



Environmental Assessment Merrimack River Bank Stabilization Chelmsford, Middlesex, MA

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LIST OF ACRONYMS

ACHP – Advisory Council on Historic Preservation

APE – Area of Potential Effect

APHIS – United States Department of Agriculture, Animal, and Plant Health Inspection Services

BAUR - Massachusetts Board of Underwater Archaeological Resources

BGEPA – Bald and Golden Eagle Protection Act

BRP – Bureau of Resource Protection

CERCLA – Comprehensive Environmental Response, Compensation and Liability Act

CFR – Code of Federal Regulations

COC – Community of Concern

dBA – A-Weighted Decibels

DHS – Department of Homeland Security

EA – Environmental Assessment

EFH – Essential Fish Habitat

EJ – Environmental Justice

EO – Executive Order

EPA – Environmental Protection Agency

ESA – Endangered Species Act

FEMA – Federal Emergency Management Agency

FPPA – Farmland Policy Protection Act

HMGP – Hazard Mitigation Grant Program

IPaC – Information for Planning and Consultation

Ldn – Day-Night Average Sound Level

MACRS - Massachusetts Cultural Resource Information System

MADAR – Massachusetts Department of Agricultural Resources

MADCR – Massachusetts Department of Conservation and Recreation

MADEP – Massachusetts Department of Environmental Protection

MADFW – Massachusetts Division of Fisheries and Wildlife

MADOT – Massachusetts Department of Transportation

MASHPO – Massachusetts State Historic Preservation Office

MEMA – Massachusetts Emergency Management Agency

MTBA – Migratory Bird Treaty Act

NHPA – National Historic Preservation Act

NRHP – National Register of Historic Places

NOAA – National Ocean and Atmospheric Administration

NPDES – National Pollution Discharge Elimination System

NRHP – National Register of Historic Places

OSHA – Occupational Safety and Health Administration

PAL – Public Archaeology Laboratory, Inc

RCRA – Resource Conservation and Recovery Act

SHPO – State Historic Preservation Office

SWPPP – Storm Water Pollution Prevention Plan

US – United States

USACE – United States Army Corp of Engineers

USFS – United States Forest Service

USFWS – United States Fish and Wildlife Services

WQC – Water Quality Certification

1.0 INTRODUCTION

Tropical Storm Irene caused storm damage from August 27-29, 2011 to several areas across the Commonwealth of Massachusetts. On September 3, 2011, President Obama declared Tropical Storm Irene a major disaster. The declaration authorized the Federal Emergency Management Agency (FEMA) to provide assistance to the state per federal disaster declaration DR-4028-MA and in accordance with Section 404 of the Robert T. Stafford Disaster Relief and Emergency Assistance Act of 1974 (42 U.S.S. 5172). The Town of Chelmsford (Town) has applied to the FEMA Hazard Mitigation Grant Program (HMGP) for financial assistance to stabilize the bank along the Merrimack River at Wellman Avenue to prevent further erosion as a means to protect a sewer line. The Massachusetts Emergency Management Agency (MEMA) is the grant recipient partner for the proposed action.

This Environmental Assessment (EA) is prepared in accordance with Section 102 of the National Environmental Policy Act (NEPA) of 1969, as amended; and the Regulations for Implementation of the National Environmental Policy Act (40 Code of Federal Regulations [CFR] Parts 1500 to 1508). The purpose of the EA is to analyze the potential environmental impacts of the proposed project and alternatives, including a no action alternative, and to determine whether to prepare an Environmental Impact Statement (EIS) or a Finding of No Significant Impact (FONSI). In accordance with above referenced regulations and FEMA Directive 108-1 and FEMA Instruction 108-1-1, FEMA is required, during decision making, to fully evaluate and consider the environmental consequences of major federal actions it funds or undertakes.

2.0 PURPOSE AND NEED

FEMA's HMGP fosters the protection of health, safety, and welfare of citizens, assists communities in mitigating damages caused by disasters, and reduces future losses resulting from natural disasters. The purpose of this project is to reduce the risk to the existing gravity sewer line from becoming washed out, exposed, and/or ruptured from bank erosion. The project is needed because the river bank is currently eroded from the natural river flow, storm flooding and runoff, and frost melt. Exposure and rupture of the sewer line would contaminate the Merrimack River with sewage and pose a threat to public health.

3.0 PROJECT LOCATION AND BACKGROUND

The site is in, and adjacent to, an 82-acre, 535-unit residential condominium complex located along the southern bank of the Merrimack River in North Chelmsford, Massachusetts (Appendix B, Figure A). Waste water from the complex is collected by an 8 inch gravity sewer line at the back of the residential units between Wellman Avenue and the Merrimack River. The sewer line parallels the river for approximately 4,000 linear feet (Appendix B, Figure B). Sewage in the gravity sewer line flows easterly to a pump station where it is pumped to the Lowell Wastewater treatment facility. (Epsilon 2016a)

The river bank rises about 8 to 12 feet from ordinary high water of the Merrimack River. The project proposal characterizes the river bank as three edge types based on slope condition. (Appendix A, Document A):

- Type A is bank slope that has an approximately 2H:1V (horizontal to vertical) slope and is vegetated. This section is located at the western most reach and is approximately 250 feet long.
- Type B is bank slope that has an approximately 1H:1V slope and is vegetated. This section is approximately 450 feet long.
- Type C is bank slope that has an approximately 1H:1V slope or steeper and is comprised of exposed sandy soil. This section is approximately 3,250 feet long.

The crest of the bank has retreated at an average 15.2 feet since 1985 ranging from 9–20 feet throughout the approximate 4,000 linear foot range (Epsilon 2016a). Erosion is episodic and caused by various factors including flooding, snow and ice melt, ice scouring, or when a tree with a robust root wad topples.

4.0 ALTERNATIVES

Several alternative courses of action were evaluated for the Merrimack River Bank Stabilization project. The alternatives were evaluated based upon engineering constraints, environmental impacts and available property. Budgetary constraints were considered but were not the controlling factor.

Guidance provided in NEPA section 102(2)(E) and 40 CFR 1508.9 regarding the NEPA provision of an alternative analysis states that an agency must rigorously explore and objectively evaluate all reasonable alternatives and for alternatives which were eliminated from detailed study, briefly discuss the reasons for their elimination. Additionally, a No Action Alternative must be included. This section discusses the No Action Alternative, also known as the “Future without Federal Project Condition”, the feasible Alternatives that would provide for the purpose and need, and the Alternative that was eliminated from full analysis.

4.1 Alternative 1: No Action Alternative

The No Action Alternative would not provide federal action to protect the sewer line at the site. The gravity sewer line would continue to be at risk from continued bank erosion. The sewer line could potentially become exposed as natural erosion continues which would risk failure from the water action. If failure were to occur, raw sewage could potentially leak from the system and contaminate the river, nearby residential area and communities down river.

4.2 Alternative 2: Proposed Alternative: Bioengineering Bank Stabilization

The Bioengineering Bank Stabilization Alternative would stabilize the bank using a mixture of structural components, such as a stone toe, and natural components such as timber, coir rolls (organic revetment that provides erosion control and facilitates the establishment of vegetation), and living vegetation. There are three stabilization techniques proposed for each edge type described in section 3.0 with sub-designs that vary due to slope conditions. See Appendix A – Document B for the full engineering details of bank stabilization. The general slope designs for each edge type include:

- **Bank Support for Edge Type A:** Work would involve installation of timber toe protection and vegetation management, including removal of tree limbs. The approximate height of this treatment would be 3 - 4 feet. Bank Support is proposed for approximately 250 linear feet.
- **Bank Repair for Edge Type B:** Work would involve installation of stone sill along the toe of the slope to 0.5 feet above ordinary high water and placement of soil behind the sill which would establish a shallow slope. One or more coir rolls would be placed on top of the stone sill to hold the soil in place to establish an approximate $\pm 3H:1V$ slope. Stabilization would be achieved through seeding, erosion control blankets, and native shrubs. Typical offset from the toe of slope to the centerline of the stone sill would be approximately 7.5 feet and the offset to the outboard limit of the stone sill would be approximately 14 feet. Bank Repair is proposed for approximately 450 linear feet.
- **Bank Reconstruction for Edge Type C:** Work would involve installation of a stone sill along the toe of slope to approximately 0.5 feet above ordinary high water mark and restoration of the entire slope cross-section with the several rows of coir fiber rolls and fabric wrapped soil cells placed in a step-wise manner to establish a 2:1 slope. Revegetation of the soil cells with native trees and shrubs would provide soil stabilization. The offset from the toe of the slope to the centerline of the stone sill would be approximately 7.5 feet and ranges from 1 to 12 feet. The out board offset of the stone sill is approximately 14 feet and ranges from 7.5. To 18.5 feet. Bank Reconstruction is proposed for approximately 3,250 linear feet.

In all edge type zones, trees on the slope and along the top of the slope in imminent danger of toppling would be removed. Installation of a turbidity barrier (a temporary silt curtain or silt fence that traps turbid water to prevent the transport of suspended sediment outside the work area) off the river edge would create a dry work area along the bank. The silt barrier would be installed first and then the remaining work would be done landward from the barrier and would eliminate the need for water egress points and anchoring locations during construction. Work would occur on approximately 3,950 linear feet of inland bank and approximately 145,250 square feet of riverfront area and bordering land. 59,250 square feet of the 145,205 square feet would occur in waters of the US which includes the turbidity shield installation and an approximately 13 foot wide by 2 foot

deep by 3,700 foot long excavation, approximately 3500 cubic yards. Excavated soils would be reused on-site and augmented by off-site material as needed. Staging of equipment and materials would be located on a small open field on the eastern edge of Wellman Ave (Appendix B Figure C). See Appendix A - Document B for location of work types and engineering plans.

4.3 Alternative 3: Rock Rip Rap

The Rock Rip Rap Stabilization Alternative includes the installation of rock rip rap along the 3,950 linear feet of bank. The rip rap would be installed along the entire 8 to 12 feet of slope after tree and vegetation removal and proper grading. The rip rap would be anchored using filter-fabric and native vegetation. The level of ground disturbance would be approximately the same as in the Proposed Alternative. This Alternative meets the purpose and need by mitigating against bank erosion which would reduce the threat of sewer exposure. The construction cost for the Rock Rip Rap Stabilization Alternative is less than the Proposed Alternative and would have a similar construction methods including landward work and square footage disturbance.

4.4 Alternatives Considered and Dismissed

4.4.1 Sewer Relocation

The Sewer Relocation Alternative involves relocating the sewer line to Wellman Avenue in front of the buildings adjacent to the Merrimack River. This alternative would require constructing approximately 4,250 linear feet of new sewer, replacing approximately 113 sewer services, and modifying the existing pump station to accommodate a deeper sewer invert. This Alternative was dismissed due to the requirements of moving the sewer services from the back of the condominiums to the front. Relocation of sewer services would require two 90 degree bends and would need to be sloped greater than 1% which would increase the likelihood of clogging. Relocation would also increase the pipe length which, coupled with the greater pipe slope, would require the replacement sewer to be deeper than the existing gravity sewer. This would require pump station modifications to accommodate the deeper inlet sewer pipe. Lastly, the cost of the Sewer Relocation Alternative is greater than the Proposed Alternative. Due to the engineering constraints and the increased cost, the Sewer Relocation Alternative was dismissed. Relocation of sewer line to other local collector lines, including under homes and closer to back of the homes would have similar restraints and was also dismissed.

4.4.2 Log Crib Wall

The Log Crib Wall Alternative would install a vertical or sloped log wall with a stone toe foundation. The area would be backfilled with gravel and soil and stabilized with geotextile fabric and native plantings. This alternative would only temporarily meet purpose and need due to timber decay and was therefore dismissed.

4.4.3 Site Specific Repairs

The Site Specific Repair alternative would use the same Rock Rip Rap Stabilization discussed in section 4.3 but would be limited to localized erosion spots instead of the entire length of the bank. This alternative would reduce the risk of sewer line exposure at those spots. However, an uneven bank creates eddies and, coupled with higher energy water movement at one or both ends of the repair, would exacerbate the soil bank erosion adjacent to the repaired end. Therefore, this alternative does not meet purpose and need because it would not provide long term protection against sewer line failure.

4.5 Summary of Alternatives

Six Alternatives were considered by the Town for implementation at the Merrimack River Bank by Wellman Avenue. Three Alternatives, Sewer Relocation, Log Crib Wall and Site Specific Repairs, were dismissed. The remaining Alternatives are:

- 1) No Action Alternative
- 2) Bioengineering Bank Stabilization
- 3) Rock Rip Rap Installation

The following impact analyses evaluate the potential environmental impacts of the three alternatives. A table summarizing the potential impacts of the three alternatives is provided in Section 10, Summary of Impacts.

5.0 AFFECTED ENVIRONMENTAL RESOURCES AND POTENTIAL IMPACTS

This section discusses the potential impacts of the No Action Alternative, the Proposed Alternative, and the Rock Rip Rap Alternative on environmental and cultural resources. The potential cumulative environmental impacts are also discussed in Section 5.11.

When possible, quantitative information is provided to establish potential impacts and the potential impacts are evaluated based on the criteria listed in Table 5.0.1. These impacts listed below will be used for both beneficial and negative impacts.

Table 5.0.1: Impact Significance and Context Evaluation Criteria for Potential Impacts

Impact Scale	Criteria
No Effect	The resource area would not be affected and there would be no impact.

Impact Scale	Criteria
Negligible	Changes would either be non-detectable or, if detected, would have effects that would be slight and local. Impacts would be well below regulatory standards, as applicable.
Minor	Changes to the resource would be measurable, but the changes would be small and localized. Impacts would be within or below regulatory standards, as applicable. Mitigation measures would reduce any potential adverse effects.
Moderate	Changes to the resource would be measurable and have either localized or regional scale impacts. Impacts would be within or below regulatory standards, but historical conditions would be altered on a short-term basis. Mitigation measures would be necessary to reduce any potential adverse effects.
Major	Changes to the resource would be readily measurable and would have substantial consequences on regional levels. Impacts would exceed regulatory standards. Mitigation measures to offset the adverse effects would be required to reduce impacts, though long-term changes to the resource would be expected.

Six environmental resource topics were omitted because they do not apply to the project as covered by this EA.

Table 5.0.2: Eliminated Resource Topics

Topic	Reason
Bedrock	Depth disturbance will occur up to two feet below water line where soil boring showed soil depth to a minimum of 26 feet. Therefore, bedrock will not be impacted since work in all alternatives would not reach that depth.
Air Quality	The project site is located in an area that is in attainment for all six National Ambient Air Quality Standards criteria pollutants. The proposed project would also only produce temporary emissions that would be well below <i>de minimus</i> standards.
Farmland Policy Protection Act	Project site is in in urban development area and is therefore exempt from the Farmland Policy Protection Act.
Safe Drinking Water Act	Project site is not located above a sole source aquifer nor would it impact one.
Coastal Zone Management Act	Project site is not within, nor does work impact coastal management zones.
Coastal Barrier Resources Act	Project site is not within a Coastal Barrier Resource Unit or an Otherwise Protected Area.

Topic	Reason
EO 12699 Seismic Safety	Project site is not in a seismic active area nor would it impact seismic activity.
Wild and Scenic Rivers Act	The Merrimack River is not classified as a Wild and Scenic River nor is there one within or near the project site.

5.1 Soils and Topography

5.1.1 Existing Conditions

The soils at the project area are almost entirely classified as Suncook Loamy Sand with a 0 to 3 percent slope. Winooski Very Fine sandy loam could potentially occur within the project area, however, it is located inland from the shore bank (Appendix A, Figure C). The Suncook series soils consists of very deep, excessively drained sandy soils formed in alluvial sediments. They are located on floodplains that are subject to flooding with a high to very high saturated hydraulic conductivity (USDA 2107). In May 2016, 11 soil borings, ranging in depth from 21 to 26 feet, were performed as part of a geotechnical investigation. The soils encountered included 12 to 24 inches of topsoil, narrowly graded sand with fines below the top soil that extended to depths of 15 to 25 feet, and fine to course sand and gravel beneath reaching to the water layer (Epsilon 2016a).

The topography of the area adjacent to the river banks is relatively flat with a slight elevation change (Appendix A, Figure D). The bank has a slope of 1:2 to 1:1 in most locations ranging in 8 to 12 feet in height due to the erosion in the area.

5.1.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

Soils would not be disturbed nor would the topography change from construction activities. Erosion would likely continue at the site that could wash away soil and change the topography adjacent to the river bank. Therefore, there would be no short term impact to soils and topography and a long term, negative, minor impact to soils and topography.

Alternative 2: Proposed Alternative, Bioengineering Bank Stabilization

The Proposed Alternative would impact soils through the construction of the bioengineered bank. During construction, installation of the coir rolls and stone sill would require 13 foot wide by 2 foot deep excavation from ordinary high water parallel to the river (Appendix A Document C). The excavation would also have approximately 3,600 cubic yards of dredging which would be reused as fill at the site. Construction would start at the eastern end of the bank and the equipment

would move along the placed fill as it constructs the mattress and stone sill to minimize impact to soils.

The Town is coordinating with MADEP to obtain a Section 401 Water Quality Certificate (WQC) Fill Permit to address the potential use of fill from offsite. If outside fill is required, compliance with all regulations in the 401 WQC Fill Permit and Massachusetts USACE General Permit #7 (USACE 2015) is required. Soils would be stabilized through various techniques stated in section 4.2. A Storm Water Pollution Prevention Plan (SWPPP) developed in accordance with an EPA National Pollution Discharge Elimination System (NPDES) General Construction Permit (See section 5.2 Water Quality for more details on NPDES) would be required since more than 1 acre would be disturbed. Best Management Practices (BMPs) would be a condition of the project and include installation of a turbidity barrier, sedimentation control barriers, installation of erosion control blanket on 4:1 exposed slopes or steeper, seeding and mulching of disturbed areas after construction, and areas with anticipated disturbances would be temporarily stabilized with mulch and tackifier, a compound that increases surface adhesiveness. With the implementation of BMPs and compliance with regulations, impacts on soils would have a minor negative impact during construction and a positive minor impact post construction due to the erosion control from bank stabilization.

Topography would be impacted in a similar way as soils from the Proposed Alternative. During construction, slope fill would be removed and replaced as the coir rolls and stone sill is installed. The work would eventually change the slope from 1:1 in most locations to 2:1 to 3:1 slope and preventing further erosion from the stabilization. Therefore, there would be a minor negative impact on topography during construction and a positive minor impact post construction from modification to the 1:1 slope and the addition of bank stabilization.

Alternative 3: Rock Rip Rap

There would be similar impacts to soils and topography from the Rock Rip Rap alternative. Similar dredging and mattress installation would occur but with the installation of rip rap instead of the bioengineered design. Soils would not be as protected from erosion due to the potential loosening of rip rap from conditions that have caused the initial erosion issues. The slope of the topography would be similar to the Proposed Alternative, however, it would not have as much vegetative cover and would not have a uniform look due to the appearance of rip rap. Therefore, the Rock Rip Rap Alternative would have a minor negative impact during construction to both soils and topography and a negligible impact post construction.

5.2 Water Quality

Congress enacted the Federal Water Pollution Control Act in 1948 which was later reorganized and expanded in 1972 and became known as the Clean Water Act (CWA) in 1977. The CWA regulates discharge of pollutants into water with sections falling under the jurisdiction of the U.S

Army Corps of Engineers (USACE) and the EPA. Section 404 of the CWA establishes the USACE permit requirements for discharging dredged or fill materials into Waters of the United States and traditional navigable waterways. Massachusetts, through the Department of Environmental Protection (MADEP), administers Section 401 of the CWA with WQC (314 CMR 9.00) for discharge of dredged materials, dredging, and dredged material disposal in waters of the US. USACE regulation of activities within navigable waters is also authorized under the 1899 Rivers and Harbors Act. Under the NPDES, the EPA regulates both point and non-point pollutant sources, including stormwater and stormwater runoff. Activities that disturb one acre of ground or more require a NPDES permit.

5.2.1 Existing Conditions

The Merrimack River Watershed (United States Geological Survey watershed designation HUC01070002) encompasses 5010 square miles in New Hampshire and Massachusetts; the fourth largest watershed in New England. The river is formed by the confluence of the Pemigewasset and Winnepesaukee River and flows 115 miles to the Atlantic Ocean near Newburyport, MA (EEA 2001). The MADEP classifies the Merrimack as a Class B (freshwater) water system at the project site, which is suitable as drinking water with adequate treatment. Downriver from the site, starting at Haverhill, the water quality is classified as SB (tidally affected), which means the river is expected to support fish, aquatic life and other wildlife and have primary (swimming) and secondary (boating) uses (MRWC 2009). Water quality issues come from combined sewer overflows up river from the site, various nonpoint sources of pollution, and smaller industrial discharges (EEA 2010). These impacts cause increased levels of bacteria and nutrient levels (primarily phosphorus) within the Lower Merrimack River (EPA 2017a).

Over 600,000 residents in Lowell, Methuen, Andover, Tewksbury and Lawrence in Massachusetts and Nashua in New Hampshire use the Merrimack River as a drinking water source (see Section 5.9).

5.2.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

Under the No Action alternative the bank will continue to erode causing silt and debris to wash into the Merrimack River. Erosion could eventually reach the sewer line and cause it to slump and possibly leak. Untreated sewage could enter the Merrimack River further increasing the bacteria and nutrient levels in the water system. Therefore, the No Action Alternative could have a moderate negative impact to water quality from erosion and if the sewer system fails and causes sewage to flow into the river.

Alternative 2: Proposed Alternative, Bioengineering Bank Stabilization

The Proposed Alternative includes dredging of approximately 3,600 cubic yards of soil below ordinary high water, shoreline placement of dredged materials, and the placement of approximately 59,250 sf of fill below ordinary high water line. The Town is required to apply for a WQC under Section 401 of the CWA. In November 2016, they submitted an application for a BRP WW 07 which is a major project certification that results in discharge of dredged material, dredging, or dredged material disposal greater than 100 cubic yards, a BRP WW 10 which is a major project certification for fill and excavation projects in waters of US , and a 401 WQC Fill Permit (Appendix D Correspondence A). The Town has also provided the USACE a Pre-Construction Notification for Massachusetts General Permit No. 7 (Bank and Shoreline Stabilization) in November of 2016 (Appendix D Correspondence B). The applications propose the following mitigation measures to reduce impact to water quality during construction:

- A turbidity barrier in the river around active work areas to contain turbid water and prevent runoff into the Merrimack.
- A “marine mattress” and stone sill to provide a raised work platform on which construction equipment could work to minimize working on river sediments and in the water column.
- Sedimentation control barriers around erodible stockpiled materials
- Erosion control blankets on all exposed slopes of 4:1 or steeper
- Seed and mulch on disturbed areas within a 100-foot buffer zone.
- Temporary stabilization using mulch and tackifier, or erosion control blankets, if additional disturbance is anticipated within 7 to 30 days.

An NPDES permit with a SWPPP may be required since more than one acre would be disturbed. The Town would be required to coordinate with EPA on requirements. The project would reuse dredge material as fill and would not require any additional outside fill. Therefore, the Proposed Alternative would have a negligible impact during construction if all permit requirements, including possible NPDES conditions, are met.

Post construction, the Proposed Alternative would reduce the level of erosion at the bank reducing the amount of sediment that enters the Merrimack River. The bioengineering elements would reduce the level and velocity of stormwater and melt runoff that enters the river as sheet flow over the bank thereby reducing the amount of sediment other contamination carried in surface water runoff conveyed to the river. The sewer line would be protected from possible exposure which would reduce the risk of failure and raw sewage contamination in the river. Any materials used in the construction of the bank would be free of known water contaminants that may violate any CWA permits. As a result, the Proposed Alternative would have a minor positive impact on water quality post construction.

Alternative 3: Rock Rip Rap

The Rock Rip Rap Alternative would have similar impacts as the Proposed Alternative both during and post construction. However, the use of rip rap on the bank would reduce the amount of vegetation and require the removal of all trees in the proposed bank stabilization area. The absence of vegetation could possibly increase the level of stormwater and melt runoff into the Merrimack River. Therefore, the Rock Rip Rap Alternative would have negligible impact to water quality because it would reduce the chance of sewer line exposure but would likely increase runoff rates due to vegetation removal.

5.3 Wetlands and Floodplain

Wetlands are areas which are inundated or saturated by surface or groundwater with a frequency and duration sufficient to support, or under normal hydrological conditions would support, a prevalence of vegetation or aquatic life typically adapted for those soil conditions. Actions that would impact wetlands would require review under several regulatory programs. Federal Executive Order (EO) 11990 and Section 404 of the CWA (33 USC 1344) are designed to protect wetlands. EO 11990 Wetlands Management requires Federal agencies to avoid funding activities that directly or indirectly support occupancy, modification, or development of wetlands, whenever there are practicable alternatives.

A special flood hazard area is defined as an area subject to inundation from a flood that has a 1 percent chance of being equaled or exceeded in any given year - often referred to as the 100-year flood or base flood. EO 11988, Floodplain Management, requires that a Federal agency avoid direct or indirect support of development within the floodplain whenever there is a practicable alternative. FEMA uses Flood Insurance Rate Maps (FIRM) to identify the special flood hazard areas for the National Flood Insurance Program (NFIP).

FEMA uses an eight-step decision-making process to evaluate potential effects on, and mitigate impacts to, wetlands and floodplains to comply with the requirements of EO 11990 and EO 11988. Federal actions within the 100-year floodplain and/or within a federally recognized wetlands, require the Federal agency to conduct an Eight-Step process (Appendix A, Document D). This process, like NEPA, requires the evaluation of alternatives prior to finding the action. FEMA's regulations on conducting the Eight Step process are documented in 44 CFR Part 9.

5.3.1 Existing Conditions

According to the USFWS National Wetland Inventory, accessed 04/18/2017, the river bank along the project area is adjacent to a riverine wetland (Appendix B, Figure F). The project site is located in the 100 year floodplain as mapped by FIRM panel number 25017C01193E dated 06/04/2010 and a floodway (Appendix B Figure G). Any work within a mapped floodway requires compliance with 44 CFR 60.3(d) through a no-rise certification issued by the local floodplain manager. The

no-rise certification is documentation of a determination that the project will not increase the level of floodwaters upstream or downstream. Since flood records have been kept, flooding on the Merrimack River in Massachusetts has seen an increase in the amount of flood crests since 1996 compared to the previous years (NOAA 2015).

5.3.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

Under the No Action Alternative, no work would be done within either the wetland or floodplain. The bank would continue to be susceptible to erosion and the adjacent sewer line could become exposed, slump, and fail due to the erosion. Sewer line failure could contaminate the floodplain and riverine wetlands with raw sewage. Therefore, there would be negligible impact to wetlands and floodplain resources unless sewer line failure occurs. If failure occurs, there would be a moderate negative impact due to erosion runoff and raw sewage contamination.

Alternative 2: Proposed Alternative, Bioengineering Bank Stabilization

Work, including dredging and placing fill, would be conducted within and adjacent to the riverine wetland. The Town is required to apply for and follow all requirements, including implementing all BMPs, within CWA permits (see section 5.2.2 Alternative 2). Post construction, the bank stabilization would reduce erosion rates and runoff from entering the riverine wetland. The project would also mitigate against sewer line failure and reduce the chance of raw sewage contaminating the riverine wetland.

Work would also be conducted within the 100 year floodplain and within a floodway. A joint wetland and floodplain 8-step decision-making process determination was conducted (Appendix A, Document D). The conclusion documented in the 8-step process is that the Proposed Alternative is the best alternative in regards to EO 11988, EO 11990, and 44 CFR part 9. The Town coordinated with the local floodplain administrator and received a no-rise certification on September 12th, 2017.

Post construction, the bank stabilization would reduce erosion and runoff and prevent floodplain degradation including potential contamination from sewer line failure. Bioengineering would restore and preserve the natural and beneficial value served by the floodplain through the use of vegetation. The top elevation of the stone sill would match the water level elevation of the river when the flash boards are raised on the downstream Pawtucket Dam and would otherwise make the riverbank more resilient to flooding events (see section 5.11).

Therefore, the Proposed Alternative would have a negligible impact to wetland and floodplain resources during construction when following all permit requirements and implementing BMPs. Post construction, the Proposed Alternative would have a minor positive impact to wetland and

floodplain resources due to increased erosion and runoff control and mitigation against potential sewer line failure.

Alternative 3: Rock Rip Rap

The Rock Rip Rap Alternative would have identical impact to wetland and floodplain resources due to similar permitting requirements during construction. Post construction, the Rock Rip Rap Alternative would have similar mitigation against sewer line failure, however it would not restore and preserve the natural and beneficial value served by the floodplain due to the use of rocks as erosion control instead of natural vegetation. It would not reduce runoff into the riverine wetland and floodplain as effectively as the Proposed Alternative due to rip raps inability to absorb run off as effectively as bioengineering (Epsilon 2016a). Therefore, the Rock Rip Rap Alternative would have a negligible impact to wetland and floodplain resource when following all permit requirements and implementing BMPs during construction. Post construction, the Rock Rip Alternative would have a negligible impact to wetlands and floodplains due to the reduced runoff mitigation.

5.4 Biological Resources

5.4.1 Wildlife and Fish

The project site is within the Southern New England Coastal Plains and Hills ecoregion (MADFW 2008). This ecoregion is currently dominated by a variety of dry to moderately wet oak forests that gradual transition to oak-pine forests along with some elm, ash, and red maple, which is typical of southern New England's forested wetlands (EPA 2009). Within this ecoregion, Massachusetts Division of Fisheries and Wildlife (MADFW) has designated 273,000 acres as habitat critical for Massachusetts species of conservation concern (MADFW 2008). The project site is adjacent to DFW habitat designation Core 3018A which is defined as habitat featuring Wetland, Aquatic, and Natural forested Communities (MADFW 2012). Within Core 3018A there are 16 wildlife and plant species of state conservation concern (Appendix C Table A). Adjacent to the project site to the south east there is MADFW designated open space (Appendix B Figure H). The project site itself is dominated by pine, oak, Maple, and Beech trees with a brush and fern understory.

The Merrimack River is habitat to diurnal fish species including alewife (*Alosa pseudoharengus*), American eel (*Anguilla rostrate*), American shad (*Alosa sapidissima*), blueback herring (*Alosa aestivalis*), and striped bass (*Morone saxatilis*) during some or all of the species' lifecycle. There is one species of fish protected under the Magnuson Stevens Fisheries Conservation and Management Act, the Atlantic salmon (*Salmo salar*). Efforts to restock the Merrimack, and other rivers, with the Atlantic salmon, through the Atlantic Salmon Restoration Program occurred up until 2013 (NH Fish and Game, 2017). However, there has been no recent occurrence of Atlantic salmon in the vicinity of the project area, but there is still potential for the species to occur. There

is currently no wetland vegetation for fishery habitat along Edge Type C at the project site and is sparse along Edge Type B.

Sturgeon, including both Atlantic and shortnose, also occur in the Merrimack River. However, according to MADFW, both species currently cannot pass the Essex Dam in Lawrence, MA (MADFW 2015a and 2015b). Therefore, sturgeon are not located at the project site, nor impacted from any alternatives, and will not be discussed further.

5.4.2 Invasive Species

EO 13112, Invasive Species, requires federal agencies, to the extent practicable, to prevent the introduction of invasive species, provide for their control, and to minimize the economic, ecological, and human health impacts that invasive species cause. Invasive species prefer disturbed habitats and generally possess high dispersal abilities, enabling them to out-compete native species. Middlesex County currently has 542 species of non-native insects, diseases, plants, and animals (EDD 2017). Middlesex County is within statewide quarantine zones for three invasive species; Emerald Ash Borer, Pine Shoot Beetle, and Euro Gypsy Moth (MANRC 2017).

5.4.3 Protected Species

The Endangered Species Act (ESA) of 1973 provides a program for the conservation of threatened and endangered plants and animals and the habitats in which they are found. The lead Federal agencies for implementing ESA are the USFWS and the National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service. The law requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any listed species or result in the destruction or adverse modification of designated critical habitat of such species. The law also prohibits any action that causes a “taking” of any listed species of endangered fish or wildlife. USFWS’s Information for Planning and Consultation (IPaC) system, accessed on May 1st 2017, reported one federally threatened species, the Northern Long-eared Bat (*Myotis septentrionalis*) (Appendix A Document E). The Northern Long-eared Bat is predominately threatened by white nose syndrome, a fungal disease. The species was listed as threatened in 2015 due to reduced population from the syndrome and in 2016, USFWS issued the 4(d) final ruling in managing the species (USFWS 2016). The species could potentially be found underneath tree bark, in cavities, or in crevices of both live trees and snags at the project site during the summer.

The Bald and Golden Eagle Protection Act (BGEPA) (16 U.S.C. 668-668c), enacted in 1940, prohibits anyone, without a permit issued by the Secretary of the Interior, from "taking" bald and golden eagles, including their parts, nests, or eggs. The law makes it illegal for anyone to possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any eagle, or their parts, feathers, nests, or eggs. “Take” is defined as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities.” USFWS’s IPaC system reported

the presence of Bald Eagles (*Haliaeetus leucocephalus*) in the area (Appendix A Document E), but MADFW reported, through a correspondence with FEMA, that there are no known nests within 2000 feet of the project site.

The Migratory Bird Treaty Act (MBTA) of 1918 provides a program for the conservation of migratory birds that fly through lands of the United States. The lead Federal agency for implementing the MBTA is the USFWS. Like the BGEPA, the law requires Federal agencies to ensure that actions they authorize, fund, or carry out are not likely to jeopardize the continued existence of any migratory birds or result in the destruction or adverse modification of designated critical habitat of such species. The law makes it illegal for anyone to “take,” possess, import, export, transport, sell, purchase, barter, or offer for sale, purchase, or barter, any migratory bird, or their parts, feathers, nests, or eggs. “Take” is defined as “to pursue, hunt, shoot, wound, kill, trap, capture, or collect, or any attempt to carry out these activities.” USFWS’s IPaC system reported 14 migratory birds, not including the Bald Eagle, could potentially occur in the area or be affected by activities in this location (Appendix A Document E).

5.4.4 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

The No Action Alternative would not alter current habitat. Bank erosion would continue to be a risk at the site which could cause habitat loss and tree falls. Though tree fall would remove some habitat for certain wildlife species, it would provide additional habitat for others including both wildlife and fish. Sewer line failure could cause river habitat contamination which could impact the health of river fish and plant species and their predators through toxins from sewage. Invasive species, particularly plant species, could get caught or become disturbed during erosion episodes and potentially spread from the disturbance. Tree fall from erosion could potentially remove nesting and perching habitat for Bald Eagles and remove summer habitat for the Northern Long Eared Bat. Tree toppling could remove some stop-over habitat for the 14 migratory bird species that could occur in the area. Therefore, the No Action Alternative could have a minor negative impact to biological resources due to habitat loss from erosion, the potential spread of invasive species, and river habitat contamination due to sewer line failure.

Alternative 2: Proposed Alternative, Bioengineering Bank Stabilization

The Proposed Alternative would temporarily disturb plant and wildlife habitat during construction through noise creation, undergrowth removal, removal of trees in danger of falling, and work in the water from turbidity barrier installation. Due to the disturbance, it is likely that wildlife in the area would be temporarily displaced during construction. BMPs would be used to reduce impacts to wildlife during construction including compliance with EPA and Occupational Safety and Health Administration (OSHA) noise level requirements (see section 5.8) and minimizing runoff and turbidity within the water (see section 5.2). The equipment will traverse the area where the

bank construction would occur to reduce impact to the land and habitat and no egress or anchorage would occur in the Merrimack River. Post construction, the bank would be planted with native vegetation providing habitat for wildlife on land.

There is potential for habitat loss for fish species, including the Atlantic salmon, within the Merrimack River due to the removal of the natural bank and replacement with a berm/sill at the water line. To mitigate potential loss the Town will revegetate from the top of the slope to restore a densely vegetated riparian habitat along the reach of the river on Type C slopes and maintain the sparse vegetation currently there where feasible. Vegetation along Type A and B slopes will maintain the current vegetation and plant extra native vegetation planted where possible. Over time, the vegetation will likely develop and provide shade and overhanging branches for fish. The face of the stone sill will not be chinked with smaller stones and would therefore leave voids between the larger stones and provide refuge for fish and other aquatic organisms. The Massachusetts Division of Marine Fisheries (MADMF) has issued a time of year restriction for diadromous species from March 15th to July 15th where work in water would not be allowed. The Town is currently coordinating with MADMF to install the turbidity barrier outside the time of year restriction and then do the remaining work year round in the bank side of the barrier. The Town would be required to follow all time of year restrictions and any further agreements from MADMF. An Essential Fish Habitat consultation for the Atlantic salmon, including a NOAA-Trust Resource Impact Assessment for diurnal fish, was sent to NOAA on July 25th, 2017 by FEMA and concurrence was received July 25th, 2017. Therefore, there would be a temporary minor negative impact to wildlife and fish resources from construction and, as long as all BMPs and mitigation measures are implemented, there would be a negligible impact post construction.

During construction, there would be a condition that any woody debris produced on site must be disposed of in compliance with all local, state, and federal regulations, policies and guidelines for transportation and disposal of the potentially contaminated debris as identified by the Massachusetts Department of Conservation and Recreation (DCR), the Massachusetts Department of Agricultural Resources (DAR), the United States Department of Agriculture Animal and Plant Health Inspection Services (APHIS), and the United States Forest Service (USFS). For Emerald Ash Borer, debris disposal measures that include the movement or transport of woody materials, in particular, from within a quarantine area, must be completed by a company or agency that has completed compliance training and is certified by the joint eradication program to perform this work. By complying with restrictions imposed by the Emerald Ash Borer Quarantine, Pine Shoot Beetle and Euro Gypsy Moth quarantine restrictions will be adhered to as well. Post construction, plantings would be done with native plants to reduce the chance of non-native and invasive plant species from spreading. Therefore, there would be a negligible impact to the spread of invasive species as long as quarantine zone debris regulations, policies, and guidelines are followed.

Due to the possible presence of the Northern Long-eared Bat and the removal of potential habitable trees, FEMA consulted with USFWS using the Rule 4(d) consultation form on March 27th 2017

(Appendix D Correspondence C) for the Proposed Alternative. FEMA had not received concurrence within thirty days and has therefore, as allowed, assumed concurrence. Construction would be required to follow USFWS's National Bald Eagle Management Guidelines (USFWS 2007) which requires a work buffer of 660 feet from any nest and avoidance of overstory trees within 330 feet of any nest. There are no known nests in or near the project site, however, if a nest is discovered within 660 feet of site, work must stop and the Town would consult with FEMA and USFWS. Migratory birds would be temporarily disturbed during construction but would likely find alternative habitat nearby. Post construction, most trees would remain and native vegetation would be planted providing potential habitat for the Northern Long-eared Bat, Bald Eagle, and migratory birds. Therefore, impacts to protected species would be negligible as long as all conditions and BMPs are followed.

Alternative 3: Rock Rip Rap

The Rock Rip Rap Alternative would have similar impacts as the Proposed Alternative with two exceptions. The Rock Rip Rap Alternative would require the removal of all trees within the project foot print to install the rip rap. This would remove habitat for wildlife, including protected species and would create a greater amount of woody debris increasing the chance of invasive species spread. There would be habitat for fish species within the space of the rocks, however, there would be no overhanging vegetation for shade and habitat. The Rock Rip Rap Alternative would also not have the benefit of a bioengineering which would reduce the amount of habit and native plants available post construction. Therefore, the Rock Rip Rap Alternative would have a minor negative impact to biological resources.

5.5 Cultural Resources

As a Federal agency, FEMA must consider the potential effects of its funded actions upon cultural resources prior to engaging in any undertaking. There are several laws a federal agency must take into account when working with and identifying cultural resources. For the Chelmsford project, FEMA was required to meet this obligation through the National Historic Preservation Act of 1966, as amended (NHPA). Section 106 of the NHPA, as implemented by 36 CFR Part 800, outlines the required process for Federal Agencies to consider a projects effects to historic properties. The NHPA defines a historic property as “any prehistoric or historic district, site, building, structure, or object included in, or eligible for inclusion on the National Register.”

The Massachusetts State Historic Preservation Office (SHPO) maintains a database of cultural resources called the Massachusetts Cultural Resource Information System (MACRIS), which includes both standing structures and objects as well as archaeological sites).

5.5.1 Existing Condition

Historic Properties

According to the MACRIS database there are 70 buildings or structures that have been assessed for the NRHP within 1-mile of the Area of Potential Effect (APE), including 4 inventoried areas or historic districts: the North Chelmsford Residential District, the Lowell-Dracut-Tyngsboro State Forest, the Eastern Pawtucketville Commercial/Residential District, and Tyng Mansion.

There are also four properties in the Town of Chelmsford listed in the National Register of Historic Places (NRHP), however, none of these properties are within the vicinity of the APE.

Neither the properties listed in MACRIS nor NRHP-listed properties will be affected either directly or indirectly by this undertaking. There are no standing structures within the construction area. The closest property to the APE is the Wellman Avenue apartment/townhouse complex that was originally constructed in the 1980s.

Archeological Resources

After reviewing the MACRIS database and other relevant information sources FEMA staff determined that the project area possessed a high potential for archaeological resources and initiated consultation with the (SHPO) as well as the Massachusetts Board of Underwater Archaeological Resources (BUAR). As a result of these consultations, FEMA and its consulting parties determined that an intensive (locational) archaeological field survey would be required (Appendix D). During this process FEMA and the applicant also initiated consultation with federally recognized tribes with an area of interest associated with this undertaking: Mashpee Wampanoag Tribe and the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts. The tribes did not raise any specific concerns as part of this early consultation. Public Archaeology Laboratory, Inc. (PAL) was hired to conduct the intensive (locational) archaeological survey and completed the survey during the summer of 2017.

PAL identified two archaeological sites during its survey: a historic period foundation associated with a defunct utility system, and what PAL designated the “Wellman Avenue Site” which dates to the pre-contact period. PAL recommended, based on the findings of the survey that Wellman Avenue Site be considered eligible for the NRHP.

FEMA reviewed the Technical Report completed by PAL, determined that it concurred with PAL’s findings and the recommendations, and re-initiated consultation with the SHPO, BUAR, and Tribes. FEMA initially reached out to both the Mashpee Wampanoag Tribe and the Wampanoag Tribe of Gay Head (Aquinnah) of Massachusetts by phone and email in October and followed the this initial outreach with an official consultation letter in November 2017. FEMA determined that the project as designed would not directly affect any NRHP eligible resources,

including the Wellman Avenue Site, but determined that project conditions would be necessary to ensure that no inadvertent damage to historic properties occurred. As such, in a letter dated November 13, 2017, FEMA recommended project conditions including the avoidance of the Wellman Avenue Site and Archaeological Monitoring during all work in the vicinity. SHPO and the BUAR concurred with these recommendations, the tribes did not provide FEMA with an official response.

5.5.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

Potential impacts to standing structures would be at the Wellman Village/Williamsburg I and II neighborhood, to which the sewer line serves. The development was built in 1984 with expansion in 1991, and is not potentially historic and therefore no impact to historic structures would occur.

The Wellman Avenue Site could be susceptible to erosion and damage and/or total loss if bank degradation continues. The No Action alternative could have a moderate negative impact to archaeological and cultural resources associated with bank erosion.

Alternative 2: Proposed Alternative, Bioengineering Bank Stabilization

No impact to historic structures is expected as a result of the proposed construction work and post construction due to the fact that there are no historic structures in or near the APE.

Provided that all conditions developed during the NHPA consultation are followed there should be no effect to the Wellman Avenue Site or any other historic property or cultural resources during construction. Therefore, construction would have a negligible impact on cultural resources. However, following construction the site would be protected from damage or loss associated with bank erosion. As such, following construction there would be a minor positive impact to cultural resources.

Alternative 3: Rock Rip Rap

Impacts to Alternative 3 would be the same to the Proposed Alternative due to similar work and ground disturbance activities. All conditions associated with Alternative 2 would also apply to work completed under Alternative 3.

5.6 Socioeconomic Resources – Environmental Justice

5.6.1 Existing Conditions

EO 12898, Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations, requires agencies to identify and address disproportionately high and adverse

human health or environmental effects its activities may have on minority or low income populations. In Massachusetts, a community is recognized as an Environmental Justice (EJ) community by the following (MADEP 2017):

- Block group whose annual median household income is equal to or less than 65 percent of the statewide median (\$62,072 in 2010); or
- 25% or more of the residents identifying as minority; or
- 25% or more of households having no one over the age of 14 who speaks English only or very well - Limited English Proficiency (LEP)

In order to provide context for this report a demographic analysis was undertaken of the project area, which is completely in Census Tract 3173.02 – Block Group 3. According to the 2010 Decennial Census (Appendix C Table B) there is a population of 1,487 people within the project site census tract. Of that population 80 percent are white, 2 percent are Black, 14 percent are Asian, and 1 percent other. The American Community Survey (Appendix C Table C) shows the median family income within Census Tract 3173.02 estimated at \$104,556 between 2010 and 2015. The Massachusetts Environmental Justice Mapper (Appendix B Figure I) shows that Census Tract 3173.02 – Block Group 3 is not a LEP population. Therefore there are no EJ communities within or adjacent to the project site.

Down river from the project site there are communities designated as minority, minority and low income, and all three (minority, income, and LEP) (Appendix B Figure I). Therefore, there are EJ communities that could be impacted by the alternatives through runoff and other materials flowing down river.

5.6.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

There would be no disproportionate impact to EJ communities from any construction work due to no undertaking, however, erosion could continue at the site causing soils and debris to flow down river. Under the No Action Alternative, the sewer line could potentially fail and cause raw sewage to flow down the Merrimack River towards the EJ communities bordering the river. This could potentially contaminate the river water that those communities may use, for recreational or other purposes, exposing them to pathogens and other health hazards that could be in raw sewage. Therefore, there could be a negative moderate impact to EJ communities, in the event of sewer line failure and a negligible impact from erosion.

Alternative 2: Proposed Alternative, Bioengineering Bank Stabilization

Construction would cause a temporary impact to land use by residents in Census Tract 3173.02 – Block Group 2 (see section 5.7) and would not impact any down river communities as long as

proper BMPs are used (see section 5.2). Since Census Tract 3173.02 – Block Group 2 is not an EJ community, there would be no construction impacts to EJ resources. Post construction, the bioengineered bank would reduce erosion rates and runoff from the project site. The project would reduce the chance of sewer line failure preventing raw sewage contamination from flowing down river towards EJ communities. Therefore, there would be a minor positive impact to EJ communities and no disproportionate impact, from reduced erosion and runoff from site and mitigation against sewage contamination.

Alternative 3: Rock Rip Rap

The Rock Rip Rap Alternative would have similar impacts as the Proposed Alternative with the exception of reduced runoff mitigation due to the hard rock stabilization not absorbing runoff as well as the bioengineered surface. Therefore, there would be a minor positive impact to EJ communities though there would be more potential runoff from the site than in the Proposed Alternative.

5.7 Land Use

5.7.1 Existing Conditions

The project site is located within two zoning districts within the Town of Chelmsford (Appendix B Figure J). The majority of the project is located within an 82 acre property that contains a 535-unit condominium complex zoned as “Residential Multifamily”. The eastern end of the project site is zoned as “Public District”, which are lands owned or leased by federal, state, or municipal district. This zone is used as natural space and fields for the adjacent Lighthouse School. (Chelmsford 1998).

The Merrimack River, along the project site banks, is used primarily for recreational purposes including fishing and paddle boating. Residents of the condominium complex typically access the river at various ad hoc locations along the bank within the Residential Multifamily zone. Other members of the public typically access the river in the area zoned as Public District. There are no official access points to the river; access points have been created by the local population.

5.7.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

Under the No Action alternative, the bank would continue to erode and ad hoc river access points would continue to be modified as deemed necessary by recreational users. If riverbank erosion led to sewer line failure, sewage could contaminate river access points and prevent recreational use over a short period of time. Therefore, there would be a minor negative impact to land use from continued erosion and possible contamination.

Alternative 2: Proposed Alternative, Bioengineering Bank Stabilization

During construction, the Proposed Alternative would reduce access to the river bank and, a turbidity shield in the river along the length of the project site would effectively prevent access into, or from, the river. Post construction, access points would be built into the bank to allow continued access to the Merrimack River in the form of paths. The project would also mitigate against sewer line failure which would also help to maintain safe recreational use of the river. Therefore, there would be a temporary minor negative impact to land use and a long term minor positive impact.

Alternative 3: Rock Rip Rap

The Rock Rip Rap Alternative would have similar impacts as the Proposed Alternative. Therefore, the Rock Rip Rap Alternative would have a minor negative impact during construction and negligible impact post construction to land use with reduced river access.

5.8 Noise

5.8.1 Existing Conditions

The project site is located within a residential area with public space and a small commercial district adjacent (See Section 5.7). The largest noise generator in the area is traffic along route 3A, which typically peaks at 70 to 80 weighted decibels (dBA) and average sound level (Ldn) of 45 dBA (2003 FHA). The town of Chelmsford requires that all sound-amplifying equipment, including construction equipment, is not be audible for a distance excess of 300 feet and not to be operated with 100 yards of hospitals, nursing homes, public housing for elderly, schools, and churches without prior approval from the Police Chief (1973 Chelmsford).

5.8.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

There would be no construction activity, and therefore no noise generation from equipment from the No Action Alternative. Noise levels could increase from emergency repair vehicles if sewer line fails but would remain under EPA and OSHA limits. Therefore there would be no impact to noise levels unless sewer line fails, then a short term minor negative impact would occur from emergency repair noises.

Alternative 2: Proposed Alternative, Bioengineering Bank Stabilization

The Proposed Alternative would create increased short term noise levels from construction activities. All construction activity would follow EPA, OSHA, and local town ordinances to minimize sound exposure and ensure noise levels would not cause impairment and permanent

damage. Post construction, noise levels would return to pre-construction levels and reduce the possibility of emergency repair noise. Therefore, the Proposed Alternative would have a minor temporary impact to noise levels and no impact long term.

Alternative 3: Rock Rip Rap

The Rock Rip Rap Alternative would have the same impact as the Proposed Alternative due to the similar level of construction work and post work mitigation.

5.9 Infrastructure, Health, and Safety

5.9.1 Existing Conditions

The project site is located within a residential area (see Section 5.7) with Wellman Ave as the main means of egress and ingress at route 3A (Appendix B – Figure A). The last traffic count by the Massachusetts Department of Transportation (MADOT) at the Wellman Ave intersection at Route 3A counted 3,467 vehicles in one day. The last monthly traffic count on Wellman Ave had a count of 13,665 vehicles.

The Town of Chelmsford, along with many municipalities on the river, draws water from gravel-packed wells (CDW 2017). Sewer collection service, including the at-risk sewer line in the project area, is provided by the town of Chelmsford Sewer Division. Sewage is treated at the Lowell Wastewater Facility (Section 3.0). Electricity is provided by National Grid or Constellation Energy through the Chelmsford Choice Program using a combination of underground and above ground lines (Chelmsford 2015). Natural gas is provided by National Grid through underground lines.

The Wellman Ave residential area is within the Chelmsford Police Department coverage area. The Chelmsford Fire Department provides emergency services and fire protection. Lowell General Hospital is the primary emergency health care facility for the Wellman Ave residential area.

5.9.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

Under the No Action Alternative, construction activity would not occur and would not cause any interruption to traffic patterns, utilities, and emergency services. Sewer failure could be a potential health risk to the Wellman Ave residential area and communities down river. Emergency crews would likely be needed to repair the failed sewer line using emergency services and adding a small increase in traffic load on Wellman Ave. Some Wellman Ave residents would be without sewer utilities until the line is repaired. Therefore, there would be no impact to infrastructure, health, and safety resources unless the sewer line fails. If the sewer line fails there would be a moderate negative temporary impact to infrastructure, health, and safety resources.

Alternative 2: Proposed Alternative, Bioengineering Bank Stabilization

During construction there would be a slight increase in traffic from construction vehicles and workers leaving and entering the project site. It is unlikely that utilities would be shut down during construction work. Since the project is within a residential neighborhood, emergency service personal presence would likely not be required, though police presence may be required per local ordinance. Post construction, there would be no increase in traffic since project would not encourage growth (see section 5.3). The Proposed Alternative would reduce the risk of sewer failure and therefore reduce the need for utility outage and emergency work. Therefore, there would be a minor positive impact to infrastructure, health, and safety resources during and post construction.

Alternative 3: Rock Rip Rap

The Rock Rip Rap Alternative would have similar impacts the infrastructure, health, and safety resources and will therefore have a negligible impact during and post construction.

5.10 Hazardous Materials

Hazardous materials and wastes are regulated under a variety of federal and state laws, including 40 CFR Part 260, the Resource Conservation and Recovery Act (RCRA) of 1976 (42 USC 6901 et seq.), Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (42 USC 9601 et seq.), Solid Waste Act, the Toxic Substances Control Act, and the Clean Air Act of 1970 (42 USC 7401 et seq.). OSHA standards under the Occupational Safety and Health Act seek to minimize adverse impacts on worker health and safety (U.S. Department of Labor no date). Evaluations of hazardous substances and wastes must consider whether any hazardous material would be generated by the proposed activity and/or already exists at or in the general vicinity of the site (40 CFR 312.10). If hazardous materials are discovered, they must be handled by properly permitted entities. Solid waste management is regulated under Massachusetts 310 CMR 19.000 by MADEP.

5.10.1 Existing Conditions

Soil boring samples were testing for volatile and semi volatile organics, petroleum hydrocarbons, metals, inorganic, and miscellaneous contamination (Epsilon 2016). None of the samples returned significant levels of hazardous and toxic waste. A search of the EPA Enviromapper (EPA 2017d) showed no superfund sites located within half a mile of project site. There is one registered RCRA waste producer located adjacent to project site (Courier North Chelmsford) and forty others within half a mile (Appendix C Table D). Domestic sewage is not regulated under RCRA (Fed Center 2017) but it is regulated as a pollutant under the CWA (see section 5.2), therefore it will no longer be discussed in this section. There is dumped waste within the bank that has been exposed by erosion, including metal and machinery waste.

5.10.2 Potential Impacts and Proposed Mitigation

Alternative 1: No Action

Under the No Action alternative, no construction work would be conducted and therefore no hazardous materials would be introduced to the site. There is potential for non-point hazardous waste to enter the Merrimack River due to the continued erosion (see section 5.2). There is also the potential for buried waste to come loose from the continued erosion as well. If hazardous materials are within the buried waste it could potentially contaminate the Merrimack. Therefore, the no action alternative could have a minor negative impact from hazardous waste.

Alternative 2: Proposed Alternative, Bioengineering Bank Stabilization

During construction of the Proposed Alternative any solid and hazardous waste produced or removed, including dumped waste, from site would be managed by MADEP permitted haulers and facilities. If dumped waste cannot be removed, burial must be done in accordance to 310 CMR 30. The discovery of Hazardous waste is not expected at the site, however, if any is found, work is to stop and FEMA and MADEP are to be notified to ensure proper management of materials. Construction equipment and any hazardous materials will comply with all EPA and OSHA regulations, including BMPs (see section 5.2), to ensure contamination does not occur. Construction activities are not expected to interfere with regulated RCRA materials producers adjacent or within the vicinity of the project site. None of the permanent materials used in the construction of the bank would contain hazardous materials. Post construction, the bioengineered bank would reduce non-point source pollution, including potential non-point hazardous waste, from entering the Merrimack River (see section 5.2). Therefore, there would be a negligible impact from hazardous waste both during and post constructions as long as all BMPs are followed.

Alternative 3: Rock Rip Rap

The impact from the Rock Rip Rap Alternative would be similar to the Proposed Alternative with the exception of reduced runoff control. Therefore there would be a negligible impact from hazardous waste both during and post construction as long as all BMPs are followed.

5.11 Cumulative Impacts

In accordance with NEPA, this EA considers the overall cumulative impact of the Proposed Alternative and other actions that are related in terms of time or proximity. According to the Council of Environmental Quality (CEQ) regulations, cumulative impacts represent the “impact on the environment which results from the incremental impacts of the action when added to other past, present, and reasonably foreseeable future actions, regardless of what federal agency (federal or non-federal) or person undertakes such other actions. Cumulative impacts can result from

individually minor but collectively significant actions taking place over a period of time” (40 CFR 1508.7).

Cumulative impacts are those impacts “... which result from the incremental impact of the action when added to other past, present and reasonably foreseeable future actions...” (40 CFR 1508.7). In the context of evaluating the scope of a proposed action, direct, indirect and cumulative impacts must be considered.

In addition to NEPA, other statutes require federal agencies to consider cumulative impacts. These include the Clean Water Act section 404 (b) (1) guidelines; the regulations implementing the conformity provisions of the Clean Air Act; the regulations implementing Section 106 of the NHPA; and the regulations implementing section 7 of the ESA.

The Town of Chelmsford is currently under taking several public works projects before, during, and after the Merrimack River Bank Stabilization project. These include construction of a new DPW facility and Salt Shed, New Fire Station, and upgrades to schools including South Row, Parker, McCarthy and the High School (Chelmsford 2017). The proposed alternatives would have no impact any of these projects, nor would they have any impact to any alternatives due to locations and project types. Since projects would not impact each other there would be no cumulative impacts to environmental and cultural resources.

There is one federally funded project down river from the project site, at the Pawtucket dam, that may cause cumulative impacts to environmental and cultural resources. Boott Hydropower Inc is replacing an existing 5 foot high wooden flash board system on the Pawtucket Dam with an identical height Pneumatic crest gate system. As compared to the wooden flashboard system and the interim modification, the proposed pneumatic crest gate system would maintain more stable water level elevations at 92.2 feet North American Vertical Datum 1988 during normal operations and 93.2 feet North American Vertical Datum 1988 during high flow conditions (FERC 2011). It is predicted that the water level would normalize up river and could impact the project alternatives due to the change in water elevation. The Proposed Alternative has been designed with the expectation that the water level would be normalized as estimated by Boott Hydropower Inc (Appendix A Document A). Therefore, there would be negligible impact to the Merrimack River Bank Stabilization project from the Pawtucket Dam project. Since the water levels will be normalized at the bank, the resources analyzed in this EA would not have any extra impacts due to the cumulative impacts between of these projects. There are no other projects that could directly or indirectly impact the Merrimack River Bank Stabilization project and environmental resources.

6.0 PERMITS AND PROJECT CONDITIONS

The Town is responsible for obtaining all applicable Federal, State, and local permits and other authorizations for project implementation prior to construction and adherence to all permit conditions. Any substantive change to the approved scope of work will require re-evaluations by FEMA for compliance with NEPA and other laws and EOs. The Town must also adhere to the following conditions during project implementations and consider the below conservation recommendations. Failure to comply with grant conditions may jeopardize Federal funds:

1. Submit a Notice of Intent to the USEPA regarding the National Pollution Discharge Elimination System Construction General Permit and Stormwater Pollution Prevention Plan.
2. Adhere to all conditions within the USACE Individual Permit to be issued for the Project.
3. Adhere to all requirements under the Massachusetts Department of Environmental Protection for Water Quality Certification per Section 401 of the Clean Water Act; requirements include Major Dredge Project Certification (BRP WW 07), Major Fill/Excavation Project Certification (BRP WW10).
4. Adhere to time-of-year restrictions for work in the river and any further conditions from MADMF and NOAA regarding diadromous species and Atlantic salmon.
5. Dispose of woody debris produced on-site in compliance with all local, state, and federal regulations, polices and guidelines for transportation and disposal of potentially contaminated debris (e.g. Asian Long-horned beetle, Emerald Ash Borer) as identified by the Massachusetts DCR, DAR, APHIS, and USFS.
6. Stop work to consult with FEMA and USFWS if a Bald Eagle nest is discovered within 660 feet of the project site. All conditions within the USFW National Bald Eagle Management Guidelines shall be followed.
7. Avoid any inadvertent ground disturbance (e.g., equipment access along the top of the embankment, tree removal) within the vicinity of any known archaeological site.
8. An archaeological monitor is required during all ground disturbing activities in the vicinity of a known archaeological site
9. Updated Design Plans showing the areas of avoidance shall be completed and submitted to FEMA for review prior to the start of any ground disturbing activity
10. In the event of the discovery of archaeological deposits (e.g. Indian pottery, stone tools, shell, old house foundations, old bottles) the Town and their contractor shall immediately stop all work in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. The Town and their contractor shall secure all archaeological discoveries and restrict access to discovery sites. The Town shall immediately report the archaeological discovery to MEMA (David Woodbury, 508-820-2034) and the FEMA Regional Environmental Officer (David E. Robbins, 978-914-0378); FEMA will determine the next steps.

11. In the event of the discovery of human remains, the Town and their contractor shall immediately stop all work in the vicinity of the discovery and take reasonable measures to avoid or minimize harm to the finds. The Town and their contractor shall secure all human remains discoveries and restrict access to discovery sites. The Town and their contractor shall follow the provisions of applicable state laws, including Massachusetts General Laws Chapter 38, section 6 (Discovery of skeletal remains likely to be Native American); Chapter 9, sections 26A (State archaeologist; duties; reservation of lands from sale; cooperation of governmental agencies) & 27C (Projects; notice; adverse effect; review); and Chapter 7, section 38A (Skeletal remains; preservation; excavation; analysis), or any amendments or supplanting laws and regulations. Violation of state law will jeopardize FEMA funding for this project. The Town will inform the Office of the Chief Medical Examiner (Henry Niels, 617-267-6767), the State Archaeologist (Brona Simon, 617-727-8470), MEMA (David Woodbury, 508-820-2034), and the FEMA Regional Environmental Officer (David E. Robbins, 978-914-0378). FEMA will consult with the SHPO and Tribes, if remains are of tribal origin. Work in sensitive areas may not resume until consultation is completed and appropriate measures have been taken to ensure that the project is in compliance with the National Historic Preservation Act.
12. Solid and hazardous waste produced or removed, including dumped waste, from the site shall be managed by MADEP permitted haulers and facilities. If dumped waste cannot be removed, burial must be done in accordance to 310 CMR 30.

7.0 AGENCY COORDINATION AND PUBLIC INVOLVEMENT

An Environmental Notification Form was submitted by the Town to the Massachusetts Executive Office of Energy and Environmental Affairs in accordance to the Massachusetts Environmental Policy Act on August 31st 2016. The Town also submitted an application package for water quality certification under Section 401 of the CWA to MADEP on November 16th, 2016. They also submitted a pre-construction notification in accordance with Massachusetts General Permit number 7 – Bank Stabilization to the USACE on November 22nd 2016. A 20 day Public Notice for the section 401 water quality certification was posted on September 15th, 2016 and on April 25th 2017 for the pre-construction notification. Public Meetings were held at the project site on September 12, 2016 conducted by the MEPA office as part of the ENF review process; and at the Chelmsford Town Hall on December 6th and 20th 2016 conducted by the Chelmsford Conservation Commission as part of the Wetlands Protection Act and Chelmsford Wetland Protection By-Law review process.

This EA will be made available for agency and public review and comment for a period of 15 days. The public information process will include a public notice with information about the proposed action in the Lowell Sun. The EA will also be made available for download at <http://www.townofchelmsford.us/174/Public-Works>.

A hard copy of the EA will be available for review at the following location(s):

Chelmsford Town Hall
50 Billerica Road
Chelmsford, MA 01824

FEMA will send notifications of the EA to the following agencies:

Massachusetts Emergency Management Agency
400 Worcester Road
Framingham, MA 01702

United States Army Corp of Engineers
696 Virginia Road
Concord, Massachusetts 01742-2751

United States Fish and Wildlife Service
70 Commercial Street, Suite 300
Concord, New Hampshire 03301

United States Environmental Protection Agency
5 Post Office Square
Suite 100

Boston, MA 02109-3912

Interested parties may request an electronic copy of the EA by emailing FEMA at Fema-r1ehppubliccomments@fema.dhs.gov. This EA reflects the evaluation and assessment of the federal government, the decision maker for the federal action; however, FEMA will take into consideration any substantive comments received during the public review period to inform the final decision regarding grant approval and project implementation. The public is invited to submit written comments by emailing Fema-r1ehppubliccomments@fema.dhs.gov or via mail to:

FEMA Region I EHP

99 High St, Floor 6

Boston, MA 02110

Attn: Merrimack River Bank Stabilization EA Comments.

If no substantive comments are received from the public and/or agency reviewers, the EA will be adopted as final, and FEMA will issue a FONSI. If FEMA receives substantive comments, it will evaluate and address comments as part of the FONSI documentation or in a final EA.

8.0 CONCLUSION

FEMA, through NEPA, has found that the Proposed Alternative to construct a bioengineered bank along the Merrimack River would not significantly impact the human environment. The EA evaluated resources that could potentially be significantly impacted. The evaluation resulted in identification of no unmitigated significant impacts associated with resources of soils and topography, water quality, wetlands and floodplains, biological resources, cultural resources, socioeconomic resources, land use and planning, noise, infrastructure, health and safety, and hazardous materials. Obtaining and implementing permit requirements and with appropriate BMPs and mitigation measures would avoid or minimize any impacts associated with the alternatives considered in this EA to below the level of a significant impact. The Town and local community would benefit from the bioengineered bank for erosion reduction and sewer line protection. If no substantive comments are received, or significant impact identified during the public comment period, it is recommended issuing a FONSI for the Proposed Alternative.

9.0 LIST OF PREPARERS

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Mary Shanks, Historic Preservation Specialist

Kathryn Emmitt, Historic Preservation Specialist

David E. Robbins, Regional Environmental Officer

10.0 SUMMARY OF IMPACTS

Section	Area of Evaluation	Alternative 1: No Action	Alternative 2: Proposed Action: Bioengineering Bank Stabilization	Alternative 3: Rock Rip Rap
5.1	Soils and Topography Agency: USDA	Minor negative impact to soils and topography from continued erosion.	There would be short term minor negative impact during construction that would be mitigated through BMPs that include using temporary stabilization with mulch and trackifer, turbidity barrier, sedimentation control barriers, erosion control blanket, marine mattress, and seeding and mulching of disturbed areas. Post construction, there would be a minor positive impact due to improved erosion control.	Rock Rip Rap installation would have similar impacts as the Proposed Action during construction. Post construction there would be a negligible positive impact due to reduced erosion protection from loose rip rap and topography would not have a uniform look.
5.2	Water Quality Agencies: USACE, EPA, and MADEP	Moderate negative impacts could occur due to erosion and sewer line failure causing sewage to flow in the river.	During construction there would be negligible impact to water quality if all BMPs listed in section 5.1 are followed. After construction, there would be a minor positive impact due to reduced erosion, sewer line protection, and reduced stormwater runoff velocity.	Impacts would be similar to the Proposed Action during construction. Post construction there would be a negligible impact to water quality due to increased removal of vegetation increasing potential stormwater and melt runoff.

Section	Area of Evaluation	Alternative 1: No Action	Alternative 2: Proposed Action: Bioengineering Bank Stabilization	Alternative 3: Rock Rip Rap
5.3	<p>Wetlands and Floodplain</p> <p>Agencies: USACE, EPA, and FEMA</p>	<p>Moderate negative impacts would occur due to sewer line failure contaminating wetland and floodplain resources</p>	<p>There would be a negligible impact to wetland and floodplain resources during construction when BMPs and any floodplain and floodway manager requirements are followed. Post construction there would be a minor positive impact to wetland and floodplains due to increased erosion and runoff control and mitigation against potential sewer line failure.</p>	<p>The Rock Rip Rap alternative would have similar impacts during construction as Proposed Action. Post construction, the project would have a negligible impact to wetland and floodplain resources due to reduced ability to control erosion and runoff from Proposed Action but will still reduce compared to the No Action.</p>
5.4	<p>Biological Resources</p> <p>Agencies: USFWS, NOAA, MADEP, MADCR, and MADFW</p>	<p>Minor negative impacts due to potential habitat loss from erosion, the potential spread of invasive species, and river habitat contamination due to possible sewer line failure.</p>	<p>There would be a temporary minor negative impact to fish and wildlife due to temporary displacement of habitat. Long term, there would negligible impact to fish and wildlife as long as all BMPs and mitigation measures are implemented.</p> <p>There would be a negligible impact to the spread of invasive species as long as quarantine zone debris regulations, policies, and guidelines are followed.</p> <p>Impacts to protected species would be negligible due to the remaining trees and native vegetation plantings.</p>	<p>There would be similar impacts as the Proposed Action with the exception of the removal of all trees would reduce habitat for fish, wildlife, and protected species. Therefore, there would be a minor negative impact to biological resources.</p>

Section	Area of Evaluation	Alternative 1: No Action	Alternative 2: Proposed Action: Bioengineering Bank Stabilization	Alternative 3: Rock Rip Rap
5.5	Cultural Resources Agencies: MHC	There could be a moderate negative impact to archeological resources from erosion.	Following the conditions imposed in Section 5.5.2, there would be a negligible impact to archaeological resources during construction and a positive minor impact post construction in the form of erosion control as long as all BMPs are used.	Impacts to Alternative 3 would be the same to the Proposed Alternative due to similar work and ground disturbance activities.
5.6	Socioeconomic – Environmental Justice Agencies: EPA	There would be moderate negative impact to EJ communities from erosion. In the event of a sewer line failure there could be a negative minor impact from raw sewage exposure.	There would be a minor positive impact to EJ communities and no disproportionate impact, from reduced erosion and runoff from site and mitigation against sewage contamination.	The impacts to EJ communities would be similar to Proposed Action and have a minor positive impact, though there would be more potential for runoff due to rip rap.
5.7	Land Use and Planning	There would be a minor negative impact from continued erosion and possible contamination reducing access to recreation use and limit residential zoning capabilities.	Land use would have a negative temporary impact from construction disruptions and a minor positive impact long term due to bank stability and sewer line protection	The Rock Rip Rap Alternative would be similar to the Proposed Alternative with the exception of a limited water access due to the rip rap.
5.8	Noise Agencies: EPA and OSHA	There would be no impact to noise levels unless sewer line fails, then a short term minor negative impact would occur from emergency repair noises.	There would be a temporary negative impact from construction noise and no impact long term.	Alternative 3 would have similar impacts at Proposed Action.

Section	Area of Evaluation	Alternative 1: No Action	Alternative 2: Proposed Action: Bioengineering Bank Stabilization	Alternative 3: Rock Rip Rap
5.9	Infrastructure, Health, and Safety Agencies: MADOT	There would be a moderate negative temporary impact from sewer line failure that would cause health issues in the Merrimack and may require emergency response	The Proposed Alternative would reduce the risk of sewer failure and therefore reduce the need for utility outage and emergency work. Therefore, there would be a negligible impact to infrastructure, health, and safety resources during and post construction.	Alternative 3 would have similar impacts at Proposed Action.
5.10	Hazardous Materials Agencies: EPA, OSHA, and MADEP	If hazardous materials are within the buried waste it could potentially contaminate the Merrimack. Therefore, the no action alternative could have a minor negative impact from hazardous waste.	There would be a negligible impact from hazardous waste both during and post constructions as long as all BMPs are followed and all laws and regulations are followed for any potential hazardous waste management.	Alternative 3 would have similar impacts at Proposed Action with the exception of reduced runoff control.

11.0 REFERENCES

Chelmsford, Town of (Chelmsford)

1973 “Town of Chelmsford, MA Code: Chapter 100: Noise” <http://ecode360.com/8273932>

1998 “Town of Chelmsford, MA Code: Chapter 195: Zoning” <http://ecode360.com/29363180>

2015 “Chelmsford Choice to Deliver Electricity Price Stability and Savings for Residents and Businesses” <http://www.townofchelmsford.us/AgendaCenter/ViewFile/Item/666?fileID=1295>

2017 “Chelmsford Current Projects” <http://www.townofchelmsford.us/196/Current-Projects>

Chelmsford Water District (CWD)

2017 “Chelmsford Water District”

http://www.chelmsfordwater.com/Pages/ChelmsfordWater_Quality/drinking

Early Detection and Distribution Mapping System (EDD)

2017 “Invasive Species by County Database”
<https://www.eddmaps.org/tools/recordsbysubject.cfm>

Epsilon Associates, Inc. (Epsilon)

2016a “Merrimack River Bank Stabilization at Wellman Avenue, Chelmsford” Submitted to Massachusetts Office of Energy and Environmental Affairs August 31, 2016.

2016b “Major Dredging Project Certification” Submitted to Massachusetts Department of Environmental Protection November 16, 2016.

Fed Center

2017 “Hazardous Waste Identification Flowchart”
<https://www.fedcenter.gov/assistance/facilitytour/hazardous/whatis/flowchart/>

Federal Energy Regulatory Commission

2011 “Final Environmental Assessment for a Non-Capacity Related Amendment to License”
[http://www.lowellheritagepartnership.org/Websites/lowellheritagepartnership/files/Content/2021282/FERC%20Final%20EA%2020111219-3034\(26724507\).pdf](http://www.lowellheritagepartnership.org/Websites/lowellheritagepartnership/files/Content/2021282/FERC%20Final%20EA%2020111219-3034(26724507).pdf)

Massachusetts Department of Environmental Protection (MADEP)

2017 “MassDEP Environmental Justice”
<http://www.mass.gov/eea/agencies/massdep/service/justice/>

Massachusetts Department of Transportation (MADOT)

2017 “Traffic Volume Counts”
<https://www.massdot.state.ma.us/highway/TrafficVolumeCounts.aspx>

Massachusetts Executive Office of Energy and Environmental Affairs (EEA)

2001, “Merrimack River: A Comprehensive Watershed Assessment Report”
<http://www.mass.gov/eea/docs/eea/water/assess-rpt-merrimack-2000.pdf>

2010 “Merrimack River Watershed 2004 Water Quality Assessment Report”
<http://www.mass.gov/eea/docs/dep/water/resources/71wqar09/84wqar09.pdf>

Massachusetts Division of Fisheries and Wildlife (MADFW)

2008 “Priority and Estimated Habitat by Natural Heritage and Endangered Species”
http://maps.massgis.state.ma.us/PRI_EST_HAB/viewer.htm

2010 “Biomap2 Summary Report” <http://www.mass.gov/eea/docs/dfg/nhosp/land-protection-and-management/biomap2-summary-report.pdf>

2012 “Biomap2 Chelmsford”
http://maps.massgis.state.ma.us/dfg/biomap/pdf/town_core/Chelmsford.pdf

2015a “Atlantic Sturgeon” <http://www.mass.gov/eea/docs/dfg/nhosp/species-and-conservation/nhfacts/acipenser-oxyrinchus.pdf>

2015b “Shortnose Sturgeon” <http://www.mass.gov/eea/docs/dfg/nhosp/species-and-conservation/nhfacts/acipenser-brevirostrum.pdf>

Massachusetts Natural Resources Collaborations (MANRC)

2017 “Introduced Pests Outreach Project” <https://massnrc.org/pests/index.htm>

Merrimack River Watershed Council, Inc. (MRWC)

2009 “Merrimack River Monitoring Program 2009 Annual Report”
<http://www.merrimack.org/oldsite/publications/documents/MRWC2009WaterQualityReport.pdf>

National Ocean and Atmospheric Administration (NOAA)

2015 “Advanced Hydrologic Prediction Service”
<http://water.weather.gov/ahps2/glance.php?wfo=box&gage=lawm3&riverid=204381>

New Hampshire Fish and Game (NH Fish and Game)

2017 “Atlantic Salmon” <http://www.wildlife.state.nh.us/fishing/profiles/atlantic-salmon.html>

Pan Am Railways (Pan Am)

2017 “About Pan Am Railways”
http://www.panamrailways.com/index.php?main_page=panam_railways

United States Army Corp of Engineers (USACE)

2015 “Errata sheet for the General Permits for Massachusetts”
<http://www.nae.usace.army.mil/Portals/74/docs/regulatory/StateGeneralPermits/MAGPs9March2015.pdf>

United States Census Bureau (Census)

2014 “American Community Survey” <https://www.census.gov/acs/www/data/data-tables-and-tools/data-profiles/2014/>

United States Department of Agriculture (USDA)

2013 “Suncook Series” https://soilseries.sc.egov.usda.gov/OSD_Docs/S/SUNCOOK.html

United States Environmental Protection Agency (EPA)

2009 “Ecoregions of New England”
ftp://newftp.epa.gov/EPADDataCommons/ORD/Ecoregions/nh/new_eng_front.pdf

2017a “Urban Waters - Lower Merrimack River” <https://www.epa.gov/lowermerrimackriver>

2017a “Sole Source Aquifer Mapper” <https://www.epa.gov/dwssa>

2017c “EPA EJscreen” <https://ejscreen.epa.gov/mapper/>

2017d “EPA Enviromapper” <https://www.epa.gov/emefdata/em4ef.home>

United States Federal Highway Administration (FHA)

2003, “Living with Noise” <https://www.fhwa.dot.gov/publications/publicroads/03jul/06.cfm>

United States Fish and Wildlife Services (USFWS)

2000 “Federal Guidance on the Use of In-Lieu-Fee Arrangements for Compensatory Mitigation under Section 404 of the Clean Water Act and Section 10 of the Rivers and Harbors Act”
<https://www.fws.gov/habitatconservation/corps%20in-lieu-fee%20guidance.pdf>

2007 “National Bald Eagle Management Guidelines”
<https://www.fws.gov/northeast/ecologicalservices/pdf/NationalBaldEagleManagementGuidelines.pdf>

2016 “4(d) Final Rule for the Northern Long-eared Bat” <https://www.gpo.gov/fdsys/pkg/FR-2016-01-14/pdf/2016-00617.pdf>

2017 “National Wetlands Inventory” <https://www.fws.gov/wetlands/data/mapper.html>

United States Geological Survey (USGS)

1983, “Bedrock Geologic Map of Massachusetts”
https://ngmdb.usgs.gov/Prodesc/proddesc_16357.htm