Aberjona River near the railroad bridge at the Muraco School down to the Swanton Street is characterized by natural vegetated banks (i.e., no rip-rap banks observed other than headwall structures) and bordering vegetated wetlands. Inland Bank directly adjacent to the railroad consists of poured concrete associated with the bridge abutments. Natural vegetated banks with good structure (i.e., undercut with stones root wads and other coarse woody debris) were present up and downstream from the abutments. The stream channel itself could potentially function as a sole connector for fisheries to move between habitats. Although riparian zones are often viewed as corridors for connectivity between habitats, this system does not provide a direct connection between adjacent areas of significant wildlife habitat and therefore does not function as a 'corridor'. The riparian zone through this reach serves more as an island of habitat in an otherwise developed landscape, which is still important and would be critical to the animals that happen to reside there. A detailed wildlife habitat assessment of this area was provided in the SDEIR.

2.6 Open Space and Recreational Resources

Open space and recreational resources located relative to the FEIR Alternative include the DCR-owned Mystic Valley Parkway, and various town and privately-owned parcels. Section 3.1.3.4 of the SDEIR provided a summary of various town and privately-owned parcels throughout the Town of Winchester that could potentially be considered for flood storage or where substantial infiltration or detention systems could be developed to reduce stormwater runoff volumes and flows entering the Aberjona River and its tributaries. The SDEIR certificate notes that the Kraft Foods, West Side Field and Winter Pond sites appear to be the most effective and feasible. The sections below provide an update on the status of these sites since the SDEIR was completed. This section also provides an update regarding the status of the "significant" open space parcels identified in a 2004 study by the Mystic River Watershed Association.

2.6.1 Kraft Foods Parcel

The General Foods Corporation (i.e., Kraft Foods) currently owns a large parcel of land along the Aberjona River in Winchester and Woburn. Part of the land in Woburn is occupied by a manufacturing and distribution facility; the remainder of the land in Winchester and Woburn is currently undeveloped, wooded open space that is used primarily as a wellhead protection zone for groundwater wells operated by Kraft. Approximately 16-acres of the land adjacent to the Aberjona River are located in Winchester.

As shown in Figure 3-12 of the SDEIR, the Winchester portion of the parcel is completely inundated by flood waters during the 50 and 100-year storm events. However, a portion of the property in Winchester

is located outside of the 25-year floodplain and could therefore be used to provide limited flood storage during more frequent storm events.

In December 2006, the Winchester Board of Selectmen, with approval from Kraft Foods, funded a \$15,000 feasibility study to evaluate potential wetland restoration opportunities and the flood storage potential of the site. The original feasibility analysis was completed in fall 2007 and a follow-up study, including a topographic survey of the site, was completed in fall 2008. The study concluded that site could provide up to 6.5 million gallons for floodwater storage for the 25-year storm event, while at the same time improving the riparian habitat and providing water quality treatment of attenuated flood waters from a highly urbanized watershed.

Since the publication of the feasibility study, the Town of Winchester has been actively researching potential funding sources to complete the final design and construction of the proposed improvements on the site. In spring 2009, the Town applied for, but did not receive, an American Recovery and Reinvestment Act of 2009 – Water Quality Management Planning Grant – 604(b) Program.

2.6.2 Winter Pond

Winter Pond is located in the north-central section of Winchester, near the Woburn line. It is categorized as a Great Pond of Massachusetts and is administered by the Town of Winchester. The Winter Pond waterbody system is formed by two basins – Big Winter Pond to the west and Little Winter Pond to the east. Winter Pond is a natural (kettle lake), approximately 15-acres in size, with Little Winter Pond covering approximately three-acres. The two basins are connected by a man-made culvert that passes under Woodside Road. During exceptionally dry years, the two basins may remain hydraulically disconnected if water levels are not high enough to fill the culvert. In recent years, the Town has cleaned the culvert to provide for improved hydraulic connection. A single outlet exists at the easternmost end of Little Winter Pond. This pipe runs through the Town-owned Wildwood Cemetery and ultimately discharges through the stormdrain system that enters Wedge Pond. Prior to the exceptionally wet spring of 2006, anecdotal accounts indicate that outflow from Pond had not occurred in 20 to 30-years.

As stated in the SDEIR, the Town of Winchester contracted with the engineering consulting firm CDM to evaluate alternatives for redirecting stormwater runoff from the drainage system on Cambridge Street, which collects runoff from the west side of Town, to Winter Pond. Previous studies had concluded that the Pond, which has historically been plagued by low-flows, has limited groundwater input. Therefore, its major sources of water are direct precipitation and surface runoff. In fall 2007, CDM completed its feasibility study for diverting stormwater runoff. The study included a wet and dry-weather water quality monitoring program at Winter Pond and at two stormdrains that were chosen for potential diversions to the Pond. Both wet and dry-weather sampling events included monitoring for total suspended solids (TSS), nitrate, ammonium, total Kjeldahl nitrogen (TKN), total phosphorus, dissolved phosphorus, chlorophyll A, fecal coliform, biological oxygen demand (BOD) and chemical oxygen demand (COD). Additional in-situ data were recorded for temperature, pH, conductivity, and dissolved oxygen.

The three dry-weather sampling events indicate that Winter Pond meets the Class B water quality standards for temperature, pH, dissolved oxygen, and fecal coliform. Dry-weather drainage collected from the stormdrains met all numerical standards for Class B waters, except for fecal coliform. A wet-weather sampling event conducted in September 2007 also showed elevated fecal coliform levels in stormwater runoff at the two stormdrain locations, both on the order of 40,000 col/100mL. Based on these monitoring results, CDM concluded that it would not be advisable to divert the storm drains in question to Winter Pond. CDM did not feel that this course of action would be feasible from a regulatory

standpoint due to the potential for adverse water quality impacts to the Pond; they advised that treatment options to improve the runoff quality would be cost prohibitive.

As a result of this recommendation, the Town of Winchester included funds for a study in its Phase III Drainage Improvement Program (funded through a capital request for FY2010) to evaluate alternative solutions for redirecting stormwater runoff from the west side of Winchester. A Request for Proposals for this study has not yet been issued by the Town. It is important to note, however, that should the Town of Winchester chose to reevaluate the possibility of redirecting stormwater runoff to Winter Pond, a 30-foot utility easement was granted to the Town on the former agricultural property known as "Pansy Patch", which is currently under development as 50 townhouse-style condominium units. The easement connects Cambridge Street to the wetland system west of Winter Pond. This wetland is hydraulically connected to Big Winter Pond via an 18-inch culvert that passes between 51 and 53 Pond Street.

2.6.3 West Side Field

West Side Field, located near the intersection of Wildwood and Cambridge Streets, is an approximately 7.5-acre parcel containing a baseball field and associated parking area owned by the Town of Winchester. In summer 2009, the field was upgraded with private funds to host the Cal Ripken Little League World Series, which included participation by teams from across the country.

In 2006, the Town of Winchester installed infiltration systems in the parking lot to accommodate the two-year storm event, as part of drainage improvements to nearby New Meadows Road and Thornton Street. As noted in the SDEIR, there is the possibility that the site could accommodate additional infiltration chambers. One potential scenario would involve redirecting a portion of the flow in the drain line on Wildwood Street into the field for infiltration. This existing drain line conveys runoff to the stormdrain network on Cambridge Street, which ultimately discharges to the Upper Mystic Lake.

Further investigation of this scenario has not been completed since the SDEIR was filed. However, as noted above, the Winchester Phase III Drainage Improvement Program includes \$100,000 for a study to evaluate various alternatives to address stormwater runoff from the west side of town. It is likely that this study will include an evaluation of infiltration/detention opportunities in West Side Field.

2.6.4 Mystic River Watershed Association Open Space Study

As stated in the SDEIR, the Mystic River Watershed Association (MyRWA) with support from the US Environmental Protection Agency (EPA) published a report in February 2004 entitled "Open Space Priorities in the Mystic River Watershed". This report provided a detailed inventory and ranking, by community, of open space sites protection priorities in the watershed.

In the Town of Winchester, the report identified nine "significant open space" parcels, totaling 91 acres. Table 3-2 of the SDEIR provided a summary of the parcel area, watershed importance score, and development likelihood as of 2004, as given in the MyRWA report. An update on the current development status of each parcel is provided below; updates on the Marotta property, Metcalf property, and Rosetti Property have not been included, as there has been no change since the SDEIR was published.

- **General Foods Property** – A portion of the site is currently used by General Foods Corporation as a manufacturing/distribution facility; the remainder of the site is wooded open space that acts as a wellhead protection zone for the groundwater wells located on the property. Currently there is no development pressure on the site; however, the Winchester portion of the property is zoned for residential land use should it ever be sold by General Foods. Any development of the

land in Winchester would be severely hindered by the presence of the Aberjona River and wetlands on the property.

- **Hamilton Farm** – The Town of Winchester purchased the property at 78 Ridge Street in 2007 through the provisions in MGL Chapter 61A. The Town also acquired the adjacent 82 Ridge Street, which was in common ownership, but not protected, for a total land acquisition of approximately 20-acres. To recoup its acquisition costs, the Town issued a Request for Proposals to develop a portion of the property for residential uses (up to 12.5-acres), with the remainder of the site (at least 7.55-acres) to be preserved by the Town for open space, agricultural, and historic preservation purposes. In July 2009, the Zoning Board of Appeals approved a special permit for the construction of 14 townhouse units and 48 flat-style units (four, 12-unit buildings) on the developed portion of the site; up to four-acres of the “developable” part of the land will also be preserved as open space. The portion of the property owned by the Town is under the control of a not-for-profit trust, the Wright-Locke Farm Conservancy created by the Town.
- **Pansy Patch** – The Winchester Planning Board, Zoning Board of Appeals, and Conservation Commissions approved the development of this site in 2007 and 2008 for 50 townhouse-style condominium units. The approvals require extensive stormwater management measures, as well as preservation of the historic farmhouse that exists on the property. Construction began in summer 2009.
- **Shannon Property** – The Winchester Planning Board denied the application for a 10-lot subdivision of this property in 2007. The applicant has appealed the decision and the parties are awaiting a court date.
- **Winchester Transfer Station** – There is currently no development potential for this site. In 2008, the Town of Winchester successfully capped a portion of the Transfer Station in accordance with DEP requirements. The Town is considering using a portion of the property for the installation of solar panels.

2.6.5 Tri-Community Bikeway/Greenway

In the mid-1990's, a grassroots movement evolved in the Town of Winchester to rediscover and revitalize the Town's existing natural corridors, or “greenways”. Currently, a relatively uninterrupted greenway forms a central spine through the Town along the Aberjona River and northwest along Horn Pond Brook. Over many decades, however, portions of the greenway have fallen into disrepair and have become under utilized by the community. The vision for this effort was, therefore, to revitalize and reconnect Winchester's greenway by opening it up to all residents as a recreational area for walkers, joggers, bicyclists, families, and persons with physical handicaps.

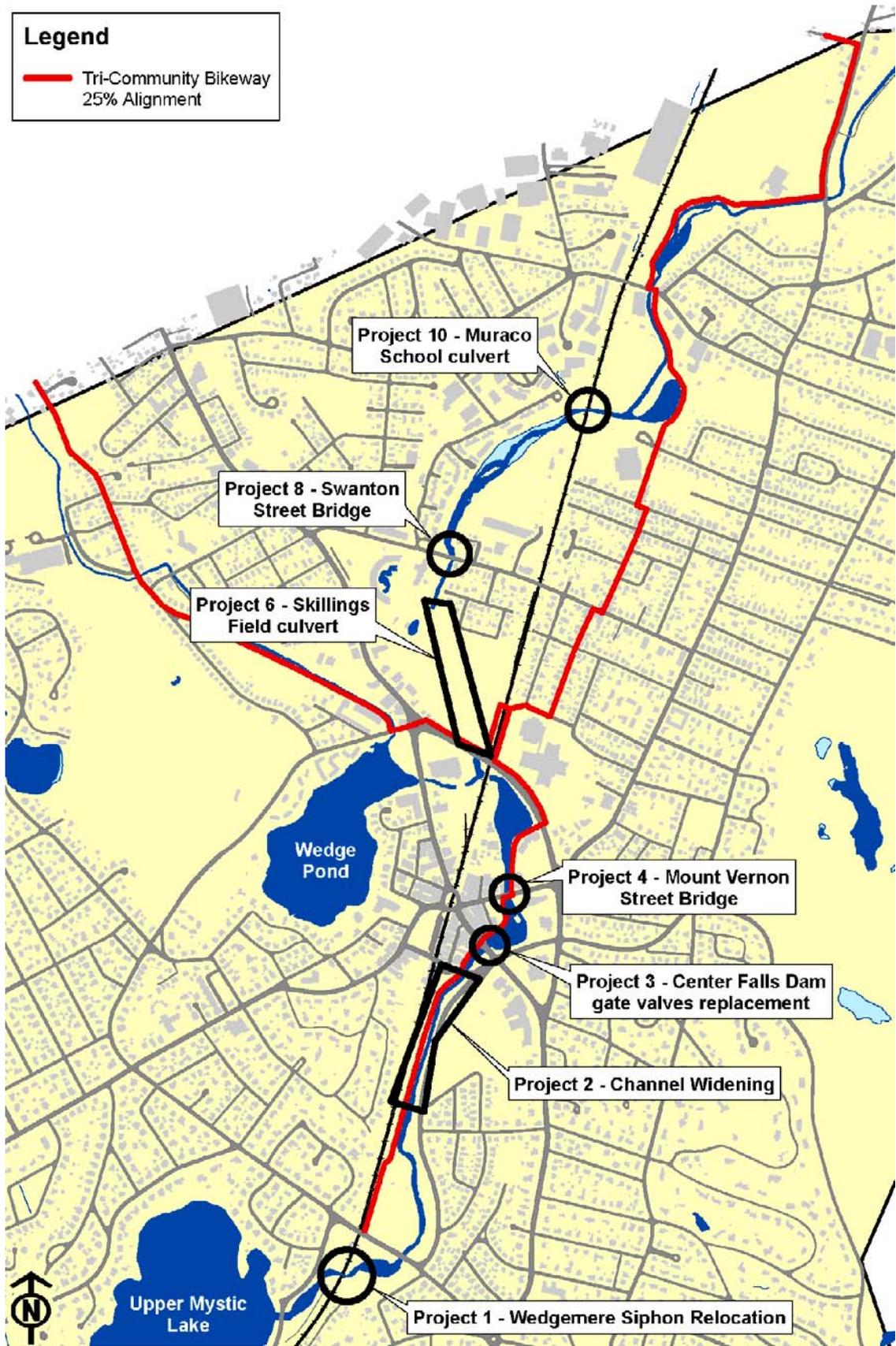
A similar vision was shared by the abutting communities of Woburn and Stoneham, which intersect the Aberjona River and Horn Pond Brook. In 1998, the three parties entered into a Memorandum of Agreement to collaborate on the design and construction of a trail that would connect the three communities. In that same year, the communities selected a team of consultants led by the engineering firm Fay, Spofford, and Thorndike to complete the bikeway design.

The development of the bikeway/greenway is expected to follow a three-phased approach: Phase I – 25% design, Phase II – 100% design, and Phase III – Construction. In 1998, the three communities secured funds through the Massachusetts Transportation Enhancement Program to complete Phase I. Since the project received state funding, it is required to meet the design standards for a “shared-use path”, as most recently outlined in the MassDOT) – Highway Division's (formerly MassHighway) “Project

Development and Design Guide". The communities filed 25% design plans with MassDOT in July 2007; a 25% design hearing is scheduled for February 2010. Funding for Phase II of the project (100% design) was provided in the FY2008 Transportation Improvement Program (TIP) through the Congestion Mitigation and Air Quality (CWAQ) Improvement Program. Construction funding was previously programmed in the TIP, but was not included in the most recent FY2010 – 2013 document adopted by the Boston Region Metropolitan Planning Organization (MPO).

Figure 2-9 shows the proposed 25% alignment of the bikeway through Winchester, as well as the location of the flood mitigation projects proposed as part of the preferred FEIR Alternative. The proposed path will generally follow the alignment of the Aberjona River between Bacon Street to the south and D Street to the north near the Woburn line. At the southern terminus, the proposed route will follow the west side of the Aberjona River between Ginn Field and Waterfield Road. Location of the path on the east side of the River in this area was not feasible due to the proposed river widening associated with Project 2. As proposed in this FEIR, Project 2 will result in the widening of river easterly towards Mystic Valley Parkway between Waterfield Road and Manchester Road to a bottom width of 35-feet. A portion of the on-street parking along the roadway will be removed to accommodate a five-foot sidewalk and landscape area. Due to the constrained space, it was not feasible to accommodate the required 10-foot wide shared use path on this side of the River. However, given the close proximity of the proposed Tri-Community Bikeway to the Project 2 area, it is likely that the path will become a highly utilized alternative to the proposed sidewalk.

Legend
 — Tri-Community Bikeway
 25% Alignment



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Figure 2-10 Tri-Community Bikeway/Greenway 25% Alignment
 Aberjona River Flood Mitigation program
 FEIR, EOE File No. 13046

2.7 Cultural Resources

The following information updates and supplements the cultural resource documentation provided in the DEIR and SDEIR and is prepared in response to comments received on the historic architectural and archaeological assessment survey technical memoranda that were presented in those report. Comments on cultural resources were received from the Massachusetts Historical Commission (MHC), Winchester Historical Commission (WHC), and Ellen Knight, Winchester Town Historian. In response to these comments, intensive level surveys were undertaken to identify potentially significant archaeological sites and to evaluate above ground resources identified as potentially eligible for listing in the National Register of Historic Places (National Register). Reports providing the results of these investigations are included in Appendices C-1 and C-2.

The Aberjona River FMP requires permits and other approvals from state and federal agencies and is therefore subject to review under Massachusetts General Law (MGL) Chapter 9, Sections 26-27C, as amended by Chapter 254 of the Acts of 1988 (950 CMR 71.00) and Section 106 of the National Historic Preservation Act of 1966, as amended, and its implementing regulations 36 CFR Part 800 promulgated by the Advisory Council on Historic Preservation (ACHP). Cultural resource management surveys conducted for the Aberjona River FMP identified a number of properties with the Areas of Potential Effect of the project elements that are listed or potentially eligible for listing in the State and National Registers of Historic Places (State/National Registers). The consultation process required by 950 CMR 71.00 and 36 CFR Part 800 to resolve adverse effects on historic properties is on-going.

2.7.1 Archaeological Resources

An Archaeological Sensitivity Assessment prepared for the SDEIR identified three project elements (Projects 2, 4, and 8) that had intact land surfaces in areas where land disturbance activities might occur. The MHC requested that an intensive (locational) archaeological survey be conducted for those areas. The intensive (locational) archaeological survey was conducted in 2009 under state archaeologist's permit number 3155 issued by the MHC. The survey included additional research, building on information contained in the previous Archaeological Sensitivity Assessment reports and subsurface testing. A total of 20 50-x-50-centimeter (CM) shovel test pits was excavated within the three areas. The test pits were spaced at 10-meter (m) intervals along linear transects; JTPs were used in areas too small to accommodate transect testing. The subsurface investigations documented disturbed fill deposits. Cultural material consisted of a low density of domestic and structural refuse in plowzone and from fill contexts. Manufacture dates of diagnostic cultural materials ranged from 1600 to present, though the vast majority of the materials dated from the nineteenth century. The generally diffuse distribution of the assemblage combined with the lack of any associated structural, landscape, or household features suggests that it is best characterized as yard/field scatter with no locational or associative integrity. No pre-contact cultural material was recovered and no evidence of subsurface features was identified during the testing. The results of the intensive survey are compiled in the technical report entitled Intensive (Locational) Archaeological Survey: Aberjona River Flood Mitigation Program, Winchester, Massachusetts (PAL 2010) to be submitted to the MHC for review.

2.7.2 Historic Architectural Resources

Historic architectural reconnaissance-level surveys conducted for the DEIR and SDEIR identified two properties—Winchester Center Historic District and Mystic Valley Parkway—within the APE of the Aberjona River FMP that are listed in the in the State/National Registers. Those surveys also recommended further evaluation of five properties within the APE to assess whether they meet the criteria for listing in the State/National registers. An intensive historic architectural survey was conducted during the fall 2009 to evaluate those properties and assess potential impacts of the Aberjona River

FMP on those evaluated as potentially eligible for listing in the State/National Registers. The five properties included in the survey consisted of:

- Kellaway Landscape
- Boston & Lowell Railroad Culvert
- United States Geological Survey (USGS) Stream Gauging Station and Weir
- Bacon Street Bridge
- Cradock Bridge and Locks

The results of the investigation were presented in a report entitled Aberjona River Flood Mitigation Program, Winchester, Massachusetts, Intensive Historic Architectural Survey and Effects Assessment (Appendix K). Included with the report were MHC Inventory of the Historic and Archaeological Assets of the Commonwealth Inventory Forms (MHC Inventory Forms) for each of the properties and a National Register Criteria Statement form for those properties that appeared to meet the criteria for listing in the State/National Registers. The report was distributed to the MHC, WHC, and DCR for review.

Of the five properties evaluated during the survey, three were recommended eligible for National Register listing. The Kellaway Landscape appears to be eligible for the National Register as a district under National Register Criteria A and C. The Bacon Street Bridge appears to be eligible for the National Register both individually and as a contributing resource to the potential Kellaway Landscape District under Criteria A and C. The USGS Gauging Station and Weir appears to be eligible for individual listing in the National Register under Criteria A and C. The Cradock Bridge and Locks and Boston & Lowell Railroad Culvert (a/k/a Muraco School Culvert) were evaluated as not eligible for listing in the National Register due to loss of integrity. Table 2-3 provides a summary list of all historic properties identified and project elements where that have the potential to impact them.

Table 2-3: Historic Properties within the ARFMP APE

Property Name	National Register Status	Applicable ARFMP Project
Winchester Center Historic District	National Register Historic District (Contributing properties within the Aberjona River FMP consist of the Mt. Vernon Street Bridge and Waterfield Road Bridge)	Projects 2 and 4
Mystic Valley Parkway	National Register Historic District	Project 2
Kellaway Landscape	Recommended eligible for National Register listing as a historic district	Project 2
USGS Stream Gauging Station and Weir	Recommended individually eligible for National Register listing	Project 2
Bacon Street Bridge	Recommended eligible for National Register listing individually and as a contributing property to the Kellaway Landscape	Project 2

3.0 Project Alternatives and Analysis

Since 1999, the Town of Winchester has been evaluating a variety of alternatives intended to reduce backwater flooding of the Aberjona River. Flooding in an area can generally be attributed to four major causes:

- Backwater (overbank) flooding of rivers and ponds;
- Stormdrain system surcharge;
- Sheet flow; and
- Groundwater mounding

The first potential cause is the backwater effect of water “piling up” in a river due to flow restrictions. In essence, water cannot move fast enough through a particular point; water gets backed up at that point and then overflows the river banks. In natural systems in equilibrium, bankfull discharge generally occurs during the 2-year flooding event. Storms larger than the 2-year event generally cause rivers to overtop their banks. In urban, lower perennial rivers such as the Aberjona, bankfull discharge typically occurs during much larger (less frequent) events because the system has been manipulated to prevent overbank flooding during frequent events like the 2-year storm. Typically, urban engineered systems contain flooding up to the 5-year storm or greater.

The second cause, storm sewer surcharge, can be directly related to the first. In this scenario, the stormdrain system not capable of conveying flow and they back up. This can be due to the intended size of the stormdrain (i.e. a pipe that is designed to pass the 10-year flow cannot handle the 25-year event) or it can be due to a tailwater effect in the pipe (i.e. the pipe cannot empty out because the river level is high and water is backing up in the pipe).

The third scenario occurs when the ground is either saturated or impervious and water flows across the surface rather than infiltrating into the ground. An example of this would be gutter flow in a paved street.

The last scenario is when the regional groundwater table rises. This is fairly typical in the spring when the combination of snowmelt and spring rains infiltrate into the ground (where water flows very slowly) and results in an elevated (or mounded) water table. This is a frequent cause of basement flooding.

The alternatives discussed in the ENF, the DEIR, the SDEIR, and this FEIR are aimed at mitigating the effects of the first type of flooding—backwater effects from the Aberjona River and its tributaries. The alternatives may also indirectly address some of the flooding caused by the other three scenarios; flooding due to stormdrain surcharge, sheet flow, and groundwater mounding. However, it is beyond the scope of the current study to address all causes of flooding; the study is aimed at addressing the most severe (and costly) form—backwater flooding.

The following sections summarize the alternatives evaluated as part of the prior EIR analyses, as well as a description of additional alternatives (i.e., Alternative 8) and proposed upstream and downstream improvements evaluated as part of this FEIR preparation. Impacts associated with the preferred FEIR Alternative and the proposed mitigation measures are addressed in Chapter 4 of this document.

3.1 Summary of DEIR Alternatives 1 through 5

In the DEIR, the following five alternatives were evaluated for efficacy in addressing backwater flooding along the Aberjona:

1. No Action Alternative,
2. Upstream Watershed Management Alternative,
3. Complete 100-Year Flow Conveyance Alternative,
4. Aberjona River Conveyance Improvement Alternative (ENF Alternative), and
5. Modified Aberjona River Conveyance Improvement Alternative (DEIR Alternative).

A brief discussion of alternatives listed above is provided below. The reader is directed to the DEIR for further information.

Alternative 1 (No Action Alternative) provides a prediction of the 100-year floodplain resulting from existing conditions as predicted by the new FEMA model. This alternative included implementation of the already-completed conveyance improvements noted in the DEIR.

Alternative 2 (Upstream Watershed Management) in the DEIR relied solely on upstream detention to attenuate peak flow on the Aberjona River. As evaluated in Alternative 2, approximately 2,600 acre-feet (113 million cubic feet or 850 million gallons) of new flood storage throughout the watershed would be required to reduce the 100-year flood flows in the Aberjona River to the same extent as the proposed conveyance improvements. Stated another way, this volume equates to approximately two-inches of stormwater storage over the entire 27.5 square mile watershed. Given the urbanized nature of the watershed, the DEIR concluded that there is simply not enough open space available to create this level of storage.

Alternative 3 (Complete 100-Year Flow Conveyance) called for the complete conveyance of the 100-year flow within the river channel. This project would entail creating a uniform channel bottom grade for the entire length of the Aberjona River from Washington Street to the Upper Mystic Lake. This would result in deepening the channel up to 10 feet and enlarging the channel to a 30 to 40 foot bottom width along much of this length. All of the culverts and bridges would have to be modified or reconstructed to accommodate the new channel inverts and widths. The DEIR concluded that a project of this magnitude would likely not pass financial feasibility tests, would lead to significant environmental impact, and could disrupt transportation and utilities throughout the community.

Alternative 4 (ENF Alternative) was the set of 17 projects originally proposed in the ENF. A complete description of these projects is contained in the DEIR and is not repeated in the current document. Analysis revealed that several of the projects contained within this alternative did not have the desired effect of floodplain reduction.

Alternative 5 (DEIR Alternative) resulted from the modification of the ENF Alternative. The DEIR analyses revealed that several of the 17 projects proposed as part of the ENF Alternative did not have the desired effect of floodplain reduction. Therefore, Alternative 4 was modified, with many projects dropping out and others changed. This modification was presented as Alternative 5 - DEIR Alternative. The DEIR also identified upstream and downstream flow regulation measures at the Scalley Dam in Woburn and Craddock Locks in Medford, respectively, aimed at mitigating the downstream impacts of

the Town's conveyance improvements. A summary of the projects included in the preferred DEIR Alternative, along with the proposed mitigation measures, is provided in the following table:

Table 3-1: Alternative 5 (DEIR) Improvements

No.	Location	Description of Work
1	MWRA Siphon Relocation - Wedgemere Train Station	Widen channel from 19 to 30-feet by reconstructing siphon (MWRA is project proponent). Construction of this project was completed in 2008.
2	Waterfield Road to Wedgemere Train Station	Widen and deepen channel to 40-foot bottom-width from current 15 to 20-foot width; remove USGS gage structure; replace foot bridge (USACE was the project proponent).
3	Center Falls Dam	Replace two, 30-inch valves with 5 by 5-foot sluice gates. One gate constructed in 2003.
4	Mt. Vernon Street	Augment the existing three 8-foot wide bridge openings with a fourth 8-foot wide opening.
6	Winchester High School Playing Field	Construct parallel 7 by 15-foot box culvert or open channel adjacent to the three existing 7-foot culverts.
8	Swanton Street	Replace existing 10 by 16-foot bridge opening with a 10 by 25-foot opening, or equivalent bypass culvert.
10	Railroad bridge near Muraco School	Install two 7-foot conduits to supplement existing twin 6.5 by 7-foot bridge openings.
15	Davidson Park	Removal of remaining pieces of derelict dam.
	Scalley Dam at Horn Pond, Woburn	Installation of a new control structure with an opening twice the size of the existing structure.
	Craddock Locks at Main Street, Medford	Removal of the remainder of the gate superstructure from the openings under Main Street.

3.2 Summary of SDEIR Alternatives 6 and 7

In the SDEIR, two additional alternatives were evaluated; a BMP-only alternative and the SDEIR alternative which included aspects of the DEIR Alternative, upstream and downstream mitigation, and expanded BMPs.

Alternative 6 (SDEIR BMP Alternative) included a cohort of Best Management Practices (BMPs) including a rain barrel program, expanded infiltration, and an examination of increased opportunities for detention. This alternative was developed to look at the potential for effecting changes in the upstream watershed which could obviate the need for some of the structural improvements in Winchester, or, at the least, extend the life of the proposed improvements.

Alternative 7 (SDEIR Alternative) was developed by re-examining each of the elements of the DEIR Alternative (Alternative 5), modifying some of the individual projects, adding BMPs from Alternative 6, and looking for additional reductions in conveyance improvements and additions to watershed controls. The Alternative was run with several different scenarios, and examined for effectiveness under different rainfall events. The different scenarios included:

- Scenario 7a - SDEIR Alternative without Project 2
- Scenario 7b - SDEIR Alternative without the Scalley Dam Improvements
- Scenario 7c - SDEIR Alternative without Upstream and Downstream Mitigation Projects
- Scenario 7d - SDEIR Alternative with Winchester BMPs

Additional information on the alternatives, impacts of the alternative, and mitigation measures are given in the SDEIR. A summary of the projects included in the SDEIR Alternative, along with the proposed mitigation measures, is provided in the following table:

Table 3-2: Alternative 7 (SDEIR) Improvements

No.	Location	Description of Work
1	MWRA Siphon Relocation - Wedgemere Train Station	Widen channel from 19 to 30-feet by reconstructing siphon (MWRA is project proponent). Construction of this project was completed in 2008.
2	Waterfield Road to Bacon Street	Widen and deepen channel to 39-foot bottom-width from Waterfield Road to Manchester Road; remove USGS gage structure; install a pilot channel within the main channel, and remove adverse slopes from Manchester Road to Bacon Street.
3	Center Falls Dam	Replace two 30-inch valves with 5 by 5-foot sluice gates. One gate constructed in 2003.
4	Mt. Vernon Street	Augment the existing three 8-foot wide bridge openings with a fourth 8-foot wide opening.
6	Winchester High School Fields	Construct parallel 7 by 15-foot box culvert adjacent to the three existing 7-foot culverts.
8	Swanton Street	Replace existing 10 by 16-foot bridge opening with a 10 by 25-foot opening, or equivalent bypass culvert.
10	Railroad bridge near Muraco School	Install two 7-foot diameter conduits to supplement existing twin 6.5 by 7-foot bridge openings.
	Upper Mystic Lake Dam	Reconstruct the outlet control and install a new fish ladder (DCR is the proponent).
	Scalley Dam at Horn Pond, Woburn	Installation of a new control structure with an opening twice the size of the existing structure.
	Craddock Locks at Main Street, Medford	Removal of the remainder of the gate superstructure from the openings under Main Street.

3.3 Summary of Alternative 8 – FEIR Alternative

The FEIR Alternative was developed by re-examining each of the elements in the SDEIR Alternative, and incorporating any changes to projects that have been completed or design has changed based on additional information or comments.

Table 3-3 presents a summary of Alternative 8, the FEIR Alternative.

Table 3-3: Alternative 8 (FEIR) Improvements

No.	Location	Description of Work
2	Waterfield Road to Bacon Street	Widen and deepen channel to 35-foot bottom-width from Waterfield Road to Manchester Road (1,300 feet); remove USGS gage structure; install an 8 foot wide by 2 foot deep pilot channel within the main channel, and remove adverse slopes from Manchester Road to Bacon Street.
3	Center Falls Dam	Replace one of two 30-inch valves with 5 by 5-foot sluice gates. One gate was already constructed in 2003.
4	Mt. Vernon Street	Augment the existing three 8-foot wide bridge openings with a fourth 8-foot wide opening.
6	Winchester High School Fields	Construct parallel 7 by 15-foot box culvert adjacent to the 3 existing 7-foot culverts.
8	Swanton Street	Replace existing 10 by 16-foot bridge opening with a 10 by 25-foot opening, or equivalent bypass culvert.
10	Railroad bridge near Muraco School	Install two 7-foot diameter conduits to supplement existing twin 6.5 by 7-foot bridge openings.
	Upper Mystic Lake Dam	Reconstruct the outlet control and install a new fish ladder DCR is the proponent. Phase I of the project is currently under construction.
	Scalley Dam at Horn Pond, Woburn	Installation of a new control structure with an 8-foot-wide opening to supplement the existing 5-foot wide structure.
	Craddock Locks at Main Street, Medford	Removal of the remainder of the gate superstructure from the openings under Main Street.

3.3.1 Baseline Model Development

The certificate on the SDEIR requested that the FEIR should include any changes to the baseline model that resulted from ongoing peer review and the FEMA map adoption appeal process. No changes to the model were required as a result of the FEMA review process, however, the Town of Winchester funded the acquisition of additional survey for the reach between Waterfield Road to just downstream of Bacon Street; this additional detail was incorporated into the baseline model. No other changes were made since the filing of the SDEIR.

3.3.2 Refinement of SDEIR Conveyance Improvements

The following section provides a summary of the modifications to, and re-evaluation of, the seven projects included in the preferred SDEIR Alternative. This analysis provided the basis for the development of the preferred FEIR Alternative.

Project 1: Wedgemere Train Station is an MWRA project which was completed in 2008. Since this project has been completed it has been removed from the FEIR Alternative and included in the baseline model.

Project 2: Channel Widening, Waterfield Road to Bacon Street was further evaluated the Town of Winchester and the project was significantly modified. At the time of the SDEIR, the USACE was preparing a Feasibility Study, which evaluated alternatives for the proposed widening project between Waterfield Road and Manchester Road and included replacement of the USGS gage (including removal of the associated weir). At the time of the SDEIR, the USACE provided the Town of Winchester with a set of draft alternatives (Alternative 1A, 1B, 1C, 2 and 3) for the channel-widening project. Alternative 1C was the option recommended by the USACE. This concept called for the west bank to be left in its existing condition and for the cross-section of the river to be expanded towards the east bank (towards Mystic Valley Parkway). USACE Alternative 1C called for a 39-foot-wide channel bottom, installation of a pilot channel for low flow consolidation, and a left (east) bank rising up to the Mystic Valley Parkway (MVP) on a 1:1 slope, and include a depressed 4-foot sidewalk at the top of slope with a modular wall rising to the grade of the MVP.

The USACE made the Draft Environmental Assessment (EA) available for public review in October 2007. The EA carried four options; Option 4 was selected as the recommended plan. Option 4 was consistent with USACE Alternative 1C carried in the SDEIR. The recommended plan proposed widening the Aberjona River to a width of 39-feet for 1,200 lineal feet downstream of the Waterfield Road Bridge. The project included relocation of the Mystic Valley Parkway drainage outfalls and removal of the USGS concrete weir. The bottom of the channel was proposed to have a 20 foot wide vegetated shelf and a 2-foot deep 20 foot wide low flow channel.

The USACE Draft EA alternative design options only included two different proposed channel bottom widths, 32-feet and 39-feet. The options did not investigate intermediate sizes between 32- and 39-feet. Since the USACE only looked at these few channel sizes, and the Town of Winchester felt that a 39-foot channel was likely too large and likely not able to be permitted. The Town contracted independently with AECOM to have a channel size optimization analysis performed to see if the channel size could be reduced and still achieve the same or similar flood level benefits.

The channel width optimization resulted in a minimum channel bottom width of 35-feet; this width was determined to be the minimum needed to provide the required flood control to the Winchester Town Center. Building upon the optimization analysis, the Town of Winchester chose to independently fund the 25% design of this alternative; thus, allowing the Town greater involvement in the process and design decisions. During the 25% design, it was determined that for an approximately 400-foot stretch, a 35-foot bottom width, 1:1 side slope, and sidewalk would not be able to fit without impacting the MVP or the west bank. As a result, the following four channel configuration options were developed for this tight stretch to achieve the conveyance capacity required and included:

- **Option 1:** 35-foot Bottom Width, 1:1 side slope, relocate sidewalk to west side;
- **Option 2:** 41-foot bottom width, vertical retaining wall, relocate sidewalk to MVP curb line;
- **Option 3:** 35-foot bottom width, 1:1 side slope, convert existing MVP shoulder to sidewalk and planting strip;
- **Option 4:** 36-foot bottom width, 1:1 side slopes, sunken sidewalk, and disturbance of both east and west banks.

Figures 3-1 through 3-4 presents the four channel configurations investigated as part of the 25-percent design. The Town worked closely with DCR and determined that Option 3 was the preferred alternative by both parties. Appendix F contains a letter from Jack Murray the DCR Deputy Commissioner stating Option 3 as DCR's preferred option, option 3 presented in the FEIR includes the minor modifications recommended by DCR.

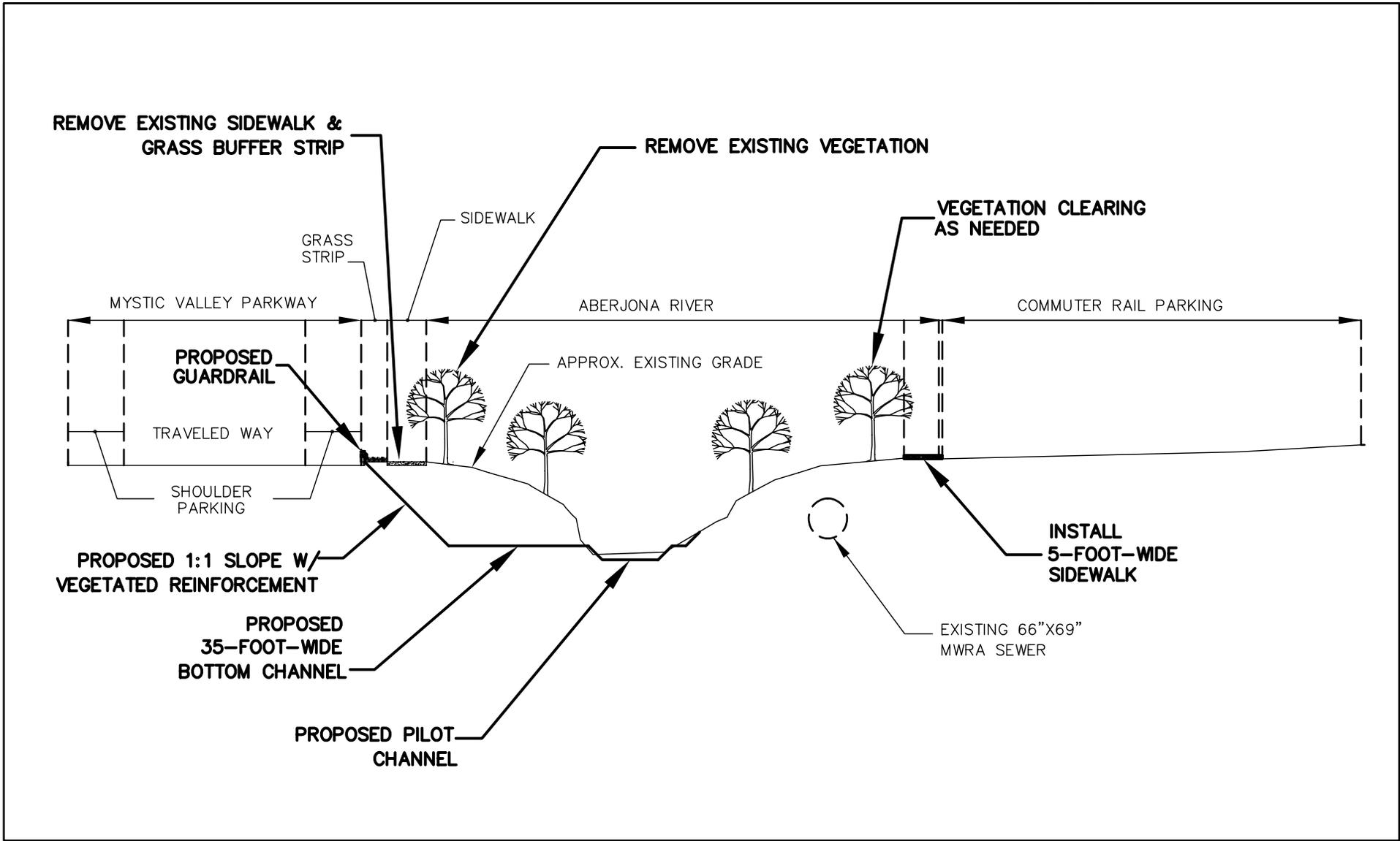


Figure 3-1
Transect 26 Cross Section – Option 1
Aberjona River Flood Mitigation
Winchester, MA

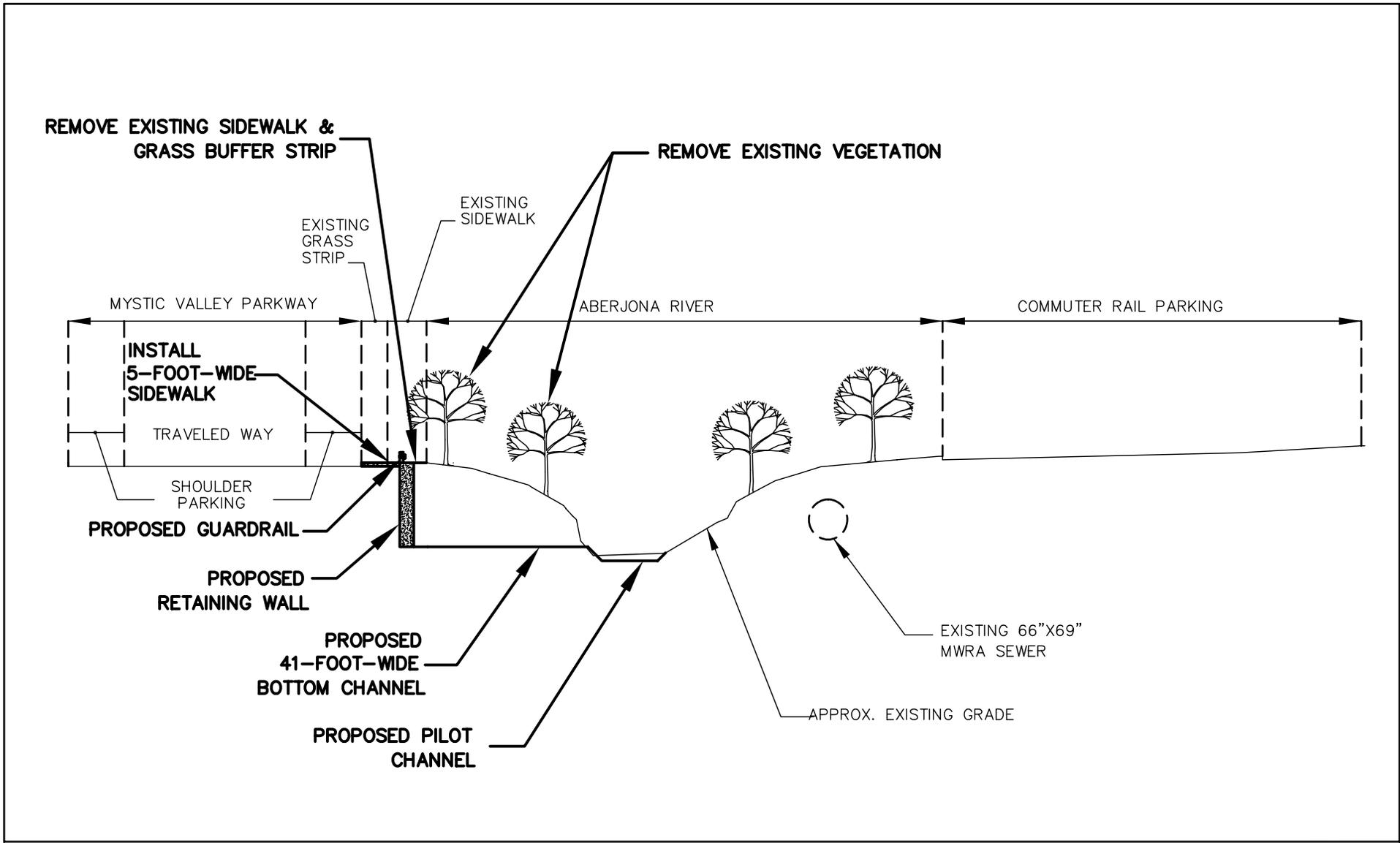


Figure 3-2
Transect 26 Cross Section - Option 2
Aberjona River Flood Mitigation
Winchester, MA

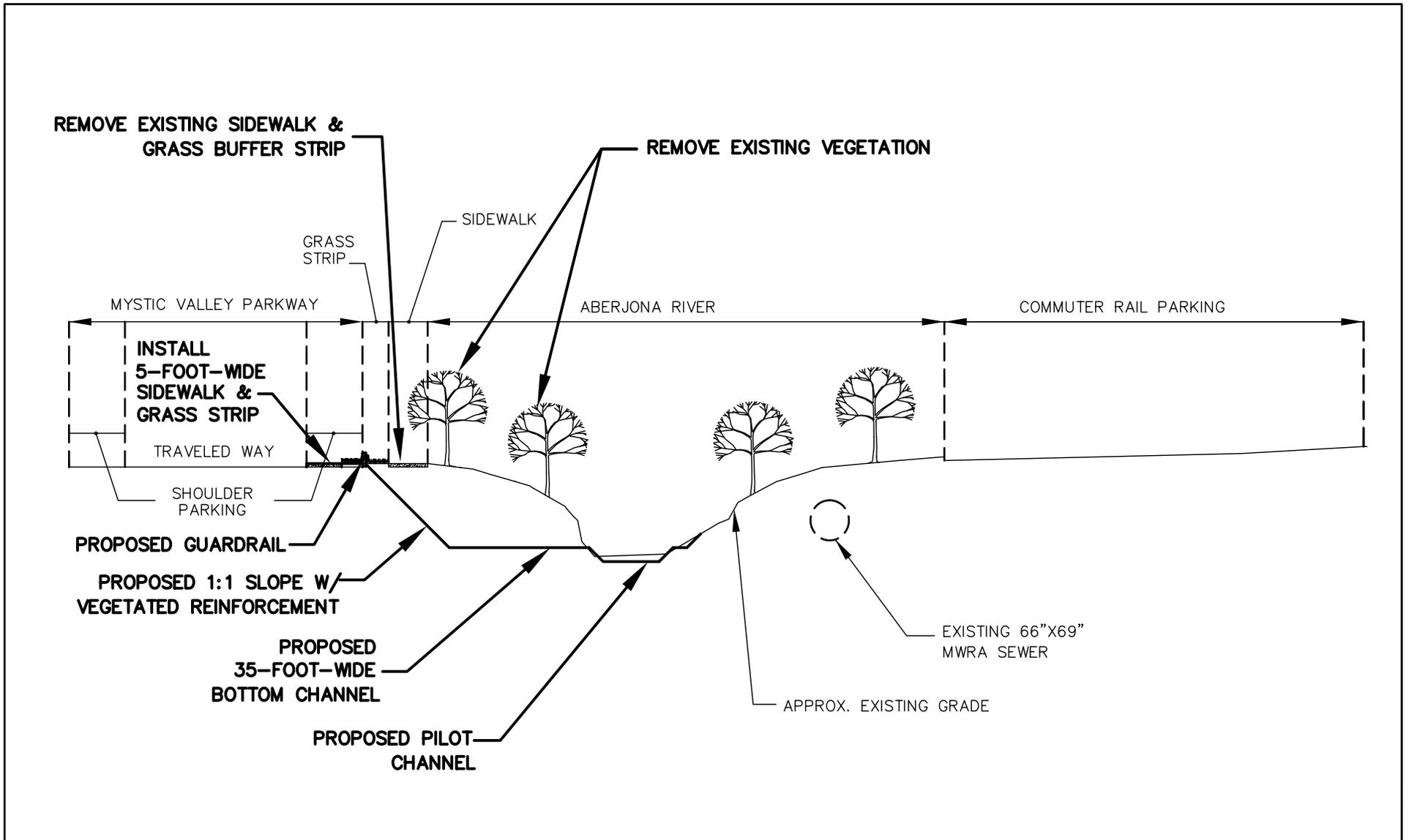


Figure 3-3
Transect 26 Cross Section - Option 3
Aberjona River Flood Mitigation
Winchester, MA

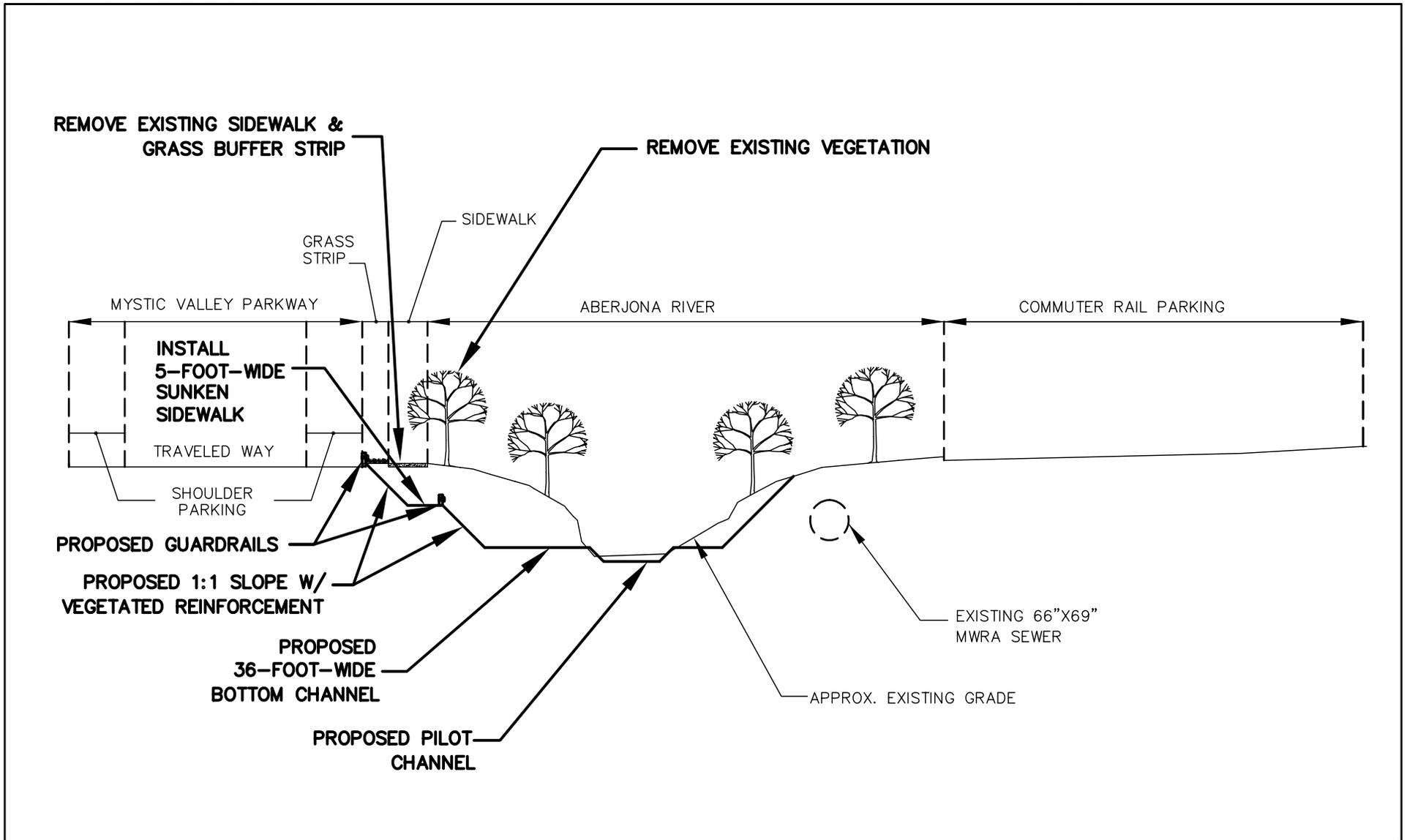


Figure 3-4
Transect 26 Cross Section - Option 4
Aberjona River Flood Mitigation
Winchester, MA

Option 3 was carried through to 25-percent design; copies of the 25 percent design plans are included in Appendix G. The USACE determined that a 39-foot design met the minimum cost-effectiveness criteria required for federal participation. However, the Town of Winchester felt strongly that the 35-foot option provided a better balance of recreational, environmental, and flood control interests and decided to move forward funding the full design and construction of this alternative without the support of the USACE.

Project 2 in the preferred FEIR Alternative includes widening the Aberjona River from Waterfield Road Bridge to approximately 1200-feet downstream with a minimum bottom width of 35-feet. Existing granite revetment along the east side of the river in this stretch will be removed and replaced with a 1:1 engineered slope using a cellular confinement system. The granite revetment on the west bank will remain in place; in areas where the revetment is failing blocks will be re-set. To the maximum extent practicable the vegetation on the west bank will be preserved as long as the vegetation does not interfere with the stability of the existing granite revetment. In this reach, Project 2 will alter the curb line of a portion of the Mystic Valley Parkway, converting 8-feet of the current shoulder to a 5-foot side-walk and vegetated strip. The Mystic Valley Parkway is currently 42-feet curb to curb in this section, the project would alter the roadway to 34-feet curb to curb (8-foot breakdown/parking lane on east side, two 12-foot travel lanes, and a 2-foot shoulder on the west side). In total the project would alter the curb line for approximately 475-feet of the parkway, of which approximately 275-feet would be the full 8-foot reduction. The remaining 200-feet of altered curb line would be tapered zones where the total road width would expand from 34-feet back to the full 42-foot width. The curb line modification would eliminate approximately 20 informal on-street parking spaces.

Downstream of the reach being widened it was determined that the channel from bank to bank had a sufficient width to achieve the required flood flows, but the channel bottom has an adverse slope (that is the channel bottom rises in places causing a backwater effect). Therefore, the project includes dredging along the entire project width to maintain a positive slope. Vegetation along both banks in this stretch will be preserved. In this stretch, the USGS gage weir will be removed and replaced with a bottom mounted velocity meter and transducer.

In order to maintain the integrity of this historical record, the Town and the USGS have had detailed discussions regarding the installation of a new gage and the need to overlap the recording interval of the new and old gages for approximately six months. This will help hydrologists calibrate the historical record to the new records produced at the replacement gage. The final location of the new gage is still being finalized by the USGS.

The project also includes the construction of a low-flow channel between the Waterfield Road Bridge and the Bacon Street Bridge. The low-flow channel will concentrate the flow of the Aberjona River into a narrow, relatively deep channel during periods when river flows are low. The proposed low-flow channel is approximately eight feet wide bottom and two feet deep. The invert elevation of the channel ranges between elevation 3.48 and 3.5 feet (NAVD 88). The top of bank of the low-flow channel ranges between elevation 5.48 and 5.5 feet NAVD 88. The proposed low-flow channel provides a minimum flow depth in the river to accommodate Alewife during the spawning season (March through May) and provides a minimum flow depth during the low-flow season (September).

The current design of the low-flow channel assumes that the Aberjona River is freely flowing along this subject reach with no backwater influence from structures downstream. However, under normal conditions the Aberjona River does not flow freely along the subject reach. The Upper Mystic Lake Dam (approximately 8000 feet downriver) maintains a water surface elevation of approximately 7.8 feet NAVD 88 through the subject reach. Under normal operating conditions, the low-flow channel will be

completely submerged. However, there are times when the Aberjona River will flow freely along the subject reach. The low-flow channel will maintain a desirable depth of flow during the condition when the water surface elevation of the Upper Mystic Lake is temporarily lowered in anticipation of a large precipitation event.

This paragraph describes the anticipated flow conditions during the Alewife spawning season and the dry season, as well as the performance of the low-flow channel assuming free-flowing conditions. AECOM determined that the proposed low-flow channel will flow full when the discharge of the river is 5.5 cubic feet per second. During May, the likelihood that the average daily flow will be less than 5.5 cubic feet per second is less than 1 percent. The historical stream gage record has never recorded a flow less than 11 cubic feet per second during the month of May. During September, the likelihood that the average daily flow will be less than 5.5 cubic feet per second is approximately 38%. During all seasons, the likelihood that the average daily flow will be less than 5.5 cubic feet per second is approximately 24%.

Project 3: Center Falls Dam involves construction of two 5 foot by 5 foot sluice gates to replace the 30 inch gate valves. One of the two gates was installed in 2003 and is included in the baseline conditions model. This project remains the same as that proposed in the SDEIR.

Project 4: Mount Vernon Street Bridge Improvements involves the construction of a fourth opening under the bridge. The selection of this option (an additional 8-foot-wide opening) resulted from an engineering and cost analysis, public meetings, and discussions with multiple stakeholder groups. This option has been chosen by the Winchester Board of Selectmen as a result of these efforts. This project remains the same as that proposed in the SDEIR. Figure 3-8 of the SDEIR presented a before and after look at the proposed changes to this structure, not including the revised railing.

Project 6: High School Playing Fields involves construction of a 7 by 15-foot box culvert parallel to the three existing 7-foot diameter culverts. This project remains the same as that proposed in the SDEIR. Figure 3-9 of the SDEIR presented a before and after look at the proposed changes to this structure

Project 8: Swanton Street Bridge Improvements requires the reconstruction of the Swanton Street Bridge over the Aberjona River, replacing the current 10 by 16-foot opening with a 10 by 25-foot opening. Reconstruction of the bridge appears to be the most viable option, but as design progresses, adding an additional 100 square foot opening under the existing road will also be evaluated. This project remains the same as that proposed in the SDEIR. Figure 3-10 of the SDEIR presented a before and after look at the proposed changes to this structure.

Project 10 (Railroad Bridge Near Muraco School) involves construction of two 7 foot diameter culverts under the railroad embankment parallel to the existing twin 6.5 by 7 foot bridge openings. As noted in the SDEIR, the Town of Winchester was evaluating the feasibility of constructing a tunnel for a bikeway/greenway under the railroad in this area. The current bikeway path no longer runs along this route. This project remains the same as that proposed in the SDEIR. Figure 3-11 of the SDEIR presented a before and after look at the proposed changes to this structure.

3.3.3 Upstream Flow Regulation – Scalley Dam, Woburn

Since the SDEIR, Winchester performed a detailed evaluation of the feasibility of making modifications to the control structure at Scalley Dam (aka Horn Pond Dam) in Woburn. The objective of the engineering study was to evaluate the feasibility of improving the hydraulic opening of the primary outlet control for Horn Pond. The existing structure (5 feet wide by 4 feet high sluice gate) is overwhelmed by

large storm events, causing uncontrolled flow over the secondary spillway of Horn Pond into Horn Pond Brook. This, in turn, causes problems downstream all the way through the confluence of Horn Pond Brook and the Aberjona River. Modeling of the system as part of the DEIR and SDEIR showed that by increasing the capacity of the primary spillway (the control structure) that the peak flow hydrograph for a storm event could be “flattened out” by letting more water out of the pond in a controlled fashion throughout the storm event. This helps to maintain the pool elevation of Horn Pond below the elevation of the secondary spillway and therefore helps to prevent overtopping of the secondary spillway and uncontrolled flow to the brook.

The study focused on the feasibility of constructing a new primary spillway, the costs of such a project, and the hydraulic impact of various options for the spillway. The impact on the Lake Avenue culvert, which is immediately downstream of the spillway was also evaluated. A copy of the study is included in Appendix H.

The SDEIR proposed increasing the size of the primary spillway from its current 5-foot-wide sluiceway to a 10-foot-wide sluiceway. To work effectively the proposed design was to raise the secondary spillway elevation by one foot, thereby forcing more water through the new primary sluiceway as opposed to allowing the secondary spillway to overtop. Operationally this configuration would necessitate opening the sluice gate earlier in the storm to drawdown the pool elevation of Horn Pond before the peak of the storm. The City Engineer in Woburn did not prefer this option because of the potential for it to cause an increased pool elevation of Horn Pond if the sluice gate was not operated correctly.

An optimization analysis (using multiple model runs of the FEMA HEC-RAS model refined for the SDEIR Alternative) to see what size the primary spillway would have to be if the secondary spillway were kept at the same elevation to provide a similar level of improvement as seen by SDEIR Alternative 7. Based on the hydraulic evaluation it is now recommended that an additional sluice 8-foot-wide (rather than the SDEIR-recommended 5-foot-wide) be constructed.

It was assumed for all model runs that at 6 hours into the 24-hour storm event that both sluice gates were opened to their maximum extent. Actual sluice gate operation for smaller storms will likely vary, resulting in higher water elevations in Horn Pond but lower downstream flows.

The analyses show that implementation of the additional 8-foot gate is not predicted to have a negative impact on either water surface profiles or on velocities upstream or downstream of the Scalley Dam. The analyses also predicted no negative impacts on the functioning of the Lake Avenue culvert but that it reduces the peak flows and water elevations.

The FEIR Alternative was modeled with the proposed modifications to the control structure at Horn Pond as determined during the detailed evaluation.

3.3.4 Downstream Flow Regulation

As part of the Mystic River watershed, the Aberjona River is one of the tributaries which have historically experienced significant flooding. As discussed in the SDEIR, creating conveyance improvements in a river reach has the potential to adversely impact downstream areas. As upstream reaches are “improved” from a conveyance standpoint, downstream reaches can experience increased flows and without compensating for those flows, the downstream reaches may experience increased flooding due to channel constrictions in those reaches.

More importantly, these downstream areas already experience flooding and flood losses due to the existing conveyance deficiencies. Therefore the projects discussed in this section should move forward regardless of the proposed Winchester improvements. These projects will result in benefits in excess of the "mitigation" required for the Winchester projects and, therefore, will benefit all of the communities in the watershed. Winchester and the DCR have taken the lead on moving these projects forward, to the benefit of the entire watershed.

As was the case in the SDEIR, as each alternative was analyzed in the FEIR process, the new FEMA HEC-RAS model for the Mystic River watershed was run all the way to the Amelia Earhart Dam. This gave the modelers the opportunity to view the existing flow constrictions in river reaches from the Mystic Lakes downstream to the dam. Because the model includes all the tributaries to the Mystic River, the potential backwater (flooding) effect on tributaries is also apparent. The proposed downstream mitigation projects evaluated as part of the FEIR are discussed in greater detail below.

3.3.4.1 Upper Mystic Lake (Mid-Lakes) Dam, Arlington and Medford

Since filing the SDEIR, the DCR has advanced the project at the **Upper Mystic Lake Dam** (also known as the Mid-Lakes Dam) through permitting and 100% design. Construction on Phase I of the project began in Fall 2009 and will continue through Memorial Day 2010; construction of Phase II will occur between Fall 2010 and Spring 2011 to minimize impacts during the summer recreational season. The DCR rehabilitation proposes to replace the primary spillways with crest gate bays and ogee bays. This will give the DCR better control of the Upper Mystic Lake pool elevation prior to a storm event and better control of the overflow during the event. This will increase the flood flow buffering capacity in Upper Mystic Lake. This new control structure was added to the FEMA HEC-RAS model as part of the FEIR Alternative, and included:

- Addition of a new 120-foot long ogee secondary spillway to the east of the primary spillway;
- Raising the right abutment area (west side of dam) to a minimum of elevation 119-feet MDC (12.58-feet NAVD);
- Replacing two of the primary spillway stoplog bays with gates (Bottom-hinged crest gates); and
- Pre-Storm Drawdown: 2.2-foot drawdown of lake prior to predicted storms. (114.2-feet MDC to 112.0-feet MDC / ~ 7.8-feet NAVD to 5.6-feet NAVD).

Over the past several years, DCR and its team of engineering consultants have completed dam safety evaluations and inspections of the Mid-Lakes Dam and have investigated alternatives to more effectively regulate flood flows from the Upper to the Lower Mystic Lake. Currently, the overall dam safety rating is "poor". The team recently completed the design and permitting of dam improvements that are intended to address the existing dam safety deficiencies and to maximize the flood storage potential of the Upper Mystic Lake. The selected design alternative will preserve the normal water level in the Upper Mystic Lake at elevation 114.2-feet (MDC datum), which is important for recreational facilities on the Lake. A summary of the current dam safety deficiencies and the proposed corrective design elements are provided in the table below.

Table 3-4: Mid-Lakes Dam Rehabilitation Corrective Design Elements

Dam Safety Deficiency	Corrective Design Element
Inadequate spillway capacity causing uncontrolled overflows onto adjacent private property	Install new secondary spillway and close existing overflow area on private property
Damaged primary spillway apron and masonry	Repair historic masonry structures and install new concrete apron
Leaking/inoperative spillway controls	Replace stop logs with concrete ogees and install two, bottom-hinged crest gates
Unsafe spillway bridge during high flows	Install new spillway bridge (test piers)
Inadequate slope stability	Flatten slopes
Inadequate erosion protection	Provide riprap and revetment stone
Vegetated embankments	Remove trees and other vegetation
Uncontrolled seepage during high water	Install new sheetpile cutoff and downstream filter soils
Inoperable low-level outlet gate	Replace existing slide gates and complete modifications to the existing aqueduct
No facilities for fish passage	Install new fish ladder and eel-way

Note: Table adapted from DCR public meeting presentation entitled "Rehabilitation of Upper Mystic Lake Dam – Medford and Arlington, MA", dated September 24, 2009.

3.3.4.2 Craddock Locks – Main Street Bridge, Medford

As noted in the SDEIR, one of the major restrictions to flow (and potentially part of the cause of flooding in the Alewife Brook section of the watershed) is the **Craddock Locks** (Main Street Bridge) in Medford. However, this constriction remained a point of contention in the comments received on the SDEIR. Since the filing of the SDEIR, MassDOT (formerly MassHighway) performed their own hydraulic study of the Main Street Bridge (Attached as Appendix I). MassDOT concluded that the current bridge opening is a minor restriction to Mystic River flood flows, and that upstream to downstream stage elevation differential ranged from 0.7 feet to 0.75-feet for the 10-, 50-, and 100-year return period flows. The study also concluded the replacement bridge openings will offer virtually no restriction to Mystic River flood flows for the same storm events.

MassDOT's current plans for the Main Street Bridge include:

- Rehabilitation of the city-owned masonry arch spans;
- Replacement of the DCR-owned bridge over the boat canal;
- Demolition of the DCR-owned west side superstructure (remnants of dam and tide gates);
- Replacement of entire west side structure with a concrete arch system that replicates the dimensions of the stone arch structure; and
- And rehabilitation of the river walls immediately upstream and downstream of bridge.

The bridge improvements are currently in the preliminary design phase. It is estimated the construction will begin in spring 2012, with an estimated construction cost of \$11,600,000.

In addition to MassHighway's efforts on the design and construction of the Main Street Bridge, Winchester performed an independent engineering study to evaluate the feasibility of improving the hydraulic opening of the Main Street Bridge as a possible interim measure. The engineering study concluded that portions of the remaining concrete panels that are part of the remaining lock mechanisms could be removed prior to full rehabilitation without adverse impact. The concrete wall panels were determined to not have a critical impact to the structural stability or integrity of the existing bridge piers and/or the overlying bridge and sidewalk features. Design and construction of these temporary measures is estimated at a cost of \$400,000. Appendix J includes the full engineering feasibility study for the interim measures investigated for the Main Street Bridge.

If the scheduling works, reconstruction of the bridge will accomplish the same purpose as simply removing the remainder of the concrete panels since either option has the same effect on upstream and downstream flood levels. However, if necessary, the Town of Winchester is willing to front-end the removal of the remaining concrete panels to provide the interim benefit necessary for flood flow mitigation. The FEIR Alternative includes removing the concrete panels and no longer includes the full reconstruction bridge option.

3.3.4.3 Amelia Earhart Dam

The FEIR Alternative continues to not include the addition of a fourth pump or any operational changes at the Amelia Earhart Dam. As stated in the SDEIR, there are currently three pumps at the Amelia Earhart Dam (each rated at 1,400 cfs), and room for a fourth pump. Under normal operation, only two of the three pumps are operated, with the third kept in reserve. The SDEIR also stated that removal of the Craddock Lock without other mitigation projects would likely result in the need for operational changes at the dam so that water surfaces downstream of the Main Street Bridge (Craddock Locks) do not raise during storm events. The analysis in the SDEIR showed that there appeared to be capacity in this system to accommodate the operational changes, and that the installation of a fourth pump would give the DCR additional operational leeway when pumping in severe (100-year and above) storm events at high tide. To clarify, operational changes at the Amelia Earhart Dam would only be needed if Craddock Bridge was rehabilitated or if some of the Winchester projects were performed prior to the rehabilitation of Scalley Dam or Upper Mystic Lakes Dam. The Craddock Lock Bridge is not being proposed prior to the completion of Upper Mystic Lake Dam project so operational changes are not required. A more detailed discussion on project sequencing is included in Section 4.8.5. For the purpose of the FEIR analyses, the models were run with the three pumps (two pumps being used, one in reserve) and the same operation as baseline, no operational changes.

3.3.5 Level of Service Analysis

The alternative preferred in this FEIR includes the revised Aberjona flood improvement projects in Winchester, together with the Craddock Locks, Upper Mystic Lake Dam, and Scalley Dam modifications. Table 3-5 compares the Level of Service (LOS) for existing conditions (Alternative 1), the SDEIR Alternative (Alternative 7), and the FEIR Alternative (Alternative 8). This comparison is also shown graphically on Figure 3-5. This LOS evaluation predicts that this alternative would result in:

- A decrease from 22 (44%) of the existing elements designated as poor or substandard to 15 (30%) of the elements designated as poor or substandard (LOS D or F)
- Of the 15 elements designated as poor or substandard, 10 were improved from F to D

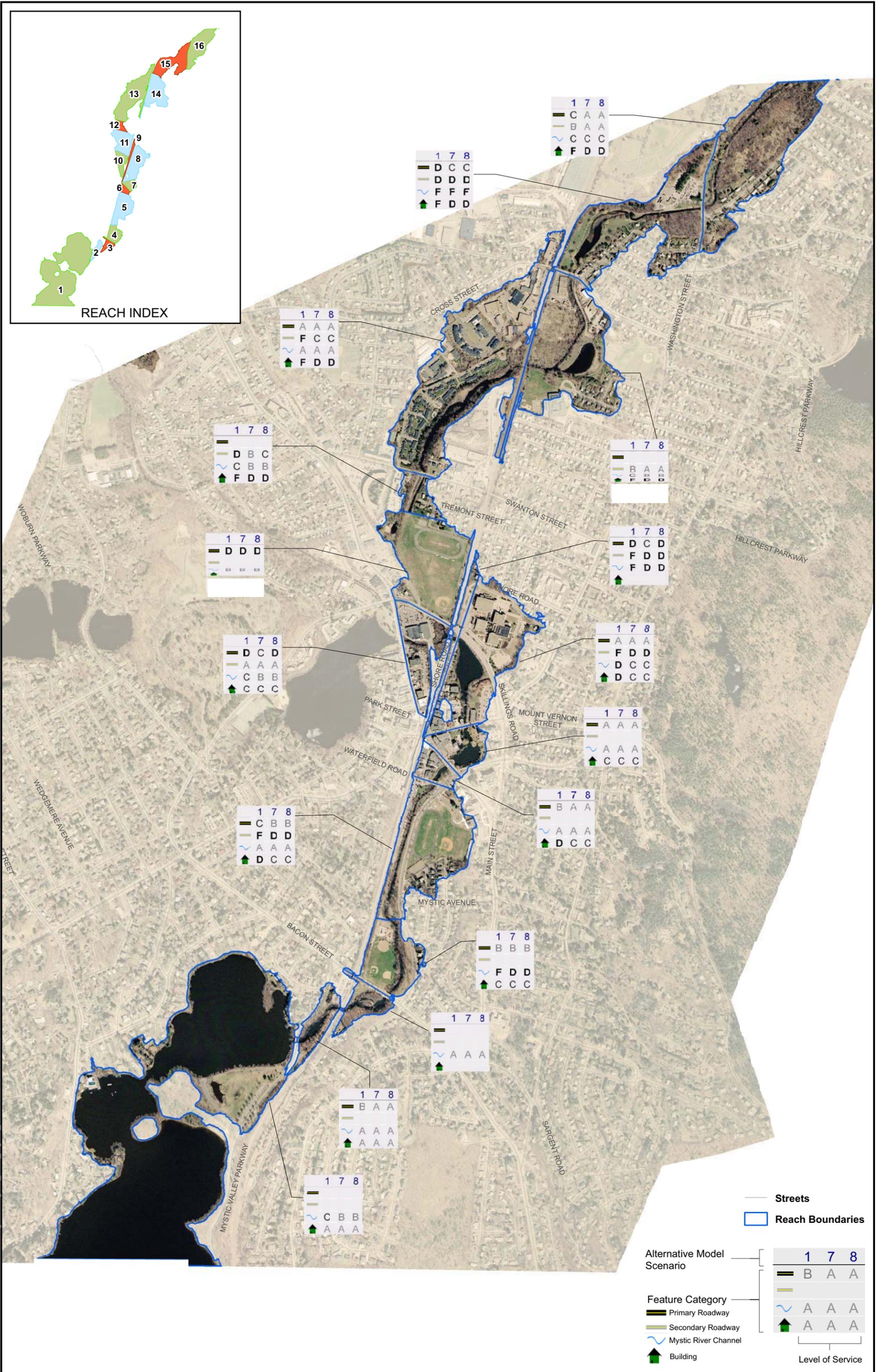
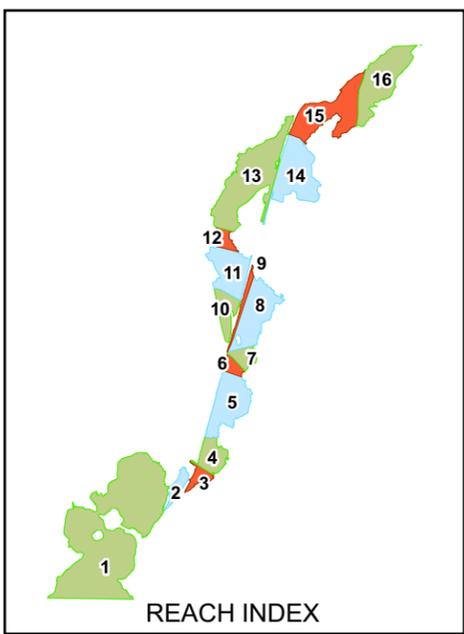
Table 3-5: Level of Service Analysis Comparison

Reach	Description	Category	Alternative 1 (Baseline)	Alternative 7 (SDEIR)	Alternative 8 (FEIR)
1	Corporate Limits to Mystic Valley Parkway	Primary Roadway	NA	NA	NA
		Secondary Roadway	NA	NA	NA
		Channel	C	B	B
		Building	A	A	A
2	Mystic Valley Parkway to Wedgemere RR Crossing	Primary Roadway	B	A	A
		Secondary Roadway	NA	NA	NA
		Channel	A	A	A
		Building	A	A	A
3	Wedgemere RR Crossing to Bacon Street	Primary Roadway	NA	NA	NA
		Secondary Roadway	NA	NA	NA
		Channel	A	A	A
		Building	NA	NA	NA
4	Bacon Street to Ginn Field Footbridge	Primary Roadway	B	B	B
		Secondary Roadway	NA	NA	NA
		Channel	F	D	D
		Building	C	C	C
5	Ginn Field Footbridge to Waterfield Road	Primary Roadway	C	B	B
		Secondary Roadway	F	D	D
		Channel	A	A	A
		Building	D	C	C
6	Waterfield Road to Main Street	Primary Roadway	B	A	A
		Secondary Roadway	NA	NA	NA
		Channel	A	A	A
		Building	D	C	C
7	Main Street to Mount Vernon Street	Primary Roadway	A	A	A
		Secondary Roadway	NA	NA	NA
		Channel	A	A	A
		Building	C	C	C
8	Mount Vernon Street to Shore Road	Primary Roadway	A	A	A
		Secondary Roadway	F	D	D
		Channel	D	C	C
		Building	D	C	C
9	Shore Road to RR Crossing	Primary Roadway	D	C	D
		Secondary Roadway	F	D	D
		Channel	F	D	D
		Building	NA	NA	NA
10	RR Crossing to Skillings Road	Primary Roadway	D	C	D
		Secondary Roadway	A	A	A
		Channel	C	B	B
		Building	C	C	C
11	Skillings Road to Winchester High School Fields Culvert	Primary Roadway	D	D	D
		Secondary Roadway	NA	NA	NA
		Channel	B	B	B
		Building	NA	NA	NA
12	Winchester High School Fields Culvert to Swanton Street	Primary Roadway	NA	NA	NA
		Secondary Roadway	D	B	C
		Channel	C	B	B
		Building	F	D	D

Reach	Description	Category	Alternative 1 (Baseline)	Alternative 7 (SDEIR)	Alternative 8 (FEIR)
13	Swanton Street to RR Crossing	Primary Roadway	A	A	A
		Secondary Roadway	F	C	C
		Channel	A	A	A
		Building	F	D	D
14	RR Crossing to Cross Street	Primary Roadway	NA	NA	NA
		Secondary Roadway	B	A	A
		Channel	C	B	B
		Building	F	D	D
15	Cross Street to Washington Street	Primary Roadway	D	C	C
		Secondary Roadway	D	D	D
		Channel	F	F	F
		Building	F	D	D
16	Washington Street to Corporate Limits	Primary Roadway	C	A	A
		Secondary Roadway	B	A	A
		Channel	C	C	C
		Building	F	D	D

Table 3-6: Level of Service Rating Table

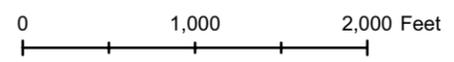
	A	B	C	D	F
Primary Roadway	100 Year	50 Year	25 Year	10 Year	5 Year
Secondary Roadway	50 Year	25 Year	10 Year	5 Year	2 Year
Channel	25 Year	10 Year	5 Year	2 Year	<2 Year
Building	> 500 Year	500 Year	100 Year	50 Year	25 Year



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Figure 3-5 Level Of Service Summary
 Alternatives 1, 7, and 8
 Aberjona River Flood Mitigation program
 FEIR, EOE File No. 13046



Streets
 Reach Boundaries

Alternative Model Scenario

1	7	8
—	—	—
B	A	A

Feature Category

—	A	A	A
—	A	A	A
—	A	A	A

Level of Service

- Primary Roadway
- Secondary Roadway
- Mystic River Channel
- Building

3.3.6 BMP Components

As stated in the SDEIR, the Town of Winchester fully understands that the long-term success of the Town's proposed flood mitigation program is dependent upon the implementation of programs to reduce existing stormwater flows, to improve stormwater management for new and redevelopment projects, and to carry out Best Management Practice (BMP) retrofits of existing stormwater management systems.

3.3.6.1 Infrastructure Capital Improvement Program

The Town of Winchester has embarked on an infrastructure capital improvement program aimed at improving the management of stormwater volume and quality. This program, which is funded through Chapter 110 residential real estate taxes and commercial water/sewer uses, has been undertaken in three phases. Phases I and II are fully complete and the Fall 2008 Town Meeting voted to appropriate \$750,000 to complete the Phase III improvements in the FY2010 budget. A summary of the projects completed or currently under design/construction since the SDEIR is provided below:

Projects Completed since the SDEIR Publication

- **Tufts Road and Chester Street Drainage Improvements** – This project included replacement of approximately 1,250-feet of drain pipe, the installation of new deep sump catch basins, the installation of approximately 335-feet of perforated pipe, and the installation of a stormwater infiltration system resulting in approximately 3800 cubic feet of storage (excluding the crushed stone).
- **Winter Pond/Cambridge Street Drainage Study** – CDM completed its feasibility study in fall 2007 to evaluate the possible diversion of stormwater runoff from the west side of Town into Winter Pond. The CDM study concluded that elevated bacteria levels in the stormwater runoff could potential adversely impact the water quality of Winter Pond and, therefore, did not recommend pursuing this project.
- **Trash Rack Repairs/Rehabilitation** – The Winchester DPW built and installed new trash racks at the West Side Field and at the point where the outlet stream from North Reservoir enters a culvert and crosses under Highland Avenue.

Phase III Drainage Projects Currently Under Design/Construction

- **Swanton and Bacon Street Storm Drain Pump Stations** – The Town currently operates stormwater pump stations on Bacon Street and Swanton Street where the roads descend under the elevated railroad tracks. Both stations were installed in the late 1950s/early 1960s when portions of the railroad were raised. Construction began in December 2009 to replace the pump stations at both locations and to upgrade the facilities to meet current code requirements. Construction is expected to be complete in Spring 2010.
- **Drainage Network Improvements in the Manchester Road and Manchester Field Area** – The area in question has long been plagued by poor drainage conditions, which results in flooding of the field, adjacent neighborhoods and roadways. The project includes enlargement of the existing 24-inch drain line that crosses Manchester Field (completed as part of the Phase I field improvements), as well as an alternatives analysis, design, and construction of improvements upstream and downstream of the field (Phase II). Construction of the Phase II proposed improvements is expected to begin in 2010. An additional \$1.7 Million were allocated for this project at the Fall 2009 Town Meeting beyond what was originally included in the Phase III allocation. The proposed Phase II field improvements include the installation of three

underground detention/infiltration systems with a combined storage capacity of approximately 150,000 cubic feet. The project as includes the replacement of approximately 1400 lineal feet of subpar storm sewer in the field and surrounding neighborhood.

- **West Side Drainage Study** – Building upon the results of the Winter Pond study completed as part of the Phase II drainage projects, this study will evaluate alternative solutions to redirecting part of the stormwater runoff that comes from the west side of Town and enters the drainage system on Cambridge Street.

3.3.6.2 NPDES Phase II Stormwater Permit

Since the publication of the SDEIR, the Winchester Board of Selectmen has officially adopted the “Rules and Regulations Regarding the Use of Public Sewers and Storm Drains in the Town of Winchester, Massachusetts”. These regulations, which became effective on June 8, 2007, incorporate the requirements of BMP 3-5, 3-6, 3-7, 5-1, and 5-3 of the Town’s NPDES Phase II stormwater permit, which relate to the passage of various water sewer regulations. The adopted regulations go above and beyond what is required by the Massachusetts Stormwater Handbook. For all new and redevelopment projects stormwater management systems must, at a minimum, be designed such that post-development discharge volumes do not exceed pre-development volumes. The 2003 small MS4 General Permit expired on May 1, 2008. As of this submittal a new general permit has not been issued by EPA, therefore the Town of Winchester continues to operate under the requirements of the 2003 permit.

3.3.6.3 Engineering Department and Conservation Commission Project Review

The Town of Winchester continues to operate under the regulations and technical principles expressed in Section 4.5.1.4 of the SDEIR. However, since the publication of the Massachusetts Stormwater Handbook in February 2008, the Town no longer allows the use of percolation tests as an adequate measure of soil infiltration rates. Rather, the Town requires all developments to use the design principles for infiltration systems outlined in the Handbook.

3.3.6.4 Rain Barrel Program

Since 2007, the Town of Winchester has held an annual program whereby residents can purchase rain barrels from the New England Rain Barrel Company (NERBC) at a discounted rate. Located in Peabody, Massachusetts, NERBC has a well-established municipal partnership program and has been widely used by other communities in the New England area. They are also an approved distributor by the Department of Environmental Protection (DEP) under their rain barrel grant program.

The New Englander barrel provided by NERBC is made from recycled barrels ranging in capacity from 55 to 60 gallons. It is intended to be used with gutters and downspouts to collect rooftop runoff. A quarter-inch of runoff from the average roof will fill the barrel. Since the program began in 2007, over 200 rain barrels have been sold to Winchester residents. The Town expects to continue the program for 2010 (delivery is typically scheduled for mid-June) and expects to also offer for sale the new compost bins available from NERBC.

3.4 FEMA Map Revision Process

Upon completion of the Aberjona Flood mitigation program, the current regulatory flood zones and Base Flood Elevations (BFEs) will remain as depicted on the current preliminary maps that become effective in June 2010. These soon to be effective maps will need to be revised through FEMA’s Letter of Map Revision (LOMR) process in order to officially lower the base flood elevations and remove properties out

of the floodplain. Until the maps are officially changed, the regulated 100-year floodplain will remain as depicted on the soon to be effective maps and properties in the depicted floodplain will still require flood insurance.

There are two steps the Town of Winchester is considering to change the floodplain. The first is a Conditional Letter of Map Revision (CLOMR). A CLOMR gives FEMA a chance to review the proposed project and its affect on the hydrologic and hydraulic characteristics of the flooding sources affected that would result in modification of the effective BFEs and the Special Flood Hazard Area (SFHA) zone mapping. A CLOMR would not revise the effective BFEs and SFHAs but would provide a letter that indicates that if a project is built as proposed would be recognized by FEMA. Once the project has been completed, an "As-Built" certification would be submitted via a LOMR to officially revise the BFEs and SFHAs shown on the Flood Insurance Rate Maps (FIRMs).

The Town of Winchester is planning on filing a CLOMR that includes all of the proposed projects with FEMA after completion of the MEPA process is complete. At this time the existing and proposed conditions models will be submitted and fully reviewed by FEMA contractors. Upon a successful review the Town will receive a letter that states that if all the projects are completed as proposed FEMA will recognize the revised FIRM changes, after submittal of "As-Built".

As all projects will not be completed simultaneously, and may stretch over several years, the LOMR process will not be as simple as submitting "As-Built". As projects are completed that have a significant change in BFEs or floodplain extent the Town of Winchester will file an interim LOMR. This will require a full submittal including an interim model that only includes the projects completed to date. The Town will work with FEMA to determine the best approach for filing these interim LOMRs.

3.5 Project Permitting

The following sections present the potential permitting process for each project within the FEIR Alternative (Alternative 8). Additional discussion relative to local, state, and federal permitting requirements is provided in Section 3.6 through 3.8.

3.5.1 Project 2: Channel Widening, Waterfield Road to Bacon Street

The widening of the Aberjona River from Waterfield Road to Manchester Road (a distance of 1,300 feet), the removal of the USGS weir, and removal of the adverse slope from Manchester Road through the Bacon Street Bridge will involve permitting at the local, state, and federal levels. At the local level a Notice of Intent under the Wetlands Protection Act and local bylaw will be filed with the Winchester Conservation Commission who has authority to issue an Order of Conditions for the project. In addition, coordination with other Town Boards and Departments will be required to implement this large and complex project. At the state level a Water Quality Certification and a Waterways License and Dredging Permit from the DEP will be required, as will coordination with the MWRA and DCR. A Section 404 Individual Permit from the USACE and coordination with the USGS will be required for this project as well.

3.5.2 Project 3: Center Falls Dam

Although previously permitted, installation of the second sluice gate at Center Falls Dam may require new permitting under the Wetlands Protection Act through the Winchester Conservation Commission due to the time elapsed since the permits were issued. Prior to bidding the project an evaluation will also be made of the status of/need for other permitting at the state and federal levels.

3.5.3 Project 4: Mount Vernon Street Bridge Improvements

This project will require the same suite of permitting as Project 2 plus a permitting/approval process through the Massachusetts Historic Commission and Winchester Historic Commission due to the historic nature of the bridge.

3.5.4 Project 6: High School Playing Fields

The supplementary 15-foot wide by 7-foot tall by 1,270 feet long box culvert will require a Notice of Intent under the Wetlands Protection Act and local bylaw. At the state level a Water Quality Certification may be required. A Section 404 permit from the USACE may be required for this project as well.

3.5.5 Project 8: Swanton Street Bridge Improvements

Replacement of the Swanton Street Bridge will require at the local level, a Notice of Intent under the Wetlands Protection Act and local bylaw will be filed with the Winchester Conservation Commission who has authority to issue an Order of Conditions. At the state level a Water Quality Certification and a Waterways License may be required. A Section 404 permit from the USACE may be required for this project as well.

3.5.6 Project 10: Railroad Bridge Near Muraco School

Besides permitting under the same laws cited in Project 8, installation of culverts under this active track will require permitting through the MBTA. .

3.5.7 Scalley Dam on Horn Pond, Woburn

Work on the outlet structure of Scalley Dam will require at the local level, a Notice of Intent under the Wetlands Protection Act and local ordinance will be filed with the Woburn Conservation Commission who has authority to issue an Order of Conditions. At the state level a Water Quality Certification and a Waterways License may be required. A Section 404 permit from the USACE may be required for this project as well but this could change based on a constructability review during the design stage of the project. A Chapter 253 Dam Safety permit from the DCR will also be required

3.5.8 Craddock Locks

Removal of the remaining concrete panels from the openings under the bridge will require filing a Notice of Intent under the Massachusetts Wetlands Protection Act with the City of Medford Conservation Commission. At this time it does not appear that other permitting will be required, but amending or applying for a Waterways (MGL Chapter 91) License may also be required. A Request for Determination of Applicability (under MGL Chapter 91, the Public Waterfront Act) will be filed with the DEP.

3.5.9 Mid Lakes

This is a DCR project and has already been designed and permitted. This project is currently under construction.

3.6 Local Permitting

The six primary flood control projects proposed as part of the FEIR Alternative (Projects 2, 3, 4, 6, 8, and 10) are all located within the Town of Winchester. The three proposed mitigation projects are located outside of Winchester; the Craddock Lakes project is located within the Town of Medford, the Scalley

Dam project is located within the City of Woburn, and the Mid-Lakes Dam is located within the Town of Arlington and the City of Medford. As such, local permitting will be required within the Towns of Winchester and Arlington and the Cities of Woburn and Medford. As the designs progress for the various projects, a final permitting assessment will be performed relative to which local, state, and federal permits or actions will be required.

3.6.1 Massachusetts Wetlands Protection Act

All projects will require approval, either a Determination of Applicability or an Order of Conditions, under the Massachusetts Wetlands Protection Act (MGL C. 131, S. 40) and Regulations (310 CMR 10.00) from the local Conservation Commission, since each project includes work that is located in or adjacent to various wetland resource areas. If any of the Orders of Conditions are appealed to the state DEP, the Superseding Order of Conditions would be considered a state action, not a local action.

All projects meet the performance standards as put forth in the Regulations, as described in Section 4.2. Mitigation of impacts includes creation of approximately 2,000 square feet of Bordering Vegetated Wetland replacement area, 2,220 linear feet of Bank restoration, and 125,000 square feet of Land under Waterways restoration, and over 40,000 square feet of Riverfront Area restoration. There are no impacts to Bordering Land Subject to Flooding. The alteration areas have been minimized to the greatest extent feasible and all mitigation is in excess of 1:1. A comprehensive stormwater control plan that includes cofferdams, silt curtains, dewatering/filtration areas, and haybale/silt fence barriers will help to avoid alterations to federal and state resource areas.

Based on project revisions and the results of the Riverfront Area analysis (see Section 4.2.4), no Variances from the Act or Regulations will be required. None of the projects presented in the FEIR Alternative exceed the Variance thresholds of the Act. The DEP in its comment letter on the DEIR and SDEIR raised the issue of requiring a Variance from the Act for impacts to Bordering Vegetated Wetlands and Riverfront Area for Project 2. Project 2 no longer impacts Bordering Vegetated Wetlands and the conservative approach to the Riverfront Area analysis presented in this FEIR shows that the project affects less than 10% of the "lot" which contains Project 2. Therefore, no Variance is required from the Act. In addition, the projects meet the General Provisions of 310 CMR 10.53(4) which allows projects with an Order of Conditions to proceed if it "... will improve the natural capacity of a resources area(s) to protect the interests identified in [the Act]"

3.6.2 Local Wetlands Protection Bylaws/Ordinances

All projects may also require approval pursuant to the local wetlands protection bylaws or ordinances. The Towns of Winchester and Arlington have local wetlands protection bylaws and the Cities of Woburn and Medford have local wetlands protection ordinances. The Orders of Conditions or Determination issued under the state Act and Regulations may also be issued simultaneously under the local bylaw or ordinance.

3.7 State Permitting

The following section presents the potential state permitting that is expected for the projects in the FEIR Alternative.

3.7.1 Article 97 Considerations

In response to comments from the Massachusetts Department of Conservation and Recreation (DCR) and others, the SDEIR Certificate requested additional analysis as to whether the construction of Project

2 as proposed in the SDEIR would trigger application of Article 97 of the Massachusetts Constitution and EOEA's Article 97 Land Disposition Policy. Subsequent to issuance of the SDEIR Certificate, the Town held a series of meetings with representatives of the U.S. Army Corps of Engineers and DCR to discuss alternative configurations for Project 2 to address the issues presented in the SDEIR comments, including application of Article 97.

These discussions led a re-design of Project 2, described in Section 3.3.2, that reduced the proposed width of the channel bottom from 39 feet to 35 feet, or by approximately 10%. In addition, the sidewalk running between the river channel and the Mystic Valley Parkway will be retained an not below street grade. Reducing the channel bottom width to 35 feet, however, disqualifies Project 2 from funding under Section 205 of the federal 1948 Flood Control Act of 1948 (Public law 80-858), as amended. The USACE concluded that a channel width of less than 39 feet would not provide sufficient flood relief to meet the 1:1 cost-to-benefit ratio required by that statute to qualify for federal funding. As a consequence, redesigning Project 2 to a 35-foot channel width eliminates approximately \$800,000 in federal funding that would be available to the project if it retained a 39-foot channel width.

However, the redesigned Project 2 does address the DCR's comment that Project 2 (as proposed in the SDEIR) "would result in a change in use and physical control to Article 97 parkland." Because Project 2 no longer qualifies for USACE funding, a permanent easement regarding the channel modification or perpetual flowage within that channel is not required. The narrower channel width substantially reduces the amount of parkland that physically altered by Project 2, and the redesigned project retains the sidewalk running between the river channel and the parkway. These changes reduce the potential impacts to public use of the parkland, and avoids any loss in DCR's legal and physical control of the project area. Based on recent discussions with DCR staff, it is the Town's understanding that DCR will not request application of Article 97 and EOEA's Article 97 Land Disposition Policy to the redesigned Project 2.

3.7.2 Section 401 Water Quality Certificate

Pursuant to Section 401 of the state and federal Clean Water Acts, a Water Quality Certificate (WQC) is required for placement of fill or dredging within waters of the United States. This approval is issued by the DEP. It is anticipated that most of the projects will require a WQC, specifically Projects 2, 8, 10, and Scalley Dam. If the work involves less than 5,000 square feet of fill and/or 100 cubic yards of dredging, then the Order of Conditions will serve as the WQC.

Project 2 will result in the removal of approximately 16,000 cubic yards of sediment (including bank soils above the mean high water - MHW) from the Aberjona River. This amount of dredging (which exceeds the threshold at 314 CMR 9.04(12)) and will require a permit from the USACE under Section 404 of the Clean Water Act (which exceeds the threshold at 314 CMR 9.04(9)). The other projects proposed by the Town of Winchester meet the standards of 314 CMR 9.03(1), (3), and (5). Therefore individual Water Quality Certification applications for those projects are not required.

The current design scenario for Project 2 calls for the 1,300 feet long reach of the river to be widened to a 35-foot bottom width, to be coffer-dammed at the upstream and downstream ends, dewatered, and for excavation to occur in the dry. This will be done during a period of low flows and the river will be bypass pumped around the contained area. This will allow for sediment dewatering to occur in place rather than hydraulically pumping the material to temporary drying beds or belt filter presses. Best Management Practices (BMPs) and turbidity controls will be put in place prior to coffer-damming and dewatering the work zone. Discharged water from the construction zone will be tested for turbidity on at least a daily basis and any rise in turbidity above 10 ntu shall be cause to temporarily halt dewatering to allow time to

address the source of turbidity. If other analytical testing and pre-treatment of dewatering fluid is required prior to discharge to prevent pollution of the river, a plan that addresses the removal of specifically identified contaminants will be proposed prior to the startup of dredging operations. This will be reviewed by the DEP prior to implementation.

Once the material is removed the channel bottom, the pilot channel and left bank will be shaped and the bio-engineering materials installed. Only after the area is re-constructed and stabilized will flow be reintroduced to the channel and the upstream cofferdam removed. The downstream cofferdam will remain in place as the next reach is dredged.

Following this excavation activity the next reach (including the USGS weir and Ginn Field footbridge) shall be coffer-dammed, dewatered, and excavated in a similar manner. The third reach (from downstream of the footbridge to just downstream of Bacon Street) will be worked on following completion of the second reach. After all three reaches have been completed; flow in the river will be restored.

The soil and sediment in the 2,650-foot long stretch associated with Project 2 has been thoroughly tested and analyzed for the contaminants in accordance with 314 CMR 9.07(2) and dredging will take place in accordance with 314 CMR 9.07(3) and (5). Dewatered material will be loaded onto trucks and testing of the material will occur for excavations in those areas pre-characterized during the sampling program as having potential exceedences of standards.

The Town hopes to be able to beneficially reuse all of the uncontaminated material excavated as part of this project under 314 CMR 9.07(9). The material will be transported to an upland storage area for stockpiling and reuse. Excess material will be used for landfill daily cover, or disposed of in an approved landfill per 314 CMR 9.07(8).

3.7.3 Chapter 91 Waterways

Pursuant to the Massachusetts Public Waterfront Act (MGL C. 91) and Regulations (310 CMR 9.00) ("Chapter 91"), the DEP has jurisdiction over waterways that are navigable and where public funds have been expended. It is anticipated that most of the projects proposed will require regulatory action pursuant to Chapter 91. Additional research will need to be performed to determine if license already exist for the various structures or projects located within the Aberjona River. If licenses exist, then many of the projects may be eligible for amended licenses or minor modifications. It is likely that Project 2 will result in the need for a new license with a dredging permit due to the magnitude of the work proposed. As this project is intended to mitigate for flooding impacts and will retain and restore open space and public access associated with the projects, no impacts to waterways or public access is anticipated.

The channel conveyance projects include work in Waters of the Commonwealth. The proposed projects have the following impacts below the mean high water (MHW) along the Aberjona River which are subject to Waterways Licensing or Permitting as Water-Dependent Projects:

Waterways Permit

- **Project 2: Channel Widening, Waterfield Road to Bacon Street** – Widen the River channel between Waterfield Road and the United States Geological Survey (USGS) gage from an average of 15 to 20-feet to approximately 35-feet. Re-grade and deepen the channel between Waterfield Road and Bacon Street. Remove and replace the USGS gage and associated weir.

Waterways Licenses

- **Project 3: Center Falls Dam** – Replace the second of two existing 30-inch gate valves on either side of Center Falls Dam with 5 by 5-foot butterfly gates and 4 by 6-foot discharge boxes (one of the two gate valves was replaced in 2003).
- **Project 4: Mount Vernon Street Bridge Improvements** – Expansion of the hydraulic opening at the Mount Vernon Street Bridge.
- **Project 8: Swanton Street Bridge Improvement** – Replacement of the existing 10 by 16-foot bridge opening under Swanton Street with a 10 by 25-foot bridge opening.
- **Project 10: Railroad Bridge Near Muraco School** – Installation of two seven-foot diameter conduits under the MBTA railroad near the Muraco School to supplement the two existing 6.5 by 7-foot bridge openings.

The areas of impact to waterways have been minimized to the greatest extent feasible and there is no alternative to constructing the proposed improvements, which would not involve work below MHW in the Aberjona River. A comprehensive stormwater control plan that includes cofferdams, silt curtains, dewatering/filtration areas, and haybale/silt fence barriers will help to avoid alterations to federal and state wetland areas. All river banks will be restored using bi-engineering methods and native plants. Public access to the river will not be adversely affected by the projects. The navigability of the river would not be adversely affected by the projects.

3.7.4 Chapter 253 Dam Safety Permit

A dam safety permit will be required for the Scalley Dam project located in the City of Woburn. This permit is issued by DCR.

3.7.5 Historical

Two of the Aberjona Flood Mitigation projects (Project 2 and 4), will have direct impacts to historical properties. A Memorandum of Agreement between the Town of Winchester, DCR, Massachusetts Historical Commission (MHC), and Winchester Historical Commission (WHC) relative to these effects will be required.

3.7.6 Other State Actions

In addition to the state permits listed above, the following permits/agreements will be required:

- DCR Access Permit (Project 2),
- 8m MWRA permit (Project 2 and 6),
- MBTA License Agreement (Project 10).

3.8 Federal Permitting

Pursuant to Section 404 of the federal Clean Water Act, approval is required for placement of fill, structures, or dredging within waters of the US. These approvals are issued by the USACE upon consultation with other federal agencies which may include the EPA and the US Fish and Wildlife Service as appropriate. It is anticipated that most of the projects will require Section 404 approval, specifically Projects 2, 8, 10, and Scalley Dam. The Massachusetts Programmatic General Permit (PGP) categories 1 and 2 may cover the majority of the projects proposed with the exception of Project 2, which will require an Individual Permit due to the amount of dredging proposed.