

GREEN INFRASTRUCTURE FOR COASTAL RESILIENCE

GRANT PROGRAM FY16

RFR ENV 16 CZM 02

Applicant: Town of Winthrop, Massachusetts

Address: One Metcalf Square, Winthrop, MA 02152

Local Project Manager:

Name: Steven Calla, Director
Department: Department of Public Works
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Phone: 617-846-1341
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Type of Green Infrastructure Project:

Green Infrastructure Feasibility Assessment and Siting Project

Project Title: Coughlin Park Green Infrastructure Feasibility Study

Total Project Cost: \$100,000

Match Amount (at least 25% of TOTAL project cost): **\$25,000**

Grant Amount Requested (maximum of \$750,000): **\$75,000**

Project Summary (brief description of the proposed project in one or two short paragraphs):

The Town of Winthrop proposes to conduct a green infrastructure feasibility study to mitigate erosion at Coughlin Park. The project will identify and map the coastal resources at Coughlin Park, as well as along adjacent beaches and nearby shore areas. In addition, the coastal processes at the site will be evaluated to determine the water levels, wave heights and storm surge elevations at the project site for present day, as well as three future out-years (i.e., 2030, 2070, and 2100) incorporating sea level rise. These data will inform the alternatives analysis to select an appropriate green infrastructure type, examining a broad range of living shoreline techniques to determine the best solution for the park; the selected alternative will provide the most erosion control and additional environmental benefits, as well as have the longest lifetime. The Town of Winthrop will be a key partner to this process and will provide critical feedback at all stages of the project. Once a living shoreline alternative is chosen, conceptual plans will be designed and completed for the Town.

Coughlin Park Green Infrastructure Feasibility Study Green Infrastructure for Coastal Resilience Grant Program FY16

Introduction

The Town of Winthrop's Coughlin Park Green Infrastructure Feasibility Study will implement living shoreline techniques that provide coastal storm damage protection and enhance natural resources. The Coughlin Park Green Infrastructure Feasibility Study is consistent with the Executive Office of Energy & Environmental Affairs' goals to "advance local efforts to implement measures to increase natural storm damage protection, flood control, and community resilience". This project will explore and research green infrastructure techniques on the shoreline in Coughlin Park bordering Boston Harbor. Potential strategies will likely include: beach nourishment, natural enhancement of adjacent coastal engineering structures, fringe marsh enhancement, and/or possible bioengineering for bank stabilization.

The Coughlin Park Green Infrastructure Feasibility Study will focus on site-specific considerations, including the severity of erosion, condition of the existing site (proximity of the eroded area to the high tide line), exposure to wind and waves, frequency of storm events, proximity to endangered or threatened species habitat, and complexity of project design and permitting.

The Winthrop Hazard Mitigation Plan 2014 Update (Attachment 7) states that Coughlin Park experiences coastal erosion and flooding during higher northwest wind events and coastal storms. The map, located in Attachment 3, documents the coastal erosion in Coughlin Park. Once completed, this project will help prevent flood related damages associated with tidal storm surges to approximately 14 acres of land, including at least 50 residential, commercial and industrial structures with an estimated replacement value of \$14,450,688 (Winthrop Hazard Mitigation Plan 2014 Update).

Problem and Climate Adaption – Description of the severity of current erosion and flooding issues(s), current and potential threats and impacts to coastal infrastructure and natural resources, and need for assistance.

The Town of Winthrop is an ocean-side suburban community situated at the entrance of Boston Harbor. The Town's land area is 1.6 miles and is located on a peninsula. Winthrop has 7 miles of shoreline, of which 4.4 miles lies along Boston Harbor (locally referred to as Winthrop Harbor).

The Table below from the Winthrop Hazard Mitigation Plan 2014 Update summarizes the hazard risks for Winthrop. This evaluation takes into account the frequency of the hazard, historical records, and variations in land use. This analysis is based on the vulnerability assessment in the Commonwealth of Massachusetts State Hazard Mitigation Plan, 2013.

Hazard	Frequency		Severity	
	Massachusetts	Winthrop	Massachusetts	Winthrop
Flooding	High	High	Serious	Serious
Dam failures	Very Low	N/A	Serious	N/A
Coastal Hazards	High	High	Serious	Serious
Tsunami	Very low	Extensive	Extensive	Extensive
Winter storms	High	High	Minor	Minor
Hurricanes	Medium	Medium	Serious	Serious
Tornados	Medium	Medium	Serious	Serious
Wildland fires	Medium	High	Minor	Minor
Earthquakes	Very Low	Medium	Extensive	Serious
Landslides	Low	Very Low	Minor	Minor
Drought	Low	Low	Minor	Minor
Extreme Temperature	Medium	Medium	Minor	Minor

Source, Massachusetts State Hazard Mitigation Plan, 2013, modified for Winthrop

Figure 1: Hazard Risks Summary. From Winthrop Hazard Mitigation Plan 2014 Update.

In addition, the Massachusetts Office of Coastal Zone Management estimates sea level rise ranging from 0.81 feet under a low emissions scenario to 6.83 feet under a high emissions scenario by the end of this century. Such a broad range creates significant issues for Massachusetts coastal communities.

Scenario	2025		2038		2050		2063		2075		2088		2100	
	ft	m												
Highest	0.49	0.15	1.08	0.33	1.81	0.55	2.80	0.85	3.92	1.19	5.33	1.63	6.83	2.08
Intermediate High	0.36	0.11	0.73	0.22	1.19	0.36	1.80	0.55	2.47	0.75	3.32	1.01	4.20	1.28
Intermediate Low	0.24	0.07	0.43	0.13	0.65	0.20	0.92	0.28	1.21	0.37	1.55	0.47	1.91	0.58
Lowest (Historic Trend)	0.18	0.06	0.29	0.09	0.39	0.12	0.50	0.15	0.60	0.18	0.71	0.22	0.81	0.25
Range	0.31	0.09	0.79	0.24	1.42	0.43	2.30	0.70	3.32	1.01	4.62	1.41	6.02	1.83

Figure 2: Relative sea level rise estimates for Boston, MA. Global scenarios were adjusted to account for local, vertical land movement with 2003 as the beginning year of analysis. From Sea Level Rise: Understanding and Applying Trends and Future Scenarios for Analysis and Planning – Massachusetts Office of Coastal Zone Management.

Since 1991, Winthrop has experienced seventeen natural hazards that triggered federal or state disaster declarations, the vast majority of which involved heavy flooding. According to the Winthrop Hazard Mitigation Plan 2014 Update, both flooding and other coastal hazards have both a high frequency and serious severity, even before the impacts of sea level rise are considered. In this particular case, high frequency means events that occur more frequently than 10% a year, while serious severity means scattered major property damage (more than 50% destroyed), some minor infrastructure damage, wider geographic area (several communities), essential service interruption, and some injuries and/or fatalities. In particular, flooding was the most prevalent serious natural hazard identified by local officials.

Winthrop is subject to three kinds of flooding: 1) coastal flooding, where wind and tide leads to flooding along tidal waterways; 2) inland/riverine flooding, where the rate of precipitation and/or amount of stormwater runoff overwhelms the capacity of natural or structured drainage systems causing overflows; and 3) urban flooding, where precipitation

causes the water table to rise and leads to flooding of low-lying areas such as streets and underpasses (Winthrop Hazard Mitigation Plan 2014 Update). Often these three types of flooding combine under storm events, as large amounts of draining stormwater becomes blocked by the inland push of wind and tide driven water, leading to flooding on a massive scale. Sea level rise contributes greatly to this type of stormwater flooding, as higher sea levels mean flooding of types 1 and 3 is more likely to occur. In addition, one overall impact of climate change is to make the frequency of such storms more likely and their severity much worse, leading to increased flood events for the town moving forward. Winthrop has identified eleven areas where flooding is of particular note, including Coughlin Park which suffers from coastal erosion and flooding during higher northwest wind events and coastal storms (Winthrop Hazard Mitigation Plan 2014 Update).

Coughlin Park is an urban park located on the bayside of Winthrop Barrier west of Winthrop Beach (Figure 3). The park provides expansive views of Logan Airport and Boston Harbor. The Town of Winthrop has approximately 19,000 residents but is a suburb of the greater Boston metropolitan area. The park was renovated in 2014 and is heavily used by Town residents and visitors, who utilize the site to exercise by walking around the park, watch boats, view Boston Harbor, or to simply watch airplanes take off and land at Boston Logan International Airport. The recent renovations to the park included new playground equipment, playground surfaces, trees and shrubs, basketball courts, hockey nets, pathways, and picnic tables and benches.

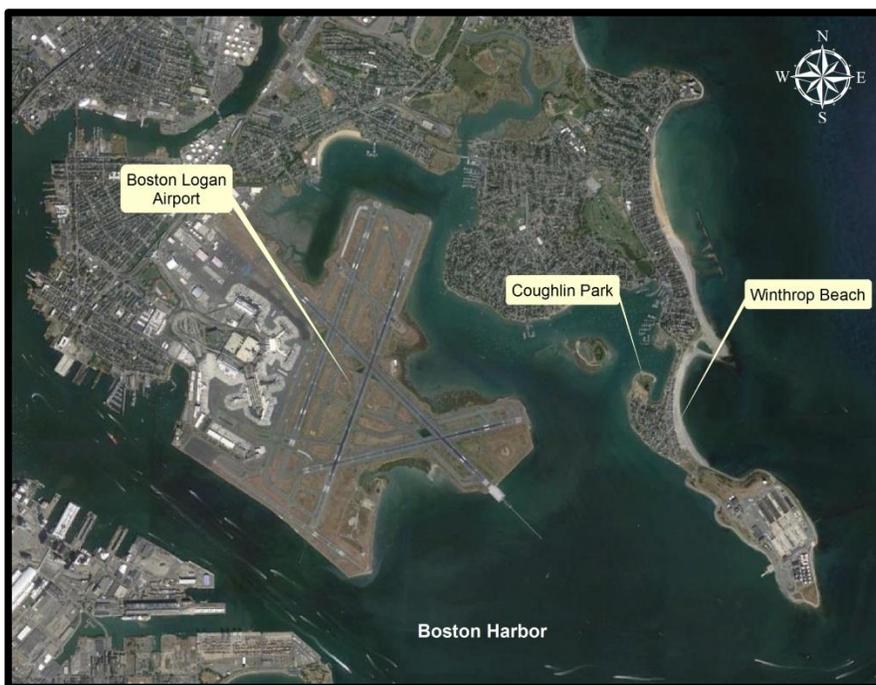


Figure 3: Project Location at Coughlin Park Located in the Town of Winthrop

In recent years, the park has been experiencing significant erosion along its western shoreline that threatens the continued use of the park. The housing development located immediately to the south of the park has constructed an extensive revetment that protects Grand View Avenue and the houses located across the street. End effect erosion from the revetment, combined with the recent storms, has caused significant erosion along approximately 300 linear feet of the park's shoreline. The Town is currently faced with a dilemma because there is a need to protect this eroding shoreline, but the Massachusetts Wetland Protection Act prohibits coastal engineering structures on properties that do not have houses, structures, or other infrastructure. Therefore, the Town would like to evaluate the feasibility of mitigating the shoreline erosion through the use of living shoreline techniques. Implementing a living shoreline project at this location could mitigate the erosion of the shoreline, increase the diversity of the near shore habitat, increase the coastal resiliency, and help protect the salt marsh that is located along the portions of the park shoreline.

Future impacts of sea level rise present an additional natural hazard risk to the Coughlin Park shoreline. The impacts will be similar to those caused by shoreline erosion, including increased forces on already vulnerable shoreline, with greater flooding and wave activity in areas previously not affected. Long-term tide gage data collected at the National Ocean Service (NOS) station in Boston, MA provide the closest measurements to Coughlin Park. Tide gage data from the Boston station for the period of 1921 to 2014 indicate a rise in sea level of 2.81 mm/yr., or 11.1 inches total over the past century. Future changes in the rate of sea level rise could increase water levels another 1.8 feet by the year 2063 (intermediate high scenario), placing Coughlin Park at further risk of erosion, storm damage and flooding. It is important to utilize a range of sea level rise scenarios to understand the uncertainty in the projections for planning purposes. A number of ongoing climate change vulnerability studies (being conducted by others) will provide a sound basis for these estimates. Ranges and rates of sea level rise will be evaluated and incorporated into the coastal processes analysis to ensure an appropriate design alternative is selected.

Project Description and Public Benefit – Details on the proposed green infrastructure project and stages of work to be funded; how the project will improve coastal resilience immediately at, adjacent to, and beyond the project site; and how the proposed project will benefit the public and public interests. Include an explanation of how sea level rise will be addressed.

The Town proposes to assess which living shoreline techniques are applicable to this location by developing an understanding of the existing environmental conditions and coastal processes at the site. A comprehensive coastal process evaluation will be used to assess the existing environmental conditions along the Coughlin Park shoreline and provide information that will be used to evaluate and select potential alternatives for mitigating the erosion and promote natural resilience along the park's shoreline. The existing conditions assessment will develop a complete picture of the ongoing processes that shape the entire Winthrop bayside shoreline, by utilizing an already developed and tested highly resolved, numerical processes model developed for Massachusetts Department of Transportation (MassDOT) and the Federal Highway Administration (FHWA) to assess the combined impact of sea level rise, storm events (tropical and extra-tropical), winds, tides, and waves. With a full understanding of the present-day coastal processes at the site, as well as an examination of potential sea level rise scenarios, an alternatives analysis will be developed that evaluates the performance and longevity of various living shoreline alternatives based on a criteria matrix, which will include but is not limited to design life, level of protection, permit ability, cost, environmental benefits, and avoidance of adverse impacts.

Improving the coastal resilience of Coughlin Park provides immeasurable environmental, recreational, and educational benefits to the local Winthrop community, as well as the greater Boston area population. A restored shoreline that uses living shoreline techniques will provide improved wildlife habitat by increasing the footprint of wetland resource areas (e.g., coastal beach, coastal dunes), increase the coastal resiliency of the park shoreline, and provide enhanced storm damage prevention for the park. Stabilizing the eroded shoreline will also reduce sedimentation in the Harbor and will help protect the fringe marsh along this section of shoreline from siltation. Improving Coughlin Park also provides recreational benefits to the public by arresting the deterioration of the coastal resources that are occurring at the Park, and ensuring continued access to the park and its facilities. Finally, the installation of a living shoreline or other green infrastructure techniques can serve not only to educate the visitors to Coughlin Park about coastal processes, climate change adaptation and green infrastructure techniques; but can also be used as a learning opportunity for developers of future green infrastructure projects by monitoring the implemented design, techniques and can be followed or approved upon at other locations.

Scope of Work

The technical approach includes the following seven tasks intended to assess the feasibility of implementing a living shoreline project at the site and to advance the project through the conceptual design phase, including the development of engineering plans.

Task 1. Identify and Review Existing Information

This task will compile existing information related to topography and bathymetry, wetland resources, including eelgrass and shellfish beds, historical shoreline change rates and current Federal Emergency Management Agency (FEMA) flood zones. Data gaps will be identified as the basis for supplemental data collection if required. A meeting with the Town will be scheduled as part of this task to discuss the project and to solicit data and input for this effort.

Task 2. Assess, Map, and Flag Wetland Resources

Wetland resources at the site will be identified and evaluated for stability, ecological health and signs of stress. Sediment samples will be collected from the coastal beach and coastal bank to determine grain size. Finally, wetland resources delineated and flagged in preparation for the site survey that will be conducted in Task 3.

Task 3. Site Topographic Survey

A site topographic survey will be completed to determine the site boundaries, present location of the shoreline, and the locations of the wetland resources flagged in Task 2. These data directly inform the alternatives analysis described in Task 4.

Task 4. Analysis of Coastal Processes

An existing coastal model, the Boston Harbor Flood Risk (BH-FR) Model developed by Woods Hole Group for MassDOT and FHWA, will be utilized to evaluate the coastal processes at the site. The BH-FR model is a highly resolved, numerical process model developed for the greater Boston Harbor area, which assesses the combined impact of:

- Sea level rise
- Storm events (tropical and extra-tropical)
- Winds
- Tides
- Waves

A statistical model will be applied to the data to calculate the 5-, 10-, 25-, and 50-year return periods for the local wave heights and water levels at the project site. This information will be used to inform the design criteria for the green infrastructure alternatives.

In addition, a shoreline change analysis will be conducted to assess the rate of change for the western shoreline of Coughlin Park; up to 10 years of historical aerial photography, recent orthoimagery and shoreline surveys will be compiled to calculate both long- and short-term shoreline change rates.

Task 5. Green Infrastructure Alternatives Analysis

With the improved knowledge of coastal processes, up to three conceptual green infrastructure alternatives will be identified and evaluated. These alternatives will likely include beach nourishment, natural enhancement of adjacent coastal engineering structures, fringe marsh enhancement, and/or possible bioengineering for bank stabilization. The alternatives analysis will use a criteria matrix approach, including such indicators as feasibility, design life, level of protection provided, permit ability, cost, environmental benefits and avoidance of adverse impacts. This task will identify profile geometry and length required, preliminarily quantify materials needed, and assess performance/maintenance requirements as the basis for recommending conceptual layout(s) for Task 6. The Town and other stakeholders will collaborate to ensure that the green infrastructure alternative selected is consistent with restoration goals and feasible to implement from both a regulatory and construction standpoint.

Task 6. Preliminary Engineering Design

Based on the chosen alternative selected in Task 5, preliminary engineering designs will be produced detailing the design specifications for the preferred alternative.

Task 7. Final Documentation and Visualizations

A summary report will be completed that will summarize Tasks 1 through 6 and will provide the additional information needed for the Town to advance the selected green infrastructure alternative to a final design. Visualizations of technical analyses will also be developed as part of this task in both static (images) and dynamic (movies) formats to clearly and appropriately convey a scientific and technical message to the general public; displaying results in Google Earth allows the viewer to “fly through” or zoom in/out of the project area to see results at different scales and angles. To further advance green infrastructure in the state, the final report and associated visualizations can also be used to transfer the input data and selection and design steps used in this project to other Towns in the region that have similar coastal management issues that might benefit from a green infrastructure approach. Additionally, the Massachusetts Office of Coastal Zone Management (CZM) and other agencies will be able to use this report to disseminate design steps and describe the advantages of green infrastructure projects over traditional hard coastal engineering alternatives.

Transferability – Description of transferability of proposed project (i.e. how the project approach, techniques, and products can be used by or serve as models for other coastal communities facing similar issues) including details of education and outreach efforts.

The proposed project is directly transferable to other coastal communities who are facing similar issues. There are other eroding shorelines in the vicinity of Coughlin Park in the Boston Harbor system that could benefit from similar green infrastructure projects. Experience gained from this project could benefit those sites as well, through the transfer of knowledge and experience with green infrastructure projects. Therefore, the results of this project will benefit other stakeholders and coastal communities. Finally, the summary report and final visualizations will provide an ideal method to disseminate the results of this project to the general public, as well as to other coastal communities, and to demonstrate the viability of green infrastructure techniques within the Boston area. We will also encourage and assist our contractor, the Woods Hole Group, in presenting the results of this project at relevant conferences such as the Conference on Ecological and Ecosystem Restoration (CEER).

Time-line – Detailed time-line with anticipated and realistic completion dates for the project.

Assuming the contract award date is July 3, 2015, we anticipate that the project will be completed by May 31, 2016. The following is the schedule breakdown for the project.

Task	Task Name	Qtr. 3			Qtr. 4			Qtr. 1			Qtr. 2		
		Jul-15	Aug-15	Sep-15	Oct-15	Nov-15	Dec-15	Jan-16	Feb-16	Mar-16	Apr-16	May-16	Jun-16
1	Identify and Review Existing Information	█	█	█									
2	Assess, Map, & Flag Wetland Resources				█								
3	Site Topographic Survey				█								
4	Analysis of Coastal Processes					█	█	█					
5	Green Infrastructure Alternatives Analysis								█	█			
6	Preliminary Engineering Design										█	█	
7	Final Documentation & Visualizations											█	█

Budget – Detailed budget and explanation of how funding and other support provided by project partners will ensure the success of the project. The 25% in-kind or cash match that has not been used for other projects must be documented.

A detailed project budget is included as Attachment 1. Attachment 10 documents the 25% cash match.

Project Management – The name of the qualified individual who will serve as the local project manager and point of contact, along with resumes for the local project manager and other staff who will work on the project.

Jeffrey Stearns, P.E., is a Project Manager at Woodard & Curran. Mr. Stearns has 19 years of experience in engineering and managing land development services for commercial, industrial, and residential projects throughout the United States, particularly in Rhode Island, Massachusetts, Georgia & Ohio. He provides site/civil design services that involve layout, permitting, stormwater design, grading, earthwork, and utility infrastructure assessments. He specializes in performing stormwater management evaluations and understanding of local and state permitting requirements.

Kirk F. Bosma, P.E., is a Senior Coastal Engineer and Team Leader of the Coastal Sciences, Engineering & Planning team at Woods Hole Group. He focuses on habitat restoration, shoreline protection, and climate change planning projects for a diverse client base. He specializes in applying numerical models to optimize engineering designs and reduce overall project life cycle costs. This includes developing and employing numerical models for marsh restoration, sediment transport, near shore spectral wave transformation, particle transport, bathymetric evolution, and two- and three-dimensional hydrodynamic processes. He also applies the latest data and numerical methods toward capturing current and future flooding risk for climate change vulnerability assessments. Mr. Bosma has a Master's from the University of Delaware's Center for Applied Coastal Research. His areas of expertise include numerical modeling of coastal and estuarine processes, coastal engineering design for shore protection, wave propagation and transformation, sediment transport and littoral processes, hydraulics for marsh restoration, climate change vulnerability assessments and engineering adaptations, and data collection and implementation of coastal engineering projects. Mr. Bosma also designed and implemented technically advanced data collection programs and analysis techniques to assess the estuarine, coastal, and oceanographic environment and help develop engineering solutions. He has also designed a number of coastal engineering structures and erosion mitigation solutions. Mr. Bosma has been the project manager for both large coastal restoration and marsh restoration projects that have included implementation of a comprehensive data collection, physical processes modeling programs, evaluation of a variety of restoration alternatives, and engineering design.

Mitchell A. Buck, P.E. is a Coastal Engineer at Woods Hole Group with a broad base of experience in various phases of coastal projects. His primary expertise is developing and implementing a wide range of field-data collection programs, analysis of collected data and the application of the results within numerical models for coastal management and design projects. He received a B.S. in Environmental Engineering from Johns Hopkins University in 2005 and a M.C.E. from the University of Delaware Center for Applied Coastal Research in 2107, where he investigated beach erosion under storm conditions in a wave flume. Mr. Buck has experience developing and employing a wide range of models for coastal processes and nears bore hydrodynamics. Recent types of coastal projects in which Mr. Buck has participated includes: coastal structure design, beach nourishment, sediment transport, inlet stability, water quality, marsh restoration and dredging. Mr. Buck is currently performing numerous topographic and bathymetric surveys using Real Time Kinematic Global Positioning Systems (RTK GPS), total stations and echosounders. He has experience with a variety of oceanographic instrumentation including tide gauges, CTD, and ADCPB. Mr. Buck has also lead and supported environmental monitoring programs for the United States Army Corp of Engineers projects that involve sediment coring, surface water and groundwater sampling, and biological sample collection. Mr. Buck is also an OSHA HAZWOPER Site Supervisor.

M. Leslie Fields has over 20 years of experience in the areas of coastal geology and coastal process evaluation. She specializes in analyses of shoreline change, geomorphic evolution of coastal systems, coastal hazard evaluation and mitigation, GIS development, coastal wetland delineation, sediment transport analyses, and permitting (local, state, and federal). Ms. Fields is experienced with all facets of environmental impact analyses ranging from the design and collection of field data to alternative analyses and design for mitigation. All of her projects benefit from Ms. Fields' strong written communication and organizational skills. Further, Ms. Fields has extensive experience in the use of GIS technology to display and analyze spatially-related data for coastal and marine projects. She routinely uses ESRI's suite of ArcGIS products to analyze, evaluate, and present information for Woods Hole Group projects. She has combined her familiarity with GIS software, database management, coastal processes, and cartography to

effectively manage and present a wide range of coastal and marine issues. Over the past 16 years, Ms. Fields has been responsible for managing and conducting numerous projects involving the evaluation of coastal processes and shoreline response. She has performed numerous shoreline change studies along the eastern United States. These studies examined issues including impacts from inlet stabilization, installation of shore protection structures (groins, revetments), inlet formation, and dredging. Where possible these studies developed information on historical shoreline change incorporating data on regional geomorphic evolution. In many cases information from the shoreline change analyses were coupled with numerical model results for wave transformation and sediment transport to help evaluate impacts of shore protection alternatives.

The key personnel who will be involved in the Coughlin Park Green Infrastructure Feasibility Study are listed in the table below and individual resumes are included in Attachment 3.

Project Team

Name	Affiliation/Title	Role
Jeffery Stearns, P.E.	Woodard & Curran – Project Manager	Project Manager
Kirk F. Bosma, P.E., M.C.E	Woods Hole Group – Woods Hole Group Team Leader/ Coastal Engineer	Team Leader/Coastal Engineer
Mitchell A. Buck, P.E., M.C.E	Woods Hole Group – Coastal Engineer	Coastal Engineer
M. Leslie Fields, M.S.	Woods Hole Group – Coastal Geologist/ Marine Environmental Analyst	Coastal Geologist/Marine Environmental Analyst

Partners – Signed support letters from all relevant local boards, departments, commissions, and other partners with a commitment for these entities to participate, as necessary, in the project.

Letters of support from all local partners are included in Attachment 11.

Attachments

- Attachment 1: Budget
- Attachment 2: Resumes
- Attachment 3: Coughlin Park – Historical Shoreline Change from 1844-2009
- Attachment 4: Hurricane Inundation Map
- Attachment 5: NFIP Flood Insurance Rate Map
- Attachment 6: Massachusetts State Hazard Mitigation Plan 2013
- Attachment 7: Winthrop Hazard Mitigation Plan Update 2014
- Attachment 8: Winthrop Open Space and Recreation Plan 2014-2021
- Attachment 9: Winthrop Harbor Assessment and Plan
- Attachment 10: Required Attachments
 - W-9
 - Authorized Signatory Sheets
 - Commonwealth Terms and Conditions
 - Matching Funds Letter
- Attachment 11: Letters of Support

ATTACHMENT 1: BUDGET

**Coughlin Park Green Infrastructure Feasibility Study
Budget**

Task	Deliverable	Due Date	Grant Award	Match Amount*	Total Cost
1 - Identify and Review Existing Information	Summary Memo & Meeting with Town	9/30/2015	\$ 8,750		\$ 8,750
2 -Assess, Map, & Flag Wetland Resources	Summary Memo	10/30/2015	\$ 8,750		\$ 8,750
3 - Site Topographic Survey	Site Plan	11/30/2015	\$ 8,000		\$ 8,000
4 - Analysis of Coastal Processes	Coastal Processes Model	1/28/2016	\$ 22,500		\$ 22,500
5 -Living Shoreline Alternatives Analysis	Summary Memo	2/29/2016	\$ 14,200		\$ 14,200
6 - Preliminary Engineering Design	Engineering Plan	3/31/2016	\$ 10,300		\$ 10,300
7 - Final Documentation & Visualizations	Report and Visualizations	5/31/2016	\$ 2,500	\$ 12,500	\$ 15,000
Project Management & Coordination	N/A	N/A		\$ 12,500	\$ 12,500
Total			\$ 75,000	\$ 25,000	\$ 100,000

* Cash Match

ATTACHMENT 2: RESUMES

JEFFERY STEARNS, PE

VICE PRESIDENT/PROJECT MANAGER



Professional Profile

Jeff has 19 years of experience in engineering and managing land development services for commercial, industrial, and residential projects throughout the United States, particularly in Rhode Island, Massachusetts, Georgia, and Ohio. He provides site/civil design services that involve layout, permitting, stormwater design, grading, earthwork, and utility infrastructure assessments. He specializes in performing stormwater management evaluations and understanding of local and state permitting requirements.

Related Experience

City of Melrose, MA - Highlands Streetscape Improvements Project. Project Manager for a roadway improvements project in the Melrose Highlands corridor. Construction activities include roadway resurfacing, sidewalk reconstruction, enhanced pedestrian accommodations, streetscaping and the reconfiguration of municipal and MBTA parking lots.

WebGIS Mapping and Data Management System VAMC West Roxbury, MA and WebGIS Mapping, Photogrammetric Aerial Survey, and Data Management System; VAMC Bedford, MA. Project Manager responsible for the development of a web-based GIS mapping and data management system at two VAMC campuses. Provided the West Roxbury VAMC and Bedford VAMC with an automated system to manage existing and future facilities data and site mapping, including digitizing record drawings and mylars, facilities plans, permits, and maintenance information. The system provides a platform for past, present, and future site utilities and building information to be organized, recorded, and managed in a consistent digital mapping and layout format.

Roadway Improvements, VAMC West Haven, CT. Project Manager and lead engineer responsible for the design of roadway improvements that expand interior access road to two-way traffic and add utility improvements for future renovations to the hospital facilities. The improvements create new parking, allow for milling and repaving of existing parking areas and roads, provide restriping and curb replacement/construction plus utility relocations for future connections, and retaining wall repairs and realignment.

Construct Parking - VAMC Bedford, MA. Project Manager responsible for the design development of contract documents, including plans and specifications, suitable for public bidding to construct five parking expansion areas. The completed project included approximately 165 parking stalls located in 4 separate locations within the VAMC campus; and included the construction of additional drainage systems, lighting, and sidewalk improvements to achieve VAMC's objective to increase the available parking on the campus. Two of the parking areas required state and

Education

- Bachelors, Civil Engineering, Worcester Polytechnic Institute

Registrations

- Professional Engineer - MA
- Professional Engineer - RI
- Professional Engineer - CT
- Professional Engineer - CO
- Professional Engineer - OH

Professional Associations

- National Society of Professional Engineers

Specialized Training

- Master Design Certificate Low Impact Development issued by Rhode Island Coastal Resources Management Council

local approvals to obtain wetland permits for work in resource areas and buffer zones.

Collapsed Roadway Repair and Drainage System Upgrade - VAMC Northampton, MA. Project Manager responsible for the design development of drainage system construction plans, a SWPPP, Stormwater Report, and Historic Preservation Report for this roadway and drainage project. Woodard & Curran also obtained a wetland permit Notice of Intent/ Order of Conditions and a local Stormwater Permit approval from the City. A new drainage design of a campus-wide downstream detention basin and design of new Stormceptor runoff filtration units was part of the design.

Design of Stormwater Treatment System to Capture Phosphorus Runoff - VAMC Jamaica Plain, MA. Project Manager and lead Engineer overseeing design of a stormwater phosphorus removal system to obtain state approval of VAMC building expansion. The project includes site investigations, utility system mapping, and stormwater sampling to design a stormwater runoff phosphorus capture system. Performed a CCTV inspection and survey of the storm drain lines and structures, and cost estimates of practical, cost-effective treatment alternatives.

Town of Seekonk, MA – Peer review services. Project Manager for Peer Review services on behalf of the Town of Seekonk for the Conservation Commission and Planning Board review of the Notice of Intent and Site Plan Application. The proposed development plans included the construction of a 156, 150 s.f. commercial building with associated drainage, lighting and parking lot improvements. Widening of the existing Fall River Avenue signalized intersection/ entrance adjacent to the Site was also included. An existing Vernal Pool and Isolated Land Subject to Flooding (ILSF)

and Isolated Vegetated Wetland (IVW) were located on the Site. Work was within the Town of Seekonk regulated 100-foot Buffer Zone associated with the IVW/ILSF/Vernal Pool.

Town of Rehoboth, MA – Peer review services. Project Manager for Peer Review Services to the Town of Rehoboth Planning Board for a Site Plan Approval Application, a Groundwater Special Permit Application, and a Large-Scale Ground-Mounted Solar Photovoltaic Installation Application. The property under review is located at 295 Tremont Street (the Site) and comprises approximately 139 acres that are zoned Business and Residence/Agriculture.

Town of Westbrook, CT (Escrow) - Third Party review services. Performed third party reviews for the Town of Westbrook Zoning and Inland Wetlands & Watercourses Commissions. Applications were reviewed for compliance with Town of Westbrook regulations, with specific emphasis on those regulations related to wetlands protection, erosion & sedimentation control, stormwater, coastal, and floodplain management, traffic, and lighting. Tasks included providing comments on the applications to the appropriate commissions for consideration and working with the Applicant to address issues to the satisfaction of the commissions.

Town of Westbrook, CT (Non-escrow) - Drainage study. Performed a preliminary drainage study to understand the cause of flooding within the low-lying and tidally influenced area of Grove Beach in Westbrook. Conceptual measures focused on reducing the magnitude and frequency of flooding within the area were identified and provided to the Town for future consideration.

Town of Westbrook, CT (Non-escrow) - Inlands Wetlands and Waterway Standards & Application. Assisted in

developing standardized checklists and application for the Inlands Wetlands and Waterway Commission. Developed standardized details for the Planning & DPW department for adaptation into the Town's subdivision regulation and on-going town projects.

Town of Westbrook, CT (Non-escrow) - FEMA & Community Rating System Funding. Works with town staff on FEMA related programs and community rating system (CRS) funding opportunities. Currently working with the Planning department on a downtown revitalization Town Center project and Hazard Mitigation Plan review. Managing MS4 related town responsibilities and presently developing concepts for a recreation parking area. Assets Planning department with grant development by providing concept plans and cost estimate.

City of Waterbury, CT - Chase Brass brownfield redevelopment project. Lead civil engineer responsible for designing and coordinating with a multi-disciplinary design team for the preparation of a full design package, which included the demolition, civil, environmental and renovation of the former 650,000 sf "Mile Long Mill" and power house building. Work included stormwater, pavement, demolition, and utility design.

Coca-Cola Refreshments, Columbus, OH – Civil engineering. Project Manager for the design and permitting of the exterior improvements for a 3.5-acre plant building expansion and 14.5-acres of site improvements. Site improvements included the design of a 160 stall concrete truck parking facility, landscaping, security enhancements, and City & private sidewalks. The design of utility services for these improvements included stormwater piping, retention pond, fire & domestic water lines, and process piping. Permitting include submissions to various departments' within the City



to obtain approvals. The submissions included a Zoning Variance Request, Sidewalk and Vehicular Entrance (E-plan approval), Stormwater Compliance Approval, and a Site Compliance Plan submission.

Coca-Cola Refreshments, Atlanta, GA – Civil engineering. Project Manager for the design and permitting of the exterior improvements to a 0.25 acre Cogen Facility contained within 0.5 acres of site improvements. The project included coordination with several disciplines as well as Georgia Power to quickly develop and permit a steam generating facility for the existing on-site production and office buildings. Responsibilities included the design of a stormwater system, layout of exterior equipment, landscaping, and obtaining City Approvals.

Johnson & Wales University, Providence, RI – Parcel 7 parking lot design. Project Manager for the design of the University's largest surface parking lot, which included master planning for approximately 13 acres of vehicle and bus parking, and a maintenance and truck wash facility. The use of LID techniques for stormwater treatment is incorporated into this project as required under the CRMC's Urban Coastal Greenway Policy. Three LID techniques were evaluated for suitability, cost, and maintenance. Bio-retention ponds were selected as the LID technique to treat stormwater from the paved surfaces. Design of the first 4-acre phase is under way, which includes parking for 200 vehicles and 30 buses. Additionally, the parking lot will serve as an environmental cap over an area contaminated by its former industrial use as a train maintenance facility. Permitting is underway with RI CRMC.

Town of Westford, MA – Engineering review services. Served as Project Engineer for various peer reviews of private site developments, subdivisions,

chapter 40B proposals, and offsite improvements in connection with site developments. Duties include review of erosion and sedimentation controls, grading, parking, stormwater management and hydraulic models, sanitary sewers, water distribution, groundwater resource protection, and general civil engineering, including the scheduling and coordination of subconsultant reviews for specified assessments including traffic, geotechnical, structural, and proposed blasting. In addition, attended public hearings with Project Manager for local zoning and planning boards, and conservation commission as necessary to assist with presenting findings and providing technical support for town.

Town of Billerica, MA – Engineering review services. Served as Project Engineer for various peer reviews of private site developments, subdivisions, and offsite improvements in connection with site developments. Duties include review of erosion and sedimentation controls, grading, parking, stormwater management and hydraulic models, sanitary sewers, water distribution, groundwater resource protection, and general civil engineering, including the scheduling and coordination of subconsultant reviews. In addition, attended public hearings for local board of health and conservation commission as necessary to present findings and provide technical support for town.

City of Leominster, MA – Engineering review services. Served as Project Engineer for various peer reviews of private site developments, subdivisions, and offsite improvements in connection with site developments. Duties include review of erosion and sedimentation controls, grading, parking, stormwater management and hydraulic models, sanitary sewers, water distribution, groundwater resource protection, and

general civil engineering, including the coordination of subconsultant reviews.

WR Grace, Concord, MA – Design services. Project Engineer to produce design documents for submission to the local conservation commission, state agencies, and Army Corp of Engineers. Design entailed the removal of contaminated materials, measures to protect endangered species, and streambank restoration.

Charles River Laboratories, Wilmington, MA – Research facility site development services. Project Engineer responsible for producing civil engineering design plans of a 44,000-square-foot research center. Engineered site grading, utility design, and drainage design. Coordinated with external architects and mechanical engineers for proposed utility and building connections.

Wal-Mart Supercenter, Northbridge, MA – Commercial development permitting and engineering services. Project Manager for permitting and engineering services for this 188,000-square-foot retail facility located on a 36-acre gravel pit. Engineered conceptual and final design plans. Assisted in the preparation of permitting documents. Engineered site grading, utility design, and drainage design. Prepared construction documents and assisted with the bidding process.

Johnson & Wales University, Cranston, RI – Grace Welcome Center permitting and site design. Project Manager for the permitting and site design of a new 8,000-square-foot admissions and welcome center. The site was designed with the building raised above existing grade to create continuity with the nearby community building and student-housing complex. Low-impact development (LID) techniques include subsurface infiltration of

stormwater. Approvals were obtained from the City of Cranston and the Providence Water Supply Board. The project is pursuing LEED certification. Construction began in the fall of 2009.

Johnson & Wales University, Providence, RI – Rolo Student Services Building permitting and storm drainage system design. Project Engineer for the permitting and storm drainage system design associated with the renovation and expansion of a former manufacturing facility for use as a student services center. The project included design of underground infiltration systems for roof and pavement runoff. Permits were obtained from the Narragansett Bay Commission and the Providence Water Supply Board. The project completed construction in 2008.

Johnson & Wales University, Providence, RI – Center for Culinary Excellence site design and permitting. Project Engineer for the site design and permitting of a new 70,000-square-foot, 4-story signature academic building for the University's culinary arts program. The facility contains 25 laboratories and three dining rooms, and is targeting LEED silver certification. The brownfield site was part of the former Providence Shipyard and subsequent industrial activities prior to being purchased by the University, and is within the velocity zone of the coastal flood plain, requiring level one of the building to be approximately 12 feet above existing grade. The project includes collection of roof runoff in a 20,000-gallon storage tank with a pumping system for reuse in toilet flushing and landscaping. Permits were obtained from CRMC and NBC. Construction was completed in 2009.

W/S Wareham LLC, Wareham, MA – Commercial development permitting and design services. Project Engineer for permitting and site/civil design services for this 750,000-square-foot, 70-acre

commercial development. Produced special permit documents, variance submittals, cost estimates, layouts, and definitive subdivision plans. Coordinated and performed engineering deliverables for major tenants such as Lowe's and Target. Maintained client relationship on a daily basis

Stoneham Executive Center, Stoneham, MA – Commercial development site design services. Project Engineer for site design services for this commercial development at the former Boston Regional Medical Center. Engineered site grading, utility design, costs estimates, and drainage design. Prepared site plans and subdivision plans for the industrial park which included the design and layout for three 45,000-square-foot office buildings and a 120,000-square-foot parking garage on a 45-acre parcel. Project involved underground utility investigations and existing infrastructure assessment.

National Amusements Inc. - New England – Theater conceptual and design plans. Project Engineer/Project Manager for conceptual and design plans for various theater sites throughout the Northeast. Provided construction inspection services at the NAI Seekonk, MA Showcase Cinema. Prepared conceptual plans for the NAI Atco, NJ Showcase Cinema. Created phasing plans for the NAI Revere, MA Showcase Cinema.

Bay State Gas, Northampton, MA – Parking lot environmental remediation design. Project Engineer to produce design documents for the environmental remediation of an existing parking lot in the center of Northampton. Coordinated efforts with environmental engineers to determine cost-effective ways to relocate existing utilities and phase the project as to not interfere with the existing pedestrian and vehicular traffic.

Charles River Laboratories, Wilmington, MA – Research facility site development services. Project Engineer responsible for producing final design plans of this 44,000-square-foot research center. Engineered site grading, utility design, and drainage design. Coordinated with outside architects and mechanical engineers for proposed utility and building connections.

Rising Sun Townhomes, Providence, RI – Residential development stormwater management and permitting. Project Manager for stormwater management and permitting for this 28-unit residential condominium development on a redeveloped parcel of land. Produced stormwater management and permit documents for submittal to state and city agencies. Managed client relationship, budget, and subcontractor responsibilities.

Tockwotton Home, East Providence, RI – Residential development civil engineering and stormwater management services. Project Engineer for civil engineering and stormwater management services for this 148-unit assisted living facility on the Seekonk River. Produced site/civil design plans and a stormwater management report.

Confidential Client, East Providence, RI – Residential development site/civil and stormwater services. Project Engineer for site/civil and stormwater services for this 5-story condominium development on the Seekonk River. Responsible for producing site/civil design plans and a stormwater management report.

Private Developer, Woburn, MA – Commercial development site layout. Project Engineer for site layout for this 172,000-square-foot, 13-acre commercial development. Worked with the client to create site layout alternatives for all three tenants – Lowe's Home



Improvement, Bertucci's, and Red Roof Inn. Final design incorporated parking decks, retaining walls, and offsite improvements. Engineered site grading, utility design, costs estimate, and conceptual layouts for various other prospective tenants. Engineered site plans, existing condition, and subdivision plans.

Woodbridge Crossing, LLC, Stoughton, MA – Residential development site design. Project Manager for engineering the site design for a 192-unit comprehensive 40B residential development. Performed site grading, utility design, layout, and drainage design.

Double J Realty Trust, Pembroke, MA – Subdivision permitting. Project Manager for the permitting of a 47-lot subdivision, including approvals from MEPA, National Heritage, Army Corp of Engineers, and the local planning board.

Castlerock Development, Kingston, and Norwell, MA – Subdivision project management. Project Manager for a proposed 14-lot subdivision in Kingston and a 3-lot subdivision in Norwell

Welch Associates, Easton, MA – Subdivision permitting. Project Engineer for a 44-lot subdivision. Project involved the submission of subdivision and special permit documents for this adult retirement community.

Oak Point LLC, Middleboro MA – Adult retirement community construction and design services. Project Engineer for various phases of construction and design, including the preparation of closed drainage design, site layout, roadway profiles, grading, and earthwork analysis.

Dedham Reuse Committee, Dedham, MA – Landfill redevelopment conceptual design. Project Engineer to assist in the production of conceptual design alternatives and cost estimates for the various recreational uses atop an exist-

ing uncapped landfill. Duties included grading, cost estimating, and planning.

City of Leominster, MA – Ballfield and hotel feasibility study. Project Engineer to assist in the production of a conceptual plan to construct a ballfield and hotel atop an existing capped landfill.

Town of Billerica, MA – Sewer collection system design and permitting. Project Engineer for the design and permitting of a 3-phase municipal sewer collection system. Assisted with the engineering and permitting of over five miles of sewer collection system and residential service connections.

West Elmwood Housing Development Corporation, Providence, RI – Westfield Townhomes permitting and site design. Project Engineer for the permitting and site design of 20 residential townhouses as part of the redevelopment of the former Rau Fastener Complex. The project provides affordable housing in Providence's largest neighborhood, the West End. Permits were required from the Providence City Plan Commission, the Narragansett Bay Commission, Providence Water Supply, and the Rhode Island Department of Environmental Management (RIDEM).

Bayside Garage, Portland, ME – Parking garage site/civil engineering services. Project Engineer for the 7-story, 660-vehicle parking garage and 20,000-square-foot retail/restaurant space. The project is being constructed as an integral component of the City's Comprehensive Plan to redevelop the Bayside area into a dense, urban, mixed-use neighborhood. Assisted with the coordination of various consultants, procurement of local and state permits, and preparation of construction documents.

The Koffler Group, Warwick Neck, RI – Residential development permitting and site/civil design. Project Engineer

for permitting and site/civil design of this 60-acre multi-family townhouse development. Pursued permits from the Rhode Island Coastal Resources Management Council, RIDEM, the Warwick Planning Board, the Warwick Zoning Board, and other local authorities.

Town of Scituate, MA – Proposed housing development review. Project Engineer for review of a proposed 60-unit housing development on a sensitive site on land between Herring Brook River and State Route 3A. In addition to wetlands and resources, other issues of concern are traffic, density, building layout, recreational uses, circulation and pedestrian activities, and visual/scenic impacts.

Town of Blackstone, MA – Proposed housing development review. Project Engineer for review of a proposed 144-unit 40B development project. The key issues in this review were the potential impacts to wetlands and vernal pool habitat; protection of a state-listed Heritage Tree; site design, density, and layout deficiencies; stormwater management and drainage design; abutter impacts; site ingress and egress; and site grading and open space. Building scale and neighborhood impacts were also key considerations.

Town of Westport, MA – Proposed subdivision engineering and wetlands review. Project Engineer for engineering and wetlands review to ZBA and Conservation Commission for a proposed 96-unit single-family subdivision development. This project was originally submitted to the Board as a 300-unit multi-housing development plan including mixed uses and age-restricted units. Based on the detailed engineering and hydrogeological review performed by Woodard & Curran, the developer modified the plan to reduce the density and convert it to a single-family housing subdivision. It was also redesigned to be

individual on-site private wells and septic systems in accordance with the Town's Title V regulations. Site drainage design and stormwater management was also redesigned by the applicant in response to review comments to expand the storage capacity and improve runoff flows to minimize potential downgradient impacts to abutting properties, wetlands and surface waters, and roadways. Wetlands impacts were also evaluated for the Conservation Commission permit review.

Confidential Pharmaceutical Client, NJ - Civil engineering. Project Manager for the Impoundment 8 operations facility re-development project. Responsible for engineering design, coordination of permitting, oversight of sub consultants, and procurement of construction services to develop the facility. The project required a Stormwater management design in accordance with New Jersey stormwater standards and development of a stormwater pollution prevention plan. Design and procurement of maintenance and hazardous waste material storage buildings and structures were included in the facility.

Confidential Pharmaceutical Client, NJ - Civil engineering. Project Engineer for various project on the project site. These projects included: Basin 98: Responsible for the coordination of the engineering design of hydraulic pumps and platform. Emergency Sluice Gate: Responsible for designing the repair of the emergency sluice gate which included procurement of materials and responding to contractor request for information. PW2 Platform: Responsible for the coordination of the engineering and procurement of the platform structure.

Confidential Client, Everett MA – Metals recycling facility. Project Manager responsible for developing and designing an enhanced stormwater management system that will remove metals

and pollutant loadings in order to meet EPA bench mark criteria. The design included development of a complex stormwater treatment train, Stormwater sampling analysis, historical rain data development, interaction with stormwater vendors, and use of stormwater storage and pump station system to meet Client goals.



Qualifications Summary

- More than 19 years of diverse professional experience in the fields of coastal sciences and engineering, specializing in the areas of project management, numerical modeling, marsh restoration, field collection programs, sediment transport, and littoral processes
- Strong written and verbal communication skills
- Implemented technically advanced data collection, analysis, and numerical modeling techniques to assess marine, coastal and oceanographic environments
- Managed multi-disciplinary coastal and marine projects requiring team management, scientific analysis, environmental sensitivity, diverse coordination, and cost-effective solutions
- Developed various hydrodynamic and hydraulic models for water quality assessment, marsh restoration projects, discharge and mixing design, bridge scour, dredging impacts, and contaminated sediment fate and transport
- Managed and/or performed environmental impact studies for water resource projects, SUPERFUND sites, concentrate discharges into rivers and estuaries, and marine and coastal projects
- Numerical model experience with FVCOM, REF/DIF S, SWAN, STWAVE, BOUSS2D, GENESIS, RMA-Series of models, CMS-Flow/Wave, MIKE 21, EFDC, CGWAVE, SED-2D, ACES, CORMIX, SSTM, WAVAD, ADCIRC and EDUNE

KIRK F. BOSMA, M.C.E., B.S., P.E.

Team Leader/Coastal Engineer

Professional Affiliations

Member, Association of Coastal Engineers (ACE)
Member, Coasts, Oceans, Ports, and Rivers Institute (COPRI)
Associate Member, American Society of Civil Engineers (ASCE)

Fields of Expertise

Managing projects and developing engineered solutions related to coastal structure design, beach nourishment, beach management, inlet stabilization, water quality, environmental permitting, impacts of offshore dredging, marsh restoration, and wave, tide, and current data collection. Coordinating field data collection and numerical modeling projects. Numerical modeling and analyses of sediment transport, nearshore spectral wave transformation, particle transport, bathymetric evolution, two-and three-dimensional hydrodynamic processes, water quality, and mixing processes. Extensive experience utilizing software packages and programming languages to present, analyze, and solve engineering and scientific problems. Experienced in coastal engineering design and planning, coastal restoration, beach nourishment plans, wave, current, and sediment transport modeling, evaluation of a variety of coastal protection alternatives, beach nourishment design, marsh restoration projects, borrow site impact assessment, and implementation of a comprehensive data collection and wave and sediment transport modeling programs. Providing expert testimony for marine and coastal physical processes and numerical modeling.

Higher Education

M.C.E., Civil Engineering-University of Delaware (1996)
B.S., Civil Engineering-Calvin College (1994)

Professional Licensing

P.E., Professional Engineer, Massachusetts License #45849

Employment History

2001-Present Coastal Engineer/Team Leader, Woods Hole Group
1997-2001 Coastal Engineer, Woods Hole Group
1994-1996 University of Delaware (Teaching and Research Assistant)
1992-1994 McNamee, Porter and Seeley, Inc.

Key Projects

MassDOT – FHWA Pilot Project for Climate Change and Extreme Weather Vulnerability Assessments and Adaptation Options of the Central Artery, Massachusetts Department of Transportation – Project Manager/Coastal Engineer and Modeler

Was a key project member on a technically advanced, leading-edge pilot project for the Federal Highway Administration evaluating the vulnerability to sea level rise and extreme weather events for the Central Artery in Boston, MA. The project combines a vulnerability assessment by conducting a new systems-level assessment and evaluated adaptation options to reduce risk to specific assets. The project also is geared towards integrating climate change vulnerability into MassDOT and FHWA overall practices. A highly resolved, numerical processes model was developed to assess the combined impact of sea level rise, storm events (tropical and extra-tropical), winds, tides, and waves. Results from the model were used to assess risk for various assets throughout the City of Boston, and subsequently investigate adaption options to reduce the identified vulnerabilities and to establish an emergency response plan for tunnel protection and/or shutdown. The investigation also included a cost benefit analysis, which helped MassDOT select the most efficient method of protecting valuable existing assets against today's weather events and future climate impacts. Climate scenarios and combined storm surge and sea level rise were developed for current day, as well as 2070 and 2100.

Coastal Climate Change Adaption and Engineering Alternatives East Boston, Massachusetts, The Boston Harbor Association – Project Manager/Coastal Engineer

Developed a range of engineering adaptation alternatives in response to potential sea level rise scenarios. The alternatives ranged from management approaches (e.g., evacuation, flood-proofing of structures, etc.), to soft-engineering options (e.g., beach nourishment, creation of wetlands, etc.). For each location, conceptual designs and associated cost estimates were developed and compared to the potential cost incurred by flooding and storm damages to the location without protective measures over a given time horizon.

Saco River and Camp Ellis Beach Section 111 Project, Saco, ME, U.S. Army Corps of Engineers – Project Manager/Coastal Engineer

Managed, coordinated, and conducted a comprehensive field data collection and numerical modeling scope of work for the Saco River and Saco Bay region. The field data collection effort consisted of a 2.5 month wave, current, and tidal observation deployment using two strategically located wave Acoustic Depth Current Profiler (ADCP) systems, a high resolution near shore bathymetric survey, and a ADCP current survey of the river hydrodynamics. The coastal monitoring data set is being utilized to calibrate and verify a series of state-of-the-art wave models ranging from generation scale (Atlantic Ocean), through transformation scale (regional), down to the local and near field scales. The advanced modeling effort includes spectrally based wind-generation (WAVAD), transformation (STWAVE and CGWAVE), and Boussinesq (MIKE 21BW) wave models. Model output is being used in sediment transport modeling on both a regional and local scale. The calibrated models are being used to assess a wide range of shore

Key Projects (continued)

protection alternatives aimed at mitigating the erosion caused by federally maintained coastal structures. The project involves a high level of coordination between regulatory agencies, the federal government, State of Maine senators, US army Corps of Engineers, Town officials, and the local community.

Town of Palm Beach Technical Review of Proposed Coastal Management Program, Palm Beach, Florida - Coastal Engineer

Provided technical review of the proposed coastal management program assembled by the Town of Palm Beach. The primary purpose of the project was to provide Town Council objective technical recommendations regarding next steps for the Town's coastal program and specific projects. The scope of work focused on a truly unbiased analysis of the plan with a focus on the feasibility of potential recommendations while providing guidance on prioritizing funding for the recommended coastal projects. Relevant materials were reviewed, stakeholders were consulted, and supplemental technical analyses were performed to help assess the cost effectiveness of various recommendations. Throughout the review, considerations were given for both island wide approaches (e.g., inlet management, regional coastal processes, beach nourishment performance, sediment sources, coastal structures, hardbottom resources, dunes, and sea level rise planning), as well as project specific approaches. The technical evaluation also included preliminary engineering calculations of life cycle project performance for the various coastal projects within the Town. Ultimately, prioritized and phased recommendations were provided to the Town for consideration and that were intended to assist the Town in both the long- and shore-term planning of coastal management.

Hydrodynamic Characterization And Sediment Transport Potential at The Former Callahan Mine Property, Brooksville, ME, Maine Department of Transportation – Project Manager/Coastal Engineer

Managed and conducted a field data collection program, developed a numerical hydrodynamic model, and performed a sediment transport evaluation for a Superfund Site in Brooksville, ME. Goose Pond Estuary is a site of environmental concern and is classified as a Superfund site on the National Priorities List by the Environmental Protection Agency (EPA). The site is the former location of a zinc/copper open-pit mine where mining operations were conducted adjacent to and beneath the tidal estuary. When mining operations ceased, the property was flooded and it is now hydraulically influenced by the tides of Penobscot Bay, as well as a small upland stream. Phase I included the collection of field hydrodynamic data to help provide insight into the overall circulation within Goose Pond, and the exchange with Goose Cove and Penobscot Bay. Phase I also provided a basis for understanding potential transport processes between Goose Pond, Goose Cove, and Penobscot Bay. The field data collection program was also designed to provide input and calibration data for the subsequent numerical modeling tasks. Utilizing the data collected, a 3-D hydrodynamic model was implemented, calibrated, and verified to characterize the circulation within the Goose Pond Estuary system. The model was used to simulate a range of conditions, including spring and neap tidal conditions, high and low freshwater inflow conditions, as well as storm surge events within Goose Pond. Hydrodynamic model results were used to evaluate overall circulation patterns within Goose Pond under a range of environmental conditions in order to identify the water and volumetric exchange between Goose Pond and Penobscot Bay. Finally, a sediment transport model was developed to

Key Projects (continued)

determine the fate and transport of contaminated material within the estuarine system and Penobscot Bay.

Coastal Climate Change Adaptation and Engineering Alternatives, Groton, Connecticut – Project Manager/Coastal Engineer

Worked with Battelle Ocean Sciences and the University of Southern Maine on assessing the impacts of Climate Change on coastal communities of Groton, Connecticut. Specifically, the regions of Groton Long Point and the infrastructure surrounding the Mystic River were evaluated. The evaluation included the impacts of sea level rise and storm events on potential flooding. For each location, conceptual designs of engineering adaptation alternatives were developed. The alternatives ranged from management approaches (e.g., evacuation, flood-proofing of structures, etc.), to soft-engineering options (e.g., beach nourishment, creation of wetlands, etc.), to more significant hard engineering structures (e.g., modular seawalls, revetments, tide gates, hurricane barriers, etc.). The community recommended alternatives for which cost estimates were determined. Engineering adaptations and costs estimates were provided for high and low rates of projected sea level rise, coupled with various return period storm events (10-, 20-, 50-, and 100-year) projected to the year 2070.

Coastal Climate Change Adaptation and Engineering Alternatives East Boston, Massachusetts - – Project Manager/Coastal Engineer

Developed a range of engineering adaptation alternatives in response to potential sea level rise scenarios. The alternatives ranged from management approaches (e.g., evacuation, flood-proofing of structures, etc.), to soft-engineering options (e.g., beach nourishment, creation of wetlands, etc.), to more significant hard engineering structures (e.g., modular seawalls, revetments, etc.). For each location, conceptual designs and associated cost estimates were developed and compared to the potential cost incurred by flooding and storm damages to the location without protective measures over a given time horizon.

Nantasket Beach Seawall Repair and Reservation Master Plan Services, Hull, MA, Massachusetts DCR - Project Manager/Coastal Engineer

Led a project team to assess the Nantasket Beach Reservation Property. The Reservation has been used as a recreational beach by Greater Boston residents since the 1800s and is currently owned and operated by the Massachusetts Department of Conservation and Recreation (DCR). Nantasket Beach serves as a valuable resource from both a commercial and recreational standpoint. The beach and the associated waterfront amenities serve as the defining feature for the Town of Hull and represent a significant draw for visitors and summer residents. Nantasket Beach has experienced ongoing erosion over the past 150 years, especially the public beach at the southern end of the system. Woods Hole Group conducted a detailed coastal processes study focused on determining potential alternatives to address the ongoing coastal erosion. The barrier beach system was simulated using state-of-the-art wave and sediment transport models to understand existing conditions, and assess potential alternatives. The project evaluated the performance of the existing seawall, as well as determined potential structural alternatives to enhance the beach and improve beach nourishment performance. The performance and lifetime of the beach nourishment were assessed in order to provide guidance on potential long-term solutions and future nourishment requirements.

Key Projects (continued)**Herring River Estuary Restoration Project, Wellfleet, MA, Town of Wellfleet – Project Manager**

Currently managing a project to restore the Herring River Estuary System, which represents a significant floodplain (the largest estuary on outer Cape Cod). The restoration is geared towards developing a plan to restore up to 1,000 acres of wetland area. Coordinating and developing a complex hydrodynamic numerical model that will address numerous concerns associated with re-establishing increased tidal exchange, as well as provide the necessary information to design an appropriate system of dikes, culverts, and road crossings. The modeling program involves evaluation and selection of the best model for application to the Herring River Estuary, model set-up, calibration, and verification, and simulation of a range of alternatives and physical conditions. The complex numerical modeling simulates both the hydraulics of the system and the salinity distribution throughout the estuary. The model results are used to design new engineering openings and water control structures.

Mixing Zone Evaluation, Whiting, IN, BP Products North America - Project Manager

Performed a third party peer review of an existing mixing zone submittal, including engineering design, confirmation of the mixing zone analysis (with specific evaluation of the implementation of the modeling), determination of the physical processes, and assessment of the diffuser design. The evaluation also included site-specific ambient water current measurements at the proposed discharge location to more accurately characterize the receiving waters. The water current observations were then used to develop more representative conditions and appropriate scenarios for modeling the dispersion and mixing zone. The distribution of water current observations and the percent occurrence of each mixing ratio were used to develop a probability density function of the dispersion ratios and provide design guidance/recommendations for diffuser orientation, design, and layout.

Ballard Street Salt Marsh Restoration Project, Saugus, MA, Division of Ecological Restoration – Project Manager

Managed a restoration and engineering assessment of the Ballard Street Salt Marsh system in Saugus, Massachusetts. The project evaluated the level of restoration potential in the Ballard Street marsh system through the observation of site-specific tide data, simulation of all the existing flow control structures in the system, verification of the proposed flow control structure design and necessary flood storage needs, and assessment of a number of approaches for modifying the hydraulic structures (as needed) in order to arrive at a conceptual design that meets the overarching goals of the project. A numerical model of the hydrodynamics and salinity throughout the system was developed and calibrated to measured field data. Model simulation were developed for normal tidal conditions, storm conditions (both rainfall and coastal storm surge), and sea level rise scenarios. Calibrated model results were subsequently used to evaluate proposed design conditions, including previous recommendations by scientific evaluations, as well as other potential design scenarios. Alternatives included: assessment of potential flow control structures that limited the amount of water directed to the northwest branch of the system (which is more densely populated and experience historic flooding issues), while allowing full tidal exchange to the southeast branch of the system, evaluation of potential flood storage increases through excavation of marsh plain area, and reconfiguration of the various culverts throughout the system.

Key Projects (continued)

Engineering Services and Environmental Impact Evaluation – Hammonasset State Park, Madison, CT, Connecticut DEP - Project Manager/Coastal Engineer

Managed and performed an engineering assessment and environmental impact study/report for Hammonasset Beach in Madison, Connecticut. Hammonasset Beach State Park contains Connecticut's largest public swimming beach and campground and is one of the region's most valued recreational and natural resources. During the winter of 2004-2005, severe storms resulted in the loss of a ¼-mile section of the beach on the western end of the park and significant damage to the boardwalk. Despite ongoing stop-gap measures to address the erosion problem, the beach continues to experience significant erosion and the boardwalk and beach remain at risk. Consequently, the Connecticut Department of Environmental Protection (DEP) was concerned about the viability of the western portion of the beach and park for recreational use and was seeking to identify the most cost-effective and long-term course of action to remedy this urgent situation. Therefore, an Environmental Assessment and Impact Evaluation was conducted to study the shoreline erosion problem, identify and evaluate the feasibility of alternative solutions, evaluate the potential impacts on Hammonasset Beach and the surrounding environment, and make recommendations as to the preferred solution. The proposed project consists of three distinct, but related elements: (1) Compilation and review of existing data and studies, as well as collection of new baseline topographic, bathymetric, sediment, and wave data; (2) an engineering feasibility study to identify and analyze beach management alternatives; and (3) an Environmental Impact Evaluation (EIE) pursuant to the Connecticut Environmental Policy Act (CEPA) to further analyze alternatives, identify potential adverse impacts and any necessary mitigation, and ultimately to support the selection of a recommended course of action.

Reverse Osmosis Concentrate Dilution Analysis and Ambient Water Characterization, Melbourne, FL, Reiss Environmental, Inc. - Project Manager and Coastal Engineer

Led a team of engineers and scientists in an evaluation of an existing Reverse Osmosis (RO) discharge. The scope of work included the collection of field data and application of a model to characterize the dilution of the existing RO discharge. The purpose of the evaluation was to assess whether a mixing zone could be permitted within the existing water quality regulations at the State and Federal level. Observations included bathymetry, a full suite of water quality constituents, and long-term, tide, current, and salinity observations. These data were used to develop a mixing zone model for constituents of concern.

Hydraulic Analysis of Flow Control Structures for Wetlands Restoration, Town Creek, Salisbury, MA - Project Manager and Coastal Engineer

Assessed and designed a modification to an existing embankment that served to restore marsh habitat and more efficiently alleviate flooding concerns in Salisbury, MA. Approximately 350 acres of tidal and formerly-tidal wetlands existed upstream of an abandoned railroad embankment. Tidal exchange was prevented from entering/exiting the marsh by a wooden flap gate on the downstream side of the railroad culvert. Hired by the MCZM Wetlands Restoration Program and US Fish and Wildlife, a hydraulic study and model of the Town Creek system was completed to assess potential restoration options. The hydraulic study evaluated a range of potential alternatives. The preferred culvert and tide control alternative: 1) increased the capacity of the marsh to drain during flood events; 2) provided the Town with a greater ability to preserve flood storage capacity by closing off the system prior to predicted storm events; and 3)

Key Projects (continued)

provided the means for small, incremental increases in tidal range over an extended time period as part of a well-monitored, risk-adverse, adaptive management approach to tidal restoration.

Hydrodynamic Analysis and Engineering Design for the Restoration of the Bride Brook Estuary, Rocky Neck State Park, East Lyme, CT, Connecticut Fund for the Environment - Coastal Engineer

Evaluated and designed a restoration project for the Bride Brook Estuary system in East Lyme Connecticut. The project investigated the hydrodynamic characteristics of the Bride Brook estuarine system and evaluated potential alternatives to restore more natural conditions to a system that has been structured since the early 20th century.). Historically, Bride Brook was one of the largest anadromous fish runs the state of Connecticut. However, since the construction of twin elliptical culverts at the mouth of the estuary in 1934, alewife numbers declined. This decrease has been attributed to the reduced tidal flow and water column light caused by the 200-foot long structure, which obscures the fish passage upstream. Therefore, the primary objective of this project was to determine an engineered alternative to the existing structure that could effectively restore the tidal regime and fish passage of the Bride Brook estuary. This project is composed of three separate tasks: 1) Data Observations, 2) Analysis and Conceptual Design, and 3) Final Design and Engineering. The design to restore the system removed the existing, undersized twin culverts and replaced them with an open channel and box culvert through the dune system. The design was successfully constructed and opened in the spring of 2010.

Peer Review of the Florida Bay Hydrodynamic and Salinity Model, Florida, South Florida Water Management District – Coastal Engineer

Served as an expert peer reviewer of the hydrodynamic modeling effort for the Florida Bay and Florida Keys Feasibility Study. The model is required to simulate circulation, salinity stratification and distribution, and water quality behavior in the Florida Bay and Reef Tract utilizing a standardized set of field data. Offered expert opinions based on knowledge, expertise, and practical experience in conducting, analyzing, and applying similar hydrodynamic modeling strategies. The peer review included assessment of the grid methods and optimization techniques to determine spatial density, scale, and distribution, the adequacy of calibration and verification, and the quality and extent of the input data and model parameters.

Analysis of Shoreline Change for Western Beach, Scarborough, ME, U.S. Army Corps of Engineers - Project Manager

Led the project that used a computer-based shoreline mapping methodology, within a Geographic Information System (GIS) framework, was used to compile and analyze changes in historical shoreline position between 1864 and 2003 for Western Beach, Saco Bay, Maine. The purpose of this task was to quantify changes in shoreline position for three (3) specific periods, (1864-1944, 1962-1977, and 1986-2003) using the most accurate data sources and compilation procedures available, and to characterize areas of erosion and accretion. This project's overall goal was to evaluate changes in the coastline of Western Beach due to significant modifications to the Scarborough River Inlet and entrance region. In addition to evaluating the shoreline change data, a projected shoreline was produced using the shoreline movement rates of the pre-1962 or pre-Scarborough River jetty construction time from 1864-1944. Using the rates prior to project construction, a projected shoreline position was estimated assuming no project had taken place and the rates continued to exist over the entire 139-year time span. The results indicated had the shoreline continued to erode at the same rates as seen from 1864-1944, the shoreline

Key Projects (continued)

would have retreated significantly on either end of Western each, while experiencing a slight advance in the center.

Beach Nourishment and Inlet Stabilization at Sandwich Town Beaches and Dredging the East End of the Cape Cod Canal, Sandwich, MA, Town of Sandwich - Project Manager/Coastal Engineer

Managed and performed comprehensive beach management plan for all Town of Sandwich beaches, including evaluation of the physical processes governing sediment transport, alternatives analysis for shore protection measures and inlet stabilization, and appropriate beach maintenance and usage. The project consisted of numerical modeling of alternatives and final design for establishing a long-term beach/dune restoration plan, as well as relocation and design of a jettied tidal inlet. Required excellent communication and close coordination with numerous agencies, local officials, sub-contractors, and multiple clients. The regulatory process is currently underway.

Waquoit Bay Yacht Club Revetment Repair, Waquoit, MA, Waquoit Bay Yacht Club - Project Manager and Coastal Engineer

Assessed and designed a repair to an existing revetment protecting the Waquoit Bay Yacht Club. Significant gaps in the toe of the structure had developed allowing for removal of the finer grain sediments from the core. In this region of revetment, which is most critical, there is significant washout of the backfill of the revetment. At Waquoit Bay Yacht Club, continued cavity formation and subsequent collapse of the existing revetment would present an immediate threat to the structural stability of the clubhouse. A wide range of alternatives were assessed and the preferred alternative was selected and designed that consisted of the installation of filter fabric behind the existing structure, the addition of a bedding and drainage stone layer behind the structure, the addition of a stormwater runoff trench at the crest of the existing structure, the addition of clean backfill material behind the structure as needed, and addition of compatible beach material in front of the structure planted with marsh species and encouraged to develop into salt marsh. Also provided construction oversight and permit compliance inspections.

Nonquitt Salt Marsh Restoration, South Dartmouth, MA, EA Engineering – Project Manager

Managed and performed a numerical circulation model directed at the restoration of the Nonquitt Salt marsh system. The project consisted of implementation of a field data collection program, development and calibration of a numerical circulation model (RMA-2), and the application of the calibrated model to determine the potential impact of design changes aimed at improving circulation. Working with the National Oceanic and Atmospheric Administration, and the U.S. Fish and Wildlife Service, the purpose of the study is to assess the effects of anthropogenic effects on the marsh ecosystem.

Numerical Modeling of Storm Surge Induced Hydrodynamics and Pollutant Transport, New Bedford, MA, Confidential Client - Project Manager/Coastal Engineer

Simulated the hydrodynamics and resulting pollutant transport due to the effects of a historical hurricane in the New Bedford Harbor Region, including the immense flooding of the upland due to the accompanying storm surge, and the release and transport of chemicals from a confidential entity. Through numerical modeling of this complex phenomena, hydrodynamic results, coupled with pollutant input data, pollutant mass rate, duration of release, and time of release, pollutants

Key Projects (continued)

were released from a single specific area to quantify the transport pathways and concentrations due to the storm surge caused by the hurricane. This project also requires expert testimony and technical analysis of wave energy, breaking, set-up, diffusivity, and mixing.

Thermal Modeling Analysis for Proposed Cooling Plant on Lake Waban, Wellesley College, Wellesley, MA, Vanasse Hangen Brustlin, Inc. - Project Manager

Performed thermal and analytical modeling of design alternatives for a proposed cooling water discharge plant on Lake Waban in Wellesley, MA. Two methods of analysis (analytical and computer model) were used to determine the mixing of temperature concentration, and the ability of the Lake to receive the discharged waters under peak demand (representing a worst-case scenario under August conditions). The purpose of this analysis was to simulate the mixing and dilution of the discharge waters with the ambient water of Lake Waban under worst-case conditions, discuss the results of the modeling effort, and provide recommendations related to potential design modifications.

Characterization Study of Delaware River Detritus, Hancock's Bridge, N.J., PSE&G, - Project Manager

Conducted an assessment of the ability of hydroacoustic technology to detect detrital material throughout the water column. Never utilized for this specific application, use of the innovative technology saved the client from other costly alternatives. Phase I of the study consisted of controlled laboratory testing in an enclosed basin and was performed with samples taken from the Delaware Bay Estuary. The results indicated that hydroacoustic technology could be utilized for identifying detritus within the Delaware Bay Estuary. Phase II of the study consisted of implementation of the hydroacoustic technology in the Delaware Bay Estuary. Field sampling also included Acoustic Doppler Current Profiler (ADCP) measurements, net captures, Conductivity Temperature Depth (CTD) casts, and Optical Backscatter Sensor (OBS) profiles. Responsible for project management, analysis and interpretation of the acoustic return signals, and reporting. Biomass estimates were determined from the measured currents and captured detrital material and compared to the integrated hydroacoustic signal. Future phases consist of detailed field measurements, 3-dimensional detrital transport modeling, and evaluation of mitigation oriented engineered solutions and management strategies.

3 Related Studies:

a) Environmental Studies Relative to Potential Sand Mining on the Continental Shelf for Beach Replenishment, Offshore Alabama, Alabama, U.S. Mineral Management Service.

b) Environmental Survey of Potential Sand Resource Sites: Offshore New Jersey, NJ, U.S. Mineral Management Service.

c) Collection of Environmental Data within Sand Resource Areas Offshore North Carolina and the Environmental Implications of Sand Removal for Coastal and Beach Restoration, North Carolina, U.S. Mineral Management Service - Coastal Engineer/Numerical Modeler

The following is a description of projects a, b, and c:

Key member of a vast multi-disciplinary team conducting large-scale studies to address environmental issues raised by the potential dredging of sand from the inner continental shelf offshore New Jersey, Alabama, and North Carolina. Quantified the potential modifications to waves that cross within identified borrow areas due to offshore dredging. Determined the impacts of offshore dredging and subsequent beach nourishment on local and regional sediment

Key Projects (continued)

transport patterns, coastal and nearshore sedimentary environments, and local shoreline processes. Performed state-of-the-art spectral wave modeling for assessing modifications to the wave field and input into nearshore circulation and offshore and nearshore sediment transport models. The results of the ongoing studies will enable Minerals Management Service to monitor Key Projects (continued) and assess the potential impacts of offshore dredging activities and to identify ways in which dredging operations can be conducted to minimize or preclude long-term adverse impacts to the environment.

Observations of Ocean Wave, Tide, and Current Processes Offshore of Little Bay, Montserrat, Montserrat, U.K., Mouchel Consulting, Ltd. - Project Manager/Coastal Engineer/Field Data Collection

Installation and monitoring of a real-time data acquisition system connected via a cable link to the shoreline in Little Bay, Island of Montserrat. Ocean wave, tide, and current data were collected and analyzed. Responsible for QA/QC of collected data. Observations from the one-year deployment will be utilized to develop and design a new harbor on the Island.

San Francisco Airport Expansion Project, San Francisco, CA, URS Corp. - Coastal Engineer

Served as a Team Engineer working on the preparation of an Environmental Impact Report/Environmental Statement (EIR/EIS) for the San Francisco Airport Expansion Project. WHG has deployed a suite of Sediment Transport Monitoring Systems (STMS) to collect seasonal current, wave, and suspended sediment concentration measurements in each of the Bay's characteristic environments. Responsible for analysis and interpretation of hydrodynamic and sediment dynamic measurements, estimation of sediment flux, modeling of sediment transport, and report generation.

Physical Sampling and Sediment Transport Analysis at Weymouth Neck, Weymouth, MA, Massachusetts DEP - Project Manager/Coastal Engineer

In this region, concerns have been raised that the metals (arsenic, copper, lead, and zinc) found in upland areas may have migrated into the sub-tidal area surrounding the peninsula. As a precursor to the chemical sampling, developed an analytical sediment transport model that was geared towards assisting in defining appropriate areas to perform sub-tidal chemical sampling. The model required a field investigation in order to determine the physical characteristics of the sub-tidal sediment within the Weymouth Neck region (including Upper Neck Cove, Lower Neck Cove, and Weymouth Back River), as well as generation of local physical processes (winds, waves, tides, and currents) in the vicinity of Weymouth Neck Peninsula. The analytical model was used to identify areas of erosion and deposition in the sub-tidal regions surrounding the peninsula. The results of the model are used as a tool to assess, justify, and bound the chemical sampling locations around the peninsula.

Evaluation of the Great Creek Outlet Structure, Milford, CT., Fuss & O'Neill, Inc. - Project Manager/Coastal Engineer

In an ongoing project, provided coastal processes analysis, analytical modeling, outlet structure assessment, and design support services for evaluating the impact of an outlet structure on downdrift erosion. Engineering alternatives are being evaluated through sediment transport analytical modeling to determine potential mitigation measures. Wave transformation modeling and sediment transport modeling are focused to assess the parameters of the outlet structure (e.g.,

Key Projects (continued)

height, length, culvert depth, etc.) and provide design guidance for corrective action and potential nourishment.

Hydrodynamic Modeling and Sediment Transport Analysis During Temporary Tunnel Storage in Fort Point Channel, Boston, MA, Gannett Fleming, Inc. - Coastal Engineer/Project Manager

Conducted a hydrodynamic and sediment transport modeling study of Fort Point Channel, MA to determine the impact caused by temporary storage of floating tunnel sections on existing conditions and industrial water usage. Completed technical report presenting the hydrodynamic and potential sediment transport results, which was utilized to assist in engineering methodology and design.

Analysis and Design of Revetment Structures at Hingham Shipyard, Hingham, MA, Sea Chain, L.L.C. - Coastal Engineer

Completed a fast-track study and design of revetment structures at Hingham Shipyard on Weymouth Back River. The study focused on analyzing the relevant coastal processes, and optimizing the design to gain the most upland area, while minimizing adverse impacts to the nearby salt marsh and other nearshore wetland resource areas. Analysis for the design included wave modeling, storm surge analysis, extremal analysis, wave reflection analysis, wave runup and overtopping analysis, revetment design and stone sizing, and sediment transport analysis.

Power Plant Effluent Mixing Zone, FL, Confidential Client - Coastal Engineer

Project Engineer involved in the investigation of the discharge from a once-through cooling system at a coastal power plant. The cooling water effluent at this station was found to have seasonally low dissolved oxygen. Woods Hole Group's investigation sought to identify the source of the dissolved oxygen depression, investigate regulatory issues, and to examine potential technologies for increasing effluent dissolved oxygen. Specifically, performed numerical particle tracking simulations in order to identify water pathways to the intakes. Additionally, a review of existing data and previous work was conducted. This revealed that the seasonally low dissolved oxygen was a widespread phenomenon in ambient waters. Because the station was not responsible for the overall dissolved oxygen depression, a mixing zone was identified as a potential regulatory solution to any minor impacts from the discharge. Engineering alternatives to raise the effluent's oxygen content were also investigated.

Particle Tracking Analysis and Improvements to the Near-Field Boundary Condition, Hancock's Bridge, NJ, Public Service Electric and Gas Company - Coastal Engineer

Completed a numerically driven particle tracking study for the Delaware Bay and estuary system to identify detrimental sources of detritus within the system. The particle tracking model, utilized in concert with a validated hydrodynamic model, was utilized to statistically evaluate near- and far-field impacts to a cooling water intake. Recommendations were provided to improve management and recycling practices, as well as provide future steps for numerical modeling of appropriate engineered solutions, which would result in safer and more cost-effective operations.

Ocean Currents Offshore Eastern Trinidad, Trinidad, Amoco Production Company - Coastal Engineer

Developed and performed in-depth data analysis of ocean conditions off the eastern coast of Trinidad based on data collected during recent measurement programs in the area. Observations

Key Projects (continued)

were utilized to investigate coastal ocean processes active at the site and extrapolate the observations to predict future extremal and operational conditions. Conducted a detailed literature review, assessed the structure and variability of the observed currents, separated the current into specific process components using advanced numerical analysis techniques, formulated an extremal value analysis, and completed technical writing of a final report. Results of the study provided recommendations for design criteria and operational procedures.

Historical Shoreline Change Analysis: Western Town Line to Horton Point, Southold, NY, Town of Southold - Coastal Engineer

Conducted an assessment of the history of storm activity in Long Island Sound. Wind and tide records were analyzed and Generalized Extremal Value (GEV) calculations were completed to determine the historical behavior and return periods of major storm events. Results of the analysis were correlated to historical shoreline change and incorporated to determine the rate and extent of erosion and accretion along the Southold coastline.

Tidal Current Characteristics of St. Lucie Inlet, St. Lucie, FL, Coastal Technologies Corporation - Coastal Engineer

Performed data analysis of observations of tidal currents in the St. Lucie Inlet to map the temporal variation in the spatial structure of flow through several Inlet cross-sections. These high-resolution measurements of tidal current velocities were obtained using a vessel-mounted Acoustic Doppler Current Profiler (ADCP) coupled with a GPS-based integrated navigation (IN) system. Results of the surveys show current energy focused in the deeper southern and center channels of the Inlet. The south channel was characterized as 'flood dominant', with stronger flood currents than ebb currents, which tend to transport sediments into the Inlet interior. The center channel was characterized as 'ebb dominant', with stronger ebb currents than flood currents, tending to move sediments out of the Inlet to form an ebb tide shoal. The geometry of the waterway, hard structures, and the alongshore coastal currents appeared to modify the spatial structure of the tidal currents through the Inlet cross section.

Coastal Flood Protection Structure Evaluation, Chatham, MA, Coastal Engineering, Inc. – Coastal Engineer

Completed an independent review of an existing coastal revetment in Chatham, MA to determine structural integrity related to wave forces. The existing stone revetment structure was evaluated to ensure that adequate design, construction, and maintenance have been undertaken to provide reasonable assurance that the structure can provide durable protection during the 100-yr (base) flood. The analysis included development of the physical parameters that represent the 100-yr flooding event and then evaluated the structural design against the 100-yr flooding physical parameters, including toe protection, backfill protection, pressure distribution and wave forces, structural stability at the minimum and critical water levels, material adequacy, etc.

Publications and Presentations

25

Other

NOAA Planning for Sea Level Rise in the Northeast: Considerations for the Implementation of Tidal Wetland Habitat Restoration Projects – Steering Committee Member.

Qualifications Summary

- More than 6 years of diverse professional experience in the fields of coastal sciences and engineering, numerical modeling, project management, field collection programs, sediment transport, and littoral processes
- Background in coastal engineering relating to the application numerical modeling to beach profile change.
- Additional background in environmental engineering including fluid mechanics, chemistry, ecology, decision analysis, and water resources and treatment.
- Numerical model experience with STWAVE, RMA2, SBEACH, CORMIX, CSHORE, GENESIS, HEC-RAS, ACES, DYNLET, EXTRM2, and CHAMP
- Proficient with MATLAB, ArcGIS, and SMS.
- Implementing and managing environmental monitoring and field sampling programs.
- Survey data acquisition, processing and interpretation (both bathymetric and terrestrial) using HYPACK and Trimble software packages
- Strong written and verbal communication skills

MITCHELL A. BUCK, M.C.E., B.S., P.E.

Coastal Engineer

Fields of Expertise

Developing and implementing a wide range of field data collection programs, analysis of collected data, and the application of the results within numerical models for coastal management and design projects. Typical projects include elements of coastal structure design, beach nourishment, sediment transport, inlet stability, water quality, tidal marsh restoration, and dredging. Extensive experience utilizing software packages and programming languages to present, analyze, and solve engineering and scientific problems. Collecting terrestrial and bathymetric data with surveying equipment including RTK GPS, total stations, and echosounders. Proficient with oceanographic instrumentation including tide gauges, ADCPs, and CTDs. Utilization of GIS and other geospatial software packages. Developing and implementing environmental monitoring programs that include the collection of sediment, surface water, groundwater, and biological samples.

Higher Education

M.C.E. Civil Engineering-University of Delaware (2007)
B.S. Environmental Engineering-Johns Hopkins University (2005)

Employment History

2007-Present Coastal Engineer, Woods Hole Group
2005-2007 University of Delaware (Teaching and Research Assistant)

Professional Licensing

P.E., Professional Engineer, Massachusetts License #51147

Certificates of Training

OSHA HAZWOPER Site Supervisor
The Complete Ground-water Sampling Field Course
First Aid & CPR Certified
SCUBA Certified

Key Projects

Bay View Pond Tidal Restoration Project, West Yarmouth, MA – Project Manager

The Bay View Pond system includes a pond and tidal marsh that is subject to poor drainage and limited tidal exchange with Lewis Bay due to inlet shoaling and clogging of the culvert. Designed and implemented a field data collection program, and then utilized data with an analytical hydrodynamic model to evaluate the system and potential alternatives for restoring the system. The field data collection program included the collection of topographic and bathymetric data in addition to the deployment of three tide gauges to define the tidal regime throughout the system. Used this data within an analytical hydrodynamic model to calculate the amount of tidal prism restoration for each alternative. Estimated sediment transport rates along the beach in order to perform inlet stability calculations. Evaluated alternatives based upon the amount of tidal prism restored to the pond and the stability of the inlet.

Bucks Harbor Former Air Force Radar Tracking Station and Former Ground/Air/Transmitter/Receiver Site, Machiasport, Maine – Project Manager

The site is a former Air Force Radar Tracking Station and Ground/Air/Transmitter/Receiver site that has Volatile Organic Compounds (VOCs) contamination in the groundwater. The Woods Hole Group currently monitors for Volatile Organic Compounds (VOCs) contamination in both monitoring and drinking water wells for the U.S. Army Corp of Engineers (USACE) since 2010. In 2012, the USACE optimized the monitoring program based on Woods Hole Group recommendations and analysis. In addition, Woods Hole Group oversaw the installation of Water FLUTE Systems in several wells for allowing for discrete sampling from specific zones and isolating fractures in the borehole. Drafted the Sampling and Health and Safety Plan (HASP) documents. Lead the field team in tasks including monitoring well sampling, pore water sampling, and residential water sampling. Analyzed data and wrote reports and notifications letters for landowners. Laboratory VOC results were built into the historical USACE database using ADR software.

Silver Sands, Milford, CT –Engineer/Modeler

Performed a coastal engineering assessment of Great Creek outlet (flow control structure/tide gate) at Silver Sands State Park in Milford, Connecticut that included coastal processes assessment, water level data collection, wave transformation modeling, and sediment transport modeling. Lead the field effort in deploying tides gauges in the creek and Long Island Sound to characterize water levels over a full lunar cycle. Developed a wave simulation model using STWAVE to generate a local wave climate to assess the erosive conditions of the beach. Wave model input was based on historical wind and wave data, tide data from instruments, and bathymetric data from published data sources. Wave simulation was used to development sediment transport conditions for the beach and perform an inlet stability analysis to assess the feasibility of proposed alternatives for the outlet structure.

Key Projects (continued)

Glenburn Former Ground to Air Transmitter Site, Glenburn, Maine – Project Manager

The site is a former Air Force Ground to Air Transmitter site that has Volatile Organic Compounds (VOCs) contamination in the groundwater. The Woods Hole Group currently monitors for Volatile Organic Compounds (VOCs) contamination in both monitoring and drinking water wells for the U.S. Army Corp of Engineers (USACE) since 2010. Drafted the Sampling and Analysis Plan (SAP) as well as the Health and Safety Plan (HASP) documents for the biannual groundwater and residential water-monitoring program in conjunction with U.S. Army Corps of Engineers. Lead the field team in tasks including monitoring well sampling, pore water sampling, and residential water sampling. In addition, electronic water level loggers deployed in wells were maintained and the data downloaded. Analyzed data and wrote reports and notifications letters for landowners. Laboratory VOC results were built into the historical USACE database using ADR software.

Stony Brook, Brewster, Massachusetts – Lead Engineer

Conducted a post-construction hydraulic study of the Stony Brook Marsh system intended to evaluate the effects of the culvert replacement to restore tidal flow to the salt marsh on the south side (upstream) of Route 6A. Lead the field effort in collecting elevation data using real-time kinematic (RTK) GPS surveying techniques and deploying six tides gauges at various locations in the marsh system to characterize water levels over a full lunar cycle. Processed and analyzed the collected data and compared with the pre-construction water level data collected in 2007. The results showed that the tidal dampening caused by the old culvert has been successfully mitigated as the tidal amplitude increased upstream of the culvert while the phase lag between the upstream and downstream locations was reduced.

Lake Wequaquet, Barnstable, Massachusetts - Engineer

Lake Wequaquet experiences seasonal eutrophic conditions due to excessive nutrient loadings to the lake. Lead the field effort to collect shallow groundwater samples along the shoreline using shallow piezometers to determine phosphorus and nitrogen loading from groundwater to the lake. Sampling was performed on a seasonal basis to determine seasonal variation in groundwater nutrient loading. Analyzed data to determine where and when excessive nutrient loading was occurring and compared against other sources such as rain and background levels. The results of the data collection effort were used to estimate the groundwater discharge of phosphorus to the lake, which would be used in the context of developing a management for the lake.

Restoration of Bride Brook Marsh System, East Lyme, Connecticut - Engineer

Assisted in a data collection program to assess potential restoration of a tidal salt marsh located in Rocky Neck State Park by improving an existing culvert controlling flow into the marsh. Tide data was collected via Seabird instruments deployed for a 30 day period to record conductivity, temperature, density and pressure to assess tidal conditions to assess the tidal conditions. Tide data was used to drive a hydrodynamic model DYNLET to understand the existing conditions within the tidal marsh and assess alternatives.

Key Projects (continued)

Sengekontacket Pond ENF/EIR, Town of Edgartown, Massachusetts – Engineer/Modeler

Developed a wave simulation model using STWAVE to generate a local wave climate to assess the erosive conditions of the beach at Sengekontacket for the town of Edgartown. Wave model input was based on historical wind data, tide data from instruments, and bathymetric data from published data sources. Wave simulation was used to development sediment transport conditions for the beach to understand the erosion taking place.

Dilution of Marafiq IWWTP Discharge to Red Sea, Al Farsh, Saudi Arabia – Engineer/Modeler

Assessed the feasibility of increasing the discharge volume and contaminant concentration for the Industrial Wastewater Treatment Plant (IWWTP) discharge into the Red Sea for the Power & Water Utility Company of Jubail & Yanbu (Marafiq). Concerns of negative water quality impacts. Data collected from previous studies were used to determine the necessary mixing zone sizes that would be required to meet the regulatory criteria. Implemented the plume model CORMIX to simulate plume characteristics both in a discharge canal and the surrounding waters.

Publications and Presentations

Buck, M., Kobayashi, N.K., Payo, A., and B.D. Johnson. “Berm and dune erosion during a storm.” CACR-07-03, Center for Applied Coastal Research, University of Delaware, Newark, Delaware.

Buck, M., Kobayashi, N.K., Payo, A., and B.D. Johnson. 2008. “Berm and Dune Erosion.” International Conference on Coastal Engineering 2008”, Hamburg, Germany.

Qualifications Summary

- Over 25 years of experience in multi-jurisdictional environmental studies
- Specializes in environmental studies of coastal and marine projects, including resource and existing conditions surveys, impact analyses, flood zone mapping, and mitigation/restoration planning for climate change
- Experience with field data collection of sediments, water, plants, fish, and benthic infauna for environmental studies, and with laboratory services required to analyze such samples
- Skilled at utilizing GIS and database technology to display and analyze spatially related data for coastal and marine projects
- Extensive experience with local, state, and federal permitting of coastal projects
- Strong written, communication, and organizational skills, including expert testimony

M. LESLIE FIELDS, CFM, M.S., B.S.

Coastal Geologist/Marine Environmental Analyst

Professional Affiliations

Association of State Floodplain Mangers (2014)
Marine Outreach Guidance Group, Woods Hole Oceanographic Institution Sea Grant Program (June 1999 – present)
Member Falmouth Conservation Commission (1990 – 1997)

Fields of Expertise

Shoreline change analyses, coastal hazard evaluation, GIS development, environmental impact analyses, coastal wetland delineation, sediment transport analyses, tidal inlet hydrodynamics, nearshore wave propagation analyses, storm surge analyses, and permitting (local, state, and federal).

Higher Education

M.S. Coastal Geology-Rutgers University (1984)
B.S. Geology-Southern Methodist University (1981)

Employment History

1989-Present Woods Hole Group, Inc.
2003-2004 Massachusetts Coastal Zone Management
1984-1989 U.S. Army Corps of Engineers, CERC
1981-1984 Rutgers University
1980-1981 Sun Energy and Development Co.

Key Projects

Technical Evaluation of Preliminary 2013 FEMA FIRMs for the Towns of Scituate, Marshfield, and Duxbury, MA – Project Manager

Managed projects for the Towns of Scituate, Marshfield, and Duxbury to perform coastal hydrologic and hydraulic evaluations of preliminary FEMA FIRMs released in May 2013. The work included assessment of 100-yr stillwater elevations, offshore wave conditions, and wave setup criterion utilized by FEMA in the coastal modeling. Woods Hole Group worked with the communities to select specific transects for detailed evaluation using FEMA’s models and methods for erosion, PFD delineation, overland wave transformation, wave runup, and overtopping. Results from the analyses were used to update the flood zone and BFE mapping shown on the preliminary FIRMs. The work was

Key Projects (continued)

performed on an accelerated schedule and resulted in an appeal to FEMA for revisions to the FIRMs. The appeal is currently under review by FEMA.

Technical Evaluation of Preliminary 2013 FEMA FIRMs for areas in Barnstable County, MA – Project Manager

Managed three (3) separate projects in Barnstable County to perform coastal hydrologic and hydraulic evaluations of preliminary FEMA FIRMs released in May 2013. The work included sites in the Towns of Chatham, Barnstable, and Falmouth. Elevations for the 100-yr stillwater conditions, offshore wave conditions, and wave setup criterion utilized by FEMA in the coastal modeling were evaluated. FEMA's models and methods for erosion, PFD delineation, overland wave transformation, wave runup, and overtopping were used to assess the 100-yr flood conditions at each site. Results from the analyses indicated that an appeal of the preliminary FIRMs was warranted for the Chatham site, but not for the sites in Barnstable or Falmouth. An appeal was filed with FEMA by the necessary deadline showing revisions to the flood zone and BFE mapping in Chatham. Upon review, the appeal was accepted by FEMA and the map revisions will be reflected in the effective maps when they are released.

Risk and Vulnerability Assessment for the Martha's Vineyard Hospital, Oak Bluffs, MA; Board of Trustees MV Hospital and MV Commission - Project Manager/Floodplain Analyst

Managed and conducted an extensive risk and vulnerability assessment for reconstruction of the Martha's Vineyard Hospital. The analysis considered risks of the existing hospital site to various natural hazards including storm surge, flooding, wind, snowfall, wildfire, coastal erosion, sea-level rise, and earthquakes. Vulnerability of the site and impacts to critical hospital services were considered. Results from the risk and vulnerability analysis were used to provide recommendations for reconstruction of the hospital facilities.

Town of Palm Beach Technical Review of Proposed Coastal Management Program; Town of Palm Beach – Coastal Geologist

Worked on the WHG team to conduct a technical review of the Palm Beach CCMP. Reviewed a broad range of reference documents and data describing the history of coastal management and coastal processes at Palm Beach. Developed island-wide recommendations for inlet management, evaluation of beach nourishment project performance and feeder beach strategies, sand source alternatives, maintenance of coastal structures, and protection of hardbottom resources. A selection of shore protection alternatives were also evaluated in terms of performance and value to help formulate recommendations for improved coastal management.

Investigation of Upland, Beneficial Reuse, and Sediment Dewatering Sites for Dredged Materials Management in Long Island Sound; US Army Corps of Engineers – Environmental Scientist

Conducted investigations at 104 upland, beneficial reuse, and sediment dewatering sites for potential dredged materials management in the Long Island Sound area. Site summaries provided information on general location, ownership, surrounding land use, zoning, wetland resources, proximity to habitat for rare and endangered species, sediment type, site access, and staging areas. Conceptual engineering designs were evaluated and site capacities were determined.

Key Projects (continued)

Management of the New Bedford Harbor Superfund Site Environmental Management Information System; US Army Corps of Engineers – Project Manager

Served as project manager for the New Bedford Harbor superfund site information system containing environmental measurements and geographic information generated for contaminant identification, delineation, and regulatory compliance during the Corps remediation activities. The information management system incorporates an Oracle environmental database, a web-based front-end that provides data access for project team members, and data management methods and procedures for quality assurance and data validation. The database holds over 300,000 analytical, biological, toxicological, and geotechnical results generated by a team of field and laboratory contractors.

Comprehensive 10-Yr Permitting for Town of Falmouth Dredging and Beach Nourishment Projects; Town of Falmouth – Project Manager

Managed a project for the Town of Falmouth Harbormaster and Department of Public Works offices to secure comprehensive 10-yr permits for dredging and beach nourishment throughout the town. The purpose of the project was to consolidate and manage environmental permits for 25 dredging and beach nourishment sites associated with maintenance of the Town's waterways, harbors, salt ponds, and public beaches. The work involved sediment sampling and analyses, wetland delineation, impact analyses, plan preparation, and permitting. Applications were secured from the appropriate local, state, and federal agencies.

Coordination, Design, and Permitting for the Vineyard Haven Harbor Dredging and Beach Nourishment Project; Town of Tisbury- Project Manager/Coastal Scientist

Coordinated, designed, and permitted a dredging and beneficial reuse beach restoration project in Vineyard Haven Harbor, Martha's Vineyard. Shoaling at the western entrance to Vineyard Haven Harbor created problems for navigation and threatened water quality in the Inner Harbor. Sandy dredge material was permitted for restoration of critically eroded beaches. Work on the project included preparation and filing for the full range of environmental permits from local, state, and federal agencies.

Evaluation of Beach Replenishment Alternatives for Narragansett Beach, Rhode Island; Town of Narragansett – Project Manager/Coastal Scientist

Managed a project to evaluate a range of alternatives for beach replenishment at Narragansett Town Beach. Erosion of the beach has historically been managed by trucking in small quantities of sand immediately prior to the summer beach season. The Town was interested in identifying longer-term solutions that would enhance the recreational resource and provide improved storm damage protection. This project evaluated quantities of sand needed for various beach nourishment scenarios involving different berm widths, elevations, nearshore slopes, and beach lengths. Levels of storm protection and project performance were evaluated. Potential sand sources and associated construction costs were also identified, and permitting requirements were addressed.

Key Projects (continued)

Development of a Plan to Address Beach Erosion at Chapin Beach, Dennis, MA; Town of Dennis – Coastal Geologist

Worked to develop a plan addressing long-term erosion at the Town of Dennis public beach area known as Chapin Beach. Concern over high erosion rates along the barrier beach prompted the Town to commission a study of causes and potential remedial actions. The work involved mapping of critical resources, analysis of historical shoreline change, investigation of site specific erosion processes, as well as an analysis of alternatives for mitigating the erosion. Planning level cost estimates and regulatory requirements for a series of recommended solutions were identified.

Preparation of a Waterways Asset and Resources Master Plan for Dredging and Beach Nourishment for the Town of Dennis, MA; Town of Dennis – Project Manager/Coastal Scientist

Documented existing conditions and management practices at the four waterways and eight primary public beach sites within the Town of Dennis. The project resulted in a master plan for dredging activities in the waterways, as well as associated beach nourishment to restore the public coastal resources. Available information from town records and permit documents was used to evaluate dredging needs and environmental resources in the different waterways. The beach sites were evaluated using a combination of information from town records, permit documents, State and Federal agencies, and survey data collected specifically for this study. Recommendations were developed and prioritized for improved management of the Towns waterways and beach resources.

Beach Management Plan for Town of Falmouth Public Beaches; Office of the Town Manager and Falmouth Beach Committee - Project Manager/Coastal Scientist

Managed and prepared a comprehensive Beach Management Plan for 10 public beaches in the Town of Falmouth. The project involved collection of beach profile data, sediment analyses, resource area delineations, and infrastructure assessments. Dominant coastal processes, directions of sediment transport, historical shoreline change, and history of human alterations were all addressed. Recommended management activities were provided for infrastructure maintenance, beach monitoring, routine maintenance, restoration activities, education, enforcement, and fund raising. Results from the Beach Key Projects Management Plan were used to file for and secure a local permit from the Falmouth Conservation Commission for a number of the recommended management activities.

Coordination, Design, and Permitting for the Menauhant Beach and Dune Restoration Project, East Falmouth, MA; Town of Falmouth - Project Manager/Regulatory Specialist

Coordinated, designed, and permitted a beneficial reuse dune and beach restoration project at Menauhant Beach in East Falmouth. Through extensive interagency coordination and cooperation, the Town of Falmouth was able to secure sand from a nearby dredging project that created a deepwater port in Great Harbor Woods Hole for a new NOAA research vessel. Dredged sand was dumped at a temporary, nearshore rehandling site offshore of Menauhant Beach, and then hydraulically pumped to Menauhant public beach to form a protective dune. The project required the full range of environmental permits from local, state, and federal agencies. Coordination

Key Projects (continued)

between local Town of Falmouth representatives, DEP regulatory officials, the Barnstable County Dredge office, NOAA, and USACE project managers was required to construct this beneficial reuse project.

Environmental Impact and Risk Assessments for Proposed Natural Gas Pipelines Offshore of Trinidad and Tobago; National Gas Company of Trinidad and Tobago Limited - Project Manager/Environmental Analyst

Managed a large-scale environmental impact and risk assessment project for two proposed natural gas pipelines offshore of Trinidad and Tobago. The work involved extensive field data collection and laboratory analysis of oceanographic, coastal, and terrestrial data. Detailed descriptions of the projects were provided along with alternatives analyses, existing conditions reports, and environmental impact analyses. Recommendations were provided to the project applicant and the regulatory agencies of Trinidad and Tobago for minimizing adverse impacts and for long-term monitoring.

Analysis of Historical Shoreline Change and Management Alternatives for Nauset Beach, Orleans, MA; Orleans Parks and Beaches Department - Project Manager/GIS Analyst

Managed and performed a comprehensive analysis of shoreline change and management alternatives for Town of Orleans public beach areas located on Nauset Beach. The project involved a quantitative analysis of historical shoreline change using ArcGIS, as well as an analysis of barrier breaching and inlet formation. Results from the study were utilized to develop recommendations for short- and long-term management of the public beach facilities and the extensive off-road vehicle trails and barrier spit to the south.

Design, Environmental Impact Analysis and Permitting for Chapoquoit Beach Replenishment, West Falmouth, MA; Chapoquoit Associates - Project Manager/Coastal Geologist

Managed a large private/public partnership project to replenish eroding beaches along the Chapoquoit Beach section of West Falmouth, MA using sand dredged from the Cape Cod Canal by the US Army Corps of Engineers. The project involved detailed design computations for the replenishment, as well as wave and sediment transport modeling to evaluate spreading and potential impacts of the project. Extensive project management was required to facilitate permitting on a fast track basis and to coordinate construction with the USACE's schedule.

Design, Environmental Impact Analysis, and Permitting for the Centerville River Dredging Project, Centerville, MA; Town of Barnstable - Project Manager/Coastal Geologist

Managed a large-scale municipal project to dredge the Centerville River for the purposes of improving navigation. This project involved extensive field investigations of the physical environment, biology, wetland resources, and sediments within the river. The nature of the sediments required identification of two types of reuse sites for the dredged material. The design included beach replenishment at the adjacent barrier beach for the sand sized material, and a variety of upland reuse sites for the fine-grained sediments. The project required the full range of environmental permits from local, state, and federal agencies.

Key Projects (continued)

Design, Environmental Impact Analysis, and Permitting for the Mashpee River Dredging Project, Mashpee, MA; Town of Mashpee - Project Manager/Coastal Geologist

Managed a large-scale municipal project to dredge the Mashpee River for the purposes of improving navigation. This project involved extensive field investigations of the physical environment, biology, wetland resources, and sediments within the river. A detailed alternatives analysis was performed to identify potential dewatering and beneficial reuse sites. The fine-grained nature of the proposed dredge sediments coupled with the lack of nearby staging sites for dewatering and storage has presented a number of unique and difficult challenges to this project. The WHG is currently working with the Town of Mashpee to identify and scope several alternative technologies for dredging and dewatering the sediments.

Federal Emergency Management Agency (FEMA) Flood Insurance Restudy for the Town of Hampton, NH, FEMA - Project Manager/Coastal Geologist

Performed and managed a Flood Insurance Restudy (FIS) for the Town of Hampton, NH. This project involved updating the FEMA Flood Insurance Rate Maps (FIRM) for the Town of Hampton by re-establishing the flood zone boundaries. Numerical models were utilized to simulate nearshore wave transformation and wave runup, and were combined with estimates of erosion potential to determine the location of the flood zones. The FIRMs were updated using quantitative information on waves, wave runup, and flooding, and were graphically displayed using GIS techniques.

Assessment of Sand Resources in Northern and Central San Francisco Bay, CA; Hanson Aggregates - GIS Analyst

Worked with a team of WHG professionals to assess sand resources in Northern and Central San Francisco Bay, and to evaluate Hanson Aggregate and RMC leased sand borrow regions to determine their viability as a renewable sand resource. The work was accomplished using available hydrodynamic, geophysical, sediment, and geological data as well as digital terrain modeling tools available with the GIS software ArcInfo. Historical changes in bottom topography were evaluated using an acoustic survey of the bedrock surface, coupled with NOS bathymetric surveys and a high resolution multibeam survey collected by the USGS. Isopach maps showing changes in sediment thickness were generated and used to compute variations in sediment volume within specified borrow sites.

Historical Shoreline Change Analysis: Western Town Line to Horton Point, Southold, NY, Town of Southold - Project Manager/Coastal Geologist

Managed and performed a comprehensive historical analysis of a 10-mile segment of shoreline within the western portion of the Town of Southold, NY. The analysis was performed using historical T-sheets, traditional aerial photography, and low-altitude, high-resolution digital photography. Rates of shoreline change were computed at 100-ft intervals throughout the study area. The impacts of shoreline protection structures and storms on the historical rates of shoreline change were evaluated. Estimates of longshore sediment transport rates were obtained from the shoreline data.

Key Projects (continued)

Beach Nourishment Design, Permitting, and Oversight at Long Beach, Centerville, MA, Long Beach Association, Inc. - Project Manager/Coastal Geologist

A beach nourishment project was designed and permitted at Long Beach, Centerville, MA to alleviate long-term erosion of the shoreline and to provide improved storm damage protection and flood control. The beach was designed with a berm elevation of +9 ft MLW and a width of 100 ft. Sediment was dredged from shoals seaward of the East Bay tidal inlet, and hydraulically pumped to Long Beach. Approximately 2,100 ft of beach was nourished with 60,000 cubic yards of clean, compatible sand. This was a multi-disciplinary project involving analysis of coastal processes, environmental sensitivity, coordination with regulatory officials and marine contractors, and management of project funds.

Federal Emergency Management Agency (FEMA) Flood Insurance Restudy for the Town of Greenwich, CT, FEMA - Project Manager/Coastal Geologist

Performed and managed a Flood Insurance Restudy (FIS) for the Town of Greenwich, CT. This project involved updating the FEMA Flood Insurance Rate Maps (FIRM) for the Town of Greenwich by adding the effects of wave runup to the designation of flood zone boundaries. Numerical models were utilized to simulate nearshore wave transformation and wave runup, and combined with estimates of erosion potential to determine the location of flood zones. The FIRMs were updated using quantitative information on waves, wave runup, and flooding, and were graphically displayed using GIS techniques.

Sediment Transport Study - Evaluation of Causeway on Coastal Processes, Westport, MA, Massachusetts Department of Environmental Management - Coastal Geologist

Team member involved in a comprehensive evaluation of regional sediment transport processes along Horseneck Beach, Gooseberry Neck, East Horseneck Beach, and Little Beach in the Towns of Westport and Dartmouth, MA. Sediment transport patterns and alternatives for beach stabilization were evaluated along with various management and engineering alternatives for the causeway connecting Gooseberry Neck to the mainland. The historical evolution of the coastal system was evaluated, and an analysis of shoreline change was performed using historical maps and aerial photography. A combination of field data and numerical modeling was used to provide a detailed evaluation of the littoral processes. Nearshore wave transformation was modeled to provide the necessary data to drive the longshore sediment transport model. Cross-shore sediment transport was also modeled and combined with the longshore sediment transport model results to provide an estimate of the net annual longshore sediment transport.

Technical Reports

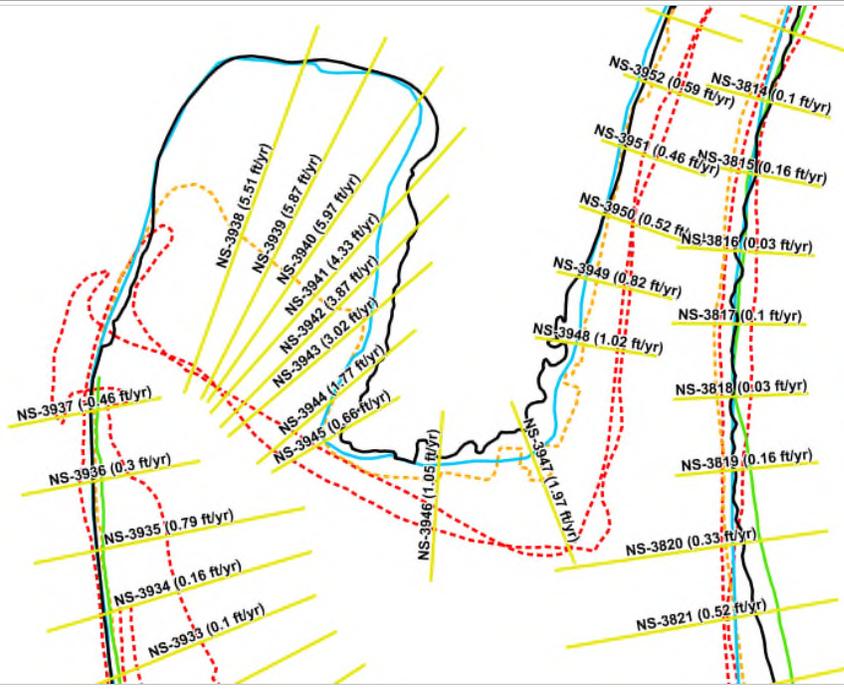
54

Publications and Presentations

11

**ATTACHMENT 3: COUGHLIN PARK – HISTORICAL SHORELINE
CHANGE FROM 1844-2009**

Coughlin Park - Historical Shoreline Change from 1844 - 2009



Shoreline Change Transects

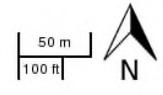
High Water Shorelines (1800s-2009)

- 1844 - 1897
- 1909 - 1938
- 1943 - 1969
- 1970 - 1982
- 1994
- 2000
- 2001
- 2007 - 2009

Massachusetts Municipal Boundaries

- Towns
- Interstate
- Coast

Geographic Place Names - Hypsographic Features



ATTACHMENT 4: HURRICANE INUNDATION MAP

Attachments: Hurricane Inundation Map

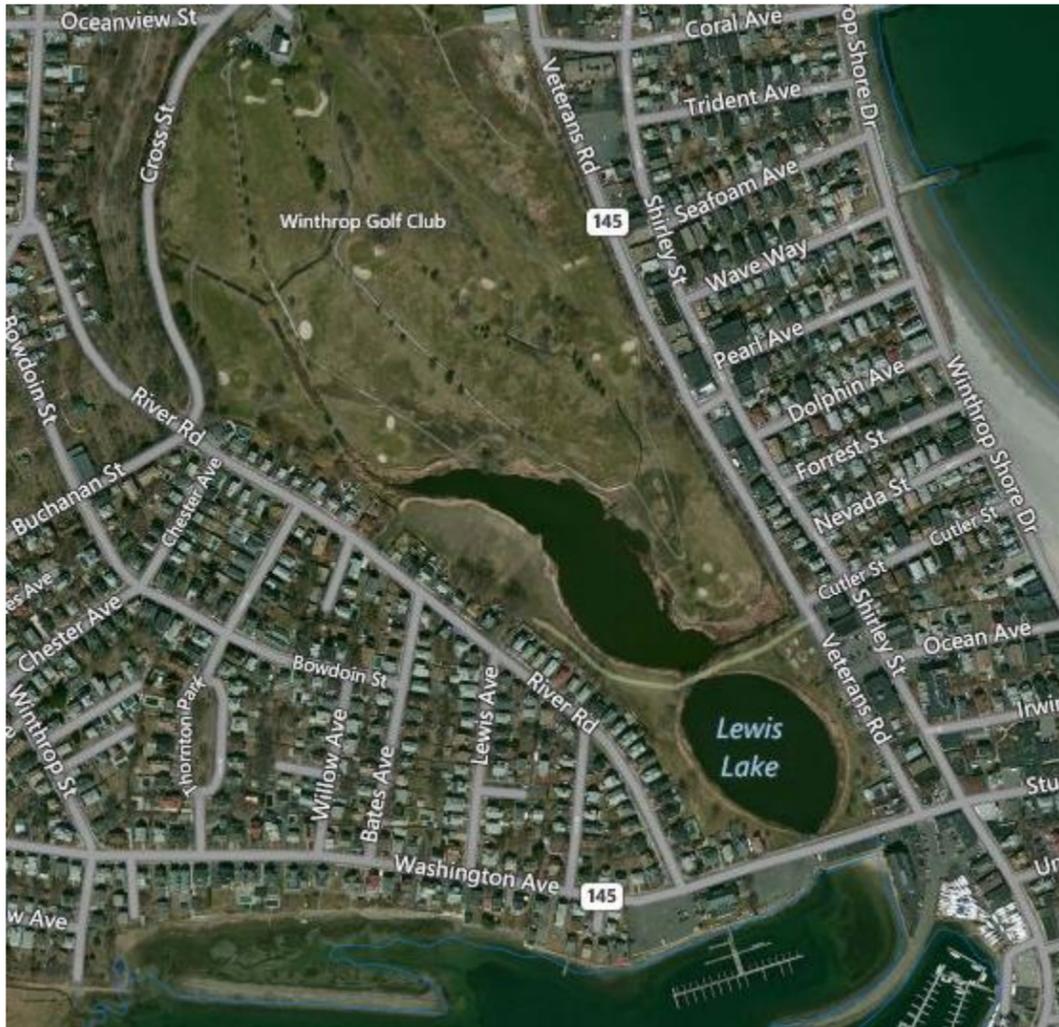


Figure 1: Winthrop Basemap (Data from MassGIS MORIS Maps)



Figure 2: Map of Winthrop with Hurricane Surge Inundation Scenarios (Data from MassGIS MORIS Maps)

Legend for Hurricane Surge Inundation Scenarios

- Category 1
- Category 2
- Category 3
- Category 4

ATTACHMENT 5: NFIP FLOOD INSURANCE RATE MAP

NOTES TO USERS

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size. The community map repository should be consulted for possible updated or additional flood hazard information.

To obtain more detailed information in areas where **Base Flood Elevations (BFEs)** and/or **floodways** have been determined, users are encouraged to consult the **Flood Profiles and Floodway Data** and/or **Summary of Stillwater Elevations** tables contained within the **Flood Insurance Study (FIS)** Report that accompanies this FIRM. Users should be aware that BFEs shown on the FIRM represent rounded whole-foot elevations. These BFEs are intended for flood insurance rating purposes only and should not be used as the sole source of flood elevation information. Accordingly, flood elevation data presented in the FIS Report should be utilized in conjunction with the FIRM for purposes of construction and/or floodplain management.

Coastal Base Flood Elevations shown on this map apply only landward of 0.0 North American Vertical Datum of 1988 (NAVD 88). Users of this FIRM should be aware that coastal flood elevations are also provided in the **Summary of Stillwater Elevations** table in the Flood Insurance Study Report for this jurisdiction. Elevations shown in the **Summary of Stillwater Elevations** table should be used for construction and/or floodplain management purposes when they are higher than the elevations shown on this FIRM.

Boundaries of the **floodways** were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the National Flood Insurance Program. Floodway widths and other pertinent floodway data are provided in the **Flood Insurance Study Report** for this jurisdiction.

The **AE Zone** category has been divided by a **Limit of Moderate Wave Action (LIMWA)**. The LIMWA represents the approximate landward limit of the 1.5-foot breaking wave. The effects of wave hazards between the VE Zone and the LIMWA (or between the shoreline and the LIMWA for areas where VE Zones are not identified) will be similar to, but less severe than those in the VE Zone.

Certain areas not in Special Flood Hazard Areas may be protected by **flood control structures**. Refer to Section 2.4 "Flood Protection Measures" of the Flood Insurance Study Report for information on flood control structures for this jurisdiction.

The **projection** used in the preparation of this map was Massachusetts State Plane Mainland Zone (FIPS zone 2001). The **horizontal datum** was NAD 83, GRS 1980 spheroid. Differences in datum, spheroid, projection or UTM zones used in the production of FIRMs for adjacent jurisdictions may result in slight positional differences in map features across jurisdiction boundaries. These differences do not affect the accuracy of this FIRM.

Flood elevations on this map are referenced to the North American Vertical Datum of 1988. These flood elevations must be compared to structure and ground elevations referenced to the same vertical datum. For information regarding conversion between the National Geodetic Vertical Datum of 1929 and the North American Vertical Datum of 1988, visit the National Geodetic Survey website at <http://www.ngs.noaa.gov> or contact the National Geodetic Survey at the following address:

NGS Information Services
NOAA, N/INGS12
National Geodetic Survey
SSM/C-3, #9202
1315 East-West Highway
Silver Spring, Maryland 20910-3282
(301) 713-3242

To obtain current elevation, description, and/or location information for **bench marks** shown on this map, please contact the Information Services Branch of the National Geodetic Survey at (301) 713-3242, or visit its website at <http://www.ngs.noaa.gov>.

Base map information shown on this FIRM was derived from digital orthophotography provided by Massachusetts Geographic Information System (MassGIS). This information was created from 30-cm pixel resolution photography dated April 2008.

The **profile baselines** depicted on this map represent the hydraulic modeling baselines that match the flood profiles in the FIS report. As a result of improved topographic data, the **profile baseline**, in some cases, may deviate significantly from the channel centerline or appear outside the SFHA.

Based on updated topographic information, this map reflects more detailed and up-to-date **stream channel configurations and floodplain delineations** than those shown on the previous FIRM for this jurisdiction. As a result, the **Flood Profiles and Floodway Data** tables for multiple streams in the Flood Insurance Study Report (which contains authoritative hydraulic data) may reflect stream channel distances that differ from what is shown on the map. Also, the road to floodplain relationships for unrevised streams may differ from what is shown on previous maps.

Corporate limits shown on this map are based on the best data available at the time of publication. Because changes due to annexations or de-annexations may have occurred after this map was published, map users should contact appropriate community officials to verify current corporate limit locations.

Please refer to the separately printed **Map Index** for an overview map of the county showing the layout of map panels; community map repository addresses; and a Listing of Communities table containing National Flood Insurance Program dates for each community as well as a listing of the panels on which each community is located.

For information on available products associated with this FIRM visit the **Map Service Center (MSC)** website at <http://msc.fema.gov>. Available products may include previously issued Letters of Map Change, a Flood Insurance Study Report, and/or digital versions of this map. Many of these products can be ordered or obtained directly from the MSC website.

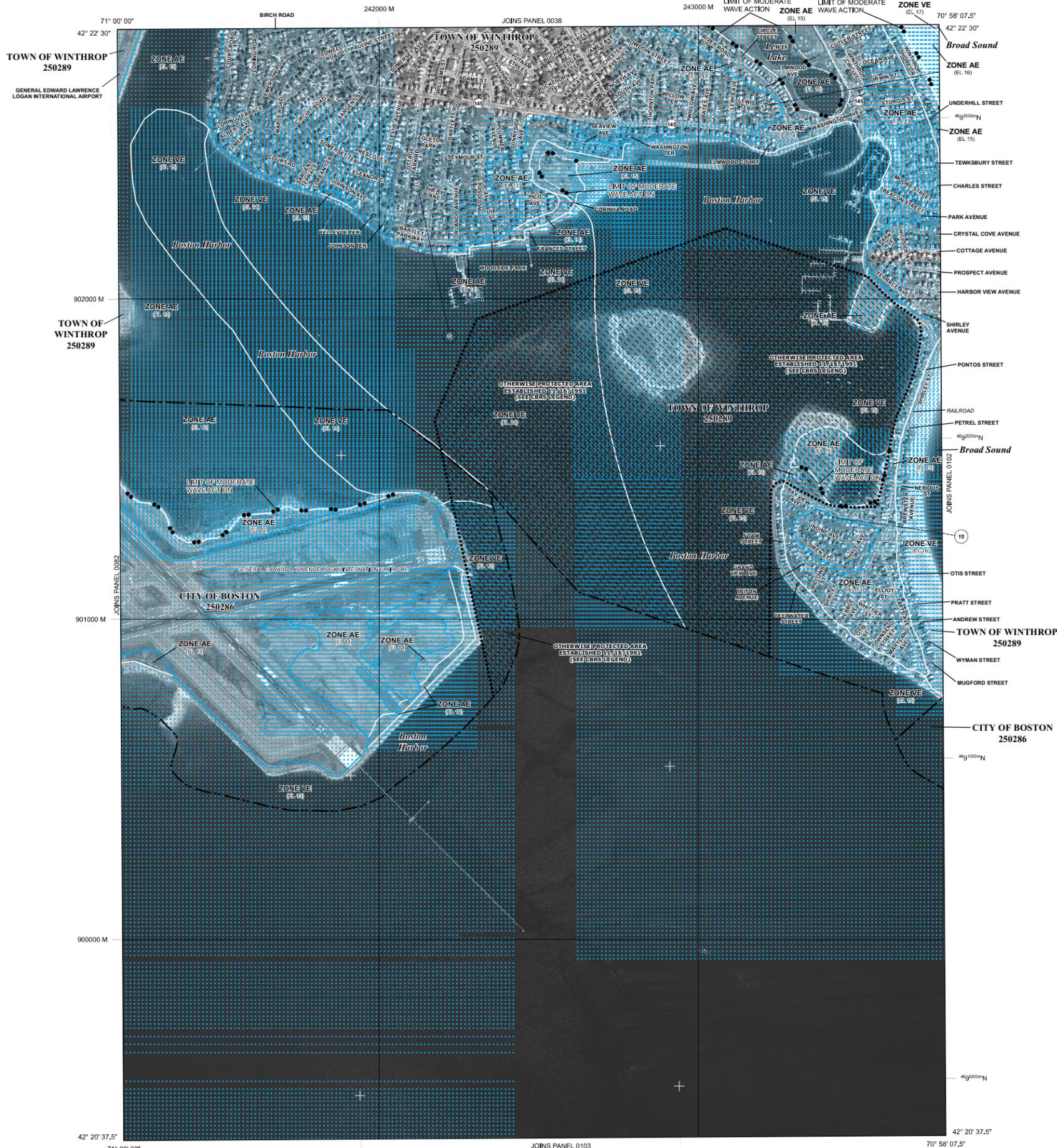
If you have **questions about this map**, how to order products, or the National Flood Insurance Program in general, please call the **FEMA Map Information eXchange (FMIX)** at 1-877-FEMA-MAP (1-877-336-2627) or visit the FEMA website at <http://www.fema.gov/business/infp>.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) LEGEND

11-16-1991 Otherwise Protected Area (OPA)
FLOOD INSURANCE NOT AVAILABLE FOR STRUCTURES NEWLY BUILT OR SUBSTANTIALLY IMPROVED ON OR AFTER NOVEMBER 16, 1991 IN DESIGNATED OPAs WITHIN THE CBRS.

Boundaries of the **John H. Chafee Coastal Barrier Resources System (CBRS)** shown on this FIRM were transferred from the official CBRS source map(s) for this area and are depicted on this FIRM for informational purposes only. The official CBRS maps are enacted by Congress via the Coastal Barrier Resources Act, as amended, and maintained by the U.S. Fish and Wildlife Service (FWS). The official CBRS maps used to determine whether or not an area is located within the CBRS are available for download at <http://www.fws.gov>. For an official determination of whether or not an area is located within the CBRS, or for any questions regarding the CBRS, please contact the FWS field office for this area at 603-223-2541.

Only coastal structures that are certified to provide protection from the 1-percent-annual chance flood are shown on this panel. However, all structures taken into consideration for the purpose of coastal flood hazard analysis and mapping are present in the FIRRM database in S_Gen_Struct.



LEGEND

SPECIAL FLOOD HAZARD AREAS (SFHAs) SUBJECT TO INUNDATION BY THE 1% ANNUAL CHANCE FLOOD
The 1% annual chance flood (100-year flood), also known as the base flood, is the flood that has a 1% chance of being equalled or exceeded in any given year. The Special Flood Hazard Area is the area subject to flooding by the 1% annual chance flood. Areas of Special Flood Hazard include Zones A, AE, AH, AO, AR, A99, V, and VE. The Base Flood Elevation is the water-surface elevation of the 1% annual chance flood.

- ZONE A** No Base Flood Elevations determined.
- ZONE AE** Base Flood Elevations determined.
- ZONE AH** Flood depths of 1 to 3 feet (usually areas of ponding); Base Flood Elevations determined.
- ZONE AO** Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.
- ZONE AR** Special Flood Hazard Areas formerly protected from the 1% annual chance flood by a flood control system that was subsequently decertified. Zone AR indicates that the former flood control system is being restored to provide protection from the 1% annual chance or greater flood.
- ZONE A99** Area to be protected from 1% annual chance flood by a Federal flood protection system under construction; no Base Flood Elevations determined.
- ZONE V** Coastal flood zone with velocity hazard (wave action); no Base Flood Elevations determined.
- ZONE VE** Coastal flood zone with velocity hazard (wave action); Base Flood Elevations determined.

FLOODWAY AREAS IN ZONE AE
The floodway is the channel of a stream plus any adjacent floodplain areas that must be kept free of encroachment so that the 1% annual chance flood can be carried without substantial increases in flood heights.

OTHER FLOOD AREAS

- ZONE X** Areas of 0.2% annual chance flood; areas of 1% annual chance flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 1% annual chance flood.
- OTHER AREAS**
- ZONE X** Areas determined to be outside the 0.2% annual chance floodplain.
- ZONE D** Areas in which flood hazards are undetermined, but possible.

COASTAL BARRIER RESOURCES SYSTEM (CBRS) AREAS

OTHERWISE PROTECTED AREAS (OPAs)
CBRS areas and OPAs are normally located within or adjacent to Special Flood Hazard Areas.

- 1% Annual Chance Floodplain Boundary
- 0.2% Annual Chance Floodplain Boundary
- Floodway boundary
- Zone D boundary
- CBRS and OPA boundary

Boundary dividing Special Flood Hazard Area Zones and boundary dividing Special Flood Hazard Areas of different Base Flood Elevations, flood depths, or flood velocities.

- Limit of Moderate Wave Action
- Limit of Moderate Wave Action coincident with Zone Break

Base Flood Elevation line and value; elevation in feet*
Base Flood Elevation value where uniform within zone; elevation in feet

*Referenced to the North American Vertical Datum of 1988

- Cross section line
- Transect line
- Culvert
- Bridge

Geographic coordinates referenced to the North American Datum of 1983 (NAD 83) WGS 1984 Hemisphere
1000-meter grid; Massachusetts State Plane Mainland Zone (FIPS Zone 2001), Lambert Conformal Conic projection
1000-meter Universal Transverse Mercator tick values, zone 19N

Bench mark (see explanation in Notes to Users section of this FIRM panel)

MAP REPOSITORIES
Refer to Map Repositories list on Map Index

EFFECTIVE DATE OF COUNTYWIDE FLOOD INSURANCE RATE MAP
SEPTEMBER 25, 2009

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL
(Date of Revision) - to change Base Flood Elevations and Special Flood Hazard Areas, to change zone designations, to update the effects of wave action, to update corporate limits, to add roads and road names, to incorporate previously issued Letters of Map Revision and to modify Coastal Barrier Resources System units.

For community map revision history prior to countywide mapping, refer to the Community Map History table located in the Flood Insurance Study report for this jurisdiction.
To determine flood insurance availability in this community, contact your insurance agent or call the National Flood Insurance Program at 1-800-638-6620.

MAP SCALE 1" = 500'
250 0 500 1000
150 0 150 300
METERS

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0101J

FIRM
FLOOD INSURANCE RATE MAP
SUFFOLK COUNTY,
MASSACHUSETTS
(ALL JURISDICTIONS)

PANEL 101 OF 176
(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOSTON, CITY OF	250296	0101	J
WINTHROP, TOWN OF	250299	0101	J

PRELIMINARY
NOVEMBER 15, 2013

NOTE: THIS MAP INCLUDES BOUNDARIES OF THE COASTAL BARRIER RESOURCES SYSTEM ESTABLISHED UNDER THE COASTAL BARRIER RESOURCES ACT OF 1982 AND/OR SUBSEQUENT ENABLING LEGISLATION.

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
25025C0101J
MAP REVISED

Federal Emergency Management Agency

**ATTACHMENT 6: MASSACHUSETTS STATE HAZARD
MITIGATION PLAN 2013**

STATE HAZARD MITIGATION PLAN

2013



Commonwealth of Massachusetts

Updated data for Repetitive Loss and Severe Repetitive Loss properties are identified for the years 2006-2012 in Table 10-23. In the 2010 Plan, the top 15 municipalities with the highest number of repetitive loss properties were examined. The same municipalities appear in the top 15 again, with the exception of Brockton, which is new to the list. To include all 15 municipalities previously included in the 2006 and 2010 analysis, the top 20 municipalities are reported. These municipalities are all located in eastern Massachusetts with the exception of Worcester in Worcester County.

TABLE 10-23.
NFIP REPETITIVE LOSS AND SEVERE REPETITIVE LOSS DATA

Community	2006			2009			2012		
	SRL Properties	RL Properties	RL Claims	SRL Properties	RL Properties	RL Claims	SRL Properties	RL Properties	RL Claims
Scituate	50	502	1,504	52	503	1,551	82	490	1,708
Revere	16	274	873	16	288	935	17	293	962
Hull	6	230	680	7	235	713	16	238	778
Quincy	1	131	364	1	144	408	11	169	513
Marshfield	3	155	419	3	156	442	7	158	474
Winthrop	1	139	386	5	136	396	5	140	411
Billerica	1	38	104	1	41	110	2	50	151
Nantucket	1	45	106	1	47	113	0	49	122
Nahant	1	45	123	1	46	133	2	46	136
Peabody	0	30	105	1	37	131	2	44	179
Swampscott	1	37	107	1	37	108	0	44	128
Duxbury	1	39	107	1	42	121	1	42	126
Newton	2	29	77	2	30	81	2	42	109
Brockton	*	*	*	*	*	*	1	38	100
Plymouth	2	33	86	2	34	91	0	37	100
Salisbury	*	*	*	*	*	*	2	34	100
Falmouth	0	32	72	0	34	76	0	33	74
Saugus	*	*	*	*	*	*	1	30	77
Worcester	*	*	*	*	*	*	0	29	81
Arlington	*	*	*	*	*	*	0	29	66

Source: FEMA Region 1

Notes: Top 20 repetitive loss communities for 2012, ordered by number of repetitive loss properties are provided in the table. Data listed for 2009 are through December 2009. Data listed for 2012 are through November 30, 2012. RL = Repetitive Loss; SRL = Severe Repetitive Loss. Asterisk (*) = data not available.

10.6.5 Economy

Economic losses due to a flood include, but are not limited to damage to buildings and infrastructure, agricultural losses, business interruption, impacts on tourism, and tax base. Damage to buildings can be estimated using the exposure analysis above. Other economic components such as loss of facility use, functional downtime, and social economic factors are less measurable with a high degree of certainty.

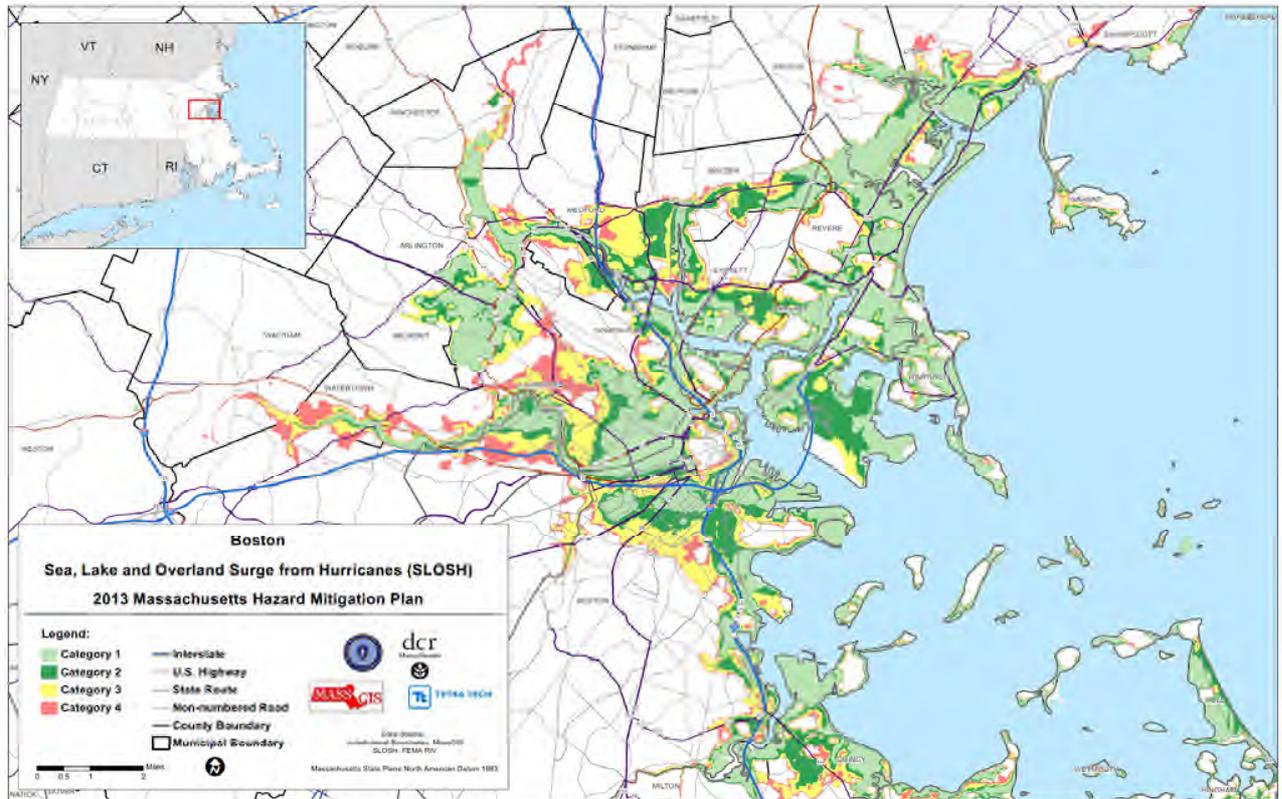


Figure 11-3. Boston SLOSH Inundation Areas

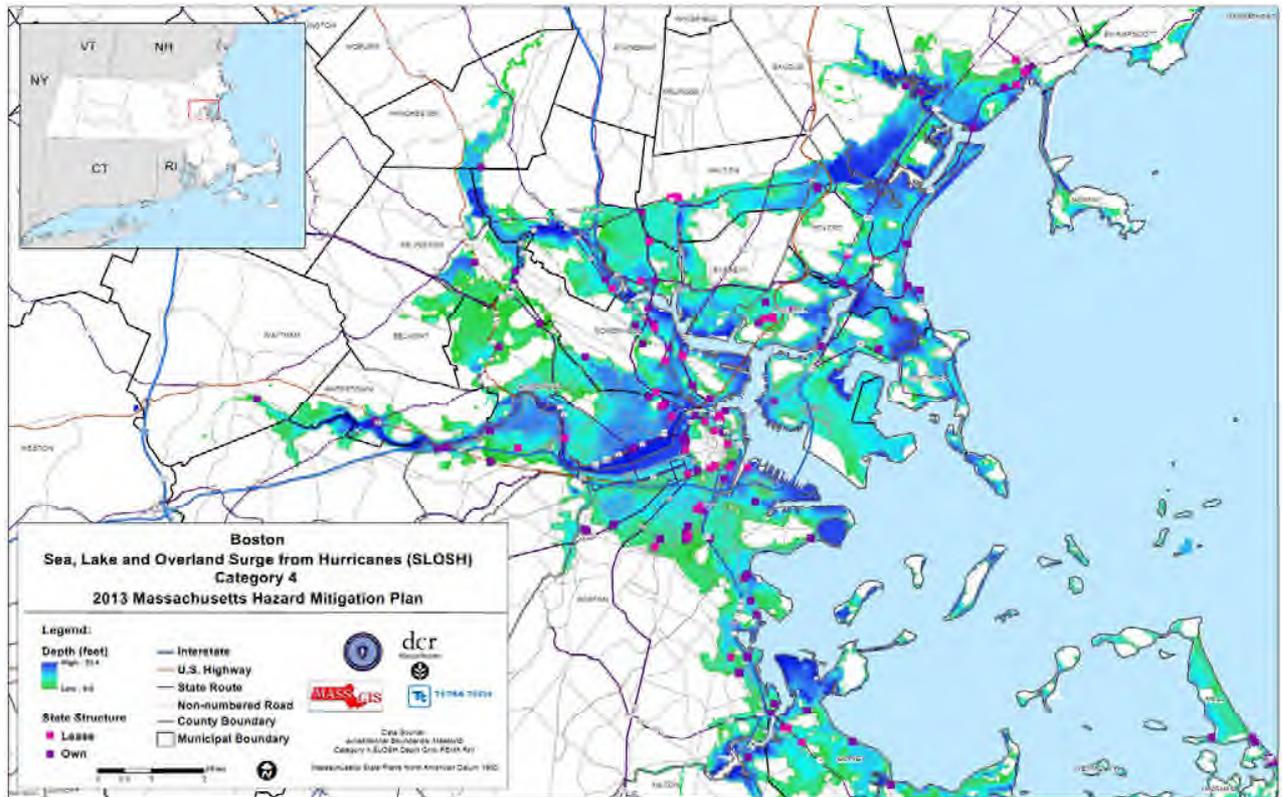


Figure 11-18. Boston SLOSH Inundation for a Category 4 Event

**TABLE 17-7.
SUMMARY OF POTENTIAL FUNDING SOURCES**

Program	Type of Assistance	Availability	Managing Agency	Funding Source
Accelerated Bridge Program	Bridge Rehabilitation, Replacement, Preservation, Maintenance, painting and cleaning projects	Rolling basis (bridges are pre-selected)	MassDOT and DCR	State Appropriation - Chapter 233 of the Acts of 2008
Dam, Levee and Coastal Infrastructure Repair and Removal Program	Grants and loans for the repair and removal of dams, levees, seawalls, and other forms of inland and coastal flood control.	Annual	Executive Office of Energy and Environmental Affairs (EEA)	State Revolving Loan
Conservation Partnership	To assist not-for-profit corporations in acquiring land and interests in lands suitable for conservation or recreation.	Annual	Executive Office of Energy and Environmental Affairs (EEA)	Executive Office of Energy and Environmental Affairs (EEA)
PARC - Parkland Acquisitions and Renovations for Communities	Provides grant assistance to cities and towns to acquire parkland, develop new parks, or renovate existing outdoor public recreation facilities (formerly the Urban Self-Help Program).	Annual	Executive Office of Energy and Environmental Affairs (EEA)	State Appropriations

Other sources:

- Grants.gov, a source for federal government grants
- Grants.com, a source for private funding opportunities
- epa.gov/ogd/grants/funding_opportunities, U.S. Environmental Protection Agency
- corporateservices.noaa.gov/grantsonline, National Oceanic and Atmospheric Administration

Additional Projects of Interest:

Below is a summary of Massworks natural hazard mitigation projects funded in 2012:

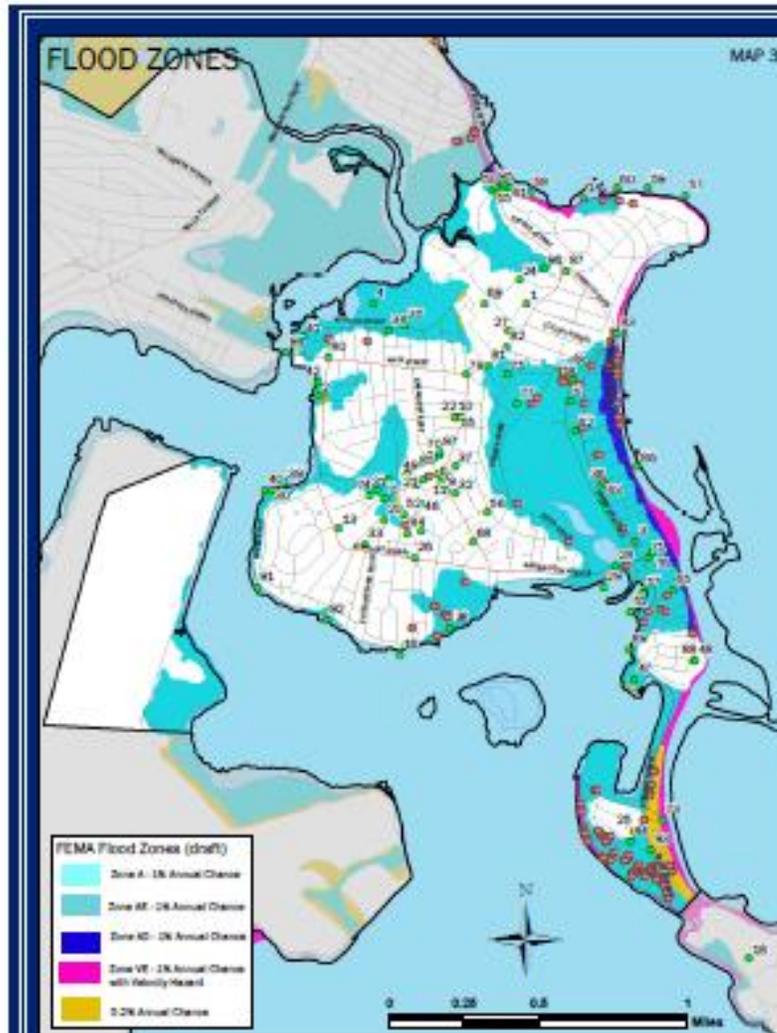
- Buckland, Clesson Brook Road Project – \$971,053 will repair a portion of Clesson Brook Road in need of immediate attention as a result of damages caused by Tropical Storm Irene. The MassWorks Award will complement approximately \$4.1 million in federal funding for repairs in the project area.
- East Brookfield, Route 9 Embankment and Lake Lashaway Dam Rehabilitation – \$594,400 will fund necessary repairs to the Lashaway Dam. The dam, now at risk of failing, supports Route 9, which carries an average of 17,500 vehicles per day. The award will complement over \$800,000 in repairs made by MassDOT to the dam's bridge.
- Paxton, Davis Hill Road Culvert – \$200,000 will replace an existing deteriorated wood, short-span bridge with a precast concrete culvert within the right of way on Davis
- Hill Road in Paxton. These improvements will increase public safety for Paxton's residents, neighboring communities and allow trucks to utilize the roadway.
- The City of Winthrop was awarded \$500,000 under the MassWorks Infrastructure Program in the Fall of 2011. Construction began in June for the Ingleside Park Revitalization. The project will improve the park and provide necessary upgrades to the existing storm water system to decrease flooding in the park and nearby streets

TABLE I-1.
NFIP POLICIES, CLAIMS AND REPETITIVE LOSS STATISTICS BY MUNICIPALITY

Community Name	Policies in Force	Claims	Total Loss Payment	Repetitive Losses	Severe Repetitive Losses
Mattapoissett	831	479	\$6,756,475	13	—
Middleborough	47	20	\$181,503	1	—
Norwell	37	12	\$51,230	2	—
Pembroke	49	11	\$21,591	—	—
Plymouth	441	370	\$4,486,532	37	—
Plympton	8	6	\$64,937	—	—
Rochester	10	1	\$0	—	—
Rockland	69	9	\$28,635	—	—
Scituate	1,473	3296	\$53,894,031	490	82
Wareham	2,049	869	\$11,607,645	19	—
West Bridgewater	32	6	\$6,192	—	—
Whitman	15	17	\$210,736	1	—
Suffolk County					
Boston	1,011	261	\$1,028,241	23	—
Chelsea	19	24	\$74,283	1	—
Revere	2,021	2499	\$14,625,217	293	17
Winthrop	1,107	1130	\$5,842,323	140	5
Worcester County					
Ashburnham	19	2	\$5,199	—	—
Athol	16	2	\$22,247	—	—
Auburn	63	22	\$82,921	1	—
Barre	13	2	\$6,340	—	—
Berlin	6	—	—	—	—
Blackstone	21	7	\$12,380	—	—
Bolton	16	4	\$12,916	1	—
Boylston	5	3	\$9,553	—	—
Brookfield	24	23	\$604,099	4	—
Charlton	50	1	\$0	—	—
Clinton	123	29	\$385,448	3	—
Douglas	15	3	\$4,886	—	—
Dudley	22	4	\$15,816	—	—
East Brookfield	12	2	\$8,308	—	—
Fitchburg	72	31	\$379,453	4	—
Gardner	5	—	—	—	—
Grafton	48	17	\$121,752	1	—
Harvard	11	—	—	—	—
Holden	11	3	\$2,225	—	—
Hopedale	7	1	\$4,854	—	—
Hubbardston	4	—	—	—	—
Lancaster	47	34	\$327,171	5	1
Leicester	32	13	\$141,075	3	—
Leominster	105	25	\$98,077	4	—
Lunenburg	21	2	\$2,538	—	—
Mendon	9	—	—	—	—
Milford	46	20	\$64,559	1	—
Millbury	53	17	\$119,916	1	—
Millville	6	4	\$9,859	—	—

**ATTACHMENT 7: WINTHROP HAZARD MITIGATION PLAN
UPDATE 2014**

TOWN OF WINTHROP HAZARD MITIGATION PLAN 2014 UPDATE



Revised Draft for Review by MEMA & FEMA
April 7, 2015

TOWN OF WINTHROP HAZARD MITIGATION PLAN 2014 UPDATE

the consistent flooding of the park and the Town is still considering structural and non-structural approaches. Winthrop has improved its storm drainage infrastructure capacity over the last several years with the purchase of its own street sweeping and catch basin trucks. It has also adopted a new storm water management ordinance to prevent and mitigate storm water runoff and has flood-proofed 17 repetitive loss properties, including the elevation of gas, electrical and heating lines. The Town is continuing to work with MA DCR and its own engineering consultant to improve Lewis Lake- working to having it dredged and increase its flood water storage capacity, upgrading the storm drain lines from Winthrop Shore Drive to the lake and replacing the old manual tide gate with a self regulating one. Some upgrades at the Pico Beach sewer pump station have been conducted, including a generator upgrade but the station needs more work and wet-well capacity issue, perhaps due to a groundwater Inflow and Infiltration (I and I) problem is still being analyzed. Finally, the seawall at Grandview Avenue has been upgraded and heightened by two feet, from just south of the intersection of Billows Street and Grandview Avenue to Coughlin Playground.

Information on flood hazard areas was taken from two sources. The first was the current National Flood Insurance Rate Maps, dated from September 25, 2009. The FIRM flood zones are shown on Map 3 in Appendix B. The second was discussions with local officials. The Locally Identified Areas of Flooding described below were identified by Town staff and other plan participants as areas where flooding is known to occur. These areas do not necessarily coincide with the flood zones from the FIRM maps. They may be areas that flood due to inadequate drainage systems or other local conditions rather than location within a flood zone. The numbers correspond to the numbers on Map 8, "Hazard Areas". The numbers do not reflect priority order.

Locally Identified Areas of Flooding

- 1) Yirrell Beach: coastal surge and flooding during storm events
- 2) Shirley Street Neighborhood: low-lying street area and adjacent seawall experience wave overtopping and flooding during storm events
- 3) Lewis Lake: Serves as drainage area for large part of downtown area. Lake overflows during storm events and causes flooding in adjacent areas.
- 4) Ingleside Park: Backup and flooding due to lack of storm water storage capacity and undersized drains. Floods during high tide events coinciding with high precipitation events of greater than 1 inch.
- 5) Lower Nahant Avenue: coastal surge, high tide and high precipitation events all cause backup in undersized drain lines and flooding within the adjacent neighborhood.
- 6A) Woodside seawall and headwall on Boston Harbor: coastal surge flooding during storm events
- 6B) Somerset seawall and headwall on Boston Harbor: coastal surge flooding during storm events
- 6C) Sargent Street seawall and headwall on Boston Harbor: coastal surge flooding during storm events

**TOWN OF WINTHROP HAZARD MITIGATION PLAN
2014 UPDATE**

6D) Cottage Park seawall and headwall on Boston Harbor: coastal surge flooding during storm events

7) Coughlin Park: coastal erosion and flooding during higher northwest wind events and coastal storms

8) Flooding: Bayou Street Neighborhood- flooding due to undersized drainage line that backs up in high precipitation events

Previous Occurrences and Impacts

Town-specific data for previous flooding -wide occurrences was not available and county flooding data was used as the best available. Suffolk County, which includes Winthrop, experienced ten non-Coastal or non-Urban Small Stream flood events from January 1, 1950 – March 1, 2014. There were no deaths or injuries reported and the six flooding events associated with property damage totaled \$25.733 million dollars.

The most severe recent flooding occurred during the major storm of March 2010, when Suffolk County broke the record of 11 inches of rain set in 1953. During the month of March of 2010, a new total of 14.83 inches of rainfall accumulation was officially recorded by the National Weather Service (NWS). The weather pattern that caused these floods consisted of early springtime prevailing westerly winds that moved three successive storms, combined with tropical moisture from the Gulf of Mexico, across New England. Historically, NWS determined that March 2010 was the fourth wettest of any month since 1872.

Based on data from the National Weather Service, National Climatic Data Center, FEMA disaster declarations, the Suffolk County FIS, and local data sources, historic flood events from 1950 through April 30, 2014 were compiled and are summarized in Table 7. The table does not include events classified as Coastal Flood or Urban/Small Stream Floods.

Table 7: Suffolk County Flood Events 1950 – 4/30/2014

County	Date	DTh	Inj	PrD
SUFFOLK CO.	10/28/2006	0	0	8.00K
SUFFOLK CO.	09/01/2013	0	0	5.00K
SUFFOLK CO.	06/07/2013	0	0	0.00K
SUFFOLK CO.	09/18/1996	0	0	0.00K
SUFFOLK CO.	10/29/2012	0	0	15.00K
SUFFOLK CO.	05/13/2006	0	0	0.00K
SUFFOLK CO.	03/14/2010	0	0	10.700M
SUFFOLK CO.	08/25/2010	0	0	0.00K
SUFFOLK CO.	02/13/2008	0	0	5.00K
SUFFOLK (ZONE)	03/05/2001	0	0	15.000M
TOTAL		0	0	25.733M

Source: NOAA, National Climatic Data Center **Column Definitions:** 'Mag': Magnitude, 'Dth': Deaths, 'Inj': Injuries, 'PrD': Property Damage, 'CrD': Crop Damage

**TOWN OF WINTHROP HAZARD MITIGATION PLAN
2014 UPDATE**

The majority of the repetitive loss properties in Winthrop are single family homes, though many multi-family and several commercial structures can be found in the FEMA flood zone A and other areas identified for frequent flooding. Table 10 below shows the breakdown of structure type by FEMA designated and locally identified flood zones.

Table 10				
Repetitive Loss Properties Summary				
Flood Zone	Single Family Residential Structures	Multi-Family Residential Structures	Commercial, Industrial, or Institutional Structures	Total Repetitive Loss Properties
FEMA Zone A	78	30	0	108
FEMA Zone VE	7	0	0	7
FEMA .2% annual chance	8	2	0	10
Total: FEMA Flood Zones	93	32	0	125
Yirrell Beach	40	8	0	48
Shirley Street Neighborhood	12	13	0	25
Lewis Lake	3	2	0	5
Somerset seawall and headwall on Boston Harbor	0	0	0	0
Cottage Park seawall and headwall on Boston Harbor	0	0	0	0
Sargent Street seawall and headwall on Boston Harbor	0	0	0	0
Woodside seawall and headwall on Boston Harbor	0	0	0	0
Coughlin Park	0	0	0	0
Bayou Street Neighborhood	0	0	0	0
Ingleside Park	0	0	0	0
Lower Nahant Avenue	2	0	0	2
	0	0	0	0
Total: Locally Identified Areas of Flooding	57	23	0	80

Probability of Future Events

Flooding of all types in Winthrop are high frequency events as defined by the 2013 Massachusetts State Hazard Mitigation Plan. This hazard may occur more frequently than once in 10 years.

TOWN OF WINTHROP HAZARD MITIGATION PLAN 2014 UPDATE

season, coastal storms typically cause erosion. With the anticipated change in climate an increase in intensity and frequency of storms is expected. This will, in turn, increase the likelihood of severe erosion episodes along the coast of Massachusetts.

Coastal erosion and shoreline change can result in significant economic loss through the destruction of buildings, roads, infrastructure, natural resources, and wildlife habitats. Damage often results from the combination of an episodic event with severe storm waves and dune or bluff erosion.

Some of the methods used by property owners to stop, or slow down, coastal erosion or shoreline change can actually exacerbate the problem. Attempting to halt the natural process of erosion with seawalls and other hard structures typically worsens the erosion in front of the structure, prevents any sediment behind the structure from supplying down drift properties with sediment and subjects down drift beaches to increased erosion. Without the sediment transport associated with erosion, some of the Commonwealth's and Winthrop's greatest assets and attractions – beaches, dunes, barrier beaches, salt marshes, and estuaries are threatened and will slowly disappear as the sediment sources that feed and sustain them are eliminated.

The Massachusetts Office Coastal Zone Management (CZM) has been collecting new data and studying and monitoring shoreline change. Additional information on shoreline change may be found in CZM's Fact Sheet on New Data on Shoreline Change online at <http://www.mass.gov/czm/hazards/index.htm> or <http://www.mass.gov/czm/coastguide/online/index.htm>

Location

Coastal Hazards are a Town-wide hazard in regard to hurricanes and nor'easters. In addition, many of the same areas in Winthrop vulnerable to coastal flooding are also subject to decreased sediment, coastal erosion and shoreline change including the following areas:

- Yirrell Beach
- Shirley Street Neighborhood
- Lower Nahant Avenue Neighborhood
- Coughlin Playground

Extent and Previous Occurrences

Erosion

Approximately 75 percent of the U.S. ocean shoreline is eroding. Massachusetts' ocean-facing shore is no exception. A study of shoreline change in Massachusetts by the U.S. Geological Survey, Woods Hole Oceanographic Institution Sea Grant Program, and Cape Cod Cooperative Extension reveals that approximately 68 percent, or 513 miles, of Massachusetts' ocean-facing shore exhibits a long-term erosion trend, 30 percent, or 226 miles, shows long-term accretion, and two percent, or 15 miles, shows no net change.

For the entire ocean-facing Massachusetts shore, from the mid -1800's to 1994, the long-term average annual shoreline change rate ranges between -0.58 and 0.75 feet per year.

Approximately 46 percent of the Massachusetts shore is eroding at one foot or less per year, while 22 percent of the shore is accreting at one foot or less per year. Eighty-one percent of the shore fluctuates

**TOWN OF WINTHROP HAZARD MITIGATION PLAN
2014 UPDATE**

Estimated Damages from Flooding

Methodology Used

MAPC did not use HAZUS-MH to estimate flood damages in Winthrop. In addition to technical difficulties with the software, the riverine module is not a reliable indicator of flooding in areas where inadequate drainage systems contribute to flooding even when those structures are not within a mapped flood zone. In lieu of using HAZUS, MAPC developed a methodology to give a rough approximation of flood damages.

Winthrop’s land area is 1.6 square miles or 1,024 acres. Approximately 369 acres have been identified by local officials as areas of flooding. This amounts to 25.33 % of the land area in Winthrop. The number of structures in each flood area was estimated by applying the percentage of the total land area to the number of structures (5,152) in Winthrop; the same number of structures used by HAZUS for the hurricane and earthquake calculations. HAZUS uses a value of \$289,013.75 per structure for the building replacement value. This was used to calculate the total building replacement value in each of the flood areas. The calculations were done for a low estimate of 10% building damages and a high estimate of 50% as suggested in the FEMA September 2002 publication, “State and Local Mitigation Planning how-to guides” (Page 4-13). The range of estimates for flood damages is \$37,687,393 - \$188,436,965. These calculations are not based solely on location within the floodplain or a particular type of storm (i.e. 100 year flood).

Table 25: Estimated Damages from Flooding

ID	Flood Hazard Area	Approximate Area in Acres	% of Total Land Area	# of structures	Replacement Value \$	Low Damage Estimate \$	High Damage Estimate \$
1	Yirrell Beach	86.5275	5.9375	306	88,438,207	884,382	44,219,104
2	Shirley Street Neighborhood	180.3025	12.3722	637	184,101,759	1,841,0176	92,050,880
3	Lewis Lake	34.9662	2.3994	124	35,837,705	3,583,771	17,918,853
4	Ingleside Park	32.0254	2.1976	113	32,658,554	3,265,855	16,329,277
5	Lower Nahant Avenue	8.0665	0.5535	28	8,092,385	809,239	4,046,193
6A	Woodside seawall and headwall on Boston Harbor	0.9456	0.0649	3	867,041	86,704	433,521
6B	Somerset seawall and headwall on Boston Harbor	0.7773	0.0533	3	867,041	86,704	433,521
6C	Sargent Street seawall and headwall on Boston Harbor	0.8664	0.0594	3	867,041	86,704	433,521
6D	Cottage Park seawall and headwall on Boston Harbor:	0.6772	0.0465	2	578,028	57,803	289,014
7	Coughlin Park	14.1474	0.9708	50	14,450,688	1,445,067	7,225,344
8	Bayou Street Neighborhood	9.8795	0.6779	35	10,115,481	1,011,548	5,0577,41
	Totals	369.18	25.33	1,304	\$376,873,930	\$37,687,393	\$188,436,965

**ATTACHMENT 8: WINTHROP OPEN SPACE AND RECREATION
PLAN 2014-2021**



Winthrop Open Space and Recreation Plan 2014-2021

Funding provided by the
District Local Technical Assistance
program

Prepared for

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James McKenna,
Town Manager

December 30, 2013

Prepared by

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Wetlands – The major areas of wetlands are all coastal including the tidal flats associated with Belle Isle Marsh, wetlands along Pleasant Street by the beaches, the tidal flats from Short Beach all along Winthrop Beach and Yirell Beach and down to Deer Island. There are also tidal wetlands surrounding Coughlin Park, and essentially along the entire shoreline.

Vernal Pools – Vernal pools are small, shallow ponds that do not support fish and that have annual or semi-annual periods of dryness. Vernal pools are very important to a variety of wildlife species. Some amphibians breed exclusively in vernal pools while others spend their entire life cycles in such pools. The Massachusetts Natural Heritage and Endangered Species Program has a program by which vernal pools can be certified. Certified vernal pools are protected if they fall under the jurisdiction of the Massachusetts Wetlands Protection Act regulations. They are also protected under other state programs. There are currently no certified vernal pools in Winthrop.

Aquifer recharge areas – Winthrop is a densely developed urban community which relies on water from the MWRA. There are no aquifer recharge areas in Winthrop.

D. VEGETATION

Trees – The DPW has a tree staff which continued to make progress on the backlog of work by removing 30 dead or dangerous trees, 60 stumps and pruning 150 trees. The DPW also planted 60 new trees. The DPW responded to damage due to Hurricane Irene which felled 15 trees and many more branches. Despite the difficult economy residents continued to participate in the “resident-purchase-a-street-tree” program which enabled the town to plant 3 times more trees than were removed. The town received a 5th consecutive Tree City designation. The town also maintains a tree fund which is supported by residents with the mission of purchasing trees to improve Winthrop’s green infrastructure. This fund received \$3,500 in donations during FY 12.

E. FISHERIES AND WILDLIFE

Common wildlife such as ducks and geese favor the Lewis Lake area. Belle Isle Marsh is a critical stopover on the Atlantic Flyway and many birds depend on its existence for successful migration. Some of the migratory birds seen at Belle Isle March in general include glossy ibis, red-breasted merganser, greater yellow-legs, black-bellied plover, mallard, snowy egret, great blue heron, loon, marsh hawk, semipalmated sandpiper and green-winger teal. Other rare species that have been documented in the Town of Winthrop include the piping plover, upland sandpiper, common tern and least tern. According to the Natural Heritage and Endangered Species Program “the best remaining wildlife habitats in town are on the “Boston Harbor Islands: Snake Island has a nice salt marsh, with adjacent sand bar and mud flats that are used by resident and migrating shorebirds. Unfortunately, the aggressive invader Common Reed, has taken over portions of the salt marsh and mud flats and it should be controlled where it is taking over the best remaining biodiversity areas in Winthrop.”

BioMap 2 – The Massachusetts Department of Fish & Game, through the Division of Fisheries and Wildlife’s Natural Heritage and Endangered Species Program (NHESP), and the Nature Conservancy’s

NRDIS: National Register District
NRTRA: National Register Thematic Resource Area
NRIND: National Register Individual Property
NRMPS: National Register Multiple Property Submission
NRDOE: National Register Determination of Eligibility

G. ENVIRONMENTAL CHALLENGES

Hazardous Waste Sites – As with most urban communities, Winthrop has a number of hazardous waste disposal sites. Most of these sites are considered non-priority by DEP and are being cleaned up by the private sector under Chapter 21E of the Massachusetts General Laws. There are currently 67 sites listed in the states’ database. A database of these sites can be accessed at: <http://public.dep.state.ma.us/SearchableSites/Search.asp>. None of these sites directly impact any of the parks.

Landfills – There are no landfills currently operating in the Town of Winthrop. All solid waste is collected and taken out of the town.

Erosion – Erosion in the town is primarily due to wave action along the beaches and to a much lesser extent from new construction activity. There is erosion at Coughlin Park which is causing a walking path to narrow and poses a hazard for walkers.

Chronic Flooding – In 2012 the Metropolitan Area Planning Council prepared an update of the natural hazards mitigation plan first completed in 2005. During the planning process, town staff identified the following flood hazard areas:

1. Yrillel Beach: coastal surge and flooding during storm events.
2. Shirley Street Neighborhood: low-lying street area and adjacent sea wall experience waves overtopping and flooding during storms. The town has been approved for a \$500,000 Pre-Disaster Mitigation grant but needs to appropriate matching funds to receive the grant. The grant will allow the installation of new drainage pipes to alleviate the problem of waves over-topping the sea wall.
3. Lewis Lake: Serves as drainage area for a large part of the downtown. The lake overflows during storms and causes flooding in adjacent areas. The town is investigating the possibility of dredging the lake and doing stormwater improvements.

4. Ingleside Park: Backup and flooding due to lack of storm water storage capacity and undersized drains. Floods during high tides coinciding with high precipitation of greater than one inch.
5. Lower Nahant Avenue: coastal surge, high tide and high precipitation all cause backup in undersize drain lines and flooding within the adjacent neighborhoods.
6. Woodside seawall and headwall on Boston Harbor: coastal surge flooding during storms.
7. Somerset seawall and headwall on Boston Harbor: coastal surge flooding during storms.
8. Sargent Street seawall and headwall on Boston Harbor: coastal surge flooding during storms.
9. Cottage Park seawall and headwall on Boston Harbor: coastal surge flooding during storms.
10. Coughlin Park: coastal erosion and flooding during higher northwest winds and coastal storms.
11. Bayou Street neighborhood: flooding due to undersized drainage line that backs up in high precipitation storms.

Sedimentation – Sedimentation is primarily caused by road runoff and construction related earth disturbances. These can be minimized by adherence to environmental regulations. Sedimentation is a major concern at Lewis Lake because the lake receives run-off from roughly one-third of the town.

Development impacts – There is very little developable land remaining in Winthrop so development impacts are limited to redevelopment projects where the original development has already resulted in land disturbance. Redevelopment of sites is done under existing environmental regulations which means that the newer development has to adhere to higher standards than that which it is replacing.

Ground and surface water pollution (point and non-point) – The Mystic River Watershed Association (MyRWA) maintains water quality monitoring stations throughout the watershed. Site BEI093 is one of the fifteen Mystic Baseline Monitoring Sites in the Mystic River Watershed. This site is one of five saltwater sites that was initiated in 2008-2009. Belle Isle was chosen as a site as it carries significant runoff from the City of Revere, City of Boston, Town of Winthrop and Suffolk Downs. The site is important due to the value of the marsh system and potential degraded shellfish because of water quality issues. The findings for multiple years reflected the significant inputs of sewage from City of Revere and from Suffolk Downs. Both of these institutions are now under federal consent decrees that mandate infrastructure improvements. Suffolk Downs has completed the majority of that work and Revere is halfway through a 10-12 year effort to improve infrastructure. The key indicator that is measured is the level of enterococcus found in the monthly water sample. Enterococcus is just one group of bacteria but is a proxy or representative of the other pathogens

SECTION VII – ANALYSIS OF NEEDS

A. OVERVIEW OF NEEDS ANALYSIS

The identification of community needs and subsequently, potential action items for the Seven-Year Action Plan, was accomplished in three ways:

- Review of previous planning studies
- Meetings with town staff and community organizations
- Two public meetings: June 20, 2013 and November 21, 2013

A list of all the meetings conducted during the course of this planning project can be found on page 4.

B. REVIEW OF PLANNING STUDIES

There are several planning studies and reports that have been done recently that were reviewed to help identify community needs and to develop the Seven-Year Action Plan. These include the following:

- **Town of Winthrop Open Space and Recreation Plan January 2005** – This plan expired in 2010 but it contains a wealth of information on open space and recreation and was the basis for the new plan update.
- **Walk Winthrop: A Plan for a More Walkable & Bikeable Town** – This report was prepared in 2010 by The Conway School of Landscape Design for the town based on the town's interest in creating a more bikeable and walkable community. The report recommended developing a network of walking and cycling routes throughout the town that would connect commercial districts, municipal services, natural resources and transportation hubs.
- **Walk Winthrop: A Greenway Action Plan** – In 2011, MAPC prepared a greenway action plan for Winthrop. The purpose of the plan was to advance the concepts first identified in the Walk Winthrop plan of 2010. The vision of the Walk Winthrop Greenway is a network of signed and marked urban trails that connect the town's natural resources, including its beaches, views, and parks with transportation systems and civic and business districts. A key tourism potential resides in the proposed Boston Harbor to Winthrop Loop where one could take the MBTA to Maverick Station, hop on a bicycle and ride along the East Boston Greenway to Constitution Beach, continue into Winthrop, head down Winthrop Shore Drive and Yirrell Beach to Point Shirley, circle Deer Island and return to the ferry terminal to head back to Rowes Wharf in Boston.

C. SUMMARY OF RESOURCE PROTECTION NEEDS

Although Winthrop is a densely developed community there are still a fair number of resource protection needs. One of the most important is sea level rise due to climate change. While this is

an important issue it is also a longer-range issue and one which is not easily addressed through an open space and recreation plan. Beach re-sanding is another issue which is currently being addressed but is an on-going concern. Sedimentation has led to reduced water depth at Lewis Lake. The lake needs to be dredged to maintain its depth and ability to store water. The lake is also overgrown with phragmites which needs to be controlled. Residents would like to see more attention paid to tree planting. There are numerous areas of chronic flooding throughout the town and erosion at Coughlin Park.

D. SUMMARY OF COMMUNITY'S NEEDS

The residents who attended the two public meetings identified a number of improvements they would like to see including community gardens, more walking paths and bike trails and the creation of a dog park. Improving Miller Field was a major concern as well as the need for additional playing fields. There was interest in a community sailing program and the construction of an indoor swimming pool. Residents thought that Halford Beach needed improvements and that Yrillel Beach needed additional parking and a permanent restroom facility.

E. COMMENTS FROM THE PUBLIC MEETING

A public meeting was held at the Gorman-Fort Banks Elementary School on June 20, 2013. A summary of the comments can be found in Appendix A. The major needs identified were:

- Manage encroachment at Fishermen's Bend and the land along Washington Street adjacent to the marsh.
- Expand the community gardens program beyond just the garden at the Senior Center.
- Increase bike and trail connectivity especially for families with children.
- Activate ferry terminal with more things to attract visitors and residents.
- Bring the Community Preservation Act back for a vote.
- The beaches need to be re-sanded.
- Halford Beach is in need of improvements
- Increase parking and install a permanent restroom at Yrillel Beach.
- Establish a community sailing program
- Indoor swimming pool.
- Establish a dog park.
- Improve Miller Field.

Additional comments were received from the public at the November 21, 2013 meeting at which the draft Seven Year Action Plan was presented.

- The town should consider creating a walking path from the parking lot at the end of Winthrop Street through Governors' Park to the Gorman/Fort Banks School.

Table 23

Seven-Year Action Plan

Action	Responsibility	Funding	Year 1	Year 2	Year 3	Year 4	Year 5	Year 6	Year 7
Evaluate ways to halt the erosion of the walking path at Coughlin Playground.	Cons. Comm.	Town							
Continue to implement the recommendations of the Harbor Management Committee’s Public Access Plan to restore stairways and public access to the waterfront. (2)	Harbor Mgt. Committee; DPW	Town, state							
Complete the Fishermen’s Bend trail project. (4)	Cons. Comm. DPW	RTGP (State) Town							
Work with DCR to ensure completion of the Winthrop	DCR	State							

ATTACHMENT 9: WINTHROP HARBOR ASSESSMENT AND PLAN

Winthrop Harbor Assessment and Plan



Prepared for:

The Town of Winthrop, Massachusetts

Prepared by:

The Cecil Group

with

FXM Associates
Vine Associates

April 2005

Acknowledgements

Winthrop Harbor Plan Committee

At the center of the planning effort was the Winthrop Harbor Plan Committee's commitment and active involvement. The Committee met approximately every month during second half of 2004 to provide direction to the Plan, insight to understanding the area, feedback on issues, and input from the various members who were also involved with other Town committees. Members of the Committee also participated visibly in all the other meetings with the public and Town officials. The Committee was comprised of representatives of various Town committees and interest groups as shown in the following table.

Committee Member	Affiliation
Richard DiMento, Chair	Winthrop Board of Selectmen
Mike Carney	Winthrop Harbor Management & Planning Committee
Joseph Clark	President, Winthrop Chamber of Commerce
Donald Colpak	Boat Captain
John Crosby	Planning Board, Conservation Commission
Chuck Famolare	Harbormaster
Captain Paul Flanagan	Winthrop Fire Department
David Hickey	Director, Department of Public Works
Barbara McNeil, Ex Officio	Grants Coordinator/Procurement Administrator
Paul Rupp, Ex Officio	Consultant, Community Reinvestment Associates
Alan Shore	Harbor Management & Planning Committee
Virginia Wilder, Ex Officio	Executive Secretary/Chief Administrative Officer

Project funded by:

Governor's Seaport Advisory Council

The Honorable Kerry Healy, Lieutenant Governor of Massachusetts,
Chairwoman

Rick S. Armstrong - Executive Secretary

Consultant Team

The Cecil Group, prime consultant

FXM Associates

Vine Associates

TABLE OF CONTENTS

Executive Summary.....1

 INTRODUCTION.....1

 VISION AND GOALS OF THE HARBOR ASSESSMENT AND PLAN.....1

 KEY FINDINGS.....2

 KEY RECOMMENDATIONS.....3

I. Introduction.....5

 OVERVIEW.....5

 STUDY AREA OF THE PLAN.....5

 ORGANIZATION OF THE PLAN.....7

 PLANNING PROCESS AND INVOLVEMENT.....8

II. History.....12

 SETTING.....12

 HISTORY OF THE HARBOR AREA.....12

III. Existing Conditions.....15

 OVERVIEW OF HARBOR USES.....15

 PROPERTY AND REGULATORY INFORMATION.....15

 COMPARISON OF MAPS FOR SHORELINE CHANGE.....23

 PUBLIC ACCESS/PUBLIC OWNERSHIP.....32

 MARITIME USES.....44

 HOMELAND SECURITY AND LOGAN AIRPORT.....54

 POLLUTION ASSESSMENT.....56

 RECREATIONAL ACTIVITIES AND TOURISM POTENTIAL.....61

IV. Action Plan and Implementation Guide.....81

 OVERVIEW OF THE PLAN’S RECOMMENDATIONS.....81

 IMPLEMENTATION SCHEDULE.....81

 WATERSIDE RECOMMENDATIONS.....84

 LANDSIDE RECOMMENDATIONS.....85

 PROGRAM AND REGULATORY RECOMMENDATIONS.....86

 SUMMARY OF FUNDING RESOURCES.....89

Note: Copies of Public Waterways licenses have been submitted as a separate document

LIST OF FIGURES

FIGURE 1.	STUDY AREA OF THE WINTHROP HARBOR ASSESSMENT	7
FIGURE 2.	HISTORIC MAP OF BOSTON HARBOR, 1775	25
FIGURE 3.	HISTORIC MAP OF BOSTON HARBOR, 1894	26
FIGURE 4.	HISTORIC MAP OF BOSTON HARBOR, 1903	27
FIGURE 5.	HISTORIC MAP OF BOSTON HARBOR, 1950	27
FIGURE 6.	SHORELINE CHANGES IN THE SOUTHERN PORTION OF WINTHROP HARBOR, 1847 - 2002.....	28
FIGURE 7.	WINTHROP ZONING DISTRICTS ALONG WINTHROP HARBOR	30
FIGURE 8.	PROPOSED LAYOUT OF THE MULTI-USE PIER	41
FIGURE 9.	WINTHROP HARBOR FEATURES	44
FIGURE 10.	EXISTING CHANNELS AND ANCHORAGE AREAS LOCATED WITHIN WINTHROP HARBOR.	47
FIGURE 11.	WINTHROP HARBOR IMPROVEMENTS PROPOSED BY THE U.S. ARMY CORP OF ENGINEERS, 1993	49
FIGURE 12.	POTENTIAL DREDGE LOCATIONS IN WINTHROP HARBOR	51
FIGURE 13.	SAMPLING LOCATION PLAN FOR 1995 CHEMICAL ANALYSES OF SEDIMENTS FOR THE DREDGING OF WINTHROP HARBOR.....	58
FIGURE 14.	SAMPLING LOCATION PLAN FOR 1997 BIOLOGICAL TESTING OF SEDIMENTS FOR THE DREDGING OF WINTHROP HARBOR.....	59
FIGURE 15.	MAP OF THE ECONOMIC STUDY AREA OF THE WINTHROP HARBOR WATERFRONT AREA	70

LIST OF TABLES

TABLE 1.	PUBLIC WATERFRONT LICENSES FOR COASTAL STRUCTURES IN WINTHROP HARBOR	19
TABLE 2.	WATERFRONT ZONES OF PROPERTIES ALONG WINTHROP HARBOR*	29
TABLE 3.	LAND USES OF PARCELS ALONG WINTHROP HARBOR*	31
TABLE 4.	DOCUMENTED PUBLIC ACCESS SITES	32
TABLE 5.	UNDOCUMENTED PUBLIC ACCESS SITES.....	33
TABLE 6.	LOCATIONS OF PUBLIC ENTITLEMENTS, COASTAL TRAILS, OR PATHWAYS ALONG WINTHROP HARBOR	34
TABLE 7.	LOCAL, STATE, AND FEDERAL FACILITIES AND STRUCTURES ON WINTHROP HARBOR	35
TABLE 8.	EASEMENTS THAT LEAD TO AND FOLLOW THE WATERFRONT OF WINTHROP HARBOR FRONT	38
TABLE 9.	YACHT CLUBS AND MARINA ALONG THE THE WINTHROP HARBOR	52
TABLE 10.	CHEMICAL COMPOSITION OF COMPOSITE SAMPLES IN WINTHROP HARBOR IN 1995.	60
TABLE 11.	WINTHROP HARBOR MASTER VESSELS	63
TABLE 12.	DEMOGRAPHIC CHARACTERISTICS: TOWN OF WINTHROP AND ITS WATERFRONT AREA	71
TABLE 13.	OCCUPATIONAL CHARACTERISTICS: TOWN OF WINTHROP AND ITS WATERFRONT AREA	71
TABLE 14.	EMPLOYMENT CHARACTERISTICS: TOWN OF WINTHROP AND ITS WATERFRONT AREA	73
TABLE 15.	EXISTING AND POTENTIAL RETAIL SALES WITHIN THE HARBORFRONT AREA OF WINTHROP	78
TABLE 16.	SUMMARY OF IMPLEMENTATION ACTIONS AND SCHEDULE.....	82

EXECUTIVE SUMMARY

Introduction

The Town of Winthrop has a vision to provide more recreational opportunities, improve options for commercial and recreational uses, increase public access to Winthrop Harbor and beyond, and improve the businesses that rely on the waterfront and its uses. The Plan provides the Town with a series of strategies and funding opportunities, and an implementation schedule to help reach its goals and achieve this vision. It reflects the desires and needs of the community and users of the harbor.

The recommendations within this Plan are the result of committee meetings and community participation through interviews and discussions with key stakeholders, along with local, state, and federal agencies. They were based on a variety of criteria and conditions including potential benefit to the local economy, appropriate uses, and impacts to the harbor.

Vision and Goals of the Harbor Assessment and Plan

The Plan envisions the Harbor to provide a resource for boating and passive recreation in a natural setting for the community of Winthrop. This Plan sees the Harbor as a vibrant area that supports both recreational and commercial uses on both the water and the waterfront. The Harbor and waterfront should be a resource for commercial fishermen, families, sailors, beach goers, and other users now and for future generations as well.

The overall purpose of this report is to assess the conditions of the harbor and its waterfront and to prioritize strategies and funding opportunities that can help the waterfront support the vision and goals. The Plan will also present options to develop and manage specific areas according to the goals of the Plan.

The Plan proposes to substantially improve commercial and recreational opportunities and increase access to the waterfront. Central to this Plan is the construction of a multi-use pier and dredging of the federal channel. Infrastructure requirements such as the stormwater system and stairways at public access points would need improvement as well. This will help unlock additional uses, access, and private development of existing and new businesses along the waterfront. Private investments to the marina facilities and in the open space areas would be needed to make the Harbor more enjoyable, aesthetically pleasing, and a safe boating and recreational area for the community of Winthrop.

Key Findings

During the development of the Winthrop Harbor Assessment and Plan, information was collected, reviewed, and analyzed from current plans and documents, Town assessor data, previous studies, federal, state, local economic and Census data, and conversations with key Town staff, businesses, and individuals. From this analysis, the following key findings were used to support the recommendations of this Assessment and Plan.

Waterside Findings

Winthrop Harbor as a Unique Resource

The Town has a unique resource: a protected harbor with direct access to both Boston Harbor and the Atlantic Ocean. With over four miles of harbor frontage, there are many opportunities for the public to access Winthrop Harbor.

Construction of a Multi-use Pier to Commercial Vessel Uses

The commercial fishing fleet, including mainly clammers and lobstermen, has been declining and has limited waterside and landside support facilities. There is strong support to invest in a multi-use pier in order to provide fishermen and other commercial uses, such as passenger and charter vessels, with a place to park vehicles, drop off fishing gear and passengers, tie up their vessels, and similar commercial vessel support operations.

Recreational Boating

There are four private clubs that operate marinas and three separate marinas on the Harbor. The Town supports a significant number of moored vessels in the Harbor. All of these vessels generate substantial waterfront activity, especially during the busy summer season.

Navigation and Dredging

Although the Harbor was dredged in the past five years, there are several channels that need to be dredged to ensure navigation and access to the Harbor and environs and to support the commercial and recreational uses of vessels as well as the businesses along the waterfront.

Shoreline Change

There have been significant changes in the shoreline over the past hundred years due mainly to dredge and fill operations. No major changes in the shoreline are seen in the near future.

Landside Findings

Tourism

The waterfront has no major tourism attractions except for several small charter boat, sport fishing operations. There is potential, however, to increase tourism and use of the waterfront by improving its infrastructure, access to the waterfront, and businesses that provide lodging.

Economic Opportunities

Restaurants and retail businesses in Winthrop now capture only about 22% of the town residents' yearly retail spending potential. Significant potential exists for these markets to be successful, relying mostly on Winthrop residents.

Public Access to the Water and Support Infrastructure

The location of the Harbor and its natural features will allow the public to have direct access to the Harbor and beyond. Although there are many places for the public to access the waterfront along the Harbor, it is limited due to the poor condition of its walls, stairs, and other infrastructure. The Town has the opportunity to increase waterfront access that encourage use of the Harbor without changing its character, so that it can be used for many generations. Several key facilities, such as the Town Landing and the former rail bed, can provide substantial opportunities for increased public access, and would require substantial funding.

Zoning

Recent zoning changes were made to encourage mixed-use developments on the waterfront. Additional changes in the zoning ordinance to allow bed and breakfast operations could help support an increase in tourism.

Homeland Security

The proximity of the harbor and waterfront to Boston Harbor and Logan Airport runways is of major concern to the community. The Town of Winthrop needs to be involved with Boston Harbor and Airport security plans to ensure that safety and well-being of its residents and users of Winthrop Harbor.

Key Recommendations

The Winthrop Harbor Assessment and Plan is intended as a practical map for future actions. Changes to the recommendations may necessitate additional public comment, permits, additional study, and town approvals depending on available funding and changes in the development of the waterfront.

The Plan seeks to utilize the commercial harbor front, preserve the residential areas, and protect its natural resources. Maintaining and enhancing the existing uses and facilities of the marinas and yacht clubs along the waterfront would help accomplish this.

The Plan also provides recommendations to increase commercial fishermen's' and the public's access and use of the Harbor by creating a multiuse pier at the Town Landing, improving public access structures along the harbor front, and designating new waterfront paths. It also seeks to improve access from the waterside by dredging the Federal Channel and the channel under Belle Isle Bridge. Improvements to the management of the Harbor

would be through a new Harbormaster Office at the Town Landing and revenue increases for moored vessels and new ramp fees. Recommendations for the commercial waterfront areas focus on streetscape improvements and changes in the zoning to allow more lodging businesses that are compatible with neighborhood character of this area.

The multi-use pier, a key project of this Plan, would be built at the Town Landing on Shirley Street. Potential waterside uses at the pier would include pier and berthing space for a variety of vessel types such as passenger vessels, ferry, commercial fishing boats, Harbormaster boats, dinghies, and transient vessels. Landside uses would include a Harbormaster office, ticket booth, pickup/drop-off area, and a place for temporary storage of commercial fishing gear. This type of development would set the stage for other water and non-water dependent uses including increased business along Shirley Street as a result of more people being attracted to and using the multi-use pier.

The following recommendations were designed to achieve the Town's overall goals for use of the harbor and waterfront, and have evolved in response to an analysis of the current conditions, issues, and resources, and comments and suggestions from businesses, residents, and members of the Harbor Plan Committee. The recommendations are summarized into three categories:

1. Waterside Recommendations

- Build a multi-use pier and operations facility at the public landing.
- Dredge Federal Channel
- Dredge Belle Isle Inlet.
- Continue Winthrop Beach Re-nourishment Program.
- Improve the boat ramp at the Town Landing.
- Investigate stabilization of Snake Island.
- Improve control of water at the Lewis Lake tide gate.

2. Landside Recommendations

- Develop the proposed HarborWalk
- Improve infrastructure (stairs and walls) at public access points
- Repair/replace Bridge over Belle Isle Inlet
- Design and implement Shirley Street streetscape improvements

3. Program and Regulatory Recommendations

- Develop a management plan for the Town Landing.
- Implement a new public access and signage program.
- Promote waterfront uses and benefits.
- Strengthen programs with existing waterfront users and advocates.
- Establish launch fees at the Town Landing.
- Increase Town mooring use and fees.
- Update and implement the shellfish management plan.
- Maintain existing businesses and attract new ones.
- Modify zoning to allow for Bed & Breakfast lodgings.

I. INTRODUCTION

Overview

Winthrop Harbor is the Town of Winthrop's greatest asset: it provides a mix of economic, recreational, and transportation opportunities and benefits to the community and its users. Located on the eastern edge of Winthrop, the Winthrop Harbor and adjacent land areas provide boaters with a calm and protected harbor. Its scenic waters and public access points provide panoramic views of the Boston Harbor and skyline, and its location allows direct vessel access to commercial fishing and recreational opportunities in Boston Harbor, the Atlantic Ocean, and points beyond. The harbor front has numerous businesses that have excellent water access, and its recently dredged harbor is home to hundreds of moored vessels. Winthrop Harbor, however, lacks investments to its infrastructure and assets that could create additional opportunities and uses to benefit the Town, residents, and businesses.

The Winthrop Harbor Assessment and Plan identifies its assets and resources on both the waterside and landside, and provides a series of recommendations that support its use and continued enjoyment by the residents, businesses, and visitors. It outlines feasible harbor development projects and describes the implementation process and costs associated with the proposed recommendations that will help realize its potential for recreational, commercial, and other waterfront opportunities. The Harbor Assessment and Plan is the result of a series of meetings, input from users, and extensive analyses of the existing conditions and potential opportunities on the Harbor and along the waterfront.

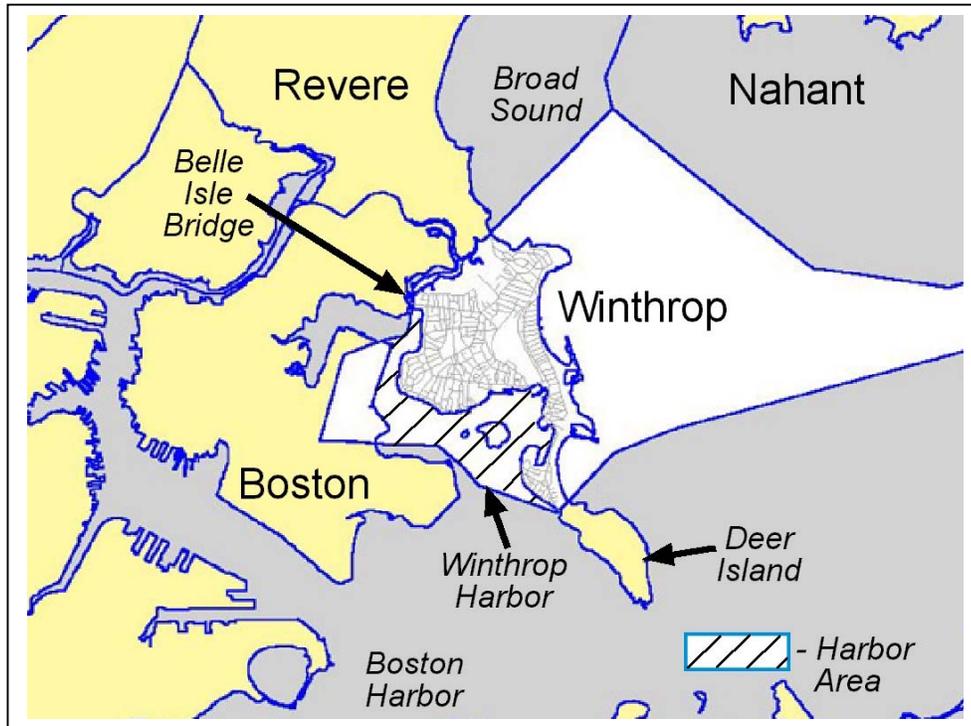


Study Area of the Plan

The planning area incorporates all the land, activities, and waterfront uses in and around Winthrop Harbor and its adjacent properties. This area encompasses approximately one square mile of water area and 4.4 miles of shorefront along the harbor (see Figure 1). In addition to the areas that are the focus of the planning efforts, the study has addressed conditions in the surrounding areas that attract people to the area and have a direct impact on the uses at Winthrop Harbor. These areas include

the adjacent Deer Island, Belle Isle Marsh and Greenway, Boston Harbor Islands, and the Winthrop beaches.

Figure 1. Study Area of the Winthrop Harbor Assessment



Source: MassGIS data base, 2004 and The Cecil Group, 2004.

Organization of the Plan

The organization of this Report includes the following elements:

- Executive Summary
- Introduction
- Existing Conditions
- Implementation Plan and Strategies
- Appendices

The recommendations of the Plan were derived in part from several sources:

- Previous reports, studies, and legal documents
- Meetings with the Harbor Plan Committee
- Interviews with key stakeholders in the Harbor
- Interviews with town, state, and federal officials
- MassGIS database
- The Cecil Group consultant team including FXM Associates and Vine Associates

Planning Process and Involvement

The Plan was prepared for the Town of Winthrop, Massachusetts. The Winthrop Harbor Plan Committee guided the planning effort throughout the process, which began in June 2004. A consultant team led by The Cecil Group, which included several team members from Vine Associates and FXM Associates, provided professional assistance.

Goals of the Master Plan

A set of goals and objectives were developed during the initial stages of the planning process. They also helped formulate a vision for this Plan. They were summarized from the workshop on Planning Goals and discussions with members of the Harbor Plan Committee and the Harbor Management Committee. They were ranked by members of these committees, and are organized with the highest ranked subjects first. The goals provided the basis for the planning recommendations and help set the priorities for these actions.

1. Commercial Fishing

- Support development of a commercial fishing dock and landside support area.
- Ensure commercial fishing vessels have sufficient shorefront facilities to conduct business.
- Fund infrastructure projects that support commercial fishing.
- Establish a shellfish management plan and fees.

2. Dredging

- Ensure harbor depths, navigation, and Federal Channel are improved and maintained to support commercial and recreational uses.
- Dredge areas as necessary to improve access for commercial and recreation vessels.
- Support dredging projects that ensure all areas are stabilized and minimize repeat dredging.
- Support dredging projects that improve the safety and security of the Harbor.
- Stabilize Snake Island to minimize repeat dredging in the Harbor.

3. Economic Development

- Maximize the potential of the Harbor in the context of economic development goals of the Town.
- Support water-dependent commercial uses.
- Ensure commercial fishing vessels have sufficient shorefront access to conduct business.
- Ensure public investment in the waterfront infrastructure will support and encourage private investment.
- Maintain balance with tourism and recreational uses and developments.
- Support development of the commuter ferry and pier.

4. Infrastructure

- Improve all waterside infrastructures so they improve water quality, public access, and safety along the Harbor.
- Improve infrastructure so that there are minimal barriers to the functionality and use of the Harbor.
- Support development of a commercial fishing dock and landside support area.
- Support development of a Town Pier.
- Ensure Belle Isle Bridge is rebuilt with increased height to allow for larger vessels and increased safety.
- Support development of a dock to house the Harbormaster, commuter ferry, and other water-dependent public uses.
- Support the on-going reconstruction and beach re-nourishment program for Winthrop beaches.
- Ensure boat ramp at the Town Landing provides adequate and safe access for the boating public.

5. Public Access

- Protect and enhance public access to the waterfront and on the water for the Winthrop community.
- Increase public access to the waterfront for recreational uses.
- Create a compatible recreational and commercial fishing dock.
- Improve use of public access areas with signs, maps, and amenities that invite the residents and visitors to use the waterfront.
- Improve access and parking for all transportation modes and emergencies.

6. Environment/Natural Resources

- Protect and enhance the environmental quality of the harbor as an integral component of any proposed development.
- Ensure Best Management Practices are used on any state, local, or private waterfront project.
- Support development of an ecological/educational center near proposed Town pier.

7. Homeland Security

- Ensure Town officials and Harbormaster are fully involved and coordinated with homeland security and safety plans and operations with Massport and the Coast Guard.
- Establish a harbor security, safety, and emergency plan with appropriate officials.
- Ensure the Harbormaster can effectively serve the community with the appropriate office space and equipment.

Existing Conditions

The consultant team identified the existing conditions of the harbor and waterfront. This assessment included property and regulatory information, public access, maritime uses, homeland security, pollution, and recreational activity and tourism. This information was collected through both primary and secondary resources including site visits, direct and phone conversations with several Town of Winthrop departments and state and federal agencies, and meetings with the Harbor Plan Committee.

Recommendations and Implementation

A draft and final plan including strategies, funding opportunities, and an implementation schedule emerged from input and discussions with town and state agencies, the Harbor Plan Committee, business owners, Town staff, the information assessment that provided an understanding of current harbor conditions, and the goals that helped direct efforts and development of the recommendations.



II. HISTORY

Setting

The Town of Winthrop is a small coastal community located approximately five miles east of Boston proper, and borders the communities of East Boston, Chelsea, and Revere. It had a population of 18,303 according to the US Census 2000.

Winthrop Harbor is located adjacent to the Town of Winthrop. It is situated on the northeastern side of Boston Harbor, to the east of Logan International Airport. Technically, the Harbor is named Boston Harbor, but the name Winthrop Harbor is used locally (and in this Assessment) to distinguish it from other waters.

In general, the Harbor is relatively quiet and with most boating activity occurring during weekends and the summer months. There are several, marinas, yacht clubs, and boat yards along the harbor front. A marina and two yacht clubs are located further inland in the neighboring communities of East Boston and Revere.

History of the Harbor Area

The history of Winthrop Harbor is tied to both its natural and built changes and is reflected by the current configuration and uses.

Geologic Formation of Winthrop

The configuration and topography of the land in and around Winthrop Harbor, which is actually part of Boston Harbor, was a series of landmasses, drumlins, and water. Drumlins were formed at the edges of retreating glaciers that left piles of rock and debris over 6000 years ago. Many of these drumlins remain today including Cottage Hill and Deer Island. Parts of the drumlins have eroded and contributed to the formation of the beaches and filling in of the water area, such as Shirley Gut, to form the present day Winthrop. Belle Isle Marsh is also sheltered among the drumlins in Revere and Winthrop.

The Built Harbor

Winthrop was settled in 1630, mainly as a sparsely settled agricultural community, and remained that way for several hundred years. In 1852, it was incorporated as a town. The community changed substantially in the late 19th Century due to the thriving economic activity in Boston and the transportation revolution.

During the 1900's, there were a series of events that change the uses and configuration of the Harbor:

- By the 1920's, the Narrow Gauge Railroad had an extensive network of stations throughout Winthrop.

-
- Part of the Harbor and Belle Isle Marsh was filled to form the rail beds that remain today.
 - The expansion of Logan Airport during and after the 1950's filled much of Boston Harbor and incorporated several small islands (Governor's and Apple).
 - Dredge and fill operations during this expansion resulted in several depressions and in Winthrop Harbor and the creation of new land such as Caughlin Park and the Town Landing.
 - A tide gate was constructed early 1900's to form Lewis Lake and prevent flooding tidal pond and adjacent land.

These and other developments have led to the present day have shaped, molded, and supported additional developments that have led to the present configuration and use of Winthrop Harbor.

III. EXISTING CONDITIONS

Overview of Harbor Uses

Winthrop Harbor is currently used for both commercial and recreational boating. Its configuration and depth allow many vessels to utilize its waters. The Harbor can now accommodate large vessels, especially sailboats with deep drafts, since the mooring areas were dredged in 2001 to a depth of 6 feet (mlw). Several shallow areas in the Harbor restrict vessel navigation, but they do not present a major problem for boaters.

Physical Description of the Harbor

Winthrop Harbor is located at the entrance of Boston Harbor on the East side of the Town of Winthrop. The harbor area, about one square mile in size, has a variety of natural resources and physical features that make in a attractive place to moor and dock vessels as well as access the Harbor. The waterfront portion of the harbor is approximately 4.4 miles long and has many coastal features. Its edges also offer excellent views of Boston Harbor, the City of Boston, and the Atlantic Ocean from many of the street fronts, adjacent hills, and access points.

The Harbor is generally accessed by water from the south between Logan Airport on the west side and Deer Island on the east side. Boaters can choose one of two main channels to continue access to the harbors facilities. The eastern channel provides access to the main boat ramp and several marinas. The western channel, which continues past the airport runways provides access to several yacht clubs and marinas, Belle Isle Marsh and inlet, and to a beach and several marine facilities in East Boston and Revere. Snake Island, a small, protected island lies in the middle of Winthrop Harbor between the two channels.

Boston Harbor and Massachusetts Bay

Massachusetts Bay and Boston Harbor provide an excellent opportunity for the boating public. The location of Boston Harbor, its islands, Boston waterfront, and its marina facilities allows direct access to many points in Winthrop Harbor. The open waters of Massachusetts Bay and the Atlantic Ocean are only a half mile from Winthrop Harbor. These features are attractive for both commercial and recreational boaters transiting to and from Winthrop Harbor and open waters as well.

Property and Regulatory Information

Winthrop's waterfront and harbor fall under the jurisdiction of several regulatory authorities. This section identifies local, state, and federal regulations that control and regulate the use of the waterfront properties and harbor activities. It also identifies licenses that grant use of the waterfront for public access and private projects.

Regulatory Overview

Some of the recommendations within this Plan are guided by regulations, at the local, state, and federal levels. The clam flats adjacent to the Logan Airport runways, for example, are restricted to permitted users due to security concerns.

Moreover, environment regulations have to be considered when planning for the new uses, especially regarding activities near the shoreline and within protected buffer zones. For example,

- Waterfront developments are subject to many state and federal agency regulations.
- The Department of Conservation and Recreation (DCR) designated Belle Isle Marsh as an Area of Critical Environmental Concern, and much of it is subject to the Department of Environmental Management and DCR jurisdiction and regulations.

Current regulations also control the number of moorings and berths in the Harbor. Regulatory approval by the DEP, Army Corps of Engineers, and other agencies may be required in order to increase the number of vessels in the Harbor.

Additional constraints in planning for alternative harbor uses include land features, local and adjacent land uses, and infrastructure conditions. For example, there are several shoal areas in the Harbor that cannot be used for mooring vessels, and some of the ramps are have restricted access due to the tides.

State Regulations: Chapter 91

Winthrop's waterfront and harbor is subject to M.G.L. Chapter 91 (Public Waterfront Act). The waterways regulations (310 CMR 9.00) that were adopted to implement this law ensure that the Commonwealth's tidelands are utilized only for water-dependent uses or a public benefit to the water when there is a project to develop or alter the waterfront. The Waterways Regulation Program of the Massachusetts Department of Environmental Protection (DEP) administers the Chapter 91 licensing program.

Chapter 91 applies in tidelands, great ponds, and along certain rivers and streams. Tidelands refer to all land presently or formerly beneath the waters of the ocean. On the landside, tidelands extend to the natural high water mark, i.e., the farthest landward tide line which existed "prior to human alteration" by filling, dredging, impoundment or other means. Generally, DEP jurisdiction applies to all filled as well as flowed tidelands.

Activities Subject to Chapter 91

Chapter 91 authorizations are generally required for the placement of fill, building of structures, and dredging in tidelands. Types of structures include piers, wharves, floats, retaining walls, revetments, pilings, bridges, dams, and waterfront buildings (if

on filled lands or over the water). A new license also may be required if there has been a structural change or change in use of a previously licensed structure.

Water-Dependent Uses

In general, uses licensed under the waterways program must either be water-dependent or "serve a proper public purpose that provides greater benefit than detriment to the rights of the public in said lands." In general, a water-dependent use is one that requires direct access to or location in tidal or inland waters, and therefore cannot be located away from said waters. A full definition of water-dependent uses can be found in the regulations (310 CMR 9.12(2)). Among the uses defined as water-dependent that are likely to apply to Winthrop are:

- Marinas, boat basins, channels, storage areas, and other commercial or recreational boating facilities;
- Facilities for fishing, swimming, diving, and other water-based recreational activities;
- Parks, esplanades, boardwalks, and other pedestrian facilities that promote use and enjoyment of the water by the general public and are located at or near the water's edge, including but not limited to any park adjacent to a waterway and created by a public agency;
- Waterborne passenger transportation facilities such as those serving ferries, cruise ships, commuter and excursion boats, and water shuttles and taxis;
- Dredging for navigation channels, boat basins, and other water-dependent purposes and sub-aqueous disposal of the dredged materials below the low water mark;
- Navigation aids, marine police and fire stations, and other facilities that promote public safety and law enforcement on the waterways;
- Shore protection structures, such as seawalls, bulkheads, revetments, dikes, breakwaters, and any associated fill which are necessary either to protect an existing structure from natural erosion or accretion, or to protect, construct, or expand a water-dependent use;
- Flood, water level, or tidal control facilities;
- Discharge pipes, outfalls, tunnels, and diffuser systems for conveyance of stormwater, wastewater, or other effluents to a receiving waterway.

Designated Port Area and Harbor Boundaries

Designated Port Area

The Massachusetts Office of Coastal Zone Management (MCZM) established Designated Port Areas (DPA) to encourage water-dependent industrial uses at 12 ports. In general, water-dependent industrial uses are those industrial and infrastructure facilities that are dependent on marine transportation or require large volumes of water to be withdrawn from or discharged to a waterway for cooling, process, or treatment purposes. Since there is no DPA in Winthrop, waterfront uses are not bound by DPA regulations that generally require licenses for specific water-dependent uses. The nearest DPA is along the shipyard area of East Boston.

Harbor Boundaries

The boundaries for Winthrop Harbor determines the resources, facilities, structures, and uses that were documented as part of this Harbor Assessment and Plan (see Figure 1). In a clockwise fashion, the harbor boundary extends from the former trolley bridge in Belle Isle Inlet along the western coast of Winthrop to the City of Boston boundary at Deer Island. From there, it extends west through Boston Harbor to Logan Airport and follows the Winthrop town land (airport runways) north where it crosses back over to the former Belle Isle trolley bridge.

Public Waterfront Licenses

Table 1 presents a summary of the private and public waterfront structures and facilities located within Winthrop Harbor and available Chapter 91 license information. Due to the inability to readily identify the ownership of many of the waterfront structures listed, the locating of license information was limited. A full record deed search may reveal additional licensing information; however, such an effort is considered beyond the present project scope. Copies of the available Chapter 91 licenses as identified in Table 1 are presented in Appendix A.

Table 1. Public Waterfront Licenses for Coastal Structures in Winthrop Harbor

License Number	License Name	Awarding Authority ¹	Structure Location	Structure Type and Notes
10	John Winthrop Realty	E	Pleasant Street below PPYC	rip rap, fill, piles, railway, timber bulkhead **located in PW books, not DEQE binders **
27	Jennie M. Dellano	DPB	end of Sargent Street	pile pier
63	Willard M. Bacon	DPB	off Washington Avenue at Elmwood	seawall, fill - same plan as 64
64	E.A. Creeley & C.P. Tewksbury	DPB	off Washington Avenue at Elmwood	seawall, fill - same plan as 63
74	Robert E. Sproule	CWPL	end of Sunnyside Avenue	ocean swimming pool
190	Cottage Park YC	DPB	end of Orlando Avenue	pile bent foundation
215	BRB&L RR	DPB	off Grand View Avenue end of Otis Street	wharf
236	BRB&L RR	CWPL	end of Winthrop Street	bulkhead, fill
587	C.E. Stevenson	HL	unknown	solid wharf
602	O.F. Belcher	HL	end of Harbor Avenue	solid wharf
607	Pleasant Park YC	E	562 Pleasant Street	granite block seawall, fill, piles, floats
614	Sarah M. Lunt	PW	off Pleasant Street	timber bulkhead/solid fill
652	Anthony C. Gregory	E	466 Pleasant Street	timber pier, piles, floats ramp
727	William B. Rice	HL	off Shirley Street at Beacon	wooden pier
740	Albert C. Moody	HL	off Johnson Avenue	pile wharf
755	Town of Winthrop	HL	Crystal Cove	bridge
760	EJBSP&PS RR	HL	end of Railroad at end of Shirley Street	wharf
798	George H. Tyler	HL	unknown	wharf
875	George H. Wood	HL	end of Sunnyside Avenue	wharf and walkway
877	BW&S RR	HL	throughout harbor in channel	drive 8 piles
908	Pleasant Park YC	PW	560 Pleasant Street	piles
919	BRB&L RR	PW	Crystal Cove drawbridge	submarine cables
925	O.F. Belcher & J.B. Huchins	HL	end of Woodside Avenue	solid/timber wharf
978	Cottage Park YC	E	end of Orlando Avenue	piles, floats
1049	BW&S RR	HL	Crystal Cove	bridge, railroad
1058	Nelson M. Powell	PW	474 Pleasant Street	timber pier, rail incline
1071	Harvey A. Maibor	E	31 Court Road	pier, ramp, piles, floats
1071	Jesse L. Scott	HL	off Shirley Street at Crystal Cove Avenue	pile structure
1072	Atlantis Marina	E	off Pleasant Street	piles, floats, ramp, revetment
1194	C.E. & S.E. Stevenson	HL	end of Pico Avenue	fill
1215	Town of Winthrop	PW	Bay View Avenue @ Triton	fill
1229	Willis J. Reid	PW	550 Pleasant Street	timber pier
1253	Ezra B. Whittier	HL	off Shirley Street between Shirley Avenue	timber pier

1291	Town of Winthrop	HL	Along Shirley Street from Shirley Avenue to Shirley Avenue	rip rap, solid fill
1321		NEP		
1325	Gray Taft	HL	Point Shirley	pile wharf
1339	Winthrop YC	PW	off Shirley Street	piles
1389	Walter G. Baker	PW	63 Main Street	fill
1406	David J. Goll	E	Court Road @ ramp	pier, gazebo, ramp, float
1410	Pleasant Park YC	PW	562 Pleasant Street	platform, piles
1445	Winthrop YC	HL	off Shirley Street at Shirley Avenue	pile wharf
1506	Winthrop YC	HL	off Shirley Street at Shirley Avenue	clubhouse, pier, floats
1537	Orlando E. Lewis	HL	off Shirley Street south of Beacon	wharf
1602	Winthrop YC	E	off Shirley Street	piles, floats
1651	Atlantis Marina LP	E	off Pleasant Street	floats, pier, ramps, bulkhead, fill
1695	Linus M. Child	HL	off Shirley Street at Crystal Cove	timber pier
1710	Town of Winthrop	HL	Washington Avenue bridge	fill
1743	BRB&L RR	HL		North of Washington Avenue
1775	Anrthur H. Wolcott	HL	off Pleasant Street at Edgehill	pile wharf
1816	BRB&L RR	HL	Belle Isle Inlet	pile bridge
1838	Orlando E. Lewis	HL	off Shirley Street at Perkins	pile wharf, fill, dredge
1839	Orlando E. Lewis	HL	end of Bartlett Road	pile wharf, fill, dredge
1868	Orlando F. Belcher	HL	Cottage Park Road to Orlando Avenue	solid fill
1902	BRB&L RR	HL	Crystal Cove	solid fill
2044	Charles M. Partebow	HL	south of railroad pier at end of Shirley Street	marine railway
2056	David J. Goll	E	Court Road @ ramp	pier, float
2128	Oliver Corporation	PW	east of Point Shirley YC	pier, float
2187	Luther Harrington	HL	Crystal Bay off Shirley Street	pier
2300	BRB&L RR	HL	Crystal Cove	widening of solid fill bridge
2362	Orlando E. Lewis	HL		North of Washington Avenue
2371	Pleasant Park YC	PW	560 Pleasant Street	dolphins
2424	Norman F. Siefert	E	41 Court Road	bulkhead, pier, ramp, floats
2486	Willis J. Reid	PW	off Pleasant Street, south of Pleasant Park YC	pier
2545	BRB&L RR	HL	Crystal Cove	train trestle, fill pile bridge
2567	Town of Winthrop	PW	end of Grand View Ave	seawall, fill
2599	Pleasant Park YC	E	562 Pleasant Street	piles, floats
2648	Cottage Park YC	E	end of Orlando Avenue	floats, ramps, piles
2721	Jerimiah Green	HL	off Main Street west of Pleasant	bulkhead, pile wharf, fill, dredge
2731	Port Shirley Club	HL	north of end of Shirley Street	pile wharf
2826	Winthrop YC	HL	off Shirley Street at Shirley Avenue	pile structure
2951	Cottage Park Hotel Corp	HL	end of Cottage Park Road	swimming tank (embankments, dredge)
3160	Cottage Park	HL	end of Cottage Park Road	pile supported

	Hotel Corp			structure, swimming pool
3169	Cottage Park Yacht Club	HL	end of Orlando Avenue	float
3209	D.T. Sea Realty Trust	E	529 Shirley Street (CCMarina)	rip rap, fill, pier, piles, ramps, floats
3235	Gordon G. Fullerton	PW	Main Street @ Pleasant	rip rap, fill
3285	Pleasant Park YC	PW	560 Pleasant Street	rip rap, fill, marine railway
3355	D.B. Hoar & W.H. Dunbar	HL	off Washington Avenue east of River	rip rap, fill
3357	Winthrop Lodge of Elks	PW	off Washington Avenue	rip rap, retaining wall, fill, building
3405	Point Shirley YC	HL	end of Otis Street	pile pier
3429	D.B. Hoar & W.H. Dunbar	HL	Washington Avenue at Crystal Cove	seawall, fill, culvert ** need text **
3452	Cottage Park Hotel Corp	HL	end of Cottage Park Road	pile supported structures
3550	Charles J. Famolare	E	55 Court Road	pier, ramp, float
3585	Pleasant Park YC	HL	off Pleasant Street	clubhouse, piles, floats
3706	Pleasant Park YC	PW	off Pleasant Street	fill, marine railway, beached scow, float, dolphins, piles
3730	Winthrop YC	PW	off Shirley Street	piles, pier, floats
3753	Gordon G. Fullerton	PW	Main Street @ Pleasant	rip rap, fill
4082	Cottage Park YC	E	end of Orlando Avenue	concrete seawall
4152	Testa Realty Trust	E	97 Court Road	bulkhead & pier
4239	A.C. & M.A. Bangs	PW	181 Court Road	pier, float
4372	Viking Realty Trust	PW	Shirley Street @ Perkins	rip rap, fill
4407	Winthrop Lodge of Elks	PW	off Washington Avenue	rip rap, pile platform, fill
4480	Town of Winthrop	PW	end of Pico Avenue	jetty
4517	Viking Realty Trust	PW	Shirley Street @ Moore	steel bulkhead, fill, dredge
4605	George Barisano	E	436 Pleasant Street	seawall
4697	Viking Realty Trust	PW	Shirley Street @ Perkins	rip rap, steel bulkhead, fill, piles, footbridge, dredge
4771	Winthrop YC	PW	off Shirley Street	pier, piles, floats
5119	Winthrop YC	E	off Shirley Street	floats, reconfiguration zone, deck
5551	Albert Pratt & Alan Butler	E	165 Tafts Avenue	seawall
5618	Ronald D'Amore	E	480 Pleasant Street	bulkhead, pier, ramp, float
5664	Winthrop Lodge of Elks	E	191 Washington Avenue	pier, ramp, floats, piles, reconfiguration zone
5698	Viking Realty Trust	PW	529 Shirley Street	rip rap, dredge, fill
5944	Winthrop YC	PW	off Shirley Street	piles, floats, platforms
6138	Winthrop YC	PW	off Shirley Street	piles, floats
6223	A.H. & S.R. Stewart	PW	end of Elmwood Court	timber pier
6230	Cottage Park YC	PW	end of Orlando Avenue	piles, floats, deck
6412	Carmelo & Sandra Lafrazia	E	111 Court Road	retaining wall, pier, stairs
7392	Linda Cioppa	E	440 Pleasant Street	seawall, stairs

7415	Town of Winthrop	E	Pleasant Street at Brookfield	seawall
8487	James & Julie Marcotte	E	227 Court Road	deck, pier, ramp, float
8966	Keith Dreyer	E	68 Johnson Avenue	pier, ramp, float
9747	Town of Winthrop	E	Shirley Street	ferry terminal, hm building, pier, ramps, floats, revetment
10047	William & Cheryl DiCenso	E	169 Court Road	seawall, pier

1. Awarding authority codes: E - DEQE, HL - Harbor & Land Commissioners, PW - Department of Public Works, PBA - Port of Boston Authority, DPB - Directors of the Port of Boston, CWPL - Commission on Waterways & Public Lands, NEP - Not DEQE or PW (older or could be typo)

Comparison of Maps for Shoreline Change

When our coastlines were undeveloped, shoreline erosion happened but it went largely unnoticed. Now, however, coastal development is threatened by several factors:

- The normal erosion process,
- A potential rise in sea level throughout the region, and
- Storm-related surges of ocean water that can destroy property within a few hours.

As a result, more and more oceanfront property owners and state and local departments have built structures such as sea walls in order to protect their properties and people from flood and storm damage.

This section identifies areas where the shoreline has changed based on state maps and aerial photographs. These changes reflect both the erosion and accretion of material to and from an area. Other areas may have changed, but have not been surveyed, documented, or made available to the public at the time of this writing.

Shoreline Changes based on Historic Maps

Several historic maps reveal the extent of shoreline change over the past 300 hundred years (see Figures 2 and 3). Although the earlier maps from the 1775 and 1894 do not replicate actual boundaries with the accuracy of today's maps, they do show many changes in the water and land area including:

- The lack of fill between the drumlins (hills formed from glacial deposits) and lowlands in and around Winthrop,
- Filled marsh areas such as the former tidal marsh where Lewis Lake is now located,
- New structures in the tidal waters such as the former trolley rail bed, and
- Filled waterways in Boston Harbor such as the area southwest of Winthrop that was filled to make the runways for Logan Airport.

Shoreline Changes based on Recent Maps

Topographic maps by the United States Geologic Survey (USGS) from 1903 and 1950 reflect a more accurate configuration of the shoreline change than previous maps (see Figures 4, 5, and 6). The 1903 map shows:

- Apple Island in Boston Harbor prior to any filling for the airport runways,
- The lack of land where Coughlin Playground is now located,
- The trolley bridge, and
- Shirley Gut between Winthrop and Deer Island.

The 1950 map shows:

- Part of Boston Harbor filled to support the airport runways,

-
- Shirley Gut filled,
 - The trolley bridge removed, and
 - The extension of the Coughlin Playground area.

Shoreline Change Study

A recent study of various parts of the Massachusetts coastline by MCZM identified the changes in the shoreline from the previous maps and other area maps and photographs over the past 150 years. Part of this study included the southern part of Winthrop Harbor between the Town Landing and Deer Island (see Figure 6). The major changes were at Coughlin Playground and the land between Winthrop and Deer Island, formerly called Shirley Gut. Both of these areas show an increase of land and fill during this time.

Figure 2. Historic Map of Boston Harbor, 1775

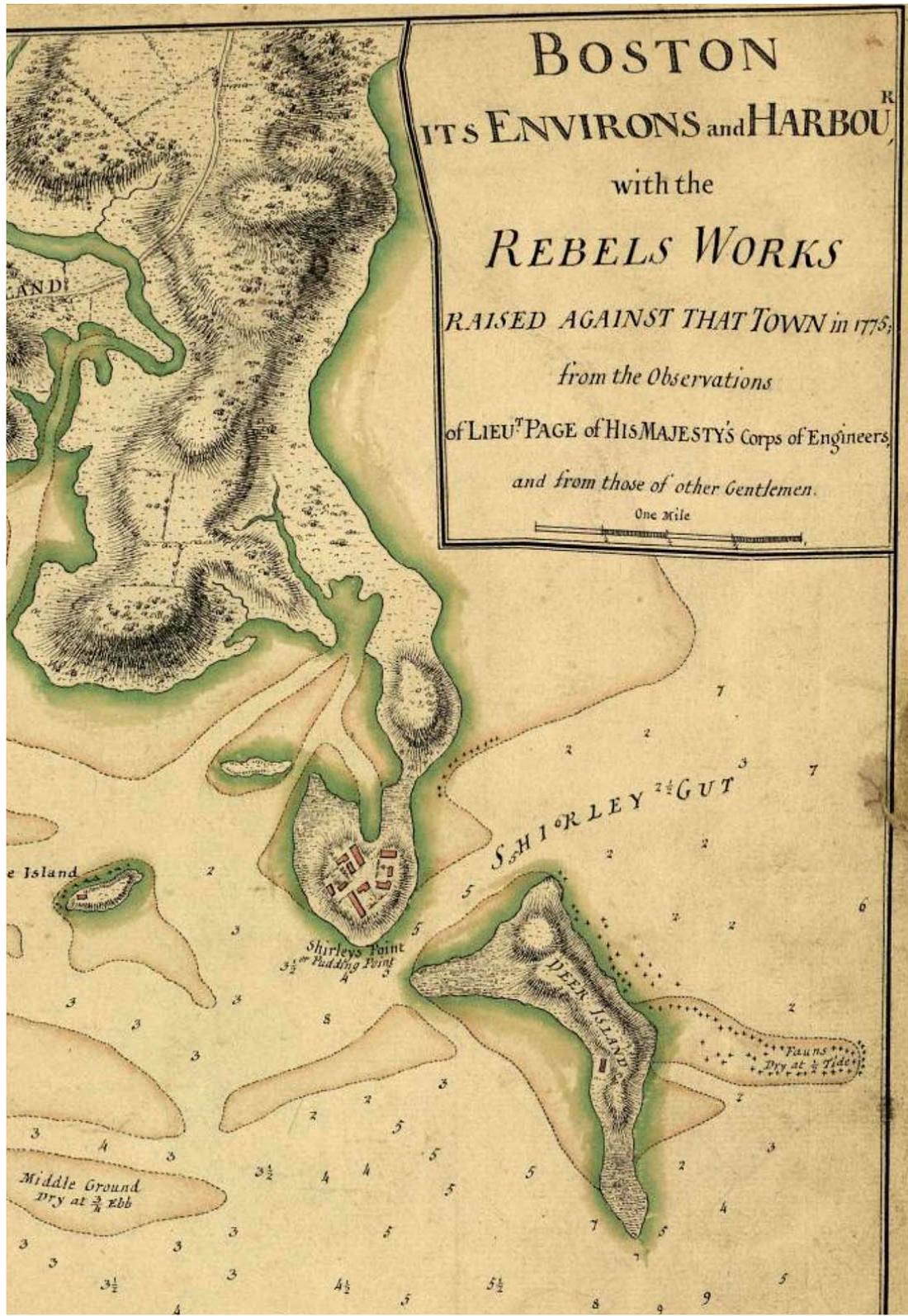


Figure 3. Historic Map of Boston Harbor, 1894



Figure 4. Historic Map of Boston Harbor, 1903

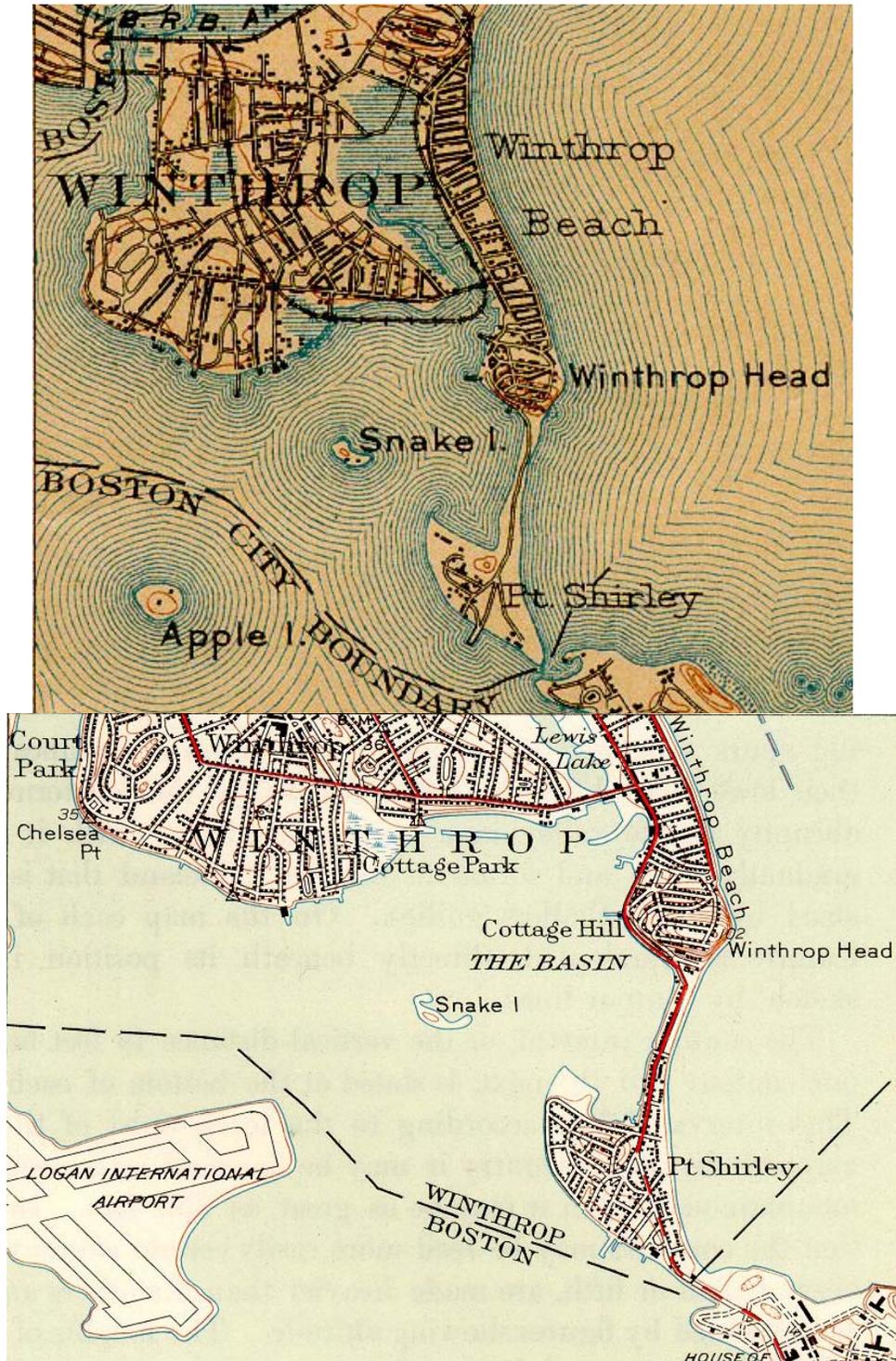


Figure 6. Shoreline Changes in the Southern Portion of Winthrop Harbor, 1847 - 2002



Note to Figure 6: This map represents the long-term shoreline change rate calculated over the past 140 years. Historic shoreline data were developed from a variety of sources including NOAA/NOS and FEMA topographic map sheets, hydrographic map sheets, orthophotos, and aerial photos. The transect number and the rate of change (feet/year) are presented at the offshore end of the transects (e.g. 12345:(6.78)). Negative values indicate erosion, positive values indicate accretion.

Zoning

The Town of Winthrop contains eight zoning districts, as designated by the Winthrop Zoning Ordinance, Chapter 145 of the Town Ordinances. Six of these districts overlay the land adjacent to the Harbor, and each district permits specific uses (see Table 2). In general, residences are allowed only in the residential districts and in the LM district by special permit, and commercial establishments are only allowed in the commercial districts. Mixed-use developments, those that combine residential and non-residential uses, were previously only permitted in the BA and CB district by special permit. However, the recent addition of the waterfront district now allows mixed-use developments along the two major commercial waterfront areas (see Figure 7). Deviations from any of the uses in these zones require either a variance or a special permit from the Board of Appeals as allowed under M.G.L. Chapter 40A.

Table 2. Waterfront Zones of Properties along Winthrop Harbor*

District	District Code	Principle Use
Residential A	RA	Residential
Residential B	RB	Residential
Residential C	RC	Residential
Center Business	CB	Commercial
Business A	BA	Commercial
Light Manufacturing	LM	Industrial
Waterfront	WF	Mixed-use
Conservation	C	Protected Open Space

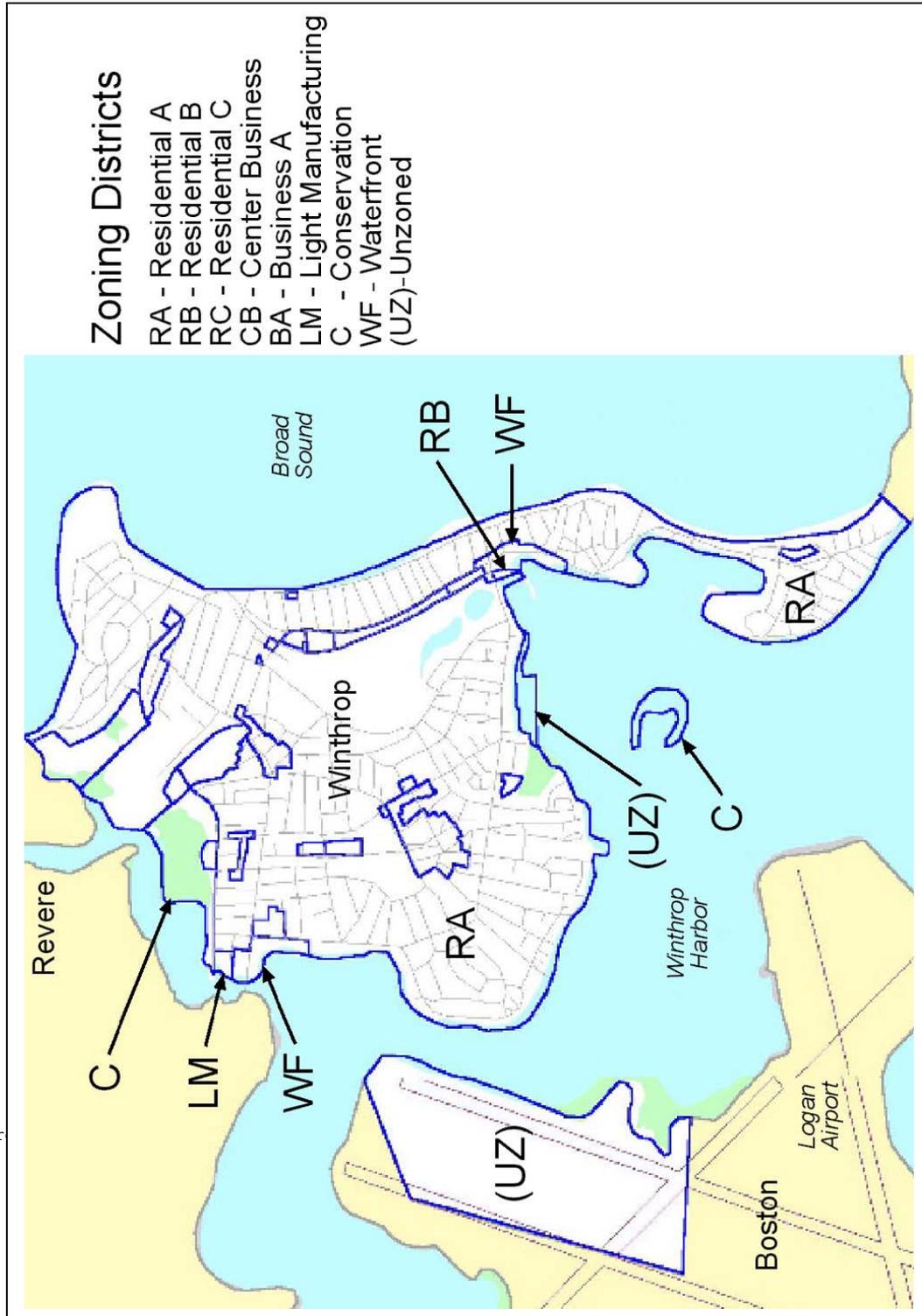
*Note - Districts in **bold** are on properties adjacent to Winthrop Harbor.
Source: Zoning Map, Town of Winthrop, 2004

Non-zoned Areas

Several areas along the harbor are not zoned and include Logan Airport runways and the western portion of the former trolley rail bed. According to the Ordinance, "all unzoned land within the Town of Winthrop, if any, is hereby zoned as a Residential A District." For all practical purposes, the airport would never be used for residential purposes. However, the former trolley area has potential for public access, and this issue is discussed in the section Public Access/Public Ownership.

As shown in the following figure, most of the waterfront is zoned residential (RA). Only two small areas are designated for commercial uses, and one is designated for light industrial use. The land use generally corresponds to zoning, i.e. there are residential uses where it is zoned residential, and there are commercial uses where it is zoned commercial. However, two yacht clubs are located in areas zoned residential.

Figure 7. Winthrop Zoning Districts along Winthrop Harbor



Sour

Waterfront Property Inventory

An analysis of the properties on the waterfront reveals that there are 164 properties that border Winthrop Harbor (see Table 3). This assessment was made from the Assessor records of all properties that border Winthrop Harbor and Belle Isle Inlet between the Dump Road in the north side and Tafts Avenue in the south side. These parcels were designated as HF (harbor front) according to the assessor data base. Parcels that have a street between them and the water are not designated as HF, and therefore, were not counted. As identified by the land use designation of these parcels, most are residential and only a few are either commercial or exempt. The exempt parcels on the harbor front include state property near Deer Island, part of the former trolley bed, and Donovan Beach.

*Table 3. Land Uses of Parcels along Winthrop Harbor**

<u>Land Use</u>	<u>Number of Parcels</u>
Residential	147
Open Space	1
Commercial	10
Mixed use, Primarily Commercial	1
Exempt	5
<u>Total Parcels</u>	<u>164</u>

*Parcels identified as HF (harbor front) by the Town of Winthrop Assessor data base, 2004

Public Access/Public Ownership

Public Access Locations and Physical Conditions

Public access sites along Winthrop Harbor and their physical conditions were investigated as part of this Assessment. Two types of locations were found: 1) documented sites, and 2) undocumented sites (see Tables 4 and 5). The documented sites are generally known and publicized areas for the public to use. The undocumented sites were determined from site visits, aerial photographs, and Assessor maps of Winthrop Harbor.

Table 4. Documented Public Access Sites

Location	Description and Condition	Use
Belle Isle Marsh Reservation (DCR)	Salt marsh, excellent for nature study and birding. Hiking trails, picnic tables. Free parking. No dedicated structures or facilities.	Infrequent use
Coughlin Park	Park under flight path of Logan Airport. Playground, sports courts, benches, picnic tables, free parking. Good overall conditions.	Used regularly throughout the year.
Crystal Cove Jetty	Former trolley rail bed and jetty for nature study. No formal public amenities or structures. Free parking.	Parking, some pedestrian use
Pico Playground and Beach	Park with playground and rocky beach for sports and nature study. Sports courts, benches, wood stairway access to beach, free parking. Concrete pre-cast wall on stone revetment/mound structure with stone groin. Good to fair overall condition.	Neighborhood recreation area
End of Winthrop Street	Railroad right-of-way to rocky beach and salt marsh for nature observation. Resident parking. Dirt path to former trolley rail bed and Fishermen's Bend marsh. No structures.	Some pedestrian use to both trolley bed and marsh
Donovan's Beach and salt marsh	Beach and mudflats for water access and views of Crystal Cove. Cemetery bordered by salt marsh. Benches and handicap access. No parking. Good condition.	Neighborhood recreation area
Snake Island	Part of the National Park Service Boston Harbor Islands. Difficult to access (no access facilities) ¹	Little or no use observed
Winthrop Town Landing	Pebbly beach with concrete boat ramp and large, free parking lot bordered by a stone revetment. Benches. Overall fair condition.	Moderate, especially ramp during summer
Woodside Park	Wooded park and rocky beach with windsurfing rigging and launch location. Resident parking.	Low

Source: MCZM Public Access, 2004 and The Cecil Group, and Vine Associates 2004.

Table 5. Undocumented Public Access Sites

Location	Description	Use	Condition
Bridge over Belle Isle Inlet on Route 145	Viewing and fishing location from sidewalks on bridge.	Heavy use by fishermen	Good surface condition. Bridge structure recently inspected by MassHighway, needs rehab or replacement.
Loring Road, end	Small ramp for high tide use. Accessible with key from Town Rec. Dept. Road excellent, ramp poor condition.	Some pedestrian and small boat use.	Road good; Ramp fair to poor
Sargent Street, end	Concrete/stone masonry wall with stone revetment and concrete stairway access to shore. Remains of outfall pipe.	Some pedestrian use	Concrete/stone wall poor; concrete stairs and revetment fair.
Somerset Avenue, end	Concrete wall and stone revetment. Concrete stairway access to shore. Board in front of stair entrance. Outfall pipe in wall	Inaccessible	Concrete wall and stone revetment good to fair; Concrete stairs poor, deteriorated, hazard.
Bellevue Terrace, end	Concrete wall with dumped stone/masonry debris in front.	Inaccessible	Concrete wall fair to poor; dumped stone/debris, poor.
Cottage Park Road, end	Concrete wall and concrete stairway access to shore. Outfall pipe in wall.	Some pedestrian use	Concrete wall, fair. Concrete stairs, fair to poor.
Bartlett Road, end	Concrete/block wall. Concrete stairway access to shore.	Some pedestrian use	Concrete/block wall, fair to poor. Concrete stairs, poor, missing steps
Woodside Avenue, (Woodside Park ¹)	Concrete wall. Concrete stairway access to shore. Concrete outfall pipe structure. Access provided on private lot. (Wooded park and rocky beach with windsurfing rigging and launch location. Resident parking. ¹)	Moderate pedestrian use.	Concrete wall, fair. Concrete stairs, good to fair (no railings) Concrete outfall, poor.
Plummer Ave., end	Concrete Wall, various generations of construction. no access, jersey barrier.	Inaccessible	Concrete wall, fair
Frances Street, adjacent	Stone Revetment alongside road with wood guardrail	Inaccessible	Stone revetment, good to fair.
Shirley Street, adjacent	Mortared granite stone block revetment with metal guardrail adjacent to roadway.	Inaccessible	Stone revetment, good to fair.
Shirley Street, adjacent	Concrete wall and mortared granite stone block revetment adjacent to roadway.	Inaccessible	Concrete wall, fair to poor. Stone revetment, fair.

Petrel Street, end.	Concrete/block wall.	Inaccessible	Concrete wall, fair to poor.
Grandview Ave, adjacent.	Dumped stone revetment with concrete stairway opposite Foam St. providing access to beach	Use unknown	Revetment, good to fair condition. Concrete stairs, good to fair.
Grandview Ave, adjacent.	Concrete wall. Stone revetment.	Use unknown	Concrete wall, fair to poor condition. Revetment, good to fair condition.
Shirley Street, end.	Concrete wall/mortared granite block revetment	Inaccessible	Concrete wall good to fair condition. Mortared granite block revetment, good.
Pebble Avenue, end	Concrete wall with stone revetment	Inaccessible	Concrete wall and stone revetment, fair.
Otis Street, end.	Concrete wall with dumped stone revetment	Inaccessible	Concrete wall and dumped stone revetment, fair.
Townsend Street, end.	Concrete wall with dumped stone revetment	Inaccessible	Concrete wall and dumped stone revetment, good to fair.
Maryland Avenue, end	Concrete wall/mortared granite block revetment	Inaccessible	Concrete wall fair condition. Mortared granite block revetment, good to fair, missing mortar.
Taft Avenue, adjacent	Concrete wall and stone revetment	Inaccessible	Concrete wall and stone revetment, good

Source: Site visits, September 2004 and November 2004.
 Note 1. source from MCZM Coastal Access Project, 2004.

Public Access Entitlements, Coastal Trails, Pathways, and Right-of-Ways

The Town of Winthrop has a variety of public access entitlements, coastal trails, and pathways that provide access to or along Winthrop Harbor. The following locations were identified during the research of assessor maps, internet search of government web sites, conversations with state and local departments and agencies, and field visits (see Table 6). Properties that did not have any entitlements or official designation, such as the former trolley rail bed on the jetty off Shirley Avenue, were not included. Some of these areas are also considered public access points as shown in the previous tables.

Table 6. Locations of Public Entitlements, Coastal Trails, or Pathways along Winthrop Harbor

Name/Location	Description	Condition	Use
Town Landing, Shirley Avenue	State-owned, town-managed parking and concrete boat ramps	Excellent Condition, ramp needs structural improvements	Heavy use by residents, non residents, clammers, and other boaters during summer and weekends
Donovan Beach, Pleasant Avenue	Town-owned and managed public beach	Excellent condition and park amenities	Mostly summer use by residents
Belle Isle Marsh Reservation, Morton Street (generally)	350-acre reservation. Largest surviving marsh in Boston Harbor. Part of Rumney Marsh Reservation under the Department of Conservation and Recreation.	Extensive wetland reconditioning program over the past 5 years.	Light use
Winthrop Greenway	This greenway on DCR land along the Winthrop side of the Belle Isle Inlet, eventually connecting the East Boston Greenway to the ocean at Short Beach.	Generally an unpaved footpath, one park bench on Morton Street	Light use
Pico Beach, Pico Avenue	Town owned and managed public beach	Good condition	Most summer use by residents
Coughlin Playground, Bay View Avenue	Town-owned public playground	Good condition and facilities	Mostly residential year round
Snake Island, Winthrop Harbor	Town owned and managed island. Preference by NPS to retain as natural area.	Unknown, no access or facilities	Practically inaccessible

Public Facilities

This section summarizes all public town and state facilities on the waterfront (see Table 7). Additional information about the condition of public structures is in section C. Maritime Uses. Furthermore, no federal facilities were identified.

Table 7. Local, State, and Federal Facilities and Structures on Winthrop Harbor

Town Facilities

Facility	Location	Use	Size/Construction	Condition
Belle Isle Bridge (1)	Saratoga Street, Boston	Main road access to Winthrop, fishing	Piling supported bridge	Needs replacement or rehabilitation
Coughlin Park	Bay View Avenue	Playground, sports courts, benches, picnic	9 acres, good condition	Good

		tables, walking paths		
Donovan's Beach, salt marsh	Pleasant Street	Public beach and viewing area; no parking	.25 acres, 6 benches, lighting, handicap ramps	Excellent
Former trolley Bed	Shirley Street, Crystal Cove	Public open space	3.5 Acres, bituminous parking, concrete ramps	Fair
Pico Beach and Playground	Pico Avenue	Playground, basketball court, and beach	0.8 acres, 1 basketball court and public beach	Good
Public moorings	Winthrop Harbor	Vessel mooring	Privately owned mooring tackle	Privately maintained, unknown condition
Snake Island	Winthrop Harbor	Natural habitat	8 acres, natural wetlands	Good
Yirrell's Beach	Boston Harbor	Beach for walking, swimming, active recreation; free parking	Beach and access paths	Good; recent improvements include repair of seawalls, beach nourishment, and user amenities.

Note 1: per telephone conversation with department head of City of Boston, Highway Division, Bridges, October 4, 2004. The bridge over Belle Island Inlet (Route 145) is owned and maintained by the City of Boston. MassHighway is responsible for its inspection as they are for all bridges in Massachusetts.

State Facilities

Facility	Location	Use	Size/Construction	Condition
Winthrop Town Landing	Shirley Street	State boat ramp, parking area, path, and benches	3.5 acres, 4 benches 2 ramps, trailer parking	Good, ramps need to be rebuilt
Winthrop Beach and Winthrop Shore Drive	Boston Harbor	Beach for walking, swimming, active recreation ; access boulevard	Beach and roadway access	Fair: erosion problems resulted in a program targeted for beach nourishment and major park renovation including improved lighting, water fountains, sand showers, benches and shade shelters.

The following section describes some of these key facilities.

Town Facilities

Former Trolley Bed

The former trolley bed, which was built to support the Narrow Gauge Railroad in the early part of the 19th century, remains in two locations: at the head of Crystal Cove and at the end of Sea View Avenue. The proposed HarborWalk included the bed in Crystal Cove as part of its public access program. It has excellent opportunities for passive recreation, especially for viewing the Harbor and Boston skyline, as mentioned in the Community Development Plan.

Route 145 Bridge over Belle Isle Inlet

The bridge over Belle Island Inlet, which is part of Route 145, is owned and maintained by the City of Boston even though half of it is actually in Winthrop. MassHighway is responsible for its inspection as they are for all bridges in Massachusetts.

State Facilities

Town Landing

The Town Landing, which is owned by the state and managed by the Town, is the area's highest use facility. The 3.5-acre facility has two boat ramps and approximately 92 trailer parking spaces and 50 spaces for automobiles. It is the site of the proposed multi-use pier. This facility is in good condition except that the ramps need to be updated due to extensive wash out from boat

propellers at the bottom of the ramp. The addition of floats would also make launching vessels safer and more convenient for boaters.

Federal Facilities

There are no federal facilities located on the Winthrop waterfront.

Easements

An easement in land is an interest in land owned by another that entitles its holder to a specific limited use. In Winthrop, only one easement was found for the entire harbor front according to Assessor maps (see Table 8). This sewer easement crosses two lots and runs between Willis Avenue and Belle Isle Inlet.

Table 8. Easements that Lead to and Follow the Waterfront of Winthrop Harbor Front

Easement Type	Location	Map/Lot
Sewer	Willis Avenue	59-4, 59-1

Source: Assessor maps, Town of Winthrop, 2004.

Proposed Waterfront Projects

Public Projects

HarborWalk

The Town has submitted a grant application to support funding for design and construction of a new harbor walk. This project would provide public access to the waterfront areas of Winthrop Harbor including Shirley Avenue and the former trolley railroad bed. Specifically, the path would travel from Lewis Lake and the adjacent Daw Playground along Shirley Street to the Public Landing. There is potential for interpretive and public viewing areas, and vest-pocket seating. This project is also recommended in the Town's 2004 Open Space and Recreation Plan and the Community Development Plan, 2004.

Multi-use Pier Facility

The Town of Winthrop is currently seeking funds to support construction of a multi-use pier, which will provide support for a variety of users. The facility will provide floats and accommodations for the Harbormaster vessels, commercial fishermen and fishing head boats, charter boats, water taxis and possibly a future ferry operation. In addition, the facility will provide dockage for dinghies and for transient vessels.

Figure 8 provides a layout of the proposed facility. Access to the commercial and recreational area is from a 10 by 16 foot landing with 50-foot gangway. The configuration as shown provides for the berthing of 4 thirty-foot vessels, and 16 twenty-six-foot vessels within the finger slips. In addition, there are approximately 350 linear feet of parallel boarding area.

The end of the 250 by 16 foot timber pier will have 24 by 30 foot pier head, which will service larger vessels with a 30 by 80 foot steel boarding float. The entire pier and float will be fully handicap accessible. The float will be accessed by a two gangways from the pier head. The pier head will provide for staging to the float and a good overlook for the public. A series of gangways, platforms and ramps will be utilized to minimize slopes over tidal conditions.

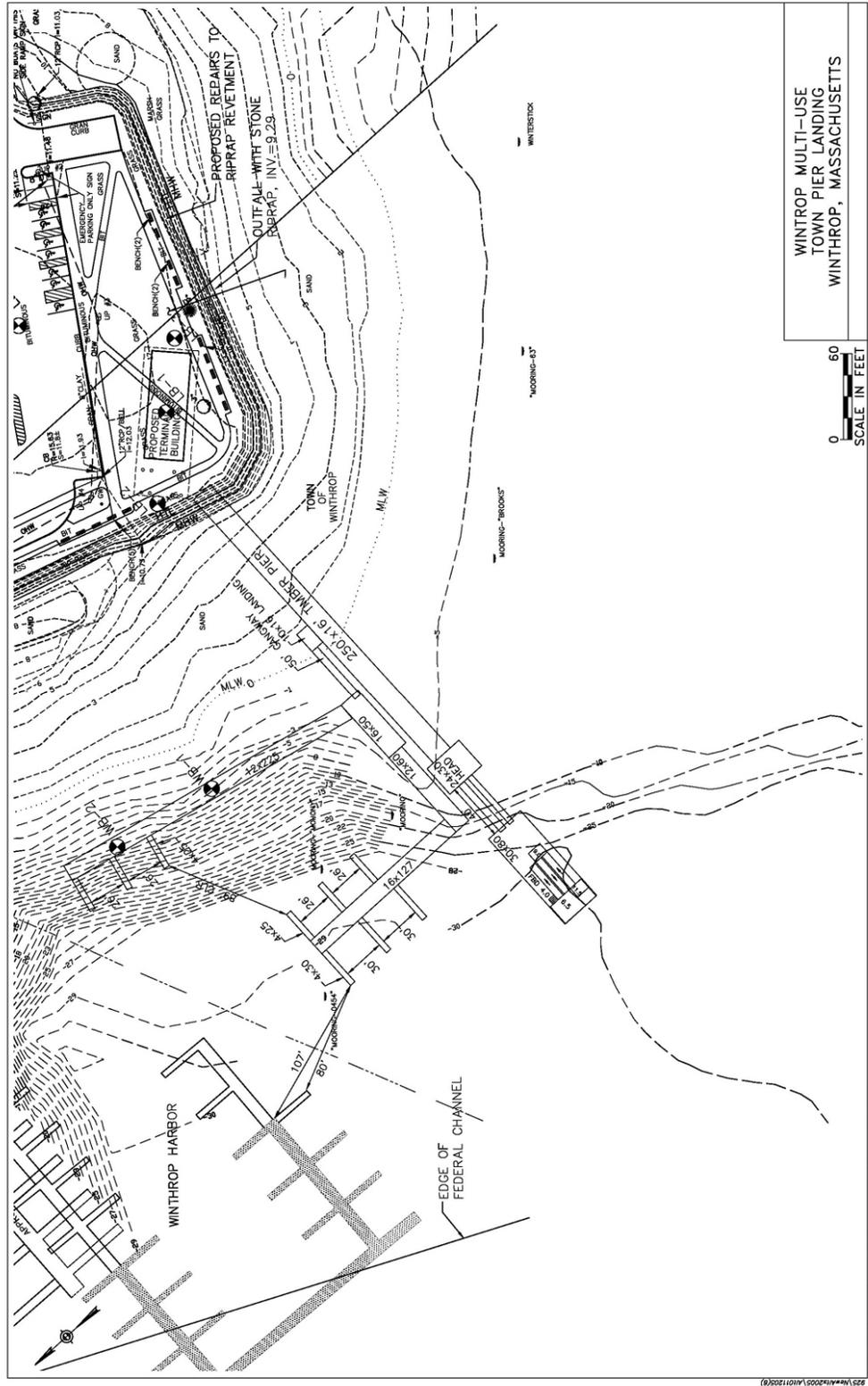
The float would provide for a variety of Boston Harbor side loading vessels up to 130 feet in length, as well as for a bow loading vessels. Future ferry operations can be accommodated by the infrastructure established by the multi-use pier construction.

Commuter Ferry

The Town of Winthrop is also seeking funds to support construction of a commuter ferry terminal at the Town Landing and operation of this ferry between Winthrop and Boston. The original Ferry Feasibility Study was concluded in January 2001. The study considered the waterfront sites throughout Winthrop Harbor. Considerations included water depths and dredging needs, necessary infrastructure, and the potential for providing necessary parking. The Study proposed a commuter ferry terminal to be built on the west side of the Town Landing off Shirley Street.

It is assumed that daily ferry service will operate from the facility and consist of four morning trips and four evening trips. It is anticipated that two commuter boats will be required to provide hourly trips. In addition, it is assumed that the operator will have the ability to utilize the pier and float system for non-commuter trips during off-hours, including weekend trips to various Harbor sites.

Figure 8. Proposed Layout of the Multi-use Pier



The commuter ferry facility will utilize the same infrastructure as the proposed mixed-use pier facility. Planned landside improvements are to include a new building, which will provide a passenger waiting area, harbormaster's office, and public restrooms. Water and electricity will be extended to both the building and the pier from existing Town facilities. Sewer will be extended to the building from existing Town facilities, but will not be provided to the pier. Modifications to the existing parking lot will allow for improved traffic circulation in and out of the parking lot. In addition, the existing parking area will also be re-surfaced, re-striped, and landscaped. A second curb cut is proposed in the improved layout, with additional green space provided along the waterfront park area.

The Town has advanced the permitting and design for the proposed commuter ferry project as detailed above. However, due to the fact that a long-term vessel operator could not be established and full project funding could not be obtained. The proposed mixed-use pier permitting will require modification of the existing permits for the ferry terminal facility.

Restoration of Winthrop Shores: Winthrop Beach and Winthrop Shore Drive

The Commonwealth's Department of Conservation and Recreation (DCR) has targeted Winthrop Shores for a major restoration project. The beaches in this area of Winthrop have been subject to substantial erosion. A project for nourishing the beaches has been planned and would place approximately 500,000 cubic yards of sand and gravel to rebuild the beach. The permitting for the project is not yet complete because of issues relating to the proposed offshore dredge borrow site. When complete, the project will involve the restoration of the parkway that provides access to this beach and an improved drainage system that will enhance water quality. Other improvements will include improved lighting, ornamental planning beds, water fountains, sand showers, benches and shade shelters. Total reinvestment in the area is expected to be about \$12,500,000.

Private Projects

Mixed use Waterfront Developments

Atlantis Marina

A development team has proposed to demolish the Atlantis Marina building on Pleasant Street and build a new, mixed-use development. The project at this writing has been granted a Special Permit for a project that would retain a 91-slip marina and add 44 residential units and 2,400 square feet of commercial uses to the site. The proponents have applied for a parking variance that would allow provision of 144 parking spaces. Additional permitting applications are in process.

This is a key parcel on the waterfront since it is one of only two large marinas in Winthrop Harbor. New mixed-use development at this location will set the stage for other waterfront projects.

Crystal Cove Marina Project

The Crystal Cove Marina site at 529 Shirley Street is a likely candidate for future mixed use development. It currently encompasses about 130 boat slips and a mix of residential, restaurant and retail spaces. No formal submittals for a project have been made at the time of this writing.

Winthrop Yacht Club

The Winthrop Yacht Club, located next to the Town Landing on Shirley Street, recently applied to several permitting and approval agencies to extend their dock systems with 45 slips on 20 new finger floats. The Club plans to add these slips to the south side of their existing 122-slip dock system in the summer of 2005 pending approval of the MEPA Environmental Notification Form. They have already received a permit from the Army Corp of Engineers, a Chapter 91 license from DEP, and approval by the Winthrop Conservation Commission.

Maritime Uses

Navigation Characteristics

General

Winthrop Harbor is the water body located along the southern and eastern portion of Winthrop extending from Belle Isle Bridge to Point Shirley. The Harbor contains a centrally located crescent shaped island, called Snake Island, which further defines the harbor. Southwest of the harbor is Logan International Airport in East Boston (see Figure 9).

Figure 9. Winthrop Harbor Features



Source: MassGIS, 2004

Tidal range of Winthrop Harbor is generally similar to Boston Harbor. The mean tide range is 9.55 feet. The extreme low tide is in the order of 2.1 feet below mean low water (MLW) and the yearly high tide is about 12.2 feet above MLW.

Entrance to the harbor from the west is through the 200-foot wide East Boston Channel. This channel contains an upper northeastern 100-foot wide spur, called the Cottage Park Channel. Entrance from the south is by the 50-foot wide, 6-foot deep Federal Channel. The Federal Channel extends from just south of Winthrop Light, continuing northeastward to Crystal Cove Marina. A second channel, which is relatively deep, extends along the western portion of the Harbor next to the airport runways. This channel provides excellent access to the marinas and businesses located along Pleasant Street, Main Street, and to other vessels that access upper reaches of Boston Harbor near Constitution Beach.

The water area extending between the 8-foot deep Cottage Park Channel and the Federal Channel contains the 6-foot deep Cottage Park Anchorage and the 6-foot and 8-foot deep Snake Island anchorages. The 6-foot deep Winthrop Basin Anchorage is located east of the Federal Channel, south of the Town Landing. Landward of the channels and anchorage areas contain private homes and a series of marinas and yacht clubs, including the Cottage Park Yacht Club, the Elks Club Marina, Crystal Cove Marina, and the Winthrop Yacht Club. In addition, there is a deep area located east of the Federal Channel where water depths extend to 30 feet below MLW. This area was previously used as a borrow pit for area filling. This area is generally referred to as the "gravel pit." Existing channel and anchorage locations presently located in Winthrop Harbor are illustrated in Figure 10.

Climate Conditions

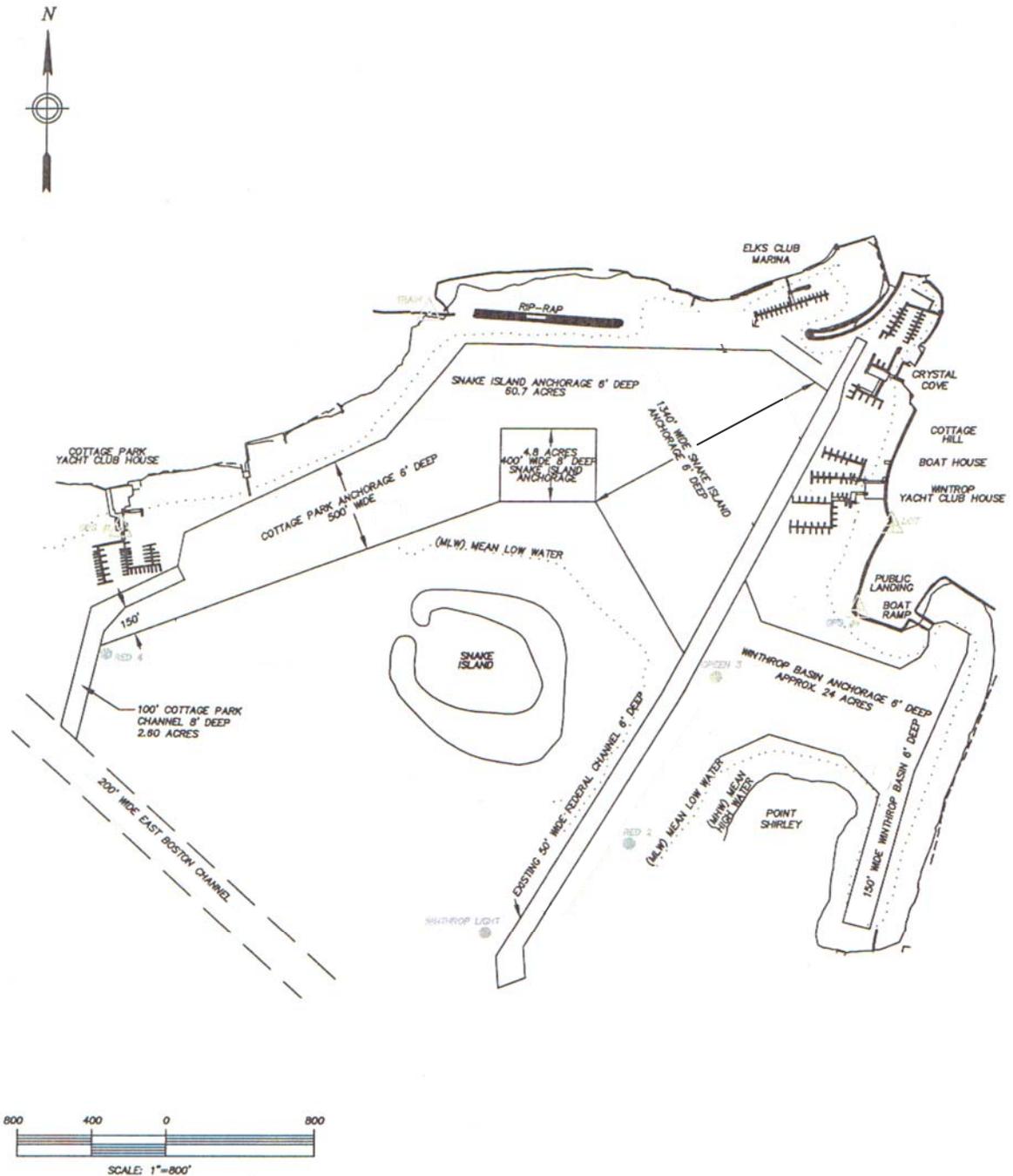
The wind and wave climate of the harbor is dictated by the wind conditions reaching the site predominately from the south and west. In general, the predominate wind conditions of the fall/winter are from the northeast, and the predominate wind conditions from the spring/summer are from the southwest. Snake Island's central location tends to break up some of the major storm conditions from the south and southwest. However, this also results in some funneling of waves directly along the Federal Channel. There is a measured fetch of 15,000 linear feet along the Federal Channel through to Quincy, which, under a direct southwest wind, can generate waves in the order of three feet. Typical waves generated by westerly winds are in the order of 1.5 feet.

Dredging

History of Dredging in Winthrop Harbor

The U.S. Army Corps of Engineers (USACE) first dredged Winthrop Harbor in 1894. Congressional authorization was issued in 1888 for the dredging of a 6-foot deep and 50-foot wide channel, which would extend 3,900 feet northeasterly from Winthrop Light to Rice's Wharf in Crystal Cove. In 1942, an emergency appropriation was issued by Congress for the USACE to dredge a 150-foot wide and 15-foot deep channel to Rice's Wharf to service coast artillery fortifications. This emergency dredging, however, was not considered a permanent alteration to the originally authorized federal project.

Figure 10. Existing Channels and Anchorage Areas located within Winthrop Harbor.



In 1946, the Commonwealth dredged an 8-foot deep channel in the vicinity of Cottage Park. In 1967-68, the State conducted a major dredging project within the Harbor. This project consisted of the dredging of approximately 45 acres within the harbor to a depth of 6-feet below MLW from the Cottage Park Yacht Club to the Winthrop Basin. Approximately 350,000 cubic yards of sediments were dredged and deposited on Snake Island, greatly increasing its size particularly to the southwest. In 1984-85, the State dredged the Winthrop Basin area to a depth of 6 feet below MLW.

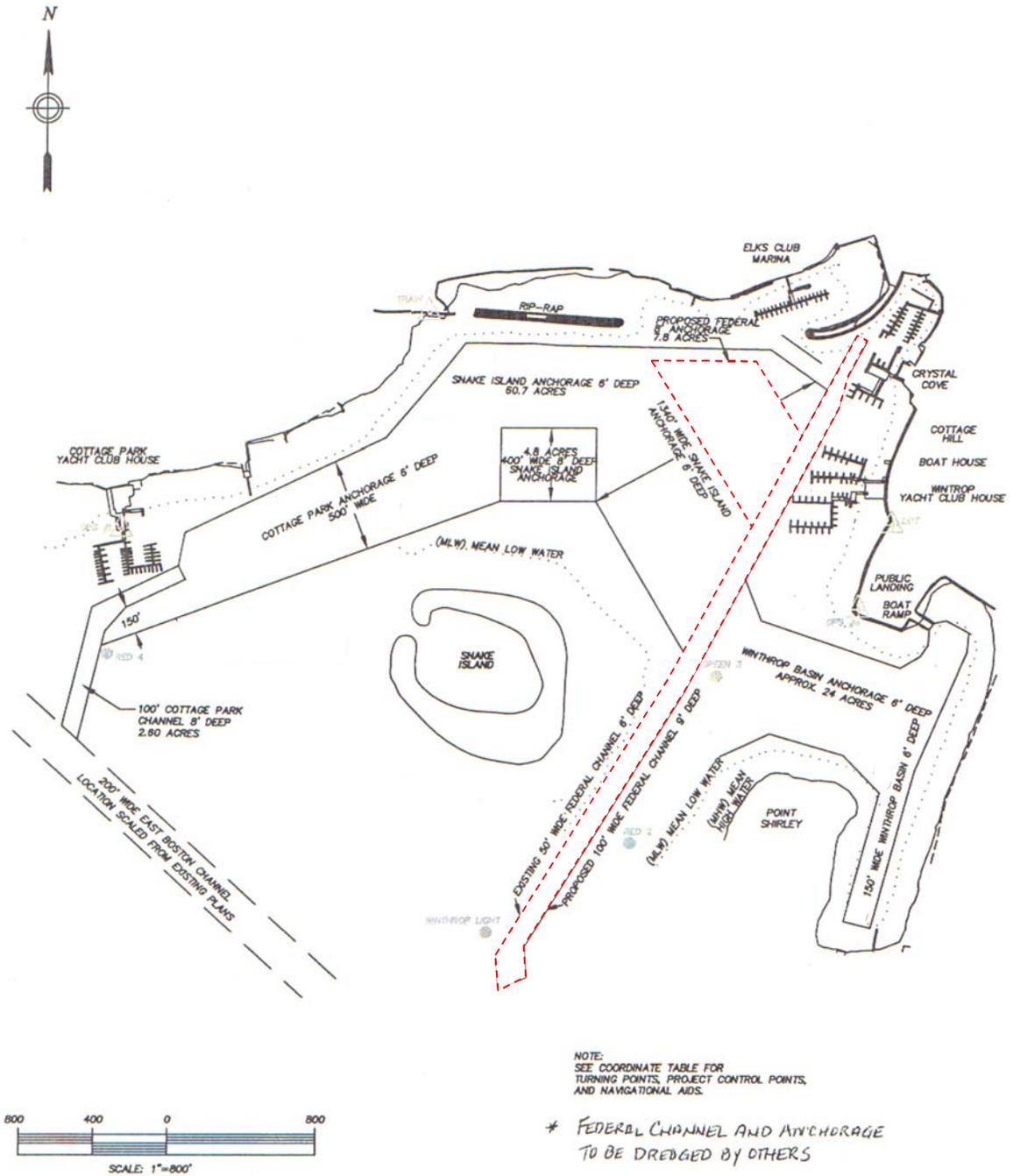
In April 1993, the U.S. Army Corps of Engineers (USACE) conducted the *Winthrop Harbor Navigation Improvement Study, Detailed Project Report and Environmental Assessment*. This study evaluated several improvement alternates for modifications to the existing Federal Navigation Project located in Winthrop Harbor for the purpose of commercial navigation. The recommended plan of improvements presented in the USACE study consists of the following:

- Widening the existing Federal entrance channel in the 3,900 feet of channel reach above Winthrop Light from its current width of 50 feet to 100 feet, except for the upper most 400 feet at Crystal Cove, which would be widened to 60 feet. The channel reach seaward of Winthrop Light, currently shown at 150 feet, would be adopted and extended seaward to deeper water in the vicinity of the East Boston Channel for a distance of approximately 1,100 feet. The modified Federal Channel would have a total length of approximately 5,000 feet and would be deepened from its existing depth of 6 feet MLW to 9 feet MLW
- Creation of a 7.5 acre commercial anchorage in the area northeast of Snake Island at the mouth of Crystal Cove to a depth of 8 feet MLW.

The proposed improvements as described above are illustrated in Figure 11. To date, the improvements have not been implemented by the USACE. According to discussions with the USACE, the cost/benefit of the improvements proposed in 1993 needs to be re-evaluated to reflect present day commercial fleet usage of the harbor as well as to identify a suitable disposal site before the project can move forward. The current report identifies the deep-water gravel pit area located to the east of the Federal channel as a suitable disposal area for dredge sediment. Massachusetts Division of Marine Fisheries (MADMF), however, has identified this location, as being suitable nursery habitat for juvenile shellfish and finfish species in 1993. The USACE estimates that it will cost approximately \$80,000 to update the 1993 report, of which the Town will be required to provide a 50% cost-share. Due to several years of inactivity on this project, the project file has been closed by the USACE. Should the Town wish to proceed with federal improvements to the harbor, a formal request must be submitted to the USACE Engineering and Planning Division.

Due to shoaling within the Federal channel, the U.S. Coast Guard and Town have been relocating channel markers toward the adjacent gravel pit deep waters in order to extend its usage.

Figure 11. Winthrop Harbor Improvements Proposed by the U.S. Army Corp of Engineers, 1993



Winthrop Harbor was most recently dredged by the Commonwealth (Department of Conservation and Recreation (formerly DEM), Office of Waterways) in 2000-2001. Approximately 100,000 cubic yards of sediments were mechanically dredged from the Cottage Park Channel and the Cottage Park, Snake Island, and Winthrop Basin Anchorages. Dredge sediments were disposed offshore at the Massachusetts Bay Disposal Site (MBDS). Total costs for the project were approximately \$1,000,000. Funding for the project was provided on a 75% State-25% Town cost-share basis. The project restored the existing channel, anchorages, and basin areas within previously authorized footprints and depths, with the exception of the 400-ft x 400-ft area within the Snake Island anchorage that was deepened from 6 to 8 feet MLW (see Figure 9). This 4.8-acre area within the Snake Island Anchorage was created to allow for the temporary harboring of larger vessels during storm events.

Dredging Process

Dredging approval within the State is a time consuming and, at times, a difficult process that involves coordination between local, State, and Federal agencies. Prior to implementing dredging, sediments must be sampled and chemically tested to determine a suitable disposal location. Typically, dredge sediments are approved for either unconfined offshore disposal (within the federally regulated Massachusetts Bay Disposal Site - MBDS), or disposal at an upland site such as a regulated landfill facility.

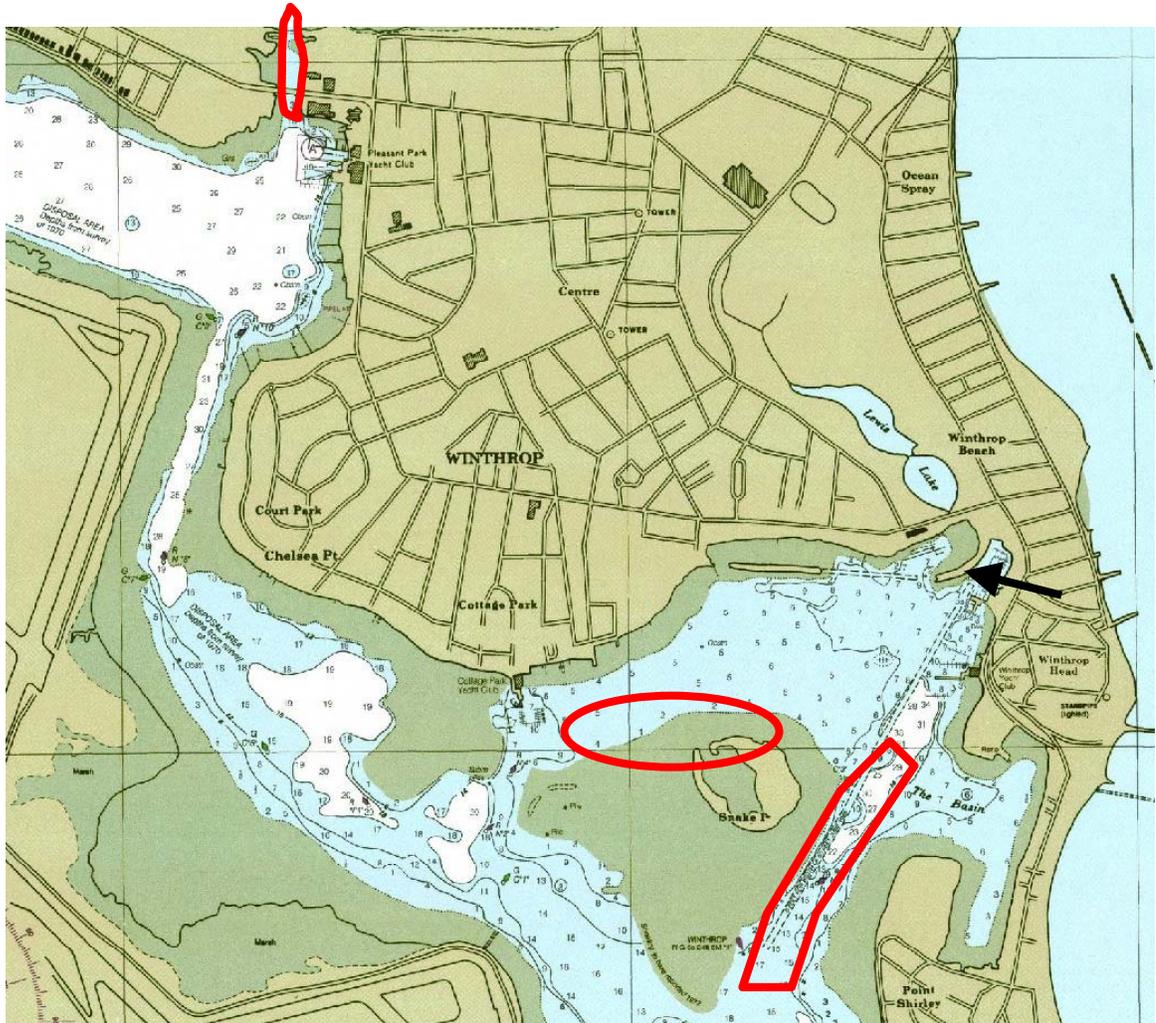
The unconfined disposal of dredge sediments must receive approval from the U. S. Army Corps of Engineers (USACE) prior to going offshore. A chemical analysis of dredge sediment must be conducted to determine if placement offshore will have a detrimental effect to the marine environment. Sediments approved for unconfined offshore disposal are typically mechanically dredged and transported via scow to the disposal site. Costs for unconfined offshore disposal can be expected range from \$16 to \$22 per cubic yard.

For sediments that are found to be unsuitable offshore disposal, chemical analyses are performed to determine suitable upland disposal alternatives, which can include beneficial reuse, beach nourishment, and/or placement at a regulated landfill facility. With upland disposal, sediments are typically hydraulically dredged and placed in a containment basin for dewatering. Costs for hydraulic dredging typically range from \$8 to \$12 per cubic yard. These costs, however, do not include those associated with the construction of a containment basin, trucking, and/or tipping fees that may be associated with disposal at landfill facilities. Unless a suitable disposal site is located within proximity to the dredge area (up to 2 miles), the upland disposal of sediments is typically less economical than offshore disposal due to the costs associated with the handling and transporting of materials. Accordingly, costs can vary significantly with respect to upland disposal and therefore, need to be determined on a case-by-case basis.

Current Dredging Needs in Winthrop Harbor

During the planning process, four sites were identified as needing to be dredged. They are indicated with several circles and one arrow in the following figure.

Figure 12. Potential Dredge Locations in Winthrop Harbor



Federal Channel

The existing federal channel should be dredged due to the significant shoaling that has occurred over many decades. Presently, the U.S. Coast Guard and Town are extending use of the channel by relocating channel markers toward the adjacent gravel pit into deeper waters.

Belle Isle Inlet

The Town, City of Revere, and City of Boston have investigated the dredging of Belle Isle Inlet on several occasions in conjunction with assistance through DCR Waterways. In 1999, the proposed dredging of the inlet from the Saratoga Street Bridge up to the Beachmont Yacht Club was put on hold due to high costs and the potential impact to salt marsh, tidal flats, and wildlife and marine habitat.

Railroad Trestle

The area south of the former trolley bed (arrow) is proposed as the site for a HarborWalk/ public access. It was also considered as an option for a Town Pier for fishermen use. The area is shallow and would need to be either dredged if it was used for vessel access. It would also compete with existing uses of the adjacent marinas.

Stabilization of Snake Island

Snake Island has been long been questioned as being a potential source contributing to sediment build-up within the harbor; thereby, increasing the frequency for maintenance dredging. It is recommended that an investigation be conducted to determine if the island is indeed a sediment source feeding the harbor, and if so, provide cost effective and environmentally sound alternatives for stabilization.

Waterfront Business Inventory

An inventory of all businesses on the harbor was conducted during August 2004. This section identifies all the waterfront businesses. It includes all the businesses properties on the harbor side of streets along Belle Isle Terrace, Main Street, Pleasant Street, Shirley Avenue, Washington Avenue, and Willis Avenue (see Table 9).

Marina and Yacht Club Locations

The location of the Winthrop Harbor marinas relative to boating destinations has important implications for the demand of its services by users who access the from either land or water. Some users prefer to be in secluded areas and have minimal services, while other users prefer very active marina centers that have a range of marina services.

In Winthrop Harbor, there are four public marinas and three yacht clubs (see Table 9). The following is a summary of public and private marina services in Winthrop Harbor.

Table 9. Yacht Clubs and Marina along the Winthrop Harbor

Marina	Address
Atlantis Marina	550 Pleasant Street
Crystal Cove Marina	529 Shirley Street
Cottage Park Yacht Club	
Winthrop Yacht Club	649 Shirley Street
Pleasant Park Yacht	562 Pleasant Street

Club	
Mullins Marine Service	554 Pleasant Street

There are numerous marinas in outside of Boston Harbor and the neighboring communities, including the East Boston Yacht Club and the Orient Heights Yacht Club on the East Boston portion of the harbor, approximately 0.5 nautical miles to the west, and the Beachmont Yacht Club that is up river on the Bell Isle Marsh at 168 Pearl Street in Revere that is accessible only at high tide.

Transportation Infrastructure

Sufficient access from both land and water is extremely important in order for users to enjoy the full benefits of a waterfront including marina, businesses, and recreation areas, and to potential uses such as the proposed commuter ferry and Town Pier. This section describes existing and potential transportation needs including an update of the Ferry Feasibility Study, which was completed in 2001.

The pier and float system described in the Proposed Waterfront section is a multi-use pier facility providing support for a variety of vessel operations. The facility will provide floats and accommodations for the Harbormaster vessels, commercial fishermen and fishing head boats, charter boats, water taxis and possibly a future ferry operation. In addition, the facility will provide dockage for dinghies and for transient vessels.

The steel berthing float provides multi-freeboard berthing solution proposed for the Winthrop facility considers three types of vessel freeboard, which may use the facility. The facility includes a 24-inch freeboard for water taxis and party vessels; 48-inch freeboard for portside loading shuttle and ferry vessels; and the 84-inch freeboard with a bow loading cradle for high loading ferry vessels that could use the facility. There is also a 12-foot by 60-foot concrete float, which will have an approximate 22-inch freeboard for the Harbormaster, and other smaller sized vessels.

Homeland Security and Logan Airport

Homeland Security

Since the time of the terrorist events that began in September 2001, the security concerns for transportation nodes, in particular harbors and airports, has become a major focus of attention. Logan International Airport and Boston Harbor, which includes Winthrop Harbor, have been identified as two major potential targets that have increased security needs.

The U.S. Coast Guard (USCG), which under the Department of Homeland Security, is responsible for the security plans of all the nations ports. The USCG First District, Sector Boston, has established the Boston Area Maritime Security Plan. The Area Maritime Security Committee, which is comprised of various government agencies, developed this Plan. MassPort, which controls Logan Airport, is represented on this Committee. This Committee distributes security planning information to subcommittees, which is then provided to the Winthrop Harbormaster among other local port, harbor, and security-related agencies.

Port of Boston

The Port of Boston is active with cargo and container ships, oil barges, ferries, recreational vessels, and a variety of small crafts and users. More importantly, liquefied natural gas (LNG) tankers pass through the Port to a transfer facility in Everett, Massachusetts. LNG tankers have received a lot of attention due to their potential as terrorist targets. When LNGs are scheduled to arrive, typically from Trinidad, the Coast Guard provides a 48-hour notification to port and security personnel.

Logan International Airport

Logan International Airport has also been placed under tight security from both outside and inside its perimeter. In fact, MassPort installed approximately 30 buoys around the 6.6 mile-perimeter of the airport in June 2003. They mark the 250-foot inner airport security zone, which is patrolled by State Police, the Coast Guard, Boston Police, the environmental Police, and Boston and Winthrop Harbormasters.



Winthrop is next to Logan International Airport and the entrance of Boston Harbor

Winthrop Security and Planning Issues

The Town of Winthrop has been and is subject to all the security and planning activity concerning both Boston Harbor and Logan Airport. All the large vessels entering Boston Harbor must pass within a quarter mile of Winthrop. Smaller vessels such a

recreational and commercial users typically approach the airport security zone, many of them trying to catch fish or dig for clams. In fact, only clammers that have security clearance and badges from MassPort, are allowed to access the clam flats within the security zone around the airport. The clammers must first have a MA Department of Marine Fisheries license to get a badge.

The proximity of the Town to the airport runways and flight paths is also a major concern to the security and emergency agencies. Town property near Court Park, aside from its ownership of part the airport runways, is less than a 1,000 feet from the runways. Massport has planned for emergencies if a plane crashed into the area as part of its Airport/Community Emergency Planning Program. Of particular concern was the poor access to the Belle Isle Marsh Reservation since the bridge for Route 145 at the entrance and the shallow water depth, especially at low tide, limits the size of emergency vessels that could access the Reservation.

Pollution Assessment

Contaminated Areas

Winthrop Harbor has been tested for a variety of contaminants in the sediments over the past decade. Sediment testing, which detects the presence of elevated concentrations of substances in the sediments that are above the natural background level, is conducted as part of the dredging process prior to dredging and for dumping dredge spoils. However, no testing was conducted in Winthrop Harbor outside of the dredged areas or in any of the areas where waterfront structures will be altered or constructed.

As part the Winthrop Harbor maintenance dredging project conducted by the Department of Environmental Management, Office of Waterways (Waterways) in 2000-2001, the existing levels of various chemical containments contained within sediments were analyzed in 1995 with limited chemical analyses being conducted again in 1997 as part of the biological testing program that was required for approval of offshore disposal of sediments at the Massachusetts Bay Disposal Site (MBDS).

In 1995, thirteen (13) core samples were obtained from the harbor and analyzed for physical and chemical properties. Figure 13 shows the approximate locations of 13 cores that were collected and analyzed. Each core sample was discretely analyzed for metals, Total Petroleum Hydrocarbons (TPH), Polychlorinated Biphenyls (PCBs), Polynuclear Aromatic Hydrocarbons (PAHs), Volatile Organic Compounds (VOCs), and Oil & Grease (O&G). The chemical concentrations identified at each of the sample locations are summarized in Table 10.

In 1997, additional testing was required to determine if dredge sediments were suitable for offshore disposal at the Massachusetts Bay Disposal Site (MBDS). Figure 14 shows the locations of the six (6) core samples obtained for the chemical and biological testing performed on sediments in 1997. Two (2) composite samples were created from the 6 individual cores. Both composites were analyzed for copper, mercury, PAH's, and Total Organic Carbon (TOC), along with biological survival rates based upon a 10-day bioassay, 28-day bioaccumulation and tissue analyses. It is noted that the only metals that needed to be tested as part of the biological testing program were copper and mercury due to the relatively "high" concentration levels identified in 1995 sediments. The chemical concentrations identified in each composite sample are summarized in Table 10.

Water Quality of Winthrop Harbor

Available water quality data was limited. Although most of it pertained to Boston Harbor, some was available from previous studies and some from ongoing monitoring the area waters.

The Massachusetts Water Resources Agency (MWRA) was responsible for improving the water quality of Boston Harbor over the past ten

years. The elimination of sewer discharges in Boston Harbor, the addition of secondary treatment at the Deer Island treatment plant, and the extension of the sewer outfall from the Deer Island plant into Massachusetts Bay all combined to significantly improve the water (and sediment) quality of Boston Harbor.

The MWRA has many water-quality monitoring stations throughout Boston Harbor, three of its largest tributaries, and Massachusetts Bay. One of these stations is located in Winthrop Harbor. The water quality indicators typically found in their reports include water clarity, human and animal bacteria, algae (chlorophyll), and monthly rainfall. Reports from these stations are available from the MRWA or their website at www.mwra.com.

The greatest threats to Boston Harbor have been from urban runoff, especially from the tributaries that have poorer water quality than Boston Harbor. Changes to improve the water quality in Winthrop Harbor could include an analysis of the number of point discharge locations such as stormwater outfalls and the use of best management practices (BMPs) that minimize and buffer stormwater flows and runoff. BMPs would also help reduce the amount of sediments and contaminants that entered the Harbor.

Figure 13 Sampling Location Plan for 1995 Chemical Analyses of Sediments for the Dredging of Winthrop Harbor.

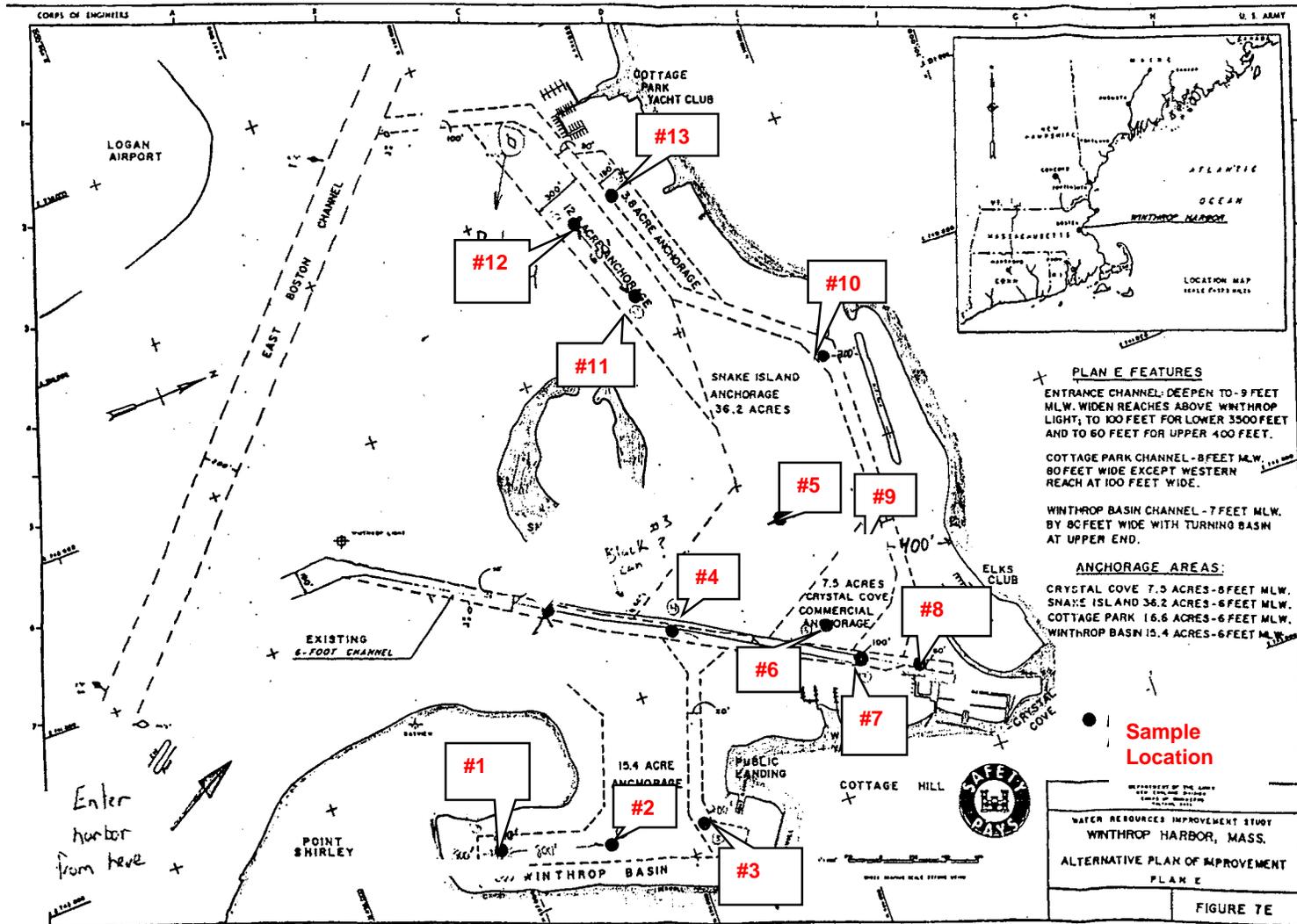


Figure 14. Sampling Location Plan for 1997 Biological Testing of Sediments for the Dredging of Winthrop Harbor

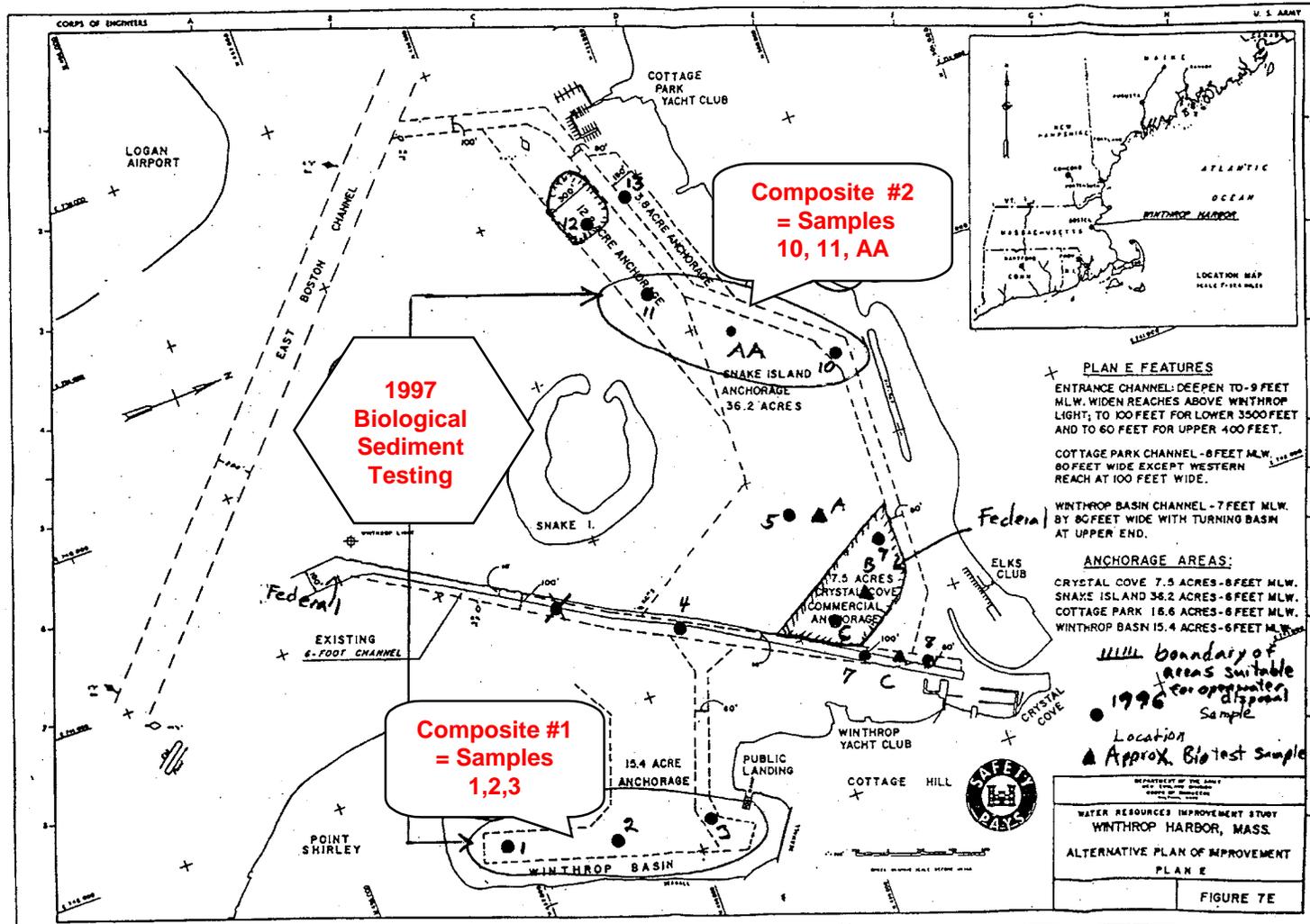


Table 10. Chemical composition of composite samples in Winthrop Harbor in 1995.

Parameter	1995 CHEMICAL CONCENTRATIONS (ppm)													1997 CHEMICAL CONCENTRATIONS (ppm)	
	Sample No.													COMPOSITE #1 (Samples 1,2,3)	COMPOSITE #2 (Samples 10, 11, AA)
	1	2	3	4	5	6	7	8	9	10	11	12	13		
Arsenic	17	13	11	12	12	9	10	13	6	14	13	7	10	NT	NT
Cadmium	3	2	2	2	2	1	2	3	1	3	2	5	2	NT	NT
Chromium	85	79	106	83	102	49	86	98	33	99	82	50	65	NT	NT
Copper	139	129	101	82	111	54	70	148	33	122	84	51	74	17.53	17.38
Lead	78	61	53	51	65	38	37	64	21	66	51	34	<5	NT	NT
Mercury	0.46	0.41	0.44	0.45	0.46	0.26	0.47	0.55	0.15	0.55	0.87	0.25	0.33	0.16	0.12
Nickel	20	16	17	18	18	11	14	17	16	21	16	13	14	NT	NT
Zinc	169	157	135	115	148	75	99	148	43	162	99	78	96	NT	NT
TPH	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	<5	NT	NT
PCBs	<0.00125	<0.00125	<0.00125	<0.00125	<0.00125	<0.00125	<0.00125	<0.00125	<0.00125	<0.00125	<0.00125	<0.00125	<0.00125	NT	NT
PAHs	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	<0.5	0.619	0.479
VOCs	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	NT	NT
O&G	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	<1	NT	NT
TOC	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	NT	0.89	0.91

Note: Parameter not tested.

Recreational Activities and Tourism Potential

Boating Uses

Winthrop Harbor

Winthrop Harbor is used mainly for recreational and commercial vessels. Its configuration and depth allow many vessels to navigate its waters. The Harbor can accommodate large vessels with drafts up to 6 feet in most places except in some of the coves and some, since the mooring areas was dredged from 4 to 6 feet (mlw) in 2001. Several shallow areas in the Harbor restrict vessel navigation, mostly in the Federal Channel, which needs to be dredged within the next few years.

One of the Harbor's best assets, aside from its deep water and protection from storms and waves, is its location on Boston Harbor. Vessels can have direct access to Boston Harbor and all of its attractions including the Boston Harbor Islands and the City of Boston waterfront. The open waters of the Atlantic Ocean are only a half mile from the main part of the Harbor just south of Deer Island. These features are attractive for boaters transiting to and from the Harbor and open waters.

Snake Island

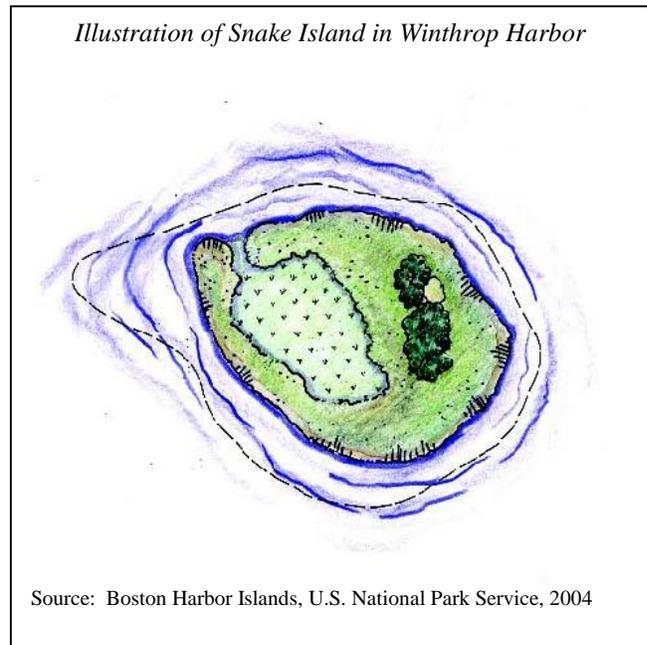
Snake Island is a small, 8-acre island in the center of Winthrop Harbor. Its shape is basically round with a marsh in the middle as shown in the following illustration. Access to the island is mainly by small vessels such as kayaks since it is surrounded by shallow tidal flats. Although the island is considered a natural island, its size increased in 1967 when approximately 350,000 cubic yards of sediments were dredged from Winthrop Harbor and deposited on Snake Island.

The island is part of the National Park Service Boston Harbor Islands. The Town of Winthrop owns and manages it. The National Park Service prefers to retain it as natural area.

Commercial Vessels

According to the Assessor's office, there are 21 commercially registered vessels in Winthrop Harbor.

Illustration of Snake Island in Winthrop Harbor



Source: Boston Harbor Islands, U.S. National Park Service, 2004

However, only five of these are excise tax exempt since they meet state commercial fishing permit regulations. All other vessels must pay excise tax to the Town.

Harbor Management and Operations

Harbormaster

The Winthrop Harbormasters are responsible for many functions and operations on Winthrop Harbor on a daily and seasonal basis. Their range of responsibilities includes collection of mooring and ramp fees, harbor safety, security, patrol, and vessel inspections and registrations. They have an administrative function for approximately 1,000 public moorings. Approximately 750 of these are used on seasonal basis, and 250 of them are reserved in a protected area of the Harbor for use during storms. The Town does not own or manage any floats or docks.

The Town owns a variety of vessels for the Harbormasters' use (see Table 11). It recently purchased a new 25-foot patrol vessel to complement its fleet and be used as the main patrol boat.

Table 11. Winthrop Harbormaster Vessels

Asset	Year	Notes
25' Power boat	2004	New vessel, main patrol boat
21' Power boat	1985	Secondary patrol vessel
20' Power boat	1980	Harbor pump vessel

Mooring Control

The Harbormaster determines mooring locations, collects fees, and performs other police duties depending on the need. Although there are no designated transient moorings, the Harbormaster could accommodate a vessel in need of one. Many towns like Winthrop leave it to the private sector to own the moorings and provide other services such as mooring repair.

Mooring Fees

Mooring fees are the only source of revenue from the harbor. There are no ramp fees or berths that contribute to the general fund of the Town. Yearly mooring fees are \$25 with boats under 12 feet exempt.

Mooring Demand and Use

Boaters must first sign up on a list with the Harbormaster to get a mooring. They are then assigned moorings as they become available. As of this writing, however, there were no people on the waiting list, which is not typical of waterfront communities in the North Shore. Most coastal communities with mooring fields typically have a waiting list due to the demand for moorings. Gloucester, for example has about 600 people on its list and many of them may have to wait more than seven years to get a mooring. Hull, a more comparable community to Winthrop in terms of its island/peninsula geography, population, and location on Boston Harbor expects to fill its approximate 400 moorings in 2005.

Town Landing

The Town Landing is located on the south side of the Harbor along Shirley Street. Its main use is for launching and retrieving boats and for parking trailers and their vehicles. There are two adjacent ramps and parking for 90 vehicles with trailers and 50 automobiles. The Landing also provides other recreational uses since it has several walking paths and benches.

The state Public Access Board owns the ramps and the Town manages them. No ramp or parking fees are charged for their use. Should the Town begin charging a ramp fees, the money would have to be put in a separate account and could only be use to support costs related to the use of the ramps such as maintenance costs or a fee collection attendant.

The ramps are in poor condition. On an annual basis, the Town fixes holes at the base of the ramps that are caused by boaters using their engines to launch and retrieve their boats. The ramps are approximately 30 years old and need to be replaced with modern concrete ramps that prevent propeller washout at the ramp bases. Floats should also be added to assist boaters with launching their vessels as well as improve the safety of launching operations at the ramps.

Pumpout Facility

The number of pumpout facilities has been increasing over the past ten years along the Massachusetts coast. There are presently over 20 pumpouts within a ten-mile radius of Winthrop Harbor, which includes the coastal towns from Lynn to Boston to Hull. Most pumpouts are at facilities that provide other services (such as water and fuel) so that boaters only have to make one stop when servicing their vessels or purchasing items for their voyages.

Pumpout management is different at various marinas, and usually depends on the demand for the service. Some large marinas, such as Boston Harbor Shipyard, offer pumpouts at shore side facilities and by a pumpout vessel.

Some marinas outside of Winthrop sell pre-paid cards that let boaters pump out their vessels either a specific number of times or a specific volume of liquid during a season. Many pumpouts are funded by the Clean Vessel Act (CVA) and provide free pumpouts.

In Winthrop, a pumpout vessel is funded by the CVA and its use is free. Users can request a pumpout by calling the harbormaster on either the telephone or the local VHF radio.

According to the Winthrop Harbormaster, the Town is addressing the need for a landside pumpout facility, with preference for a facility at the proposed multi-use pier at the Town Landing. This would give the Harbormaster more time for other harbormaster activities and make it more convenient for users since they would not have to wait for the pumpout vessel.

Waterfront Visitor Uses and Attractions

There was no data available on tourists to the Winthrop harbor front, due mainly to the fact that there are no major tourists attractions on the harbor. However, the consultant identified several small sport fishing boats that offered day trips attracted relatively few people to several marinas and the public landing as pick up and drop-off points for their businesses. Their contribution to the local economy would be minor since they would most likely purchase a few items such as bait, tackle, ice, and food for a day trip on the water.

There are several other attractions located near Winthrop Harbor including Belle Isle Marsh Reservation, Boston and Winthrop Greenways, Boston Harbor Islands, Deer Island, and several beaches on the Atlantic Ocean side of the Town. Although these resources are not directly on the harbor front, visitors may pass by some of the businesses and purchase local goods and services.

Belle Isle Marsh Reservation

The Belle Isle Marsh reservation, a 350-acre reservation, was acquired from MassPort in the late 1970s by the former Metropolitan District Commission (MDC, now the Department of Conservation and Recreation, DCR). It was opened as a public park in 1985. In 1986, the MDC reclaimed a major section of Belle Isle Marsh as a reservation. The Friends of Belle Isle Marsh, a grassroots environmental organization, was formed in the early 1980s to help preserve the marsh and publicize its importance as an urban nature laboratory and resource. Approximately 150 acres of the marsh is in Winthrop. Birdwatchers, kayakers, and others frequently use it with small vessels. Its main water access point is at the Belle Isle Bridge.

Boston Harbor Islands

The Boston Harbor Islands became a unit of the National Park System in November 1996 by an act of Congress (Public Law 104-333) that contains several provisions, which, in total, make this a national park like no other. It includes 34 islands that lie within the large "C" shape of Boston Harbor. Managed by a unique Partnership, the islands have been closely linked to Massachusetts Bay and to coastal communities for thousands of years.

The islands also offer an exceptional perspective on change in the region's ecosystem. Thus the islands are both a recreational haven for urban residents and tourists and a highly effective laboratory in which to learn about natural change, cultural history, and stewardship.

In 1985, Boston Harbor was labeled the most polluted harbor in the nation, but the dramatic recovery of water quality during the 1990s, through the Massachusetts Water Resources Authority's wastewater treatment, contributed to widespread support for establishing a national park area. Now, after an investment of more than \$4 billion in better wastewater management and treatment, the harbor is cleaner and more inviting. Over the past

three decades, numerous public and private agencies have once again turned their focus to Boston Harbor and its islands, as the region seeks to rebuild its historical and ecological ties to Massachusetts Bay.

The 34 islands of Boston Harbor (ranging in size from less than 1 acre to 274 acres) have served numerous public and private uses and are a unique example of an island cluster intimately tied to the life of a city. Although within sight of a dynamic and densely populated metropolitan area, they continue to offer the visitor a rare sense of isolation. Their proximity to a large urban population and their special natural and geologic resources, cultural and historic resources, and associated values contribute to their national significance.

Winthrop Greenway

The Winthrop Greenway is on DCR land and runs along the Winthrop side of the Belle Isle Inlet. Beach. The Greenway is currently a footpath and connects to the East Boston Greenway and to Short Beach in Winthrop. To encourage its use and benefits, the Winthrop Greenway should be linked the other pedestrian and bicycle paths and recreational resources such as the Town Landing or the proposed HarborWalk.

East Boston Greenway

The East Boston Greenway connects marshes, beaches, playing fields, Logan Airport, MBTA stations, and residential areas throughout the East Boston community. It was created from an abandoned railroad right-of-way in 1996. It will be extended to Belle Isle Marsh, mostly on DCR owned land.

Winthrop Beaches

There are two main beaches in Winthrop, both are on the Atlantic side of the town and are within a five to ten-minute walk from the center of town. Winthrop beach is a popular sandy beach that is maintained by DCR. It has restrooms and free parking. Yirrell Beach is a less popular beach and also offers free, but limited parking.

Deer Island

Deer Island is the site of wastewater treatment facility of Massachusetts Water Resources Authority (MWRA). It is located beyond the southern end of Point Shirley and is connected to it by a causeway. There is a park at the northerly end, perimeter walkway with numerous lookout points, visitor station, and free parking. Due to its relative high topography, the island provides panoramic views of the Boston skyline, Boston Harbor Island, and the Atlantic Ocean.

Winthrop Waterfront Area Economic Condition

Introduction

While Winthrop's waterfront is the defining geographic asset of the community, its potential to provide jobs and serve both local resident and visitors has not been fully realized. As part of this study, FXM Associates interviewed a selected sample of waterfront area business establishments, marine businesses, and others to determine what, if any, public or private sector actions could stimulate the waterfront more effectively as an economic asset.

Town officials, business representatives, and recent planning reports anticipate new development along the waterfront area during the next 5 to 10 years. Significant changes are anticipated, in part because of the preliminary planning approvals and developer feasibility studies for mixed-use (residential/commercial) development within a five- to six-block area along Pleasant Street involving the Atlantis and Crystal Cove marinas.

Senior staff of FXM Associates conducted interviews and analyzed relevant secondary source data (reports, studies, city records, etc.) on existing economic conditions, planned and proposed waterfront activity, economic trends, and potential effects on the harbor and town economy. This portion of the Plan reports on the results of the existing conditions assessment.

Community Profile

The Town of Winthrop is situated on a peninsula located five miles north of downtown Boston. It is bordered by Revere, Boston, and the Atlantic Ocean. Bus service travels throughout the town and connects to the MBTA rapid transit service (Blue Line) at Orient Heights station in East Boston.¹ The town is described as "a close-knit, family-oriented community where everything is within walking distance and that has retained its reputation for being a safe and pleasant place to live."² There are numerous parks and playgrounds, six public beaches, four tennis courts, five athletic fields, a public landing for boats, indoor skating rink, three yacht clubs, and a golf course.³

Winthrop is one of 24 communities that make up the Inner-Core region of Greater Boston, and is within the Metropolitan Planning Council (MPC) region as well as the Boston Metropolitan Statistical Area (MSA).⁴ In 2001, a town buildout analysis projected continued population growth to 18,493 in 2025, about a 10% increase, and that these additional 190 residents would occupy 83 new households.⁵ The analysis starts with available land in

¹ Winthrop (Suffolk County) Community Profile, Massachusetts Department of Housing and Community Development (DHCD)

² Ibid.

³ Ibid.

⁴ Op. Cit., DHCD Community Profile

⁵ Ibid.

each zoning district and makes projections of additional housing units and commercial/industrial space according to each zoning district's minimum lot size and other regulations. The projections only account for as-of-right development and do not include development by special or comprehensive permit that may increase the amount of development.⁶ Essentially, the EOEА analysis found Winthrop to be built up and built out.

Community Development Plan

The planning framework for an assessment of Winthrop Harbor's economic potential is provided by the Community Development Plan (CDP) (Final Draft, April 2004), prepared by the MAPC in conformance with Executive Order 418. The Plan provides an overview of local demographic, housing, transportation, and economic development conditions, and incorporates the results of two town-wide workshops sponsored by the CDP Committee, the Vision Workshop (June 2003), and the Economic Development Workshop (January 2004). The resulting vision statement aims to foster development that "will be compatible with and take advantage of the outstanding water assets of Winthrop's seaside location - its harbor, beaches and marshes."⁷ By 2020, this "hidden jewel" of Boston's North Shore will still feel like "a small-town oasis in a heavily urbanized area" with convenient intermodal access to all points, with "ferry service providing additional opportunities for carless travel to and from Winthrop."⁸

The Economic Development section of the Community Development Plan highlights salient characteristics and economic indicators of the local economy and resident workforce, and acknowledges that access to Winthrop from neighboring communities is problematic and limits the type and scale of viable local businesses. Key findings in the Plan include the following:

- Winthrop has a small base of local jobs relative to its population: 50% of residents work in Boston, and 70% of jobs based in Winthrop are filled by residents
- More than 50% of commuters to Boston work downtown (1,750) or at Logan (900), and 2.6% (249) work from home
- Resident workforce trails Boston region in education attainment, managerial/professional jobs
- 50% of private sector jobs are stores, restaurants, and local health care facilities
- Average Winthrop private sector job wage was \$25,324 compared to Boston metro average of \$50,752 in 2003
- Resident workforce grew 7% to 10,644 (2000 - 2002)
- Number of Winthrop jobs declined to 2,300 in 2002 from 3,100 in 1992; the town exports workers
- Average unemployment rate has been slightly below the state average since 1985; in December 2003 it was 5.1% and the state's was 5.4%

⁶ Massachusetts Executive Office of Environmental Affairs (EOEA), Winthrop Buildout Analysis Summary, 2001

⁷ Ibid.

⁸ Winthrop Community Development Plan, Final Draft, April 2004

-
- The town receives less business tax revenue than other suburban Boston communities

The Plan also references public infrastructure improvements to sustain and stimulate waterfront and water-related business and real estate development, as well as encourage greater public use of Winthrop's coastal resources. Six of the eight priority goals set forth by participants at the Economic Development Workshop are pertinent to this waterfront area assessment.⁹

- Examine zoning to allow high intensity (density) redevelopment, and address associated traffic and parking issues
- Address parking and traffic problems at Port Shirley, downtown, and beaches
- Grow existing businesses
- Improve transportation links
- Promote marine uses on the waterfront
- Pursue opportunities for a ferry link to Boston, Harbor Islands National Park and excursion destinations, and related development on Shirley Street

This section of the Community Development Plan identifies and maps several potential or prospective locations for public and private sector economic development initiatives in the Harbor Area and Shirley Street area (from harbor to Cross/Crescent Street/Beach Road).¹⁰

Goals for Harbor Area

- Encourage hospitality, tourism-related businesses (restaurants, shops, bed & breakfast lodging, small/boutique hotel) to leverage the harbor location and ferry service-related traffic (pedestrian)
- Pursue funding for Harbor Walk design, implementation¹¹
- Expand parking to support businesses and establish bus service to Wonderland/Revere to facilitate through traffic circulation
- Redevelop the marina and business district more intensively, including mixed uses (residential above commercial)
- Improve DCR beach and establish more water-based and waterfront visitor attractions
- Support marine uses (e.g., marine electronics sales/service) to maintain working waterfront and harbor navigation

Goals for the Shirley Street Subarea

- Develop a more pleasant streetscape to encourage pedestrian use
- Allow a mix of residential and commercial uses
- Reduce traffic speeds to enhance pedestrian crossing

⁹ Ibid., "Section One – Vision"

¹⁰ Ibid., p. 24

¹¹ Ibid., pp. 35, 36

Goals for the Beach Area

- Beautify beach to attract visitors according to US Army Corp of Engineers' plan
- Explore potential for bed & breakfast development on the one small parcel available for development in this entirely residential neighborhood

Waterfront Economic Area - Secondary Source Data Analysis

The Waterfront economic area is defined for the purposes of this study as the area extending from the immediate harbor area two to three blocks inland, depending upon the configuration of the segment. The economic area lies between Pleasant Street in the northwest corner of the town and approximately Ocean Avenue on the eastern shore. This is the area containing virtually all of the waterfront-related economic activities (see Figure 15).

Data in the Table 12 summarize selected demographic characteristics of the waterfront area compared to the Town of Winthrop as a whole:

Figure 15. Map of the Economic Study Area of the Winthrop Harbor Waterfront Area



Table 12. Demographic Characteristics: Town of Winthrop and its Waterfront Area

	Waterfront Economic Area	Town of Winthrop	Waterfront Economic Area
Population			
1990	4,900	18,127	27%
2000	4,800	18,303	26%
% • 1990-2000	-1.97%	0.97%	
2009 (est)	4,500	17,600	
Avg. hhld size	2.38	2.3	
owner-occupied	64%	53%	
renter-occupied	36%	47%	
median hhld income	\$70,000	\$63,000	111%
< \$15,000 income	7%	10%	

Source: Claritas, Inc. and FXM Associates

The total population of the waterfront area is estimated at 4,800 in 2000, a slight decline from the 1990 census figure of 4,900. This decline has been projected to continue, with the 2009 estimate put at 4,500.¹² In contrast, the Town of Winthrop grew at the rate of 1.11% over the period 1990-2000; however it too is expected to experience a slight decline by 2009, to a total population of 17,421. The waterfront area, then, comprises a little over a quarter of the town's population. The average size of waterfront area households is 2.38 persons, compared to the town's 2.3 persons per household. Over 95% of both waterfront and town population is white. Housing units in the waterfront area are slightly more likely (64%) to be owner-occupied than units in the town as a whole (54%). Incomes in the waterfront area are higher than in the town: the median household income is estimated at \$69,397 compared to \$61,798. Only 7.3% of households in the waterfront area have incomes below \$15,000, whereas the town has 9.44% of households in this category.

Data in the following table show the distribution of occupations a in the waterfront economic area and the Town of Winthrop overall.

Table 13. Occupational Characteristics: Town of Winthrop and Its Waterfront Area

¹² All figures in this section are drawn from Claritas, Inc. **Site Reports**, whose data are based on the US Census.

Occupation	Waterfront Economic Area	Town of Winthrop	Waterfront Economic Area %
Executive & Profess.	157	1,220	13%
Adminis.& Support	123	979	13%
Service	73	638	11%
Trade & Labor	137	895	15%
Total	490	3,732	13%

Source: Claritas, Inc. and FXM Associates

In the waterfront area, the largest category of occupation is executive and professional, which accounts for 32% of employment, followed closely by trade and labor at 28%. Administration (25%) and service (15%) personnel make up the balance of waterfront employment. In the Town of Winthrop, the profile is similar, but not identical: 33% of occupations are categorized as executive and professional, followed by administration and support at 26%, trade and labor at 24%, and service personnel at 17%.

Data in Table 14 present the employment characteristics of the waterfront economic area and the Town of Winthrop overall.

Employment in the waterfront area is predominantly in services, which account for approximately 35% of employees. Second in frequency is retail trade, where about 20% of employees work. Remaining employment, in order of frequency, is in finance/insurance/real estate (13%), transportation/communication/utilities (11%), construction (10%), and government (6%). The service sector in the Town of Winthrop is even more dominant, accounting for 48% of employment. Retail trade is next at 14%. No other categories of employment reach even 10% of remaining employees.

Within the Town of Winthrop overall there are about 530 business establishments with 3,700 employees and \$370 million in business sales annually. About 17% of these businesses are located within the Waterfront Study Area, including 90 establishments that account for 500 jobs and approximately \$50 million in business sales annually. The proportion of town-wide retail establishments within the Waterfront Study Area, where 17 of the approximately 97 retail businesses in Winthrop are located, is slightly higher and accounts for 100 jobs (out of 500 retail jobs town-wide) and \$11 million of the \$55 million in town-wide retail sales. Eating and Drinking places comprise the largest category of retail employment in Winthrop, with over 200 jobs (more than double those of food stores), and 6 of the 26 eating and drinking establishments town-wide are in the Waterfront Study Area. Neither the Waterfront Study Area retailers nor retailers town-wide capture more than 15 to 22% of the retail sales potential of Winthrop residents, who purchase most goods and services out of town. This suggests that tourists or out-of-town residents do not account for a significant proportion of business sales in Winthrop, including the sales of restaurants, retail shops, general or specialty merchandise, food stores, and so forth.

Table 14. *Employment Characteristics: Town of Winthrop and Its Waterfront Area*

	Waterfront Economic Area	Town of Winthrop	Waterfront Economic Area %
Employment			
Retail	99	521	19%
<i>home improvement</i>	14	23	61%
<i>general merchandise</i>	0	8	0%
<i>food stores</i>	7	93	8%
<i>auto dlrs & gas sta.</i>	5	15	33%
<i>apparel and accessories</i>	1	4	25%
<i>furniture & home furnishings</i>	10	45	22%
<i>eating and drinking places</i>	50	213	23%
<i>misc retail</i>	12	120	10%
FIRE	66	264	25%
Services	174	1,798	10%
Fishing	9	19	47%
Construction	48	211	23%
Manufacturing	5	206	2%
Transport/Communic.	57	153	37%
Wholesale Trade	13	269	5%
Government	28	299	9%
Total	598	4,261	14%

Source: Claritas, Inc. and FXM Associates

In both the waterfront economic area and in the town as a whole there are substantial market opportunities to capture "leaked" sales, especially in the areas of eating and drinking places and specialty retailing: Waterfront area residents spend over \$11 million in eating and drinking places outside the area and over \$5 million in special retailing stores outside the area. Town of Winthrop residents overall spend almost \$40 million in eating and drinking places outside the town and over \$18 million in special retailing stores outside the town. Both these categories of retailing are typically found in successful waterfronts, as the appeal of the waterfront provides distinctive locational advantages for specialty shopping and dining.

Waterfront Economic Area -- Summary of Interviews

FXM has interviewed nine business and property owners of marinas, restaurants, lodging, boat repair, commercial fishing, and other waterfront activities, some of whom are members of the Harbor Plan Committee. This effort is not intended to represent a comprehensive sample of the many, diverse businesses operating in the harbor area. To date, FXM has not received any objective data from town officials or proponents of planned and/or proposed waterfront real estate development. This summary highlights the relevant points of these interviews.

Recreational boating represents a significant amount of the business activity along Winthrop Harbor's waterfront from Crystal Cove to Main Street. The town maintains a 'major league' mooring field that accommodates 800 to 900 boats, the majority of which are 50- to 60-foot vessels and some as large as 110 feet. These public moorings are typically filled throughout the season (May - October). The harbormaster started keeping a waiting list in 2004, and expects to add 10 to 15 public moorings for transient boaters in tandem with construction of a public pier at the proposed ferry terminal. There are private marinas such as Atlantis Marina and Crystal Cove Marina, with slips for members, the general public, and occasional transient boaters. Mullins Marine Service also has slips available to the general public, local lobster boats, and, as needed, Massport fire and police boats.

Winthrop has a number of yacht clubs (Winthrop, Country Park, Pleasant Park) that maintain numerous slips and moorings for their members and guests. These social clubs are zoned and taxed as commercial uses; yacht clubs have entertainment/liquor licenses and most rent function rooms to the general public. The Winthrop Yacht Club was established in 1884 and has grown to 400 regular members and 125 lifetime members. Its marina has 122 slips and there are plans to add another 45 slips. It is also the home base for the US Coast Guard Auxiliary Flotilla 51, which conducts public education and community services. The Pleasant Park Yacht Club has 300 members, about 55 parking spaces on-site, and 70 slips for boats up to 43 feet. The club would like to add 10 to 15 floats to accommodate members with larger boats but there are problems at low tide when water depth is reduced to 3 to 4 feet.

The harbormaster, yacht club representatives, and local planning officials identify a public pier as the priority waterfront infrastructure improvement. The 150 public parking spaces available in the waterfront district are deemed adequate for existing businesses and waterfront activity. There has been limited demand for transient docking or 'touch and go' berths because the town does not have a public pier; however, some transient boaters are accommodated as guests at one of the local yacht clubs. Local marina operators expressed interest in future expansion to accommodate transient boaters, noting that the lack of such facilities diminishes business potential for day-trippers or visitors to restaurants, shops, etc.

There are 12 to 15 lobster boats and 4 to 5 charter fishing boats operating from Winthrop Harbor, as well as a dozen or more residents who regularly harvest clams from Airport Flats, an area reputedly owned by the Town of Winthrop. These lobster boats are owned by Winthrop residents and since the town does not have a commercial wharf, lobster boats are berthed at either Mullins Marine marina, East Boston marinas, or at moorings in Winthrop Harbor, and local fishermen have no adequate place to load/unload, store traps, bait, etc.. Current town policy would separate commercial fishing activity from the planned ferry landing, although the proposed pier design could accommodate both types of vessels at Town Landing. The Trestle location is cited as an alternative site for a commercial fishing wharf, however the

harbormaster reports that there is a serious problem with shoaling between Snake Island and Coughlin Park affecting the ferry landing, Crystal Cove development, and other proposed waterfront improvements.

Mullins Marine Services provides boat, sail and mast repair as well as specialty services (woodworking, antique boat restoration) at their historic boatyard that operates one of the few remaining railway/cradle haul-out systems. This boat yard also includes a small marina (12 slips), but opportunities to expand moorings for transient boaters are constrained by significant silting from Belle Isle Creek.

Waterfront restaurants and lodging establishments are generally optimistic about proposals for ferry service, condominium development, and marina expansion, anticipating that these uses will attract more customers. However, most proprietors are also concerned about additional vehicular parking and traffic congestion potentially associated with the residential and commercial development at Atlantis Marina and Crystal Cove.

Waterfront Area Economic Development Potential

Introduction

At the November 17, 2004 meeting of the Harbor Planning Committee, Frank Mahady, FXM Principal, presented the firm's findings on existing economic conditions in Winthrop overall and the waterfront area in particular, including commuter ferry and multi-use public pier issues. His presentation also covered landside economic development opportunities based on resident and tourist markets and potential physical improvements along the waterfront. Participants at the meeting discussed these and other issues. Their concerns included support of local businesses and prospects for new business development linked to waterfront area improvements and related considerations. This memorandum summarizes that discussion, focusing on economic development opportunities and public policy and program initiatives to advance those opportunities.

Multi-use Public Pier

- Since publication of the *Winthrop Commuter Boat Feasibility Study* (January 2001) the Town has been unable to secure commitments from a private ferry operator for an *unsubsidized* commuter ferry service to downtown Boston, as called for in the recommendations of that study. While the demand analysis and vessel characterization assumptions contained in the 2001 report remain valid, an initially restrictive RFP resulted in no operator response, and subsequent efforts have been unsuccessful for a number of reasons, including changes in the supply of potentially available vessels, changing business circumstances for the operators who expressed interest (1999-2000) prior to the initial RFP, and dramatically increased fuel costs. Efforts by the Town to secure commitments from the Commonwealth of Massachusetts for

a *subsidized* demonstration project have thus far proved unsuccessful.

- Members of the Committee and the consultant recalled meetings during the commuter boat feasibility study in which the broader purpose of a multi-use public pier had been a primary community objective. The ferry project had been viewed as a first step towards securing funding and other commitments to build a pier, or piers, that would satisfy the needs of the fishing industry, local charter and excursion vessels, and the harbor master, as well as provide the ferry option for commuters to downtown Boston.
- From an economic development perspective, one objective of the ferry project had been to bring visitors to Winthrop to patronize local shops and restaurants and the two hotel/motels currently in Winthrop. The Chamber of Commerce views visitors and tourists as a major benefit of waterfront revitalization in general, and the ferry is viewed as a contributor to that goal. The consultant noted that the original ferry study had recommended that the ferry operator be allowed to stage dinner cruises and other charter and excursion opportunities from the new pier, and this potentially substantial source of revenue could be an inducement for the commuter ferry operator. Previous studies of commuter boat operations in Boston Harbor had shown that non-commuters and excursions make up 29 to 38% of overall ridership and 45 to 48% of revenues for vessel use.
- Programming for a multi-use pier should consider the needs of Winthrop-based commercial lobster boats, charter and excursion vessels (both existing local and potential new operators that could bring visitors to Winthrop), commercial clambers, transient recreational vessels (touch and go and possible longer term), and safety, security, and management needs identified by the Harbor Master.

FXM Observations and Recommendations: The potential uses at the new multi-use pier may not be complicated, but neither are they transparent at this time. For example, the implications of moving vessels now docked at private marinas (such as local fishing and charter boats) to a public pier have not been addressed, and such uses will affect capital and operating costs at the public pier and possibly revenues to existing marina owners. The design of the pier needs to be informed by prospective uses, even if the objective is for optimal flexibility for potential uses (including a ferry). Management and use rules and priorities have not been established but may be a secondary priority until the pier is closer to operational. A *pro forma* for operating costs and revenues should be prepared for a multi-use public pier, and responsibilities should be identified for assuring the solvency as well as management of the new pier on an annual operating basis.

Each of these issues should be addressed as part of conceptual and final site planning and engineering for the new pier. They need not delay the process of securing funding for the construction of

a new pier and may in fact expedite the process by assuring potential grantors and other capital contributors that both community support and sound pier operations are in place prior to construction. Annual operating subsidies from the State are highly unlikely, as are contributions from general tax revenues by the Town.

Landside Economic Development Opportunities

As noted in FXM's prior technical memorandum (*Winthrop Waterfront Area Economic Conditions*, October 26, 2004), available secondary source data indicate that retail stores and restaurants in **Winthrop now capture only about 22% of the town residents' yearly retail spending potential.** A breakdown of spending potential, current store sales, and "leakage" from the town by business type is shown in Table 15.

Table 15. Existing and Potential Retail Sales within the Harborfront Area of Winthrop

Retail Market Potential		
	Waterfront Area	Town of Winthrop
Business Type		
Bldg. Mat, Garden Supp.	\$ 1,805,183	\$ 6,555,194
Gen'l Merchandise	\$ 4,871,713	\$ 17,611,322
Food & Drug Stores	\$ 13,212,524	\$ 48,005,765
Auto Dlr's & Gas Stations	\$ 10,317,813	\$ 37,316,243
Apparel & Accessory	\$ 5,136,325	\$ 18,589,198
Eating & Drinking Places	\$ 13,753,229	\$ 50,252,573
Home Furnishings & Equipment	\$ 2,814,134	\$ 10,139,412
Total of categories	\$ 51,910,921	\$ 188,469,707
Other Retail	\$ 15,738,875	\$ 56,514,015
Total Retail Potential	\$ 67,649,796	\$ 244,983,722
Current Retail Sales		
	Waterfront Area	Town of Winthrop
Business Type		
Bldg. Mat, Garden Supp.	\$ 2,300,000	\$ 3,500,000
Gen'l Merchandise	\$ -	\$ 800,000
Food & Drug Stores	\$ 1,000,000	\$ 23,100,000
Auto Dlr's & Gas Stations	\$ 1,000,000	\$ 2,900,000
Apparel & Accessory	\$ 100,000	\$ 400,000
Eating & Drinking Places	\$ 2,400,000	\$ 10,900,000
Home Furnishings & Equipment	\$ 1,800,000	\$ 7,400,000
Total of categories	\$ 8,600,000	\$ 49,000,000
Other Retail	\$ 2,100,000	\$ 5,700,000
All Retail Sales	\$ 10,700,000	\$ 54,700,000
Current Retail Sales Leakage		
	Waterfront Area	Town of Winthrop
Business Type		
Bldg. Mat, Garden Supp.	\$ (494,817)	\$ 3,055,194
Gen'l Merchandise	\$ 4,871,713	\$ 16,811,322
Food & Drug Stores	\$ 12,212,524	\$ 24,905,765
Auto Dlr's & Gas Stations	\$ 9,317,813	\$ 34,416,243
Apparel & Accessory	\$ 5,036,325	\$ 18,189,198
Eating & Drinking Places	\$ 11,353,229	\$ 39,352,573
Home Furnishings & Equipment	\$ 1,014,134	\$ 2,739,412
Total of categories	\$ 43,310,921	\$ 139,469,707
Other Retail	\$ 13,638,875	\$ 50,814,015
Total Leakage	\$ 56,949,796	\$ 190,283,722
% captured	16%	22%

and FXM

8 data)

It is unrealistic to assume that new businesses in Winthrop could capture even a majority of the \$190 million in annual spending of Winthrop residents now taking place outside of town (see Table 15 for details). Big box retailers, grocery chains, major auto dealers and others serving regional markets will continue to capture most of local resident spending for large ticket items, weekly groceries, and general merchandise. However, **significant potential exists for Eating & Drinking Places (restaurants, lounges, entertainment, and related) and specialty retail shops (including Apparel & Accessories stores) to be successful in Winthrop, relying mostly on the local resident market.** Visitors and tourists would help, but may not be essential to the success of new business ventures of these types along or near the waterfront.

The waterfront area could offer the special ambience and visibility important to a successful restaurant (good food and good service are essential in any location), as well as to specialty retail shops (quality merchandise targeted to the local market and competitive prices are essential in any location). A distinctive environment, such as waterfront views and access, will help attract residents as well as visitors to new eating, entertainment, and shopping opportunities.

FXM Observations and Recommendations: The landside of Shirley Street along the main waterfront area is currently a mix of commercial and residential uses that, depending upon the success of revitalization and improved access along the immediate waterfront, may transition to more intensive commercial uses. There is little developable area on the immediate waterside of this main thoroughfare.

It is our understanding that zoning allows for commercial uses in this mixed residential/ commercial neighborhood, but specifically prohibits B&Bs. The opportunity to accommodate visiting boaters overnight, whether docked at the private marinas or a new multi-use public pier, or other visitors attracted to Winthrop by an excursion or charter vessel outing from the Winthrop pier or a water taxi or ferry from downtown Boston, should not be prohibited. B&Bs have traditionally allowed local property owners and entrepreneurs opportunities to compete in small ways for overnight visitors by offering an attractive alternative to more traditional and larger hotels or motels. With fewer services typically internalized at B&Bs, visitors are encouraged to eat and shop elsewhere in the local community.

Winthrop is now facing waterfront development issues, which, while outside the scope of this study, bear comment in general terms. Efforts to limit obstructions to the waterfront views and access corridors and to expand waterfront-walking opportunities are essential to the revitalization and economic development potential elsewhere in the waterfront area and in the community as a whole. An attractive, publicly accessible waterfront adds to the quality of life and property values of an entire community and not simply the uses immediately adjacent to the waterfront. Where communities have encouraged or demanded public access to the

waterfront as part of private development initiatives, they have realized longer term value and off-waterfront investments even as such access may have required trading off short term property tax benefits along the immediate waterfront. In most instances, however, an attractive and active public space along the water has enhanced waterfront property values (the Fort Point Channel, Boston, *Watersheet Activation Plan (2003)* is a good example: waterfront property owners believe that the value of their residential, hotel, retail and other commercial investments will improve as a consequence of public access and activity on and along the water, and, as a result, they are contributing to the support of waterfront infrastructure and events programming).

IV. ACTION PLAN AND IMPLEMENTATION GUIDE

Overview of the Plan's Recommendations

This section describes the principal recommendations proposed in the Winthrop Harbor Assessment and Plan. They are designed to achieve the Town's overall goals for use of the harbor and waterfront, and have evolved in response to an analysis of the current conditions, issues, and resources, and comments and suggestions from businesses, residents, and members of the Harbor Plan Committee.

The recommendations are organized according to planning elements. In some cases, the discussion expands upon a specific use or activity over short, mid, and long terms.

Implementation Schedule

The following pages describe the implementation strategies for the Plan (see Table 16). The recommendations are organized according to five elements.

Action	Lists the actions necessary to achieve the goals of the Plan
Costs	Estimated costs of project. Detailed costs would require site inspection, permitting, and other site-specific investigations.
Funding	Potential funding agencies
Responsible Agencies	Assigns the elected or appointed body, agency, group, individuals or volunteers principally responsible to initiate the implementation action.
Priority	Identifies the need rank of a project. However, a low priority may take precedent due to availability of funding or other reason.
Time Frame	Identifies the relative time that the project should begin.

Table 16. Summary of Implementation Actions and Schedule

Waterside Recommendations

Action	Costs	Funding	Responsible Agencies	Priority	Time Frame
Build a multi-use pier and operations facility at the public landing.	Pier @ \$2M, Landside @ \$1M.	Seaport Advisory Council, PWED	Town Administrator, Harbor Management, Harbormaster	High	Immediate
Dredge Federal Channel		ACE	Town Administrator, Harbor Management	High	Short
Dredge Belle Isle Inlet.	Unknown	State	Harbor Management	Low	Medium
Continue Winthrop Beach Re-nourishment Program.	\$12,500,000	DCR	DCR	High	On-going, complete by 2005
Improve the boat ramp at the Town Landing.		Public Access Board	Harbor Management	High	Short
Investigate stabilization of Snake Island.	\$80,000	ACE, NOAA	Harbor Management	Medium	Short term
Improve control of water at the Lewis Lake tide gate.		NOAA	Public Works	Medium	Medium

Landside Recommendations

Action	Costs	Funding	Responsible Agencies	Priority	Time Frame
Develop the proposed HarborWalk	Planning and Design @ \$15,000 Construction \$unknown	MassPike Tourism, Seaport Advisory, Urban Self Help	Open Space and Recreation Committee	High	Short term
Improve infrastructure (stairs and walls) at public access points		DCR, MCZM	Public Works	Medium	Medium
Repair/replace Bridge over Belle Isle Inlet		Design - Boston 50%, Winthrop 50% Build -	MassHighway, Bridges Division, Public Works Department, City of	Medium	Medium

		MassHighway 100%	Boston; Winthrop Public Works		
Design and implement Shirley Street streetscape improvements		CDBG	Town Administrator	Medium	Medium

Program and Regulatory Recommendations

Action	Costs	Funding	Responsible Agencies	Priorit y	Time Frame
Develop a management plan for the Town Landing.	Minimal	None	Harbormaster, Harbor Mgt. Committee	High	Short
Implement a new public access and signage program.	Minimal	Minimal	Town Administrator, Public Works		Medium
Promote waterfront uses and benefits.	Minimal	None	Town Administrator	Medium	Short
Strengthen programs with existing waterfront users and advocates.	None	None required	Town Administrator,	Medium	Medium
Establish launch fees at the Town Landing.	None	None required	Town Administrator, Harbormaster, Selectmen	High	Short
Increase town mooring use and fees.	None	None required	Harbormaster, Selectmen	High	Short
Update and implement the shellfish management plan.	None	None required	Harbormaster, Town Administrator	Medium	Medium
Maintain existing businesses and attract new ones.	None	Small Business Administration	Town Administrator	Medium	Medium
Modify zoning to allow for Bed & Breakfast lodgings.	None	None required	Selectmen	Medium	Short

Waterside Recommendations

Build a multi-use pier and operations facility at the Town Land.

The Plan envisions a multi-use pier at the Town Landing that would support a variety of commercial and public uses. The Town should embark upon a program to develop waterside and landside structures that will improve marine-dependent opportunities in Winthrop Harbor as well as businesses along the waterfront. A new pier would provide berthing and access for the Harbormaster vessels, commercial fishing vessels, dinghies, a commuter ferry, and excursion and transient vessels. A new building adjacent to this pier would house the harbormaster office, restrooms, and a ticket booth. This facility would also provide an area for fishermen to temporarily store gear, pickup and drop-off gear and passengers. The Town will need to work with appropriate funding sources such as the Seaport Advisory Council, to secure funds for additional design work and to develop a management plan for the Town Landing.

Dredge the Federal Channel.

The existing federal channel should be dredged due to the significant shoaling that has occurred over many decades. Presently, the U.S. Coast Guard and Town are extending use of the channel by relocating channel markers toward the adjacent gravel pit into deeper waters.

As a federally designated channel, the USACE is obligated for its maintenance and/or for implementation of any improvements. The Town should submit a formal request to the USACE Engineering and Planning Division in order to proceed with unlocking the potential assets and opportunities within the Harbor.

Dredge Belle Isle Inlet.

Due to the past history for dredging Belle Isle Inlet, opposition expressed by the US Environmental Protection Agency, the regulatory process for the dredging of Belle Isle Inlet would be expected to be extremely difficult, time consuming, and costly. It is anticipated that the project would require the preparation of an Environmental Impact Report (EIR) and could require significant mitigation to offset impacts due to dredging.

Investigate stabilization of Snake Island.

Snake Island has long been questioned as being a potential source contributing to sediment build-up within the Harbor; thereby, increasing the frequency for maintenance dredging. It is recommended that an investigation be conducted to determine if the island is indeed a sediment source feeding the harbor, and if so, provide cost effective and environmentally sound alternatives for stabilization.

Continue with Winthrop Beach Re-nourishment program as part of the Winthrop Shores Reservation Restoration of Winthrop and Short Beaches.

The state and the town should continue to support the Winthrop Beach Re-nourishment program. This project, which includes

\$12,500,000 of improvements to the drainage system, landscape amenities, and reconstruction of Winthrop Shore Drive, will help protect the area from storms and increase the size of the beach, which is a major recreation attraction for the residents of Winthrop as well as thousands of people that visit Winthrop from the region.

Rebuild the boat ramp and add floats at the Town Landing.

Improve the condition of the current facility and expand the usage by providing side boarding floats to tie-up to. Improvements are currently being investigated by the State Public Access Board (PAB). The Town should peruse with PAB, the implementation of these improvement plans.

Improve the control of water at the Lewis Lake tide gate.

The tide gate located on Washington Street controls the water levels for Lewis Lake. This gate, which has not functioned properly, has resulted in stagnant water in the Lake. It needs to be upgraded to improve the water quality, control floodwaters, and to possibly reduce sedimentation at the confluence of the waters exiting the gate and Winthrop Harbor. The Town should seek funds to assess the sedimentation process, reconstruct the gate, and manage its operations.

Landside Recommendations

Develop the proposed HarborWalk.

The proposed HarborWalk is a key component of this Plan. The HarborWalk, which would create a pedestrian path along and between Dow Playground and the Town Landing along Shirley Street, would link important recreational resources as well as provide viewing locations, in particular, at the former trolley bed in Crystal Cove. It would be an attractive resource that could link other recreational uses such as the Winthrop Greenway. The HarborWalk would complement the recreational uses at the proposed multiuse pier at the Town Landing as well as support businesses along Shirley Street by increasing the number of people that pass through the commercial area.

The area south of the former trolley bed is proposed as the site for a HarborWalk/ public access. It was also considered as an option for a Town Pier for fishermen use. Issues with this option would include the need to provide an extended pier/gangway/float system to gain ample water depth for boat docking. Other considered methods would be to provide shoreline stabilization with some dredging but this would be a more complex project. The proposed use of this area would also need to consider the navigation issues within the area, as presently the water area is shared with adjacent marinas. Landside limitations include parking and work area, which need further be further investigated considering specific usage.

Improve the infrastructure at public access points.

Public access is critical to the success of any town harbor front. Equally important is the need for good quality and safe infrastructure to support this access. The Town needs to upgrade and rehabilitate many of its public access points as indicated in the existing conditions sections on public access locations. Missing or crumbling stairways, for example, prevent people from access the shoreline. Faded or missing signs that would normally direct people where to go or inform them about the history of the area should also be replaced. A program of infrastructure improvements should be developed and prioritized so residents, tourists, and others can access and enjoy Winthrop's beautiful waterfront and its history and amenities.

Repair and/or replace the bridge over Belle Isle Inlet.

Transportation access is critical to the function of a working community. The bridge over Belle Isle Inlet is one of only two access points to the Town of Winthrop. The channel under the bridge provides the only water access to Belle Isle Marsh. This bridge should be replaced and, possibly, built several feet higher to accommodate larger boats, especially emergency or rescuer vessels. This project would complement the other recommendation to dredge near and under the bridge to increase the water depth for deeper draft vessel.

Design and implement Shirley Street streetscape improvements.

Shirley Street is the main commercial/retail area along Winthrop Harbor. The conditions of its streetscape should be improved to help attract people and support businesses along the waterfront. Improvements would include directive and informative signs, pedestrian walkways, benches, and similar streetscape amenities. These improvements would also link this business area with other destinations such as the Town Landing and the proposed HarborWalk. This recommendation is also in the Winthrop Community Development Plan.

Program and Regulatory Recommendations

Establish launch fees at the Town Landing.

The Town Landing is owned by the state Public Access Board (PAB) and managed by the Town. Although user fees for the ramp are not collected at this time, the Town should establish launch fees. They could be used to support the operational costs of this facility or other costs that are used to support the ramp. The only requirement by the PAB is that the fee structure is equitable for all users. Options for this fee structure include daily, seasonal, or yearly fees.

Increase town mooring use and fees.

The Town should increase revenues from Town moorings by 1) increasing mooring fees and 2) promoting and increasing the number of Town moorings. Additional revenues would support harbor improvements and management. Depending on the fee structure, the increase may affect resident and non-resident vessel owners with moorings. Although all the Town moorings are not currently

occupied, the Town should attract boaters to the Harbor with the use of brochures or other economic development programs that promote the benefits and advantages of mooring in Winthrop Harbor.

Adopt a shellfish management plan.

The clam flats in Winthrop are designated by the Division of Marine Fisheries (DMF) as conditionally restricted, which means that the shellfish can only be dug by commercially permitted diggers and must be brought to the depuration plant for cleansing. The Town's option to implement a shellfish management plan is dependent on the DMF, which only allows the Town to manage the flats if they are designated clean areas. There is potential for the flats to open as Boston Harbor becomes cleaner. The Town should take advantage of improvements to the flats and update and adopt a previously written shellfish management plan, should flats become cleaner. Furthermore, permit fees would help offset to the cost of a shellfish constable, which would manage, inspect, and collect fees from both commercial and non-commercial diggers.

Develop a management plan the Town Landing and proposed multi-use pier.

A key component of the proposed multi-use pier at the Town Landing is a management plan that would be needed to manage all uses, activities, building spaces, and operations at the Town Landing. Existing uses include boat launching, parking, and passive recreation. Additional uses with the multi use pier would include a harbormaster's office, collection of ramp and berthing fees, additional parking needs for users of the pier, vessel docking for commercial vessels, loading and unloading of fishing gear and seafood products, scheduling of excursions and passenger vessel berthing and use, and similar pier activities. A management plan for the pier, ramp, and parking facility would coordinate the use and users, maximize revenue, and support the goals of the Town. It would also be part of an operations plan for the pier.

Support efforts to maintain existing businesses in and attract new ones to the commercial waterfront areas.

Businesses located along or near a waterfront have an advantage over others non-waterfront areas since people are typically attracted to waterfronts, especially to businesses that are water-enhanced such as restaurants, specialty retailers, and lodging. New businesses to Winthrop's waterfront would help increase business, improve the local economy, and reduce sales leakages, which is relatively high for Winthrop. Options for the Town could be to create a business improvement district or an economic development committee that would focus on methods to attract business, business support and startup programs, marketing, and partnerships with other business organizations such as the Winthrop Chamber of Commerce.

Modify zoning to allow for Bed & Breakfast lodgings.

The Town should change the current zoning ordinance to allow bed and breakfast businesses in the commercially zoned areas as a measure to improve the tourism and hospitality services in Winthrop. Currently, there are only two facilities of accommodation, the Inn at Crystal Cove and the Winthrop Arms Hotel

and Restaurant. Smaller lodging businesses would provide direct and indirect revenue to the Town, which is typical of businesses that offer overnight visits. Bed and breakfasts would fit with the character of the homes and businesses, fill a niche market, increase pedestrian traffic, and support other businesses such as restaurants.

Promote waterfront uses and benefits to the residents of Winthrop.

The Town of Winthrop has excellent waterfront and natural assets that are available to the community. The Town should take advantage of these assets and promote the cultural and recreational benefits of Winthrop Harbor with an informational and educational program. It would address the Harbor's opportunities, amenities, natural resources, uses, activities, and contribution to the local culture. The local school system should also be included to help develop the program and educate students about the resources, culture, and benefits of the waterfront. The goal of a waterfront program would be to encourage more residents to visit and enjoy the Harbor. A key method to support this recommendation would be to improve signs that direct people to the waterfront and educate them about it when they get there. The recommendation is explained below.

Implement a new public access and signage program.

A public access and signage program would help support the Town's goal to improve public access, educate them about the area, and attract more residents and tourists to the waterfront for recreational uses. This program should provide both informative and directive signs. For example, informative signs could tell people about the history or views at or from a specific location. Directive signs could help people locate attractions or designated routes. They could also direct tourists to take paths along commercial areas and other places of businesses.

Strengthen programs with existing waterfront users and advocates.

There are a variety of groups that have been involved with the uses and activities on the waterfront including the Department of Conservation and Recreation, Friends of Belle Isle Marsh, and the Harbor Management Committee, and the Harbor Plan Committee. The Harbor Management Committee, who is responsible, for the overall management of the Harbor should ensure programs and partnerships of harbor users, stakeholders, and interested groups are strengthened and expanded as necessary. This would support the exchange and dissemination of ideas, opportunities, and activities along the waterfront.

Summary of Funding Resources

A variety of both debt and equity (grants) sources may be appropriate to the implementation of this Plan. A range of state and federal sources was explored as part of an implementation strategy for this Plan. The following summary represents a first step in this process, but is not intended to foreclose other options that may arise as the Town implements specific action of the Plan.

The Town would be eligible for funds generally authorized for improvements to coastal facilities, public access, business development, and recreational areas. Boating access to Winthrop and Boston Harbors, improved handicap access, and increased open space are improvements that generally may qualify for some type of state or federal financial support. Funds may be available for construction, expansion, and improvement of public facilities, piers, boardwalks, bulkheads, and other harbor and waterfront facilities. Moneys may also become available for additional research, planning, and public infrastructure investments as the Plan is implemented. A brief description of public funding programs of potential relevance to the implementation of the Plan follows.

State Sources

Source	Seaport Bond Bill
Amounts	Varies - requires a 25% local match for dredging and a 50% match for other projects.
Uses	Design and construction of coastal projects such as piers, wharves, and revetments.
Timing	
Contact site	www.mass.gov/seaports

Source	Rivers and Harbors Grant Program, MA Department of Environmental Managements
Amounts	Generally < \$300,000 - 25% local match for dredging and a 50% match for other projects.
Uses	Design and construction that address problems on coastal waterways
Timing	
Contact site	www.mass.gov/dcr/grants

Source	MA Riverways Program
Amounts	Grants typically average \$1,000 to \$5000. Over \$92,000,000 granted in 2002.
Uses	Projects that promote the restoration and protection of Commonwealth's rivers, streams, and adjacent lands.
Timing	Submission deadlines are generally in the late Fall.
Contact site	www.mass.gov/dfwele/reiver/rivsmallgrnts.htm

Source	Smart Growth Technical Assistance Grants (EOEA)
Amounts	Up to \$30,000
Uses	Projects identified in the Community Development Plan
Timing	November

Contact site www.comm-pass.com

Source	DEM Greenways and Trails Demonstration Grants
Amounts	Up to \$5,000 for non-profits, municipalities, and regional planning associations.
Uses	Greenway and trail planning, mapping and resource assessment, greenway public education and outreach. Promotion of linkages across town boundaries,
Timing	unknown
Contact site	www.mass.gov/dem/programs/greenway/grants

Federal Sources

Source	NOAA/NMFS Community-based Restoration Program
Amounts	unknown
Uses	Restoration of wetlands and supporting structures
Timing	Active
Contact site	www.nmfs.noaa.gov/ or Eric Hutchins at 978.281.9300 x6313

Source	Five-star Restoration Matching Grants Program
Amounts	\$5,000 to \$20,000 average \$10,000
Uses	Competitive grants for communities that support wetland, riparian, and coastal habitat restoration projects that build diverse partnerships.
Timing	March 1, 2005
Contact site	www.nfwf.org

Source	Clean Vessel Act, Department of the Interior, US Fish and Wildlife
Amounts	Total program \$6,000,000
Uses	This grant program provides funding for the development, operation, and maintenance of sewage pumpout facilities for recreational boaters and also for programs that educate boaters about the importance of proper disposal of their sewage.
Timing	January 7, 2005
Contact site	www.fedgrants.gov

The likelihood of acquiring funding under any of these or other sources depends on a variety of factors, including timing, eligibility and competing applications. At the same time, the inclusion of a recommendation of a project seeking funding in a harbor plan or other community plan would undoubtedly strengthen its position in any competitive review process.

ATTACHMENT 10: REQUIRED ATTACHMENTS

- W-9
- Authorized Signatory Sheets
- Commonwealth Terms and Conditions
- Matching Funds Letter

Request for Taxpayer Identification Number and Certification

Completed form should be given to the requesting department or the department you are currently doing business with.

Please print or type

Name (List legal name, if joint names, list first & circle the name of the person whose TIN you enter in Part I-See **Specific Instruction** on page 2)
 Town of Winthrop, Massachusetts

Business name, if different from above. (See **Specific Instruction** on page 2)

Check the appropriate box: Individual/Sole proprietor Corporation Partnership Other **public entity/local government**

Legal Address: number, street, and apt. or suite no. Town Hall, 1 Metcalf Square	Remittance Address: if different from legal address number, street, and apt. or suite no.
--	--

City, state and ZIP code Winthrop, MA 02152	City, state and ZIP code
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Phone # () Fax # () Email address:

Part I Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box. For individuals, this is your social security number (SSN). **However, for a resident alien, sole proprietor, or disregarded entity, see the Part I instruction on page 2.** For other entities, it is your employer identification number (EIN). If you do not have a number, see **How to get a TIN** on page 2.
Note: If the account is in more than one name, see the chart on page 2 for guidelines on whose number to enter.

	Social security number
	□□□-□□-□□□□
	OR
	Employer identification number
	04-6001372

Vendors: Dunn and Bradstreet Universal Numbering System (DUNS)	DUNS
	□□□□□□□□

Part II Certification

Under penalties of perjury, I certify that:

- The number shown on this form is my correct taxpayer identification number (or I am waiting for a number to be issued to me), **and**
- I am not subject to backup withholding because: (a) I am exempt from backup withholding, or (b) I have not been notified by the Internal Revenue Services (IRS) that I am subject to backup withholding as a result of a failure to report all interest or dividends, or (c) the IRS has notified me that I am no longer subject to backup withholding, **and**
- I am an U.S. person (including an U.S. resident alien).
- I am currently a Commonwealth of Massachusetts's state employee: (check one): No Yes If yes, **in compliance with** the State Ethics Commission **requirements**.

Certification instructions: You must cross out item 2 above if you have been notified by the IRS that you are currently subject to backup withholding because you have failed to report all interest and dividends on your tax return. For real estate transactions, item 2 does not apply.

Sign Here	Authorized Signature ▶	Date ▶
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Purpose of Form
 A person who is required to file an information return with the IRS must get your correct taxpayer identification number (TIN) to report, for example, income paid to you, real estate transactions, mortgage interest you paid, acquisition or debt, or contributions you made to an IRA.

Use Form W-9 only if you are a U.S. person (including a resident alien), to give your correct TIN to the person requesting it (the requester) and, when applicable, to:

- Certify the TIN you are giving is correct (or you are waiting for a number to be issued).
- Certify you are not subject to backup withholding

If you are a foreign person, use the appropriate Form W-8. See Pub 515, Withholding of Tax on Nonresident Aliens and Foreign Corporations.

What is backup withholding? Persons making certain payments to you must withhold a designated percentage, currently 28% and pay to the IRS of such payments under certain conditions. This is called "backup withholding." Payments that may be subject to backup withholding include interest, dividends, broker and barter exchange transactions, rents, royalties, nonemployee pay, and certain payments from fishing boat operators. Real estate transactions are not subject to backup withholding.

If you give the requester your correct TIN, make the proper certifications, and report all your taxable interest and dividends on your tax return, payments you receive will not be subject to backup withholding. **Payments you receive will be subject to backup withholding if:**

- You do not furnish your TIN to the requester, or
- You do not certify your TIN when required (see the Part II instructions on page 2 for details), or
- The IRS tells the requester that you furnished an incorrect TIN, or
- The IRS tells you that you are subject to backup withholding because you did not report all your interest and dividends only), or

5. You do not certify to the requester that you are not subject to backup withholding under 4 above (for reportable interest and dividend accounts opened after 1983 only).

Certain payees and payments are exempt from backup withholding. See the Part II instructions on page 2.

Penalties

Failure to furnish TIN. If you fail to furnish your correct TIN to a requester, you are subject to a penalty of \$50 for each such failure unless your failure is due to reasonable cause and not to willful neglect.

Civil penalty for false information with respect to withholding. If you make a false statement with no reasonable basis that results in no backup withholding, you are subject to a \$500 penalty.

Criminal penalty for falsifying information. Willfully falsifying certifications or affirmations may subject you to criminal penalties including fines and/or imprisonment.

Misuse of TINs. If the requester discloses or uses TINs in violation of Federal law, the requester may be subject to civil and criminal penalties.

Specific Instructions

Name. If you are an individual, you must generally enter the name shown on your social security card. However, if you have changed your last name, for instance, due to marriage without informing the Social Security Administration of the name change, enter your first name, the last name shown on your social security card, and your new last name.

If the account is in joint names, list first and then circle the name of the person or entity whose number you enter in Part I of the form.

Sole proprietor. Enter your **individual** name as shown on your social security card on the "Name" line. You may enter your business, trade, or "doing business as (DBA)" name on the "Business name" line.

Limited liability company (LLC). If you are a single-member LLC (including a foreign LLC with a domestic owner) that is disregarded as an entity separate from its owner under Treasury regulations section 301.7701-3, **enter the owner's name on the "Name" line.** Enter the LLC's name on the "Business name" line.

Caution: *A disregarded domestic entity that has a foreign owner must use the appropriate Form W-8.*

Other entities. Enter your business name as shown on required Federal tax documents on the "Name" line. This name should match the name shown on the charter or other legal document creating the entity. You may enter any business, trade, or DBA name on the "Business name" line.

Part I - Taxpayer Identification Number (TIN)

Enter your TIN in the appropriate box.

If you are a **resident alien** and you do not have and are not eligible to get an SSN, your TIN is your IRS individual taxpayer identification number (ITIN). Enter it in the social security number box. If you do not have an ITIN, see **How to get a TIN** below.

If you are a **sole proprietor** and you have an EIN, you may enter either your SSN or EIN. However, the IRS prefers that you use your SSN.

If you are an **LLC** that is **disregarded as an entity** separate from its owner (see **Limited liability company (LLC)** above), and are owned by an individual, enter your SSN (or "pre-LLC" EIN, if desired). If the owner of a disregarded LLC is a corporation, partnership, etc., enter the owner's EIN.

Note: See the chart on this page for further clarification of name and TIN combinations.

How to get a TIN. If you do not have a TIN, apply for one immediately. To apply for an SSN, get **Form SS-5**, Application for a Social Security Card, from your local Social Security Administration office. Get **Form W-7**, Application for IRS Individual Taxpayer Identification Number, to apply for an ITIN or **Form SS-4**, Application for Employer Identification Number, to apply for an EIN. You can get Forms W-7 and SS-4 from the IRS by calling 1-800-TAX-FORM (1-800-829-3676) or from the IRS's Internet Web Site www.irs.gov.

If you do not have a TIN, write "Applied For" in the space for the TIN, sign and date the form, and give it to the requester. For interest and dividend payments, and certain payments made with respect to readily tradable instruments, generally you will have 60 days to get a TIN and give it to the requester before you are subject to backup withholding on payments.

The 60-day rule does not apply to other types of payments. You will be subject to backup withholding on all such payments until you provide your TIN to the requester.

Note: Writing "Applied For" means that you have already applied for a TIN or that you intend to apply for one soon.

Part II - Certification

To establish to the paying agent that your TIN is correct or you are a U.S. person, or resident alien, sign Form W-9.

For a joint account, only the person whose TIN is shown in Part I should sign (when required).

Real estate transactions. You must sign the certification. You may cross out item 2 of the certification.

Dunn and Bradstreet Universal Numbering System (DUNS) number requirement –

The United States Office of Management and Budget (OMB) requires all vendors that receive federal grant funds have their DUNS number recorded with and subsequently reported to the granting agency. If a contractor has multiple DUNS numbers the contractor should provide the primary number listed with the Federal government's Central Contractor Registration (CCR) at www.ccr.gov. Any entity that does not have a DUNS number can apply for one online at <http://www.dnb.com/us/> under the DNB D-U-N Number Tab.

Privacy Act Notice

Section 6109 of the Internal Revenue Code requires you to give your correct TIN to persons who must file information returns with the IRS to report interest, dividends, and certain other income paid to you, mortgage interest you paid, the acquisition or abandonment of secured property, cancellation of debt, or contributions you made to an IRA or MSA. The IRS uses the numbers for identification purposes and to help verify the accuracy of your tax return. The IRS may also provide this information to the Department of Justice for civil and criminal litigation, and to cities, states, and the District of Columbia to carry out their tax laws.

You must provide your TIN whether or not you are required to file a tax return. Payers must generally withhold a designated percentage, currently 28% of taxable interest, dividend, and certain other payments to a payee who does not give a TIN to a payer. Certain penalties may also apply.

What Name and Number to Give the Requester

For this type of account:	Give name and SSN of:
1. Individual	The individual
2. Two or more individuals (joint account)	The actual owner of the account or, if combined funds, the first individual on the account ¹ The minor ²
3. Custodian account of a minor (Uniform Gift to Minors Act)	The grantor-trustee ¹
4. a. The usual revocable savings trust (grantor is also trustee)	The actual owner ¹
b. So-called trust account that is not a legal or valid trust under state law	
5. Sole proprietorship	The owner ³
For this type of account:	Give name and EIN of:
6. Sole proprietorship	The owner ³
7. A valid trust, estate, or pension trust	Legal entity ⁴
8. Corporate	The corporation
9. Association, club, religious, charitable, educational, or other tax-exempt organization	The organization
10. Partnership	The partnership
11. A broker or registered nominee	The broker or nominee
12. Account with the Department of Agriculture in the name of a public entity (such as a state or local government, school district, or prison) that receives agricultural program payments	The public entity

¹ List first and circle the name of the person whose number you furnish. If only one person on a joint account has an SSN, that person's number must be furnished.

² Circle the minor's name and furnish the minor's SSN.

³ You must show your individual name, but you may also enter your business or "DBA" name. You may use either your SSN or EIN (if you have one).

⁴ List first and circle the name of the legal trust, estate, or pension trust. (Do not furnish the TIN of the personal representative or trustee unless the legal entity itself is not designated in the account title.)

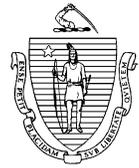
Note: If no name is circled when more than one name is listed, the number will be considered to be that of the first name listed.

If you have questions on completing this form, please contact the Office of the State Comptroller. (617) 973-2468.

Upon completion of this form, please send it to the Commonwealth of Massachusetts Department you are doing business with.

**COMMONWEALTH OF MASSACHUSETTS
CONTRACTOR AUTHORIZED SIGNATORY LISTING**

Issued May
2004



CONTRACTOR LEGAL NAME :
CONTRACTOR VENDOR/CUSTOMER CODE:

INSTRUCTIONS: Any Contractor (other than a sole-proprietor or an individual contractor) must provide a listing of individuals who are authorized as legal representatives of the Contractor who can sign contracts and other legally binding documents related to the contract on the Contractor's behalf. In addition to this listing, any state department may require additional proof of authority to sign contracts on behalf of the Contractor, or proof of authenticity of signature (a notarized signature that the Department can use to verify that the signature and date that appear on the Contract or other legal document was actually made by the Contractor's authorized signatory, and not by a representative, designee or other individual.)

NOTICE: *Acceptance of any payment under a Contract or Grant shall operate as a waiver of any defense by the Contractor challenging the existence of a valid Contract due to an alleged lack of actual authority to execute the document by the signatory.*

For privacy purposes **DO NOT ATTACH** any documentation containing personal information, such as bank account numbers, social security numbers, driver's licenses, home addresses, social security cards or any other personally identifiable information that you do not want released as part of a public record. The Commonwealth reserves the right to publish the names and titles of authorized signatories of contractors.

AUTHORIZED SIGNATORY NAME	TITLE
James McKenna	Town Manager

I certify that I am the President, Chief Executive Officer, Chief Fiscal Officer, Corporate Clerk or Legal Counsel for the Contractor and as an authorized officer of the Contractor I certify that the names of the individuals identified on this listing are current as of the date of execution below and that these individuals are authorized to sign contracts and other legally binding documents related to contracts with the Commonwealth of Massachusetts on behalf of the Contractor. I understand and agree that the Contractor has a duty to ensure that this listing is immediately updated and communicated to any state department with which the Contractor does business whenever the authorized signatories above retire, are otherwise terminated from the Contractor's employ, have their responsibilities changed resulting in their no longer being authorized to sign contracts with the Commonwealth or whenever new signatories are designated.

Signature

Date:

Title: Telephone:

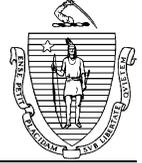
Fax: Email:

[Listing can not be accepted without all of this information completed.]

A copy of this listing must be attached to the "record copy" of a contract filed with the department.

**COMMONWEALTH OF MASSACHUSETTS
CONTRACTOR AUTHORIZED SIGNATORY LISTING**

Issued May
2004



CONTRACTOR LEGAL NAME :
CONTRACTOR VENDOR/CUSTOMER CODE:

PROOF OF AUTHENTICATION OF SIGNATURE

**This page is optional and is available for a department to authenticate contract signatures.
It is recommended that Departments obtain authentication of signature for the signatory
who submits the Contractor Authorized Listing.**

This Section MUST be completed by the Contractor Authorized Signatory in presence of notary.

Signatory's full legal name (print or type): James McKenna

Title: Town Manager

X _____
Signature as it will appear on contract or other document (**Complete only in presence of notary**):

AUTHENTICATED BY NOTARY OR CORPORATE CLERK (PICK ONLY ONE) AS FOLLOWS:

I, _____ (NOTARY) as a notary public certify that I witnessed
the signature of the aforementioned signatory above and I verified the individual's identity on this date:

_____, 20 ____.

My commission expires on:

AFFIX NOTARY SEAL

I, _____ (CORPORATE CLERK) certify that I witnessed the
signature of the aforementioned signatory above, that I verified the individual's identity and confirm the individual's
authority as an authorized signatory for the Contractor on this date:

_____, 20 ____.

AFFIX CORPORATE SEAL



COMMONWEALTH TERMS AND CONDITIONS

This Commonwealth Terms and Conditions form is jointly issued by the Executive Office for Administration and Finance (ANF), the Office of the Comptroller (CTR) and the Operational Services Division (OSD) for use by all Commonwealth of Massachusetts ("State") Departments and Contractors. **Any changes or electronic alterations by either the Department or the Contractor to the official version of this form, as jointly published by ANF, CTR and OSD, shall be void.** Upon execution of these Commonwealth Terms and Conditions by the Contractor and filing as prescribed by the Office of the Comptroller, these Commonwealth Terms and Conditions will be incorporated by reference into any Contract for Commodities and Services executed by the Contractor and any State Department, in the absence of a superseding law or regulation requiring a different Contract form. Performance shall include services rendered, obligations due, costs incurred, commodities and deliverables provided and accepted by the Department, programs provided or other commitments authorized under a Contract. A deliverable shall include any tangible product to be delivered as an element of performance under a Contract. The Commonwealth is entitled to ownership and possession of all deliverables purchased or developed with State funds. Contract shall mean the Standard Contract Form issued jointly by ANF, CTR and OSD.

1. Contract Effective Start Date. Notwithstanding verbal or other representations by the parties, or an earlier start date indicated in a Contract, the effective start date of performance under a Contract shall be the date a Contract has been executed by an authorized signatory of the Contractor, the Department, a later date specified in the Contract or the date of any approvals required by law or regulation, whichever is later.

2. Payments And Compensation. The Contractor shall only be compensated for performance delivered and accepted by the Department in accordance with the specific terms and conditions of a Contract. All Contract payments are subject to appropriation pursuant to M.G.L. C. 29, §26, or the availability of sufficient non-appropriated funds for the purposes of a Contract, and shall be subject to intercept pursuant to M.G.L. C. 7A, §3 and 815 CMR 9.00. Overpayments shall be reimbursed by the Contractor or may be offset by the Department from future payments in accordance with state finance law. Acceptance by the Contractor of any payment or partial payment, without any written objection by the Contractor, shall in each instance operate as a release and discharge of the State from all claims, liabilities or other obligations relating to the performance of a Contract.

3. Contractor Payment Mechanism. All Contractors will be paid using the Payment Voucher System unless a different payment mechanism is required. The Contractor shall timely submit invoices (Payment Vouchers - Form PV) and supporting documentation as prescribed in a Contract. The Department shall review and return rejected invoices within fifteen (15) days of receipt with a written explanation for rejection. Payments shall be made in accordance with the bill paying policy issued by the Office of the Comptroller and 815 CMR 4.00, provided that payment periods listed in a Contract of less than forty-five (45) days from the date of receipt of an invoice shall be effective only to enable a Department to take advantage of early payment incentives and shall not subject any payment made within the forty-five (45) day period to a penalty. The Contractor Payroll System, shall be used only for "Individual Contractors" who have been determined to be "Contract Employees" as a result of the Department's completion of an Internal Revenue Service SS-8 form in accordance with the Omnibus Budget Reconciliation Act (OBRA) 1990, and shall automatically process all state and federal mandated payroll, tax and retirement deductions.

4. Contract Termination Or Suspension. A Contract shall terminate on the date specified in a Contract, unless this date is properly amended in accordance with all applicable laws and regulations prior to this date, or unless terminated or suspended under this Section upon prior written notice to the Contractor. The Department may terminate a Contract without cause and without penalty, or may terminate or suspend a Contract if the Contractor breaches any material term or condition or fails to perform or fulfill any material obligation required by a Contract, or in the event of an elimination of an appropriation or availability of sufficient funds for the purposes of a Contract, or in the event of an unforeseen public emergency mandating immediate Department action. Upon immediate notification to the other party, neither the Department nor the Contractor shall be deemed to be in breach for failure or delay in performance due to Acts of God or other causes factually beyond their control and without their fault or negligence. Subcontractor

failure to perform or price increases due to market fluctuations or product availability will not be deemed factually beyond the Contractor's control.

5. Written Notice. Any notice shall be deemed delivered and received when submitted in writing in person or when delivered by any other appropriate method evidencing actual receipt by the Department or the Contractor. Any written notice of termination or suspension delivered to the Contractor shall state the effective date and period of the notice, the reasons for the termination or suspension, if applicable, any alleged breach or failure to perform, a reasonable period to cure any alleged breach or failure to perform, if applicable, and any instructions or restrictions concerning allowable activities, costs or expenditures by the Contractor during the notice period.

6. Confidentiality. The Contractor shall comply with M.G.L. C. 66A if the Contractor becomes a "holder" of "personal data". The Contractor shall also protect the physical security and restrict any access to personal or other Department data in the Contractor's possession, or used by the Contractor in the performance of a Contract, which shall include, but is not limited to the Department's public records, documents, files, software, equipment or systems.

7. Record-keeping And Retention, Inspection Of Records. The Contractor shall maintain records, books, files and other data as specified in a Contract and in such detail as shall properly substantiate claims for payment under a Contract, for a minimum retention period of seven (7) years beginning on the first day after the final payment under a Contract, or such longer period as is necessary for the resolution of any litigation, claim, negotiation, audit or other inquiry involving a Contract. The Department shall have access, as well as any parties identified under Executive Order 195, during the Contractor's regular business hours and upon reasonable prior notice, to such records, including on-site reviews and reproduction of such records at a reasonable expense.

8. Assignment. The Contractor may not assign or delegate, in whole or in part, or otherwise transfer any liability, responsibility, obligation, duty or interest under a Contract, with the exception that the Contractor shall be authorized to assign present and prospective claims for money due to the Contractor pursuant to a Contract in accordance with M.G.L. C. 106, §9-318. The Contractor must provide sufficient notice of assignment and supporting documentation to enable the Department to verify and implement the assignment. Payments to third party assignees will be processed as if such payments were being made directly to the Contractor and these payments will be subject to intercept, offset, counter claims or any other Department rights which are available to the Department or the State against the Contractor.

9. Subcontracting By Contractor. Any subcontract entered into by the Contractor for the purposes of fulfilling the obligations under a Contract must be in writing, authorized in advance by the Department and shall be consistent with and subject to the provisions of these Commonwealth Terms and Conditions and a Contract. Subcontracts will not relieve or discharge the Contractor from any duty, obligation, responsibility or liability arising under a Contract. The Department is entitled to copies of all subcontracts and shall not be bound by any provisions contained in a subcontract to which it is not a party.

10. Affirmative Action, Non-Discrimination In Hiring And Employment. The Contractor shall comply with all federal and state laws, rules and regulations promoting fair employment practices or prohibiting employment discrimination and unfair labor practices and shall not discriminate in the hiring of any applicant for employment nor shall any qualified employee be demoted, discharged or otherwise subject to discrimination in the tenure, position, promotional opportunities, wages, benefits or terms and conditions of their employment because of race, color, national origin, ancestry, age, sex, religion, disability, handicap, sexual orientation or for exercising any rights afforded by law. The Contractor commits to purchasing supplies and services from certified minority or women-owned businesses, small businesses or businesses owned by socially or economically disadvantaged persons or persons with disabilities.

11. Indemnification. Unless otherwise exempted by law, the Contractor shall indemnify and hold harmless the State, including the Department, its agents, officers and employees against any and all claims, liabilities and costs for any personal injury or property damages, patent or copyright infringement or other damages that the State may sustain which arise out of or in connection with the Contractor's performance of a Contract, including but not limited to the negligence, reckless or intentional conduct of the Contractor, its agents, officers, employees or subcontractors. The Contractor shall at no time be considered an agent or representative of the Department or the State. After prompt notification of a claim by the State, the Contractor shall have an



COMMONWEALTH TERMS AND CONDITIONS

opportunity to participate in the defense of such claim and any negotiated settlement agreement or judgment. The State shall not be liable for any costs incurred by the Contractor arising under this paragraph. Any indemnification of the Contractor shall be subject to

appropriation and applicable law.

12. Waivers. Forbearance or indulgence in any form or manner by a party shall not be construed as a waiver, nor in any way limit the legal or equitable remedies available to that party. No waiver by either party of any default or breach shall constitute a waiver of any subsequent default or breach.

13. Risk Of Loss. The Contractor shall bear the risk of loss for any Contractor materials used for a Contract and for all deliverables, Department personal or other data which is in the possession of the Contractor or used by the Contractor in the performance of a Contract until possession, ownership and full legal title to the deliverables are transferred to and accepted by the Department.

14. Forum, Choice of Law And Mediation. Any actions arising out of a Contract shall be governed by the laws of Massachusetts, and shall be brought and maintained in a State or federal court in Massachusetts which shall have exclusive jurisdiction thereof. The Department, with the approval of the Attorney General's Office, and the Contractor may agree to voluntary mediation through the Massachusetts Office of Dispute Resolution (MODR) of any Contract dispute and will share the costs of such mediation. No legal or equitable rights of the parties shall be limited by this Section.

15. Contract Boilerplate Interpretation, Severability, Conflicts With Law, Integration. Any amendment or attachment to any Contract which contains conflicting language or has the affect of a deleting, replacing or modifying any

printed language of these Commonwealth Terms and Conditions, as officially published by ANF, CTR and OSD, shall be interpreted as superseded by the official printed language. If any provision of a Contract is found to be superseded by state or federal law or regulation, in whole or in part, then both parties shall be relieved of all obligations under that provision only to the extent necessary to comply with the superseding law, provided however, that the remaining provisions of the Contract, or portions thereof, shall be enforced to the fullest extent permitted by law. All amendments must be executed by the parties in accordance with Section 1. of these Commonwealth Terms and Conditions and filed with the original record copy of a Contract as prescribed by CTR. The printed language of the Standard Contract Form, as officially published by ANF, CTR and OSD, which incorporates by reference these Commonwealth Terms and Conditions, shall supersede any conflicting verbal or written agreements relating to the performance of a Contract, or attached thereto, including contract forms, purchase orders or invoices of the Contractor. The order of priority of documents to interpret a Contract shall be as follows: the printed language of the Commonwealth Terms and Conditions, the Standard Contract Form, the Department's Request for Response (RFR) solicitation document and the Contractor's Response to the RFR solicitation, excluding any language stricken by a Department as unacceptable and including any negotiated terms and conditions allowable pursuant to law or regulation.

IN WITNESS WHEREOF, The Contractor certify under the pains and penalties of perjury that it shall comply with these Commonwealth Terms and Conditions for any applicable Contract executed with the Commonwealth as certified by their authorized signatory below:

CONTRACTOR AUTHORIZED SIGNATORY: _____
(signature)

Print Name: James McKenna

Title: Town Manager

Date: June 9, 2015

(Check One): Organization Individual

Full Legal Organization or Individual Name: Town of Winthrop, Massachusetts

Doing Business As: Name (If Different): _____

Tax Identification Number: 046-001-372

Address: Town Hall, 1 Metcalf Square, Winthrop, MA 02152

Telephone: 617-846-1705 FAX: 617-846-5458

INSTRUCTIONS FOR FILING THE COMMONWEALTH TERMS AND CONDITIONS

A "Request for Verification of Taxation Reporting Information" form (Massachusetts Substitute W-9 Format), that contains the Contractor's correct TIN, name and legal address information, must be on file with the Office of the Comptroller. If the Contractor has not previously filed this form with the Comptroller, or if the information contained on a previously filed form has changed, please fill out a W-9 form and return it attached to the executed COMMONWEALTH TERMS AND CONDITIONS.

If the Contractor is responding to a Request for Response (RFR), the COMMONWEALTH TERMS AND CONDITIONS must be submitted with the Response to RFR or as specified in the RFR. Otherwise, Departments or Contractors must timely submit the completed and properly executed COMMONWEALTH TERMS AND CONDITIONS (and the W-9 form if applicable) to the: **Payee and Payments Unit, Office of the Comptroller, 9th Floor, One Ashburton Place, Boston, MA 02108** in order to record the filing of this form on the MMARS Vendor File. Contractors are required to execute and file this form only once.

June 9, 2015

Patricia Bowie, Coastal Resiliency Specialist
Massachusetts Office of Coastal Zone Management
251 Causeway Street, Suite 800
Boston, MA 02114

Re: Town of Winthrop – Green Infrastructure for Coastal Resilience Grant Application
Coughlin Park Green Infrastructure Feasibility Study

Dear Ms. Bowie:

The Town of Winthrop commits to match 25% of the \$100,000 Coughlin Park Green Infrastructure Feasibility Study grant application with a \$25,000 cash match. Matching funds are in the process of being approved by Town Council and the Town acknowledges that funding is provided on a reimbursement basis.

As part of the Coughlin Park Green Infrastructure Feasibility project, the Town will evaluate and identify the feasibility of green infrastructure improvements to provide erosion control in Coughlin Park. The Town would greatly appreciate CZM support for this important climate resilience project. If you have any questions or require any additional information, please contact Steven Calla, Department of Public Works Director, at 617-846-1341.

Sincerely,

James McKenna
Town Manager

ATTACHMENT 11: LETTERS OF SUPPORT