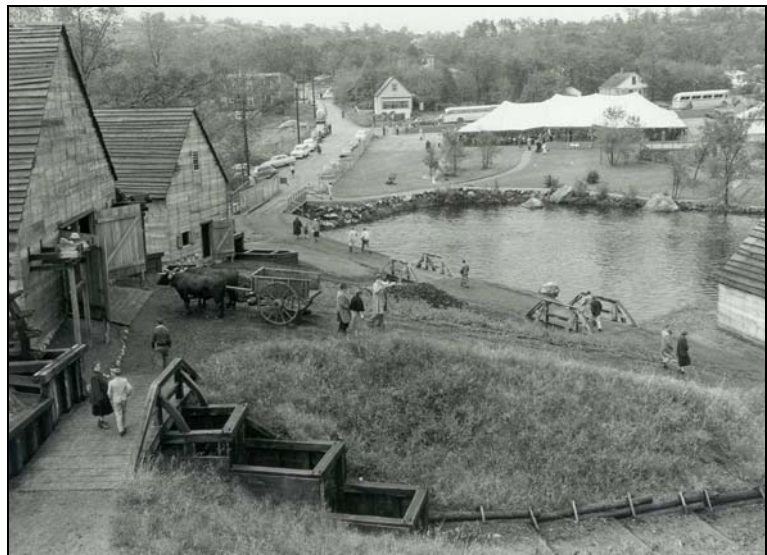

Draft

**Environmental Assessment/
Draft Environmental Impact Report
for
Restore Saugus River Turning Basin and Dock**

**National Park Service
Saugus Iron Works National Historic Site
Saugus, Massachusetts**



EOEA #13563

October 2006



Draft

**Environmental Assessment/
Draft Environmental Impact Report
for
Restore Saugus River Turning Basin and Dock**

**National Park Service
Saugus Iron Works National Historic Site
Saugus, Massachusetts**

EOEA #13563

October 2006

Proponent:

National Park Service
Ms. Patricia Trap, Superintendent
Saugus Iron Works NHS

Prepared by:

CH2M HILL
Mr. John Burgess, Project Manager
Ms. Cristina Corwin, Project Scientist



25 New Chardon Street. Suite 300
Boston, MA 02114

Executive Summary

The project described in this Environmental Assessment/Draft Environmental Impact Statement (EA/DEIR) is the Restore Saugus Iron Works Turning Basin and Dock, at 244 Central Street in Saugus, Massachusetts, within the Saugus River Watershed. The National Park Service (NPS), project proponent, filed an Environmental Notification Form (ENF) with the Massachusetts Environmental Policy Act (MEPA) Office that was posted for availability in the June 22, 2005 Environmental Monitor. The location of Saugus Iron Works Turning Basin and Dock is shown in Figure 1 (Site Map). The Executive Office of Environmental Affairs (EOEA) file number for the Restore Saugus Iron Works Turning Basin and Dock is 13563.

About Saugus Iron Works National Historic Site

Saugus Iron Works National Historic Site (NHS) in Saugus, Massachusetts is the site of the first integrated iron works in North America, which operated from 1646 to 1668. The 8.51-acre site, about 10 miles north of Boston in Essex County Massachusetts, preserves and interprets the archaeological and historic areas, structures, and objects, and reconstructs the historical setting of the colonial Iron Works (Figures 1 and 2). As the southern gateway to the Essex National Heritage Area, Saugus Iron Works NHS interprets the early settlement of Massachusetts Bay and links thousands of historic places in Essex County related to three primary historical themes: early settlement, maritime trade, and early industrialization. Saugus Iron Works' resources are prominent examples available for public interpretation of the colonial revival and early preservation movements in early to middle twentieth century. The park is the result of preservation efforts by local citizens and the American Iron and Steel Institute. These groups financed a restoration of the iron works, including the boat dock and turning basin, important elements of the historic landscape, based on detailed archeological excavations and memorialized the site as an icon to the achievements of the Puritan era. The reconstructed historic park was opened to the public in 1954.

On April 5, 1968, Congress established Saugus Iron Works National Historic Site as a unit of the National Park system under Public Law 90-282. The site's legislated mission is to preserve in public ownership the first sustained iron works in the Thirteen Colonies. Saugus Iron Works National Historic Site was listed as a National Historic Landmark (NHL) in 1966. The NHL recommendation was based on a report conducted for the Board by the National Park Service Northeast Regional Office entitled *Area Investigation Report on the Saugus Iron Works, Saugus, Massachusetts*, September 1963. Saugus Iron Works, also known as Hammersmith, was listed in the National Register of Historic Places in 1966.

Project Description

In 1957, a breach of the Prankers Pond dam on the Saugus River upstream of the Iron Works resulted in extensive sedimentation in the turning basin. Today, nearly 4 acres of the Saugus River within the NHS are choked with invasive plant species and are impacted by industrial contaminants derived from the urbanized Saugus River watershed, as well as

from waste material produced by the historic iron works (i.e., the slag pile). This condition cuts the site off from the water, impacting the interpretation of the iron works and the historic scene as well as degrading the natural habitat. The goal for the current project is to restore the historic, reconstructed landscape in compliance with the park's founding legislation, as well as to improve the native habitat.

An ENF was submitted to the Commonwealth of Massachusetts Office of Environmental Affairs in June 2006 that presented seven alternatives. These seven alternatives, (including a no-action) were developed during a Value Analysis (VA) for the proposed project conducted by the NPS at Saugus, Massachusetts on June 11, 2004. Of the six action alternatives developed during the VA, three were retained for further evaluation in this EA/DEIR and three were dismissed because they either do not meet project objectives or could not be implemented for technical reasons. The three dismissed alternatives are repair existing dock and bulkhead with no excavation of sediment; replace existing dock and bulkhead with no excavation of sediment; and replace dock and bulkhead with excavation of the turning basin, also commonly known as the "Northern Area," and control of invasive plant species below the "Northern Area" through means other than excavation of sediment (mechanical or chemical control). Dismissed alternatives (1) and (2) were not carried forward for further analysis because they do not meet project objectives to restore the historic turning basin scene. Dismissed alternative (3) was not carried forward for further analysis because it has a limited probability of success, potentially high maintenance requirements and costs, and low public acceptance due to the need to use herbicides over a substantial area to control *Phragmites* and other invasive species.

Three action alternatives to restore the turning basin at Saugus Iron Works National Historic Site are carried forward for analysis in this EA/DEIR. A no-action alternative is also analyzed. The no-action alternative would continue current park management actions and operational procedures at the park, but would neither remove sediments nor restore the historic open water condition of the turning basin. The no-action alternative sets a baseline of existing impacts that would be continued into the future and against which to compare impacts of the action alternatives.

As described in the original ENF, the NPS preferred alternative (Alternative B) would allow park visitors to better appreciate the role of the Saugus River as a deciding factor in the siting of the industrial complex, to gain a fuller understanding of the early preservation aesthetic, and to better experience the natural history of the Saugus River. The NPS preferred alternative would replace in-kind the reconstructed 17th century waterfront structures (dock and bulkhead) at Saugus Iron Works National Historic Site. The preferred alternative would remove approximately 9,000 cubic yards of sediment within the historic location of the turning basin and would restore the turning basin commonly referred to as the "Northern Area" to the open-water condition that was present prior to the 1957 dam breach. This sediment removal would alter approximately one acre of low quality, invasive, species-dominated vegetated tidal wetlands within the Northern Area. The area would be excavated to pre-1957 grades to produce an open water condition at high tide. During low tides, portions of this area would be exposed to provide a mud flat habitat as existed pre-1957.

To maintain fish habitat, particularly smelt spawning habitat, the existing flow regime and bottom sediment structure of the tidal Saugus River would not be altered by the proposed

wetland restoration project. A riparian cobble berm would be constructed at the river's edge of the Northern Area to maintain the existing channel configuration and provide increased substrate for fish habitat. The berm would be vegetated with native woody vegetation to provide shade to enhance fish habitat quality.

The NPS also proposes to restore and enhance the tidal wetland located to the southeast of the historic turning basin area. This wetland area is commonly referred to in project documents as the "Southern Area." Sediments deposited by the 1957 dam break would be excavated in approximately 2.75 acres.

Two other action alternatives analyzed in the EA/DEIR would also restore the reconstructed historic scene, but differ from the NPS preferred alternative in removing lesser amounts of sediment. Alternative C would remove sediment from only the Northern Area of the turning basin, leaving sediment in the turning basin's Southern Area intact. Alternative D would remove sediment in the Northern Area of the turning basin and 40% of the sediment in the Southern Area of the turning basin.

Purpose and Need

The Restore Saugus River Turning Basin and Dock EA/DEIR is consistent with 2002 NPS planning efforts during the development of the General Management Plan (GMP) for Saugus Iron Works National Historic Site. The GMP process sought public comment and professional expertise to identify issues and concerns and to analyze the park's existing resource conditions and interpretive effectiveness. Visitor surveys, open house meetings, thematic workshops, historic resource reports, professional consultation, and inventory and monitoring studies helped planners define problems and envision optimal visitor experience and resource conditions for the park.

The Saugus Iron Works NHS General Management Plan (GMP) (NPS, 2002) recommends restoring the open-water condition of the turning basin to preserve the distinctive character of the historic site and thereby provide a higher quality visitor experience (Figure 3). The goal of the project (EOEA # 13563) is to restore the turning basin to a condition with a higher ecological value commensurate with the historically accurate setting. An open-water basin with an emergent wetland also would enhance the habitat for fish, waterfowl, and other birds. This goal would be achieved through the following project components:

- Removal of contaminated wetland sediments;
- Removal of invasive exotic plant species;
- Restoration of an open-water condition by regrading;
- Construction of emergent brackish wetlands using native vegetation; and
- Removal and in-kind replacement of existing bulkhead and dock along the Saugus River.

EA/DEIR Development Process

The planning stages for the implementation of the turning basin project included internal consultation and solicited public input and comment. A press release was published in local newspapers including the *Saugus Advertiser*, the *Saugonian*, the *Lynn Daily Item*, and the regional section of the *Boston Globe*. An open house was held at the park on November 9, 2004 to provide an opportunity for comment.

This project has also been coordinated very closely with State and Federal regulators with review jurisdiction over the restoration of the historic scene at Saugus Iron Works. Reviewing agencies have been involved at key project milestones, and their comments accordingly incorporated. This early coordination has been essential in developing the proposed alternatives put forward in this report.

Public Comment Process

Public comment will be invited on this EA/DEIR in full compliance with the regulations implementing the National Environmental Policy Act (NEPA) and the Massachusetts Environmental Policy Act (MEPA). Upon notification of receipt of this EA/DEIR by the Secretary of Environmental Affairs, in the *Environmental Monitor*, there will be a thirty-seven (37) day review period from the date of notification of the availability of the report. Comments on the Restore Saugus River Turning Basin and Dock should be directed to:

Secretary of Environmental Affairs
Attention: MEPA Office
William Gage, EOE No. 13563
100 Cambridge Street - 20th floor
Boston, Massachusetts 02202.

The structure and content of the Restore Saugus River Turning Basin and Dock EA/DEIR is controlled by three sets of regulations. At the federal level, the EA/DEIR is subject to the provisions of Section 404 of the Clean Water Act (Section 404), and to the National Environmental Policy Act (NEPA). The Section 404 and NEPA outlines ensure meeting the requirements of federal environmental policies. At the state level, MEPA identifies the information that must be evaluated as part of the site identification process. This EA/DEIR will ensure that the requirements of the state's environmental policies are met.

Impact Topics

Issues associated with the Saugus Iron Works NHS restoration were determined in stages as various studies were conducted and differing issues came to light. Specific impact topics were developed for focused discussion and to allow comparison of the environmental consequences of each alternative. These impact topics were identified based on federal laws, regulations, and Executive Orders; 2001 NPS Management Policies; and NPS knowledge of limited or easily impacted resources.

Each impact was reviewed and analyzed for type (beneficial or adverse), context (site-specific, local, or regional), intensity (negligible, minor, moderate, or major), duration (short or long-term), and impairment (would or would not impair site resources and values). Impact topics discussed in this document are described in Table 1.

TABLE 1
Potential Resource Impacts to Consider

<ul style="list-style-type: none"> • Soundscapes • Water quality and quantity • Marine or estuarine resources • Floodplains or wetlands • Unique or important wildlife or wildlife habitat • Unique, essential, or important fish or fish habitat 	<ul style="list-style-type: none"> • Recreation resources, including supply, demand, visitation, activities, etc. • Visitor experience, aesthetic resources • Resources, including energy, conservation potential, sustainability • Urban quality, gateway communities, etc. • Traffic • Long-term management of resources or land/resource productivity • Cultural resources, including archeology, prehistoric/historic structures, and cultural landscape
---	---

Alternatives

The following alternatives were considered for restoring the Saugus River turning basin, the reconstructed 17th century waterfront structures (dock and bulkhead), and the emergent wetland habitats at Saugus Iron Works NHS:

Alternative A is the no-action alternative. The dock, bulkhead, turning basin, and southern area of the site would remain unchanged. This alternative does not involve discontinuing existing maintenance or operational procedures of the site.

Alternative B is the NPS preferred and is also the environmentally preferred alternative and consists of the proposed action for the restoration of the Saugus River Turning Basin and Dock. The proposed action would restore the turning basin, waterfront structures, and emergent marsh to conditions and contours similar to those found prior to the 1957 dam breach. It includes restoration of the aquatic and wetland habitats south of the historic turning basin area and within site boundaries (henceforth referred to as the “southern area”).

Alternative C is similar to the preferred alternative, except that it does not take action with respect to the southern area as described above.

Alternative D is similar to the preferred alternative, except that only 40 percent of the southern area of the tidal basin would be excavated and restored to approximate 1954 contours.

Environmental Consequences

Potential resource impacts as a result of the restoration are described in terms of type, context, intensity, duration, and impairment. Each impact is analyzed for each alternative.

Given the goals to enhance the cultural and natural landscape of the site, most resources would receive only beneficial impacts or negligible adverse impacts. Resources that might experience adverse effects would only be minimally impacted during the course of

construction, and every effort would be made to mitigate and employ best management practices to minimize any potential adverse impact. No significant adverse impacts to site resources are expected for any of the alternatives proposed.

Mitigation Activities for the Action Alternatives and Proposed Section 61 Findings

The following mitigation activities would be conducted during the design and implementation phases of the identified alternative to lessen the adverse impacts of the action.

Soundscapes

In order to reduce the short term impact of noise during construction, equipment would use standard noise muffling devices to limit noise levels. In addition, operation of the equipment would be limited to weekday daytime hours to limit disturbance during sensitive evening and weekend time periods. Noise levels would be periodically monitored to ensure compliance with local Saugus requirements.

Water Quality and Quantity

In order to prevent impacts to local water quality, silt fencing along the perimeter of dewatering/loading areas would be installed to collect and contain sediment generated during dewatering, processing, and loading. Its intent is to remove sediment at the source, thereby minimizing the volume of sediment which must be contained and collected within the excavation and perimeter barrier (see Appendix D, page 5).

A sediment barrier would be created along the perimeter of the excavation where it abuts the Saugus River channel. The conceptual sediment barrier between the excavation and the river channel includes a physical barrier to filter sediment out of the water and contain it along the edge of the excavation (see Appendix D page 5).

Marine or Estuarine Resources

Local marine or estuarine resources would likely experience beneficial effects as a result of the tidal marsh/non-vegetated wetland habitat restoration included in this proposal. There is a growing literature documenting the degraded habitat value of *Phragmites* marshes with respect to their role in supporting fish populations. It is assumed that the *Phragmites* marshes of the tidal Saugus River estuary are not serving an essential role as habitat for larval and juvenile fishes, resulting in a reduced fish population and subsequent impacts on higher trophic predators (e.g., fish and birds) that depend on juvenile fishes as prey. Therefore, the restoration activities are expected to create long-term beneficial impacts for local estuarine resources.

Floodplains and Wetlands

Floodplain or wetland resources would likely incur beneficial effects as a result of the restoration although some bordering vegetated wetland area would be converted to open water/mud flat habitat. The majority of the wetlands within the site are classified as tidal

freshwater marsh, an ecosystem that is extremely vulnerable in the State of Massachusetts, with five or fewer occurrences and very few remaining acres. The proposed restoration of the wetlands would increase the area of this limited ecosystem and have a beneficial, long-term, site-specific impact. Under the preferred alternative the project would not meet the performance standards under the Massachusetts Wetlands Protection Act and the 401 Water Quality Certification with regard to the requirements for 1:1 mitigation for bordering vegetated wetland. However, the NPS would be restoring the entire area to a mixture of bordering vegetated wetland and mudflat and increasing the biodiversity of the system. A variance from the performance standards of these regulatory programs would be sought because of the national historic significance of the site and the public interest in rehabilitating the NHS.

Special precautions will be implemented to ensure protection of the floodplains and wetlands included in the project area. Silt fencing, sediment barriers and project timing are planned mitigation measures detailed in the Statement of Findings included in Appendix K.

Unique or Important Wildlife or Wildlife Habitat

The restoration project is likely to have beneficial, long-term impacts for unique or important wildlife or wildlife habitat. No federally-listed or proposed, threatened or endangered species or critical habitats are known to occur in the project area (Appendix B).

The existing wetlands are dominated by invasive species, such as common reed and purple loosestrife, which are considered to provide limited opportunities for wildlife use. The proposed restoration and enhancement plan would provide high quality, high functional value, native species dominated wetlands and remove impacted sediments from these areas. It is anticipated that the restored and enhanced wetlands proposed would provide a greater wildlife habitat function than the existing condition of these wetlands.

Unique, Essential, or Important Fish or Fish Habitat

The project would be timed around the annual spawning of rainbow smelt and other anadromous fish spawning. To maintain river flow and protect rainbow smelt spawning habitat, no work would take place within the river channel itself. The integrity of the rainbow smelt spawning habitat would be maintained by enhancing the gravel and cobble berm between the river channel and the proposed turning basin. The berm would be enhanced by removing invasive plant species, extending the length of the berm, armoring with cracked stone to provide enhance fish habitat, and planting native species to maintain shade of the spawning area.

Recreation Resources, Including Supply, Demand, Visitation, Activities, etc.

Recreation resources would likely improve as a result of the proposed restoration. Dock restoration would provide long-term, beneficial visitor impacts region-wide. The restoration of the turning basin and dock would provide visitor access to the dock and improved viewsheds, enabling visitors to gain a better understanding of the iron works and, in turn, increasing visitation. Because the project is expected to provide long-term benefits for supply, demand, and visitation at the site there is no specific additional mitigation for this resource.

Visitor Experience, Aesthetic Resources

While the project is expected to provide long term benefits for visitor experience and aesthetic resources, it is anticipated that there will be short term adverse impacts during construction and full visitor use will be restricted. During construction the park would remain open and the project itself would be interpreted using signs and presentations by park personnel. Because the project is expected to improve the visitor experience and aesthetic resources at the site there is no specific additional mitigation for this resource.

Resources, Including Energy, Conservation Potential, Sustainability

The proposed restoration would likely have moderate, long-term, beneficial impacts on environmental sustainability at the site. Sustainability and conservation potential are likely to increase due to the improvement in wetland habitat and open-water condition as seen in the 1950s. Because the project is expected to improve the sustainability at the site there is no specific additional mitigation for this resource.

Urban Quality, Gateway Communities, etc.

The proposed Saugus River turning basin and dock restoration activities would likely result in, long-term benefits for urban quality and gateway communities region-wide. Because the project is expected to provide benefits for the gateway community there is no specific additional mitigation for this resource.

Long-term Management of Resources or Land/Resource Productivity

Long-term management of the resources or land/resource productivity is likely to experience local and long-term benefits as a result of the planned restoration activities. The restoration is anticipated to improve the visitor experience, increase the use and productivity of the site, and ultimately enable better management of the site ecology. Because the project is expected to provide benefit to the long-term management of resources and resource productivity at the site there is no specific additional mitigation for this resource.

Traffic

Traffic flow is likely to experience a short-term adverse effect under this alternative because construction is likely to slightly increase the amount of traffic entering and exiting the site and potentially reduce the amount of parking available for visitor use. In order to reduce the impacts to local traffic patterns in a suburban area, the scheduling of transport into and out of the site would be timed to minimize and reduce impacts to traffic.

Cultural Resources

Archeological resources are not anticipated during the implementation of this undertaking, however the area has some sensitivity, therefore if during construction unanticipated archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed if necessary in consultation with the Massachusetts Historical Commission. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlines in the

Native American Graves Protection and Repatriation Act of 1990 would be followed. Only post-1954 deposited sediments would be removed from the turning basin therefore any pre-1954 sediments would remain.

Mitigation Measures for the Slag Pile, Bulkhead, and Dock

The following mitigation measures would be implemented to minimize damage to the environment and cultural resources resulting from work in the vicinity of the slag pile and rehabilitation of the dock and bulkhead.

- The NPS would continue to maintain and enforce public access restrictions to the slag pile as described in the Notice of Activity and Use Limitation.
- The final design would include regrading and stabilization of the drainage swale to the west of the slag pile to minimize the potential for erosion and transport of slag materials down gradient. Any disturbance to the archeologically significant Joseph Jenks site near the drainage swale would be avoided.
- Contract specifications for intrusive work adjacent to the exposed historic slag pile would clearly state the potential hazards and would include provisions for appropriately trained personnel and appropriate safety and environmental monitoring and controls. All efforts to avoid the historic slag pile would be utilized.
- Researching the longevity of preserved timber and the availability of pressure treated timber would facilitate the future use of timbers for historical purposes.
- Methods for securely attaching the wood bulkhead to the concrete retaining wall would be evaluated.
- Historic joint methods would be evaluated to confirm their strength relative to design requirements and to determine reinforcement requirements and methods should the joints be found to provide inadequate strength.
- The reconstructed dock would be designed to withstand expected design loads (personnel and maintenance vehicles) and meet applicable code requirements for public walkways. Existing and expected loading conditions would be discussed with site staff.
- Alternative materials would be investigated that may provide greater strength and durability in portions of the dock that are hidden from normal view.

Removal of Hamilton Street Weir

Although not part of the proposed action, the NPS would continue to facilitate the removal of the Hamilton Street weir in collaboration with other stakeholders. The weir occurs approximately 700 feet downstream of the Southern Area, outside of the NPS boundary, and is currently owned by the now defunct First Ironworks Association. The rock weir, composed of large rocks placed in the river in the 1950s, was intended to maintain an open water condition in the upper Saugus River and reduce tidal surge. Removal of the rock weir is not expected to have a direct influence on the hydrology or river geomorphology of the Northern and Southern Areas, but removal would contribute to restoration of wetland

habitat features downstream of the project area and would enhance recreational opportunities throughout the Saugus River.

Draft Section 61 Findings

With the identification of the preferred alternative for restoration of the Saugus River Turning Basin and Dock, MCZM and MDEP find that, with implementation of the mitigation measures listed above, all feasible means have been taken to avoid or minimize damage to the environment. Implementation of the mitigation measures will occur in accordance with the terms and conditions set forth in the permits.

Compliance Needs

This section describes regulatory needs in relation to the Saugus Iron Works NHS restoration project, detailing the range and priorities of permits, laws, and regulations to be addressed during the proposal stage.

National Environmental Policy Act

The **National Environmental Policy Act** (NEPA) of 1969 (42 USC Sections 4321 *et seq.*), as amended, requires all federal agencies, including the NPS, to: (1) prepare in-depth studies of the impacts of and alternatives to proposed “major federal actions”; (2) use the information contained in such studies in deciding whether to proceed with the actions; and (3) diligently attempt to involve the interested and affected public before any decision affecting the environment is made (NPS DO #12, section I).

***Status with Saugus Iron Works NHS:** NPS has prepared this EA/DEIR for the proposed action in accordance with the guidance set forth in NPS Director’s Order #12. The EA/DEIR prepared under NEPA also addresses MEPA requirements.*

Federal Fisheries Regulations

Federal Fisheries Regulations (16 U.S.C. Ss. 1801 *et seq.* Magnuson-Stevens Fishery Conservation and Management Act; 50 CFR 600.00: Essential Fish Habitat) aim to protect Essential Fish Habitat (EFH), including the waters and substrates necessary for fish to spawn, breed, feed, or grow to maturity.

***Status with Saugus Iron Works NHS:** A letter dated September 15, 2004, from NMFS states that “No threatened or endangered species under the jurisdiction of the National Marine Fisheries Service are known to exist in the Saugus area. Therefore, no consultation pursuant to Section 7 of the Endangered Species Act of 1973, as amended, is required.”*

Federal Endangered Species Act

The **Federal Endangered Species Act** (16 U.S.C. Ss.1531 *et seq.*: Endangered Species Act of 1973; 50 CFR 17.00: Endangered Species and Threatened Wildlife and Plants) is intended to conserve the ecosystems on which endangered species and threatened species depend. Species protected under the Act are listed as either endangered (in danger of extinction) or threatened (likely to become endangered in the near future).

Status with Saugus Iron Works NHS: USFWS has been contacted via letter dated September 3, 2004, requesting their review and determination of the project proposal. A letter dated October 7, 2004 was received from the USFWS stating “no federally-listed or proposed, threatened or endangered species or critical habitat... are known to exist in the project area(s).”

Executive Orders

In accordance with **Executive Order 11990, Protection of Wetlands**, all federal agencies must avoid, where possible, impacts on wetlands. The NPS uses the policies and procedures contained in DO #77-1: Wetland Protection and Procedural Manual #77-1: Wetland Protection to implement the Executive Order.

Status with Saugus Iron Works NHS: This EA/DEIR will analyze wetland issues in more detail, and the NPS will coordinate with the Saugus Conservation Commission to appropriately address the Executive Order. A Wetlands Statement of Findings has been prepared and can be found in Appendix K.

Executive Order 11988, Floodplains, mandates that all federal agencies must avoid, where possible, impacts on floodplains. NPS DO #77-2: Floodplain Management and Procedural Manual #77-2 are the policies and procedures that the NPS uses to implement the Floodplain Executive Order.

Status with Saugus Iron Works NHS: Per Federal Emergency Management Agency (FEMA) maps, and as a result of the particular restoration activities at Saugus Iron Works NHS, it is anticipated that the only impacts on floodplains would be beneficial. (Refer to Figure 4 for the MassGIS 100-year floodplain boundary as it relates to the site.) A Floodplain Statement of Findings has been prepared and can be found in Appendix K.

U.S. Army Corps of Engineers (USACE) Permits

The **Rivers and Harbors Act of 1899 (Section 10)** (33 U.S.C., 33 CFR 323: Permit for Structures or Work Affecting Navigable Waters of the United States) and the **Clean Water Act (Section 404)** (33 U.S.C. Ss.1251 et seq.: Federal Water Pollution Control Act; 33 FCR 322 Permits for Discharges of Dredged or Fill Material in to the Waters of the United States) administered by the USACE New England District, are required for all work including structures seaward of the annual high water line in navigable waters of the United States.

Status with Saugus Iron Works NHS: The proposed sediment removal activities exceed the thresholds for a Nationwide Permit; therefore, an Individual Permit has been prepared for Section 10/Section 404.

National Pollution Discharge Elimination System (NPDES) Permit

The **NPDES Permit** (33 U.S.C. Ss 1251 Ss1251 et seq.: Federal Water Pollution Control Act; 40 CFR 122: EPA Administered Permit Programs: National Pollution Discharge Elimination System; M.G.L. c. 21: Massachusetts Clean Waters Act; 314 CMR 3.00: Massachusetts Surface Water Discharge Permit Program) is administered by the United States Environmental Protection Agency (USEPA) as well as the Massachusetts Department of Environmental Protection (DEP).

Under the **NPDES Construction Stormwater General Permit** (33 U.S.C. Ss1251 et seq.: Federal Water Pollution Control Act; 40 CFR 122: EPA Administered Permit Programs: National

Pollution Discharge Elimination System), operators of large and small construction activities must obtain coverage under a NPDES construction stormwater permit.

***Status with Saugus Iron Works NHS:** Large construction projects, like the Saugus Iron Works NHS turning basin and dock restoration project, must obtain coverage under the NPDES Stormwater Construction General Permit because it approaches a disturbance of nearly 4 acres of land. A SWPPP has been prepared and will remain at the project site during construction.*

Delegated Federal Regulations

Executive Order 149, FEMA and Floodplain Use, is regulated by the Massachusetts Department of Conservation (DCR), the state coordinating agency for the National Flood Insurance Program for construction in floodplains within Massachusetts.

The **Federal Consistency Review** is regulated by the Massachusetts Coastal Zone Management (CZM).

The **National Historic Preservation Act** (16 U.S.C. 470 *et seq.* 36 CFR Part 60) is jointly administered with the Massachusetts Historic Commission (MHS).

***Status with Saugus Iron Works NHS:** The status of these regulations is discussed in the following section.*

Massachusetts Laws, Regulations, and Programs Related to the Saugus Iron Works NHS Restoration

This section provides a complete picture of the required regulations mandated by the Commonwealth of Massachusetts.

Massachusetts Environmental Policy Act (MEPA)

Because the Saugus Iron Works NHS restoration project would alter wetlands, the project is subject to review in accordance with the MEPA (M.G.L. c. 30; MEPA; 30 CMR 11.00: MEPA Regulations). The MEPA Unit under the Executive Office of Environmental Affairs administers project review.

***Status with Saugus Iron Works NHS:** An Environmental Notification Form has been prepared under MEPA. This EA/DEIR integrates the MEPA process with the NEPA process such that the EA/DEIR prepared under NEPA also addresses MEPA requirements.*

Executive Order 149: FEMA and Floodplain Use

Under **Executive Order 149, FEMA and Floodplain Use**, the Massachusetts DCR is the state coordinating agency for the National Flood Insurance Program for construction in floodplains within Massachusetts.

***Status with Saugus Iron Works NHS:** The NPS will meet the intent of the Wetlands Protection Act and the Saugus Conservation Commission's requirements associated with bordering lands subject to flooding. According to MassGIS map data, Saugus Iron Works NHS is within the 100-year floodplain (Figure 4).*

Massachusetts State Fisheries Regulations

The Massachusetts Division of Marine Fisheries (DMF) licenses and oversees fin fisheries and shell fisheries in Massachusetts waters, both for resident species and those that spend a portion of their life cycle in the state's tidal waters as part of the **Massachusetts State Fisheries Regulations** under the M.G.L. c. 21 and c.130: Marine Fisheries; 322 CMR 2.00 et seq.

***Status with Saugus Iron Works NHS:** Given the presence of spawning habitat for rainbow smelt, a State species of concern, within the project area, the project team has been working closely with the DMF to ensure protection of the species during construction and beyond*

Department of Environmental Protection Regulations

Public Waterfront Act, Chapter 91 (M.G.L. 310 CMR 9.00: Waterways Regulations) and its implementing regulations, managed by the DEP, preserves the rights of the public and guarantees the private uses of tidelands and waterways that serve a public purpose and are generally water dependent

***Status with Saugus Iron Works NHS:** Consultation has been conducted with appropriate State and local officials. Saugus Iron Works has completed a permit application to address this regulation (Appendix M).*

401 Water Quality Certification (33 U.S.C. 1341 et seq. Ss. 401: Federal Water Pollution Control Act, M.G.L. c.21: Massachusetts Clean Water Act; 314 CMR 4.00: Surface Water Quality Standards 314 CMR 9.00: 401 Water Quality Certification) for Dredging and Discharge, administered by the Division of Wetlands and Waterways within the DEP.

***Status with Saugus Iron Works NHS:** It is estimated that the proposed project will entail sediment removal of greater than the threshold of 5,000 cubic yards of material, and therefore would be considered a major project. CH2M HILL has prepared the certification on behalf of the NPS. Under the preferred alternative, the project would not meet the performance standards under the 401 Water Quality Certification with regard to the requirements for 1:1 mitigation for bordering vegetated wetland. However, the NPS would be restoring the entire area to a mixture of bordering vegetated wetland and mudflat and increasing the biodiversity of the system. A variance from the performance standards for this certification would be sought because of the national historic significance of the site and the public interest in rehabilitating the NHS. It is possible that the project may require a variance to this regulation if it does not meet the limited project provisions within the Saugus Conservation Commission.*

Federal Consistency Review

Massachusetts CZM administers the **Federal Consistency Review** (16 U.S.C. 1451 et seq.: as amended, 15 CFR 930; M.G.L c 21A Ss 2, 4: 301 CMR 20.00: CZM Program, 301 CMR 21.00: Federal Consistency Review Procedures), which ensures that any federal activities in or affecting Massachusetts coastal resources are consistent with state coastal policies.

***Status with Saugus Iron Works NHS:** CH2M HILL prepared the Federal Consistency Review paperwork on behalf of the NPS and both have worked closely with CZM throughout the regulatory process.*

Natural Heritage Endangered Species Program (NHESP)

The **Massachusetts Endangered Species Act** (M.G.L. c.131A: *Massachusetts Endangered Species Act*; 321 CMR 8:00: *List of Endangered and Threatened Species*; 321 CMR 10:00: *Massachusetts Endangered Species Regulations*) protects and lists endangered or threatened species or species of concern and their habitat.

Status with Saugus Iron Works NHS: The NHESP has responded to an a Rare Species Information Request Form and letter dated September 3, 2004 with no endangered species determination in a letter dated October 8, 2004.

National Historic Preservation Act

National Historic Preservation Act and Massachusetts Historic Properties (M.G.L. c. 9: *Massachusetts Historic Commission*; M.G.L. c. 40C *Historic District Act*; 950 CMR 71.00: *Protection of Properties Included on the State Register of Historic Places*), under the authority of the Massachusetts Historic Commission, protects properties that are on or eligible for listing on the National Register of Historic Places. The primary regulation is Section 106 of the National Historic Preservation Act, requiring federal agencies to account for the impacts of federal projects on properties listed or eligible for listing on the National Register.

Status with Saugus Iron Works NHS: NPS has received confirmation from the State Historic Preservation Officer in "no adverse impacts" concurrence letters dated March 2, 2004 and February 2, 2006.

Massachusetts Board of Underwater Archeological Resources

The **Massachusetts Board of Underwater Archeological Resources** (M.G.L. c. 6: *Board of Underwater Archeological Resources*; 312 CMR 2.00: *Massachusetts Underwater Archeological Resources*), protects and preserves those resources from damage or disturbance.

Status with Saugus Iron Works NHS: The NPS is committed to cooperating with the needs of the Massachusetts Board of Underwater Archeological Resources.

Delegated State Regulations

The **Massachusetts Wetlands Protection Act and Rivers Protection Act (MWPA)** (M.G.L. Chapter 131, Section 40A; 310 CMR 10. *Wetlands Restrictions*) is administered by the local conservation commission.

Status with Saugus Iron Works NHS: All project work within protected zones will be done in cooperation with local officials who administer the MWPA

Local Laws, Regulations, and Programs Related to Saugus Iron Works NHS Restoration

The following local regulations are presented in an effort to provide a complete picture of the regulations applicable to the Saugus Iron Works NHS restoration.

The **Massachusetts Wetlands Protection Act** (insert missing information for EA/DEIR, including Order of Conditions update) under the Town of Saugus bylaws is administered by the Saugus Conservation Commission. The Wetlands Protection Act (M.G.L. c.131 Ss.40A) prohibits the alteration of any wetland resource area of buffer zone without the

prior written consent if the local conservation commission through their issuance of an Order of Conditions

***Status with Saugus Iron Works NHS:** The NPS will cooperate with the Saugus Conservation Commission regarding local regulations. The Saugus Conservation Commission attended a pre-application meeting and is collaborating with the NPS. Under the preferred alternative, the project would not meet the performance standards under the Massachusetts Wetlands Protection Act with regard to the requirements for 1:1 mitigation for bordering vegetated wetland. However, the NPS would be restoring the entire area to a mixture of bordering vegetated wetland and mudflat and increasing the biodiversity of the system. A variance from the performance standards of this Act would be sought because of the national historic significance of the site and the public interest in rehabilitating the NHS.*

The Town of Saugus also administers a series of **zoning bylaws**, under which several local regulations are listed. Under these laws, noise, solid waste, the **State Environmental Code (Title 5)** (M.G.L. c 21A Ss.13: *State Environmental Code*; 310 CMR 11: *Title I*), the **Massachusetts State Building Code** (M.G.L. c.143; 780 CMR: *Massachusetts State Building Code*), and demolition permits are administered. The review processes are locally determined.

***Status with Saugus Iron Works NHS:** The NPS will meet the intents stated in the local zoning by-laws of the town of Saugus.*

Contents

Executive Summary.....	i
Acronyms and Abbreviations	xx
Secretary's Certificate	xxii

1.0 Purpose and Need.....	1-1
1.1 Purpose and Need for the Proposed Action	1-1
1.2 Historical Background.....	1-1
1.3 EA/DEIR Development Process.....	1-3
1.3.1 Coordination with State Agencies.....	1-3
1.3.2 Executive Office of Environmental Affairs (MEPA) Procedural History	1-4
1.3.3 Massachusetts Office of Coastal Zone Management (CZM).....	1-4
1.3.4 Riverways Program.....	1-5
1.3.5 Division of Marine Fisheries.....	1-5
1.3.6 Department of Environmental Protection.....	1-5
1.4 Purpose and Significance of the Park.....	1-5
1.5 Project Background.....	1-6
1.5.1 Previous Planning.....	1-8
1.5.2 Internal Scoping.....	1-9
1.5.3 External Scoping	1-10
1.6 Issues.....	1-10
1.7 Issues Beyond the Scope of this Document.....	1-10
1.7.1 Removal of the Rock Weir at Hamilton Street Bridge.....	1-10
1.8 Impact Topics	1-11
1.8.1 Derivation of Impact Topics.....	1-11
1.8.2 Impact Topics Included in this Document	1-11
1.8.3 Impact Topics Dismissed from Further Analysis.....	1-12
2.0 Description of the Proposed Action and Alternatives.....	2-1
2.1 Alternative A (The No-Action Alternative)	2-1
2.2 Alternative B (The Preferred Alternative)	2-1
2.3 Alternative C.....	2-3
2.4 Alternative D	2-4
2.5 Additional Restoration Activities Common to All Action Alternatives	2-5
2.5.1 Slag Pile Containment	2-5
2.5.2 Sediment Controls and Long-Term Monitoring.....	2-5
2.5.3 Wetland Restoration.....	2-6
2.5.4 Reconstruction of the Bulkhead, and Dock.....	2-8
2.5.5 Protection of Historic Properties.....	2-9
2.5.6 Construction Period Precautions	2-9
2.5.7 Approximate Construction Timetable and Cost Estimate	2-10
2.6 Mitigation Activities for the Action Alternatives and Proposed Section 61 Findings.....	2-10

2.6.1	<i>Soundscapes</i>	2-10
2.6.2	<i>Water Quality and Quantity</i>	2-10
2.6.3	<i>Marine or Estuarine Resources</i>	2-11
2.6.4	<i>Floodplains and Wetlands</i>	2-11
2.6.5	<i>Unique or Important Wildlife or Wildlife Habitat</i>	2-12
2.6.6	<i>Unique, Essential, or Important Fish or Fish Habitat</i>	2-12
2.6.7	<i>Recreation Resources, Including Supply, Demand, Visitation, Activities, etc.</i>	2-13
2.6.8	<i>Visitor Experience, Aesthetic Resources</i>	2-13
2.6.9	<i>Resources, Including Energy, Conservation Potential, Sustainability</i>	2-13
2.6.10	<i>Urban Quality, Gateway Communities, etc.</i>	2-13
2.6.11	<i>Long-term Management of Resources or Land/Resource Productivity</i>	2-14
2.6.12	<i>Traffic</i>	2-14
2.6.13	<i>Cultural Resources</i>	2-14
2.6.14	<i>Mitigation Measures for the Slag Pile, Bulkhead, and Dock</i>	2-14
2.6.15	<i>Draft Section 61 Findings</i>	2-15
2.7	<i>Alternatives Considered but Dismissed</i>	2-16
2.8	<i>Environmentally Preferred Alternative</i>	2-16
2.8.1	<i>Alternatives Comparison Table</i>	2-17
2.9	<i>Regulatory Objectives</i>	2-18
2.9.1	<i>The Massachusetts Wetland Protection Act</i>	2-18
2.9.2	<i>Protection of Public and Private Water Supply</i>	2-18
2.9.3	<i>Protection of Groundwater Supply</i>	2-19
2.9.4	<i>Flood Control and Storm Damage Prevention</i>	2-19
2.9.5	<i>Prevention of Pollution</i>	2-21
2.9.6	<i>Protection of Land Containing Shellfish</i>	2-22
2.9.7	<i>Protection of Fisheries</i>	2-22
2.9.8	<i>Protection of Wildlife Habitat</i>	2-24
2.9.9	<i>Chapter 91 Waterways Permitting</i>	2-26
2.9.10	<i>Section 106 of the Historic Preservation Act</i>	2-26
2.9.11	<i>Water Quality Certification</i>	2-26
2.9.12	<i>Section 404 of the Federal Clean Water Act</i>	2-27
2.9.13	<i>NPDES</i>	2-27
2.9.14	<i>Notice of Intent/Order of Conditions</i>	2-28
2.9.15	<i>Summary of Environmental Consequences/Impact Comparison Matrix</i>	2-28
3.0	<i>Affected Environment</i>	3-1
3.1	<i>Site and Landscape History</i>	3-1
3.2	<i>Existing Conditions</i>	3-2
3.2.1	<i>Existing Conditions of the Historic Turning Basin and Waterfront Area</i>	3-3
3.2.2	<i>Existing Conditions of the Slag Pile</i>	3-5
3.3	<i>Cultural Resource Environment</i>	3-6
3.3.1	<i>Archeological Resources</i>	3-6
3.3.2	<i>Cultural Landscape and Prehistoric/Historic Structures</i>	3-7
3.4	<i>Natural Resource Environment</i>	3-8
3.4.1	<i>Topography</i>	3-8
3.4.2	<i>Vegetation and Habitats</i>	3-8
3.4.3	<i>Floodplains and Wetlands</i>	3-9
3.4.4	<i>Fish and Wildlife</i>	3-10
3.4.5	<i>Water Bodies and Water Quality</i>	3-11

3.4.6	<i>Climate, Air Quality, and Soundscapes</i>	3-13
3.4.7	<i>Geology and Soils</i>	3-13
3.5	Socioeconomic Environment	3-14
3.5.1	<i>Visitor Use, Visitor Experience</i>	3-15
3.5.2	<i>Land Management and Sustainability</i>	3-16
4.0	Environmental Consequences	4-1
4.1	Methodology	4-1
4.1.1	<i>Connected and Cumulative Actions</i>	4-2
4.2	Impairment of Park Resources or Values	4-4
4.3	Impacts to Cultural Resources and Section 106 of the National Historic Preservation Act	4-5
4.4	Impact Analysis	4-5
4.4.1	<i>Soundscapes</i>	4-5
4.4.2	<i>Water Quality and Quantity</i>	4-7
4.4.3	<i>Marine or Estuarine Resources</i>	4-9
4.4.4	<i>Floodplains and Wetlands</i>	4-11
4.4.5	<i>Unique or Important Wildlife or Wildlife Habitat</i>	4-13
4.4.6	<i>Unique, Essential, or Important Fish or Fish Habitat</i>	4-15
4.4.7	<i>Recreation Resources, including Supply, Demand, and Visitation Activities</i> ..	4-17
4.4.8	<i>Visitor Experience, Aesthetic Resources</i>	4-18
4.4.9	<i>Resource, including Energy, Conservation Potential, Sustainability</i>	4-20
4.4.10	<i>Urban Quality and Gateway Communities</i>	4-22
4.4.11	<i>Long-Term Management of Resources or Land/Resource Productivity</i>	4-23
4.4.12	<i>Traffic</i>	4-25
4.4.13	<i>Cultural Resources</i>	4-26
5.0	Consultation and Coordination	5-1
5.1	Groups Consulted	5-1
5.2	Compliance Needs	5-1
5.2.1	<i>Massachusetts Laws, Regulations, and Programs Related to the Saugus Iron Works NHS Restoration</i>	5-5
5.2.2	<i>Local Laws, Regulations, and Programs Related to Saugus Iron Works NHS Restoration</i>	5-8
6.0	List of Preparers	6-1
7.0	Distribution List	7-1
8.0	Acknowledgements	8-1
9.0	References	9-1

Tables

1	Potential Resource Impacts to Consider
2	Potential Impacts on Site Resources by Alternative
3	Proposed Planting Species
4	Alternatives Comparison Table
5	Summary of Environmental Consequences
6	Summary of Potential Impact Characteristics

Figures

- 1 Site Map
- 2 Site Photo
- 3 Restoration Plan
- 4 Wetland Resources
- 5 Vegetation Cover
- 6 Channel Substrates
- 7 Existing Topography

Photos

- 1 Saugus River, Saugus Iron Works turning basin, 1954
- 2 Saugus Iron Works National Historic Site, 2000
- 3 Bulkhead, 2004
- 4 Saugus Iron Works National Historic Site, 2000
- 5 Warehouse, bulkhead, dock, and "Alewife" (reproduction sailing vessel), 2004
- 6 Slag pile, undated
- 7 Narrow-leaved cattail and Saugus River viewed from western bank, 2004
- 8 Viewshed from waterfront area, 2004

Appendices

- A NPS Responses and MEPA Scope and Comment Letters
- B Agency Review Letters
- C Marsh Characterization Report
- D Surface Water Pollution Prevention Plan
- E Monitoring Plan
- F Natural Resource Functional Assessment
- G Weir Assessment
- H Drainage and Stormwater Management Assessment
- I Wetland Delineation
- J Aquatic Habitat Assessment
- K NPS Statement of Findings for Floodplains and Wetlands
- L Draft Construction Documents
- M Chapter 91 Permit Application

Compact Disc

Complete electronic copies of the reports listed in the appendices

Acronyms and Abbreviations

ACEC	Area of Critical Environmental Concern
APE	Area of Potential Effect
CEQ	Council on Environmental Quality
CFR	Code of Federal Regulations
CLA	Cultural Landscape Assessment
CMR	Code of Massachusetts Regulations
CZM	Coastal Zone Management
DAR	Daughters of the American Revolution
DCR	Department of Conservation
DEP	Massachusetts Department of Environmental Protection
DMF	Division of Marine Fisheries
EA	Environmental Assessment
EIR	Environmental Impact Report
EIS	Environmental Impact Statement
ENF	Environmental Notification Form
ESF	Environmental Screening Form
EFH	Essential Fish Habitat
FEMA	Federal Emergency Management Agency
FIWA	First Iron Works Association
FONSI	Finding of No Significant Impact
ft	feet
GMP	General Management Plan
in	inch
LSP	Licensed Site Professional
MBTA	Massachusetts Bay Transportation Authority
MCP RCS-1	Massachusetts Contingency Plan Reportable Concentrations for Soil Category 1
MEPA	Massachusetts Environmental Policy Act

MOA	Memoranda of Agreement
MWPA	Massachusetts Wetlands Protection Act
NAAQS	National Ambient Air Quality Standards
NEPA	National Environmental Policy Act
NHESP	Natural Heritage and Endangered Species Program
NHA	National Heritage Area
NHL	National Historic Landmark
NHPA	National Historic Preservation Act
NHS	National Historic Site
NMFS	National Marine Fisheries Service
NPDES	National Pollution Discharge Elimination System
NPS	National Park Service
PAH	Polycyclic Aromatic Hydrocarbon
PM-10	Particulate Matter
PPM	Priority Pollutant Metal
PMIS	Project Management Information System
ROD	Record of Decision
sf	square feet
SRWC	Saugus River Watershed Council
SHPO	State Historic Preservation Officer
SWOT	strengths, weaknesses, opportunities, and threats
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey



The Commonwealth of Massachusetts

Executive Office of Environmental Affairs

100 Cambridge Street, Suite 900

Boston, MA 02144-2524

MITT ROMNEY
GOVERNOR

KERRY HEALEY
LIEUTENANT GOVERNOR

STEPHEN R. PRITCHARD
SECRETARY

July 29, 2005

Tel. (617) 626-1000
Fax. (617) 626-1181
<http://www.mass.gov/envir>

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

PROJECT NAME : Restoration of the Saugus Iron Works
Turning Basin & Dock
PROJECT MUNICIPALITY : 244 Central Street - Saugus
PROJECT WATERSHED : Saugus River
EOEA NUMBER : 13563
PROJECT PROPONENT : National Park Service
DATE NOTICED IN MONITOR : June 22, 2005

Pursuant to the Massachusetts Environmental Policy Act (G. L., c. 30, ss. 61-62H) and Section 11.06 of the MEPA regulations (301 CMR 11.00), I hereby determine that this project **requires** the preparation of a Draft and Final Environmental Impact Report (DEIR and FEIR).

According to the Environmental Notification Form (ENF), the proposed project consists of restoration/excavation (78,418 square foot (sf) area) of the Saugus River turning basin and the reconstruction of the dock (432 sf) and bulkhead (110 linear feet) at the Saugus Iron Works. The project will remove approximately 155,945 sf of existing bordering vegetated wetlands dominated by *Phragmites australis* and other non-native species. It will include the disposal of approximately 9,620 cubic yards of sediment from the riverbed to a landfill after dewatering has occurred on-site. The site is approximately 8.51 acres.

This project is subject to a mandatory EIR pursuant to Section 11.03(3)(a)(1)(a) of the MEPA regulations. It alters one or more acres of Bordering Vegetated Wetlands (BVW). The project will require a Chapter 91 License and Permit, a Section 401 Water Quality Certificate from the Department of Environmental Protection (DEP). It might require a Variance from the Wetlands Protection Act from DEP if the project does not meet the limited project provisions with the Saugus Conservation Commission. The project must comply with the National Pollutant Discharge

Elimination System (NPDES) General Permit for stormwater discharges from a construction site. It will need a Section 404 Programmatic General Permit (Category II) from the U.S. Army Corps of Engineers. An Order of Conditions will be required from the Saugus Conservation Commission for work within a resource area. Because the proponent is not seeking financial assistance from the Commonwealth for the project, MEPA jurisdiction is limited to those aspects of the project within the subject matter of required state permits (wetlands, waterways, and stormwater) that may have significant environmental impacts.

The proponent has estimated that the disposal of excavated material will generate approximately 30 to 40 truck trips per day for four to six weeks.

Single EIR/Waiver Request:

In accordance with Section 11.05(7) of the MEPA regulations, the proponent submitted an ENF with a request that I allow the proponent to fulfill its EIR obligations under MEPA with a Single EIR, rather than require the usual two-step Draft and Final EIR process. The ENF received an extended public comment period pursuant to Section 11.06(1) of the MEPA regulations. I have reviewed the proponent's request for a Single EIR in accordance with Section 11.06(8) of the MEPA regulations, and I find that the ENF was not an "Expanded" ENF. I find that the ENF did not meet the enhanced standards required in the MEPA regulations. The ENF describes and analyzes only some aspects of the project and not all feasible alternatives; it provides some of the detailed baseline information in relation to which potential environmental impacts and mitigation measures can be assessed; and it does not demonstrate that the planning and design of the project has used all feasible means to avoid potential environmental impacts. Therefore, I am denying the proponent's request to prepare a Single EIR. The proponent must prepare a Draft and a Final EIR in fulfillment of the requirements of Section 11.03 of the MEPA regulations. Should the Draft EIR resolve the substantive issues outlined below, I will consider the procedural options available to me at 301 CMR 11.08(8)(b)(2), as they relate to the Scope for the Final EIR.

SCOPE

As modified by this scope, the DEIR should conform to Section 11.07 of the MEPA regulations for outline and content. The DEIR should resolve the remaining issues outlined below. It should address the comments listed at the end of this Certificate to the extent that they are within this scope, and it should include a copy of this Certificate and all comment letters.

Project Description:

The DEIR should provide a detailed project description with a summary/history of the project. It should include existing and proposed site plans. The DEIR should identify and describe any project phasing. It should describe each state agency action required for the project. The DEIR should demonstrate how the project is consistent with the applicable performance standards. It should contain sufficient information to allow the permitting agencies to understand the environmental consequences of their official actions related to the project.

Alternatives Analysis:

In addition to the Preferred Alternative, the No-Build Alternative (Alternative A), the DEIR should discuss the alternatives from the ENF. The proponent has evaluated alternatives with the ability to avoid or minimize wetland related impacts, all centered on the excavation of the boat turning area within the Saugus River that bisects the property from north to south. Three alternatives were identified in the ENF:

- Alternative B - Preferred Alternative - the restoration of the turning basin and waterfront structures to their condition prior to the 1957 dam breach and the restoration of the portion of the Saugus River south of the historic turning basin area.
- Alternative C - identical to the Preferred Alternative, but it does not include the restoration of the Saugus River south of the historic turning basin.
- Alternative D - identical to the Preferred Alternative, except that only 40-percent of the southern area of the tidal basin would be excavated and restored to approximate 1954 contours.

The DEIR should summarize the alternatives already developed for the project site by the proponent. The analysis should clearly present the alternative configurations at the site and identify the advantages and disadvantages of the Preferred Alternative. The DEIR should provide a comparative analysis that clearly shows the differences between the environmental impacts associated with each of the alternatives.

Waterways Licensing/Permitting:

The DEIR should identify if the existing pier, bulkhead, and bridge are licensed under the Chapter 91 Waterways Program. It should state whether any new Chapter 91 License would be required for existing or proposed structures. The DEIR should describe the

Chapter 91 Permit that will be required for the dredging portion of the project in the Saugus River.

The DEIR should provide the information necessary for a complete filing under the Chapter 91 Licensing Program. This should include an alternative analysis; public purpose determination; provisions for open space, setbacks, and view facilities; description of flooding conditions, if any, and facilities to encourage waterfront use; and a maintenance plan. The DEIR should address historical licensing information.

Wetlands:

The Commonwealth has endorsed a "No Net Loss Policy" that requires that all feasible means to avoid and reduce the extent of wetland alteration be considered and implemented. The Wetland Section of the DEIR should conform to this approach by first examining options that avoid impacts to wetland resource areas, their associated buffer zones, riverfront protection areas and 100-year flood plain areas. Where it has been demonstrated that impacts are unavoidable, the DEIR should illustrate that the impacts have been minimized, and that the project will be accomplished in a manner that is consistent with the Performance Standards of the Wetlands Regulations (310 CMR 10.00).

The DEIR should address the significance of the wetland resources on site, including public and private water supply; riverfront areas; flood control; storm damage prevention; fisheries; shellfish; and wildlife habitat. It should identify the location of nearby public water supplies and wells.

All resource area boundaries, riverfront areas, applicable buffer zones, and 100-year flood elevations should be clearly delineated on a plan. Bordering vegetated wetlands that have been delineated in the field should be surveyed, mapped, and located on the plans. Each wetland resource area and riverfront area should be characterized according to 310 CMR 10.00. The text should explain whether the local conservation commission has accepted the resource area boundaries, and any disputed boundary should be identified.

Proposed activities, including construction mitigation, erosion and sedimentation control, phased construction, and drainage discharges or overland flow into wetland areas, should be evaluated. The locations of detention/infiltration basins and their distances from wetland resource areas, and the expected water quality of the effluent from said basins should be identified. This analysis should address current and expected post-construction water quality of the predicted final receiving water bodies. Sufficient mitigation measures should be incorporated to ensure that no downstream impacts would occur.

The drainage analysis should ensure that on- and off-site wetlands are not impacted by changes in stormwater runoff patterns. How will the project proponent maintain the amount of shading along the streambed and water temperatures after removing invasive plant species?

For any amount of required wetlands replication, a detailed wetlands replication plan should be provided in the DEIR that, at a minimum, includes: replication location(s) delineated on plans, elevations, typical cross sections, test pits or soil boring logs, groundwater elevations, the hydrology of areas to be altered and replicated, list of wetlands plant species of areas to be altered and the proposed wetland replication species, planned construction sequence, and a discussion of the required performance standards and monitoring.

Drainage:

The DEIR should evaluate potential drainage impacts on water resources from the dewatering of the dredged material. It should present drainage calculations and plans for the management of runoff from the dredged material. The DEIR should include a detailed description of the proposed drainage system design for the dewatering area, including a discussion of the alternatives considered along with their impacts. It should identify the quantity and quality of flows. The DEIR should identify the increased water storage volume that will result from the dredging/excavation of the boat basin.

The DEIR should address the performance standards of DEP's Stormwater Management Policy. It should demonstrate that the dewatering area is consistent with this policy. The proponent should use the DEP Stormwater Management Handbook when addressing this issue.

The DEIR should discuss consistency of the project with the provisions of the National Pollutant Discharge Elimination System (NPDES) General Permit from the U.S. Environmental Protection Agency for stormwater discharges from construction sites. The DEIR should include discussion of best management practices employed to meet the NPDES requirements, and should include a draft Pollution Prevention Plan.

Hazardous Wastes:

The DEIR should present a summary of the results of any hazardous waste studies and remediation for the dredged material to be removed from the site by the proponent.

Rare Species:

The DEIR should provide a summary of the project site's habitat assessment. It should identify if the project will impact the state-listed American waterwort, which has been identified in the stream channel of the Saugus River. The proponent has stated that it will maintain streambed levels, and it will monitor streambed levels. The DEIR should document the streambed and its proposed monitoring program. What kind of impacts occur if streambed levels cannot be maintained? The DEIR should describe any habitat enhancements.

Historical/Archaeological Issues:

The proponent should consult with the Massachusetts Historical Commission (MHC), the Massachusetts Board of Underwater Archaeological Resources, and the local Historic Preservation Commission as it proceeds with the project planning.

Construction Issues:

The DEIR should include a construction management plan that describes the project, phasing, erosion and sedimentation controls, monitoring, and contingencies.

Mitigation:

The DEIR should include a separate chapter on mitigation measures. The proponent should consider participating in proposals by the Town of Saugus to remove the existing weir structure that is located downstream of the project site within the Saugus River. This weir structure reduces the natural tidal flow from reaching the project site.

The DEIR should outline the proponent's wetland replication areas as part of its mitigation package.

This chapter on mitigation should include a proposed Section 61 Finding for all state permits. The proposed Section 61 Finding should contain a clear commitment to mitigation, an estimate of the individual costs of the proposed mitigation and the identification of the parties responsible for implementing the mitigation. A schedule for the implementation of mitigation should also be included.

Response to Comments:

The DEIR should respond to the comments received to the extent that the comments are within the subject matter of this scope. Each comment letter should be reprinted in the DEIR. I defer to the proponent as it develops the format for this

July 29, 2005

section, but the Response to Comments section should provide clear answers to the questions raised.

Circulation:

The DEIR should be circulated in compliance with Section 11.16 of the MEPA regulations and copies should also be sent to the list of "comments received" below and to Saugus officials. A copy of the DEIR should be made available for public review at the Saugus Public Library.

July 29, 2005

DATE


Stephen R. Pritchard

Cc: Nancy Baker, DEP/NERO

Comments received:

NPS, 7/5/05

CH2M, 7/6/05

CH2M, 7/11/05

NPS, 7/12/05

MA Board of Underwater Archaeological Resources, 7/19/05

MCZM, 7/22/05

DEP/NERO, 7/22/05

Saugus River Watershed Council, 7/22/05

e13563

SRP/WTG/wtg

1.0 Purpose and Need

The following sections detail the purpose and need for restoration of the Saugus Iron Works NHS turning basin and dock.

1.1 Purpose and Need for the Proposed Action

The National Park Service (NPS) at Saugus Iron Works National Historic Site is proposing to restore its historic waterfront area, which was damaged in 1957 from sediments released following an upstream dam breach, and to improve the function of its wetlands. The project proposes to rehabilitate the historic waterfront structures, return a portion of the historic tidal basin to its open-water condition, and restore native wetlands.

Consistent with the legislated mission of Saugus Iron Works National Historic Site and NPS mission goals, rehabilitation of the historic waterfront would facilitate visitor understanding of the pivotal role that the Saugus River and the iron works played during the colonial era in the history of the United States. Moreover, the restoration of the river environment would improve biodiversity by enhancing native plant, fish, and wildlife habitat.

Furthermore, this project offers a unique opportunity to demonstrate the restoration of an urban coastal river environment through a partnership-based approach. The restoration of the historic iron works landscape within a tidal freshwater river environment could serve as a model both for integrated historic and natural resource preservation and for tidal freshwater wetland restoration in an urban setting. The NPS would collaborate with scientists, regulators, citizen groups, and interested members of the public as part of project implementation and monitoring, and would use this project as a springboard to celebrate the historic and natural resources of the Saugus River and to promote their long-term stewardship.

1.2 Historical Background

Saugus Iron Works NHS in Saugus, Massachusetts, is the site of the first integrated iron works in North America, which operated from 1646 to 1668. Saugus Iron Works NHS is an 8.51-acre park located about 10 miles north of Boston in Essex County, Massachusetts (Figures 1 and 2). The site, which is administered by the NPS, preserves and interprets the archaeological and historic areas, structures, and objects, and reconstructs the historical setting of the iron works.

In 1957, a breach of the Prankers Pond dam on the Saugus River upstream of the site resulted in extensive sedimentation in the turning basin, which is an important historical element of Saugus Iron Works NHS. Consequently, 3.58 acres of the river within the NHS are choked with invasive plant species and the sediments are impacted by industrial contaminants from the urbanized Saugus River watershed, as well as from waste material produced by the historic iron works (i.e., the slag pile) (see Appendix C).

The purpose of the proposed action is to restore the natural and cultural resources of Saugus Iron Works NHS. Restoring the reconstructed historic scene of the site would provide a more accurate portrayal of the iron-making industry and would enhance the quality of the visitors' experience. Restoration of the historic tidal basin to an open-water condition and the *Phragmites australis*-dominated marsh to a native emergent wetland would underscore the historical importance of the river setting for the iron works. The Saugus River was essential for the transport of raw materials to the site and of finished iron goods to local and international markets. The restoration also would improve biodiversity by enhancing native fish and wildlife habitat.

The Saugus Iron Works NHS GMP (NPS, 2002) recommends restoring the Saugus River turning basin to its original open-water condition to preserve the distinctive character of site resources and thereby provide for a quality visitor experience (Figure 3). The goal of the project is to restore the turning basin to an environment with a higher ecological value commensurate with a historically accurate setting and enhance the interpretive quality of the site. An open-water habitat with an emergent wetland would enhance the habitat for fish, waterfowl, and other birds. This goal would be achieved through the following project components:

- **Removal of contaminated wetland sediments.** The removal of contaminated wetland sediments covering 3.58 acres would help to minimize threats to human and ecosystem health and would improve natural habitats.
- **Removal of invasive exotic plant species.** Invasive plant species displace valuable native species and contribute to the narrowing of the river channel, threatening the health of wetland habitats and limiting biodiversity. This displacement also has impacted the site's viewsheds, as character-defining landscape elements are now blocked by stands of *Phragmites australis* (common reed) and other exotic invasive species. Control of invasive plant species infesting the marsh area is needed to improve biodiversity, restore habitat, and achieve a more historically accurate, natural wetland vista for visitor enjoyment and understanding.
- **Restoration of an open-water condition by regrading.** The current turning basin area would be restored to the 1954-period open-water and emergent wetland condition by excavating and regrading the marsh sediments (Figure 3). This would be achieved by careful selection of target elevations within the intertidal zone. The appropriate microtopography elevations can also serve to reduce the spread of invasive species, such as *Phragmites*.
- **Construction of emergent brackish wetlands using native vegetation.** Native vegetation would contribute to a more historically appropriate, ecologically diverse, and aesthetically pleasing landscape for visitors, and would also enhance wildlife habitat. An emergent wetland would be created along the river, bordered by non-vegetated mudflats at low tide (Figure 3).
- **Removal and in-kind replacement of the existing wood bulkhead and dock along the Saugus River.** Replacement of these elements of the historic waterfront area would restore the cultural landscape of the site, improve visitor understanding of the historical context in which these structures were used, and allow visitors better access to the

waterfront area. The dock and bulkhead are reconstructed elements of the seventeenth century iron works. The structures are listed on the National Register of Historic Places as “Wharf (Pier and Bulkhead) LCS # 40302”. The existing wood bulkhead is approximately 6.5 ft high and 110 ft long. The existing dock consists of a 36-ft by 12-ft timber plank supported by three 9-in by 7-in oak stringers (girts). Based on evaluation of the structures’ existing conditions, it was determined that the entire wooden bulkhead and dock would need to be removed and replaced with new wooden members. Stones beneath the dock would be removed during construction and replaced once the cribbing has been rebuilt. The replacement structures would take into account stability analyses and would be constructed to withstand expected design loads (e.g., personnel and maintenance vehicle loads) as well as applicable code requirements for public walkways. Currently, site visitors are restricted from using the dock because of safety concerns related to its degraded condition. The stone bulkhead was built by the First Iron Works Association in 1954 as part of the effort to reconstruct the colonial ironworks.

1.3 EA/DEIR Development Process

It is the intention of the NPS to address Massachusetts Environmental Policy Act (MEPA) issues through the NEPA process. This Environmental Assessment and Draft Environmental Impact Report (EA/DEIR) has been prepared in accordance with the National Environmental Policy Act (NEPA) of 1969 and implementing regulations, 40 Code of Federal Regulations (CFR) Parts 1500-1508; NPS Director's Order #12 and handbook, Conservation Planning, Environmental Impact Analysis, and Decision-making; and Section 106 of the National Historic Preservation Act (NHPA) of 1966 as amended, and implementing regulations, 36 CFR Part 800, and NPS Director’s Order #28 Cultural Resource Management. The EA/DEIR has also been prepared in accordance with MEPA regulations 310 CMR Section 11.

1.3.1 Coordination with State Agencies

The Restore Saugus Turning Basin project will require a number of local, state, and federal permits or approvals. Some required approvals entail multi-jurisdictional potential actions involving state and federal (e.g., 404(b)(1)/Section 401 Water Quality Certification) or local and federal (e.g., Section 106 Review) agencies. Because of the array of permits required from the state to implement the Restore Saugus Turning Basin and Dock, planning for the project has required coordination with state regulatory agencies, particularly the Executive Office of Environmental Affairs (EOEA) which includes Massachusetts Environmental Policy Act (MEPA) Office, Office of Coastal Zone Management (CZM), Division of Marine Fisheries, and the Riverways Program. The NPS has also coordinated the project with Massachusetts Department of Environmental Protection (DEP). Massachusetts DEP administers Section 401 of the federal Clean Water Act, 33 U.S.C. 1251 *et seq.*, for the discharge of dredged or fill material, dredging, and dredged material disposal in waters of the United States within the Commonwealth. Massachusetts DEP also administers Massachusetts Waterways Regulations; and Wetlands Protection Act Regulations. In addition, NPS has consulted with the Saugus Conservation Commission, and Massachusetts Historical Commission (MHC).

Required permits and a brief discussion of requirements that are considered key to the planning and permitting of the Saugus Turning Basin project are discussed in Section 5.2, Compliance Needs.

1.3.2 Executive Office of Environmental Affairs (MEPA) Procedural History

The MEPA Office conducts environmental impact reviews of projects requiring state agency action, specifically granting state permits. Although MEPA review is not a permitting process, it does require public study, disclosure, and development of feasible mitigation for proposed actions. MEPA review occurs before permitting agencies act, to ensure that they know the environmental consequences of their actions. MEPA provides the mechanism through which information collection and mitigation mandate is executed. The process is public and encourages comments from the public and from state, regional and local agencies. Restore Saugus Turning Basin and Dock is a federal action requiring the issuance of water quality permits, therefore, it must be reviewed by MEPA before the permitting agencies can act.

The submission of the ENF for the Saugus Iron Works in May 2005 started the official MEPA review process for the Restore Saugus River Turning Basin and Dock. On July 29, 2005, pursuant to the Massachusetts Environmental Policy Act (M.G.L. c. 30, ss. 61-62H) and the MEPA Regulations (301 CMR 11.00), the Secretary of the Executive Office of Environmental Affairs (EOEA) made the determination that the Restore Saugus Iron Works Turning Basin and Dock project requires the preparation of an Environmental Impact Report (EIR). The EOEA Number is 13563. The Secretary's ENF Certificate of July 29, 2006 (included in the front matter of this EA/DEIR), establishes the scope for this EA/DEIR. In addition to the EA/DEIR subject matter outline contained in Section 11.07 of the MEPA regulations, several major issues were emphasized as subjects to be addressed in this EA/DEIR:

- Provide detailed project description with a summary / history of the project;
- Include existing and proposed site plans;
- Identify and describe any project phasing;
- Describe each state agency action required for the project;
- Demonstrate how the project is consistent with applicable performance standards;
- Provide sufficient information to allow permitting agencies to understand the environmental consequences of their official actions related to this proposed undertaking

1.3.3 Massachusetts Office of Coastal Zone Management (CZM)

The mission of CZM is to balance the impacts of human activity with the protection of coastal and marine resources. Massachusetts CZM was specifically established to work with other state agencies, federal agencies, local governments, academic institutions, nonprofit groups, and the general public to promote sound management of the Massachusetts coast. CZM is not a permitting agency; however it does have the authority to review federal activities in the Massachusetts coastal zone to ensure that they are consistent

with CZM program policies. Because the Restore Saugus River Turning Basin and Dock is a federal undertaking it must be approved by CZM before the action can take place.

1.3.4 Riverways Program

The mission of the Riverways Program is to promote the restoration and protection of the ecological integrity of the Commonwealth's watersheds, rivers, streams and adjacent lands. Goals of the Riverways Program are to protect and restore water quality, protect healthy stream flows, protect land along rivers and streams, improve habitat for wildlife and fish in river corridors, and to promote public access to and along rivers and streams consistent with resource protection. The Riverways Program is not a permitting agency and seeks to encourage and support local river protection initiatives as a vital complement to state action. By restoring an open water condition in the Northern Area of the Turning Basin the project would restore water quality, protect stream flows, improve habitat for wildlife and fish, and enhance public understanding of the function of the Turning Basin consistent with resource protection.

1.3.5 Division of Marine Fisheries

Marine Fisheries is responsible for the management of anadromous fish resources of the Commonwealth and has broad legal authority within the Commonwealth to provide suitable passage for anadromous fish coming into fresh water to spawn. The Saugus River is home to anadromous fish species such as the rainbow smelt, American shad and river herring (alewives and blueback herring). Marine Fisheries works to provide fishway maintenance, reconstruction and replacement of fishway passage facilities. Marine Fisheries is not a permitting agency.

1.3.6 Department of Environmental Protection

The Department of Environmental Protection (DEP) is the state agency responsible for ensuring clean air and water within the Commonwealth of Massachusetts. DEP administers regulations relating to the discharge of dredged or fill material, dredging, and dredged material disposal activities in waters of the United States within the Commonwealth which require federal licenses or permits and which are subject to state water quality certification under 33 U.S.C. 1251, *et seq.* Massachusetts DEP issues 401 Water Quality Certification for Discharge of Dredged or Fill Material, Dredging, and Dredged Material Disposal in Waters Within the Commonwealth.

1.4 Purpose and Significance of the Park

To preserve and interpret the archeological sites and features, the historic and reconstructed structures and scene, and the museum collections associated with America's first sustained, integrated, and successful iron works venture, which operated at this site on the Saugus River from 1646 to about 1670.

To assist in the interpretation of the Essex National Heritage Area, especially the theme of early settlement.

- Saugus Iron Works NHS mission (NPS, 2002)

Saugus Iron Works NHS is the best evidence and demonstration of the earliest development of iron manufacturing in colonial America. The original manufacturing site served as a training ground for skilled iron workers for what would become America's iron and steel industry. Iron making provided the infrastructure for the rise of other colonial industries. Called "the forerunner of America's industrial giants," the site served as a center for technology, innovation, and invention (www.nps.gov/sair).

The reconstructed site illustrates the critical role of iron making in 17th century settlement and its legacy in shaping the early history of the nation. The site's setting on the Saugus River, featuring an open-air museum with working waterwheels, evokes a unique experience for visitors. These resources demonstrate 17th century engineering and design methods, iron-making technology and operations, local and overseas trade, and life and work in the Massachusetts Bay Colony.

The southern gateway to the Essex National Heritage Area (NHA), Saugus Iron Works NHS links thousands of historic places in Essex County related to the historical themes of colonial settlement, maritime trade, and early industrialization.

The site's resources are prominent examples of the colonial revival and historic preservation movements in the early-to-middle 20th century. Saugus Iron Works NHS itself is the result of preservation efforts by local citizens and the American Iron and Steel Institute.

In the sections that follow, a discussion of the project background, objectives, and scoping provides an understanding of the current needs of the site and the improvements necessary to uphold the mission of the NPS.

1.5 Project Background

The Saugus River and turning basin are integral landscape features of the historic setting at Saugus Iron Works NHS. They represent the importance of coastal rivers as a vital transportation network in the seventeenth century.

Taking advantage of a location along the Saugus River at the northern extent of tidal influence on the Saugus River, English settlers in colonial North America built the Saugus iron works in 1646. The Saugus plant containing a blast furnace, forge, rolling and slitting mill, warehouse, blacksmith shops, a grist mill, and a dock from which company boats carried iron products to Boston, was one of only a dozen such plants in the 17th century world. In 1676 the iron works operation was discontinued and the plant eventually deteriorated and disintegrated. In the early 20th century, in response to a proposal to remove colonial structures from the property to Michigan, Saugus residents formed the First Iron Works Association (FIWA) in 1943. Beginning in 1949, the American Iron and Steel Institute began funding an archaeological investigation and excavation of the site. The Institute also funded reconstruction of the colonial era plant, which was designed by the architectural firm of Perry, Shaw, Hepburn, Kehoe, and Dean, prominent designers of Colonial Williamsburg. In 1954 the site was opened to the public.

In 1957, a dam breach upstream of the site caused extensive sedimentation in the turning basin. After the Iron and Steel Institute withdrew funding in 1962, FIWA began a campaign to have the NPS administer the property. This occurred in the late 1960s when Saugus Iron

Works National Historic Site was authorized on April 5, 1968 (Public Law 90-282). The site's legislated mission is to preserve in public ownership the first sustained integrated iron works in the Thirteen Colonies.

Sedimentation of the turning basin at Saugus Iron Works has resulted in non-native invasive plant species filling nearly four acres of the river, thus hindering the interpretive aspect of the NHS. Various features essential to maintaining Saugus Iron Works NHS are in need of restoration, particularly the cultural and historic landscape and the ecological value of the turning basin. Restoration of the site requires removal of invasive plant species and deposited sediment across the turning basin and southern area, as well as reconstruction of the deteriorated dock and bulkhead at the site.

During the general management planning process for Saugus Iron Works National Historic Site in 2002, public comment and professional expertise were sought in investigating the park's resource conditions and in evaluating impacts. The planning process identified several issues that hinder the visitor experience and negatively impact the park's cultural and natural resources. Three fundamental objectives were identified: (1) to preserve the distinct character of park resources; (2) to provide for quality visitor experiences; and to (3) ensure organizational effectiveness.

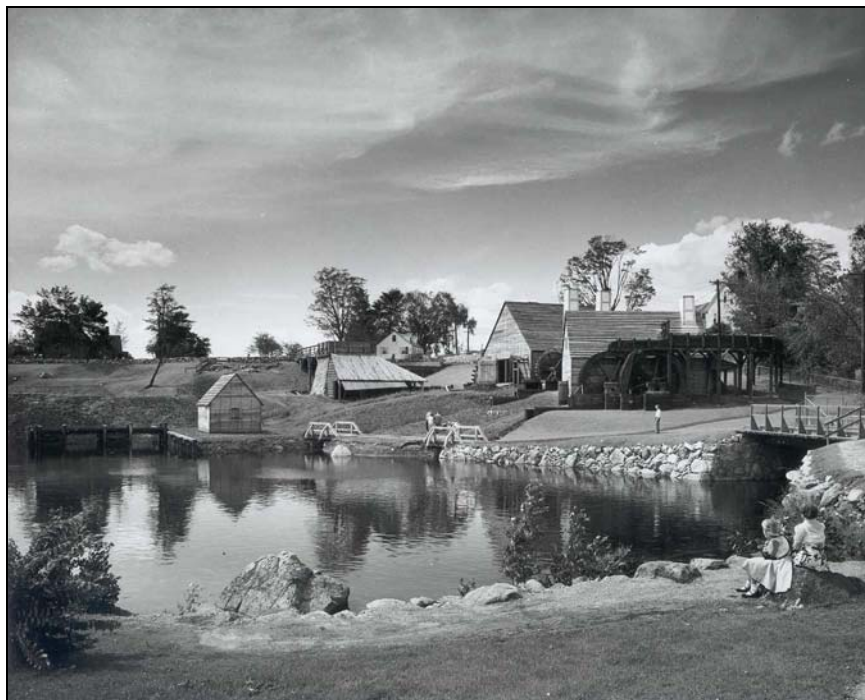


Photo 1 - Saugus River, Saugus Iron Works turning basin, 1954 (NPS photograph).

Various studies have been conducted to better understand the current conditions of the site. These studies include, but are not limited to, the following:

- Restore Saugus River Turning Basin and Dock -- Internal Scoping (CH2M HILL, 2004a)
- Restore Saugus River Turning Basin and Dock -- Pre-Design Report (CH2M HILL, 2004b)

- Restore Saugus River Turning Basin and Dock – Marsh Characterization (CH2M HILL, 2004c)
- Restore Saugus River Turning Basin and Dock -- Regulatory Needs Assessment (CH2M HILL, 2004d).
- Restore Saugus River Turning Basin and Dock – Tidal Monitoring Addendum to the Marsh Characterization Report (CH2M HILL, 2004e)
- Restore Saugus River Turning Basin and Dock -- Value Analysis Report (CH2M HILL, 2004f)
- Restore Saugus River Turning Basin and Dock – Aquatic Habitat and Benthic Invertebrate Study (CH2M HILL, 2004g)
- Restore Saugus River Turning Basin and Dock – Schematic Design (CH2M HILL, 2004h)
- Summary of Wetland Delineation Activities, Saugus Iron Works National Historic Site (CH2M HILL, 2004i)

Results from a previous study (Goff-Chem, 1995) showed that the quality of the sediment within the project area has been impacted by priority pollutant metals (PPMs) and polycyclic aromatic hydrocarbons (PAHs). These results prompted the NPS to request a Marsh Characterization study (CH2M HILL, 2004c; Appendix C). Most of the samples from this study contained detectable concentrations of PPMs; the most frequent detections were arsenic, chromium, lead, nickel, and zinc. PAHs also were detected, but less frequently than the metals. PAHs were detected at 10 of the 20 sampling locations, mostly in the upper organic peat layer (CH2M HILL, 2004c).

The detected PPM and PAH concentrations were compared with Massachusetts Contingency Plan Reportable Concentrations for Soil Category 1 (MCP RCS-1) (DEP, 1999), and six of the 20 sampling locations contained concentrations of PPMs or PAHs greater than the MCP RCS-1 values (CH2M HILL, 2004c). All but one sampling location with MCP RCS-1 exceedance of the PAH criteria were closest to the Saugus River. This pattern of contamination would seem to be consistent with contaminant migration and deposition from an upstream release of PAHs.

After the Marsh Characterization Report was submitted, an in-depth review of the environmental setting and conditions in which the marsh sediments were deposited (e.g., a tidal setting and deposition relating to a dam breach) led to discussion with Massachusetts Department of Environmental Protection (DEP). Discussions with the DEP in August 2004 confirmed that it was not necessary to report the sediment sampling results under the 120-day notification requirement of the Massachusetts Contingency Plan.

1.5.1 Previous Planning

The GMP (NPS, 2002) presents and analyzes alternative management options for Saugus Iron Works NHS. During the GMP process, public comment and professional expertise were solicited to analyze the park's existing resource conditions and to evaluate impacts to them under two action alternatives and a no-action (or continued management action). During this planning, several issues concerning the park's cultural landscape and wetland

marsh were identified. The GMP identified two management zones within the park, a cultural zone, including resources contributing to Saugus Iron Works' historical importance and thus to its establishment as a NHS and a development zone or areas where new construction or development may occur. The cultural zone includes the Saugus River within the park and its associated wetlands. It is the only planning document relevant to this EA/DEIR. The GMP briefly states the need for improving the turning basin and does not include details of a planned restoration for the area because a restoration was not a realistic option at the time the GMP was written. The GMP states, "Park natural resources that have been damaged by human activities may need to be corrected. The silting of the river, the invasion of exotic plant species, and the loss of navigability are the major examples. Appropriate inventories, studies, and consultation will precede any restoration program." (NPS, 2002) The turning basin, including the Saugus River within the site and its associated wetlands, is included in the cultural zone. Numerous studies, stakeholder meetings and consultation for restoring the integrity of the cultural landscape have since occurred, and a proposed restoration of the area is now feasible and consistent with the objectives set forth in the GMP.

During internal scoping, an NPS list of issues was discussed and reviewed for inclusion in the ESF. Potential resource impacts were identified by the internal scoping team through the analysis process described in NPS DO #12 subsection 2.9 guidance. Numerous meetings with stakeholders were held to identify, discuss and analyze issues and impacts associated with the proposed restoration. Public comment was solicited for these resource impacts during the public open house held November 9, 2004, and will be gathered during the public comment period as well. Meetings included but were not limited to the following:

- Kickoff Meeting - April, 2004
- Value Analysis Meeting- June, 2004
- Internal Scoping Meeting- July 8, 2004
- Pre-Application Regulator Meeting- September, 2004
- Public Open House, Saugus Iron Works NHS - November, 2004
- Second Pre-Application Regulator Meeting- December, 2004
- Final Design Kickoff Meeting- February, 2004
- 30% Design Meeting - April, 2005

1.5.2 Internal Scoping

The internal scoping meeting occurred at Saugus Iron Works NHS on July 8, 2004, with NPS and CH2M HILL personnel attending. The meeting served as an opportunity for discussion and further understanding of the project, pertinent issues, possible alternatives, constraints and local considerations.

Internal scoping is an interdisciplinary process and, at a minimum, involves NPS staff participation to define issues, alternatives, and data needs. In addition to those goals previously listed, the Saugus Iron Works NHS internal scoping meeting was used to discuss purpose and need; brainstorm any connected, similar, or cumulative actions associated with the proposed action; decide on the appropriate level of documentation; develop a public involvement approach; and review preliminary regulatory needs. As part of the NEPA process, the interdisciplinary team members developed an Environmental Screening Form (ESF) to serve as a guide in determining affected resources (CH2M HILL, 2004a). The form

was presented, discussed, and updated during the scoping meeting. The ESF, along with input from agencies and other experts, is used to decide the appropriate level of documentation for the NEPA analysis.

1.5.3 External Scoping

Public input, review, and comment were encouraged by way of press releases, public mailings that included owners of properties abutting the site as well as other stakeholders, and an open house. The press released appeared in the following local newspapers: the *Saugus Advertiser*, the *Saugonian*, the *Lynn Daily Item*, and the regional section of the *Boston Globe*.

An open house was held at Saugus Iron Works NHS on November 9, 2004, to provide an opportunity for oral comment on the Proposed Action and to distribute site and restoration proposal information. A combination of posters and brochures displayed the geographical and regional setting of the site and an aerial view of the NHS. Photos of the mudflats at high and low tide, as well as historical views of the site, were included to increase public comprehension of the project. The conceptual plan and schematic design drawings (Figure 4) also were available for public viewing, and sign-up sheets and comment cards were distributed. An invitation to the open house was posted on the Saugus Iron Works NHS website and letters were sent to the State Historic Preservation Officer (SHPO), stakeholders, and other interested parties. During the public comment period, the proposed action and related information would be available for public review and comment on the Saugus Iron Works NHS website. Copies of the EA/DEIR would also be available at Saugus Iron Works NHS and Saugus Public Library.

1.6 Issues

Various features essential to maintaining the Saugus Iron Works NHS need restoration. In particular, the historic scene has been deteriorating as growth of invasive plant species and crumbling rock retaining walls continue to alter the cultural and historic landscape. The current sediment-filled turning basin detracts from the interpretation of the iron works as a colonial industrial and necessary sea transportation operation and the ecological value of the turning basin and southern area has also deteriorated as a result of the sedimentation and consequent invasion of non-native species. In addition, visitor access is currently restricted from the deteriorated dock as a safety precaution. To reconstruct the historic scene, the cultural landscape, ecological habitats and viewsheds, the turning basin and southern area need to be restored by replacing the unsafe dock and bulkhead, and by removing the invasive species and deposited sediment.

1.7 Issues Beyond the Scope of this Document

1.7.1 Removal of the Rock Weir at Hamilton Street Bridge

To the south of the project site, next to the Hamilton Street Bridge, the First Iron Works Association placed large rocks in the Saugus River to form a weir, which was intended to enhance the open water condition of the river and slow tidal surge. The rock weir creates a backwater condition upstream of the weir for approximately 655 feet. If the rock weir was

removed, the backwater condition would be eliminated and the river would flow as it does in the upstream reaches of the project site. A National Park Service engineering assessment of the Hamilton Street rock weir conducted in 2005, found that the weir is breached during all recorded tidal events, that it encompasses a small portion of the water column during high tide events, and considering the rate at which the tide rises, the rock weir is crested very early in each tide event (NPS, Assessment of the Rock Weir at Hamilton Street Bridge, 2005). The NPS study suggests that the Hamilton Street Bridge may have more of an influence on reducing the amount of salt water entering the project site, because the bridge is a significant constriction in the river. The NPS engineering study finds that removal of the rock weir would not likely have a (sizable) significant effect on the upstream salinity values, and it would not (substantially) significantly affect peak water surface elevations. Removal of the rock weir may allow navigation of the river in this area by small water craft such as canoes or kayaks.

The weir is located approximately 700 feet down stream from the National Historic Park boundary and is not owned by NPS and is not under NPS jurisdiction. State, local and federal agencies as well as some project stakeholders have expressed the desire and support for the removal of the weir as a part of this project. Because of the location of the weir outside park property, and the current undetermined ownership of the weir, the removal of the structure is not considered a current part of this project. However, the NPS is committed to looking for creative ways to collaborate with other agencies and organizations in removing the Hamilton Street Bridge weir. Because the high level of support makes the removal of the weir reasonable foreseeable, it is included in the impact analysis for this project as a cumulative action.

1.8 Impact Topics

The following sections detail the identification of impact topics and list the impacts included in this document as well as those topics that were dismissed from further analysis.

1.8.1 Derivation of Impact Topics

The NPS generated a working list of potential issues through analysis of applicable federal laws, regulations and Executive Orders, the 2002 Saugus Iron Works GMP, and NPS knowledge of limited or readily impacted resources. During the internal scoping meeting, these issues were analyzed and either dismissed or categorized as impacts. A brief rationale for the identification of each impact topic is given below, along with the rationale for dismissing specific topics from further consideration. For a list of contributors and consultants that collaborated during the identification process, please see Section 5.0 Consultation and Coordination.

1.8.2 Impact Topics Included in this Document

Each impact derived was reviewed and analyzed for type (beneficial or adverse), context (site-specific, local, or regional), intensity (negligible, minor, moderate, or major), duration (short or long-term), and impairment (would or would not impair site resources and values).

As a result of activities associated with the proposed restoration, the following impact topics may be beneficially or adversely affected and were therefore retained for further analysis in Section 4.4, Impact Analysis:

- Soundscapes
- Water quality and quantity
- Marine or estuarine resources
- Floodplains or wetlands
- Unique or important wildlife or wildlife habitat
- Unique, essential, or important fish or fish habitat
- Recreation resources, including supply, demand, visitation, activities, etc.
- Visitor experience, aesthetic resources
- Resource, including energy, conservation potential, sustainability
- Urban quality, gateway communities, etc.
- Long-term management of resources or land/resource productivity
- Cultural resources, including archeological resources, prehistoric/historic structures, and cultural landscape.

1.8.3 Impact Topics Dismissed from Further Analysis

Topics that were estimated to have negligible or no impact were not retained for further analysis. These are listed below along with the justification for dismissal.

Air quality. This impact topic was not retained because any potential impact that would occur to resources would be negligible. Air quality at Saugus Iron Works NHS may be adversely affected in the short term. Though likely negligible, air quality may be affected as a result of emissions from equipment used during the course of the project. Air quality also may be affected during removal activities due to a naturally occurring sulfide odor that may arise during sediment removal.

Streamflow characteristics. No construction work would take place within the river channel itself and the stream course and flow would not be disturbed. Restoration activities would likely not impact stream flow characteristics; therefore, this resource was not considered to be an impact topic.

Species of Special Concern or their habitat. In April 2004, rainbow smelt was listed as a species of concern by the National Marine Fisheries Service (NMFS), and would thus require special attention. However, because no work would take place during the smelt run (February 15 through June 30); the project is expected to have no effect on species of special concern or their habitat. In a letter dated September 15, 2004, the NMFS states that "no threatened or endangered species under the jurisdiction of the NMFS are known to exist in the Saugus area." Letters from the U.S. Fish & Wildlife Service (USFWS) and Division of Marine Fisheries (DMF) concur that no rare species are known to occur on site (see Appendix B).

Since receipt of the letters, American waterwort (*Elatine americana*), a state-listed endangered plant, was tentatively identified within the stream channel at the site. However, the species in question was confirmed to not be *Elatine Americana* by the Massachusetts Natural Heritage & Endangered Species Program (Appendix B).

Water supply. There would not likely be any interbasin transfer, withdrawal from groundwater or surface water, or any impact to municipal or regional water supply as a result of the restoration activities. Therefore, this resource was dismissed as an impact topic.

Wastewater. It is unlikely that there would be any discharge to groundwater, surface water, or outstanding resource water as a result of this project. Because municipal or regional wastewater facilities would not likely be impacted, this is not considered an impact topic.

Other transportation facilities. The restoration project would have no impact on other transportation facilities (i.e., trains, planes, boats) and therefore is not considered an impact topic.

Solid and hazardous waste. It is unlikely that restoration activities would create hazardous waste. Removed soil and sediment would be tested, transported and disposed pursuant to the appropriate state and federal guidelines. Therefore, this is not considered an impact topic.

Coastal hazards. The project is not likely to present any impact to coastal resources because the habitat is not considered a barrier beach, nor does contain sand dunes. Because coastal hazards are not applicable to the project, this is not considered an impact topic.

2.0 Description of the Proposed Action and Alternatives

The NPS is proposing a project that would restore the Saugus River turning basin and reconstructed 17th century waterfront structures (dock and bulkhead) at Saugus Iron Works NHS. The following sections detail the four alternatives considered, as well as the identification of the preferred alternative. The four alternatives were identified during a value analysis meeting with several stakeholders. For additional detail on the identification of alternatives, please refer to the Restore Saugus River Turning Basin and Dock Value Analysis Report (CH2M HILL 2004f). Under each alternative, five key components of the project are reviewed, and activities associated with each component are described. The five key components of the proposed action are:

- Turning Basin Sediments
- Turning Basin Vegetated Wetland
- Southern Area Sediments
- Southern Area Vegetated Wetland
- Bulkhead, and Dock

2.1 Alternative A (The No-Action Alternative)

Alternative A is the no-action alternative. The dock, bulkhead, turning basin, and southern area would remain unchanged. This alternative does not involve discontinuing existing maintenance or operational procedures of the site.

Turning Basin Sediments. All contaminated sediments would remain in place.

Turning Basin Vegetated Wetland. Existing non-native species of vegetation would remain in place.

Southern Area Sediments. All contaminated sediments would remain in place.

Southern Area Vegetated Wetland. Existing non-native species of vegetation would remain in place.

Bulkhead and Dock. The decaying bulkhead and dock would remain in place, unchanged.

2.2 Alternative B (The Preferred Alternative)

After an evaluation of all proposed alternatives and the no-action alternative and a stakeholder value analysis meeting, the NPS has identified Alternative B as the preferred action for the restoration of the Saugus River turning basin and dock. Part of the rationale for identifying Alternative B as the preferred alternative is its consistency with the goals and objectives set forth in the GMP (NPS, 2003). The proposed action can be characterized as "restoration" of the turning basin and waterfront structures to their condition prior to the

1957 dam breach. It also includes restoration of the portion of the Saugus River south of the historic turning basin area, within site boundaries (henceforth referred to as the “southern area”) to conditions prior to the dam breach. Approximately 9,000 cubic yards of sediment within the historic location of the turning basin would be removed within the turning basin and southern area.

Turning Basin Sediments. The proposed sediment removal would alter approximately 1.00 acre of low quality, invasive species-dominated vegetated tidal wetlands within the Northern Area. Sediments deposited during the 1957 dam breach would be excavated, tested, dewatered, and disposed of off site pursuant to the appropriate and applicable state standards. The spoils likely would be disposed of in an unlined landfill, though the plan contains a contingency for disposing of 30 percent of spoil in a treated landfill. The turning basin and marsh would be excavated to proposed base grades, which would be determined based on historical excavation drawings of the original turning basin, water surface elevation data collected during the tidal change study, the depth of pre-1957 sediments as determined from the sediment cores collected during the marsh characterization study, and the baseline topographic survey. Grades would be designed to restore an open-water turning basin at high tide and a vegetated wetland with some non-vegetated areas at low tide.

Turning Basin Vegetated Wetland. Emergent vegetation would be removed from the project area during excavation of the turning basin. Wetland species present in this area, such as cattail (*Typha angustifolia*) and the invasive purple loosestrife (*Lythrum salicaria*), would be removed as part of this activity. The final restored condition would provide approximately 0.90 acres of open water/mud flat habitat and 0.05 acres of vegetated tidal wetland characterized by a diversity of native species. After sediment removal efforts are complete, native marsh grasses would be reestablished in the area. Prescribed plantings and seeds should take hold and provide increased vegetative diversity. Recolonization by native species should increase yearly. Herbicide treatment, manual removal, and proper disposal would ensure effective *Phragmites* control until the emergent wetland is established.

The area immediately west of the channel would be altered to create a 150 feet by 12 feet stabilized gravel/cobble berm (0.05 acres), planted with a diverse assemblage of shade-producing native shrubs as well as herbaceous perennials, thereby protecting the existing riffle habitat that is utilized by spawning rainbow smelt. The berm would be gradually sloped down at its terminus and overlain with 3 to 6-inch cracked native stone to increase the stability of the berm and enhance the habitat value for fishes. The slag pile, which is an original feature of the colonial iron works, would be preserved in its present state by the NPS during and after the project.

Southern Area Sediments. Sediments deposited in 1957 after the upstream dam break would be excavated across approximately 2.75 acres. Contaminated sediments deposited during the 1957 dam breach would be excavated and disposed of off site pursuant to the appropriate and applicable state standards. The area then would be excavated to grades designed to promote a healthy tidal marsh ecosystem and minimize the suitability of the area for exotic invasive plant species such as *Phragmites*. The majority of spoil disposal would likely be in unlined landfills, though final determination of the disposal site would

depend upon results of post-removal sediment testing to ensure proper disposal procedures.

Southern Area Vegetated Wetland. Non-native, invasive plant species would be removed during excavation of the southern area. After sediment removal and/or *Phragmites* control efforts are complete, native marsh grasses would be reestablished in the area. Prescribed plantings and seeds from nearby marshes should take hold and provide increased vegetative diversity. Recolonization by native species should increase yearly. Herbicide treatment, manual removal, and proper disposal would ensure effective *Phragmites* control until the emergent wetland is established. The southern area wetland would be revegetated in the same manner as described for the turning basin wetland. The final condition would provide approximately 1.45 acres of intertidal mud flat habitat and 1.3 acres of vegetated tidal wetlands.

Bulkhead and Dock. The existing dock and bulkhead located along the northern extent of the historic turning basin would be replaced in-kind once wetland restoration activities have been completed. The entire wooden bulkhead and dock structure, including timber crib supports, would be removed for landfill disposal and replaced with new wooden members. Analyses would be conducted on the existing retaining wall, oak timber, historic joints, and other components to determine their ability to meet design requirements. Alternatives or reinforcement methods would be evaluated in the case that the existing materials are not sufficient. Stones beneath the dock would be removed during construction and replaced once the cribbing has been rebuilt. The reconstructed dock would be designed to withstand personnel and maintenance vehicle loads and meet applicable code requirements for public walkways. All additions will be hidden to the eye and the wall will retain the same character and appearance as it did in 1954.

2.3 Alternative C

Alternative C is identical to the preferred alternative, but does not take action with respect to the southern area. This would leave an area of approximately 77,000 square feet (sf) of contaminated sediments and non-native vegetation in place. As described in the preferred alternative, approximately 9,000 cubic yards of sediment within the historic location of the turning basin and southern area would be removed.

Turning Basin Sediments. The proposed sediment removal would alter approximately 1.00 acre of low quality, invasive species-dominated vegetated tidal wetlands within the Northern Area. Contaminated sediments deposited during the dam breach would be excavated and disposed of off site pursuant to the appropriate and applicable state standards. The turning basin and marsh would be excavated to proposed base grades, which would be determined based on historical excavation drawings of the original turning basin, water surface elevation data collected during the tidal change study, the depth of pre-1957 sediments as determined from the sediment cores collected during the marsh characterization study, and the baseline topographic survey. Grades would be designed to restore an open-water turning basin at high tide and a vegetated wetland with some non-vegetated areas at low tide.

Turning Basin Vegetated Wetland. As described in the preferred alternative, non-native, emergent vegetation would be removed to allow for the reestablishment of naturally occurring marsh grasses and supplemental prescribed planting. Herbicide treatments or manual removal may be required in some cases to continue effective *Phragmites* control until the marsh is established.

Southern Area Sediments. No action would be taken with respect to the sediments in the southern area. Any existing contamination would be left in place, and topographical characteristics in the area would remain unchanged.

Southern Area Vegetated Wetland. No action would be taken with respect to vegetation in the southern area. Existing vegetation would remain in place.

Bulkhead and Dock. As described in the preferred alternative, construction activities include removal and replacement of the entire bulkhead, dock structure, crib supports and stone fill. Original materials that remain functional would be preserved to the extent possible. Where these materials are no longer suitable, reinforcements or other attempts would be made to maintain the historic character of the structure. The reconstructed dock would be designed to withstand design loads and meet applicable code requirements common to all public walkways.

2.4 Alternative D

Alternative D is similar to the preferred alternative, differing in that only 40 percent of the southern area of the tidal basin would be excavated and restored to approximate 1954 contours. The excavation and restoration effort in the southern area would occur in the northern most section of the “southern area” and would involve excavation and restoration of approximately 0.7 acres of wetlands. This would extend the restoration effort approximately half way down the southern area and leave approximately one acre of un-restored wetland area in the southern project area to maintain an open waterway with a removal of some invasive species, but maintaining a vegetated wetland. As described in the preferred alternative, approximately 9,000 cubic yards of sediment within the historic location of the turning basin and southern area would be removed.

Turning Basin Sediments. The proposed sediment removal would alter approximately 1.00 acre of low quality, invasive species-dominated vegetated tidal wetlands within the Northern Area. Contaminated sediments deposited during the dam breach would be excavated and disposed of off site pursuant to the appropriate and applicable state standards. The turning basin and marsh would be excavated to proposed base grades, which would be determined based on historical excavation drawings of the original turning basin, water surface elevation data collected during the tidal change study, the depth of pre-1957 sediments as determined from the sediment cores collected during the marsh characterization study, and the baseline topographic survey. Grades would be designed to restore an open-water turning basin at high tide and a vegetated wetland with some non-vegetated areas at low tide.

Turning Basin Vegetated Wetland. As described in the preferred alternative, emergent vegetation would be removed to allow for the reestablishment of naturally occurring marsh grasses and supplemental prescribed planting. Herbicide treatments or manual removal

may be required in some cases to continue effective *Phragmites* control until the marsh is established.

Southern Area Sediments. In approximately 40 percent of the southern area, sediments deposited during the 1957 dam breach would be excavated and disposed of off site pursuant to the appropriate and applicable state standards. The area then would be excavated to grades designed to promote a healthy tidal marsh ecosystem and minimize the suitability of the area for exotic invasive plant species.

Southern Area Vegetated Wetland. Invasive plant species would be removed during the excavation of approximately 40 percent of the southern area. This area would be revegetated in the same manner as described for the turning basin wetland.

Bulkhead and Dock. As described in the preferred alternative, construction activities include removal and replacement of the entire bulkhead, dock structure, crib supports and stone fill. Original materials that remain functional would be preserved to the extent possible. Where these materials are no longer suitable, reinforcements or other attempts would be made to maintain the historic character of the structure. The reconstructed dock would be designed to withstand design loads and meet applicable code requirements for public walkways.

2.5 Additional Restoration Activities Common to All Action Alternatives

The following sections describe additional restoration activities applicable to Alternatives B, C, and D. These activities include slag pile containment; sediment controls and long-term monitoring; wetland restoration; reconstruction of the bulkhead, and dock; and protection of existing site features.

2.5.1 Slag Pile Containment

If containment of the slag pile is necessary, it should maximize, to the extent possible, the existing configuration, historical character, and view of the slag pile, minimize long-term operations and maintenance requirements, and minimize impacts to the surrounding area. Only if necessary as determined at the time of construction, as a part of the restoration, the portion of the toe area that is within tidal influence would be armored with riprap or stone paving to protect the toe from erosion during tidal fluctuations or wave action. The cultural resource managers and SHPO would be consulted if such containment becomes necessary. In addition, the drainage swale would be stabilized to the west of the slag pile to minimize the potential for erosion and downgradient transport of slag materials.

2.5.2 Sediment Controls and Long-Term Monitoring

Sediment controls would be necessary to prevent sediment transport into the Saugus River channel during construction. Water containment or treatment is not deemed necessary based on previous sediment sampling results (CH2M HILL, 2004c).

The sediment control plan, which is designed to collect and settle out sediment before it can enter the river channel, consists of the two following components:

- A sediment barrier along the perimeter of the excavation where it abuts the Saugus River channel and
- Silt fencing along the perimeter of the dewatering/loading areas.

The sediment barrier between the excavation and the river channel is a physical barrier that would collect sediment along the edge of the excavation. The sediment would be contained and filtered from water within the excavation area. Potential barriers being considered include a silt fence supported by steel posts and wire mesh and conventional silt curtains.

Silt fencing along the perimeter of the dewatering/loading areas would serve to collect and contain sediment generated during dewatering, processing, and loading. The purpose of the fencing is to remove sediment at the source, thereby minimizing the volume of sediment that must be contained and collected within the excavation and perimeter barrier.

Other measures, including staged excavation and use of absorbent materials, would be utilized if deemed necessary during excavation. Staged excavation would involve breaking the excavations into components, either by designated areas of excavation or by intermediate silt curtains. Its purpose would be to provide intermediate settling areas or traps to collect sediment before it reaches the perimeter controls. Absorbent materials would be used in conjunction with other controls to contain and collect any oily residues that might be present in the work areas. Best management practices would be followed and implemented during restoration activities (Appendix D).

In addition, the sediment control program would include long-term water monitoring to ensure that water being released into the river conforms to applicable state and federal discharge standards. Included in the long-term monitoring would be *Phragmites* control with herbicides and manual removal by a full-time, on-site NPS employee. A monitoring and sampling plan is currently being developed (Appendix E).

2.5.3 Wetland Restoration

After the sediment is removed, an emergent wetland with bordering mudflats would be restored by grading the remaining sediments to promote a landscape of emergent marsh of native freshwater and brackish vegetation. This would be achieved by careful selection of target elevations within the intertidal zone, which would be derived from tidal change and contaminant studies, as well as topographic surveys. The appropriate microtopography elevations also could serve to reduce the spread of invasive species, such as *Phragmites*. Native vegetation would contribute to a more historically appropriate, ecologically diverse, and aesthetically pleasing landscape for visitors to appreciate, and also would enhance wildlife habitat. The creation of the vegetated wetlands would consist of removing the existing vegetation, preparing the soils, and planting. (CH2M HILL, 2004h).

Removal of Existing Vegetation and Preparation of Soils

To prepare the wetlands for planting, existing vegetation would be removed. The majority of vegetation removal would be concurrent with the sediment excavation. For existing vegetation above the excavation line but within the wetland area, *Phragmites* stalks, rhizomes, and root litter would be removed and disposed of accordingly. Removal efforts likely would require a combination of mechanical and manual removal. Any native, non-

invasive plant species found in these areas would be evaluated for inclusion in the vegetated wetland and, based on evaluation, may be left in place to support the wetland.

Existing conditions indicate that the soils in the proposed emergent wetland areas provide sufficient moisture-holding capacity to support the wetlands. Subsequent to the removal of existing vegetation, soils would be lightly compacted to a firm configuration necessary to support planting and minimize erosion.

Planting Plan

The selection of wetland plants would be based on the following considerations.

- Species must be native to the northeastern United States.
- Whenever possible, plants would be derived from local genetic stock.
- Native species identified during on-site wetland vegetation surveys or observed in comparison marshes would be chosen preferentially, as appropriate.
- *Phragmites australis* and other exotic invasive species would be excluded.
- A species' salinity tolerance must be appropriate for the salinity ranges provided by the wetland.
- A species' hydroperiods (i.e., water tolerance) must be appropriate for the depth ranges provided by the wetland.
- If cost allows, species would be of the maximum available size to encourage plant growth and maximum rate of spread.

Table 3 presents a planting plan, including a list of species currently under consideration (based on current knowledge of salinity in the project area) for inclusion in the final design.

TABLE 3
Proposed Planting Species
Vegetated Wetlands at Saugus Iron Works NHS

Tidal Zone	Plant Species	Common Name
High Marsh Zone	<i>Cephalanthus occidentalis</i>	Buttonbush
	<i>Rosa palustris</i>	Swamp rose
	<i>Calamagrostis Canadensis</i>	Blue joint grass
	<i>Carex lacustris</i>	Lake sedge
	<i>Carex stricta</i>	Tussock sedge
	<i>Iris versicolor</i>	Blue flag
	<i>Peltandra virginica</i>	Arrow arum
	<i>Pontederia cordata</i>	Pickernelweed
	<i>Sagittaria latifolia</i>	Northern arrowhead
	<i>Solidago sempervirens</i>	Seaside goldenrod

Tidal Zone	Plant Species	Common Name
	<i>Spartina pectinata</i>	Prarie cordgrass
	<i>Zizania aquatica</i>	Wild rice
Low Marsh Zone	<i>Schoenoplectus tabernaemonani</i> (<i>Scirpus validus</i>)	Soft-stem bulrush
	<i>Schoenoplectus americanus</i> (<i>Scirpus pungens</i>)	Three-square bulrush
	<i>Acorus americanus</i>	Sweetflag
	<i>Peltandra virginica</i>	Arrow arum
	<i>Pontederia cordata</i>	Pickereelweed
	<i>Sagittaria graminea</i>	Grass-leaved arrowhead
	<i>Zizania aquatica</i>	Wild rice
Streamside Riparian Buffer	<i>Alnus rugosa</i>	Speckled alder
	<i>Cornus amomum</i>	Silky dogwood
	<i>Myrica gale</i>	Sweet gale
	<i>Spartina pectinata</i>	Prairie cordgrass
	<i>Rosa palustris</i>	Swamp rose
	<i>Carex lacustris</i>	Lake sedge
	<i>Carex stricta</i>	Tussock sedge

The final vegetated wetlands configurations, proper elevation zones, densities of the wetland plants, and planting details would be developed during future stages of the design process and would be graphically illustrated on the final design drawings (60% Construction Design Drawings are presented in Appendix L). Specifications would be developed for the proper shipping, handling, deployment, and maintenance of the plants.

2.5.4 Reconstruction of the Bulkhead, and Dock

The existing oak bulkhead and dock, including the timber crib piers beneath the dock, are severely deteriorated, with some portions missing. The design concept is to remove these structures completely, except for the supporting concrete structures, and replace them in-kind. To the extent possible, the bulkhead and dock would be reconstructed to the same configurations as the original structures installed in the early 1950s (CH2M HILL, 2004h).

All timber used for reconstructing the bulkhead and dock would be treated with preservative to increase the life of the structures to the extent possible. Research during the pre-design phase indicates that pressure-treated oak is not available. As a result, the materials would have to be surface-treated prior to or after delivery to the site with a preservative agent similar to the agent currently being used on other timber structures at the site. Specifications for the preservative agent and application requirements would be prepared during future stages of the design.

2.5.5 Protection of Historic Properties

The existing slag pile, which is the only surviving cultural resource of the original iron-making operations, would be maintained and protected as-is during the course of the work. The slag pile poses a low public safety hazard and apparently low potential for releasing constituents, as verified by the results of recent sediment sampling (CH2M HILL, 2004c). Therefore, no additional action is required except for access and disturbance restrictions per the current Notice of Activity and Use Limitation issued by the State of Massachusetts in 1998.

Park Operations

Saugus Iron Works NHS would likely remain open during the course of the proposed work; however, operations would adjust according to the needs of the project. If needed, the scope of visitor access may be reduced or temporarily halted to ensure visitor safety and project efficiency. To further promote the restoration as a model project, interpretive programs would be modified to take advantage of educational opportunities generated by the restoration. To the extent possible, construction access routes and physical barriers have been included in the Schematic Design (CH2M HILL, 2004h) to minimize impacts on park operations and the public. In addition, Saugus Iron Works would be providing interpretive signage to provide restoration information to visitors and would continue to communicate with the public using selected media channels.

2.5.6 Construction Period Precautions

The proposed project has been designed specifically to minimize impacts to the project site adjacent land within Saugus Iron Works NHS as well as the surrounding properties by reducing the amount of earthmoving, land clearing, erosion and sedimentation, construction traffic and equipment refueling, and storage activities during construction. The majority of the construction activities associated with the project are limited to the immediate area within Saugus Iron Works NHS.

The project proponent would require all contractors to follow the following general principles during the construction phase:

- Minimize the area of disturbance
- Protect and maintain existing vegetation whenever possible
- Install mitigation devices as early as possible
- Minimize the time disturbed areas are left unstabilized
- Maintain siltation control devices in proper condition

The Stormwater Pollution Prevention Plan (SWPPP) for construction activities has been created for the proposed activities and can be found in Appendix D. Regularly scheduled SWPP system inspections would be conducted during all construction activities. The proposed project's SWPPP has been designed to meet all of the Stormwater Management Standards in DEP's Stormwater Management Policy, as well as the federal National Pollutant Discharge Elimination (NPDES) guidelines for appropriate stormwater management. The drainage system will utilize a combination of Best Management Practices (BMP's) to treat water quality during construction. For additional information on environmental impacts associated with this project please refer to Section 4.4 of this

EA/DEIR, Impact Analysis. Please refer to the SWPPP in Appendix D and Section 2.6 of this EA/DEIR for greater detail on environmental, erosion and sedimentation controls during construction activities of the project. Additional information on long term monitoring and construction details can be located in Appendices E and L, respectively.

2.5.7 Approximate Construction Timetable and Cost Estimate

The following preliminary cost estimates were developed for each of the alternatives during the value analysis and including excavation of sediment and off-site disposal of soils (CH2M HILL 2004f). Construction is proposed to begin after the end of the smelt spawning season on June 30 with activities continuing for three months. The costs for the three action alternatives are presented below (using fiscal year 2006 dollars):

- Alternative B (NPS Preferred Alternative): \$2,542,671
- Alternative C: \$1,139,373
- Alternative D: \$2,022,154

2.6 Mitigation Activities for the Action Alternatives and Proposed Section 61 Findings

The following mitigation activities would be conducted during the design and implementation phases of the identified alternative to lessen the adverse impacts of the action. Section 61 of Chapter 30 of the Massachusetts General Laws (MEPA) requires that all agencies, departments, boards, commissions and authorities of the commonwealth shall review, evaluate, and determine the impact on the natural environment of all Projects or activities conducted by them and shall use all practicable means and measures to minimize damage to the environment. Section 5.0 Consultation and Coordination lists the groups consulted and state agencies with whom the NPS has collaborated and Section 5.1.2 addresses the state specific regulatory requirements for the project. This section summarizes the Proponent's commitments to measures designed to minimize environmental damage (and in several instances to create environmental benefits) with respect to those aspects of the Project for which state permits may be required.

2.6.1 Soundscapes

In order to reduce the short term impact of noise during construction, equipment would use standard noise muffling devices to limit noise levels. In addition, operation of the equipment would be limited to weekday daytime hours to limit disturbance during sensitive evening and weekend time periods. Noise levels would be periodically monitored to ensure compliance with local Saugus requirements.

2.6.2 Water Quality and Quantity

In order to prevent impacts to local water quality, silt fencing along the perimeter of dewatering/loading areas would be installed to collect and contain sediment generated during dewatering, processing, and loading. Its intent is to remove sediment at the source, thereby minimizing the volume of sediment which must be contained and collected within the excavation and perimeter barrier (see Appendix D, page 5).

A sediment barrier would be created along the perimeter of the excavation where it abuts the Saugus River channel. The conceptual sediment barrier between the excavation and the river channel includes a physical barrier to filter sediment out of the water and contain it along the edge of the excavation (see Appendix D page 5).

2.6.3 Marine or Estuarine Resources

Local marine or estuarine resources would likely experience beneficial effects as a result of the tidal marsh/non-vegetated wetland habitat restoration included in this proposal. There is a growing literature documenting the degraded habitat value of *Phragmites* marshes with respect to their role in supporting fish populations. For example, studies have demonstrated that *Spartina*-dominated marshes provide essential habitat for recently hatched mummichog (*Fundulus heteroclitus*) larvae and small juveniles, but *Phragmites* marshes do not serve this important function (see Appendix F for discussion). It is assumed that the *Phragmites* marshes of the tidal Saugus River estuary are not serving an essential role as habitat for larval and juvenile fishes, resulting in a reduced fish population and subsequent impacts on higher trophic predators (e.g., fish and birds) that depend on juvenile fishes as prey. Therefore, the restoration activities are expected to create long-term beneficial impacts for local estuarine resources.

To assess how well the restored wetland is providing ecological services in the form of Marine or estuarine resources, aquatic organism surveys will be performed using methodologies described in the Monitoring Plan included in Appendix E. In order to verify successful reestablishment of the native ecological community, monitoring will be conducted on a semi-annual or annual basis depending on the needs of the resources.

2.6.4 Floodplains and Wetlands

Floodplain or wetland resources would likely incur beneficial effects as a result of the restoration although some bordering vegetated wetland area would be converted to open water/mud flat habitat. The majority of the wetlands within the site are classified as tidal freshwater marsh, an ecosystem that is extremely vulnerable in the State of Massachusetts, with five or fewer occurrences and very few remaining acres. The proposed restoration of the wetlands would increase the area of this limited ecosystem and have a beneficial, long-term, site-specific impact. Under the preferred alternative the project would not meet the performance standards under the Massachusetts Wetlands Protection Act and the 401 Water Quality Certification with regard to the requirements for 1:1 mitigation for bordering vegetated wetland. However, the NPS would be restoring the entire area to a mixture of bordering vegetated wetland and mudflat and increasing the biodiversity of the system. A variance from the performance standards of these regulatory programs would be sought because of the national historic significance of the site and the public interest in rehabilitating the NHS.

Special precautions will be implemented to ensure protection of the floodplains and wetlands included in the project area. Silt fencing, sediment barriers and project timing are planned mitigation measures detailed in the Statement of Findings included in Appendix K.

2.6.5 Unique or Important Wildlife or Wildlife Habitat

The restoration project is likely to have beneficial, long-term impacts for unique or important wildlife or wildlife habitat. No federally-listed or proposed, threatened or endangered species or critical habitats are known to occur in the project area (Appendix B). American waterwort (*Elatine americana*), a state-listed endangered plant, was tentatively identified within the stream channel at the site. However, the species in question was confirmed to not be *Elatine Americana* by the Massachusetts Natural Heritage & Endangered Species Program (Appendix B).

Bordering vegetated wetlands are important inland habitat for wildlife. The hydrologic regime, plant community composition and structure, soil composition and structure, topography, and water chemistry of bordering vegetated wetlands provide important food, shelter, migratory and overwintering areas, and breeding areas for many birds, mammals, amphibians and reptiles. The existing wetlands are dominated by invasive species, such as common reed and purple loosestrife, which are considered to provide limited opportunities for wildlife use. The proposed restoration and enhancement plan would provide high quality, high functional value, native species dominated wetlands and remove impacted sediments from these areas. These enhancements over the existing condition would greatly improve the quality of wetlands on site for wildlife habitat. Species diversity and varying zones of wetland from intertidal to emergent would promote greater use of these wetlands by local wildlife populations. Proposed mud flat areas would support benthic invertebrate communities and therefore provide ideal feeding areas for shorebirds, waterfowl and mammals. It is anticipated that the restored and enhanced wetlands proposed would provide a greater wildlife habitat function than the existing condition of these wetlands.

2.6.6 Unique, Essential, or Important Fish or Fish Habitat

Site-specific unique, essential, or important fish or fish habitat would likely experience beneficial impacts in the long term. No impacts to the Saugus River bed are proposed, however, the proposed condition would create additional Land Under Waterbodies and Waterways which would be beneficial to fisheries. Therefore, the proposed condition would not affect Banks of or Land Under Rivers that Underlie and Anadromous Fish Run but would improve the ability of Land Under Waterbodies and Waterways to protect fisheries.

The project would be timed around the annual spawning of rainbow smelt and other anadromous fish spawning. To maintain river flow and protect rainbow smelt spawning habitat, no work would take place within the river channel itself.

The integrity of the rainbow smelt spawning habitat would be maintained by enhancing the gravel and cobble berm between the river channel and the proposed turning basin. The berm would be enhanced by removing invasive plant species, extending the length of the berm, armoring with cracked stone to provide enhance fish habitat, and planting native species to maintain shade of the spawning area.

A monitoring plan would be instituted for a minimum of three years to determine the effectiveness of the restoration plan and allow for adaptive management actions if needed for the project.

2.6.7 Recreation Resources, Including Supply, Demand, Visitation, Activities, etc.

Recreation resources would likely improve as a result of the proposed restoration. Dock restoration would provide long-term, beneficial visitor impacts region-wide. Site-specific adverse impacts to site recreation resources may occur in the short term during construction. The dock is currently so degraded that it has become a safety concern and visitors are prohibited from its use. Thus, restoration of the turning basin and dock would provide visitor access to the dock and improved viewsheds, enabling visitors to gain a better understanding of the iron works and, in turn, increasing visitation.

Because the project is expected to provide long-term benefits for supply, demand, and visitation at the site there is no specific additional mitigation for this resource.

2.6.8 Visitor Experience, Aesthetic Resources

While the project is expected to provide long term benefits for visitor experience and aesthetic resources, it is anticipated that there will be short term adverse impacts during construction and full visitor use will be restricted. During construction the park would remain open and the project itself would be interpreted using signs and presentations by park personnel.

Park management expects that by the time construction begins, newly renovated park exhibits and facilities in the Museum and Iron Works House Visitor Center, which would remain open throughout the project, would provide programmatic accessibility to help to mitigate adverse impacts to visitors caused by closure of the industrial area and the East Bank of the Saugus River.

Visitors would be informed of any temporary closures and construction schedule through the park website as well as press releases, and notices posted at the park visitor center.

Because the project is expected to improve the visitor experience and aesthetic resources at the site there is no specific additional mitigation for this resource.

2.6.9 Resources, Including Energy, Conservation Potential, Sustainability

The proposed restoration would likely have moderate, long-term, beneficial impacts on environmental sustainability at the site. Sustainability and conservation potential are likely to increase due to the improvement in wetland habitat and open-water condition as seen in the 1950s.

Because the project is expected to improve the sustainability at the site there is no specific additional mitigation for this resource.

2.6.10 Urban Quality, Gateway Communities, etc.

The proposed Saugus River turning basin and dock restoration activities would likely result in, long-term benefits for urban quality and gateway communities region-wide. By enhancing the Essex NHA, the Saugus Iron Works NHS restoration would likely become a model project for river restoration. The planned improvements to visitor experience would likely increase visitor attendance and ultimately benefit surrounding communities and resources including, but not limited to, the Essex NHA.

Because the project is expected to provide benefits for the gateway community there is no specific additional mitigation for this resource.

2.6.11 Long-term Management of Resources or Land/Resource Productivity

Long-term management of the resources or land/resource productivity is likely to experience local and long-term benefits as a result of the planned restoration activities. The restoration is anticipated to improve the visitor experience, increase the use and productivity of the site, and ultimately enable better management of the site ecology. Because the project is expected to provide benefit to the long-term management of resources and resource productivity at the site there is no specific additional mitigation for this resource.

2.6.12 Traffic

Traffic flow is likely to experience a short-term adverse effect under this alternative because construction is likely to slightly increase the amount of traffic entering and exiting the site and potentially reduce the amount of parking available for visitor use.

In order to reduce the impacts to local traffic patterns in a suburban area, the scheduling of transport into and out of the site would be timed to minimize and reduce impacts to traffic.

2.6.13 Cultural Resources

Archeological resources are not anticipated during the implementation of this undertaking, however the area has some sensitivity, therefore if during construction unanticipated archeological resources are discovered, all work in the immediate vicinity of the discovery would be halted until the resources could be identified and documented and an appropriate mitigation strategy developed if necessary in consultation with the Massachusetts Historical Commission. In the unlikely event that human remains, funerary objects, sacred objects, or objects of cultural patrimony are discovered during construction, provisions outlines in the Native American Graves Protection and Repatriation Act of 1990 would be followed.

Only post-1954 deposited sediments would be removed from the turning basin therefore any pre-1954 sediments would remain.

2.6.14 Mitigation Measures for the Slag Pile, Bulkhead, and Dock

The following mitigation measures would be implemented to minimize damage to the environment and cultural resources resulting from work in the vicinity of the slag pile and rehabilitation of the dock and bulkhead.

- The NPS would continue to maintain and enforce public access restrictions to the slag pile as described in the Notice of Activity and Use Limitation.
- The final design would include regrading and stabilization of the drainage swale to the west of the slag pile to minimize the potential for erosion and transport of slag materials downgradient. Any disturbance to the archeologically significant Joseph Jenks site near the drainage swale would be avoided.

- Contract specifications for intrusive work adjacent to the exposed historic slag pile would clearly state the potential hazards and would include provisions for appropriately trained personnel and appropriate safety and environmental monitoring and controls. All efforts to avoid the historic slag pile would be utilized.
- Researching the longevity of preserved timber and the availability of pressure treated timber would facilitate the future use of timbers for historical purposes.
- Methods for securely attaching the wood bulkhead to the concrete retaining wall would be evaluated.
- Historic joint methods would be evaluated to confirm their strength relative to design requirements and to determine reinforcement requirements and methods should the joints be found to provide inadequate strength.
- The reconstructed dock would be designed to withstand expected design loads (personnel and maintenance vehicles) and meet applicable code requirements for public walkways. Existing and expected loading conditions would be discussed with site staff.
- Alternative materials would be investigated that may provide greater strength and durability in portions of the dock that are hidden from normal view.

Removal of Hamilton Street Weir (outside the scope of this project)

Although not part of the proposed action, the NPS would continue to facilitate the removal of the Hamilton Street weir in collaboration with other stakeholders. The weir occurs approximately 700 feet downstream of the Southern Area, outside of the NPS boundary, and is currently owned by the now defunct First Ironworks Association. The NPS is collaborating with the Massachusetts Riverways Program to establish a process by which the weir can be transferred to other ownership and then removed. The rock weir, composed of large rocks placed in the river in the 1950s, was intended to maintain an open water condition in the upper Saugus River and reduce tidal surge. A recent engineering study of the rock weir determined that removal of the rock weir is not expected to have a direct influence on the hydrology or river geomorphology of the Northern and Southern Areas (CH2M HILL 2005; Appendix G), but as noted in subsequent sections of this report, removal would contribute to restoration of wetland habitat features (river geomorphology, *Phragmites* control) downstream of the project area and would enhance recreational opportunities throughout the Saugus River.

2.6.15 Draft Section 61 Findings

With the identification of the preferred alternative for restoration of the Saugus River Turning Basin and Dock, MCZM and MDEP find that, with implementation of the mitigation measures listed above, all feasible means have been taken to avoid or minimize damage to the environment. Implementation of the mitigation measures will occur in accordance with the terms and conditions set forth in the permits.

2.7 Alternatives Considered but Dismissed

A value analysis stakeholder meeting was held to analyze and select for the most appropriate alternatives to consider. Three additional alternatives were identified during the NEPA scoping process, but were eliminated from further consideration, for environmental, feasibility, cost or timing issues. For additional information regarding the alternatives identification process, please refer to the Restore Saugus River Turning Basing and Dock Value Analysis (CH2M HILL, 2004f). These alternatives included:

Renovation of the Bulkhead and Dock Only. This involves replacement of the deteriorated timber bulkhead and superstructure of the dock with timber materials and construction methods similar to those used in the 1950s to replicate the 17th century construction. No actions would be taken with respect to the turning basin or southern area and the alternative therefore does not meet project objectives and was dismissed from further consideration.

Replacement of the Bulkhead and Dock Only. This alternative is similar to the previously described alternative except that it also includes reconstruction of the deteriorated timber crib piers beneath the dock with timber and stone materials. No actions would be taken with respect to the turning basin or southern area and the alternative therefore does not meet project objectives and was dismissed from further consideration.

Replacement of the Bulkhead and Dock, Excavation of the Turning Basin, Phragmites Control without Excavation, and Planting of Vegetated Wetlands (Northern Area). This alternative is similar to Alternative C, but uses primarily herbicides to control invasive wetland plant species and causes too great an environmental impact to be considered a viable alternative.

2.8 Environmentally Preferred Alternative

The NPS is required to identify the environmentally preferred alternative(s) for any of its proposed projects. According to the CEQ guidelines, the environmentally preferred alternative is the alternative that would promote the national environmental policy as expressed in Section 101 of NEPA, which considers:

1. fulfilling the responsibilities of each generation as trustee of the environment for succeeding generations
2. assuring for all generations safe, healthful, productive, and aesthetically and culturally pleasing surroundings
3. attaining the widest range of beneficial uses of the environment without degradation, risk of health or safety, or other undesirable and unintended consequences
4. preserving important historic, cultural, and natural aspects of our national heritage and maintaining, wherever possible, an environment that supports diversity and variety of individual choice
5. achieving a balance between population and resource use that would permit high standards of living and a wide sharing of life's amenities

6. enhancing the quality of renewable resources and approaching the maximum attainable recycling of depletable resources (NEPA, Section 101)

Alternative B, the preferred alternative, has been identified as the environmentally preferred alternative because it would restore the greatest area of wetlands and eliminate the greatest amount of invasive species and sediment contamination. Alternative B best fulfills the six criteria, particularly criterion two, through removal of all contaminated sediments on site and providing the best long term management of invasive species by removal of the maximum amount of invasive species. The other two action alternatives, Alternatives C and D, would also meet the criteria set by the CEQ guidelines; however they do not remove all contaminated sediments or remove the maximum amount of invasive species. Subsequently alternatives C and D would not fulfill criteria 2 and 3 as well as alternative B. The no-action Alternative has not been identified as the Environmentally Preferred Alternative as it does not remove any contaminated sediments, or restore any cultural resources.

2.8.1 Alternatives Comparison Table

Table 4 compares Alternatives A through D. All activities pertaining to each alternative are listed as well as whether the alternative would meet the needs of Saugus Iron Works NHS

TABLE 4
Alternatives Comparison Table

	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C	Alternative D
Action	No Action	<ul style="list-style-type: none"> • Replace Dock and Bulkhead • Excavate Turning Basin • Excavate Southern Area • Plant Tidal Vegetated Wetlands 	<ul style="list-style-type: none"> • Replace Dock and Bulkhead • Excavate Turning Basin • Plant Tidal Vegetated Wetlands 	<ul style="list-style-type: none"> • Replace Dock and Bulkhead • Excavate Turning Basin • Excavate 40 percent of Southern Area • Plant Tidal Vegetated Wetlands
Meets Project Needs?	This alternative does not meet project needs.	This alternative meets project needs because the cultural landscape and natural environment would be restored to pre-1957 vistas and thus enhance visitor understanding of the site. The dock and bulkhead would be made safe for public use.	This alternative meets the project objectives because the cultural landscape would be restored to the pre-1957 vistas and natural resources would also be restored but not as well as Alternative B because the amount of wetland restoration would be less.	This alternative meets the project objectives because the cultural landscape would be restored to the pre-1957 vistas and natural resources would also be restored but not as well as Alternative B because the amount of wetland restoration would be less.

2.9 Regulatory Objectives

The following sections briefly identify the regulatory objects of the project.

2.9.1 The Massachusetts Wetland Protection Act

The Massachusetts Wetland Protection Act identifies eight interests, or functions, to be protected for any project affecting Areas Subject to Protection under M.G.L. c. 131§40. Those interests are:

- Protection of Public and Private Water Supply
- Protection of Groundwater Supply
- Flood Control
- Storm Damage Prevention
- Prevention of Pollution
- Protection of Land Containing Shellfish
- Protection of Fisheries
- Protection of Wildlife Habitat

Areas Subject to Protection under M.G.L. c. 131§40 identified on site include:

- Banks of or Land Under Rivers that Underlie and Anadromous Fish Run
- Bank Resource Area
- Bordering Vegetated Wetland
- Land Under Waterbodies and Waterways
- Bordering Land Subject to Flooding
- Riverfront Area

2.9.2 Protection of Public and Private Water Supply

As defined in the Massachusetts Wetlands Protection Act, Banks, Bordering Vegetated Wetlands, Land Under Waterbodies and Waterways and Riverfront Areas located on site may function to protect public and private water supplies.

The Saugus River is part of the North Shore Coastal Drainage Area. The portion of the Saugus River which runs through the site is designated as a Class SB waterbody. These waters are designated as a habitat for fish, other aquatic life and wildlife and for primary and secondary contact recreation. In approved areas, they shall be suitable for shellfish harvesting with depuration (Restricted Shellfish Areas).

The portion of the Saugus River which runs through the site is not a public water supply and is designated as a prohibited shellfish growing area. The portion of the Saugus River which runs through the site also does not meet the requirements for designation as an Outstanding Resource Water.

The site of proposed activities does not lie within a surface water supply protection area zone. Surface water supply protection zones are protected under 310 CMR 22.00, Massachusetts Drinking Water Regulations. Private residences in the vicinity of the Saugus Iron Works obtain water supply from municipal sources, not private on site wells.

Therefore, this function of Banks, Bordering Vegetated Wetlands, Land Under Waterbodies and Waterways and Riverfront Areas is not applicable to the existing or proposed condition.

2.9.3 Protection of Groundwater Supply

As defined in the Massachusetts Wetlands Protection Act, Banks, Bordering Vegetated Wetlands, Land Under Waterbodies and Waterways and Riverfront Areas located on site may function to protect groundwater supplies.

The project site is not located within a Sole Source Aquifer. A Sole Source Aquifer is an aquifer designated by the U.S. Environmental protection Agency as the sole or principal source of drinking water for a given aquifer service area; that is, an aquifer needed to supply 50% or more of the drinking water for that area and for which there are no reasonably available alternative sources should that aquifer become contaminated.

Therefore, this function of Banks, Bordering Vegetated Wetlands, Land Under Waterbodies and Waterways and Riverfront Areas is not applicable to the existing or proposed condition.

2.9.4 Flood Control and Storm Damage Prevention

As defined in the Massachusetts Wetlands Protection Act, Banks, Bordering Vegetated Wetlands, Land Under Waterbodies and Waterways, Bordering Land Subject to Flooding and Riverfront Areas located on site may provide a flood control and storm damage prevention function.

Banks act to confine floodwaters during the most frequent storms, preventing the spread of water to adjacent land. An alteration of a Bank that permits water to frequently and consistently spread over a large and more shallow area may increase damages to properties associated with storm events. The flood control and storm damage prevention function of Bank areas would not be affected by the proposed project. Grading is limited to wetland areas and other areas outside of the low-flow channel and waterward of the high water line of the Saugus River. Bank areas would remain that would confine floodwaters during the most frequent storms. Therefore, the proposed condition would not affect the ability of on site Bank resource areas to provide a flood control and storm damage prevention function.

The profusion of vegetation in Bordering Vegetated Wetlands acts to slow down and reduce the passage of flood waters during periods of peak flows by providing temporary flood water storage and by facilitating water removal through evaporation and transpiration. This process reduces downstream flood crests and resulting damage to private and public property. It is anticipated that the proposed wetland areas would provide a similar reduction in flood water velocities. The proposed sediment removal within the floodplain would provide additional flood water storage and the enhanced wetlands would continue to provide a water removal function through evaporation and transpiration. The proposed sediment removal within the floodplain will provide additional flood water storage and the enhanced wetlands will continue to slow stormwater flows and provide a flood control and storm damage prevention function.

Land Under Water Bodies and Waterways, in conjunction with banks, serve to confine floodwater within a definite channel during the most frequent storms. Filling within this channel blocks flows which in turn causes backwater and overbank flooding during such

storms. The boundary of Land Under Water Bodies and Waterways is the mean annual low water level. As shown on Drawing C6, Excavation and Grading Plan, and Drawing C8, Typical Sections in Appendix L, no excavation or filling is proposed within the river bed of the Saugus River. The proposed sediment removal within the Northern Area would create additional Land Under Water Bodies and Waterways on site. The proposed condition, therefore, would result in an improvement in the ability of on site Land Under Waterbodies and Waterways to provide a flood control and storm damage prevention function.

Bordering Land Subject to Flooding provides a temporary storage area for flood water which has overtopped the bank of the main channel of a creek, river or stream. During periods of peak run-off, flood waters are both retained (*i.e.*, slowly released through evaporation and percolation) and detained (slowly released through surface discharge) by Bordering Land Subject to Flooding. The site currently contains areas inundated by the 100-year flood event (Figure 3). As shown on the 60% Construction Drawings, subsheets C16-C19 in Appendix L, the proposed site work would primarily involve sediment removal within existing Bordering Land Subject to Flooding. Approximately 9,000 cubic yards of material will be removed from this area. The proposed condition, therefore, would result in an improvement in the ability of on site Bordering Land Subject to Flooding to provide a flood control and storm damage prevention function.

By providing recharge and retaining natural flood storage, as well as by slowing surface water runoff, Riverfront Areas can mitigate flooding and damage from storms. The root systems of riverfront vegetation keep soil porous, increasing infiltration capacity. Vegetation also removes excess water through evaporation and transpiration. This removal of water from the soil allows for more infiltration when flooding occurs. Increases in storage of floodwaters can decrease peak discharges and reduce storm damage. Vegetated riverfronts also dissipate the energy of storm flows, reducing damage to public and private property. All Riverfront Areas disturbed as a result of the proposed project, with the exception of proposed interpretive trails, would be restored to pre-construction condition (see Restoration Plan, Drawing C7 In the draft construction documents in Appendix L). No new structures are proposed within the Riverfront Area. Therefore, the proposed condition would not affect the ability of on site Riverfront Areas to provide a flood control and storm damage prevention function.

Although vegetated wetland habitat will be reduced with the proposed restoration activity, it is expected that the flood attenuation functions of this upper reach of the tidal Saugus River will be retained. The restored vegetated wetland will slow current velocities and provide water removal through evaporation/transpiration (at least during the growing season), while the proposed intertidal mudflat habitat, a shallow water area, will allow for sheet flow and reduce tidal flow energy and flow velocities through frictional drag (e.g., Pethick 1996). It is also noted that approximately 9,000 cubic yards of material is proposed for removal from the area, thereby increasing the flood storage capacity by as much as 4.6 acre-feet (see Drainage and Stormwater Management Report, Appendix H CH2M HILL, 2006).

2.9.5 Prevention of Pollution

As defined in the Massachusetts Wetlands Protection Act, Banks, Bordering Vegetated Wetlands, Land Under Waterbodies and Waterways and Riverfront Areas located on site may function to improve water quality and reduce the effects of pollution.

Where Banks are partially or totally vegetated, the vegetation serves to maintain the Banks' stability, which in turn protects water quality by reducing erosion and siltation. Bank areas would be maintained under the proposed condition. Areas disturbed temporarily for construction access and staging would be stabilized and restored to a vegetated condition. Therefore, the proposed condition would not affect the ability of on site Bank resource areas to provide a water quality function.

The plants and soils of Bordering Vegetated Wetlands remove or detain sediments, nutrients (such as nitrogen and phosphorous) and toxic substances (such as heavy metal compounds) that occur in runoff and flood waters. Some nutrients and toxic substances are detained for years in plant root systems or in the soils. Wetlands host complete food chains with producers, consumers and decomposers that purify water as it flows to the sea. As in all ecosystems, the succession of micro-organisms that occurs in detritus (involving namely bacteria and fungi as well as detritus-feeding invertebrates) reduces organic material to elemental nutrients. Wetlands, however, are major "sinks" of nutrients and pollutants and are particularly important in the conversion of nitrates to harmless nitrogen gas. This is due to denitrifying bacteria that are especially active in waterlogged anaerobic soils. Mud flats have enormous biological productivity and are important as nursery grounds for fish as well as for endemic and migratory birds. Overall, the total wetland area on site would be reduced; however, proposed mud flat habitats are anticipated to have a similar pollutant retention ability. The proposed mudflat habitats are depositional environments and as a microalgal and microbial community develops it is anticipated that they will have similar retention ability. In addition, the proposed removal of impacted sediments would greatly improve the water quality function of these areas. Therefore, the proposed condition would not affect the ability of on site Bordering Vegetated Wetlands resource areas to provide a water quality function.

The physical nature of Land Under Water Bodies and Waterways is highly variable, ranging from deep organic and fine sedimentary deposits to rocks and bedrock. The main channel of the Saugus River through the site can generally be described as having a gravel and rock bottom. The boundary of Land Under Water Bodies and Waterways is the mean annual low water level. As shown on Drawing C6, Excavation and Grading Plan, and Drawing C8, Typical Sections, no excavation is proposed within the river bed of the Saugus River. The proposed sediment removal within the Northern Area would create additional Land Under Water Bodies and Waterways on site. These areas would consist of organic soils and sediments. The organic soils and sediments play an important role in the process of detaining and removing dissolved and particulate nutrients (such as nitrogen and phosphorous) from the surface water above. They also serve as traps for toxic substances (such as heavy metal compounds). The proposed condition, therefore, would result in an improvement in the ability of on site Land Under Waterbodies and Waterways to provide a water quality function.

The riverfront area can prevent degradation of water quality by filtering sediments, toxic substances (such as heavy metals), and nutrients (such as phosphorus and nitrogen) from stormwater, nonpoint pollution sources, and the river itself. Sediments are trapped by vegetation before reaching the river. Nutrients and toxic substances may be detained in plant root systems or broken down by soil bacteria. Riverfront areas can trap and remove disease-causing bacteria that otherwise would reach rivers and coastal estuaries where they can contaminate shellfish beds and prohibit safe human consumption. Natural vegetation within the riverfront area also maintains water quality for fish and wildlife. All Riverfront Areas disturbed as a result of the proposed project would be restored to pre-construction condition (see Restoration Plan, Drawing C7). No new structures or impervious areas are proposed within the Riverfront Area. Therefore, the proposed condition would not affect the ability of on site Riverfront Areas to provide a water quality function.

2.9.6 Protection of Land Containing Shellfish

As defined in the Massachusetts Wetlands Protection Act, Riverfront Areas located on site may function to protect land containing shellfish. Riverfront areas can trap and remove disease-causing bacteria that otherwise would reach rivers and coastal estuaries where they can contaminate shellfish beds and prohibit safe human consumption. All Riverfront Areas disturbed as a result of the proposed project would be restored to pre-construction condition (see Restoration Plan, Drawing C7 in Appendix L). No new structures or impervious areas are proposed within the Riverfront Area. Therefore, the proposed condition would not affect the ability of on site Riverfront Areas to protect land containing shellfish.

2.9.7 Protection of Fisheries

As defined in the Massachusetts Wetlands Protection Act, Banks of or Land Under Rivers that Underlie and Anadromous Fish Run, Banks, Bordering Vegetated Wetlands, Land Under Waterbodies and Waterways and Riverfront Areas located on site may function to protect fisheries.

The Banks of or Land Under Rivers that Underlie and Anadromous Fish Run are significant to protection of marine fisheries. Anadromous fish are renewable protein resources that provide recreational, aesthetic and commercial benefits. In addition, throughout their life cycle such fish are important components of freshwater, estuarine, and marine environments and are food sources for other organisms. The portion of the Saugus River that is located at the site is utilized by rainbow smelt (*Osmerus mordax*) as a spawning area. Studies on fisheries use of the Saugus River within the site boundary indicates that the site is currently or has been historically used by species such as river herring (*Alosa pseudoharengus* and *Alosa aestivalis*), yellow perch (*Perca flavescens*), American eel (*Anquilla rostrata*), mummichog (*Fundulus heteroclitus*), white sucker (*Catostomus commersonii*) and white perch (*Morone Americana*). No impacts to the Saugus River bed are proposed, however, the proposed condition would create additional Land Under Waterbodies and Waterways which would be beneficial to fisheries. Therefore, the proposed condition would not affect Banks of or Land Under Rivers that Underlie and Anadromous Fish Run but would improve the ability of Land Under Waterbodies and Waterways to protect fisheries.

Banks provide shade that moderates water temperatures, as well as providing breeding habitat, escape cover and food, all of which are significant to the protection of fisheries. Bank areas would be maintained under the proposed condition. Areas disturbed temporarily for construction access and staging would be stabilized and restored to a vegetated condition. Therefore, the proposed condition would not affect the ability of on site Bank resource areas to provide a protection of fisheries function.

Wetland vegetation provides shade which moderates water temperatures important to fish life. Wetlands flooded by adjacent water bodies and waterways provide food, breeding habitat and cover for fish. Fish populations in the larval stage are particularly dependent upon food provided by overbank flooding which occurs during peak flow periods (extreme storms) because most river and stream channels do not provide sufficient quantities of the microscopic plant and animal life required for food. The proposed restoration and enhancement plan would provide native species dominated wetlands and remove impacted sediments from these areas. These improvements would result in water quality improvements that would benefit local fish populations. The proposed diverse and native species dominated wetlands would provide new wildlife habitat opportunities which would benefit fish populations who use wetlands during high flows as feeding areas. Under present conditions the Northern Area and Southern Area contain dense vegetation and based on elevation these areas are only flooded for a short duration during a tidal cycle. With restoration, and especially relevant to the Southern Area, the elevation will be decreased and the duration of flooding subsequently increased. This will allow greater utilization of the Southern Area vegetated marsh by fish for forage and refuge from predators. Although not studied, it is expected that the existing common reed dominated Southern Area marsh serves a minimal fisheries support function. Overall, the proposed condition is anticipated to have a beneficial effect on fisheries.

Riverfront areas are critical to maintaining thriving fisheries. Maintaining vegetation along rivers promotes fish cover, increases food and oxygen availability, decreases sedimentation, and provides spawning habitat. Maintenance of water temperatures and depths is critical to many important fish species. Where groundwater recharges surface water flows, loss of recharge as a result of impervious surfaces within the riverfront area may aggravate low flow conditions and increase water temperatures. In some cases, summer stream flows are maintained almost exclusively from groundwater recharge. Small streams are most readily impacted by removal of trees and other vegetation along the shore. All Riverfront Areas disturbed as a result of the proposed project would be restored to pre-construction condition (see Restoration Plan, Drawing C7 in Appendix L). No new structures or impervious areas are proposed within the Riverfront Area. Therefore, the proposed condition would not affect the ability of on site Riverfront Areas to protect fisheries.

There is a growing literature documenting the degraded habitat value of *Phragmites* marshes with respect to their role in supporting fish populations. For example, many studies have demonstrated that *Spartina*-dominated marshes provide essential habitat for recently hatched mummichog (*Fundulus heteroclitus*) larvae and small juveniles (e.g., Kneib 1984, Talbot and Able 1984), but *Phragmites* marshes do not serve this important function (Able and Hagen 2000 and 2003, Raichel et al. 2003). During low tides *Phragmites* marshes often lack standing water on the marsh surface, including shallow pools, creeks and rivulets, all important refuge/nursery habitat for survival of larval and juvenile fish (Weinstein and

Balletto 1999). Fell et al. (2003) report similar findings for brackish *Phragmites* marshes along the Connecticut River. Based on these studies and others, it is assumed that the *Phragmites* marshes of the tidal Saugus River estuary are not serving an essential role as habitat for larval and juvenile fishes, resulting in a reduced fish population and subsequent impacts on higher trophic predators (e.g., fish and birds) that depend on juvenile fishes as prey.

2.9.8 Protection of Wildlife Habitat

As defined in the Massachusetts Wetlands Protection Act, Banks, Bordering Vegetated Wetlands, Land Under Waterbodies and Waterways, Bordering Land Subject to Flooding and Riverfront Areas located on site may provide a protection of wildlife habitat function.

The topography, plant community composition and structure, and soil structure of banks together provide important food, shelter, migratory and overwintering areas, and breeding areas for wildlife. Topography plays a role in determining the suitability of banks to serve as burrowing or feeding habitat. Soil structure also plays a role in determining the suitability for burrowing, hibernation and other cover. Bank topography and soil structure impact the bank's vegetative structure, as well. Bushes and other undergrowth, trees, vegetation extending from the bank into the water, and vegetation growing along the water's edge are also important to a wide variety of wildlife. A number of tubers and berry bushes also grow in banks and serve as important food for wildlife. Finally, banks may provide important shelter for wildlife which needs to move between wetland areas. Bank areas would be maintained under the proposed condition. Areas disturbed temporarily for construction access and staging would be stabilized and restored to a vegetated condition. Therefore, the proposed condition would not affect the ability of on site Bank resource areas to provide a protection of wildlife habitat function.

Bordering vegetated wetlands are probably the Commonwealth's most important inland habitat for wildlife. The hydrologic regime, plant community composition and structure, soil composition and structure, topography, and water chemistry of bordering vegetated wetlands provide important food, shelter, migratory and overwintering areas, and breeding areas for many birds, mammals, amphibians and reptiles. A wide variety of vegetated wetland plants, the nature of which are determined in large part by the depth and duration of water, as well as soil and water composition, are utilized by varied species as important areas for mating, nesting, brood rearing, shelter and food (directly and indirectly). The diversity and interspersed nature of the vegetative structure is also important in determining the nature of its wildlife habitat. Different habitat characteristics are used by different wildlife species during summer, winter and migratory seasons.

The existing wetlands are dominated by invasive species, such as common reed and purple loosestrife, which are considered to provide limited opportunities for wildlife use. The proposed restoration and enhancement plan would provide high quality, high functional value, native species dominated wetlands and remove impacted sediments from these areas. These enhancements over the existing condition would greatly improve the quality of wetlands on site for wildlife habitat. Species diversity and varying zones of wetland from intertidal to emergent would promote greater use of these wetlands by local wildlife populations. Proposed mud flat areas would support benthic invertebrate communities and therefore provide ideal feeding areas for shorebirds, waterfowl and mammals. Overall, the area of emergent wetlands on site would be reduced from 3.75 acres to 1.35 acres. However,

based on the functional lift provided by the proposed condition it is anticipated that the restored and enhanced wetlands proposed would provide a greater wildlife habitat function than the existing condition of these wetlands.

The plant community composition and structure, hydrologic regime, topography, soil composition and water quality of Land Under Waterbodies and Waterways provide important food, shelter, migratory and overwintering areas, and breeding areas for wildlife. As shown on Drawing C6, Excavation and Grading Plan, and Drawing C8, Typical Sections, no excavation is proposed within the river bed of the Saugus River. The proposed sediment removal within the Northern Area would create additional Land Under Water Bodies and Waterways on site. The proposed condition, therefore, would result in an improvement in the ability of on site Land Under Waterbodies and Waterways to provide a protection of wildlife habitat function.

Certain portions of Bordering Land Subject to Flooding are also likely to be significant to the protection of wildlife habitat. These include all areas on the ten year floodplain or within 100 feet of the bank or bordering vegetated wetland (whichever is further from the waterbody or waterway, so long as such area is contained within the 100 year floodplain). The site currently contains areas inundated by the 10 and 100-year flood event (Figure 3). As shown on the 60% Construction Drawings, subsheets C16-C19, the proposed site work would primarily involve sediment removal within existing Bordering Land Subject to Flooding. The proposed condition, therefore, would result in an improvement in the ability of on site Bordering Land Subject to Flooding to provide a protection of wildlife habitat function.

Riverfront areas are important wildlife habitat, providing food, shelter, breeding, migratory, and overwintering areas. Even some predominantly upland species use and may be seasonally dependent on riverfront areas. Riverfront areas promote biological diversity by providing habitats for an unusually wide variety of upland and wetland species, including bald eagles, osprey, and kingfishers. Large dead trees provide nesting sites for bird species that typically use the same nest from year to year. Sandy areas along rivers may serve as nesting sites for turtles and water snakes. Riverfront areas provide food for species such as wood turtles which feed and nest in uplands but use rivers as resting and overwintering areas. Riverfront areas provide corridors for the migration of wildlife for feeding or breeding. Loss of this connective function, from activities that create barriers to wildlife movement within riverfront areas, results in habitat fragmentation and causes declines in wildlife populations. All Riverfront Areas disturbed as a result of the proposed project would be restored to pre-construction condition (see Restoration Plan, Drawing C7 in Appendix L). No new structures or impervious areas are proposed within the Riverfront Area. Therefore, the proposed condition would not affect the ability of on site Riverfront Areas to protect wildlife habitat.

With restoration of the historic turning basin landscape at Saugus Iron Works there is a commensurate opportunity to significantly improve the habitat value for fish, birds, and other wildlife groups. There is an extensive literature documenting that the ecological values and functions of degraded *phragmites* marshes in New England, as well as *Typha* marshes, can be enhanced given the restoration of hydrologic processes; including restoration of tidal flow, increased duration and depth of marsh surface flooding, and increased salinity. Ecological enhancement has been documented through studies of

vegetation, macroinvertebrate, fish, and bird responses to tidal restoration (e.g., Peck et al. 1994, Roman et al. 1995, Burdick et al. 1997, Brawley et al. 1998, Raposa 2002, Roman et al. 2002, Warren et al. 2002). These previous studies, and others, focused on restoring hydrologic conditions to degraded marshes that were once saline *Spartina alterniflora* dominated habitats. There are few, if any, examples in the literature of restoring freshwater/brackish tidal wetlands as found at the upper tidal reaches of the Saugus River; however, it is expected that with lowering of the existing marsh surface elevation, as proposed, the planted native freshwater/brackish tidal marsh species and associated intertidal mudflats would thrive under a regime of increased flooding depth and duration.

2.9.9 Chapter 91 Waterways Permitting

There is no recorded license for the existing pier, bulkhead, and bridge under Chapter 91 Waterways Program found in a search of National Park Service records at Saugus Iron Works NHS. For the purposes of this project, it is assumed that no previous license exists, and a Chapter 91 license is required. Information necessary for a complete filing under the Chapter 91 license Waterways Program is included in Appendix M.

2.9.10 Section 106 of the Historic Preservation Act

National Historic Preservation Act and Massachusetts Historic Properties (M.G.L. c. 9: Massachusetts Historic Commission; M.G.L. c. 40C Historic District Act; 950 CMR 71.00: Protection of Properties Included on the State Register of Historic Places), under the authority of the Massachusetts Historic Commission, protects properties that are on or eligible for listing on the National Register of Historic Places. The primary regulation is Section 106 of the National Historic Preservation Act, requiring federal agencies to account for the impacts of federal projects on properties listed or eligible for listing on the National Register.

Status with Saugus Iron Works NHS: NPS has received confirmation from the State Historic Preservation Officer in a "no adverse effect" concurrence letter dated March 2, 2004. NPS received additional concurrence of "no adverse effect" from the Massachusetts Historical Commission on February 2, 2006.

2.9.11 Water Quality Certification

The project would require a **401 Water Quality Certification** (33 U.S.C. 1341 et seq. Ss. 401: Federal Water Pollution Control Act, M.G.L. c. 21: Massachusetts Clean Water Act; 314 CMR 4.00: Surface Water Quality Standards 314 CMR 9.00: 401 Water Quality Certification) for Dredging and Discharge, administered by the Division of Wetlands and Waterways within the DEP. This permit represents the state's assurance that excavation will not adversely affect water quality. The 401 review ensures that a proposed dredge and/or fill project that can result in the discharge of pollutants complies with Massachusetts Surface Water Quality Standards, the Massachusetts Wetlands Protection Act, and otherwise avoids or minimizes individual and cumulative impacts to Massachusetts waters and wetlands.

Status with Saugus Iron Works NHS: It is estimated that the proposed project will entail sediment removal of greater than the threshold of 5,000 cubic yards of material, and therefore would be considered a major project. CH2M HILL has prepared the certification on behalf of the NPS. Under the preferred alternative, the project would not meet the performance standards under the 401 Water Quality Certification with regard to the requirements for 1:1 mitigation for bordering vegetated

wetland. However, the NPS would be restoring the entire area to a mix of bordering vegetated wetland and mudflat and increasing the biodiversity of the system. A variance from the performance standards for this certification would be sought because of the national historic significance of the site and the public interest in rehabilitating the NHS. It is possible that the project may require a variance to this regulation if it does not meet the limited project provisions within the Saugus Conservation Commission.

2.9.12 Section 404 of the Federal Clean Water Act

The **Rivers and Harbors Act of 1899 (Section 10)** (33 U.S.C., 33 CFR 323: *Permit for Structures or Work Affecting Navigable Waters of the United States*) and the **Clean Water Act (Section 404)** (33 U.S.C. Ss.1251 et seq.: *Federal Water Pollution Control Act*; 33 FCR 322 *Permits for Discharges of Dredged or Fill Material in to the Waters of the United States*) administered by the USACE New England District, are required for all work including structures seaward of the annual high water line in navigable waters of the United States. A Section 404 permit is required for activities that involve the discharge of dredged or fill material into waters of the United States, including not only navigable waters, but also coastal waters, inland rivers, lakes, streams, and wetlands. Given the nature and extent of the Saugus Iron Works NHS wetland restoration project, it is most likely that the general permit, a consolidation of all USACE permits, will not suffice and applications for individual permits will be necessary. Under this latter review process, applications are submitted to the USACE, which in turn issues a Public Notice and initiates a comment period. The USACE evaluates the comments, public interest criteria, and compliance with Section 404 of the Federal Clean Water Act, and issues a permit.

Status with Saugus Iron Works NHS: The proposed sediment removal activities exceed the thresholds for a Nationwide Permit; therefore, an Individual Permit has been prepared for Section 10/Section 404.

2.9.13 NPDES

The **NPDES Permit** (33 U.S.C. Ss 1251 Ss1251 et seq.: *Federal Water Pollution Control Act*; 40 CFR 122: *EPA Administered Permit Programs: National Pollution Discharge Elimination System*; M.G.L. c. 21: *Massachusetts Clean Waters Act*; 314 CMR 3.00: *Massachusetts Surface Water Discharge Permit Program*) is administered by the United States Environmental Protection Agency (USEPA) as well as the Massachusetts Department of Environmental Protection (DEP). Under the NPDES program, as authorized by the Federal Clean Water Act, no point sources of pollutants can be discharged to the waters of the United States without a permit. The review process is initiated by contacting USEPA's Water Permits Division to determine applicable permits. The project proponent must file an application describing the location and nature of the proposed discharge and its receiving waters. NPDES permits are not valid until the applicant has received a 401 Water Quality Certification and a concurrence from the Massachusetts Office of Coastal Zone Management (CZM) under the Federal Consistency Review.

Under the **NPDES Construction Stormwater General Permit** (33 U.S.C. Ss1251 et seq.: *Federal Water Pollution Control Act*; 40 CFR 122: *EPA Administered Permit Programs: National Pollution Discharge Elimination System*), operators of large and small construction activities must obtain coverage under a NPDES construction stormwater permit. The project

proponent must submit a Notice of Intent to USEPA and must develop and implement a Stormwater Pollution Prevention Plan (SWPPP), detailing construction activities, erosion control measures, and inspection schedules to be implemented during construction.

Status with Saugus Iron Works NHS: Large construction projects, like the Saugus Iron Works NHS turning basin and dock restoration project, must obtain coverage under the NPDES Stormwater Construction General Permit because it approaches a disturbance of nearly 4 acres of land. A SWPPP has been prepared and will remain at the project site during construction

2.9.14 Notice of Intent/Order of Conditions

The project was presented at a hearing of the Saugus Conservation Commission on September 13, 2006. In accordance with the mission of the National Park Service and the General Management Plan for Saugus Iron Works National Historic Site, the project entails the removal of contaminated sediments and invasive plant species, the restoration of high quality wetland and aquatic habitat and the historic scene, and the rehabilitation of historic dock structures, within the boundary of the National Historic Site.

The Order of Conditions filed by the Saugus Conservation Commission states “the Saugus Conservation Commission at the Public Hearing on September 13, 2006 strongly supports the National Park Service (NPS) at Saugus Ironworks National Historic Site Proposal to restore its historic waterfront area, which was damaged in 1957 from sediments released following an upstream dam breach, and to improve the function of its wetlands, but under Ch. 131, sect. 40, write a denial.

This project is Denied under M.G.L. Chapter 131, Section 40, CMR 310, 10.55 Bordering Vegetated Wetlands (wet meadows, marshes, swamps and bogs)

Failure to meet: (1) preamble and (4) General Performance Standards, Alteration of 167,100 square feet of Bordering Vegetated Wetlands, and proposed replacement of 67,286 square feet, Net Loss of 99,814 square feet of Bordering Vegetated Wetlands”.

NPS requested a Superseding Order of Conditions for the project “Restore Saugus River Turning Basin and Dock,” DEP File # 67-892 from the Massachusetts DEP on September 22, 2006. In accordance with Massachusetts General Laws Chapter 131, Section 40, and 310 CMR 10.00 the NPS believes that this project would provide substantial benefits to the historic and natural resources of the National Historic Site. The project would entail the replacement of bordering vegetated wetlands that are dominated by dense stands of the invasive exotic common reed (*Phragmites australis*) or narrow-leaf cattail (*Typha angustifolia*) with an area of diverse native emergent fringing wetland and an area of intertidal mudflat/open water habitat.

2.9.15 Summary of Environmental Consequences/Impact Comparison Matrix

Table 5 presents a preliminary screening of impacts for Alternatives A through D. Consequences for the impact topics are listed in Section 4.0 and are thoroughly evaluated in Section 4.4, Impact Analysis.

TABLE 5
Summary of Environmental Consequences

Impact Topics	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C	Alternative D
Soundscapes	Would not be affected	Minor, short-term, site-specific, adverse impacts	Similar to Alternative B	Similar to Alternative B
Water quality and quantity	Would not be affected	Moderate, short-term, local, adverse impacts	Similar to Alternative B	Similar to Alternative B
Marine or estuarine resources	Minor, long-term, site-specific, adverse impacts	Moderate, long-term, local benefits	Similar to Alternative B	Similar to Alternative B
Floodplains or wetlands	Would not be affected	Moderate, long-term, site-specific benefits	Similar to Alternative B	Similar to Alternative B
Unique, essential or important wildlife or wildlife habitat	Would not be affected	Minor, long-term, site-specific benefits	Similar to Alternative B; however, less area would benefit	Similar to Alternative B
Unique, essential or important fish or fish habitat	Would not be affected	Moderate, long-term, site-specific, benefits	Similar to Alternative B; however, less area would benefit	Similar to Alternative B
Recreation resources, including supply, demand, visitation, activities, etc.	Would not be affected	Moderate, long-term regional benefits, and Minor, short-term, site-specific adverse impacts	Similar to Alternative B	Similar to Alternative B
Visitor experience, aesthetic resources	Minor, long-term, site-specific, adverse impacts	Moderate, long-term site-specific benefits, and Minor, short-term, site-specific, adverse impacts	Minor, long-term, site-specific, benefits, and Minor, short-term, site-specific, adverse impacts	Negligible, long-term, site-specific, benefits, and Minor, short-term, site-specific, adverse impacts
Resource, including energy, conservation potential, sustainability	Would not be affected	Moderate, long-term, site-specific benefits	Minor, long-term, site-specific benefits	Similar to Alternative B
Urban quality, gateway communities	Would not be affected	Moderate, long-term, regional benefits	Minor, long-term, regional benefits	Similar to Alternative C
Long-term management of resources or land/resource productivity	Would not be affected	Minor, long-term, local benefits	Similar to Alternative B	Similar to Alternative B
Traffic	Would not be affected	Negligible, short-term, local, adverse effects	Similar to Alternative B	Similar to Alternative B
Cultural Resources: Archeological resources	Archaeological resources would not be impacted	Short and long-term impacts are expected to be negligible <i>Section 106 Summary: no adverse effect</i>	Similar to Alternative B	Similar to Alternative B

Impact Topics	Alternative A (No Action)	Alternative B (Preferred Alternative)	Alternative C	Alternative D
Cultural Resources: Prehistoric/ historic structures	Minor, long-term, site-specific, adverse impacts <i>Section 106 Summary: no adverse effect</i>	Moderate, long-term, site- specific, benefits <i>Section 106 Summary: no adverse effect</i>	Similar to Alternative B	Similar to Alternative B
Cultural Resources: Cultural landscapes	Minor, long-term, site-specific, adverse impacts <i>Section 106 Summary: no adverse effect</i>	Moderate, long-term, site- specific benefits <i>Section 106 Summary: no adverse effect</i>	Minor, long-term, site-specific benefits <i>Section 106 Summary: no adverse effect</i>	Similar to Alternative C

3.0 Affected Environment

This section describes the affected environment of the turning basin and historic waterfront area at Saugus Iron Works NHS. The following subsections are based on the Saugus Iron Works NHS GMP (NPS, 2002) and are divided into five primary headings: site and landscape history, existing conditions, the cultural resource environment, the natural resource environment, and the socioeconomic environment.

3.1 Site and Landscape History

Iron manufacturing in New England began as English settlers faced iron shortages due to deforestation in England and the resulting slowdown in English smelting industries. With the end of the Great Migration in 1641, fewer ships carried iron supplies to New England. Consequently, iron speculators came to see America's vast timber and ore reserves as an excellent business prospect (NPS, 2002 and 2003a).

The Saugus iron works plant was built in 1646 and continued operations until 1668. Water power was facilitated through a system of sluiceways and tailraces fed from a 1,600-ft canal. The Saugus River was dammed north of the site. The dam measured 100-ft long, 18-ft high and 75-ft thick at its base. Waste material from the furnace was dumped into the Saugus River, creating the slag pile (NPS, 2002 and 2003a).

The Saugus plant used state-of-the-art manufacturing technology, one of only a dozen such plants in the 17th century world. The iron works plant, located at the site's floodplain area, contained a blast furnace, forge, rolling and slitting mill, warehouse, blacksmith shops, a grist mill, and a dock from which company boats carried iron products to Boston. The iron works plant converted raw materials – bog ore, charcoal, and gabbro (a flux) – into cast and wrought iron products.

The Saugus iron works supplied New England village blacksmiths with wrought iron bars, nail rod, and flat stock. These local blacksmiths then hammered the wrought iron into finished products, such as nails, hammers, hoes, harpoons, and saws. The iron works exported any excess iron bar and cast products primarily to Virginia, Barbados, and London (NPS, 2002 and 2003a).

Although production was good, mismanagement and lawsuits brought the iron works to a series of faltering halts. Iron workers trained at Saugus and their descendents took their skills to new iron ventures throughout the northeast, giving rise to what would become the American iron and steel industry.

In 1676, Samuel Appleton, Jr., grandson of the last owner-operator of the iron works, inherited the 600-acre property. Appleton discontinued the iron works operation, choosing instead to farm the property. It is conjectured that Appleton built the Iron Works House in about 1682. A 1724 probate record indicates that the iron works site was not built upon after 1724 (NPS, 2002 and 2003a). The plant eventually deteriorated and disintegrated, becoming an archaeological cache.

Wallace Nutting, a leading exponent of the colonial revival movement in America, purchased and restored the Iron Works House to its 17th century appearance in 1915-1917, on the recommendation of William Sumner Appleton, founder of the Society for the Preservation of New England Antiquities. In 1938, the Parson Roby Chapter of the Daughters of the American Revolution (DAR) acquired the property containing the site of the colonial iron works plant. In 1941, a private owner sold the Iron Works House to the Henry Ford Alumni Association, which intended to move the house to Greenfield Village, in Dearborn, Michigan. In response, Saugus residents formed the First Iron Works Association (FIWA) in 1943 to keep the house in Saugus. By 1946, they purchased the house, furnished it, and opened it to the public. That same year, the DAR donated the iron works site to FIWA (NPS, 2002 and 2003a).

Beginning in 1949, the American Iron and Steel Institute began funding the archaeological excavations begun at the site in 1948 by Roland Robbins. The Institute also funded reconstruction of the colonial plant, which was designed by the architectural firm of Perry, Shaw, Hepburn, Kehoe, and Dean, prominent designers of Colonial Williamsburg. Central Street was permanently re-routed around the site, the harbor area was restored to its original open-water condition, and much of the site was regraded. In 1954, the site was opened to the public. In 1957, the Prankers Pond dam on the Saugus River upstream of the site breached, dumping a large quantity of sediment into the restored harbor and creating a brackish marshland. After the Iron and Steel Institute withdrew its funding in 1962, FIWA began a campaign to have the NPS take over the property. This transfer took place in 1968 (NPS, 2002 and 2003a).

3.2 Existing Conditions

Visitors to Saugus Iron Works NHS experience a 17th century, water-powered, iron-making plant through both original and reconstructed features. Extant 17th century site resources include the Iron Works House, slag pile, stone trough, and various exposed archaeological foundation ruins, such as the Joseph Jenks site. The reconstruction of the colonial industrial plant includes the blast furnace, forge, slitting mill, dock, and warehouse. The reconstruction is based on a major archaeological investigation that was completed in 1954. Seven working waterwheels operate equipment to demonstrate the colonial iron-making process. These original and recreated structures and settings interpret the colonial iron works operation, from the harvesting of raw materials to the shipping of finished products. The entire site is registered as a state archaeological site, with the east bank area receiving an additional state archaeological designation.

Saugus Iron Works NHS is bordered on the northeast by a former industrial site. This site was used in the 1800s for leather treatment and woolen trade and in the early 1900s for the production of gasoline engines (Goff-Chem, 1995). Furniture manufacturing, oilless bearings, and leather-treating oil and chemicals have been produced by companies operating in the facility, which was used most recently by the Henkel Corporation to produce fish oil (Goff-Chem, 1995). Except for the Central Street Storage, which currently occupies the former Henkel facility, the site is surrounded by residential properties.

3.2.1 Existing Conditions of the Historic Turning Basin and Waterfront Area

Major landscape features were severely altered in 1957, when the dam breach north of the property caused extensive sedimentation in the site's restored harbor. A brackish marsh dominated by narrow-leaved cattail (*Typhus angustifolia*) and *Phragmites* has replaced the open-water turning basin and native low-lying marsh grasses that previously existed. The marsh obscures the reconstructed turning basin and its role in the original iron-making operations. The NPS manages the river and marsh as a damaged cultural landscape and natural resource area. Current drainage conditions of the turning basin have been studied and are detailed in the Drainage Assessment in Appendix H.



Photo 2 - Saugus Iron Works NHS, 2000 (NPS photograph).

Bulkhead and Dock

The existing bulkhead is constructed of oak and is approximately 6.5 ft high and 110 ft long. It extends from the eastern edge of the existing slag pile to the western end of the rectangular fill area containing the reconstructed 17th century warehouse. With the exception of a 12-ft-long section across the tailrace for the waterwheel at the western end of the forge building, the timber bulkhead is a façade constructed over an underlying concrete retaining wall. In the tailrace area, the timber bulkhead is a freestanding structure sitting on a lowered section of the concrete retaining wall.



Photo 3 - Bulkhead, 2004 (NPS photograph).



Photo 4 – Saugus Iron Works NHS, 2000 (NPS photograph).

The existing dock is a 36-ft-long, 12-ft-wide timber construction, extending into the turning basin from the existing bulkhead. The dock is connected to the bulkhead and is supported on two rock-filled timber crib piers located within the turning basin. According to data available in park records, creosote was not used to treat the wood.

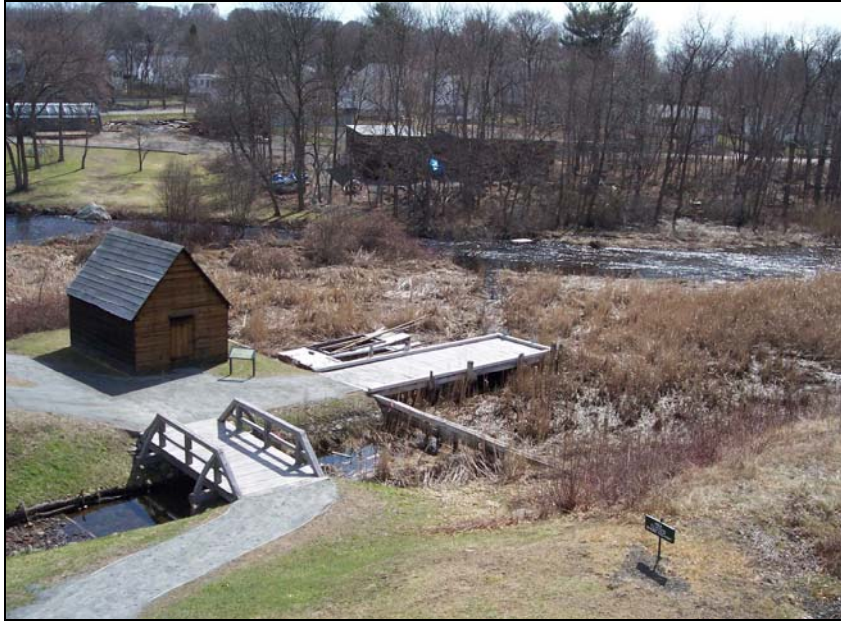


Photo 5 - Warehouse, bulkhead, dock, and "Alewife" (reproduction sailing vessel), 2004 (NPS photograph).

3.2.2 Existing Conditions of the Slag Pile

The only existing remnant of the original iron-making operations is a slag pile located to the south of the reconstructed blast furnace. Slag is an aggregate-like waste material produced in the iron-making process. During site operations, this material was removed from the blast furnace and dumped in a ridge-like pile at the northwestern corner of the tidal basin.



Photo 6 - Slag pile, undated (NPS photograph).

The slag pile, as it currently exists, is approximately 150 ft long, 50 ft wide, and 12 ft high. It has a narrow crest width, ranging from 5 to 7 ft, and steep side slopes, ranging from 1.5H:1V (1.5 horizontal to 1 vertical) to 1.8H:1V. The current configuration of the pile may be the result of regrading that occurred during site restoration activities in the early 1950s.

Approximately 40 percent of the surface of the slag pile is covered with grass, brush, and briars. The remainder is bare slag integrated with a high percentage of aggregate materials in the gravel-to-cobble size range.

During the site visit that occurred on April 8-9, 2004, the slag pile was observed to be generally stable and relatively clear of erosion damage, even after heavy rains that occurred immediately before the site visit. Discussions with Saugus Iron Works NHS personnel indicate that the slag pile does require landscape maintenance to preserve the pile's integrity. There were, however, signs of past erosion damage in the drainage swale where the western side of the slag pile abuts the natural hillside. Although the area is predominately vegetated, some exposed slag is present.

3.3 Cultural Resource Environment

Cultural resources in the project area include archeological resources, cultural landscape and historic structures.

Saugus Iron Works NHS (also known as Hammersmith) was established as a unit in the National Park System on April 5, 1968 (P.L. 90-282) and is listed on the National Register of Historic Places. The park is also recognized as a National Historic Landmark (NHL). The NHL recommendation in 1966 was based on a report conducted for the Advisory Board on National Parks, Historic Sites, Buildings and Monuments by the NPS Northeast Regional Office entitled *Area Investigation Report on the Saugus Iron Works, Saugus, Massachusetts*, September 1963.

Saugus Iron Works NHS contains the best evidence of the earliest development of iron manufacturing in colonial North America. The site's resources are also prominent examples of the colonial revival and historic preservation movements in the early to mid-twentieth century. The park is the result of preservation efforts by local citizens and the American Iron and Steel Institute. These groups restored and memorialized the site as an icon to the achievements of the Puritan era. Cultural resources in the project area include the reconstructed structures of the iron-making plant (i.e., the bulkhead and dock) and the slag pile. There is also the potential for prehistoric and historic archeological resources to be present.

3.3.1 Archeological Resources

Saugus Iron Works NHS can be divided into four archeological areas: (1) the terrace surrounding the Iron Works House, museum, and visitors station; (2) a sloping area to the east of the terrace, between the terrace and the industrial complex; (3) the industrial complex, site of the reconstructed Iron Works; and (4) a parcel of land on the east bank of the Saugus River, across the river from the industrial complex. The area of potential effect (APE) for the proposal to rehabilitate the Saugus Turning Basin includes the shoreline portion of area (3) and the industrial complex, site of the reconstructed Iron Works.

Extensive and intensive archeological investigation and excavation of area (3), conducted between 1948-1953 by Roland Wells Robbins, uncovered the remains of the 17th century Iron Works, along with thousands of artifacts and many structural features. Following Robbins' excavations, the major components of the industrial complex, including the furnace, forge, rolling/splitting mill, and the bulkheads and dock of the Turning Basin were reconstructed. Archeological investigation and testing during the 1970s focused on areas outside of the reconstructed Iron Works identified features associated with the original Iron Works, structures and refuse associated with later inhabitants of the sites, and features related to earlier American Indian occupation of the site.

In 1997, a NPS *Archeological Overview and Assessment* of Saugus Iron Works NHS indicated the presence of important archeological resources at the park including the seventeenth-century Iron Works, with its industrial, commercial and domestic components; a Native American component spanning as much as 7,000 years up to the seventeenth century; a varied eighteenth-century through nineteenth century agricultural and residential complex; and the mid-twentieth-century Iron Works excavation and reconstruction. The *Archeological Overview and Assessment* also confirmed that the reconstructed industrial complex close by the river had undergone more extensive and intensive disturbance than any other portion of the park and that various flood events have also caused destruction of archeological resources.

When Saugus Iron Works was reconstructed in the 1950s, the Turning Basin was an open-water environment. Historical information indicates that the upper layer of sediments currently in the Turning Basin are the likely result of fluvial transport following the 1957 dam failure upstream from the park. Sediments deposited in the turning basin following the 1957 dam breach and any historical materials in these sediments are in a secondary or tertiary depositional context (i.e., these historical materials have been moved by natural or cultural forces at least once or possibly twice since they were deposited in their original location). Because cultural materials in these sediments are in an altered depositional context, their location does not relate directly to the historic functioning of the Iron Works. Archeological investigation indicates that Saugus Iron Works NHS is an area of high archeological sensitivity with a wide range of known and potential archeological resources. Historic or archeological materials should be recorded as part of the sediment removal operations.

3.3.2 Cultural Landscape and Prehistoric/Historic Structures

Saugus Iron Works NHS is important for its association with the advent of iron producing technology and large-scale industrial manufacturing in colonial America. Here, between 1646 and ca. 1670, an integrated Iron Works produced cast iron and wrought iron from local bog ore. The park's principal historic structure is the Iron Works House which is among the largest surviving First Period (1620-1725) dwellings in the United States. The Iron Works House, a seventeenth-century dwelling that actually postdates the closing of the colonial Saugus Iron Works, is located on the upper lawn area or terrace above the reconstructed industrial complex and is outside of the area of potential effect for the proposal to restore the Turning Basin.

Saugus Iron Works NHS is also important as a reconstruction and an example of the historic preservation movement of the mid-twentieth century. The existing industrial complex is an

in-situ reconstruction of the colonial Iron Works on the banks of the Saugus River. The NPS considers the reconstructed structures of the iron-making site to be historic resources and important examples for public interpretation of the colonial revival and historic preservation movements in the early to mid-twentieth century. Reconstructed buildings include a blast furnace, forge, slitting mill, and iron warehouse. These reconstructed structures are adjacent to the area of potential effect for the proposal to restore the Turning Basin. Reconstructed features of the Iron Works located within the area of potential effect for the proposed project are the reconstructed bulkheads, two retaining walls located on either side of the Saugus River; and the dock. The only extant remnant of the original colonial Iron Works within the area of potential effect for the proposal is the slag pile.

A cultural landscape assessment at the park was conducted by the NPS in 1993, and in May of 2003, a cultural landscape report (CLR) was completed by the NPS to identify twentieth-century pedestrian circulation patterns at the park. The 2003 report examined landscape design and existing conditions; and visitor use and access and made treatment recommendations for the designed landscape at the park. Saugus Iron Works NHS is listed on the National Register of Historic Places as a historic district and the NPS manages the cultural landscape at the park as a historic resource.

3.4 Natural Resource Environment

Natural resources in the project area include topography, vegetation and habitats, fish and wildlife, and wetlands, among others. It is the NPS's mission to preserve these aspects of Saugus Iron Works NHS and the value that they provide to the public.

3.4.1 Topography

Topographically, Saugus Iron Works NHS features a somewhat steep gradient from an upland area to the Saugus River and its floodplain. The Iron Works House and Museum, with groomed lawns, specimen trees, an herb garden, and a picnic site, are at the highest upland elevation. The restored iron works are at a lower upland elevation, and the Saugus River, floodplain, and tidal wetlands are at the lowest elevation. Topographic surveys of the site were completed in September 2002, March 2003, April 2004, and April 2005. The existing topography of the project site is shown in Figure 7. Surface drainage from the site flows into the wetlands bordering the Saugus River and eventually into the river itself (Appendix H).

3.4.2 Vegetation and Habitats

Saugus Iron Works NHS is composed of three distinct vegetative zones. The upper lawn area includes the ornamental and indigenous shrubs and trees surrounding the Iron Works House and parking area. The Saugus River floodplain is a tidal marsh that supports wetland vegetation. The wooded nature trail area, located along the east bank of the Saugus River and extending up to the site's boundary, is characterized by a variety of trees, shrubs, and marsh plants.

Botanists completed a vascular plant survey of the site in November 1997 (Clemants, undated). One hundred-sixty species of plants were identified during the survey. In a letter dated September 15, 2004, the NMFS states that "no threatened or endangered species under

the jurisdiction of the NMFS are known to exist in the Saugus area.” Letters from the USFWS and DMF concur that no rare species are known to occur on site (see Appendix B). The NHESP has been notified of the discovery in a letter dated March 25, 2005. Native tree species found along the Saugus River within the riparian woodlands include white and scarlet oak, American beech, shagbark hickory, black walnut, black cherry, black willow, red and silver maple, and box elder. Poison ivy is abundant in these areas. Native wildflowers include Jack-in-the pulpit, skunk cabbage, jewelweed, goldenrod, and numerous species of asters. Fern species include sensitive fern, cinnamon fern, and lady fern. (CH2M HILL, 2004c)



Photo 7 - Narrow-leaved cattail and Saugus River viewed from western bank, 2004 (NPS photograph).

3.4.3 Floodplains and Wetlands

Wetland resources within the project area were initially identified from NPS background data and current Massachusetts Geographic Information System (MassGIS) maps. This information was integrated to form a base map of wetland resources (Figure 4). Under the Massachusetts Wetlands Protection Act and regulations (310 CMR 10), the following resources are present at the site:

Coastal Resources

- Land Subject to Coastal Storm Flowage

Freshwater Resources

- Bordering Vegetated Wetland
- Land Subject to Flooding
- Bank
- Land Under Water
- Buffer Zone

Preliminary vegetation reconnaissance observed at least 27 species of plants within the bordering vegetated wetland area, of which 16 are non-native and invasive. The wetland is dominated by common reed and narrowleaf cattail (Figure 5) including the area adjacent to the Joseph Jenks archeological site by the slag pile. Other abundant species include purple loosestrife (*Lythrum salicaria*), Japanese knotweed (*Polygonum cuspidatum*), multiflora rose (*Rosa multiflora*), and curly pondweed (*Potamogeton crispus*). These introduced species are considered to be aggressive invaders of disturbed or damaged habitats and tend to replace more valuable native species. Exotic vegetation directly affects natural resources and can result in severe and persistent changes to habitat conditions and ecosystem functions, disrupting natural processes. Woody plants also are becoming established in the marsh area and have begun to visually block the east bank of the Saugus River (CH2M HILL 2004c). CH2M HILL recently conducted a wetland delineation at the site in April 2005. Please refer to technical memorandum, Summary of Wetland Delineation Activities Saugus Iron Works National Historic Site, the Natural Resources Functional Assessment, and the NPS Statement of Findings for Floodplains and Wetlands for additional wetland details (Appendices I, J, and K, respectively).

Floodplains

A large portion of the site is comprised of floodplain, in the form of side channel bars on either side of the Saugus River. These side channel bars, which are 1 to 3 ft above mean high tide, support the wetland in the vicinity of Saugus Iron Works NHS.

Increasing development upstream of Saugus Iron Works NHS increases the potential for seasonal flooding. A flood damage control project for the Saugus River and tributaries has been underway since 1989 (U.S. Department of the Army, 1989). The USACE installed a gauge to measure river flow from the adjacent Henkel Corporation (Central Street Storage) property, immediately upstream from the site. The USGS now monitors this gauge. Real-time data are posted on the USGS website (<http://ma.water.usgs.gov/basins/ncoastalsfw.htm>). Flood insurance maps for Saugus depict a portion of the historic site within the 100-year flood zone (Figure 4).

Wetlands

Wetlands in the area of the historic turning basin were delineated in August 2003, according to DEP methodology (310 CMR 10.55, Bordering Vegetated Wetland, 1999). Vegetation observed in the wetlands included *Phragmites*, narrow-leaved cattail, jewelweed, purple loosestrife, Joe-Pye weed, multiflora rose, and white ash. Soils were observed to be very dark brown to black organic muck from 0 to 20 in below ground surface, which was consistent with the soil type mapped for this area (i.e., Ipswich and Westbrook Mucky Peats). CH2M HILL recently conducted a wetland delineation for the proposed restoration area in April 2005. Please refer to technical memorandum, Summary of Wetland Delineation Activities Saugus Iron Works National Historic Site for additional wetland details (Appendix I).

3.4.4 Fish and Wildlife

Saugus Iron Works NHS is a significant resource for animal species because it provides wildlife habitat in a heavily settled area. Informal observation indicates that the site provides habitat to resident and transient populations of small mammals, birds, fish,

reptiles, amphibians, and insects. No state-listed wildlife species are known to be present on site (NPS, 2002). CH2M HILL conducted an aquatic and benthic macroinvertebrate survey in July 2004 (Appendix J) and the NPS in conjunction with University of Rhode Island also conducted a nekton (fish and decapod crustaceans) and vegetation survey at Saugus Iron Works NHS in June-August 2004 (James-Pirri and Roman, 2004). The purpose of conducting these surveys was to determine if species composition and habitats had changed since the most recent survey conducted by Hudsonia Limited between 1989 and 1991 (Hudsonia Limited, 1991).

Thirty-seven species of birds have been identified at Saugus Iron Works NHS (Trocki and Paton, 2004). These include wetland birds such as mallards and black ducks, herons, egrets, redwing blackbirds, kingfishers, and Canada geese, which are regularly found within site boundaries. Songbirds include cardinals, orioles, finches, robins, hairy woodpeckers, white-breasted nuthatches, blue jays, crows, black-capped chickadees, flickers, catbirds, mocking birds, and wrens. Barn swallows nest in the iron works buildings and are highly visible to the public (NPS, 2002).

Ten species of mammals have been identified on site: woodchucks, field mice, chipmunks, rabbits, moles, skunks, gray squirrels, raccoons, opossum, and muskrat.

Reptiles observed at the site include the eastern garter snake, the northern brown snake, and the common snapping turtle, which is known to nest on site adjacent to the Saugus River. Amphibians include the green frog and the northern two-lined salamander, which has been observed utilizing sheltered areas of the site for breeding.

Within the last twenty years, two major fish inventories were conducted within the site. The first major inventory was completed by Hudsonia in 1989. Hudsonia found four species of fish, including American eel (*Anguilla rostrata*), four-spine stickleback (*Apeltes quadracus*), white sucker (*Catostomus commersoni*), and mummichog (*Fundulus heteroclitus*) (Hudsonia 1991). The second major fish inventory was conducted in 2004 by the University of Rhode Island. This study listed eleven species of fish. In addition to the four species previously surveyed by Hudsonia, the University of Rhode Island discovered alewife (*Alosa pseudoharengus*), brook stickleback (*Culaea inconstans*), redbfin pickerel (*Esox americana*), three-spine stickleback (*Gasterosteus aculeatus*), large mouth bass (*Micropterus salmoides*), white perch (*Morone americana*), and nine-spine stickleback (*Pungitius pungitius*) (James-Pirri and Roman 2004). The Massachusetts Division of Marine Fisheries also conducted a survey of rainbow smelt spawning habitat within the site in 1991. The gravel and cobble portions of the Saugus River within the site were identified as one of only seven smelt spawning habitats within the North Coastal Basin of Massachusetts (Chase 1992).

3.4.5 Water Bodies and Water Quality

The Saugus River, which was critical to the operation of the 17th century iron works in its former navigable condition, is the major aquatic resource of the site. The river originates at Lake Quannapowitt in Wakefield, Massachusetts, approximately 9 miles northwest of Saugus Iron Works NHS. Water flows from the outlet of the lake in an easterly direction through the 540-acre Reedy Meadows. The Reedy Meadows wetlands complex has been heavily impacted by industry, private development, and railroad crossings, resulting in various degrees of degradation and loss of marsh area. After Reedy Meadows, the river

turns south and flows past the Colonial Golf and Country Club to an impoundment where the City of Lynn diverts the river through a water supply canal. Below this point, the river can be characterized as heavily silted-in.

The transition from freshwater to salt water occurs between Saugus Iron Works NHS and the adjacent property immediately upstream at Bridge Street (Central Street Storage). In the area of Saugus Iron Works NHS, siltation from the 1957 dam breach has converted the once-wide river into a narrow reach, flanked with marshes dominated by *Phragmites* and narrow-leaved cattail. Here, the depth of the river ranges from a few inches to approximately 3 ft deep at normal high tide.

Downstream of Saugus Iron Works NHS, the river is a tidal estuary (4.5 miles long). The river is hydrologically sluggish because of its flat gradient. The tidal estuary and marshlands comprise about 10 percent of the total watershed area. The river meanders to the Atlantic Ocean at Lynn Harbor.

Watersheds

The main stem of the Saugus River is 13 miles long and extends through Wakefield, Lynnfield, Saugus, and Lynn. The Saugus River Watershed includes all of Saugus and portions of ten other towns, encompassing an area of over 47 square miles. The river has six tributaries. The watershed is an urbanized area with commercial, industrial, and residential development. Five major transportation corridors pass through the watershed: Routes 1, 95/128, 107, 1A, and the Massachusetts Bay Transportation Authority (MBTA) Commuter Rail line.

Water Quality

The Massachusetts Division of Water Pollution Control assessed the water quality of the Saugus River at twelve sampling stations in 1982 and established a water quality rating of B, suitable for fishing and swimming (DEP, 1982). The United States Army Corps of Engineers (USACE) sampled the estuarine reaches (lower 4.7 miles) during the period of 1982-1984 and again in 1986 (U.S. Department of the Army, 1989). Water quality testing also was documented by Sandy Wignot, a seasonal park ranger, in a report entitled "Baseline Water Quality Data for the Saugus River," (Wignot, 1988). In 1989-1990, a study of the Saugus River system analyzed samples from ten stations along the river, including Saugus Iron Works NHS. The results, published in *Baseline Assessment of the Saugus River System* (Tashiro, et al., 1991), suggest that the river may be exceeding the limits for a B rating (NPS, 2002).

The Saugus River has comparatively low levels of chemical pollution; however, high levels of coliform bacteria have been found in some areas (NPS, 2002). Although the town of Saugus installed a new sewage pumping station in 1987, sewage still seems to be the most obvious detriment to Saugus River water quality, which is probably due to infiltration and inflow, such as rain and groundwater, that enters sewer pipes. Fecal coliform may increase to high levels after rainstorms. The Saugus River Watershed Council (SRWC) coordinates a water monitoring effort, and designated site staff participates in the cooperative effort. The NPS is continuing its cooperation with the SRWC in water quality testing at the site and with the U.S. Geological Survey (USGS) toward developing a program of enhanced stream monitoring.

3.4.6 Climate, Air Quality, and Soundscapes

Saugus is located along the northern portion of Massachusetts Bay at 42 degrees north latitude. The weather is typical of that for many New England coastal communities. Summers are cooler and winters are warmer than inland communities because of the proximity of the Atlantic Ocean. The average temperature in January is 25.8 degrees Fahrenheit; the average temperature in July is 71.6 degrees Fahrenheit. The area receives approximately 40 in of annual precipitation, distributed evenly throughout the year. In a year, there are approximately 100 clear days, 106 days of partly cloudy weather, and 159 days of cloudy skies (NPS, 2002).

Air quality is managed regionally and on the state level by the DEP, which enforces National Ambient Air Quality Standards (NAAQS) established by the United States Environmental Protection Agency (USEPA) under the Clean Air Act (42 USC 7401 et seq.). NAAQS have been established for six pollutants: ozone, particulate matter (PM-10), sulfur dioxide, nitrogen oxides, carbon monoxide, and lead. Three air quality categories have been established for units of the NPS: Class I, Class II, and Class III. Saugus Iron Works NHS is in a Class II area. The state may permit a moderate amount of new air pollution (sulfur dioxide, PM-10, and nitrogen oxides) as long as neither NAAQS nor the maximum allowable increments over established baseline concentrations are exceeded.

Air quality in Saugus is affected by power stations in Salem and Charlestown, and by remote sources of air pollution that are transported into the region by prevailing winds. The town of Saugus lies within the Metropolitan Boston Intrastate Air Quality Control Region. This is an area of attainment for NAAQS, except for the pollutant ozone. However, annual reports indicate that the level of ozone is decreasing and that the air quality is improving in regard to ozone pollution. Chelsea and Lynn are the cities closest to Saugus for which air quality data are available from the annual air quality reports prepared by the DEP. The site closest to Saugus from which the DEP collects air quality data is the Lynn Water Treatment Plant, which monitors for ozone, nitrogen oxides, and PM-10.

No major pollutants originate from Saugus Iron Works NHS. The only pollutants originating from site-related activities are emissions from vehicles used by visitors to reach the site and by routine maintenance activities.

The acoustic environment of a specific location is a combination of the sounds associated with the natural and human surroundings. Noise is considered to be unwanted sound that interferes with normal activities or otherwise diminishes the quality of the environment. Noise may be associated with stationary sources such as industrial activities or with mobile sources such as vehicles and aircraft. It may be continuous or of relatively long duration, as with equipment operation, or intermittent, as with vehicles and traffic.

Saugus Iron Works NHS is located in a largely residential area where sounds are largely natural including birdsong and flowing water. Additional, non-natural sounds include traffic noise from adjacent roads.

3.4.7 Geology and Soils

Saugus Iron Works NHS is situated on the northern edge of the Boston Basin, a geological feature created by a shift in the earth's crust millions of years before the glaciers. After

glaciation, the ice sheets receded, part of the Boston Basin was submerged, and river valleys, such as the lower 4.5 miles of the 13-mile Saugus River, became tidal estuaries. To the north, south, and west, the basin is ringed by hills of granitic rock.

The uplands north and west of Saugus are called the Lynn Volcanics. As the Saugus River flows from its origin in the uplands northwest of the site to the sea, it descends rapidly in elevation near the iron works site. This area of small rapids influenced the choice of this site for the iron works, as did the terrain and the presence of bog iron.

The bedrock underlying the site is argillite of sedimentary origin, locally known as Cambridge Slate. A major source of Saugus jasper is located near the site; prehistoric inhabitants used this igneous rhyolite to fashion many of the site's lithic artifacts.

The soils of the watershed are mainly glacial in origin and consist of glacial till and glacial outwash deposits. Bank soils of the Saugus River were identified in *Baseline Assessment of the Saugus River System* (Tashiro, et al., 1991). The banks along the river in the Saugus Iron Works NHS area are Hollis-Urban Land-Rock Outcrop complex, Merrimac-Urban Land complex, and some Ipswich and Westbrook muck peats (NPS, 2002). In the freshwater tidal marsh and the estuarine reaches, sediments are more usually dominated by decomposed sapric histosols or organic or organic-rich mineral soils.

Analysis of soil samples collected from the project site in April 2004 (CH2MHILL, 2004c) indicated that peat extends to 2 ft below ground surface in some areas, particularly on the eastern riverbank where *Phragmites* is most dense. Generally, a layer of sand was observed below the organic layer, with silt and clay usually noted below the sand.

3.5 Socioeconomic Environment

Saugus Iron Works NHS is located in the town of Saugus (in the southern portion of Essex County), Massachusetts, approximately 10 miles north of Boston. Logan Airport is less than one-half hour away by car, and the site is accessible by public transportation from Boston. The site is approximately one mile from Route 1 and two miles from Interstate 95, the primary north-south highways in Massachusetts. Nearly all visitors to the town and the site arrive by private vehicle.

The site is bordered by residential neighborhoods and by residences and commercial buildings visible to the south as one looks down the Saugus River. The center of Saugus, site of the Saugus Town Hall, other town buildings, and a small retail district, is one-third mile south of the site. Most of the community is residential, with 78 percent of the households owner-occupied. The population is about 27,000, or roughly 4 percent of the Essex County population of about 700,000. The population density in Saugus is about 2,400 persons per square mile; about 43 percent of the land is developed. Nearly 80 percent of Saugus' working residents who are 16 years or older travel under 34 minutes to their place of work. This indicates that this large percentage of the population is spending most of their time close to home and therefore rather significantly contributing to the local economy (U.S. Census, 2000). The demand for housing in the Boston metropolitan area, and the consequent pressures on undeveloped land in Saugus, have increased significantly in recent years. This would affect the viewsheds that provide a context for the historical site.

Saugus Iron Works NHS may contribute to the economic development of the area because of its singular position as the southern gateway to the Essex National Heritage Area (NHA). However, its economic impact would be of significance only in the small retail area of Saugus Center. Route 1 in Saugus, one mile away, is a major retail, hotel, and light industrial corridor. It is the primary focus of economic activity in the area and is traversed by over 110,000 vehicles per day. The impact on traffic of any changes in visitation to Saugus Iron Works NHS would be felt only in the immediate area of the site and would not be statistically significant.

While the racial and ethnic makeup of Saugus is traditionally homogeneous (nearly 98 percent Caucasian), recent influxes of immigrants from Asia (0.57 percent) and Latin America are very likely to continue to increase the diversity of the visitors the site serves (U.S. Census, 2000). Other changes in population related to growth, aging, and mobility may alter traditional visitor use patterns for Saugus Iron Works NHS and shift impacts on resources and demands for interpretive and recreational services.

3.5.1 Visitor Use, Visitor Experience

People visit Saugus Iron Works NHS from all 50 states and many foreign countries. According to the NPS (2002), recent visitation numbers approximate 23,000 annually, including up to 3,000 children attending educational programs. The heaviest visitation (78 percent) occurs from May through October. Education programs reach student groups from preschool to post-graduate levels. Museum collections attract researchers in the fields of industrial archaeology, Native American prehistory and plantation period, colonial iron making, colonial settlement and life, genealogy, 17th century architecture, and the 20th century preservation movement (NPS, 2002).

In 1996, the site became the southern gateway to the Essex NHA, serving as a visitor information center for people approaching the heritage area from Boston and points south. Through the Essex NHA, the site is connected to other historic resources that interpret early colonial settlement in Essex County.

The considerable aesthetic qualities of the site are directly related to its historic, natural, and cultural scene. It is valued as one of the few high-quality open spaces in the Saugus area. Currently, the invasive vegetation that has overtaken the historic turning basin obscures the historic, character-defining landscape elements and the natural environment, making it difficult for visitors to experience the historical and cultural context of the site and to appreciate its natural aesthetics.



Photo 8 - Viewshed from waterfront area, 2004 (NPS photograph).

3.5.2 Land Management and Sustainability

Current land management and sustainability measures are coordinated by the staff at Saugus Iron Works NHS. Natural and cultural resources are maintained by regular monitoring and detailed record-keeping to ensure long-term sustainability at the site. Saugus Iron Works NHS promotes conservation and preservation of the resources by employing full-time staff members committed to studying the site and managing its resources.

4.0 Environmental Consequences

The following sections describe the environmental consequences associated with Alternatives A through D, including direct, indirect, and cumulative impacts. Potential resource impacts are described in terms of type (beneficial or adverse), context (site-specific, local, or regional), intensity (negligible, minor, moderate, or major), duration (short or long-term), and impairment (would or would not impair site resources and values). The environmental resources will be described in the same order as they were presented in Section 1.5, Impact Topics.

4.1 Methodology

This section describes the methodology used to analyze the potential impacts on the identified environmental resources listed in Table 1 of the Executive Summary.

Table 6 lists the specific definitions used to evaluate the potential impacts associated with the project alternatives.

Each potential impact has been individually characterized by type, context, duration, intensity, and impairment, as defined in Table 6.

TABLE 6
Summary of Potential Impact Definitions

Potential Impact Characterization	Definition
Type	Beneficial or Adverse
Context	Site-specific: Saugus Iron Works NHS
(dependent upon each resource)	Local: Saugus, Massachusetts
	Regional: Saugus River Watershed
Duration	Short-term: Impacts last one year or less
	Long-term: Impacts last greater than one year
Intensity	<i>Resource-specific intensities are defined for each of the impact topics. In general:</i>
	Negligible: Barely detectable impacts, not measurable
	Minor: Detectable but not noticeable
	Moderate: Detectable and noticeable
	Major: Significant impact

Topics reviewed had both adverse and beneficial impacts to resources and were estimated to have either short-term or long-term impacts. The impacts also were analyzed according to context; the impact analysis for this EA/DEIR is limited to resources within the Saugus

River watershed. Intensity analysis is categorized as no impact, negligible impact, minor impact, moderate impact, and major impact. Those potential impacts that were determined unlikely to affect physical natural and cultural resources were not included as impact topics and were dismissed from further analysis.

4.1.1 Connected and Cumulative Actions

In determining the scope, the NPS is required to analyze the range of actions, alternatives, and impacts involved in the proposed project. The NPS also considers connected, similar, and cumulative actions. The internal scoping meeting discussed the proposed actions and their associated impacts under these three categories of actions, which are described in detail below and will be finalized after public comment.

Connected Actions

Connected actions are identified to ensure that all aspects of a proposed action are considered as a whole rather than in separate pieces. Actions that are closely related to the proposal and its alternatives are considered connected. They can be considered as interrelated segments of the same action and as dependent on other actions. In particular, the actions are considered connected if they automatically trigger other actions or are associated with a larger action, requiring that larger action for justification.

No connected actions have been identified for the Restore Saugus River Turning Basin and Dock project.

Cumulative Actions

The combined and incremental impacts of human activity, referred to as cumulative impacts, potentially pose a serious threat to the environment. While they may be insignificant by themselves, cumulative impacts can accumulate over time, from one or more sources, and can result in the degradation of important resources. Cumulative impacts are additive impacts to a particular resource, and include impacts of the past, the present, and the reasonably foreseeable future. The team can determine which resources are cumulatively affected by considering:

- whether the resource is vulnerable to incremental impacts
- whether the restoration project is one of several similar projects in the area
- whether other activities in the area have similar impacts on the resource
- whether other activities in the area have identified cumulative actions of concern

A comprehensive discussion of these guidelines during internal scoping yielded several potential cumulative actions that relate to Saugus Iron Works NHS. After careful consideration, actions deemed relevant to the project were those that are being proposed or have been recently completed within the Saugus River watershed upstream and downstream of the site, thus ensuring that any potential impact on the area could indeed be related to the Saugus Iron Works restoration. The following projects are described from the headwater portions of the Saugus River near Lake Quannapowitt to the tailwaters leading to the Atlantic Ocean.

Reedy Meadow Flood Control

A flood control project is being proposed for Reedy Meadow, a 540-acre freshwater marsh and National Natural Landmark (designated in 1972) located north of Route 128/I-95 and south of Lake Quannapowitt. The project is still in the preliminary design and permitting phase and future funding is uncertain. The proponent of this project is the Saugus River Watershed Council.

Saugus River Herring Restoration Habitat Assessment

A habitat assessment for the Saugus River will be conducted by the Saugus River Watershed Council to restore anadromous fisheries in the Saugus River watershed. The assessment will evaluate the extent of available fish spawning habitat in the Saugus River watershed upstream of the Lynn Water and Sewer Commission Dam. The geographic scope of this project will include the upstream portions of the Saugus River watershed including: Reedy Meadow, Lake Quannapowitt and Pillings Pond. The Saugus River Habitat Assessment will include information regarding water chemistry, depth, sediments, hydrology and physical characteristics. The Assessment will be conducted through a combination of fieldwork and review of existing scientific studies.

Town of Saugus Sewer Overflow Concerns

The Town of Saugus is currently cooperating with the DEP to locate and repair water infiltration and inflow problems that enter the community's sewage system. Over the next several years, storm drains and sewer lines should be repaired or replaced in various areas of the Town.

Rumney Marshes

The Saugus River feeds into the Rumney Marsh downstream of Saugus Iron Works NHS. Rumney Marsh is one of the most biologically significant salt marshes north of Boston. Designated as an Area of Critical Environmental Concern (ACEC) by MA DEP in 1988, the 1,700-acre marsh is home to rainbow smelt, winter flounder, alewife, American eel, soft-shelled and razor clams, mussels, and a variety of native and migratory birds. The Rumney Marsh ACEC includes two highly productive estuarine systems: Rumney Marsh in Lynn, Revere, and Saugus; and Belle Isle Marsh in Boston, Revere, and Winthrop. Many projects have been recently completed or are proposed within this coastal salt marsh:

- Ten innovative self-regulating tidegates replaced broken standard type tidegates in Revere, restoring tidal flow to 24 acres of the Central Country Ditch wetlands, 16 acres behind Revere Beach, and 5 acres at Town Line Brook.
- Four additional acres of the abandoned I-95 embankment were removed to restore clam flat and salt marsh habitat bringing the total I-95 fill removal acreage up to 25 acres.
- Over 50 acres of salt marsh have better tidal flow and fresh water drainage because of ditch maintenance and Open Marsh Water Management projects completed in Saugus and Revere.

In addition, a Salt Marsh Restoration Plan for the Rumney Marshes ACEC is being drafted under the leadership of the Massachusetts Wetlands Restoration Program and the state's

ACEC Program. The Plan recommends restoration projects for 200 acres spread over at least 15 sites in Rumney Marsh.

Saugus Iron Works NHS Accessibility Project

Saugus Iron Works NHS is proposing to create a path that would lead the visitor from a redesigned parking lot to the front of the Iron Works House and around to a new Annex entrance. The annex would be reused as a visitor orientation center. The museum building and its exhibits would be rehabilitated. Stored museum collections would be housed in a rehabilitated site residence.

Saugus Iron Works NHS Stone Wall Rehabilitation

The stone wall at Saugus Iron Works NHS, which runs approximately 66 ft along the river's west banks and about 250 ft along the river's east bank, is in need of maintenance. To improve the current condition of the wall and enhance the historic viewshed, fallen rocks would be restacked and new rocks may be added for greater stability.

Hamilton Street Weir

The NPS would continue to facilitate the removal of the Hamilton Street weir in collaboration with other stakeholders. The weir occurs approximately 700 feet downstream of the Southern Area, outside of the NPS boundary, and is currently owned by the now defunct First Ironworks Association. The NPS is collaborating with the Massachusetts Riverways Program to establish a process by which the weir can be transferred to other ownership and then removed. Removal of the weir would contribute to restoration of wetland habitat features (river geomorphology, *Phragmites* control) downstream of the project area and would enhance recreational opportunities throughout the Saugus River.

Direct and Indirect Impacts

NPS policy requires that both direct and indirect impact be considered during impact analysis. A direct impact is caused by an action and the impact occurs at the same time and place as the action. An indirect impact is an effect that is caused by an action but the effects occur at a greater distance from the impact or later in time but still reasonably foreseeable. Though both direct and indirect impacts are included in the analysis, direct and indirect impacts are not distinguished.

4.2 Impairment of Park Resources or Values

The fundamental purpose of the NPS, as established by the Organic Act of 1916 and reaffirmed by the General Authorities Act of 1970, as amended, begins with a mandate to conserve National Park resources and values. NPS managers must always seek ways to avoid or minimize, to the greatest degree practicable, adverse impacts on park and monument resources and values. However, the laws do give NPS management discretion to allow impacts to park resources and values when necessary and appropriate to fulfill the purposes of a site, as long as the impacts do not constitute impairment of the affected resources and values. Although Congress has given NPS management discretion to allow certain impacts within sites, that discretion is limited by statutory requirement that the NPS

must leave site resources and values unimpaired, unless a particular law directly and specifically provides otherwise.

An impairment is an impact that, in the professional judgment of the responsible NPS manager, would harm the integrity of site resources or values, including opportunities that otherwise would be present for the enjoyment of those resources or values. An impact to any site resource or value may constitute impairment if conservation of that resource or value is:

- necessary to fulfill specific purposes identified in the establishing legislation or proclamation of the site;
- key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site; or
- identified as a goal in the site's Master Plan or GMP or other relevant NPS planning documents.

A determination on impairment is included where appropriate in the resource impact analysis of each alternative (Section 4.4).

4.3 Impacts to Cultural Resources and Section 106 of the National Historic Preservation Act

Section 106 of the NHPA requires federal agencies to consider the impacts of their proposed actions on historic properties, and to provide State Historic Preservation Officers (SHPO), tribal historic preservation officers, and, as necessary, the Advisory Council on Historic Preservation a reasonable opportunity to review and comment on these actions. Section 106 review and NEPA are two separate, distinct processes. They can and should occur simultaneously, and documents can be combined, but one is not a substitute for the other. However, they should be coordinated to avoid duplication of public involvement or other requirements. The information and mitigation gathered as part of the 106 review must be included in the NEPA document, and the 106 process must be completed before a Finding of No Significant Impact (FONSI) or a Record of Decision (ROD) can be signed on a proposed action that affects historic properties.

NPS has received confirmation from the State Historic Preservation Officer in "no adverse impacts" concurrence letters dated March 2, 2004 and February 2, 2006 (Appendix B).

4.4 Impact Analysis

The following impact topics have been identified from an NPS list of issues that were discussed during the internal scoping meeting. The impacts have been analyzed for each alternative and characterized by type, context, duration, intensity, and impairment.

4.4.1 Soundscapes

The NPS *Management Policies* 2001, states that the NPS will strive to preserve the natural quiet and natural sounds associated with the physical and biological resources of parks.

Context, time, and intensity together determine the level of impact for an activity. It is usually necessary to evaluate all three factors together to determine the level of noise impact. In some cases an analysis of one or more factors may indicate one impact level, while an analysis of another factor may indicate a different impact level, according to the criteria below. In such cases, best professional judgment based on a documented rationale must be used to determine which impact level best applies to the situation being evaluated.

Impact Intensity	Impact Description
Negligible	Effects to natural sound environment would be at or below the level of detection and such changes would be so slight that they would not be of any measurable or perceptible consequence to the visitor experience or to biological resources.
Minor	Effects to the natural sound environment would be detectable, although the effects would be localized, and would be small and of little consequence to the visitor experience or to biological resources. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Effects to the natural sound environment would be readily detectable, localized, with consequences at the regional or population level. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
Major	Effects to the natural sound environment would be obvious and have substantial consequences to the visitor experience or to biological resources in the region. Extensive mitigation measures would be needed to offset any adverse effects and success would not be guaranteed.

Soundscapes at Saugus Iron Works NHS may be adversely affected in the short term. It is anticipated that the noise from construction machinery and construction-related activities may have minor, site-specific effects, with no impairment to the site. It is suggested that this topic be retained for further discussion with local officials to determine the applicability to the Town of Saugus Noise Bylaw.

Alternative A— Under the no-action alternative, no new impacts to soundscapes from wetland restoration would occur. Soundscapes would not be affected.

Cumulative Impact— Because the alternative would produce no new impacts, there would be no contribution to cumulative impacts.

Conclusion: No new impacts would occur, no contribution to cumulative impacts and no impairment would occur.

Alternative B— The machinery used during construction would be the only source of adverse impacts to soundscapes. Sound impacts are expected to be localized due to topography, and attenuated by distance and surrounding trees and other vegetation. As such, soundscapes would incur a minor, adverse, site-specific, and short-term noise impact during construction.

Cumulative Impact— Because there are no identified actions in the vicinity that would impact the local soundscape, it is anticipated that this alternative would not add to cumulative impacts.

Conclusion: Alternative B would have minor, adverse, site-specific and short-term impact to soundscapes. No contribution to cumulative impacts would occur. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to soundscapes.

Alternatives C and D— Because the nature of construction noise and duration would be very similar to those anticipated under Alternative B, the level of soundscape impacts from these alternatives would be the same as stated under Alternative B.

Cumulative Impact— Because there are no identified actions in the vicinity that would impact the local soundscape, it is anticipated that these alternatives would not add to cumulative impacts.

Conclusion: Alternatives C and D would have minor, adverse, site-specific and short-term impacts to soundscapes. No contribution to cumulative impacts would occur. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to soundscapes.

4.4.2 Water Quality and Quantity

The NPS *Management Policies* 2001 state that the NPS will take all necessary actions to maintain or restore the quality of surface waters and ground waters within the parks consistent with the Clean Water Act and all other applicable federal, state, and local laws and regulations. Considerations in assessing the magnitude of water quality impacts include the effect on those resources dependent on a certain quality or condition of water. Sensitive aquatic organisms, submerged aquatic vegetation, riparian areas, and wetlands are affected by changes in water quality from direct and indirect sources.

Given the above water quality issues and methodology and assumptions, the following impact thresholds were established in order to describe the relative changes in water quality (overall, localized, short and long term, cumulatively, adverse and beneficial) under the management alternatives.

Impact Intensity	Impact Description
Negligible	Impacts (chemical, physical, or biological effects) would not be detectable, would be well below water quality standards or criteria, and would be within historical or desired water quality conditions.
Minor	Impacts (chemical, physical, or biological effects) would be detectable but would be well below water quality standards or criteria and within historical or desired water quality conditions.
Moderate	Impacts (chemical, physical, or biological effects) would be detectable but would be at or below water quality standards or criteria; however, historical baseline or desired water quality conditions would be temporally altered.
Major	Impacts (chemical, physical, or biological effects) would be detectable and would be frequently altered from the historical baseline or desired water quality conditions; and/or chemical, physical, or biological water quality standards or criteria would temporarily be slightly and singularly exceeded.

Sediment removal activities at Saugus Iron Works NHS may moderately and adversely affect the water quality of the Saugus River during the short-term. Removal activities may temporarily increase the turbidity of the water downstream of the site. Only barely perceptible, incremental cumulative impacts are anticipated as a result of this potential impact to water quality, because turbidity would only increase during approximately three months of construction activities. Water quality would be retained as an impact topic because it directly pertains to regulations associated with the Clean Water Act. Restoration activities are not likely to affect water quantity.

Alternative A— Under the no-action alternative, no new impacts to water quality or quantity would occur. Water quality and quantity would not be affected.

Cumulative Impact— Because the alternative would produce no new impacts, there would be no contribution to cumulative impacts.

Conclusion: No new impacts would occur, no contribution to cumulative impacts and no impairment would occur.

Alternative B— Local water quality may be moderately and adversely affected during the short term under the preferred alternative. The impacts would occur only during the construction period, and restoration would not likely affect water quantity.

Cumulative Impact— All cumulative actions identified in Section 4.1.1, with the exception of the Saugus Iron Works NHS Accessibility Project, would likely contribute moderately to the cumulative scenario with respect to water quality and quantity, given the size, duration and nature of the actions. Only barely perceptible incremental cumulative impacts are anticipated as a result of this potential impact to water quality, because turbidity would only increase during approximately 3 months of construction activities.

Conclusion: Alternative B would likely have moderate, adverse, local and short-term impact to water quality and no impact to water quantity. Only barely perceptible incremental cumulative impacts are anticipated from this alternative. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural

integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to water quality and quantity.

Alternatives C and D— Because the nature of water quality would be very similar to those anticipated under Alternative B, the level of water quality impacts from these alternatives would be the same as stated under Alternative B.

Cumulative Impact— All cumulative actions identified in Section 4.1.1, with the exception of the Saugus Iron Works NHS Accessibility Project, would likely contribute moderate impacts to the cumulative scenario with respect to water quality and quantity, given the size, duration and nature of the actions. Only barely perceptible, incremental cumulative impacts are anticipated as a result of this potential impact to water quality, because turbidity would only increase during approximately 3 months of construction activities.

Conclusion: Alternatives C and D would likely have moderate, adverse, local and short-term impact to water quality and no impact to water quantity. Only barely perceptible incremental cumulative impacts are anticipated from this alternative. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to water quality and quantity.

4.4.3 Marine or Estuarine Resources

According to *NPS Management Policies 2001*, the restoration of native species is a high priority. Information on Saugus Iron Works NHS marine or estuarine resources was taken from park documents and records. The Saugus Iron Works NHS natural resource management staff, NMFS and the DMF also provided marine or estuarine information.

Impact Intensity	Impact Description
Negligible	There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.
Minor	Impacts would be detectable, but they would not be expected to be outside the natural range of variability of native species' populations, their habitats, or the natural processes sustaining them. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Breeding species of concern are present; species are present during particularly vulnerable life-stages, such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit. Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they could be outside the natural range of variability. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
Major	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they would be expected to be outside the natural range of variability. Key ecosystem processes might be disrupted. Loss of habitat might affect the viability of at least some native species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

Local marine or estuarine resources are expected to moderately benefit from the restoration activities. The local estuarine fish species would likely experience long-term benefits from restoration of the current habitat to a functioning tidal marsh/non-vegetated wetland habitat. It is anticipated that anadromous fish populations would be enhanced by the likely improvement in habitat, water quality, and ecosystem health as a result of the restoration. Barely perceptible incremental cumulative impacts are anticipated as a result of this benefit to marine or estuarine resources because benefits to this resource are likely to be long-term.

Alternative A— Under the no-action alternative, continued *Phragmites* growth and potential loss of open water and species habitat may result in minor, adverse, and site-specific impacts to marine or estuarine resources over the long-term.

Cumulative Impact— All cumulative actions identified in Section 4.1.1, with the exception of the Saugus Iron Works NHS Accessibility Project, would likely contribute moderately to the cumulative scenario with respect to marine or estuarine resources, given the size, duration and nature of the actions. Because the alternative would produce only minor impacts to marine and estuarine resources, only a barely perceptible incremental contribution to cumulative impacts is likely. No impairment would occur.

Conclusion: Alternative A may result in minor, adverse, and site-specific impacts over the long-term and would only have a barely perceptible, incremental adverse contribution to an overall moderate cumulative beneficial impact. No impairment would occur.

Alternative B— Local marine or estuarine resources would likely experience moderate beneficial impacts as a result of the tidal marsh/non-vegetated wetland habitat restoration included in this alternative. The restoration activities are expected to create long-term beneficial impacts for local marine or estuarine resources.

Cumulative Impact— All cumulative actions identified in Section 4.1.1, with the exception of the Saugus Iron Works NHS Accessibility Project, would likely contribute moderate beneficial impacts to the cumulative scenario with respect to marine or estuarine resources, given the size, duration and nature of the actions. Small cumulative effects are anticipated as a result of this potential impact to the resource, because benefits are likely to be long-term.

Conclusion: Alternative B would likely have moderate, beneficial, long-term impact to local marine or estuarine resources. Small cumulative impacts are anticipated from this alternative. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to marine or estuarine resources.

Alternatives C and D— Because marine or estuarine resources would be very similar to those anticipated under Alternative B, the marine or estuarine resources impacts from these alternatives would be the same as stated under Alternative B.

Cumulative Impact— All cumulative actions identified in Section 4.1.1, with the exception of the Saugus Iron Works NHS Accessibility Project, would likely contribute moderate beneficial impacts to cumulative impacts with respect to marine or estuarine resources,

given the size, duration and nature of the actions. It is anticipated that these alternatives C and D would contribute a small beneficial increment to cumulative impacts.

Conclusion: Alternatives C and D would likely have moderate, beneficial, long-term impact to local marine or estuarine resources. These alternatives would contribute a small beneficial increment to overall moderate beneficial cumulative impacts. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to marine or estuarine resources.

4.4.4 Floodplains and Wetlands

Executive Order 1990 ("Protection of Wetlands") requires an examination of impacts to wetlands; and protecting wetlands. The NPS has adopted a "no net loss" of wetlands policy. Executive Order 11988 ("Floodplain Management") requires an examination of impacts to floodplains; of potential risk involved in placing facilities within floodplains, and protecting floodplain values. The planning team based the impact analysis and the conclusions for possible impacts to floodplains or wetlands on 100-year floodplain maps, the on-site inspection of known and potential jurisdictional wetlands within the park, review of existing literature and studies, information provided by experts in the NPS and other agencies, and Saugus Iron Works NHS staff insights and professional judgment.

Impact Intensity	Impact Description
Negligible	There would be no change in the ability of a floodplain to convey floodwaters, or its values and functions. Project would not contribute to a flood. Wetlands would not be affected or the effects would be below or at the lower levels of detection.
Minor	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and local, although the changes would be only just measurable. Project would not contribute to a flood. No mitigation would be needed. The effects to wetlands would be detectable and relatively small in terms of area and the nature of the change. The action would affect a limited number of individuals of plant or wildlife species within the wetland.
Moderate	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and local. Project could contribute to a flood. The impact could be mitigated by modification of proposed facilities in floodplains. The effects to wetlands would be readily apparent over a relatively small area but the impact could be mitigated by restoring previously degraded wetlands. The action would have a measurable effect on plant or wildlife species within the wetland, but all species would remain indefinitely viable.
Major	Changes in the ability of a floodplain to convey floodwaters, or its values and functions, would be measurable and, widespread. Project activities would contribute to a flood. The effects to wetlands would be readily apparent over a relatively large area. The action would have measurable consequences for the wetland area that could not be mitigated. Wetland species would be at risk of extirpation from the area.

Floodplain or wetland resources would likely incur moderate beneficial impacts as a result of the restoration. The majority of the wetlands within the site are classified as tidal freshwater marsh, an ecosystem that is extremely vulnerable in the State of Massachusetts,

with five or fewer occurrences and very few remaining acres. The proposed restoration of the wetlands would increase the area of this limited ecosystem and have a positive, long-term, site-specific impact. This impact topic is retained for future discussions with the Saugus Conservation Commission with regard to the Wetland Protection Act.

Alternative A – Under the no-action alternative, no new impacts to floodplains or wetlands would occur. Floodplains or wetlands would not be affected.

Cumulative Impact – Because the alternative would produce no new impacts, there would be no contribution to cumulative impacts.

Conclusion: No new impacts would occur, no contribution to cumulative impacts and no impairment would occur.

Alternative B – Site-specific floodplain or wetland resources would likely experience a moderate, long-term, beneficial impact under this alternative. Under this alternative the project would not meet the performance standards under the Massachusetts Wetlands Protection Act and the 401 Water Quality Certification with regard to the requirements for 1:1 mitigation for bordering vegetated wetland. However, the NPS would be restoring the entire area to a mixture of bordering vegetated wetland and mudflat and increasing the biodiversity of the system. A variance from the performance standards of these regulatory programs would be sought because of the national historic significance of the site and the public interest in rehabilitating the NHS.

Cumulative Impact – Due to the size of the marshes and the extent of the historical, restorative projects that have occurred as well as those that are in the reasonably foreseeable future, the estimated long-term impacts from Rumney Marshes and Reedy Meadow Flood Control projects are considered moderate benefits to the cumulative scenario. Because this alternative would be impacting a relatively small area, there would only be an appreciable, beneficial contribution to cumulative impacts.

Conclusion: Alternative B would likely have moderate, beneficial, site-specific and long-term impacts to floodplain or wetland resources. Only small cumulative impacts are anticipated from this alternative. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to floodplains or wetlands.

Alternative C – Though the nature of floodplain or wetland resources is similar to those anticipated under Alternative B, the size of the proposed restoration smaller. Therefore, the level of floodplain or wetland resource impacts from these alternatives would be minor, beneficial, site-specific, long-term benefits.

Cumulative Impact – Due to the size of the marshes and the extent of the historical, restorative projects that have occurred as well as those that are in the reasonably foreseeable future, the estimated long-term impacts from Rumney Marshes and Reedy Meadow Flood Control projects are considered moderate benefits to the cumulative scenario. Because this alternative would be impacting an even smaller area than the preferred alternative, there

would only be a barely perceptible, incremental and beneficial contribution to cumulative impacts.

Conclusion: Alternative C would likely have minor, beneficial, site-specific and long-term impacts to floodplain or wetland resources. Only barely perceptible, incremental cumulative impacts are anticipated from this alternative. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to floodplains or wetlands.

Alternative D— Because the nature of floodplain or wetland resources would be very similar to those anticipated under Alternative B, the level of floodplain or wetland resource impacts from this alternative would be the same as stated under Alternative B.

Cumulative Impact— Due to the size of the marshes and the extent of the historical, restorative projects that have occurred as well as those that are in the reasonably foreseeable future, the estimated long-term impacts from Rumney Marshes and Reedy Meadow Flood Control projects are considered moderate benefits to the cumulative scenario. Because this alternative would be impacting a relatively small area, there would only be small, though appreciable, beneficial contribution to cumulative impacts.

Conclusion: Alternative D would likely have moderate, beneficial, site-specific and long-term impacts to floodplain or wetland resources. Only small cumulative impacts are anticipated from this alternative. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to floodplains or wetlands.

4.4.5 Unique or Important Wildlife or Wildlife Habitat

The NPS Organic Act, which directs parks to conserve wildlife unimpaired for future generations, is interpreted by the agency to mean that native animal life should be protected and perpetuated as part of the site's natural ecosystem. The USFWS and the NHESP were contacted for a list of special status species and designated critical habitats that may be within the project area or affected by any of the alternatives. Information on possible threatened, endangered, candidate species and species of special concern was gathered from prior research at Saugus Iron Works NHS. Information on Saugus Iron Works NHS wildlife was taken from site documents and records. The Saugus Iron Works NHS natural resource management staff, the USFWS, and the DEP resources also provided wildlife information.

Impact Intensity	Impact Description
Negligible	There would be no observable or measurable impacts to native species, their habitats, or the natural processes sustaining them. Impacts would be well within natural fluctuations.
Minor	Impacts would be detectable, but they would not be expected to be outside the natural range of variability of native species' populations, their habitats, or the natural processes sustaining them. Mitigation measures, if needed to offset adverse effects, would be simple and successful.
Moderate	Breeding animals of concern are present; animals are present during particularly vulnerable life-stages, such as migration or juvenile stages; mortality or interference with activities necessary for survival can be expected on an occasional basis, but is not expected to threaten the continued existence of the species in the park unit. Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they could be outside the natural range of variability. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful.
Major	Impacts on native species, their habitats, or the natural processes sustaining them would be detectable, and they would be expected to be outside the natural range of variability. Key ecosystem processes might be disrupted. Loss of habitat might affect the viability of at least some native species. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed.

The restoration project is likely to have minor, beneficial, long-term impacts for unique or important site-specific wildlife or wildlife habitat. The USFWS issued a letter dated October 7, 2004, stating that "no federally-listed or proposed, threatened or endangered species or critical habitat ... are known to occur in the project area(s)" (see Appendix B).

Alternative A— Under the no-action alternative, no new impacts to unique or important wildlife or wildlife habitat would occur. Unique or important wildlife or wildlife habitat would not be affected.

Cumulative Impact— Because the alternative would produce no new impacts, there would be no contribution to cumulative impacts.

Conclusion: No new impacts would occur, no contribution to cumulative impacts and no impairment would occur.

Alternative B— Site-specific unique or important wildlife or wildlife habitat would likely experience minor beneficial impacts in the long term.

Cumulative Impact— Because there are no identified actions in the vicinity that would impact the local unique or important wildlife or wildlife habitat, it is anticipated that this alternative would not add to cumulative impacts.

Conclusion: Alternative B would have minor, beneficial, site-specific and long-term impacts to unique or important wildlife or wildlife habitat. No contribution to cumulative impacts would occur. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to unique or important wildlife or wildlife habitat.

Alternatives C and D— Because the nature of unique or important wildlife or wildlife habitat resources would be very similar to those anticipated under Alternative B, the level of unique or important wildlife or wildlife habitat resource impacts from these alternatives would be the same as stated under Alternative B.

Cumulative Impact— Because there are no identified actions in the vicinity that would impact the local unique or important wildlife or wildlife habitat, it is anticipated that this alternative would not add to cumulative impacts.

Conclusion: Alternatives C and D would have minor, beneficial, site-specific and long-term impacts to unique or important wildlife or wildlife habitat. No contribution to cumulative impacts would occur. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to unique or important wildlife or wildlife habitat.

4.4.6 Unique, Essential, or Important Fish or Fish Habitat

The Endangered Species Act (16 USC 1531 et seq.) mandates that all federal agencies consider the potential effects of their actions on species listed as threatened or endangered. NMFS and the DMF were contacted for a list of special status species and designated critical habitats that may be within the project area or affected by any of the alternatives.

Information on possible threatened, endangered, candidate species and species of special concern was gathered from prior research at Saugus Iron Works NHS. Map locations of habitat associated with threatened, endangered, candidate species and species of special concern were compared with locations of proposed developments and existing facilities.

Impact Intensity	Impact Description
Negligible	The action could result in a change to a population or individuals of a species or designated critical habitat, but the change would be so small that it would not be of any measurable or perceptible consequence.
Minor	The action could result in a change to a population or individuals of a species or designated critical habitat. The change would be measurable but small and localized and of little consequence.
Moderate	The action would result in some change to a population or individuals of a species or designated critical habitat. The change would be measurable and of consequence.
Major	The action would result in a noticeable change to a population or individuals of a species or resource or designated critical habitat.

Per consultation from NMFS, there are no known species of threatened or endangered status under NMFS jurisdiction in the Saugus area, although rainbow smelt is listed as a species of concern. The NHESP issued a letter dated October 8, 2004 stating that no threatened or endangered species or special habitat under their jurisdiction were known to occur in the project area (see Appendix B). Given this information, it is expected that site-specific unique, essential, or important fish or fish habitat would experience moderate

beneficial impacts because the restoration would enhance the current habitat for the long term, especially for the local rainbow smelt population.

Alternative A— Under the no-action alternative, no new impacts to unique, essential, or important fish or fish habitat would occur. Unique or important wildlife or wildlife habitat would not be affected.

Cumulative Impact— Because the alternative would produce no new impacts, there would be no contribution to cumulative impacts.

Conclusion: No new impacts would occur, no contribution to cumulative impacts and no impairment would occur.

Alternative B— Site-specific unique, essential, or important fish or fish habitat would likely experience minor beneficial impacts in the long term.

Cumulative Impact— Because there are no identified actions in the vicinity that would impact the site specific, unique, essential, or important fish or fish habitat, it is anticipated that this alternative would not add to cumulative impacts.

Conclusion: Alternative B would have minor, beneficial, site-specific and long-term impacts to unique, essential, or important fish or fish habitat. No contribution to cumulative impacts would occur. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to unique, essential, or important fish or fish habitat.

Alternatives C and D— Because the nature of unique, essential, or important fish or fish habitat resources would be very similar to those anticipated under Alternative B, the level of unique, essential, or important fish or fish habitat resource impacts from these alternatives would be the same as stated under Alternative B.

Cumulative Impact— Because there are no identified actions in the vicinity that would impact the local unique, essential, or important fish or fish habitat, it is anticipated that this alternative would not add to cumulative impacts

Conclusion: Alternatives C and D would have minor, beneficial, site-specific and long-term impacts to unique, essential, or important fish or fish habitat. No contribution to cumulative impacts would occur. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to unique, essential, or important fish or fish habitat.

4.4.7 Recreation Resources, including Supply, Demand, and Visitation Activities

Issues were identified through the scoping process, and concerns covered by this section include recreation resources and visitation activities including but not limited to park operations, visitor access to site features such as the dock, slitting mill, blacksmith shop, etc.

Impact Intensity	Impact Description
Negligible	Recreation resources and visitation activities would not be affected, or the effects would be at low levels of detection and would not have an appreciable effect.
Minor	The effect would be detectable and would be of a magnitude that would not have an appreciable effect on recreation resources or visitation activities. If mitigation was needed to offset adverse effects, it would be simple and likely successful.
Moderate	The effects would be readily apparent and result in a substantial change noticeable to staff and the public. Mitigation measures would be necessary to offset adverse effects and would likely be successful.
Major	The effects would be readily apparent, result in a substantial change in park operations in a manner noticeable to staff and the public, and be markedly different from existing operations. Mitigation measures to offset adverse effects would be needed, extensive, and success could not be guaranteed.

Recreation resources would likely improve as a result of the proposed restoration. Dock restoration would provide long-term, moderate, beneficial visitor impacts region-wide. Minor, adverse, site-specific impacts to site recreation resources may occur in the short term during construction. The dock is currently so degraded that it has become a safety concern and visitors are prohibited from its use. Thus, restoration of the turning basin and dock would provide visitor access to the dock and improved viewsheds, enabling visitors to gain a better understanding of the iron works and, in turn, increasing visitation.

Alternative A— Under the no-action alternative, no new impacts to recreation resources, including supply, demand, and visitation activities would occur. Recreation resources, including supply, demand, and visitation would not be affected.

Cumulative Impact— Because there are no identified actions in the vicinity that would impact recreation resources, including supply, demand, and visitation, it is anticipated that this alternative would not add to cumulative impacts.

Conclusion: No new impacts or contribution to cumulative impacts would occur.

Alternative B— Recreation resources, including supply, demand, and visitation activities, would likely experience moderate, long-term benefits in the region, with short-term minor adverse impacts on site recreation during construction.

Cumulative Impact— Because of its proximity to the restoration project, the estimated long-term cumulative impacts from the Saugus Iron Works NHS Accessibility project are likely to be site-specific, beneficial and minor. In conjunction with Alternative B, there would only be small, beneficial impacts to the cumulative scenario.

Conclusion: Alternative B would have minor, beneficial, site-specific and long-term impacts to recreation resources, including supply, demand, and visitation activities. Small, benefits to the cumulative scenario would occur.

Alternatives C and D— Because improvements to recreation resources, including supply, demand, and visitation activities would be very similar to those anticipated under Alternative B, the impact to recreation resources, including supply, demand, and visitation activities from these alternatives would be similar to those stated under Alternative B.

Cumulative Impact— Because of its proximity to the restoration project, the estimated long-term cumulative impacts from the Saugus Iron Works NHS Accessibility project are likely to be site-specific, beneficial and minor. In conjunction with either of these alternatives, there would only be small, beneficial impacts to the cumulative scenario.

Conclusion: Alternatives C or D would have minor, beneficial, site-specific and long-term impacts to recreation resources, including supply, demand, and visitation activities. Small, benefits to the cumulative impacts would occur.

4.4.8 Visitor Experience, Aesthetic Resources

NPS Management Policies 2001 state that the enjoyment of site resources and values by the people of the United States is part of the fundamental purpose of all parks and that the NPS is committed to providing appropriate, high-quality opportunities for visitors to enjoy the parks. Visitor experience and aesthetic resources are central to the Saugus Iron Works NHS mission. Visitor experience and aesthetic resource information has been obtained from Saugus Iron Works NHS staff and using professional judgment, determined whether or how these projected changes would affect the desired visitor experience and to what degree and for how long .

Impact Intensity	Impact Description
Negligible	Effects to the visitor experience and aesthetic resources of the site would be at or below the level of detection; changes would be so slight that they would not be of any measurable or perceptible consequence to the visitor experience. The visitor would not likely be aware of the effects associated with the alternative.
Minor	Effects to the visitor experience and aesthetic resources would be detectable, localized, and would be small and of little consequence. Mitigation measures, if needed to offset adverse effects, would be simple and successful. The visitor would be aware of the effects associated with the alternative, but the effects would be slight.
Moderate	Effects to the visitor experience and aesthetic resources of the site would be readily detectable, localized, with consequences at the regional level. Mitigation measures, if needed to offset adverse effects, would be extensive and likely successful. The visitor would be aware of the effects associated with the alternative and would likely be able to express an opinion about the changes.
Major	Effects to the visitor experience and aesthetic resources would be obvious, with substantial consequences region wide. Extensive mitigation measures would be needed to offset any adverse effects and their success would not be guaranteed. The visitor would be aware of the effects associated with the alternative and would likely express a strong opinion about the changes.

Site-specific visitor experience and aesthetic resources are anticipated to have moderate benefits over the long term at the site, with minor short-term adverse impacts within the site as a result of construction activities. The project aims to restore open water to the turning basin and rebuild the dock and bulkhead to reconstruct the historic scene of Saugus Iron Works NHS. Currently, the visitor experience is compromised by a restricted, unsafe dock and a viewshed that does not evoke the era of the original iron works.

Alternative A— Visitor experience and aesthetic resources at Saugus Iron Works NHS may experience a minor, adverse impact over the long term as a result of the no-action alternative because the viewsheds of the turning basin and dock are not representative of the original ironworks. Visitors are therefore less likely to gain an accurate understanding of the iron-working process and an appreciation of the site's value. Aesthetic resources may continue to deteriorate over time if no action is taken, as invasive species continue to grow and further impact the viewshed.

Cumulative Impact— Because of its proximity to the restoration project, the estimated long-term cumulative impacts from the Saugus Iron Works NHS Accessibility project are likely to be site-specific, beneficial and minor. In conjunction with either of these alternatives, there would only be small, beneficial impacts to the cumulative scenario.

Conclusion: Alternative A would have minor, beneficial, site-specific and long-term impacts to visitor experience and aesthetic resources. Small, benefits to the cumulative scenario would be anticipated.

Alternative B— After construction, site-specific visitor experiences and aesthetic resources are likely to experience moderate, long-term beneficial impacts as a result of Alternative B. During construction, however, these resources may experience site-specific, minor, adverse impacts.

Cumulative Impact— Because of its proximity to the restoration project, the estimated long-term cumulative impacts from the Saugus Iron Works NHS Accessibility project are likely to be site-specific, beneficial and minor. In conjunction with either of these alternatives, there would only be moderate, beneficial impacts to the cumulative scenario.

Conclusion: Alternative B would have moderate, beneficial, site-specific and long-term impacts to visitor experience and aesthetic resources as well as site-specific, minor, adverse impacts during construction. Moderate benefits to the cumulative scenario would be anticipated.

Alternative C— The nature of visitor experiences would be very similar to those anticipated under Alternative B. Therefore, impacts on visitor experience are similar to the preferred alternative, except the Northern Area would be the only portion of the wetland undergoing restoration. This alternative is not likely to benefit the viewsheds as much as Alternative B. It is anticipated, therefore, that these resources would experience only minor long-term benefits to the site with similar adverse impacts as those mentioned in Alternative B.

Cumulative Impact— Because of its proximity to the restoration project, the estimated long-term cumulative impacts from the Saugus Iron Works NHS Accessibility Project are likely to be site-specific, beneficial and minor. In conjunction with either of these alternatives, there would only be small, beneficial impacts to the cumulative scenario.

Conclusion: Alternative C would have minor, beneficial, site-specific and long-term impacts to visitor experience and aesthetic resources as well as site-specific, minor, adverse impacts during construction. Small benefits to the cumulative scenario would be anticipated.

Alternative D— The nature of visitor experience would be very similar to those anticipated under Alternative B. Impacts on visitor experience and aesthetic resources are therefore similar to the preferred alternative with minor, short-term, site-specific adverse impacts during construction and negligible long-term benefits to the site. Because only a portion of the Southern area is proposed for restoration, visitors are less likely to benefit from the results of the proposed restoration.

Cumulative Impact— Because of its proximity to the restoration project, the estimated long-term cumulative impacts from the Saugus Iron Works NHS Accessibility project are likely to be site-specific, beneficial and minor. In conjunction with either of these alternatives, there would only be small, beneficial impacts to the cumulative scenario.

Conclusion: Alternative D would have negligible, beneficial, site-specific and long-term impacts to visitor experience and aesthetic resources as well as site-specific, minor, adverse impacts during construction. Small benefits to the cumulative scenario would be anticipated.

4.4.9 Resource, including Energy, Conservation Potential, Sustainability

Issues were identified through the scoping process, and concerns covered by this section include natural resource restoration, conservation potential and project sustainability.

Impact Intensity	Impact Description
Negligible	No effects would occur or the effects to energy, conservation potential and sustainability would be below the level of detection.
Minor	The effects to energy, conservation potential and sustainability would be detectable. Any effects would be small and if mitigation were needed to offset potential adverse effects, it would be simple and successful.
Moderate	The effects to energy, conservation potential and sustainability would be readily apparent. Any effects would result in changes to energy, conservation potential and sustainability on a local scale. If mitigation is needed to offset potential adverse effects, it could be extensive, but would likely be successful.
Major	The effects to energy, conservation potential and sustainability would be readily apparent and would cause substantial changes to energy, conservation potential and sustainability in the region. Mitigation measures to offset potential adverse effects would be extensive and their success could not be guaranteed.

The proposed restoration would likely have moderate, long-term, beneficial impacts on environmental sustainability at the site. Sustainability and conservation potential are likely to increase due to the improvement in wetland habitat and open-water condition as seen in the 1950s.

Alternative A— Under the no-action alternative, no new impacts to resource, including energy, conservation potential, and sustainability would occur. Resource, including energy, conservation potential, and sustainability, would not be affected.

Cumulative Impact— Because the alternative would produce no new impacts, there would be no contribution to cumulative impacts.

Conclusion: No new impacts or contribution to cumulative impacts would occur.

Alternative B— Site-specific resources, including energy, conservation potential, and sustainability would experience moderate, long-term, beneficial impacts as a result of this alternative. The potential for sustainability and conservation are likely to increase over time because of the removal of invasive species in the wetland habitat.

Cumulative Impact— All cumulative actions identified in Section 4.1.1, with the exception of the Saugus Iron Works NHS Accessibility Project, would likely contribute negligible impacts to the cumulative scenario with respect to site-specific resources, including energy, conservation potential and sustainability, given the size, duration and nature of the actions. Only barely perceptible, incremental cumulative impacts are anticipated as a result of this potential impact to resources, including energy, conservation potential, and sustainability, because of the relatively small size of the proposed restoration project.

Conclusion: Alternative B would likely have moderate, beneficial, long-term impact to site-specific resources, including energy, conservation potential, and sustainability. Barely perceptible, incremental cumulative impacts are anticipated from this alternative.

Alternative C— Impacts on resources and conservation potential are similar to the preferred alternative, except the Northern Area would be the only portion of the wetland undergoing restoration, resulting in only minor long-term benefit to this resource at Saugus Iron Works NHS.

Cumulative Impact— All cumulative actions listed in Section 4.1.1 would likely contribute negligible to the cumulative scenario with respect to resources, including energy, conservation potential, and sustainability, given the size, duration and nature of the actions. Only barely perceptible, incremental cumulative impacts are anticipated as a result of this potential impact to resources, including energy, conservation potential, and sustainability, because of the relatively small size of the proposed restoration project.

Conclusion: Alternative C would likely have minor, beneficial, long-term impact to site-specific resources, including energy, conservation potential, and sustainability. Barely perceptible, incremental cumulative impacts are anticipated from this alternative.

Alternative D— Because the nature of resources, including energy, conservation potential, and sustainability would be very similar to those anticipated under Alternative B, the only impacts to resources, including energy, conservation potential, and sustainability from this alternative would be similar to those stated under Alternative B.

Cumulative Impact— All cumulative actions identified in Section 4.1.1, with the exception of the Saugus Iron Works NHS Accessibility Project, would likely contribute negligible impacts to the cumulative scenario with respect to resources, including energy, conservation potential, and sustainability, given the size, duration and nature of the actions. Only barely perceptible, incremental cumulative impacts are anticipated as a result of this potential impact to resources, including energy, conservation potential, and sustainability, because of the relatively small size of the proposed restoration project.

Conclusion: Alternative D would likely have moderate, beneficial, long-term impact to site-specific resources, including energy, conservation potential, and sustainability. Barely perceptible, incremental cumulative impacts are anticipated from this alternative.

4.4.10 Urban Quality and Gateway Communities

Issues were identified through the scoping process, and concerns covered by this section include effects on adjacent landowners and nearby towns or agencies, and economical and social contribution of Saugus Iron Works NHS to local communities.

Impact Intensity	Impact Description
Negligible	No effects would occur or the effects to urban quality and gateway community conditions would be below the level of detection.
Minor	The effects to urban quality and gateway communities would be detectable. Any effects would be small and if mitigation were needed to offset potential adverse effects, it would be simple and successful.
Moderate	The effects to urban quality and gateway communities would be readily apparent. Any effects would result in changes to socioeconomic conditions on a local scale. If mitigation is needed to offset potential adverse effects, it could be extensive, but would likely be successful.
Major	The effects to urban quality and gateway communities would be readily apparent and would cause substantial changes to socioeconomic conditions in the region. Mitigation measures to offset potential adverse effects would be extensive and their success could not be guaranteed.

The proposed Saugus River turning basin and dock restoration activities would likely result in moderate, long-term benefits for urban quality and gateway communities region-wide. By enhancing the Essex NHA, the Saugus Iron Works NHS restoration would likely become a model project for river restoration. The planned improvements to visitor experience would likely increase visitor attendance and ultimately benefit surrounding communities and resources including, but not limited to, the Essex NHA.

Alternative A – Under the no-action alternative, no new impacts on urban quality and gateway communities would occur. Urban quality and gateway communities would not be affected.

Cumulative Impact – Because the alternative would produce no new impacts, there would be no contribution to cumulative impacts.

Conclusion: No new impacts or contribution to cumulative impacts would occur.

Alternative B – Because this restoration project would occur in an otherwise urban environment, impacts on urban quality and gateway communities would likely be moderate, long-term, and beneficial within the region.

Cumulative Impact – All cumulative actions identified in Section 4.1.1 would likely contribute moderately to the cumulative scenario with respect to urban quality and gateway communities, given the size, location, duration and nature of the actions. Measurable cumulative impacts are anticipated as a result of this potential impact to urban quality and

gateway communities, because the proposed restoration would likely become a model project for river restoration.

Conclusion: Alternative B would likely have moderate, beneficial, long-term impact to the region with regards to urban quality and gateway communities. Measurable cumulative impacts are anticipated from this alternative.

Alternative C— Impacts on urban quality and gateway communities are similar to those for the preferred alternative. However, because only the Northern Area would have planned wetland restoration, Alternative C impacts are likely to be minor, long-term, and beneficial within the region.

Cumulative Impact— All cumulative actions identified in Section 4.1.1 would likely contribute moderately to the cumulative scenario with respect to urban quality and gateway communities, given the size, duration and nature of the actions. Small cumulative impacts are anticipated as a result of this potential impact to urban quality and gateway communities, because the proposed restoration would cover a smaller area.

Conclusion: Alternative C would likely have minor, beneficial, long-term impact to the region with regards to urban quality and gateway communities. Small cumulative impacts are anticipated from this alternative.

Alternative D— Because the nature of urban quality and gateway communities would be very similar to those anticipated under Alternative C, the only impacts to urban quality and gateway communities from this alternative would be the similar to those stated under Alternative C.

Cumulative Impact— All cumulative actions identified in Section 4.1.1 would likely contribute moderately to the cumulative scenario with respect to urban quality and gateway communities, given the size, duration and nature of the actions. Small cumulative impacts are anticipated as a result of this potential impact to urban quality and gateway communities, because the proposed restoration would cover a smaller area.

Conclusion: Alternative D would likely have minor, beneficial, long-term impact to the region with regards to urban quality and gateway communities. Small cumulative impacts are anticipated from this alternative.

4.4.11 Long-Term Management of Resources or Land/Resource Productivity

Issues were identified through the scoping process, and concerns covered by this section include longevity and productivity of land and resources with the natural and cultural environment of Saugus Iron Works NHS.

Impact Intensity	Impact Description
Negligible	No effects would occur or the effects to long-term management of resources or land/resource productivity would be below the level of detection.
Minor	The effects to long-term management of resources or land/resource productivity would be detectable. Any effects would be small and if mitigation were needed to offset potential adverse effects, it would be simple and successful.
Moderate	The effects to long-term management of resources or land/resource productivity would be readily apparent. Any effects would result in changes to long-term management of resources or land/resource productivity on a local scale. If mitigation is needed to offset potential adverse effects, it could be extensive, but would likely be successful.
Major	The effects to long-term management of resources or land/resource productivity would be readily apparent and would cause substantial changes to long-term management of resources or land/resource productivity in the region. Mitigation measures to offset potential adverse effects would be extensive and their success could not be guaranteed.

Long-term management of the resources or land/resource productivity is likely to experience minor, local, and long-term benefits as a result of the planned restoration activities. The restoration is anticipated to improve the visitor experience, increase the use and productivity of the site, and ultimately enable better management of the site ecology.

Alternative A— Under the no-action alternative, no new impacts on long-term management of resources or land/resource productivity would occur. Long-term management of resources or land/resource productivity would not be affected.

Cumulative Impact— Because the alternative would produce no new impacts, there would be no contribution to cumulative impacts.

Conclusion: No new impacts would occur, no contribution to cumulative impacts and no impairment would occur.

Alternative B— Long-term management of the resources or land/resource productivity is likely to experience a minor, long-term benefit under this alternative because the restoration is expected to improve park operations, the visitor experience, and overall productivity of the site both culturally and ecologically.

Cumulative Impact— All cumulative actions identified in Section 4.1.1 would likely contribute moderately to the cumulative scenario with respect to long-term management of resources or land/resource productivity, given the size, proximity, duration and nature of the actions. Only barely perceptible, incremental cumulative impacts are anticipated as a result of this potential impact to long-term management of resources or land/resource productivity because of the relatively small size of the site restoration.

Conclusion: Alternative B would likely have minor, beneficial, and local long-term impacts to long-term management of the resources or land/resource productivity. Only barely perceptible, incremental cumulative impacts are anticipated from this alternative. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3)

identified as a goal in the site's GMP, there would be no impairment of site resources related to Long-Term Management of Resources or Land/Resource Productivity.

Alternatives C and D— The nature of long-term management of the resources or land/resource productivity would be very similar to those anticipated under Alternative B. Impacts to long-term management of the resources or land/resource productivity from these alternatives are therefore similar to those stated under Alternative B.

Cumulative Impact— All cumulative actions identified in Section 4.1.1 would likely contribute moderately to the cumulative scenario with respect to long-term management of resources or land/resource productivity, given the size, proximity, duration and nature of the actions. Only barely perceptible, incremental cumulative impacts are anticipated as a result of this potential impact to long-term management of resources or land/resource productivity because of the relatively small size of the site restoration.

Conclusion: Alternatives C and D would likely have minor, beneficial, and local long-term impacts to long-term management of the resources or land/resource productivity. Only barely perceptible, incremental cumulative impacts are anticipated from these alternatives. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to Long-Term Management of Resources or Land/Resource Productivity.

4.4.12 Traffic

Issues were identified through the scoping process, and concerns covered by this section include maintenance of traffic flow in and out of Saugus Iron Works NHS.

Impact Intensity	Impact Description
Negligible	The impact would be a change that would not be perceptible or would be barely perceptible by local roadway users.
Minor	The impact would have an effect on travel times, and the impact would be noticeable, but would result in little inconvenience or benefit to local roadway users.
Moderate	The impact would impact the travel time of a large number of local roadway users and would result in a noticeable change in travel time, convenience, or benefit.
Major	There would be a substantial impact on the travel time of a large number of regional roadway users and would result in a highly noticeable change in travel times, convenience, or benefit.

Alternative A— Under the no-action alternative, no new impacts on traffic flow would occur. Traffic flow would not be affected.

Cumulative Impact— Because the alternative would produce no new impacts, there would be no contribution to cumulative impacts.

Conclusion: No new impacts or contribution to cumulative impacts would occur.

Alternative B— Traffic flow is likely to experience a negligible, short-term adverse effect under this alternative because construction is likely to slightly increase the amount of traffic entering and exiting the site and potentially reduce the amount of parking available for visitor use.

Cumulative Impact— The Accessibility Project identified in Section 4.1.1 would likely contribute a local, negligible, adverse impact for the short term given the construction transportation necessities. If timed concurrently with the Accessibility Project, Alternative B would likely have minor, adverse, and local short-term impacts to traffic flow as a result of increased construction vehicular traffic. Alternative B would contribute a barely perceptible, increment to minor cumulative impacts as a result of this potential impact to traffic because construction would only be temporary.

Conclusion: Alternative B would likely have negligible, adverse, and local short-term impacts to traffic flow and contribute a perceptible increment to overall minor cumulative impacts.

Alternatives C and D— Because construction for Alternatives C and D would be very similar to those anticipated under Alternative B, the impact to traffic flow from these alternatives would be similar to those stated under Alternative B.

Cumulative Impact— Because of its similar construction needs on a transportation level, the estimated long-term cumulative impacts from the Saugus Iron Works NHS Accessibility project are likely to be local, negligible, adverse and short-term.

Conclusion: If timed concurrently with the Accessibility Project, Alternatives C or D would likely have minor, adverse, and local short-term impacts to traffic flow as a result of increased construction vehicular traffic. Only small, incremental cumulative impacts are anticipated from this alternative.

4.4.13 Cultural Resources

The potential impacts of the restoration project on archaeological resources, prehistoric and historic structures, and cultural landscapes are detailed in the sections below.

In this environmental assessment impacts to cultural resources are described in terms of type, context, duration, and intensity, which is consistent with the regulations of the CEQ that implement the NEPA. These impact analyses are intended, however, to comply with the requirements of both NEPA and Section 106 of the NHPA. In accordance with the Advisory Council on Historic Preservation's regulations implementing Section 106 of the NHPA (36 CFR Part 800, Protection of Historic Properties), impacts to cultural resources were also identified and evaluated by (1) determining the area of the potential effects; (2) identifying cultural resources present in the area of potential effects that are either listed in or eligible to be listed in the National Register of Historic Places; (3) applying the criteria of adverse effect to affected, National Register eligible or listed cultural resources; and (4) considering ways to avoid, minimize or mitigate adverse effects.

Under the Advisory Council's regulations a determination of either adverse effect or no adverse effect must also be made for affected National Register listed or eligible cultural resources. An *adverse effect* occurs whenever an impact alters, directly or indirectly, any

characteristic of a cultural resource that qualifies it for inclusion in the National Register, e.g. diminishing the integrity (or the extent to which a resource retains its historic appearance) of its location, design, setting, materials, workmanship, feeling, or association. Adverse effects also include reasonable foreseeable effects caused by the alternatives that would occur later in time, be farther removed in distance or be cumulative (36 CFR 800.5, *Assessment of Adverse Effects*). A determination of no adverse effect means there is an effect, but the effect would not diminish the characteristics of the cultural resource that qualify it for inclusion in the National Register.

CEQ regulations and the National Park Service's Conservation Planning, Environmental Impact Analysis and Decision-Making (NPS DO#12) also call for a discussion of mitigation, as well as an analysis of how effective the mitigation would be in reducing the intensity of a potential impact, e.g. reducing the intensity of an impact from major to moderate or minor. Any resultant reduction in intensity of impact due to mitigation, however, is an estimate of the effectiveness of mitigation under NEPA only. It does not suggest that the level of effect as defined by Section 106 is similarly reduced. Cultural resources are non-renewable resources and adverse effects generally consume, diminish, or destroy the original historic materials or form, resulting in a loss in the integrity of the resource that can never be recovered. Therefore, although actions determined to have an adverse effect under Section 106 may be mitigated, the effect remains adverse.

A Section 106 summary is included for cultural resources in the environmental consequences section. The Section 106 summary is an assessment of the effect of the undertaking (implementation of the alternative) on National Register eligible or listed cultural resources only, based upon the criterion of effect and criteria of adverse effect found in the Advisory Council's regulations.

Archaeological Resources

The NPS defines an archaeological resource as any material remains or physical evidence of past human life or activities that are of archeological interest, including the record of the effects of human activities on the environment (NPS DO #28).

Impact Intensity	Impact Description
Negligible	Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be no adverse effect.
Minor	The disturbance of a site(s) results in little, if any, loss of integrity. The determination of effect for Section 106 would be no adverse effect.
Moderate	The disturbance of a site(s) results in loss of integrity. The determination of effect for Section 106 would be adverse effect. A memorandum of agreement is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the memoranda of agreement (MOA) to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.
Major	The disturbance of a site(s) results in loss of integrity. The determination of effect for Section 106 would be adverse effect. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the NPS and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Alternative A— Under the no-action alternative, no new impacts on archaeological resources would occur. Archaeological resources would not be impacted.

Cumulative Impact— Because the alternative would produce no new impacts, there would be no contribution to cumulative impacts.

Conclusion: No new impacts would occur, no contribution to cumulative impacts and no impairment would occur.

Alternative B - Impact to archeological resources is not anticipated therefore short and long-term impacts are expected to be negligible.

Cumulative Impact— Past activities at Saugus Iron Works National Historic Site, including intensive archeological excavation in the 1950s by Roland Robbins, have had moderate adverse impacts on archeological resources. Present and reasonably foreseeable activities, including the current park proposal to provide universal accessibility to park resources, would contribute moderate adverse impacts on archeological resources. Alternative B would have negligible impacts to archeological resources, therefore, in conjunction with past, present and reasonably foreseeable activities Alternative B would contribute a barely perceptible increment to overall cumulative moderate adverse impacts to archeological resources.

Conclusion: Alternative B would have negligible, short and long-term impacts to archeological resources and would contribute a barely perceptible increment to overall cumulative moderate, adverse impacts to archeological resources. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to archeological resources.

Section 106 Summary: Under Alternative B, mitigation would be effective in eliminating potential impacts to the archeological site within the area of potential effects. After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS has determined that implementing Alternative B would have an effect, but that it would not be an adverse effect (see SHPO correspondence, Appendix B).

Alternatives C and D - The nature of impacts to archaeological resources would be very similar to those anticipated under Alternative B, and therefore the impact to archaeological resources from these alternatives would be the similar to those stated under Alternative B.

Cumulative Impact— Because of the related nature of the Saugus Iron Works NHS Accessibility project, long-term, beneficial, minor cumulative impacts are likely to occur. Alternatives C and D would only incrementally, adversely contribute to the cumulative scenario because the impacts are likely short term.

Conclusion: Alternatives C and D may have negligible, adverse, site-specific and short-term impacts to archeological resources and incremental, adverse contributions to the cumulative scenario. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for

enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to archeological resources.

Section 106 Summary: Under Alternatives C and D, mitigation would be effective in eliminating potential impacts to the archeological site within the area of potential effects. After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS has determined that implementing either Alternative C or D would have an effect, but that it would not be an adverse effect (see SHPO correspondence, Appendix B).

Prehistoric/Historic Structures

The NPS defines a structure as a constructed work, usually immovable by nature or design, consciously created to serve some human activity (NPS DO #28).

Impact Intensity	Impact Description
Negligible	Impact is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be no adverse effect.
Minor	The alteration of a feature(s) would not diminish the overall integrity of the resource. The determination of effect for Section 106 would be no adverse effect.
Moderate	The alteration of a feature(s) would diminish the overall integrity of the resource. The determination of effect Section 106 would be adverse effect. A MOA is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.
Major	The alteration of a feature(s) would diminish the overall integrity of the resource. The determination of effect for Section 106 would be adverse effect. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the NPS and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Alternative A— Under the no-action alternative, prehistoric/historic structures would continue to degrade and minor long-term adverse impacts would be expected if no actions are taken to restore or maintain them. No action would probably result in continued deterioration of the historic structures.

Cumulative Impact— The Saugus Iron Works NHS Accessibility Project would likely contribute moderate benefits to the cumulative scenario with respect to prehistoric/historic structures given its nature and proximity to the proposed restoration project. Alternative A would likely produce minor, long-term, adverse impacts to prehistoric/historic structures. If Alternative A is combined with the other cumulative actions, there would likely be a small beneficial contribution to cumulative impacts.

Conclusion: Alternative A may result in minor, adverse, and site-specific impacts over the long-term and if selected, would only result in a small beneficial contribution to cumulative impacts. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for

enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to prehistoric/historic structures.

Alternative B— Saugus Iron Works is listed on the National Register of Historic Places and the reconstructed structures of the iron-making works are contributing historic resources, therefore the rehabilitation / restoration of the dock and bulkheads would have moderate, long-term beneficial impacts on these historic structures.

Cumulative Impact— The Saugus Iron Works NHS Accessibility Project would likely contribute moderate benefits to the cumulative scenario with respect to prehistoric/historic structures given its nature and proximity to the proposed restoration project. Because this alternative would likely produce moderate, long-term, beneficial impacts to prehistoric/historic structures, there would likely be a measurable beneficial contribution to cumulative impacts.

Conclusion: Alternative B would have moderate, beneficial, site-specific impacts over the long-term to prehistoric/historic structures. Measurable beneficial cumulative impacts are anticipated from this alternative. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to prehistoric/historic structures.

Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS has determined that implementing Alternative B would have an effect, but that it would not be an adverse effect (see SHPO correspondence, Appendix B).

Alternatives C and D— The nature of prehistoric/historic structures would be very similar to those anticipated under Alternative B, and therefore the impact to prehistoric/historic structures from these alternatives would be the similar to those stated under Alternative B.

Cumulative Impact— The Saugus Iron Works NHS Accessibility Project would likely contribute moderate benefits to the cumulative scenario with respect to prehistoric/historic structures given its nature and proximity to the proposed restoration project. Because these alternatives would likely produce moderate, long-term, beneficial impacts to prehistoric/historic structures, there would likely be a measurable beneficial contribution to cumulative impacts.

Conclusion: Alternatives C and D would likely have moderate, beneficial, site-specific impacts over the long-term to prehistoric/historic structures. Measurable cumulative impacts are anticipated from these alternatives. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to prehistoric/historic structures.

Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS has determined that implementing either

Alternative C or D would have an effect, but that it would not be an adverse effect (see SHPO correspondence, Appendix B).

Cultural Landscapes

The NPS defines cultural landscape as a geographic area, including both cultural and natural resources and the wildlife or domestic animals therein, associated with a historic event, activity, or person or exhibiting other cultural or aesthetic values (DO #28, NPS, 1998). A Cultural Landscape Assessment (CLA) for Saugus Iron Works NHS was prepared by the NPS in 1994 and 2003.

Impact Intensity	Impact Description
Negligible	Impact(s) is at the lowest levels of detection with neither adverse nor beneficial consequences. The determination of effect for Section 106 would be no adverse effect.
Minor	The alteration of a pattern(s) or feature(s) of the landscape would not diminish the overall integrity of the landscape. The determination of effect for Section 106 would be no adverse effect.
Moderate	The alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. The determination of effect for Section 106 would be adverse effect. A memorandum of agreement is executed among the NPS and applicable state or tribal historic preservation officer and, if necessary, the Advisory Council on Historic Preservation in accordance with 36 CFR 800.6(b). Measures identified in the MOA to minimize or mitigate adverse impacts reduce the intensity of impact under NEPA from major to moderate.
Major	The alteration of a pattern(s) or feature(s) of the landscape would diminish the overall integrity of the landscape. The determination of effect for Section 106 would be adverse effect. Measures to minimize or mitigate adverse impacts cannot be agreed upon and the NPS and applicable state or tribal historic preservation officer and/or Advisory Council are unable to negotiate and execute a memorandum of agreement in accordance with 36 CFR 800.6(b).

Alternative A – Under the no-action alternative, the designed cultural landscape would not be restored and would experience minor, adverse, site-specific, impacts over the long-term because without rehabilitation or restoration, the cultural landscape would probably continue to deteriorate.

Cumulative Impact – The Saugus Iron Works NHS Accessibility Project would likely contribute moderate benefits to the cumulative scenario with respect to cultural landscape given its nature and proximity to the proposed restoration project. Under the no-action alternative, the designed cultural landscape would continue have undesirable resource conditions as impacted by a prior event. Without rehabilitation or restoration, the cultural landscape would have continuing adverse impacts. Given the no-action alternative, cumulative impacts would likely be barely noticeable, incremental benefits.

Conclusion: Under the no-action alternative minor adverse impacts would occur. There would be a small contribution to cumulative impacts and no impairment would occur.

Alternative B -- Restoring Saugus Iron Works NHS would greatly improve the cultural landscape of the site by recreating the historic vistas seen at the iron works in the 1950s. These vistas are important to visitor understanding of the iron works culture and history

and provide a more vivid educational experience. As a result of these improvements, cultural landscapes are anticipated to experience moderate beneficial impacts over the long term.

Cumulative Impact— The Saugus Iron Works NHS Accessibility Project would likely contribute moderate benefits to the cumulative scenario with respect to cultural landscapes given its nature and proximity to the proposed restoration project. Because this alternative would likely produce moderate, long-term, beneficial impacts to cultural landscape, there would likely be a measurable beneficial contribution to cumulative impacts.

Conclusion: Alternative B would likely have moderate, beneficial, site-specific impacts over the long-term to cultural landscape. Measurable cumulative impacts are anticipated from this alternative. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to cultural landscape.

Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS has determined that implementing Alternative B would have an effect, but that it would not be an adverse effect (see SHPO correspondence, Appendix B).

Alternative C -- This alternative also would rehabilitate the landscape at the site, but less so because only the turning basin in the Northern Area would be restored. Therefore, it would provide only minor, long-term, site-specific benefits.

Cumulative Impact— The Saugus Iron Works NHS Accessibility Project would likely contribute moderate benefits to the cumulative scenario with respect to cultural landscapes given its nature and proximity to the proposed restoration project. Because this alternative affects a relative small area of the cultural landscape, there would only be an incremental beneficial contribution to cumulative impacts.

Conclusion: Alternative C would have minor, beneficial, site-specific impacts over the long-term to cultural landscapes. Only incremental cumulative impacts are anticipated from this alternative. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to cultural landscape.

Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS has determined that implementing Alternative C would have an effect, but that it would not be an adverse effect (see SHPO correspondence, Appendix B).

Alternative D – Alternative D would restore the Northern Area of the Turning Basin and 40% of the Southern Area. Therefore, Alternative D would have a more positive impact on the cultural landscape of the Turning Basin than Alternative C. Improvement to the cultural landscapes would approach improvements anticipated under Alternative B, although not to

as great an extent, therefore impact to cultural landscape from this alternative would be slightly less beneficial than those expected under the implementation of Alternative B or minor to moderate beneficial impacts.

Cumulative Impact— The Saugus Iron Works NHS Accessibility Project would likely contribute moderate benefits to the cumulative scenario with respect to cultural landscapes given its nature and proximity to the proposed restoration project. Because Alternative D restores the Northern Area but only 40% of the Southern Area of the Turning Basin it would contribute smaller cumulative benefit to the overall cumulative impacts than Alternative B.

Conclusion: Alternative D would have minor to moderate beneficial, site-specific impacts over the long-term to cultural landscapes. Alternative D would contribute a noticeable beneficial increment to overall cumulative impacts. Because there would be no major adverse impacts to a resource or value whose conservation is 1) necessary to fulfill specific purposes identified in the site's establishing legislation, 2) key to the natural or cultural integrity of the site or to opportunities for enjoyment of the site, or 3) identified as a goal in the site's GMP, there would be no impairment of site resources related to cultural landscape.

Section 106 Summary: After applying the Advisory Council on Historic Preservation's criteria of adverse effect (36 CFR 800.5), the NPS has determined that implementing Alternative D would have an effect, but that it would not be an adverse effect (see SHPO correspondence, Appendix B).

5.0 Consultation and Coordination

This section lists the organizations and agencies that were consulted and contacted for information. These groups assisted in identifying important issues, developing alternatives, and/or analyzing impacts. Future compliance needs, internal and external scoping, and public involvement efforts also are identified.

5.1 Groups Consulted

The following groups have been consulted or contacted for assistance during the preparation of this document:

- Essex National Heritage Commission
- Executive Office of Environmental Affairs, Massachusetts Environmental Policy Act (MEPA) unit
- Massachusetts Board of Underwater Archeological Resources
- Massachusetts Department of Coastal Zone Management (CZM)
- Massachusetts Department of Conservation (DCR)
- Massachusetts Department of Environmental Protection (DEP)
- Massachusetts Department of Fish and Game
- Massachusetts Division of Marine Fisheries (DMF),
- Massachusetts Historic Commission (MHC)
- Massachusetts Office of Travel and Tourism
- Natural Heritage and Endangered Species Program (NHESP)
- National Marine Fisheries Service (NMFS)
- National Park Service (NPS)
- Saugus Conservation Commission
- U.S. Army Corps of Engineers (USACE)
- U.S. Environmental Protection Agency (USEPA)
- U.S. Fish and Wildlife Service (USFWS)
- U.S. Geological Survey (USGS)

5.2 Compliance Needs

This section describes regulatory needs in relation to the Saugus Iron Works NHS restoration project, detailing the range and priorities of permits, laws, and regulations to be addressed during the proposal stage. Each regulation, permit, or program listed below includes the name of the statute, its authorities and jurisdiction, applicability to the proposed action, and a summary of the regulation and its review process (*Environmental Permitting in Massachusetts*, CZM 2003).

The following regulations are organized by jurisdiction: federal, state, and local. It is understood that the proposed restoration will comply with federal regulations above all others; however, in an effort to present complete information, state and local regulations

also are detailed below and listed in the regulatory needs matrix in the Restore Saugus River Turning Basin and Dock Regulatory Needs Assessment (CH2M HILL 2004d).

The following federal regulations will take precedence over state and locally administered regulations.

National Environmental Policy Act

The **National Environmental Policy Act** (NEPA) of 1969 (42 USC Sections 4321 *et seq.*), as amended, requires all federal agencies, including the NPS, to: (1) prepare in-depth studies of the impacts of and alternatives to proposed “major federal actions”; (2) use the information contained in such studies in deciding whether to proceed with the actions; and (3) diligently attempt to involve the interested and affected public before any decision affecting the environment is made (NPS DO #12, section I).

Status with Saugus Iron Works NHS: The EA/DEIR for the proposed action was prepared in accordance with the guidance set forth in DO #12. The EA/DEIR prepared under NEPA will also address MEPA requirements.

Federal Fisheries Regulations

Federal Fisheries Regulations (16 U.S.C. Ss. 1801 *et seq.* Magnuson-Stevens Fishery Conservation and Management Act; 50 CFR 600.00: Essential Fish Habitat) aim to protect Essential Fish Habitat (EFH), including the waters and substrates necessary for fish to spawn, breed, feed, or grow to maturity. Habitat for managed species must be identified, and adverse impacts to EFH must be minimized. National Marine Fisheries Service (NMFS) and other federal agencies coordinate on efforts to preserve and enhance EFH. Generally, NMFS incorporates its EFH assessment into existing interagency coordination processes established under the Endangered Species Act, the Clean Water Act, and the Fish and Wildlife Coordination Act. After notification of a project proposal, NMFS must develop EFH Conservation Recommendations for the project. These recommendations are reflected in the federal permit.

Status with Saugus Iron Works NHS: A letter dated September 15, 2004, from NMFS states that "No threatened or endangered species under the jurisdiction of the National Marine Fisheries Service are known to exist in the Saugus area. Therefore, no consultation pursuant to Section 7 of the Endangered Species Act of 1973, as amended, is required" (Appendix B).

Federal Endangered Species Act

The **Federal Endangered Species Act** (16 U.S.C. Ss.1531 *et seq.*: Endangered Species Act of 1973; 50 CFR 17.00: Endangered Species and Threatened Wildlife and Plants) is intended to conserve the ecosystems on which endangered species and threatened species depend. Species protected under the Act are listed as either endangered (in danger of extinction) or threatened (likely to become endangered in the near future). The NMFS and United States Fish and Wildlife Service (USFWS) jointly administer the law (see Federal Fisheries Regulations). A Habitat Conservation Plan is prepared to detail measures to minimize and mitigate the impact of the project on endangered or threatened species. An application for an Incidental Take Permit includes a completed application form, the habitat conservation plan, and an Environmental Assessment or Environmental Impact Statement.

Status with Saugus Iron Works NHS: USFWS has been contacted via letter dated September 3, 2004, requesting their review and determination of the project proposal. A letter dated October 7, 2004 was received from the USFWS stating “no federally-listed or proposed, threatened or endangered species or critical habitat... are known to exist in the project area(s)” (Appendix B).

Executive Orders

In accordance with **Executive Order 11990, Protection of Wetlands**, all federal agencies must avoid, where possible, impacts on wetlands. The NPS uses the policies and procedures contained in DO #77-1: Wetland Protection and Procedural Manual #77-1: Wetland Protection to implement the Executive Order. The Director's Order and Procedural Manual require that NPS planning documents incorporate a sequence of (1) avoiding wetland impacts, where practicable; (2) minimizing impacts that cannot be avoided; and (3) compensating for any remaining wetland impacts through restoration of previously degraded wetlands.

Status with Saugus Iron Works NHS: This EA/DEIR will analyze wetland issues in more detail, and the NPS will coordinate with the Saugus Conservation Commission to appropriately address the Executive Order. A Wetlands Statement of Findings has been prepared and can be found in Appendix K.

Executive Order 11988, Floodplains, mandates that all federal agencies must avoid, where possible, impacts on floodplains. NPS DO #77-2: Floodplain Management and Procedural Manual #77-2 are the policies and procedures that the NPS uses to implement the Floodplain Executive Order. The Director's Order and Procedural Manual require that NPS will take action to reduce the risk of flood loss; minimize the impact of floods on human safety, health, and welfare; and restore and preserve the natural and beneficial values served by floodplains.

Status with Saugus Iron Works NHS: Per Federal Emergency Management Agency (FEMA) maps, and as a result of the particular restoration activities at Saugus Iron Works NHS, it is anticipated that the only impacts on floodplains would be beneficial. (Refer to Figure 4 for the MassGIS 100-year floodplain boundary as it relates to the site.) A Floodplain Statement of Findings has been prepared and can be found in Appendix K.

U.S. Army Corps of Engineers (USACE) Permits

The **Rivers and Harbors Act of 1899 (Section 10)** (33 U.S.C., 33 CFR 323: Permit for Structures or Work Affecting Navigable Waters of the United States) and the **Clean Water Act (Section 404)** (33 U.S.C. Ss.1251 et seq.: Federal Water Pollution Control Act; 33 FCR 322 Permits for Discharges of Dredged or Fill Material in to the Waters of the United States) administered by the USACE New England District, are required for all work including structures seaward of the annual high water line in navigable waters of the United States. A Section 404 permit is required for activities that involve the discharge of dredged or fill material into waters of the United States, including not only navigable waters, but also coastal waters, inland rivers, lakes, streams, and wetlands. Given the nature and extent of the Saugus Iron Works NHS wetland restoration project, it is most likely that the general permit, a consolidation of all USACE permits, will not suffice and applications for individual permits will be necessary. Under this latter review process, applications are submitted to the USACE, which in turn issues a Public Notice and initiates a comment period. The USACE evaluates the comments, public

interest criteria, and compliance with Section 404 of the Federal Clean Water Act, and issues a permit.

***Status with Saugus Iron Works NHS:** The proposed sediment removal activities exceed the thresholds for a Nationwide Permit; therefore, an Individual Permit was prepared for Section 10/Section 404. The permit application was submitted to the ACOE in May, 2005.*

National Pollution Discharge Elimination System (NPDES) Permit

The **NPDES Permit** (33 U.S.C. Ss 1251 Ss1251 et seq.: Federal Water Pollution Control Act; 40 CFR 122: EPA Administered Permit Programs: National Pollution Discharge Elimination System; M.G.L. c. 21: Massachusetts Clean Waters Act; 314 CMR 3.00: Massachusetts Surface Water Discharge Permit Program) is administered by the United States Environmental Protection Agency (USEPA) as well as the Massachusetts Department of Environmental Protection (DEP). Under the NPDES program, as authorized by the Federal Clean Water Act, no point sources of pollutants can be discharged to the waters of the United States without a permit. The review process is initiated by contacting USEPA's Water Permits Division to determine applicable permits. The project proponent must file an application describing the location and nature of the proposed discharge and its receiving waters. NPDES permits are not valid until the applicant has received a 401 Water Quality Certification and a concurrence from the Massachusetts Office of Coastal Zone Management (CZM) under the Federal Consistency Review.

Under the **NPDES Construction Stormwater General Permit** (33 U.S.C. Ss1251 et seq.: Federal Water Pollution Control Act; 40 CFR 122: EPA Administered Permit Programs: National Pollution Discharge Elimination System), operators of large and small construction activities must obtain coverage under a NPDES construction stormwater permit. The project proponent must submit a Notice of Intent to USEPA and must develop and implement a Stormwater Pollution Prevention Plan (SWPPP), detailing construction activities, erosion control measures, and inspection schedules to be implemented during construction.

***Status with Saugus Iron Works NHS:** Large construction projects, like the Saugus Iron Works NHS turning basin and dock restoration project, must obtain coverage under the NPDES Stormwater Construction General Permit because it approaches a disturbance of nearly 4 acres of land. A SWPPP has been prepared and would remain at the project site during construction.*

Delegated Federal Regulations

Executive Order 149, FEMA and Floodplain Use, is regulated by the Massachusetts Department of Conservation (DCR), the state coordinating agency for the National Flood Insurance Program for construction in floodplains within Massachusetts.

The **Federal Consistency Review** is regulated by the Massachusetts Coastal Zone Management (CZM). While the CZM is not a permitting agency, under the Federal CZM Act of 1972 (16 U.S.C.1451-1464, c. 33), it has the authority to review federal activities in the Massachusetts coastal zone to ensure that they are consistent with CZM policies. Consequently, any coastal project that requires a federal license or permit, is implemented by a federal agency, or is carried out with federal funds must be approved by CZM before the federal activity can take place.

The **National Historic Preservation Act** (16 U.S.C. 470 *et seq.* 36 CFR Part 60) is jointly administered with the Massachusetts Historic Commission (MHS).

Status with Saugus Iron Works NHS: The status of these regulations is discussed in the following section.

5.2.1 Massachusetts Laws, Regulations, and Programs Related to the Saugus Iron Works NHS Restoration

This section provides a complete picture of the required regulations mandated by the Commonwealth of Massachusetts.

Massachusetts Environmental Policy Act (MEPA)

Because the Saugus Iron Works NHS restoration project would alter wetlands, the project is subject to review in accordance with the MEPA (*M.G.L. c. 30: MEPA; 30 CMR 11.00: MEPA Regulations*). The MEPA Unit under the Executive Office of Environmental Affairs administers project review. MEPA provides opportunities for public review of the potential environmental impacts of projects for which state agency action is required. It helps state agencies to satisfy their obligation to avoid damage to the environment, or if damage to the environment cannot be avoided, to minimize and mitigate the damage to the greatest extent practicable. The intent of the MEPA review is to inform project proponents and state agencies of potential adverse environmental impacts while a proposal is still in the planning stage. The proponent, through the preparation of one or more review documents, identifies required state agency actions and describes the means by which the proposal complies with applicable regulatory standards and requirements. Proponents of projects that require state action and that meet or exceed MEPA review thresholds must file an Environmental Notification Form (ENF) and may be required to file an Environmental Impact Report (EIR) as well. The total review period for an ENF is 30 days from the publication date of the *Environmental Monitor*, of which the first 20 days is available for public and agency comment. The Massachusetts Secretary of Environmental Affairs issues a certificate stating whether or not an EIR is required and, if so, what the scope of the EIR will be. The scope is limited to the potential environmental damages of the proposal that are within the subject matter of the required state permits. After the EIR review period and public and agency comment, the Secretary issues a certificate stating whether or not the EIR complies with MEPA. No state permits can be issued until the Secretary certifies that the EIR complies with MEPA; that is, the environmental impacts have been fully described and all necessary plans to avoid, minimize, and mitigate adverse impacts are in place.

Status with Saugus Iron Works NHS: An Environmental Notification Form has been prepared under MEPA. This EA/DEIR integrates the MEPA process with the NEPA process such that the EA/DEIR prepared under NEPA also addresses MEPA requirements.

Executive Order 149: FEMA and Floodplain Use

Under **Executive Order 149, FEMA and Floodplain Use**, the Massachusetts DCR is the state coordinating agency for the National Flood Insurance Program for construction in floodplains within Massachusetts. It requires all state agencies, to the extent possible, to avoid construction or provision of loans or grants conveying or permitting projects in

floodplains. Proposed actions are reviewed in conjunction with MEPA, Massachusetts Wetlands Protection Act, and Massachusetts Office of CZM reviews.

***Status with Saugus Iron Works NHS:** The NPS will meet the intent of the Wetlands Protection Act and the Saugus Conservation Commission's requirements associated with bordering lands subject to flooding (see Statement of NPS Findings for Floodplains and Wetlands, Appendix K). According to MassGIS data, Saugus Iron Works NHS is within the 100-year floodplain (Figure 4).*

Massachusetts State Fisheries Regulations

The Massachusetts Division of Marine Fisheries (DMF) licenses and oversees fin fisheries and shell fisheries in Massachusetts waters, both for resident species and those that spend a portion of their life cycle in the state's tidal waters as part of the **Massachusetts State Fisheries Regulations** under the M.G.L. c. 21 and c.130: Marine Fisheries; 322 CMR 2.00 et seq. The purpose of the regulation is to minimize impacts to fin fish and shellfish and their habitats. As part of the review process, the DEP will contact DMF during its 401 Water Quality Certification review. The DMF will likely recommend time-of-year restrictions to protect spawning fish or mitigation for damage to shellfish beds or areas of submerged aquatic vegetation.

***Status with Saugus Iron Works NHS:** Given the presence of spawning habitat for rainbow smelt, a State species of concern, within the project area, the project team has been working closely with the DMF to ensure protection of the species during construction and beyond.*

Department of Environmental Protection Regulations

Public Waterfront Act, Chapter 91 (M.G.L. 310 CMR 9.00: Waterways Regulations) and its implementing regulations, managed by the DEP, preserves the rights of the public and guarantees the private uses of tidelands and waterways that serve a public purpose and are generally water dependent. Water-dependent uses are varied, including marine industry, commercial and recreational boating and waterborne passenger transportation facilities, parks, boardwalks, sanctuaries, aquariums and marine research facilities, and others. The applicant must provide DEP with the proposed project location, type of project, project plans, information about other applicable state permits, a certification that the project does not violate municipal zoning, and notification of the municipal planning board. Projects are subject to a 30-day public comment period advertised in a newspaper of general circulation. The Chapter 91 license must be recorded at the Registry of Deeds with the property's chain of title within 60 days of issuance or the license becomes invalid.

***Status with Saugus Iron Works NHS:** Consultation has been conducted with appropriate State and local officials. Saugus Iron Works has completed a permit application to address this regulation (Appendix M).*

Particular attention will need to be paid to **401 Water Quality Certification** (33 U.S.C. 1341 et seq. Ss. 401: Federal Water Pollution Control Act, M.G.L. c.21: Massachusetts Clean Water Act; 314 CMR 4.00: Surface Water Quality Standards 314 CMR 9.00: 401 Water Quality Certification) for Dredging and Discharge, administered by the Division of Wetlands and Waterways within the DEP. This permit represents the state's assurance that excavation will not adversely affect water quality. The 401 review ensures that a proposed dredge and/or fill project that can result in the discharge of pollutants complies with Massachusetts

Surface Water Quality Standards, the Massachusetts Wetlands Protection Act, and otherwise avoids or minimizes individual and cumulative impacts to Massachusetts waters and wetlands.

Status with Saugus Iron Works NHS: *It is estimated that the proposed project will entail sediment removal of greater than the threshold of 5,000 cubic yards of material, and therefore would be considered a major project. CH2M HILL has prepared the certification on behalf of the NPS. Under the preferred alternative, the project would not meet the performance standards under the 401 Water Quality Certification with regard to the requirements for 1:1 mitigation for bordering vegetated wetland. However, the NPS would be restoring the entire area to a mixture of bordering vegetated wetland and mudflat and increasing the biodiversity of the system. A variance from the performance standards for this certification would be sought because of the national historic significance of the site and the public interest in rehabilitating the NHS. It is possible that the project may require a variance to this regulation if it does not meet the limited project provisions within the Saugus Conservation Commission.*

Federal Consistency Review

Massachusetts CZM administers the **Federal Consistency Review** (16 U.S.C. 1451 *et seq.*: as amended, 15 CFR 930; M.G.L. c. 21A Ss 2, 4; 301 CMR 20.00: CZM Program, 301 CMR 21.00: Federal Consistency Review Procedures), which ensures that any federal activities in or affecting Massachusetts coastal resources are consistent with state coastal policies. These policies are based on existing Massachusetts statutes and regulations and offer policy guidance on management of water quality, marine habitat, protected areas, coastal hazards, port and harbor infrastructure, public access, energy, ocean resources and growth management. The project-specific federal activity cannot take place until CZM concurs that the project is consistent with state coastal policies. After receiving the final MEPA Certificate for the proposed project, the applicant must submit a copy of the Certificate, a copy of the federal license or permit application, and a federal consistency certification that describes the project's compliance with CZM's policies to CZM. CZM has up to 180 days to complete its review.

Status with Saugus Iron Works NHS: *CH2M HILL prepared the Federal Consistency Review paperwork on behalf of the NPS and both have worked closely with CZM throughout the regulatory process.*

Natural Heritage Endangered Species Program (NHESP)

The **Massachusetts Endangered Species Act** (M.G.L. c.131A: Massachusetts Endangered Species Act; 321 CMR 8:00: List of Endangered and Threatened Species; 321 CMR 10:00: Massachusetts Endangered Species Regulations) protects and lists endangered or threatened species or species of concern and their habitat. Taking, possessing, transporting, exporting, processing, selling, or purchasing any species that is state or federally listed is prohibited. The act also prohibits any alteration of significant habitat of any protected species. The act is administered by the NHESP within the Massachusetts Department of Fish and Game. The Massachusetts program coordinates with the Federal Endangered Species Act, administered by the USFWS.

Status with Saugus Iron Works NHS: *The NHESP responded to a Rare Species Information Request Form and letter dated September 3, 2004 with a no endangered species determination in a*

letter dated October 8, 2004. A second review was requested on March 25, 2005 in response to the potential discovery of an endangered species, American waterwort (*Elatine americana*) by the University of Rhode Island. The NHESP responded on October 5, 2006 that the species discovered was not *Elatine americana* (Appendix B).

National Historic Preservation Act

National Historic Preservation Act and Massachusetts Historic Properties (M.G.L. c. 9: Massachusetts Historic Commission; M.G.L. c. 40C Historic District Act; 950 CMR 71.00: Protection of Properties Included on the State Register of Historic Places), under the authority of the Massachusetts Historic Commission, protects properties that are on or eligible for listing on the National Register of Historic Places. The primary regulation is Section 106 of the National Historic Preservation Act, requiring federal agencies to account for the impacts of federal projects on properties listed or eligible for listing on the National Register.

Status with Saugus Iron Works NHS: NPS has received confirmation from the State Historic Preservation Officer in "no adverse impacts" concurrence letters dated March 2, 2004 and February 2, 2006.

Massachusetts Board of Underwater Archeological Resources

The **Massachusetts Board of Underwater Archeological Resources** (M.G.L. c. 6: Board of Underwater Archeological Resources; 312 CMR 2.00: Massachusetts Underwater Archeological Resources), protects and preserves those resources from damage or disturbance. The Board oversees the discovery, reporting, protection, and preservation of resources such as abandoned artifacts, treasure trove, and sunken ships that have remained unclaimed for 100 years or more, which are valued at \$5,000 or more. Before excavating an underwater archeological site, the Board must first be contacted; a site visit may follow.

Status with Saugus Iron Works NHS: The NPS is committed to cooperating with the needs of the Massachusetts Board of Underwater Archeological Resources and has coordinated with the Board to assess potential impacts to underwater archeological resources (see letter from Massachusetts Board of Underwater Archeological Resources, Appendix B).

Delegated State Regulations

The **Massachusetts Wetlands Protection Act and Rivers Protection Act (MWPA)** (M.G.L. Chapter 131, Section 40A; 310 CMR 10. Wetlands Restrictions) is administered by the local conservation commission.

Status with Saugus Iron Works NHS: All project work within protected zones would be done in cooperation with local officials who administer the MWPA

5.2.2 Local Laws, Regulations, and Programs Related to Saugus Iron Works NHS Restoration

The following local regulations are presented in an effort to provide a complete picture of the regulations applicable to the Saugus Iron Works NHS restoration.

The **Massachusetts Wetlands Protection Act** (insert missing information for EA/DEIR, including Order of Conditions update) under the Town of Saugus bylaws is administered by the Saugus Conservation Commission. The Wetlands Protection Act (M.G.L. c.131

Ss.40A) prohibits the alteration of any wetland resource area of buffer zone without the prior written consent if the local conservation commission through their issuance of an Order of Conditions. In 1996, the Act was amended to add another protected resource, the riverfront area, which prohibits the alteration of any area within 200 feet of each side of a river from the mean annual high water mark. In order to conduct work in this area, the applicant must demonstrate that the proposed project, including mitigation measures, will result in no significant adverse impact on the riverfront area and that there is no practicable and substantially equivalent economic alternative.

***Status with Saugus Iron Works NHS:** The NPS will cooperate with the Saugus Conservation Commission regarding local regulations. The Saugus Conservation Commission attended a pre-application meeting and is collaborating with the NPS. Under the preferred alternative, the project would not meet the performance standards under the Massachusetts Wetlands Protection Act with regard to the requirements for 1:1 mitigation for bordering vegetated wetland. However, the NPS would be restoring the entire area to a mix of bordering vegetated wetland and mudflat and increasing the biodiversity of the system. A variance from the performance standards of this Act would be sought because of the national historic significance of the site and the public interest in rehabilitating the NHS. A variance may be required if the project does not meet the limited project provisions.*

The Town of Saugus also administers a series of **zoning bylaws**, under which several local regulations are listed. Under these laws, noise, solid waste, the **State Environmental Code (Title 5)** (M.G.L. c 21A Ss.13: State Environmental Code; 310 CMR 11: Title I), the **Massachusetts State Building Code** (M.G.L. c.143; 780 CMR: Massachusetts State Building Code), and demolition permits are administered. The review processes are locally determined.

***Status with Saugus Iron Works NHS:** The NPS will meet the intents stated in the local zoning by-laws of the town of Saugus.*

6.0 List of Preparers

The following individuals have been the primary preparers of this EA/DEIR:

- Mr. John Burgess, Project Manager, CH2M HILL
- Dr. Stephen Petron, Senior Consultant, CH2M HILL
- Dr. Bernard Holcomb, Senior Consultant, CH2M HILL
- Ms. Cristina Corwin, Project Scientist, CH2M HILL

The following individuals also have contributed to the preparation of this EA/DEIR:

- Ms. Patricia Trap, Superintendent, Saugus Iron Works NHS
- Dr. Steve Kesselman, Former Superintendent, Saugus Iron Works NHS
- Mr. Marc Albert, Biologist, Saugus Iron Works, NHS
- Mr. Daniel Noon, Biologist, Saugus Iron Works NHS
- Dr. Charlie Roman, Biologist, NPS
- Ms. Jodie Petersen, Project Manager, NPS-DSC
- Ms. Janet Regan, Museum Technician, Saugus Iron Works NHS
- Mr. Carl Salmons-Perez, Museum Curator, Saugus Iron Works NHS
- Ms. Jane Sikoryak, Cultural Resource Specialist, NPS-DSC
- Mr. Paul Wharry, Natural Resource Specialist, NPS-DSC
- Mr. Curtis White, Interpretive Ranger, Saugus Iron Works NHS
- Ms. Margo Muhl Davis, Resource Protection Specialist, NPS
- Mr. David Uschold, Resource Protection Specialist, NPS
- Mr. Dave Clark, Regional Environmental Coordinator

7.0 Distribution List

As stated in 301 CMR 11.16(3), this document shall be circulated to the MEPA office and previous commenters to the document in addition to those parties who have requested copies. Copies of the document were mailed to the following recipients.

Secretary Robert W. Golledge, Jr.
Executive Office of Environmental Affairs
Attn: MEPA Office
100 Cambridge Street, Suite 900 (9th Floor)
Boston, MA 02114

EOEA Undersecretary for Policy
100 Cambridge Street, Suite 900
Boston, MA 02114

Massachusetts DEP Commissioner's Office
One Winter Street
Boston, MA 02108

Massachusetts DEP Northeast Region
MEPA Coordinator
205B Lowell St
Wilmington, MA 01887

Brona Simon
State Historic Preservation Officer
Massachusetts Historical Commission
220 Morrissey Boulevard
Boston, MA 02125

John Fowler
Advisory Council on Historic Preservation
Old Post Office Building
1100 PA. Ave. N.W., Suite 809
Washington, DC 20004

Karen Kirk Adams
Regulatory Division
Department of the Army
New England District, Corps of Engineers
696 Virginia Road
Concord, Massachusetts 01742-2751

Mr. Frank McKinnon, Conservation Officer
Saugus Conservation Commission
Town Hall Annex
25 Main Street
Saugus, MA 01906

Massachusetts Executive Office of Environmental Affairs (EOEA)
Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114-2136

Victor Mastone
Massachusetts Executive Office of Environmental Affairs
Board of Underwater Archeological Resources
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114-2138

Lisa Rhodes
Massachusetts DEP
One Winter Street
Boston, Massachusetts 02108

Phil DiPietro
Massachusetts DEP
One Winter Street
Boston, Massachusetts 02108

Department of Conservation and Recreation
251 Causeway Street, Suite 600
Boston, MA 02114-2104

Natural Heritage & Endangered Species Program
Massachusetts Division of Fisheries & Wildlife
North Drive, Westborough, MA 01581

Stephen Carlson, Chair
Town of Saugus Historical Commission
298 Central Street
Saugus, MA 01906

Town of Saugus Historical Commission
298 Central Street
Saugus, MA 01906

U.S. Department of Commerce
National Marine Fisheries Service (NMFS)
NERO NEPA Coordinator
(978) 281-9391
National Marine Fisheries Service
One Blackburn Drive
Gloucester, MA 01930

Massachusetts Executive Office of
Transportation and Construction (EOTC)
10 Park Plaza, Suite 3170
Boston, MA 02116

Brad Chase
Massachusetts Division of Marine Fisheries
30 Emerson Avenue
Gloucester, MA 01930

Division of Marine Fisheries (North Shore)
ATTN: Environmental Reviewer
30 Emerson Avenue
Gloucester, MA 01930

U.S. Environmental Protection Agency (EPA)
Region 1
1 Congress Street, Suite 1100
Boston, MA 02114-2023

Andrew Bisignani
Saugus Town Manager
Town Hall
298 Central Street
Saugus, MA 01906

Massachusetts Metropolitan Area Planning Council (MAPC)
60 Temple Place, 6th Floor
Boston, Massachusetts 02111

Saugus Board of Selectmen
Town Hall
298 Central Street
Saugus, MA 01906

Timothy Hawkes
SAVE
225 Walnut Street
Saugus MA 01906

Saugus Planning Board
Town Hall Annex
25 Main Street
Saugus, MA 01906

Saugus River Watershed Council
177 Forest Street
Saugus, MA 01906

Joan LeBlanc
Saugus River Watershed Council
P.O. Box 1092
Saugus, MA 01906

Director of Public Health
298 Central Street
Saugus, MA 01906

Massachusetts Department of Public Health
250 Washington Street
Boston, MA 02108-4619

Massachusetts Water Resources Authority (water and sewer) ??
Charlestown Navy Yard
100 First Ave
Boston, MA 02129

Saugus Public Library
295 Central Street,
Saugus MA 01906

Annie Harris
Executive Director
Essex National Heritage Area
221 Essex St.
Suite 41
Salem, MA 01970

Cindy Delpapa
Stream Ecologist and Urban Rivers Coordinator
Riverways Program
Department of Fish and Game
251 Causeway, Suite 400
Boston MA 02114

Robert Cameron
Essex Shipbuilding Museum
P.O. Box 277
66 Main Street
Essex, MA 01929

Charles Burnham
Essex Shipbuilding Museum
P.O. Box 277
66 Main Street
Essex, MA 01929

8.0 Acknowledgements

Thank you to the following people for their participation in the Value Analysis Workshop:

- Mr. Robert Cameron, Essex Shipbuilding Museum
- Mr. Charles Burnham, Essex Shipbuilding Museum
- Dr. William Griswold, NPS Northeast Region Archeology Program
- Mr. Jeff Killion, NPS Olmstead Center for Landscape Preservation
- Ms. Joan LeBlanc, Saugus River Watershed Council
- Mr. Kevin Mendik, NPS Project Manager GMP/EA
- Dr. Charles Roman, NPS North Atlantic Coast Cooperative Ecosystem Studies Unit

Thank you to Mr. Frank McKinnon, Saugus Conservation Commission for his participation in planning meetings.

9.0 References

- Blinken, Dave. 2002. Introduced Species Summary Project, Common Reed. Columbia University, New York, March 7, 2002.
http://www.columbia.edu/itc/cerc/danoffburg/invasion_bio/inv_spp_summ/Phragmites_australis.htm
- CH2M HILL. 2004a. Restore Saugus River Turning Basin and Dock -- Final Internal Scoping, Saugus Iron Works National Historic Site, Saugus, Massachusetts, December 2004.
- CH2M HILL. 2004b. Restore Saugus River Turning Basin and Dock -- Final Pre-Design Report, Saugus Iron Works National Historic Site, Saugus, Massachusetts, July 2004.
- CH2M HILL. 2004c. Restore Saugus River Turning Basin and Dock -- Final Marsh Characterization, Saugus Iron Works National Historic Site, Saugus, Massachusetts, August 2004.
- CH2M HILL. 2004d. Restore Saugus River Turning Basin and Dock -- Draft Regulatory Needs Assessment, Saugus Iron Works National Historic Site, Saugus, Massachusetts, September 2004.
- CH2M HILL. 2004e. Restore Saugus River Turning Basin and Dock -- Tidal Monitoring Addendum to the Marsh Characterization Report, Saugus Iron Works National Historic Site, Saugus, Massachusetts, November 2004.
- CH2M HILL. 2004f. Restore Saugus River Turning Basin and Dock -- Final Value Analysis Report, Saugus Iron Works National Historic Site, Saugus, Massachusetts, June 2004.
- CH2M HILL. 2004g. Restore Saugus River Turning Basin and Dock -- Final Aquatic Habitat and Benthic Invertebrate Survey, Saugus Iron Works National Historic Site, Saugus, Massachusetts, December 2004.
- CH2M HILL. 2004h. Restore Saugus River Turning Basin and Dock -- Schematic Design, Saugus Iron Works National Historic Site, Saugus, Massachusetts, 2004.
- CH2M HILL. 2004i. Summary of Wetland Delineation Activities, Saugus Iron Works National Historic Site, Saugus, Massachusetts, 2004
- Chase, Bradford. 1992. "Massachusetts Bay Smelt Spawning Habitat Monitoring Program: Preliminary Report on the Saugus River." Massachusetts Division of Marine Fisheries. 47 pages.
- Clemants, Steven. Undated. Vascular Plant Survey 1996-1997. Brooklyn Botanical Garden, New York.
- Goff-Chem, Inc. 1995. Phase I Initial Site Investigation Report. Prepared for National Park Service, Saugus Iron Works National Historic Site. Release Tracking Number 3-12551. December 1995.

- Goff-Chem, Inc. 1996. Imminent Hazard Evaluation. Prepared for National Park Service, Saugus Iron Works National Historic Site. December 1996.
- Goff-Chem, Inc. 1998. Site Specific Risk Characterization. Release Tracking Number 3-12551/3-13248. Prepared for Saugus Iron Works National Historic Site, Saugus, Massachusetts. May 1998.
- Goff-Chem, Inc. 1998. Downgradient Property Status Opinion, Polycyclic Aromatic Hydrocarbons. Release Tracking Number 3-12551. Prepared for National Park Service Saugus Iron Works National Historic Site. May 1998.
- Goff-Chem, Inc. 2000. Mitigation and Restoration Management Plan for *Phragmites australis* (Common Reed). Prepared for Saugus Iron Works National Historic Site, Saugus, Massachusetts. April 2000.
- Goff-Chem, Inc. Undated. Report of Soil Core Sampling and Analysis for Hazardous Substances (P.O. #1443PX2000-93-210). Prepared for National Park Service, Saugus Iron Works National Historic Site.
- Hazardous and Medical Waste Services, Inc. 1997. Final Saugus Iron Works National Historic Site Baseline PRP Search Report. Prepared for Hazardous Waste Management and Pollution Prevention Team, National Park Service. March 1997.
- Hudsonia Limited, 1991. Baseline Assessment of the Saugus River System, MA.
- James-Pirri, Mary-Jane and Charles Roman. 2004. Summary of Nekton and Vegetation Sampling at Saugus Iron Works National Historic Site Prepared in collaboration with the University of Rhode Island, Graduate School of Oceanography and the National Park Service. June-August 2004.
- Massachusetts Department of Environmental Protection. 1999. Massachusetts Contingency Plan, 310 CMR 40.000. Boston, MA: Office of the Secretary of state.
- Massachusetts Department of Environmental Protection. 1982. Massachusetts Stream Classification Program Part I: Inventory of Rivers and Streams. Massachusetts Division of Fisheries and Wildlife, Department of Fisheries, Wildlife, and Recreational Vehicles and Massachusetts Division of Water Pollution Control, Department of Environmental Quality Engineering. Westborough, MA.
- National Environmental Policy Act (NEPA), 1969.
- National Marine Fisheries Service. 2004. Letter from National Marine Fisheries Service September 15, 2004. September 2004.
- National Park Service, Saugus Iron Works Website: www.nps.gov/sair. Accessed 2004.
- National Park Service. 2004. Saugus Iron Works National Historic Site Fire Management Plan. 2004
- National Park Service. 2003a. Cultural Landscape Report for Saugus Iron Works National Historic Site: Twentieth-Century Pedestrian Circulation – Site History, Existing Conditions, and Recommendations.

- National Park Service. 2003b. Saugus Iron Works National Historic Site Resource Management Plan. 2003.
- National Park Service. 2003c. Wetland Restoration Assessment at Saugus Iron Works National Historic Park. Saugus Iron Works National Historic Site, Saugus, Massachusetts. June 2003.
- National Park Service. 2002. General Management Plan (GMP)/Environmental Assessment. Saugus Iron Works National Historic Site, Saugus, Massachusetts. April 2002.
- National Park Service. 1998. Director's Order #28: Cultural Resource Management. Effective Date: June 11, 1998.
- State Historic Preservation Officer, Massachusetts Historic Commission. 2004. Concurrence letter to Saugus Iron Works NHS. March 2, 2004.
- Tashiro, et al. 1991. *Baseline Assessment of the Saugus River System*. 1991.
- Trocki, Carol and Peter Paton. 2004. Avian Surveys in Northeast Temperate Network Parks. Technical Report NPS/NER/NRTR - 2005/004. National Park Service. Woodstock, VT. 2004.
- Unknown. 1998. Town of Saugus By-Laws. February 1998.
- University of Massachusetts Lowell Radiation Laboratory. 1995. Report on the analysis of iron slag from Saugus Iron Works, MA using Rutherford backscattering spectroscopy (RBS) and proton induced x-ray emission (PIXE) techniques. Saugus Iron Works National Historic Site, Saugus, Massachusetts. March 1995.
- U.S. Department of the Army. 1989. Saugus River and tributaries, Lynn, Malden, Revere, and Saugus, Massachusetts - Flood damage reduction: Volume 2 Appendix C (Water Quality). New England Division, Army Corps of Engineers, Waltham, Massachusetts.
- U.S. Department of Commerce, Bureau of the Census. 2000. Census Population and Housing.
- U.S. Geological Survey. Accessed September 2004.
<http://waterdata.usgs.gov/ma/nwis/us?01102345>
- Woodard & Curran Environmental Services. 1995. Licensed Site Professional (LSP) Review for Saugus Iron Works. Saugus Iron Works National Historic Site, Saugus, Massachusetts. January 1995.
- Wignot, Sandy. 1988. Baseline Water Quality Data for the Saugus River. Thesis for B.S. Degree, University of California at Santa Cruz.