VOLUME I

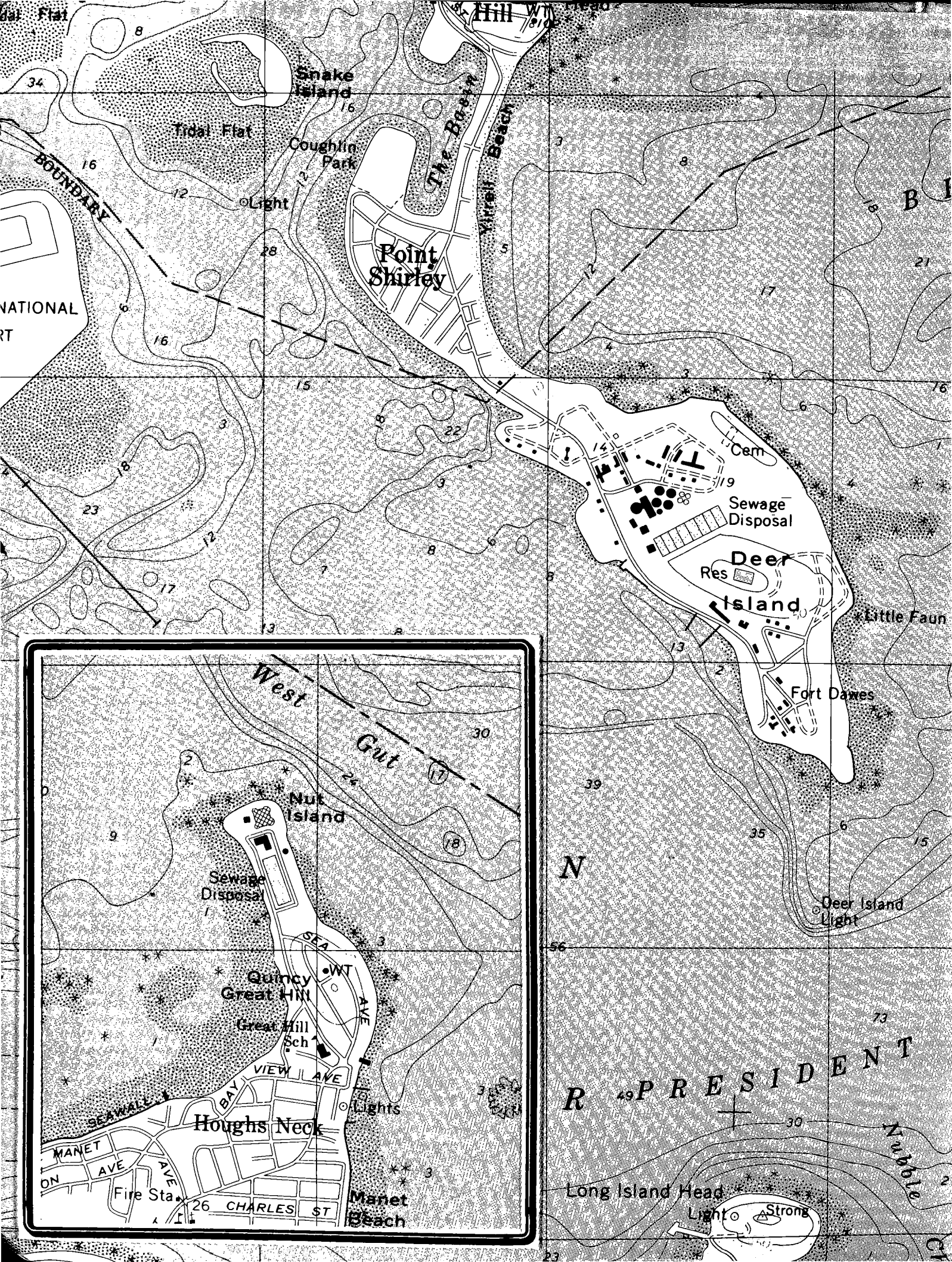
COMPREHENSIVE SUMMARY

Final Environmental Impact Statement

SITING of WASTEWATER TREATMENT FACILITIES for BOSTON HARBOR

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION I
J.F.K. FEDERAL BUILDING
BOSTON, MASSACHUSETTS 02203

1985


Tidal Flat
Snake Island
Tidal Flat
Coughlin Park
Light
BOUNDARY
The Basin
Virginia Beach
Point Shirley
Hill
Head
NATIONAL
RT
Cem
Sewage Disposal
Deer Island
Res
Little Faun
Fort Dawes
Deer Island Light
West Gut
Nut Island
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SEA
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Manet Beach
PRESIDENT
Long Island Head
Light
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UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

REGION I

J. F. KENNEDY FEDERAL BUILDING, BOSTON, MASSACHUSETTS 02203

To: All Interested Agencies, Public Groups, and Citizens

Enclosed is a copy of the Final Environmental Impact Statement (FEIS) on the Siting of Wastewater Treatment Facilities for Boston Harbor.

In accordance with the requirements of the National Environmental Policy Act of 1969, there will be a thirty (30) day comment period which will end on January 21, 1986. Any comments or inquiries concerning the FEIS should be submitted to the above address. The Massachusetts Water Resources Authority (MWRA) has prepared a separate Final Environmental Impact Report on the Siting of Wastewater Treatment Facilities for Boston Harbor. Any questions on the MWRA document should be addressed to Elisa Speranza, Public Affairs Coordinator, One Central Plaza, Boston, MA 02108 (742-7600).

EPA and the MWRA will sponsor a public information meeting on January 8, 1986 at the Department of Transportation Building at Kendall Square in Cambridge at 7:30 p.m. EPA and the MWRA will sponsor three public hearings on the FEIS and FEIR on January 13, 14, and 15, 1986. The location and time for each public hearing is listed below:

January 13, 1986 - 7:30 p.m.
North Quincy High School Auditorium
316 Hancock Street
Quincy, MA.

January 14, 1986 - 7:00 p.m.
Faneuil Hall
Faneuil Hall Market Place
Boston, MA.

January 15, 1986 - 7:30 p.m.
Winthrop Jr. High School Auditorium
45 Pauline Street
Winthrop, MA.

We encourage your participation. EPA will receive comments on the FEIS until January 21, 1986. All comments should be addressed to Michael R. Deland, Regional Administrator, EPA Room 2100B.

Sincerely yours,

Michael R. Deland
Regional Administrator

VOLUME I

COMPREHENSIVE SUMMARY

Final Environmental Impact Statement

SITING of WASTEWATER TREATMENT FACILITIES for BOSTON HARBOR

Prepared by:

UNITED STATES
ENVIRONMENTAL PROTECTION AGENCY
REGION I

Technical Assistance by:
THIBAULT/BUBLY ASSOCIATES
PROVIDENCE, RHODE ISLAND

12/2/85

MICHAEL R. DELAND Date
Regional Administrator, U.S. EPA, Region I

This Final Environmental Impact Statement has been prepared by the U.S. Environmental Protection Agency (EPA) with assistance from the General Services Administration as a Cooperating Agency under the requirements of the National Environmental Policy Act. The FEIS identifies and evaluates the environmental impacts of various site options for wastewater treatment facilities for treating Greater Boston's wastewater in compliance with federal and state water pollution control laws.

FINAL ENVIRONMENTAL IMPACT STATEMENT

PROPOSED ACTION:	SITING OF WASTEWATER TREATMENT FACILITIES IN BOSTON HARBOR
LOCATION:	BOSTON, MASSACHUSETTS
DATE:	DECEMBER 1985
SUMMARY OF ACTION:	This FEIS considers the environmental acceptability of alternative locations for the construction of new wastewater treatment facilities for Boston Harbor. The FEIS recommends the construction of a secondary wastewater treatment facility at Deer Island.
VOLUMES:	I. COMPREHENSIVE SUMMARY II. TECHNICAL EVALUATIONS III. PUBLIC PARTICIPATION AND RESPONSE TO COMMENTS IV. PUBLIC AND INTERAGENCY COMMENTS
LEAD AGENCY:	U.S. ENVIRONMENTAL PROTECTION AGENCY, REGION I JFK Federal Building, Boston, Massachusetts 02203
COOPERATING AGENCY:	GENERAL SERVICES ADMINISTRATION
TECHNICAL CONSULTANT:	THIBAULT/BUBLY ASSOCIATES Providence, Rhode Island
FOR FURTHER INFORMATION:	Mr. Ronald Manfredonia Water Management Division U.S. EPA, Region I JFK Federal Building Boston, MA 02203 617-223-5610
FINAL DATE BY WHICH COMMENTS MUST BE RECEIVED:	_____

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Volume 1

BOSTON HARBOR
FEIS - COMPREHENSIVE SUMMARY

INTRODUCTION

This document, Comprehensive Summary -- Final Environmental Impact Statement on the Siting of Wastewater Treatment Facilities for Boston Harbor, is one of four volumes prepared in response to comments raised on the Supplemental Draft Environmental Impact Statement/Environmental Impact Report (SDEIS) published jointly by the United States Environmental Protection Agency (EPA) and the Metropolitan District Commission (MDC) on December 31, 1984 to replace an earlier Draft EIS published in 1978. The treatment facilities will be constructed by the applicant, the Massachusetts Water Resources Authority (MWRA), a successor agency to the MDC.

The MWRA has the responsibility of selecting the site for the wastewater treatment facilities. The EPA has the responsibility of conducting an independent evaluation of the site's environmental acceptability, providing federal financial assistance if available, and ensuring rapid compliance with the federal Clean Water Act.

The General Services Administration (GSA) has participated with EPA in the preparation of this Final Environmental Impact Statement (FEIS) as a cooperating agency and has performed an independent analysis of the environmental impacts of the disposal of federally owned parcels on Deer Island.

This Comprehensive Summary includes a recapitulation of the need for the project, the principal siting alternatives, their impacts and the possible actions that might be taken to mitigate those impacts. It outlines the key location-affecting issues that have developed during the planning process; it summarizes the United States Environmental Protection Agency's evaluation of the alternatives; it identifies the Agency's preferred alternative; and it lists mandatory mitigation activities.

In summary, this FEIS recommends All Secondary Deer Island as the EPA's preferred alternative. EPA has also determined that All Secondary Long and Split Secondary Deer/Long are environmentally acceptable. Split Secondary Deer/Nut is unacceptable.

Volume II of this series, Technical Evaluations, includes the environmental impact analysis prepared by GSA, and a number of technical reports and memoranda prepared by EPA in response to comments on the SDEIS. This SDEIS consisted of several volumes: an Executive Summary; the SDEIS itself; a volume of appendices on water quality impacts, land use and demographics, traffic, recreational resources and visual quality, costs, financial impacts, noise, odor, geology, historical and archeological resources, and legal and institutional constraints; a volume entitled Evaluation of Satellite Advanced Wastewater Treatment Facilities; a volume entitled Boston Harbor Water Quality Baseline; and a volume entitled Boston Harbor SDEIS Report of Final Screening Results.

Volume III of this FEIS, Public Participation and Response to Comments, describes the interagency and public participation review processes, summarizes comments received on the SDEIS, and gives the Agency's responses to those comments.

Volume IV of this FEIS, Public and Interagency Comments, includes the comments received on the SDEIS.

This FEIS was prepared consequent to a location study for the proposed facility, the Nut Island Wastewater Treatment Plant Facilities Planning Project Phase I, Site Options Study (published by the MDC). In accordance with an agreement between EPA and the MDC dated April 18, 1978 on the phasing of facilities planning for the Metropolitan Sewer District, this FEIS addresses the question of the location and construction of the proposed facility and appropriate mitigation actions. Detailed facilities planning will be included in the next planning phase.

In evaluating the effects of the facility at the various alternative locations considered in this FEIS, the need for mitigating actions to avoid or reduce adverse impacts were identified and described. These mitigating actions, where

considered essential by EPA, will be required of the MWRA as a condition of any federal grant to the applicant for construction of the proposed facilities.

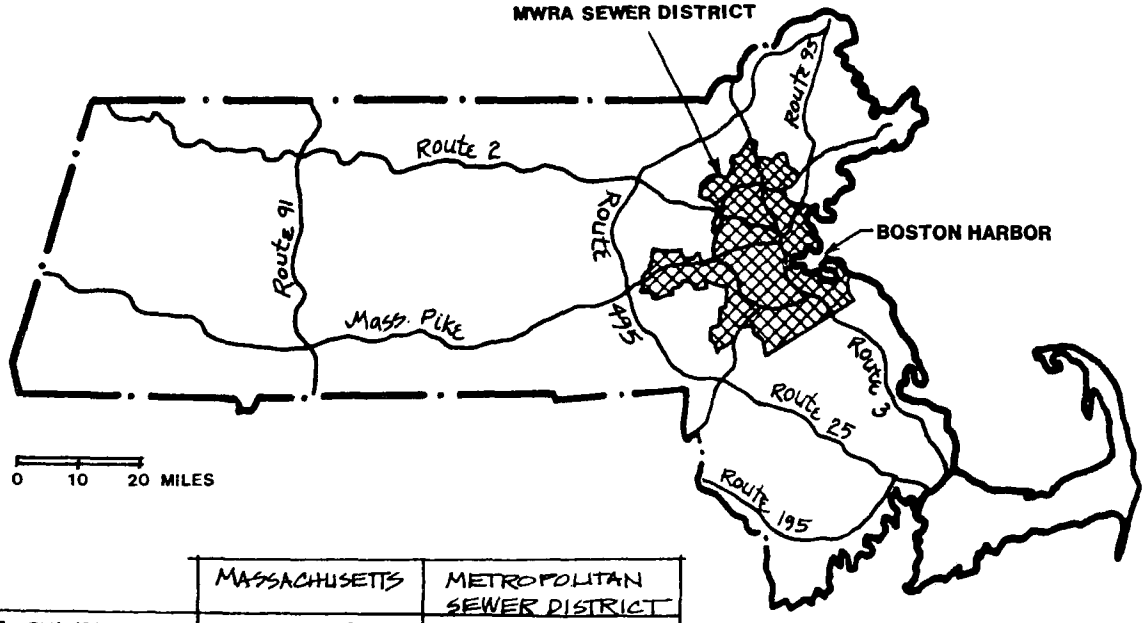
Finally the MWRA has prepared and published a concurrent but separate Final Environmental Impact Report (FEIR), as required by state law. Copies of the FEIR are available at the offices of the Massachusetts Water Resources Authority, One Center Plaza, Boston, Massachusetts 02108.

During the preparation of the FEIS and FEIR, EPA and MWRA collaborated and shared technical information so that their decisions would be based upon a common data base.

I. THE EXISTING PROBLEM AND THE "NO ACTION" ALTERNATIVE

Boston Harbor, one of New England's most valuable economic and recreational resources, is being seriously polluted in violation of federal law. Its waters are murky, streaked with floating wastes, and contaminated with domestic and industrial pollutants. A major source of this pollution is the discharge into the harbor of inadequately treated wastewater from 43 cities and towns lying both along the shores of the harbor and up to 30 miles inland, including communities well outside of the natural watershed of the harbor.

The flow of wastewater from the Deer and Nut Island treatment plants exceeds in volume the average flow of the Harbor's three principal rivers, the Charles, the Mystic, and the Neponset. Serious violations of the Clean Water Act are caused by the continued discharge of this inadequately treated waste generated by residents, visitors and commuters representing almost half of the state's population.



	MASSACHUSETTS	METROPOLITAN SEWER DISTRICT
POPULATION	5,737,037 (1980)	2,000,000
AREA (SQ. MILES)	8,257	550

As Judge A. David Mazzone of the United States District Court, District of Massachusetts observed in his September 5, 1985 decision which found these discharges to be illegal:

> "Boston Harbor is a powerful ecological system which is capable of reconstituting itself as long as the system is not overloaded ... The system is being continuously overloaded and, as a result, each day the Harbor becomes more polluted [as a result of] ... chronic, flagrant violations of the federal law. That law secures to the people the right to a clean harbor. No argument ... disputes the fact that massive quantities of pollutants are discharged every day into the Harbor."

A. Description

Consideration of "No Action" is mandated to EPA by federal regulations adopted pursuant to the National Environmental Policy Act of 1969, and, in some cases, it is the most appropriate alternative. In this case, "No Action" would consist of continuation of the operation of the existing undersized primary treatment plants at Deer and Nut Islands, in the form to which they are being upgraded by an ongoing improvement program known as "Immediate Upgrade" or "Fast Track." Although these improvements are necessary to prevent further deterioration of the existing plants and their adjacent environments, they will not bring the plants or their effluent into conformance with state or federal law.

At Deer Island, the improvement program consists of repairs, replacement and upgrading of the main treatment plant's power distribution system, pump station, power supply, non-potable water system, disinfection system, and primary sedimentation system. While construction of new scum and skimmings disposal facilities has been recommended, planning of these facilities is still being conducted. Construction of the rest of the proposed work is scheduled for 1986-1989. These improvements are intended to enhance the safety of plant operators and neighbors, reduce odors, reduce operation and maintenance costs and improve the level of treatment at the plant until long-term plans can be implemented.

At Nut Island, the program underway includes improvements to the power and air production system, electrical system, treatment processes, odor control system, preaeration and sedimentation tanks, and outfalls. The goal of this work is to alleviate bypasses and overflows, odor emissions, worker safety concerns, and the general unreliability of the plant.

Figure I-2 shows the location of the existing principal wastewater disposal facilities in Boston Harbor.

The treatment process, as designed a generation ago, provides only for sedimentation, which removes only a small portion of the total suspended solids, and for disinfection of the clarified effluent. The plants discharge three-quarters of this effluent to President Roads, off Deer Island, and one-quarter to Nantasket Roads, off Nut Island. The wastes which are removed by this sedimentation process (known as sludge) are then decomposed or "digested," both to recover methane for use within the plant and to reduce the mass of the solids. This sludge is also

MWRA WASTEWATER DISPOSAL FACILITIES

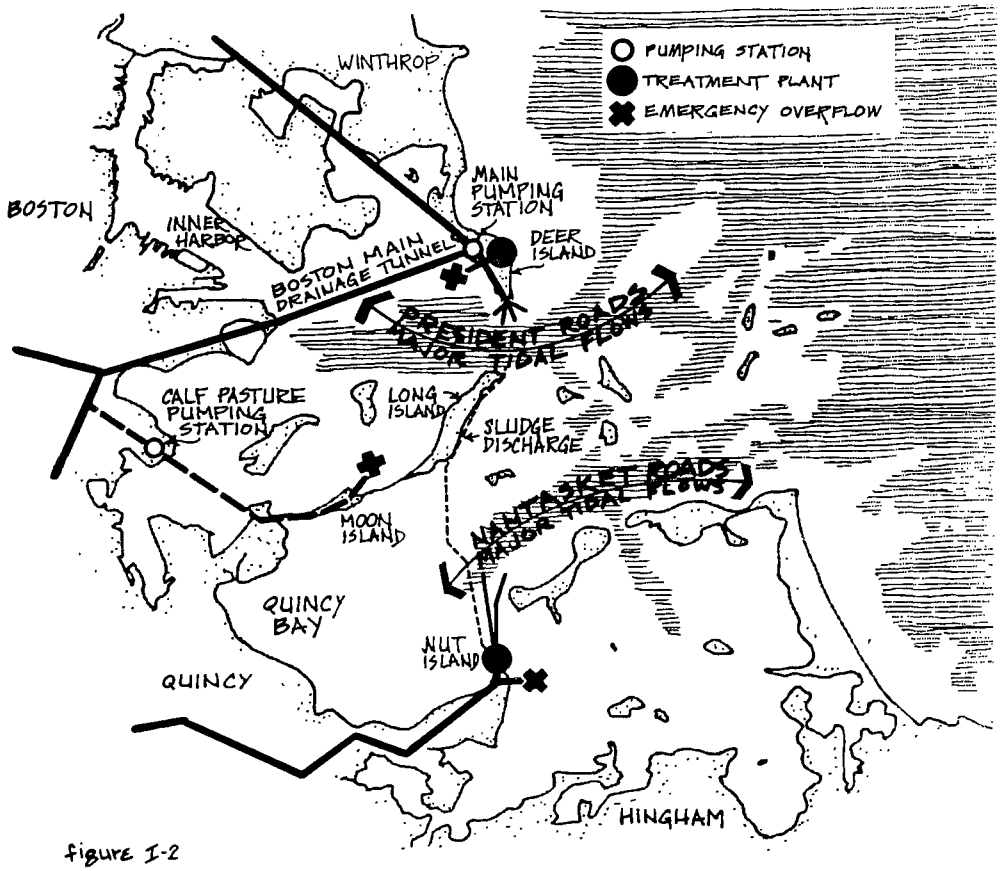
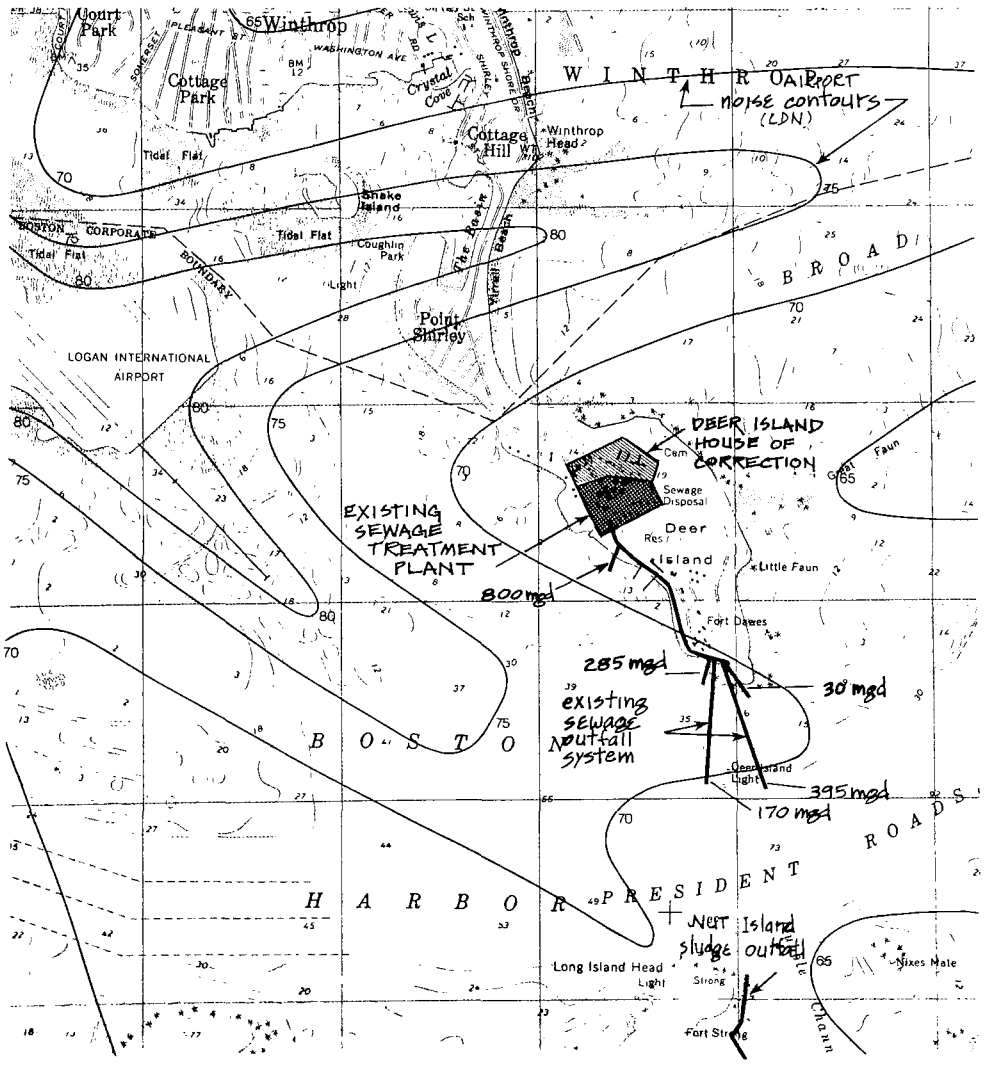


figure I-2

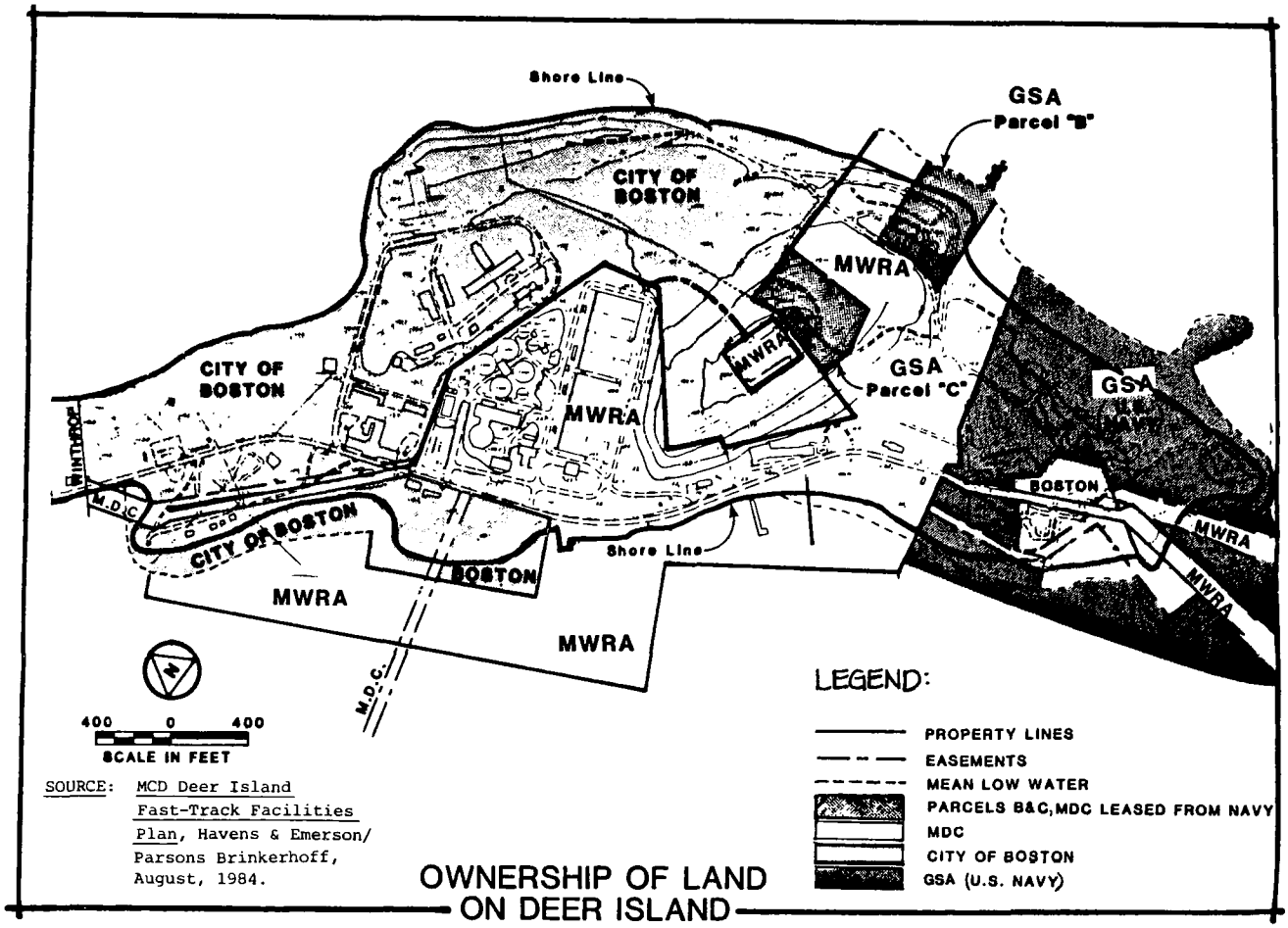
discharged on the ebb tide to President Roads, via the effluent outfalls from Deer Island and via a special sludge pipeline from Nut Island.

In addition, raw sewage discharges which are caused by breakdowns at the main pumping station at Deer Island are made by way of a 19th century sewage pumping station and outfall system to Moon Island, while other raw overflows occur at Deer and Nut Islands.

Figure I-3 shows the setting at Deer Island including the existing treatment plant, the immediately adjoining prison (Suffolk County House of Correction), the Point Shirley neighborhood to the north in Winthrop, the existing outfall system, and the center lines and noise contours of Logan Airport. The treatment plant uses only about 26 acres.



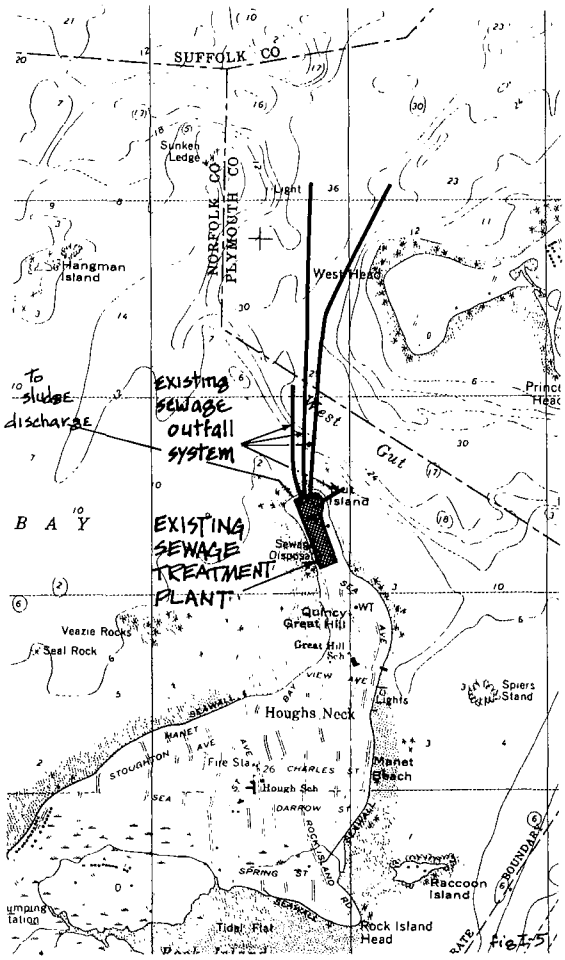
Most of the land on the island is underutilized except for the prison and the treatment plant. Fort Dawes at the southern end, no longer in use, is in the process of being disposed of by the federal government in the near future. Access to the island is controlled closely by the prison and no recreational use is permitted. Figure I-4 shows the present pattern of land ownership.



SOURCE: MCD Deer Island Fast-Track Facilities Plan, Havens & Emerson/ Parsons Brinkerhoff, August, 1984.

OWNERSHIP OF LAND ON DEER ISLAND

Figure I-5 shows the setting at Nut Island including the existing treatment plant, adjoining residential areas, and the existing outfall system. The treatment plant owns 17 acres of available land with minimal buffer space between the plant and the adjoining residential area. No recreational access to the water is permitted.



B. Environmental Impacts of the "No Action" Alternative

Even upon completion of the "Fast Track" improvements previously discussed, major problems would continue. These represent the environmental impacts of the "No Action" alternative and include:

a. Continued reliance on undersized, overloaded treatment plants that discharge or bypass a daily average flow of 450 million gallons of turbid wastewater, contaminated with bacteria and putrescible materials far in excess of the limits established by law.

b. Continued daily discharge to Boston Harbor of 70 dry tons (or 600,000 gallons) of digested sludge, in violation of federal law.

c. Continued discharge in the wastewater of plastic tampon inserters and condoms. These products are found throughout the harbor, have become as much a part of the shoreside environment as seashells, and are often picked up as playthings by small children.

d. Continued emissions of odors. Full odor control is not part of the "Fast Track" upgrading program.

e. Continued exposure of residents in the neighborhoods around, and on the access routes to, Deer and Nut Islands to the risk of accidental spills of liquid chlorine.

f. Continued barring of public access to the harbor at two potentially recreationally valuable locations, i.e. Deer Island and Nut Island. Both the existing wastewater treatment facility sites offer good vantage points for viewing the panoramas of Boston Harbor, for watching the varied and intensive boating traffic into and out of Boston Harbor, and for shoreline fishing.

EPA has concluded that the "no action" alternative, even with the upgrade, was an unacceptable long-term solution.

II. SECONDARY TREATMENT ALTERNATIVES

Abatement of this pollution will require a complex set of actions, including, at its heart, the construction of secondary wastewater treatment facilities as required by federal law. Evaluating the environmental acceptability of a site for these facilities is the subject of this Final Environmental Impact Statement (FEIS).

There are four remaining alternatives for the siting of secondary wastewater treatment facilities for Boston Harbor that are described in this FEIS, and a variation of one of those four. These are the following:

1. All Secondary Deer Island -- Consolidation of all major facilities on Deer Island.

2. Split Secondary Deer Island and Nut Island -- major facilities split between Deer and Nut Islands.

3. All Secondary Long Island -- Consolidation of all major facilities on Long Island.

4. Split Secondary Deer Island and Long Island -- major facilities split between Deer and Long Islands.

An important variation is similar in many respects to All Secondary Deer Island, but includes the mitigating action of removing the prison from Deer Island.

Other alternatives, included in studies that have led to this FEIS and that have been eliminated from consideration, and the reasons for their elimination, are described in the SDEIS.

(It is also possible that a primary treatment plant requiring less than half as much land might be built instead of the anticipated secondary treatment plant, if EPA's finding that primary treatment is inadequate, is successfully challenged. The alternative locations for primary treatment are included in Appendix B of this volume.)

All the sites in the final set of alternatives were selected after consideration of a large number of factors as stipulated in the SDEIS (social,

technical, environmental, economic, political, legal and institutional), including the location of the existing major wastewater conveyances and of waters that are adequate in volume to receive the very large flows of treated effluent without violation of water quality standards. Figure II-1 shows the location of the major wastewater conveyances and the deeper waters off Boston.

The identification of a suitable site for the treatment facilities is controversial because of the large land area that an adequate treatment plant requires, a scarcity of underdeveloped land near the harbor, intense competition for open land, and high population densities relatively close to all of the large underdeveloped land areas in the region. As the plant will be sized to process a peak flow of about 1.2 billion gallons, or 5 million tons, per day, location very remote from the existing trunklines is not practical.

MWRA WASTEWATER CONVEYANCE SYSTEM

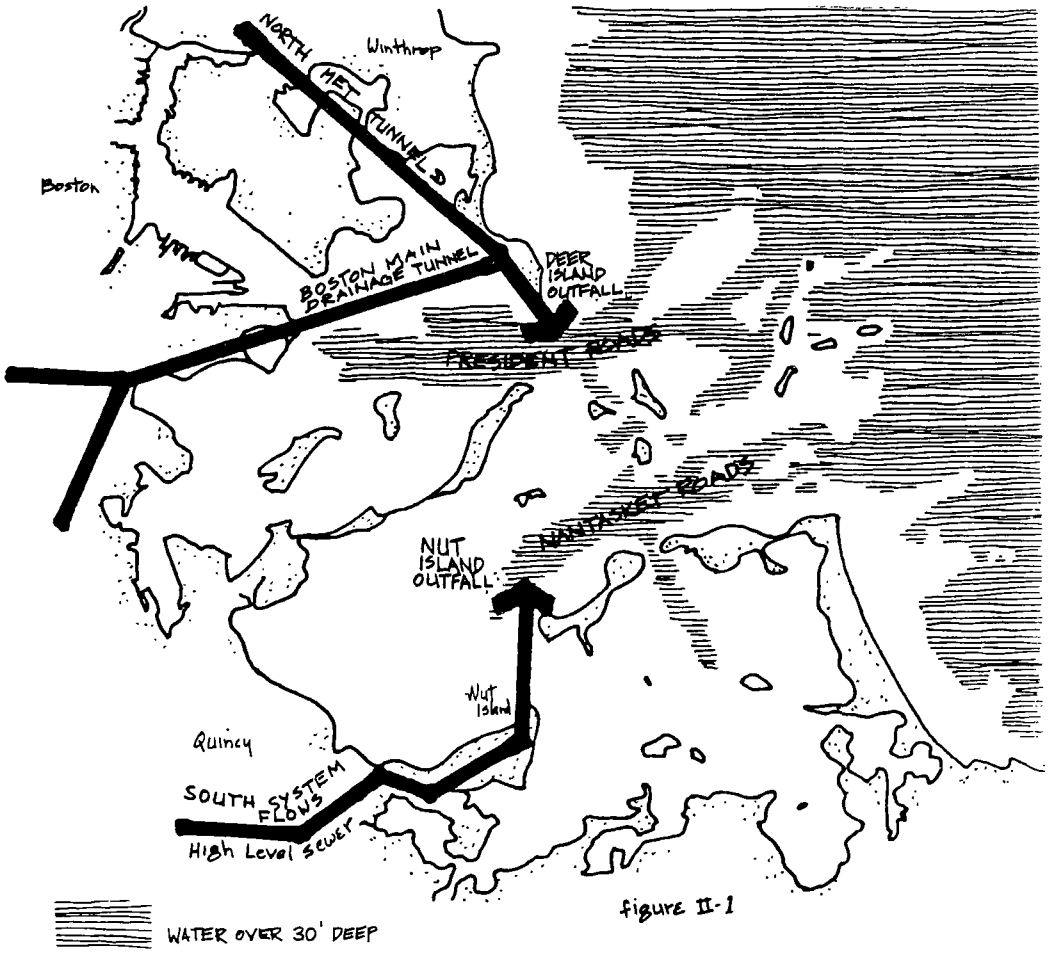


figure II-1

A. Description of Secondary Treatment

Any secondary treatment facility that might be constructed for Boston Harbor will have to be designed to remove wastes from wastewater to the standards set by law. For a treatment plant of this size, there are a limited number of processes that could be used for this purpose.

The process assumed in this EIS on facilities location is "activated sludge," the most widely used process for large treatment plants and the one assumed in the MDC's Nut Island Wastewater Treatment Plant Facilities Planning Project, Phase I, Site Options Study and in the MWRA's FEIR. It relies upon simple sedimentation to remove solids both near the beginning, and near the end, of the process with an aeration step, the "activated sludge" process, between them. The "activated sludge" process biologically oxidizes part of the dissolved and suspended organic compounds in the wastewater to carbon dioxide and water and absorbs most of the rest into the sludge biomass for subsequent removal by sedimentation.

SECONDARY ACTIVATED SLUDGE TREATMENT PROCESS

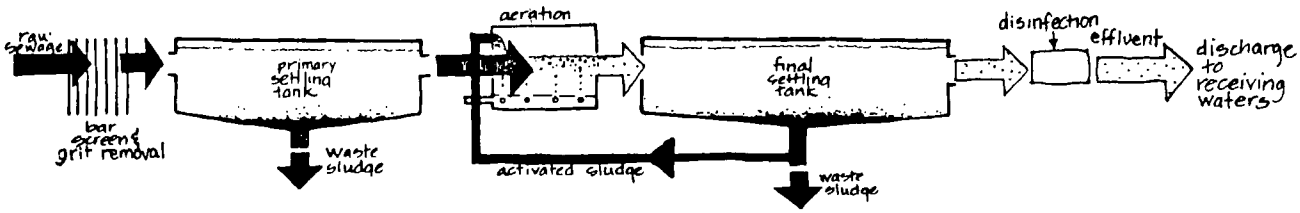


figure II-2

Although some other process or design modification might ultimately be selected, it is the construction and operational effects of "Activated Sludge" facilities that were used as the basis for assessment of the impacts of secondary treatment at the various alternative sites in this FEIS.

In this case this is a reasonable and conservative assumption. For all principal impacts in this case, the severity of any impact is a function of the size of the treatment facility, which in turn determines not only its proximity to its neighbors but its conflicts with other land uses. Of all the treatment technologies that could be reasonably applied to a plant of this size, activated sludge is the most land intensive and thus will be closest to its neighbors and have the greatest potential conflict with other land uses.

The solids removed from the wastewater must be disposed of in some manner, with or without several possible intermediate processes. These solids may be as high as 415 dry tons per day (2000 tons per day of sludge cake at 20% solids). This amount, in contrast to the quantity of effluent, is so much smaller, that it is reasonable to consider its removal from the wastewater treatment plant site by, for example, small diameter pipeline or vessel for disposal anywhere within a broad region.

Digestion is one intermediate process commonly employed to recover energy resources in the sludge and to reduce its polluting potential. For the reasons discussed above concerning plant size, and because digestion is a land-intensive intermediate process, the land area requirements, cost and other impacts in this FEIS are based on the assumption that sludge would be digested and dewatered on the site. Whether sludge digestion will in fact be part of the final pollution control strategy will depend on the choice of an ultimate sludge disposal method or methods.

The MWRA has made no decision as to how secondary sludge will be disposed of except that on July 10, 1985 the MWRA voted that it preferred that sludge disposal not occur at the wastewater treatment plant island. The ultimate sludge disposal alternatives that appear possible in this case are landfilling, composting/land application, and incineration.

This document does not analyze the impacts of ultimate sludge disposal because this siting decision does not influence any future decision on whether or where to landfill, to compost and apply to land, or to incinerate. Landfilling and compost disposal can and must be done offsite, because neither Deer Island nor Long Island is large enough for a landfill or compost disposal area sufficient to handle the quantities of sludge which are expected to be generated by the plant. Compost processing also can and must be done offsite, because the size of the plant and volume of material to be composted eliminate both Deer Island and Long island as locations for composting, except that partial composting would be possible at either site. An incinerator large enough to handle the MRWA wastes could be constructed offsite, or at either Deer Island or Long Island, without violating national ambient air quality standards or Federal Aviation Administration regulations on Logan flight paths. Thus, selection of a treatment plant site does not foreclose any of the available sludge disposal alternatives. Neither does it make the selection of any alternative more likely because of the similar constraints on all three options which would be present at either island.

Conversely, even if the choice of landfilling, composting/land application or incineration as the sludge disposal method were made simultaneously with the plant siting decision, any sludge decision would neither foreclose nor encourage any treatment plant site. Landfilling and compost application is impossible at both islands; composting is impossible at both except as a partial solution, and incineration is possible at either. Any sludge option is possible off-site. Thus any sludge choice made would not influence the site of the treatment plant. Because of high acreage requirements, construction complexity, and enormously greater flows, treatment plant siting takes precedence.

It is important to note that the construction of a secondary treatment plant is mandated by the Clean Water Act as a distinct phase of a process which includes production of secondary sludge. It is appropriate to make a siting decision for the treatment plant separately from a sludge disposal decision because delaying this siting decision until after study and selection of a sludge disposal option would unreasonably delay the planning and

construction of a secondary treatment facility, resulting in additional environmental harm.

MWRA has begun a study which will lead to the selection of a sludge disposal method and to an EIR. EPA intends to prepare an Environmental Impact Statement. The specific impacts of sludge management alternatives typically include construction and operational traffic, odor, noise and air or water emissions; the cumulative impacts of a 500 mgd treatment plant will be considered.

B. Generic Environmental Impacts of a Secondary Treatment Plant

The facilities necessary for the activated sludge wastewater treatment process generate some environmental impact, both during construction of the plant and during its operation.

During operation, all the alternatives would discharge their treated effluents through a common outfall diffuser to be constructed further out in the harbor at a site to be determined during the facilities plan. Consequently, all would have identical effects on water quality and marine biota.

The process requires the construction of large concrete structures for aeration and sedimentation tanks; some aerosols and volatile compounds are emitted from the surfaces of the tanks and flow channels.

The large size of a 500 million gallon per day "activated sludge" treatment facility would require a large land area (about 115-140 acres), a construction period of about eight years, the employment of 650 (average) to 1300 (one year peak) workers and the movement of large volumes of construction materials and construction wastes (over one million tons) onto, around, or off the site. The environmental effects of such extensive construction would include the commitment of a large area of waterfront land to wastewater treatment, theoretically denying its use for future recreation; and, without mitigating actions, the emission of noise and dust from construction equipment and from many hundreds of trips per day of trucks and construction workers' autos.

In addition, during operation the plant would require a large staff and a steady supply of materials and it would require periodic heavy maintenance. Without mitigating actions, the plant has the potential to emit significant odors.

With a treatment facility the size of that proposed for Boston Harbor, these effects could become significant problems.

To reduce these impacts, a set of mitigating actions was proposed in the SDEIS. These mitigating actions included barging of bulk materials to and from the site(s) to reduce the amount of trucking, busing of construction workers to reduce commuter traffic, and control of noise and odor. Continuing review of the potential impacts of secondary treatment of the specific sites under consideration has demonstrated that more stringent mitigating actions will be required by EPA of the applicant as a condition of federal financial assistance to the project.

III. RESULTS OF FURTHER ANALYSIS OF IMPACTS OF SITING ALTERNATIVES.

The specific final secondary alternatives that were described in the SDEIS, their impacts as further defined since publication of the SDEIS, and the mitigating actions that have been considered are described in the sections of this FEIS immediately below. These mitigated impacts have been summarized in a matrix appended to this volume and are discussed in detail in Volume II of this FEIS. The process used in the selection of recommended alternatives is described in the final chapter of this volume.

For the reader's convenience EPA has reproduced for each alternative its description as contained in the SDEIS.

SDEIS SECONDARY TREATMENT ALTERNATIVES

A. All Secondary Deer Island

*This alternative would:

1. Expand the existing primary wastewater treatment facility at Deer Island to a secondary treatment plant.

2. Reduce the existing primary treatment facilities at Nut Island to a small headworks.

3. Construct a major new pipeline or tunnel from Nut Island to Deer Island to allow the consolidation of the two facilities.

4. Construct a new local outfall to the east of Deer Island Light.

AREA: The existing wastewater treatment facility on Deer Island would be increased from 26 acres to about 115-140 acres while that on Nut Island would be reduced from 12 acres to about 2 acres.

COST: The overall construction cost of this alternative would be about $1135 million and its annual cost of operation, maintenance and replacement would be about $50* million.

*IMPACT: This alternative would commit almost all the land on the island south of the prison to wastewater treatment and level almost all the topographic features of the island.

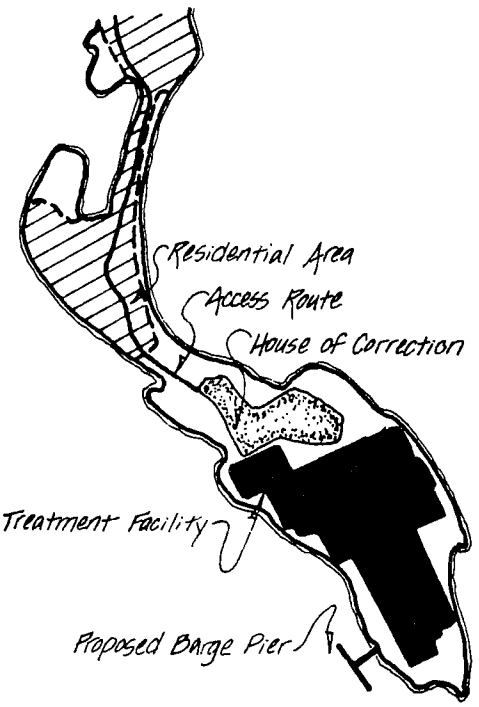
*At Point Shirley, it will increase traffic and traffic noise during the 7 years of construction by about 21 trucks and buses each day. However, at the peak periods, 6 months to a year, it would increase by up to 34 trucks and buses each day.

*On the island itself, this alternative will cause:

1. Permanent preclusion of public access to a number of potential recreational resources including Signal Hill (the Deer Island drumlin), with its panoramic views of the whole range of the harbor islands, and the southern end of the island, with its potential access to the water for shoreline fishing. Recreational use of this land, though suggested in prior plans, is not a current priority for the Commonwealth, so that this would only be a moderate impact.

2. Destruction of Signal Hill, the visual landmark that defines the northeastern limit of the harbor, and that is an important component of the views of the harbor from significant vantage points. It is judged to be a severe impact.

This alternative will have no significant adverse impact on Nut Island. It will preserve Long Island for major recreational use, a priority for the Harbor Islands State Park.



*Updated, See Vol II.

Salient comments on the SDEIS raised questions on the sensitivity of the adjoining areas to traffic and noise that would be generated by this alternative; the feasibility of their mitigation including over-water transportation of all workers, materials, and equipment; the emissions of odors, volatile organic compounds, and pathogenic aerosols; the risks of accidental spills of chlorine in and near residential areas; the potential of archaeological, historical and recreational resources on Deer Island; and the benefits of moving the Deer Island Prison.

Each of these issues was subsequently reviewed and re-evaluated. The key findings of these reviews are described in the sections below; the discussion of the recreational potential of Deer Island is included in the section on All Secondary Long.

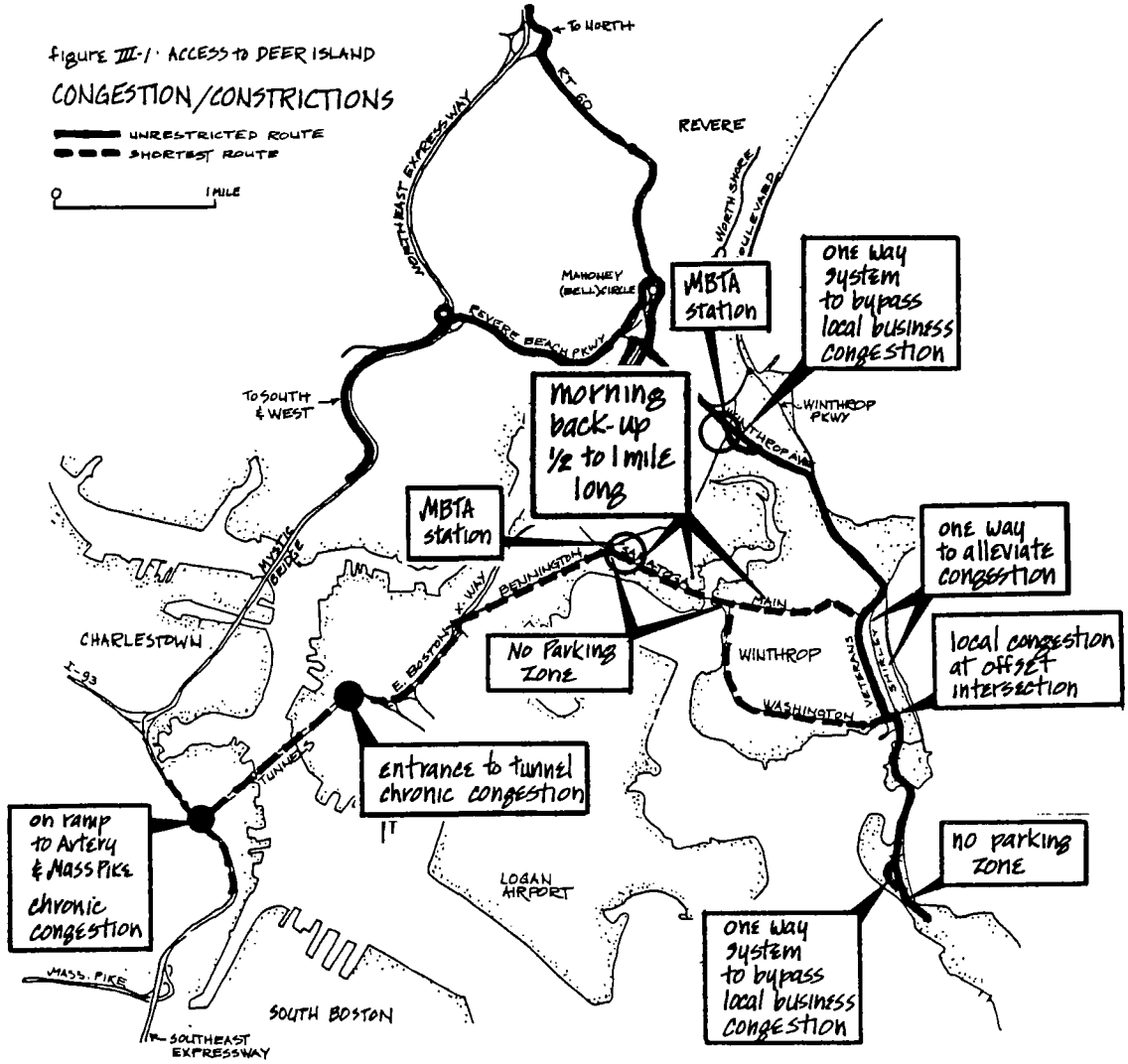
a. Construction Traffic

Existing road conditions in Winthrop and East Boston, with or without the construction of a large wastewater treatment plant on Deer Island, give rise to the following specific concerns:

1. Emergency access to Deer Island and the neighborhood adjacent to the treatment plant site, Point Shirley, is possible by only one narrow, winding roadway through Winthrop. Furthermore, the roadways closest to Deer Island, at Point Shirley, are very narrow and do pose a potential for accidents as a result of the mixture of through traffic and residential use. In particular, the portion of Shirley Street from Washington Avenue to Cottage Hill, with public transit buses, two way traffic, parking on both sides, an offset alignment and a fairly sharp curve, does not provide completely safe and convenient public traffic service.

2. The Town of Winthrop is accessible from the surrounding metropolitan area by only two roadways, each with only two travel lanes. The intersections on Saratoga Street near Bennington Street in East Boston, with their public transit station bus ways and parking lots, constrained roadway width, and adjoining business uses, are congested, creating a long, stop-and-go queue, up to one mile, on Saratoga Street in the mornings.

   The Saratoga Street Bridge over Belle Isle Inlet is in deteriorating condition, and may need replacement in the near future.



In addition, in order for Winthrop and East Boston residents to travel anywhere except to the north, they must traverse both the Sumner Tunnel and downtown Boston on ramps and roadways that are severely congested, almost all day long, by traffic from Logan Airport, the northeastern metropolitan area, and beyond.

Without mitigation, this multi-year construction project would generate major new traffic (up to 500 trucks a day) and would make a difficult situation worse. The SDEIS proposed to limit the traffic increase to about 8 heavy trucks (round trips) and to an average of 13 buses (26 peak) per day by requiring barging of all bulk materials and the busing of all construction workers. This increase in traffic will not be significant, especially since most of it will run counter to the predominant flow of commuting traffic, using lanes that are not otherwise heavily traveled at that time of day.

Comments on the SDEIS raised the question of whether such mitigation was in fact possible, and whether still more could be done. Review of the mitigating actions proposed in the SDEIS indicates that they are feasible. Historically a great deal of major public works construction has occurred on Deer Island prior to its connection to the mainland. The waters off Deer Island are sufficiently deep for barges and the underlying soils, while not ideal, are suitable for pier foundations. For the commodities proposed in the SDEIS for barging, no special facilities would be needed for off-island loading and unloading. Gravel and steel could be loaded into the barges from any general purpose pier and surplus earth excavation to be removed from the island would likely be dumped off shore anyway since there is no longer a ready market for common fill.

In arriving at its conclusion that the number of heavy truck trips could be limited to eight per day, the SDEIS assumed that the lack of roll-on/roll-off (RO/RO) loading facilities precluded the barge movement of material and equipment other than bulk materials. However, further study demonstrated that it is feasible to reduce construction traffic even further by providing RO/RO facilities at Deer Island and at a point on the mainland (such as along the Mystic, Chelsea, or Fore or Back Rivers, or Lynn Harbor). RO/RO facilities, for low volumes of cargo (8 to 20 trucks per day) would require a simple ramp supported by a gantry or a float and some mooring dolphins at each end of the barge line, a single barge and less than one acre of land. EPA regards a RO/RO facility as a desirable construction practice which will virtually eliminate heavy construction trucking and reduce operation traffic. Accordingly,

EPA includes RO/RO as a mandatory mitigation measure. It is estimated that construction related trucking would be reduced to an average of eight lighter trucks per day.

The SDEIS, in estimating 13 buses (26 one year peak) per day, assumed that all workers would be bused to the site. This number could be reduced by providing a ferry service for workers coming from the south and west. Further analysis has confirmed that this is not only practical, but that intra-harbor worker ferry service could be a highly satisfactory mass transit alternative for workers living to the south and west of the harbor. An investigation of the factors influencing the feasibility of ferrying (e.g. cost, harbor regulations, terminal sites) showed that it would be feasible to provide this service and to reduce predicted bus traffic. A prohibition on individual construction worker vehicles and a requirement of a combination of busing and ferrying will be mandatory mitigation measures.

In summary, review of construction traffic impacts indicated that the impacts of the proposed project, as they will be required to be mitigated, will be acceptable.

b. Operation and Maintenance Traffic

The operation of the wastewater treatment facilities, with a permanent operating staff estimated at 227 in the SDEIS, could be expected to generate the average traffic equivalent of a 50 house residential neighborhood or a small industrial facility. The traffic generated, about 250 round trips per day, would be spread over three shifts, lessening peak load.

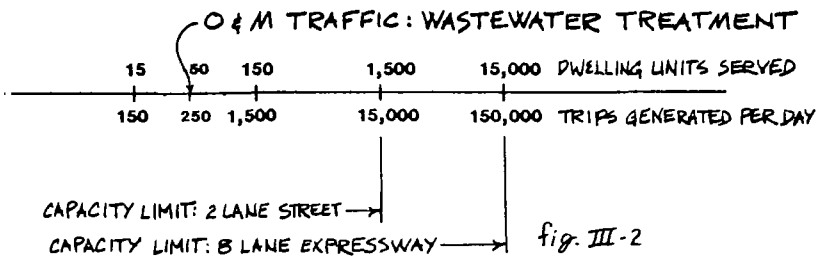


fig. III-2

This level of traffic is well within the roadway's capacity and will not be distinguishable from the present level of treatment plant and prison operations traffic.

c. Noise

Salient questions on noise centered on construction traffic and on the effects of multiple pieces of equipment in simultaneous use at the construction site on nearby receptors.

Traffic noise from the few trucks and buses that would use the streets of Winthrop, with waterborne transportation of construction materials, would be of brief duration, only a few minutes per day, and hence is an acceptable impact of the proposed project.

Recalculation of construction noise, on the other hand, indicates that the SDEIS underestimated both the number of pieces of heavy construction equipment likely to be on the site on average and the noise likely to be generated by individual pieces of equipment. The net effect of these changed assumptions would be to generate the noise levels at the prison and Point Shirley, during daytime construction operation, to those shown on the accompanying table.

TABLE III-1

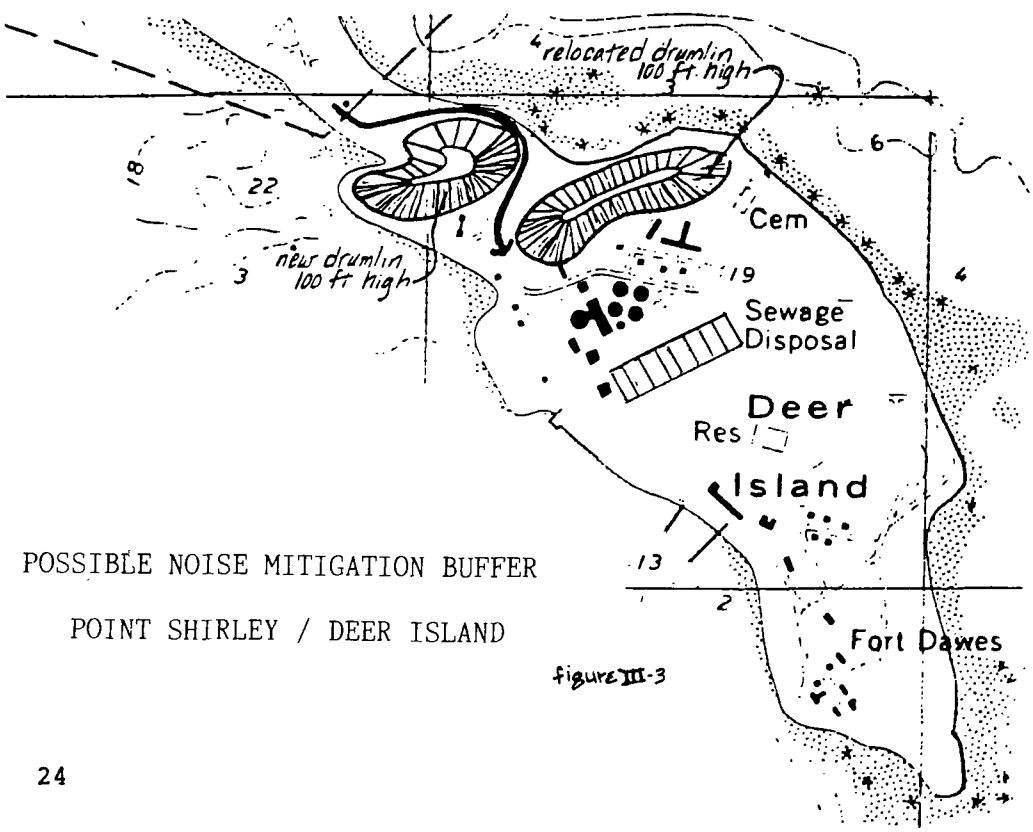
EXPECTED CONSTRUCTION NOISE
DEER ISLAND AND VICINITY

Location	Zoning	Ambient Noise Measured L_{10} dBA (1 hr.)[1]	Total Noise dBA (L_{10})	Boston N.C. Reg. L_{10} dBA
Tafts Street (Pt. Shirley)	Residential	60	59-63	75
Prison	Residential/ Institutional	60[2]	69-75	75

[1]Without aircraft noise.
[2]Estimated.

These levels at the nearest portions of Point Shirley are well below (15 decibels) City of Boston noise regulations applicable to construction projects and are equivalent to current ambient L_{10} noise levels at Point Shirley without aircraft overflights. During aircraft overflights, construction noise would be completely masked at Point Shirley. However, at the prison, even though the noise regulations are not exceeded, EPA believes mandatory mitigation will further reduce the levels: EPA will require that the drumlin be excavated from its south side so that the remnant acts as a shield; furthermore, a sound barrier must be erected to reduce noise levels at ground level at the prison.

Considering the duration of the proposed construction project, however, consideration should be given to further reasonable mitigation. To some degree, additional mitigation appears possible in the scheduling of construction activities, and in limiting the number of noise emitters operating simultaneously near the prison. Further mitigation may be possible by the construction of an earthen mound, across the neck between Deer Island and Point Shirley, using excavated earth that would otherwise have to be removed from the site. The specific extent of the mound, and its resulting effectiveness, will depend in large part on the availability of land. Figure III-3 shows one possible layout for a mound system.



POSSIBLE NOISE MITIGATION BUFFER

POINT SHIRLEY / DEER ISLAND

figure III-3

In summary, review of noise likely to be generated by construction of the facility indicated that no violation of the applicable noise control regulations will occur either at Point Shirley or the prison.

d. Odor

Questions on odors centered on the level, frequency, and severity of odor emissions to areas surrounding the facility. In summary, further analysis has demonstrated that due to the characteristics of the incoming wastewater, the uncontrolled odor impact of the plant could be significant, but it is not a site determining factor; existing and available technologies can be used to reduce odors to an acceptable level at all receptor sites, and odors might be reduced even further as the result of aggressive design. However, it is not possible to rule out some rare occurrences of odor due to process upset or equipment malfunction.

The odor impact of a treatment plant is not a controlling one in the site selection process because a treatment plant at either Deer Island or Long Island would have approximately the same odor impact on a wide selection of receptor sites around the Harbor.

1.If no odor controls are applied, odors would be perceptible about the same percent of the time at many receptor sites, as shown by the following table (hours per year, percentages rounded):

Table III-2
Odors Without Odor Control:
Percent of Year Perceived

	Plant at Deer I.	Plant at Long I.
Prison	9.8	6.0
Point Shirley	6.3	4.0
Cottage Park	5.4	3.3
Squantum	3.5	4.5
Hull	7.9	14.9
Beachmont	3.4	3.2
Hough's Neck	5.1	6.0
Thompson Island	3.8	4.7
Winthrop Beach	4.1	4.3
South Boston	4.6	4.6
Peddock's Island	5.4	9.0

Source: Vol. II, Section II-2, Tables 3 and 4

Note that the neighborhood with the greatest frequency of perceived uncontrolled odors would be Hull from a Long Island plant, but Hull would also be the most frequently impacted community from a Deer Island plant. In general, communities on the west and south of the harbor would be more frequently impacted by a Long Island plant. Certain neighborhoods in Winthrop such as Winthrop Beach are also potentially as frequently affected by a Long Island plant as by a Deer Island plant. Furthermore, a month by month analysis indicates that, due to prevailing winds, during certain months such as January, June, October and December impacts on all receptors in Winthrop are either the same from either plant or worse from a Long Island facility.

2. Without controls, the frequency at these receptor sites of odors likely to generate strong complaints is even lower, but still approximately the same whether the plant is sited on Deer Island or Long Island, except at the prison (hours per year, percentages rounded):

Table III-3
Percent of Year Uncontrolled Odors
Would Generate Strong Complaint

	Plant at Deer I.	Plant at Long I.
Prison	8.1	1.2
Point Shirley	1.5	0.7
Cottage Park	0.5	0.3
Squantum	0	1.2
Hull	1.3	2.2
Beachmont	1.3	0.5
Hough's Neck	0.6	2.3
Thompson Island	0.3	1.6
Winthrop Beach	1.0	1.0
South Boston	0.4	0
Peddock's Island	0.5	1.7

Source: Vol. II, Section II-2, Table 5.

3.0 Even without controls, odors strong enough to severely interfere with normal activities could be expected almost never at any receptor sites except the prison. However, location of the plant at Long Island does result in a slightly greater impact on Winthrop (percent of hours per year):

Table III-4
Percent of Year Uncontrolled Odors
Would Severely Interfere with Normal Activities

	Plant at Deer I.	Plant at Long I.
Prison	4.3%	--
Point Shirley	--	0.2%
Winthrop Beach	--	0.2%
Cottage Park	--	--
Beachmont	0.3%	--
Squantum	--	--
Hough's Neck	--	--
Peddock's Island	--	--
Hull	--	--
Thompson Island	--	1%

Source: Vol. II, Section II-2, Table 5.

Note that the Prison is clearly the most heavily impacted receptor. The figures indicate that when uncontrolled odors would be perceived at the prison, they would be strongly perceived. Uncontrolled levels at the prison could on occasion approach those at which headaches and nausea result.

Though properly designed and operated sewage works employing good housekeeping practices should not pose an odor problem, the incoming metropolitan Boston wastewater carries with it the potential for serious odor problems independent of such factors and demands that a thorough investigation of specific mitigation actions be made.

Effective mitigation of odor from a Boston Harbor treatment facility will be contingent upon the implementation of the following mandatory mitigation measures:

1. A further, complete monitoring of the odor characteristics of the influent to the current treatment works.

2. A commitment to the maximum feasible degree of mitigation.

3. A thorough investigation of state-of-the-art odor control technologies to be applied not only at the treatment plant but at points in the conveyance system. This study will be undertaken as part of the facilities planning process.

By making every effort to apply reasonably available technology designed to achieve a high degree of efficiency, EPA believes that a reasonable and effective mitigation of odors can be achieved, so that except at the prison odors would be perceived very rarely at all receptors and never at the level which would generate strong complaint. Due to the proximity of the Deer Island House of Correction, however, it is possible that odor could reach levels at the prison at which complaints could arise, but, should the above reasonably available technologies be applied, it is expected that these occurrences would be rare and levels would never reach those which cause severe interference with normal activities.

Furthermore applying the above mandatory mitigation measures, EPA expects that detailed odor control strategies can be developed during detailed facilities planning and design which will eliminate "strong complaint" odors at the prison and further reduce perceptible odors at other receptors.

It should be noted that even a well-operated facility emits a low level of musty odor to which some people object if they can smell it at all but this is unlikely off-site. Also, it is impossible to guarantee that a process upset or equipment malfunction will not reduce the efficiency of the odor control system so that odor will increase to perceptible levels; because it is expected that odor control technologies will be applied at multiple locations in the delivery and treatment system, temporary failure of a piece of equipment or a process will not result in severe odor at a receptor. The likelihood that such a temporary event, if it occurred, could be perceived in a neighborhood is roughly expressed by the Table III-3 of percentages.

In summary, EPA concludes that acceptable levels of odor control can be achieved through reasonably available technology and that the mandatory mitigation measures can result in a treatment plant which is rarely perceived as offensive.

e. Volatile Organic Compounds

The metropolitan sewer system is used by many people for the disposal of such volatile organic compounds (VOC) as cleaning fluids and solvents. These

compounds can be expected to volatilize continuously throughout the sewer system, including the treatment plant, and be dispersed into the atmosphere where ever they volatilize.

These compounds have two quite different adverse environmental effects, i.e. they may be directly damaging to health in their original forms, and they may be indirectly hazardous by contributing to the formation of atmospheric smog. The effects of each of these potential impacts were separately evaluated.

To examine the impacts associated with compounds that may be directly damaging to health, their concentrations in the vicinity of the treatment plant were calculated. It was estimated that, (1) at the present time, with primary treatment, 1/3 of these compounds that reach the plant go off into the air and (2) with secondary treatment with no controls, about 85% could do so.

EPA calculated the concentrations of the various compounds in the air even without emission controls; EPA found no levels that can be construed to be a significant health threat, either at the prison or in any neighborhood, according to criteria developed by EPA's Carcinogen Assessment Group and the U.S. Public Health Service's Centers for Disease Control.

As discussed above, the atmospheric smog problem is quite different in character from the toxic VOC problem. Smog is formed in the air by complex interactions of oxides of nitrogen (emitted by engines and boilers), volatile organic compounds, oxygen, and sunlight. The combination, which takes hours to form, results in new compounds that are irritating to the eye and damaging to lung tissue and vegetation.

These new compounds are not a site specific problem, but occur over large areas where the total emissions of oxides of nitrogen and volatile organics can form mixtures in the atmosphere that are stable long enough to interact. The most effective method of control is reduction over large areas of the emission of oxides of nitrogen and volatile organic compounds.

The proposed secondary treatment facility, wherever it is located, is expected to generate more volatile organic compound emissions than the existing primary

facilities. Wherever the plant is located, an identical level of control of these emissions will be required under the Clean Air Act. Specific controls could include:

1. control of emissions at the treatment plant by a volatile organic compound capture system.

2. control of the discharge of volatile organic compounds to the sewer system by user pretreatment or recycling.

3. more stringent control of volatile organic compound emissions from other sources throughout the metropolitan area to compensate for the emissions from the wastewater treatment plant.

In summary, review of volatile emissions indicates that they will pose no hazards to public health and are not significant in siting the facility.

f. Pathogenic Aerosols

Commentors noted that the "activated sludge" process for secondary treatment generates aerosols, less than one percent of which can contain viable microorganisms that can, theoretically, have adverse effects on public health.

EPA reviewed relevant literature to determine what is known about the impact of pathogenic aerosols on populations working or living near wastewater treatment plants. No epidemiological evidence was found of public health hazards from such plants on nearby residential neighborhoods.

For further discussion on this and other technical issues, see Volume II.

g. Risk of Chlorine Spills

Public comment on the SDEIS raised questions as to whether the continued storage and use of liquid chlorine (i.e., liquified gaseous chlorine) at Deer Island poses a threat to public health and safety, and whether the storage and use of liquid chlorine would be safer if the treatment plant were built at Long Island instead of Deer Island.

Chlorine gas is toxic, and it can move rapidly with the wind in a gaseous state. It is usually shipped and stored as a pressurized liquid, but if spilled it readily vaporizes at normal atmospheric pressures and temperatures. An accidental liquid chlorine spill during transport, storage, handling, or use at a sewage treatment plant should be considered a potential threat to the health and safety of treatment plant staff and local residents. Such accidents, while rare, have occurred as a result of the widespread use of liquid chlorine by industry and by other municipal sewage treatment facilities.

Further study of the implications of the use of liquid chlorine for the MWRA secondary treatment plant showed that liquid chlorine use does not affect the site selection process. Even though a plant at Long Island would be farther from residential areas than a plant at Deer Island (causing greater dilution of any chlorine gas cloud which might reach populated areas), the winds would be approximately three times as likely to blow such a cloud from Long Island toward a residential area such as Hull. Thus, the proximity of inhabitants near Deer Island to its proposed plant site, weighed against the increased risk of a release being blown toward residential areas in the case of a Long Island site, reduces chlorine use as a site-determinating factor.

However, certain special features of the Deer Island site call for unusual precautions for the long-term use of chlorine. The treatment plant would be immediately adjacent to the Deer Island House of Correction, unless the prison were removed. The prison inmates and staff would be at increased risk in the event of a chlorine spill from this larger facility because of their proximity to the plant and lack of mobility. Compounding the problem, Deer Island and neighboring Point Shirley could be difficult to evacuate because they are served by only one narrow roadway. The roadway itself leads directly away from the plant (i.e., downwind if the wind is wrong) without intersecting alternative routes for two miles. In light of these special characteristics of the Deer Island site, EPA has determined that, as a mandatory mitigation measure, if Deer Island is to be the site of the new treatment plant, liquid chlorine shall not be used at a new Deer Island treatment plant unless the MWRA can demonstrate to EPA during facilities planning

that there is a clear and convincing need for the use of liquid chlorine and that it can be transported, handled, stored, and used in an environmentally acceptable manner.

The transportation of liquid chlorine through Winthrop by truck presents a separate but related issue. The Massachusetts Executive Office of Environmental Affairs has stated that the frequent transport of liquid chlorine for a Deer Island treatment plant through residential streets as narrow as those in Point Shirley is undesirable and should be eliminated from planning for the long-term facility under study in this FEIS. EPA agrees and believes reasonable alternatives exist. Accordingly, as part of its effort to minimize impacts on neighbors, as a mandatory mitigation measure EPA will require that the trucking of liquid chlorine through Winthrop cease upon completion of the pier and associated on-shore transportation facilities called for in this FEIS.

h. Archaeological and Historical Resources

An archaeological reconnaissance survey of Deer Island prepared by a consultant for MWRA has identified the abandoned sewage pump station complex (including a farmhouse) and the House of Corrections complex as potentially eligible for listing on the National Register of Historic Places and for the special consideration afforded by that listing. Moreover, an archaeological survey has verified the existence of unmarked graves on the prison grounds. MWRA is continuing investigation of the House of Corrections complex and the graveyard. No prehistoric archaeological sites have been located on Deer Island.

With respect to the prison and pump station complexes, all steps necessary to comply with Section 106 of the National Historic Preservation Act will be completed as soon as possible. This will include determination of whether the project will have an effect or an adverse effect on these structures and preparation of a "preliminary case report" and "memorandum of agreement" between the EPA, the Massachusetts Historic Preservation Officer, and the Advisory Council on Historic Preservation, taking into account the effects of the project on eligible historic properties. During facilities planning, preservation and reuse of eligible structures will be rigorously evaluated.

With respect to the graveyard, legislative action might be necessary to relocate the graves. Instead, depending upon the extent of the graves, the cemetery might not be affected. The additional study under way will provide the information necessary to make this decision.

It should be noted that neither the presence of graves nor of historic structures (which may be present at each island) precludes construction of a treatment plant.

i. The Benefits of Moving the Prison

There is a variation of the All Secondary Deer Island which assumes that the prison would be removed, as a mitigating action, and that its site would be made available for the wastewater treatment plant. This variation would use most of the island but land would be available for buffering, contouring, and recreational use.

The removal of the prison would reduce the impacts of the treatment plant in several ways, including the following:

1. It would remove the receptor population (the prison workers and inmates) most affected by the plant's impacts, including noise and odor.

2. It would eliminate prison-related traffic, thus offsetting construction-related and operations traffic for the treatment plant.

3. It would improve the appearance of Deer Island by removing the prison buildings.

4. It would permit opportunities for sculpting the landscape to a more natural appearance and for screening the facility from both the harbor and Point Shirley and Cottage Hill in Winthrop.

5. It would increase the opportunity for buffering noise at Point Shirley by earthen barriers on prison property.

6. It would permit the retention of at least a portion of the island's shoreline for recreation.

7. It would remove prison-related anxieties from Winthrop.

8. It would make more land available to the wastewater treatment facility, possibly making construction and maintenance easier.

This variation does not reduce the need for any of the mitigating actions proposed for the All Secondary Deer Island alternative with the prison to remain, except for those intended to reduce impacts at the prison itself, e.g., a noise barrier.

However, the process required to release the Deer Island prison site for treatment plant use may be so lengthy as to delay or frustrate the construction of this variation of the All Secondary Deer Island alternative.

EPA has long advocated removal of the prison if Deer Island is to be the treatment plant site, but EPA will not require removal of the prison as a grant condition because implementation of secondary treatment as required by the Clean Water Act cannot be made dependent upon removal of the prison if the site is otherwise acceptable. This FEIS concludes that in EPA's judgment the All Secondary Deer Island alternative can be implemented without unacceptable environmental impacts even if the prison remains.

SDEIS SECONDARY TREATMENT ALTERNATIVES

B. Split Secondary Deer Island and Nut Island

The SDEIS summary said of this alternative:

"This alternative would:

1. Expand the Deer Island treatment facility to provide secondary treatment for all flows.

2. Expand the Nut Island treatment facility to provide primary treatment.

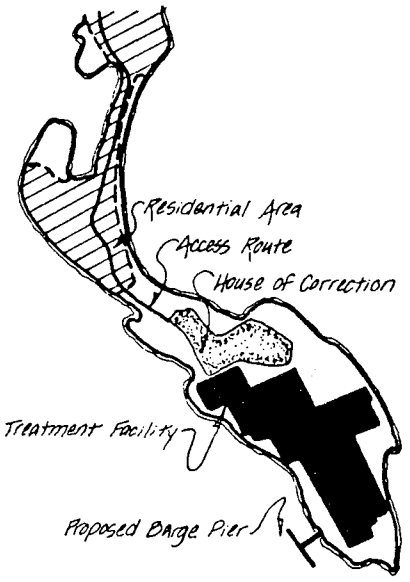
3. Construct a new pipeline or tunnel from Nut Island to Deer Island to allow pumping of Nut Island primary effluent to Deer Island for secondary treatment.

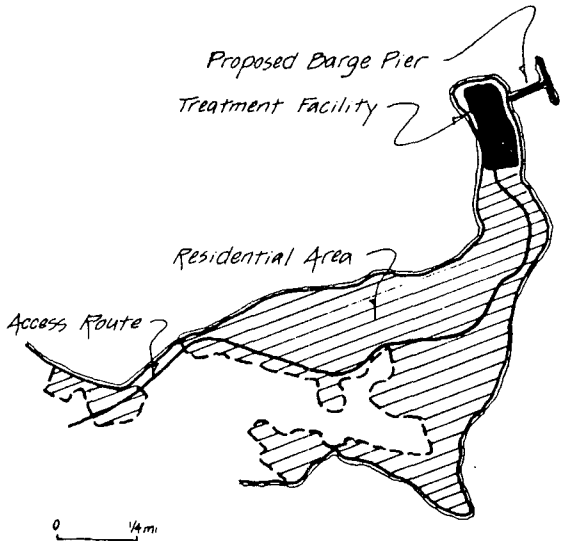
4. Construct a new local outfall to the east of Deer Island Light.

"AREA: The existing facility on Deer Island would be increased from 26 acres to about 115-140* acres while those on Nut Island, now about 12 acres in extent, would be increased to about 18 acres.

"COST: The overall construction cost of this alternative would be about $1285* million and its annual cost of operation, maintenance and replacement would be about $50* million.

"IMPACT: On Deer Island its significant impacts would be virtually identical to those of the preceding alternative, namely slight to moderate traffic impacts at Point Shirley and moderate loss of recreational potential and severe loss of visual quality at Deer Island.





"On Nut Island, however, since the site is closely limited by both adjoining houses and the sea, this alternative would generate severe environmental effects. The expansion of the plant would expose the immediately adjacent neighborhood on Quincy Great Hill, during the construction period, to five years of noise and mess, and, thereafter, to the sight and infrequent smells of an even larger sewage treatment plant than now exists. To maintain a buffer zone, it will be necessary either:

a. to fill up to 3 acres of Hingham Bay, or

b. to relocate the small number of families immediately adjoining the site.

"This alternative will have no impacts on Long Island and will preserve it for future recreational use."

*Updated, See Vol II.

Comments on this alternative, made in response to the SDEIS, were similar to those made on the All Secondary Deer Island alternative, but with stronger expressions of concern about the closer proximity of the Nut Island facility to a residential area.

Subsequent reviews indicate that at Nut Island, the impacts would be even more severe than those described in the SDEIS. It is likely that L_{10} (10% peak) construction noise would be about 10 decibels worse than previously estimated, resulting in 82 dBA in the adjoining residential neighborhood for various lengthy periods during five years. This severe noise level would be probably impossible to mitigate because of the topography, the small size of the site and the closely adjoining residences. Some mitigation could occur by careful scheduling of construction activities.

SDEIS SECONDARY TREATMENT ALTERNATIVES

C. All Secondary Long Island

The SDEIS summary said of this alternative:

"This alternative would:

1. Construct a wholly new, consolidated secondary treatment facility on Long Island.

2. Reduce the existing primary treatment facilities at Deer Island and Nut Island to smaller headworks.

3. Construct major new pipelines or tunnels from both Nut and Deer Islands to Long Island to allow the consolidation of the facilities.

4. Construct a new local outfall to the east of Deer Island Light.

"AREA: The new Long Island treatment facility would require about 115-140* acres of land, while the Deer Island and Nut Island facilities would be reduced from 26 and 12 acres respectively to 5 and 2 acres.

"COST: The overall construction cost of this alternative would be about $1180* million and its annual cost of operation, maintenance and replacement would be about $50* million.

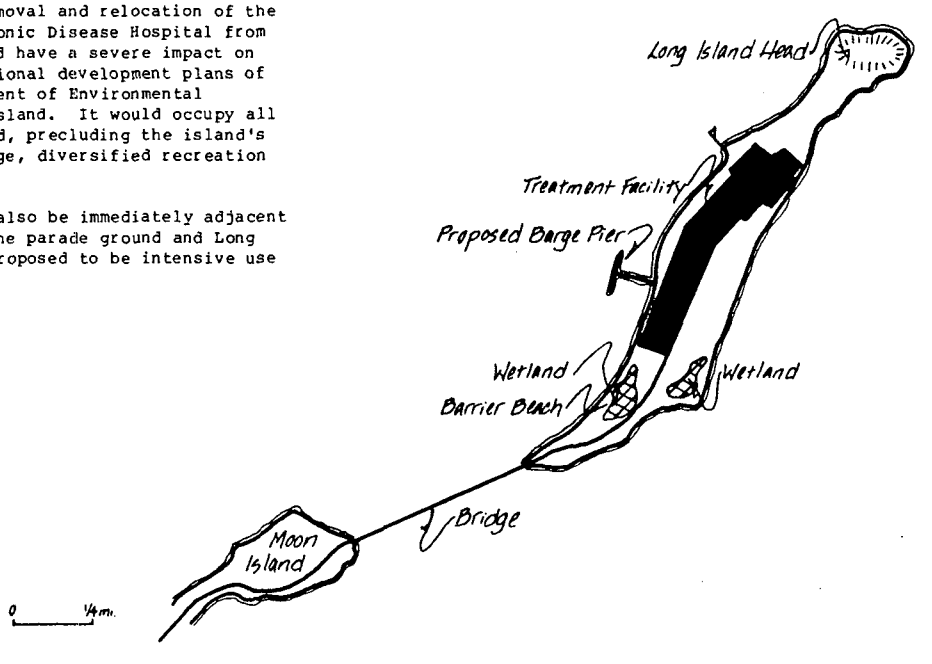
"IMPACT: The sheer size of this alternative would require the removal and relocation of the City of Boston's Chronic Disease Hospital from the island. It would have a severe impact on the proposed recreational development plans of the City and Department of Environmental Management for the island. It would occupy all of the central upland, precluding the island's development as a large, diversified recreation area.

"The facility would also be immediately adjacent to, and upwind of, the parade ground and Long Island Head, areas proposed to be intensive use recreation areas.

"In addition, it would change the appearance of the island from both on-island and off-island vantage points and would have a severe impact on archeological and, possibly, other cultural resources on the island.

"In addition, it should be noted that this alternative would require land transfer from the City of Boston, approval of land transfer and construction by the Department of Environmental Management, and approval of land transfer by the legislature. It would also require review by the United States Advisory Council on Historic Preservation and the Massachusetts Historical Commission. These procedures could significantly delay, or even impair, the implementation of this alternative.

"This alternative will have no significant adverse impact on Nut Island. It is expected to release almost all of Deer Island for other purposes including, possibly, recreation."



*Updated. See Vol. II.

Comments on the SDEIS raised questions about the possibility that the SDEIS exaggerated:

1. The intrinsic value of Long Island as a park resource, as compared with Deer Island.

2. The adverse impacts of a treatment plant on Long Island on the appearance, recreational use potential, and archaeological resources of the island.

3. The legal difficulties of acquiring the site for a treatment plant, including the difficulties of removing the civil war cemetery.

4. The difficulties of over-the-road access to Long Island.

Commenters also questioned the feasibility of establishing a barge terminal on Long Island, whether shifting the facility from Deer Island to Long Island would not eliminate any adverse environmental neighborhood impact but simply shift it from one neighborhood to others, and whether the higher costs of building on Long Island would fall disproportionately on local taxpayers.

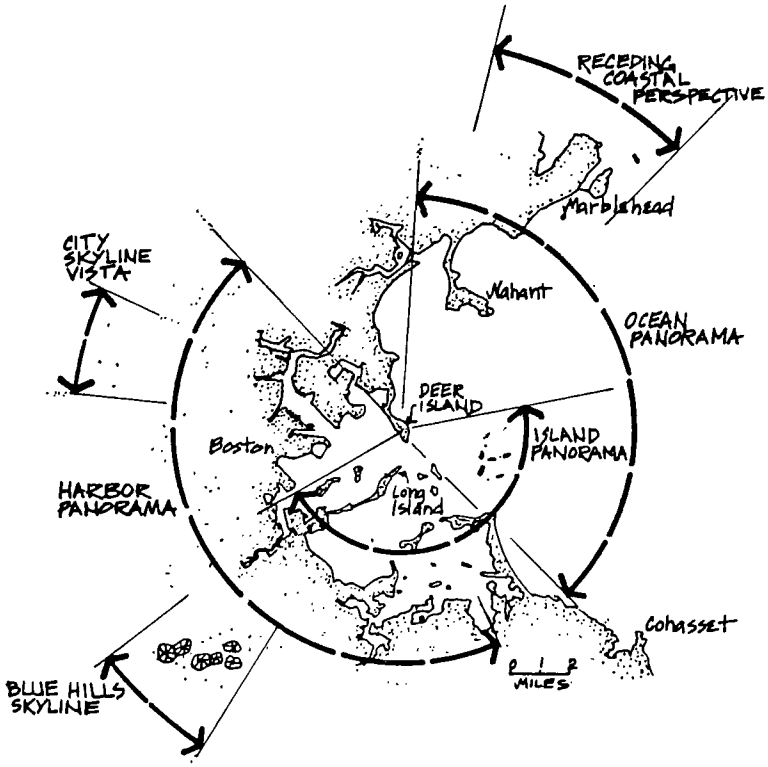
Review of these issues indicates:

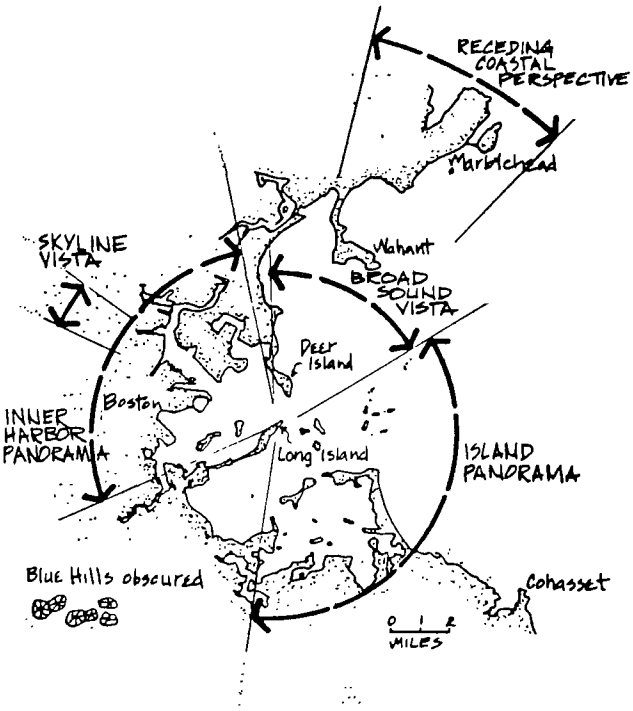
a. Value of Long Island and Deer Island as a Park Resource

Direct comparison of the on-site natural resources of the two islands indicates that Long Island does offer a greater variety of close-up quality natural landscapes, including a small waterfowl pond, marshes, beaches, bluffs, etc.

Similar comparison of the seascapes that surround the two islands indicates that Deer Island offers a greater variety of broad views of the sea, the rocky shoreline of Massachusetts Bay, the harbor and the islands, and the Blue Hills.

Systematic evaluation of Long Island and Deer Island for the range of recreational activities that appear appropriate (viewing the scenery, walking, fishing, picnicking, etc.) indicates that the two islands appear to be approximately equal in potential long-term value as recreational resources, as places around which to walk in a variety of landscapes and from which to view a variety of waterfront scenery.





However a Deer Island park faces severe short and intermediate term difficulties due to problems of prison security access, delays inherent in treatment plant demolition and the necessity of extensive island rehabilitation.

Finally, evaluation of both islands as elements of the harbor landscape, as viewed from off the islands, indicates that the two islands are quite similar, though Long Island occupies a more central location. They are nearly equal in area and in their range of topographic variability; they both present large areas of vegetation; and they both are the sites of large and highly visible institutional building complexes.

b. Impacts of Construction on the Appearance, Recreational Use and Archaeological Resources of the Islands

The amount of land required for this alternative will be more than the 96 acres estimated in the SDEIS. With secondary treatment and sludge digestion all on Long Island, the plant would

extend from the edge of the uplands just to the south of the Nike missle base site to a line just below the "Head" to the northeast, an area of between 115-140 acres.

Though preliminary design studies for the siting of treatment facilities on Long Island indicate that a plant could be built on Long Island somewhat following the terrain and keeping somewhat back from the edges of the bluffs, it is likely that a plant of this scale would cause harm to the appearance of the island as seen from the adjoining waters and shorelines.

However, the facility could be built with no disturbance to the wetlands, barrier beaches and documented archaeological resources on the southwestern portion of the island, and with no direct disturbance to Long Island Head and its old fortifications. These undisturbed areas, including most of the scenic and ecologically valuable areas of the island, could be preserved.

Any similar plant built on Deer Island would require levelling the drumlin and occupying all of the island south of the prison, unless the prison were to be removed. With removal of the prison, however, an attractive, alternative landscape having recreational potential could be created in the land remaining around the treatment facility. There are no wetlands, barrier beaches or documented archaeological resources on Deer Island.

c. Cost Estimates

Review of the cost estimates of the various secondary treatment alternatives indicate:

1. That all the alternatives are likely to be significantly more costly than previously estimated.

2. That there are no significant differences in the costs of the various alternatives, i.e. the differences between alternatives are less than the inherent errors of engineering cost estimation.

With little or no difference in cost between alternatives, there would be no disproportionate tax impact if the Long Island site were to be chosen.

TABLE III-2

COMPARATIVE CONSTRUCTION COSTS OF OPTIONS (1985)
(Millions)

	All Deer	All Long	Split Deer-Nut	Split Deer-Long
Primary	1,065 - 1,090	1,180 - 1,285	1,210 - 1,230	1,345 - 1,365
Secondary	1,115[1] - 1,135[2]	1,180[3] - 1,285[4]	1,275 - 1,295	1,355 - 1,375

Estimated Annual Operation, Maintenance and Replacement Costs

Primary Facilities Only	$16,500,000 - $33,500,000
Secondary Facilities Only	$28,000,000 - $50,000,000

[1]Prison removed.
[2]Prison to remain.
[3]Hospital removed.
[4]Hospital to remain.

Source: FEIS Vol. II, Section II-8.
FEIR on Siting of Wastewater Treatment Facilities for Boston Harbor, Vol. I, C.D.M., Dec. 1985.

d. Legal and Institutional Analysis

Since preparation of the SDEIS, the Massachusetts legislature created the MWRA to operate and improve sewage collection, disposal and treatment systems which were formerly under the control of the MDC. The act creating the MWRA provides new powers to and limitations on the MWRA which were not applicable to the MDC, including new provisions exempting the MWRA from certain state laws, and subjecting it to new legislative controls. Accordingly EPA conducted a legal analysis of the power of the MWRA to acquire necessary land and construct wastewater treatment facilities on both Long Island and Deer Island. Its legal analysis is part of Volume II of this FEIS.

The legal analysis concluded that, for several reasons, legislative and gubernatorial approval would certainly be required to authorize construction of a secondary treatment facility on Long Island, but that the need for such an approval is less clear in the case of Deer Island. The recent discovery of graves on Deer Island increases the likelihood of the need for legislative approval. In any event, legal counsel for the MWRA

has determined that the Authority should seek legislative and gubernatorial approval of a Deer Island site as a precautionary matter. Thus, it is probable that whichever site were selected, the approval of the legislature and governor would be sought. Although the need for legislative approval is not a site-distinguishing factor, the probability of obtaining support for the selected site is important. In the judgment of EPA, for reasons explained below and in the Decision Process section, the legislature is more likely to approve of Deer Island than Long Island. This conclusion follows from the policies regarding plant siting on the part of the governmental entities which own or control the use of property on both islands and the implications of these policies for legislative and gubernatorial approval.

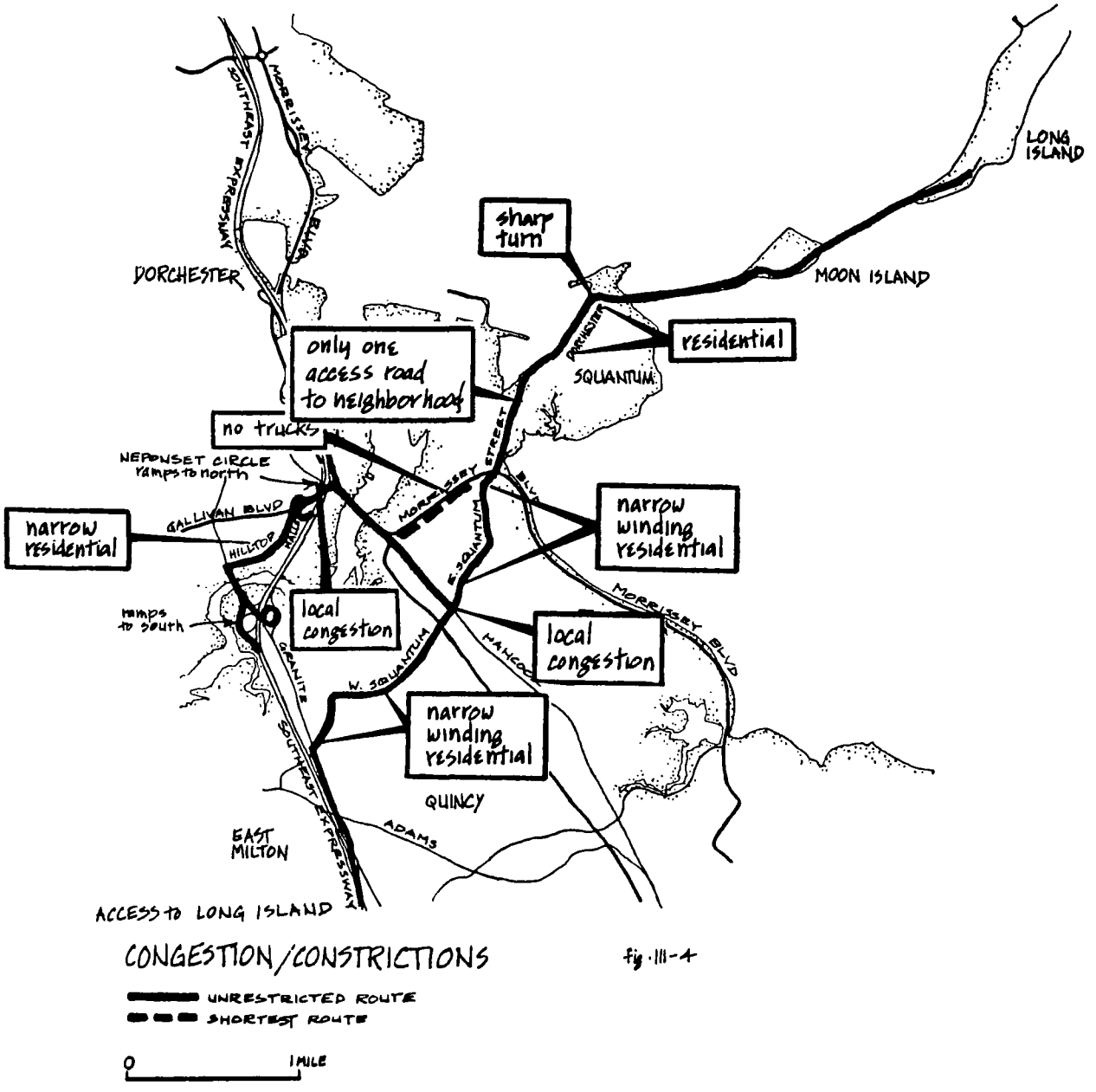
Long Island, with the exception of the lighthouse, is owned by the City of Boston under the care, custody, and control of the Boston Department of Public Health and Hospitals. It lies within the corporate limits of the City of Boston, which has expressed its desire to continue the hospital use and supports use of Long Island for recreation. Abandonment of hospital use could additionally require the approval of the Massachusetts Department of Public Health which must evaluate whether needed facilities are available elsewhere. Furthermore, the siting of the treatment plant on Long Island is strongly opposed by the Massachusetts Department of Environmental Management (DEM). DEM has the umbrella authority under the Harbor Islands Act to veto public land transfers, construction and other activities which it deems inconsistent with the purposes of that act. The DEM Commissioner, commenting on the SDEIS/EIR, cited the "great significance and consequence to the Commonwealth" of Long Island as a park and noted that in DEM's view three million five hundred thousand people annually would be deprived of what he describes as a sorely needed recreational experience if Long Island were to become a major treatment plant site. He described that loss as "severe" and stated that no other island offered equivalent opportunities. In addition, the City of Quincy, through which the major access route passes, is opposed to the use of Long Island for siting of the treatment plant.

By contrast, the MWRA already owns or controls most of the Deer Island site which is its tentative preferred alternative by its vote of July 10, 1985. The City of Boston has expressed a willingness to transfer to the MWRA the Deer Island land it owns (including the land currently occupied by the House of Correction as well as other lands which would be needed even if the prison remains.) The General Services Administration (GSA), in this document, has tentatively identified the wastewater treatment facilities as its preferred alternative use for the federally owned parcels there, which are in the process of disposal. The DEM did not include Deer Island in its 1984 draft recreation plan for the harbor islands.

The array of opposition from its owner and other governmental authorities to Long Island as a treatment plant site, contrasted with the support of the entities which control Deer Island, suggests that approval of the Deer Island site would be more likely than approval of the Long Island site. For a further legal analysis, the reader is referred to the memorandum of law which is contained in Volume II.

e. Over the Road Access to Long Island

Review of roadways to Long Island confirms that they are inadequate for the unmitigated impact of many hundreds of daily construction vehicles. However, with barging and busing and with the portion of Quincy Shore Drive between Hancock and East Squantum Street opened to trucks and buses, they would be significantly better for the greatly reduced traffic than those to Deer Island. In general, access would be possible entirely on main through roads that are heavily traveled or that do not pass through residential areas. However, if Quincy Shore Drive cannot be opened to trucks and buses, drivers would be required to use East Squantum Street between the Shore Drive and Hancock Street, a roadway as narrow and winding as any on the route through Winthrop to Deer Island. With mitigation, traffic to Long Island is acceptable.



f. Barge Terminal Feasibility

In response to comments, review of topographic conditions both on shore and off shore at Long Island show a pier is feasible. The pier facilities would be more appropriate along the northwestern shore of the Parade Ground rather than further to the southwest as shown in the SDEIS. A parade ground location, somewhere between the two rotting, existing piers, would avoid the bluffs that could be a problem with the more southwestern location; it would offer access to deeper water without dredging, and it would facilitate the use of the parade ground as a "laydown" area during construction.

g. Relocation of Impacts

On the issue of whether "relocating" the wastewater treatment facility from Deer Island to Long Island would actually reduce human exposure to adverse environmental effects or simply relocate them from one neighborhood to another:

1. From the limited perspective of traffic congestion, if Quincy Shore Drive were available to trucks and buses, Long Island would be a better site. It would be accessible over roads that are wider, straighter, and more separated from residential areas. If the Drive is not opened, access is equal at both islands. However, with barging and RO/RO and ferrying and busing of construction workers, traffic is expected to have an insignificant impact at both sites.

2. From the limited perspective of construction noise, Long Island would be a better site since there would not be any nearby residential receptors. Construction noise levels at Deer Island prison are expected to be loud but within standards. Construction noise levels at Point Shirley are well under Boston noise levels as the neighborhood is a half mile away from construction activity.

3. From the perspective of odors, since EPA will require that the wastewater treatment facilities incorporate effective control systems, the facility is normally expected not to emit perceived odors and hence the two sites are equal, except at the prison where though the odor would occasionally be perceived from a Deer Island plant the impacts are expected to be acceptable.

To the extent that some level of perceived odors do rarely occur even with mitigation as the result of process upset, moving the plant to Long Island does not significantly benefit Winthrop overall and does increase impacts on other harbor neighborhoods, such as Hull. However, moving the plant to Long Island would

reduce the close exposure of the prison workers and inmates; Hull would be more frequently but less intensely impacted than the prison, but in either event, odor incidents are expected to be very rare and at worst, temporarily moderate.

If the prison were to be removed, plants on either island would result in approximately the same overall neighborhood exposure to what very infrequent slight odor events may occur.

As to other relevant impacts, it was concluded that any variation in impact was insignificant.

SDEIS SECONDARY TREATMENT ALTERNATIVES

D. Split Secondary Deer Island and Long Island

The SDEIS summary said of this alternative:

"This alternative would:

1. Expand the existing Deer Island treatment facility for primary treatment only.

2. Construct a new treatment facility to provide secondary treatment for all flows on Long Island.

3. Reduce the existing primary treatment facility at Nut Island to a small headworks.

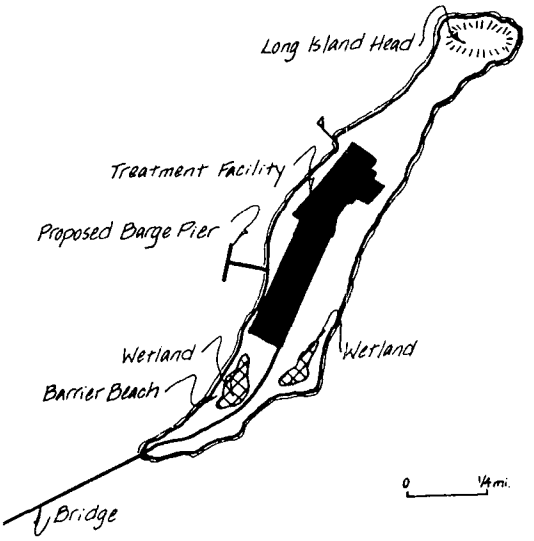
4. Construct new pipelines or tunnels from both Deer and Nut Islands to Long Island to allow the consolidation of the facilities.

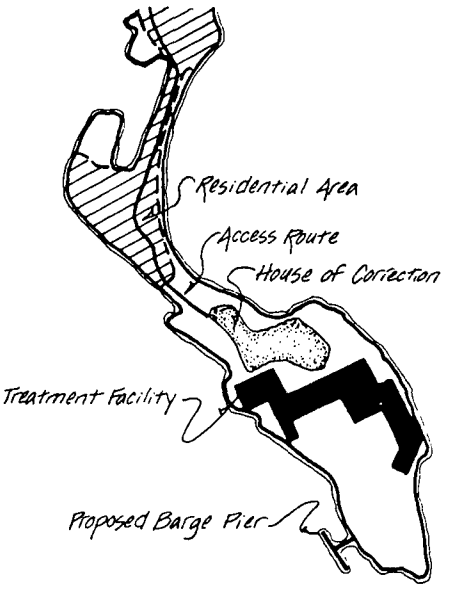
5. Construct a new local outfall to the east of Deer Island Light.

"AREA: The new Long Island facility would require about 82-96 acres of land; the Deer Island facility would be increased from 26 acres to about 52 acres, and the Nut Island facility would be reduced from 12 acres to about 2 acres.

"COST: The overall construction cost of this alternative would be about $1365* million and its annual cost of operation, maintenance, and replacement would be about $50* million.

"IMPACT: At Long Island, the effects of this alternative are virtually identical to those of the preceding alternative. It would occupy the central uplands, require relocation of the Chronic Disease Hospital, preclude development of the proposed hiking and nature study area to the south, severely impact on proposed intensive use areas at Long Island Head, and suffer from severe institutional constraints to implementation.





"Elsewhere, based on the extensive and detailed evaluations of all the impacts, as described in detail in the SDEIS/EIR, none of the environmental impacts of this alternative, with the required set of mitigating actions, are expected to be severe or significant. At Point Shirley, the nearest neighborhood in Winthrop, nearly one half mile away from the plant, it is expected that traffic and traffic noise will increase somewhat during construction, but that the increase will have slight impacts. Construction traffic is not expected to exceed 15 trucks and buses each day.

"With respect to Deer Island, this alternative is not expected to have any severe environmental effects since the plant will not alter the appearance of the island, the island is ample in size, and most of the land to be used is otherwise unused or committed. The expansion will leave substantial portions of Deer Island for other purposes including, possibly, recreation.

"This alternative will have no significant adverse impact on Nut Island."

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*Updated. See Volume II.

Salient comments on this alternative were limited to the question of why the adverse environmental impacts of a sewage treatment plant, its odors, emissions and changes in land use and appearance should be spread to more than one site.

Specific impacts of the split option on each island would be perceived to be very similar to building the entire plant on that one island alone. For impacts such as traffic, construction noise, and the potential for odor, the effects on neighbors in Winthrop and the prison would be about the same as those of the All Secondary Deer Island alternative, while the conflicts with the Commonwealth of Massachusetts, and the City of Boston's proposals for hospital and recreational use of Long Island would remain.

The sole benefit of splitting the treatment plant between the two islands is the reduction of the size of the plant on each island. The division of the treatment plant to two sites, by reducing the land area required on each site, would increase the fraction of land available for other uses of both islands, including recreation. This would make smaller waterfront parks feasible on both islands and preserve the Deer Island drumlin.

The division of the treatment plant, however, would not obviate the need for the mitigating actions described for the other single-island alternatives.

IV. DECISION PROCESS

The SDEIS summary said of the process which EPA proposed to use to select a site for secondary facilities:

> "Six decision criteria have been identified. Each alternative will be evaluated to determine the extent to which it:
>
> 1. is consistent with and, if possible, promotes the fulfillment of the promise of Boston Harbor. ["Harbor Vision"]
>
> 2. can be implemented in a timely and predictable manner. ["Implementability"]
>
> 3. minimizes the adverse impacts of the facility on neighbors, taking into consideration existing conditions, facility siting impacts and mitigation measures. ["Effects on Neighbors"]
>
> 4. minimizes the impacts of the facilities on natural and cultural resources. ["Impact on Cultural and Natural Resources"]
>
> 5. can be built and operated at a reasonable cost. ["Cost"]
>
> 6. maximizes the reliability of the entire treatment system. ["Reliability"]
>
> Public comment is sought on the adequacy and accuracy of all the material contained in this SDEIS including the decision making process. Are the decision criteria adequate? How should the alternatives be rated against the decision criteria? Which decision criteria are the most important?
>
> In addition, it should be noted that any of the seven options will have some impacts on some neighbors. Some options locate most impacts on one site to the benefit of other sites. Other options spread impacts among various sites. We seek public comment on how the EPA and the Commonwealth should judge the combined consequences of each option."

A. Decision Criteria

EPA had made explicit the decision criteria as a way to impose order on a mass of detail, and to focus on those impacts which are relevant to the choice of a site. Public comment generally agreed that these six criteria captured the premier issues that should drive a siting decision, though there was strong disagreement on the relative importance to be accorded to each decision criterion.

B. After the Close of the Public Comment Period

In light of the high degree of public acceptance, EPA decided to retain its original six decision criteria. EPA also reviewed all the public comments submitted to identify both those criteria-relevant issues which needed further analysis prior to a selection of a preferred alternative and those other issues which related to the overall project, or were otherwise not criteria-relevant, but which were appropriate for inclusion in the FEIS or the MWRA's FEIR. EPA performed additional analyses on all potentially site-relevant topics, such as noise, odor, volatile organic compounds, feasibility of barging and busing, feasibility of ferrying workers, comparative recreation potential, preliminary site layout, etc.

EPA and the MWRA agreed that it was appropriate for each to pursue an independent decision making process under their respective statutory mandates but to do so in parallel and with a high degree of coordination. Accordingly, to ensure that both agencies shared a common data base, as either agency identified data needs or developed information, it was shared with the other by exchange of technical memoranda and through technical presentations at meetings with EPA's Technical Advisory Group or with the MWRA's Board of Directors or staff.

As additional data were received, EPA systematically reviewed its entire data base using the decision criteria suggested in the SDEIS and an evaluation process described below. This process evaluated each piece of the mass of data in terms of one or more of the appropriate decision criteria (was the information relevant to the criterion and, if so, how important?) ensuring that the decision would be based on current information and would be objective. EPA felt that each decision criterion

was legitimate and was confident that sufficient objective data existed to permit a reasoned judgment as to the acceptability of the alternative sites.

To start this process, EPA scrutinized each decision criterion carefully, in light of the technical information then available, and identified the specific impacts which were relevant to that criterion. For example, for the "Effect on Neighbors" decision criterion, the principal relevant impacts became the following:

a. Years of Construction
b. Daily Construction Traffic
c. Operations Traffic
d. Construction Noise
e. Odor
f. Visual
g. Pathogenic Aerosols
h. Chlorine Transportation and Use
i. Volatile Organic Compounds

(For a list of the principal impacts relevant to the other decision criteria, which EPA considered see Appendix C.)

Then mandatory mitigation assumptions relevant to that decision criterion were made an explicit part of the impact analysis. For example, EPA considered to what extent barging and busing would reduce the impact of construction traffic on "Effects on Neighbors."

For each decision criterion, EPA performed the following analysis:

1. EPA evaluated how severe each relevant impact would be if a particular site were chosen, e.g. how severe would construction traffic be in Winthrop if Deer Island were chosen?

2. EPA then evaluated the relative importance of each of the relevant impacts to the appropriate decision criterion. For example, in a particular fact situation, what is the relative importance to "Effects on Neighbors" of construction noise impacts in Winthrop of a Deer Island plant, as compared with construction traffic impacts on Quincy of a Long Island plant.

EPA reviewed its evaluations to identify areas of possible technical misunderstanding or miscommunication. An effort was made to give prominence to severe site-distinguishing impacts of importance to a decision criterion, in order to call attention to critical issues. During this time, additional pieces of technical information were being received; these were continuously made part of the evaluation and none caused a change in the results of the evaluations already accomplished.

C. Mandatory Mitigation Measures

Upon the completion of the review of each decision criterion, the assumed level of mandatory mitigation as set forth in the SDEIS/EIR was either confirmed or, if appropriate, modified as the result of further technical information. EPA found that the most critical need for mitigation was to reduce impact on neighbors.

EPA adopted the following specific mitigating actions to be required of the applicant. These will be required whichever site is selected (except as noted below):

1. Transportation of all bulk materials by barge. Bulk materials, including earth, gravel, and reinforcing steel, shall be transported to and from the site by barge. This action will require construction of a bulk materials loading pier at the site, and associated terminal on-shore.

2. Use of roll-on/roll-off transport for heavy trucking. In order to accommodate heavy trucking, a roll-on/roll-off barge loading facility shall be constructed at the site and at an onshore transfer station.

3. Busing and ferrying of workers to the construction site. Prior to the commencement of construction, the MWRA shall establish or cause to be established a bus and ferry service to provide transportation to and from the construction site. The applicant shall ensure that all construction workers travel to and from the construction site only on said buses or ferries, except in cases of medical or other emergency.

4. Control of odors. To ensure adequate odor control, the applicant shall:

   a. Conduct a baseline survey of the synchronous concentrations of malodorous compounds into the influent at Deer and Nut Islands, and in the air downwind of the existing wastewater treatment facilities.

   b. Rigorously explore the technologies necessary to maintain concentrations of malodorous compounds in the air below the threshold of perception for the various compounds.

   c. Design and construct appropriate facilities and/or equipment to control odor.

5. Control of volatile organic compound emissions. To ensure control of volatile organic compound emissions, the applicant shall:

   a. Conduct a baseline survey of the synchronous concentrations of volatile organic compounds in the influent at Deer and Nut Islands, and in the air downwind of the existing wastewater treatment facilities.

   b. Rigorously explore the technologies necessary to control the emission of volatile organic compounds.

   c. Should the sampling program indicate, or if required by Clean Air Act, design and construct appropriate facilities and/or equipment to control volatile organic compound emissions.

6. Liquid Chlorine.

   Liquid chlorine (i.e., liquified gaseous chlorine) shall not be used at Deer Island unless the MWRA can demonstrate to EPA that there is clear and convincing need for the use of liquid chlorine and that this substance can be transported, handled, stored, and used in a manner which will not

cause unacceptable risk to the environment or to public health. The MWRA shall provide EPA, during further facilities planning, with information on alternatives, risk assessments, and methods of control sufficient for EPA to complete its environmental review of this issue of chlorine use.

7. Prohibition of the trucking of liquid chlorine through Winthrop. Through-neighborhood trucking of liquid chlorine to Deer Island is prohibited upon completion of the pier and associated staging called for in this FEIS.

8. Exploration of alternative techniques for liquid chlorine use. Giving due regard to the hazards of liquid chlorine, the applicant shall explore alternatives to its use at the treatment plant as a headworks.

9. Exploration of alternative treatment processes. The applicant shall identify any alternative treatment processes that might be less space demanding, less costly, or more reliable under varying influent characteristics. Such exploration is required under EPA's regulations for facilities planning.

10. Exploration of recreational joint use development of the wastewater treatment facility site. The applicant shall examine the feasibility of recreational development in conjunction with the development of the new wastewater treatment facility site. This exploration is required under EPA's regulations for facilities planning.

11. Control of dust, erosion, and sedimentation. The applicant shall implement the provisions ordinarily required by the City of Boston and the Commonwealth of Massachusetts for the control of dust, erosion, and sedimentation.

12. Implementation of noise control measures. While noise levels during construction are expected to be within acceptable limits, due to the long duration of this project, all

practical noise reduction practices should be used. These must include the excavation of the drumlin from the south. These must also include the construction of a sound barrier to ensure compliance with noise standards at ground level outside the prison. Because under the Nut Island headworks options, short-term noise levels could be high at Nut Island during the relatively brief period of demolition of existing facilities nearest homes, MWRA must develop a noise mitigation plan including a scheduling of noise emitting equipment to reduce simultaneous impact on nearby homes.

Each of these mitigating efforts will be the subject of detailed study by the MWRA as further facilities planning explores these ways of achieving acceptable levels of impact. EPA welcomes this investigation and the development of alternative, more innovative and effective approaches which would achieve equivalent impact reduction; EPA after appropriate environmental review is prepared to modify these mitigation measures so that equal protection can be achieved by better methods.

D. Final Analysis

During the final analysis, it became clear that three of the decision criteria, though theoretically important, no longer played site-distinguishing roles.

1) On "Cost," a more detailed analysis revealed that the costs of the four alternatives were essentially equal. The spread of estimated costs among them was less than had been realized and was less than the inherent error factor of cost-estimating techniques of this nature. Because of this, though the rank order remained the same and All Secondary Deer Island remained the least expensive, EPA decided to regard this decision criterion as having neutral effect.

2) On "Reliability," though the reliability of the new plant or plants was of great importance, further review could not identify any differences among the sites that could not be readily overcome by thoughtful design, segregation of system flows, etc. Each of the sites permitted treatment plants of equal reliability.

3) On "Impact on Cultural and Natural Resources," though this decision criterion included federally protected resources (wetlands, barrier beaches, recognized historical and archeological sites, etc.), the impact of plants on either Deer or Long Islands would be essentially equal. Preliminary site designs by both EPAs and the MWRA's consultants demonstrated that a treatment plant could be sited on either Deer Island or Long Island in such a way that either island's recognized or documented natural or archeological resources would be adequately protected though graves and possible historic structures on either island would be adversely affected in similar ways. Thus the site-distinguishing significance of this decision criterion on the Deer-Long choice is eliminated. On Nut Island, however, the Split Secondary Deer-Nut Alternative would involve the serious impacts of filling of tidal areas (unless homes were taken) and this was taken into account in the final decision.

"Effects on Neighbors," "Harbor Vision," and "Implementability" remained as the principal decision criteria for EPA. EPA felt each of these three criteria represented protection of important public values of substantial weight.

V. Major Site-Relevant Criteria

A. With respect to the "Effects on Neighbors" decision criterion, the populations of principal concern are residential populations in proximity to the three islands and their access routes. Potential impacts on persons using the harbor for recreation are principally evaluated under the "Harbor Vision" Decision Criterion. In the case of Deer Island, potentially impacted residential populations include, in particular, the staff and inmates of the House of Correction, and the residents of Point Shirley, Cottage Hill, and more generally, the wider communities of Winthrop, Revere, and East Boston. Long Island, with its central harbor location, has as its closest "neighbors" many widely scattered but approximately equidistant receptors including Hull, Hough's Neck, Squantum, Thompson Island Education Center, South Boston, the Deer Island House of Correction, and Point Shirley in Winthrop. (The Long Island Hospital is not included in this analysis for, as stated in the SDEIS/EIR, both Long Island secondary alternatives assume that the hospital must be relocated off-island.) In the case of Nut Island, principal attention is focused on Hough's Neck in Quincy.

Should the "no prison" variation of the All Secondary Deer Island alternative be implemented, EPA concludes that a treatment plant at either Deer Island or Long Island would have acceptable and essentially equal impacts on its neighbors, with the mandatory mitigation measures in place.

a. As noted earlier, removing the prison not only eliminates a current source of adverse impact, but also permits the MWRA to implement the further mitigation it has proposed: to contour the Island reducing even further construction noise levels and screening the facility from Winthrop's view.

b. As to traffic, if Quincy Shore Drive were to be closed to construction-related traffic, access was judged to be equal in difficulty; if the Drive were to be opened, access to Long Island would be better though this is somewhat balanced by Long Island's longer construction period. In either event, EPA concluded that the highly protective mandatory mitigation measures of

barging/busing/ferrying reduced traffic impacts so that they were acceptable and essentially equal.

c. For such rare odors as might occur, though Long Island is slightly more distant from its receptors than the Deer Island site is from Point Shirley, Long Island is ringed by many equidistant potential receptors. Odor impacts are roughly equal, but Hull is the most frequently impacted community (from a Long Island plant) and Winthrop is impacted nearly as much from a Long Island plant as from a Deer Island plant.

d. All other neighborhood impacts were, as discussed, found not to be significant or site relevant.

However, if the prison were to remain on Deer Island, EPA concludes that a plant site on Deer Island would have a greater effect on its neighbors than a site on Long Island. The prison adjoins the Deer Island treatment plant site and, even with mitigation, would be subjected to greater noise and odors than would Long Island's more distant closest neighbors but these impacts were found to be moderate and acceptable. The Point Shirley area would also be subject to somewhat greater traffic and noise than Long Island's neighbors; Winthrop as a whole would be subjected to slightly greater traffic impacts than those in Quincy, but as discussed above, these and other neighborhood related impacts were found not to be significant.

EPA did consider the issue of "fairness" earnestly advocated by the people of Winthrop. Enough is enough, they said, having experienced the uncertainty of the prison; the noise and risk of Logan's aircraft; the objectionable nature of the current wastewater plant which causes water pollution, odors, diesel exhaust fumes, and stack fires, and which has experienced at least one potentially serious chlorine leak.

In addressing the issue EPA placed its principal emphasis on an objective analysis of "Effect on Neighbors" and considered issues of "fairness" in that context, including the mitigating effect of moving the prison. EPA believes that an upgraded treatment plant with EPA's mandatory mitigation will

remove the adverse impacts associated with the current facility and will improve water quality in the Winthrop area.

EPA also considered the argument that the decision maker must allocate within a metropolitan area the inevitable burdens of regional responsibility perhaps somehow offsetting them against the benefits given a community by its location or by human design so that the "pluses" and the "minuses" even out over the entire area. EPA concluded that in this case the application of extraordinary mitigation that it was requiring reduced the impact of the upgraded facility so substantially that it could be constructed despite the presence of the airport and the prison. EPA felt that removal of the prison was desirable but not mandatory.

To summarize the issue of "fairness": EPA has engaged in a decision process which gathered technical information, exposed it to extensive public scrutiny, developed very stringent mitigation measures, and evaluated the alternatives in terms of disclosed decision criteria. EPA believes this open process has arrived at a fair and reasonable conclusion that the upgraded treatment plant, considered singly or in combination with other conditions, will be constructed and operated with acceptable environmental results.

The Split Secondary Deer-Long alternative would involve major construction activity of approximately the same perceived effect on the neighbors of each Island as if the entire plant were being constructed there. Though those effects were found to be acceptable, it was felt to be unwise to impact two sets of neighbors unless there would be some benefit to another decision criterion.

Split Secondary Deer-Nut imposed severe burdens on its immediate neighbors on Hough's Neck without any corresponding benefit to Deer Island and Point Shirley. It was found to be environmentally unacceptable.

B. Considering only the <u>"Harbor Vision" decision criterion</u>, EPA concludes that though all four alternatives were acceptable, the All Secondary Deer alternative was preferred under "Harbor Vision."

EPA's principal conclusion as the result of site investigations, reports and alternative site layouts is that the treatment plant could be built on Long Island without seriously damaging the long-term prospects for public use of the Harbor because Deer Island could serve as a substitute for Long Island as the Harbor's major island park resource. However, EPA participants did conclude that Long Island did have greater current potential as a major island park. It is currently in much better shape, has more diverse cultural features and natural habitats, has better access for visitors and a central harbor location. It also has city and state support.

A treatment plant at either island risks causing severe visual damage from off-island viewpoints. Though this damage could be partially mitigated by contouring and screening in the case of a Long Island site and a "no-prison" Deer Island site, any visual damage that did occur at Long Island would be more visible due to Long Island's central harbor location.

Though EPA believes that Deer Island's size, topography, and setting give it acceptable long-term potential for rehabilitation as a park resource, EPA does conclude that while both All Secondary Deer and All Secondary Long satisfied the Harbor Vision decision criteria, All Secondary Deer satisfied it better.

Less acceptable were the other two alternatives. Though Split Secondary Deer-Long preserved significant potential recreation space at each island, EPA agreed with the Commonwealth that an entire island as park was preferable. Split Secondary Deer-Nut committed Nut Island to wastewater treatment without any corresponding benefit at Deer Island; though Nut Island has not been a major part of a harbor park plan, it could provide locally important open space.

C. Considering only the "Implementability" decision criterion, the following issues were of principal importance to EPA:

   a. Permits and Licenses. EPA considers the difficulties of obtaining the required permits and licenses to use either Deer or

Long Island to be approximately equal. In both cases it will be complex but can be done. In the case of Nut Island, severe problems are anticipated in either the taking of homes or obtaining permits to fill since any of the other three alternatives avoids these impacts at Nut Island without increasing the impacts at either of the other islands.

b. Boston. The opposition of the City of Boston to the All Secondary Long Island and Split Deer/Long options and its lack of opposition to All Secondary Deer seriously affects "Implementability" of any Long Island plant site. Both Deer Island and Long Island are within the corporate limits of the City and the City owns all of the Long Island site and necessary parcels on Deer Island, independent of whether the prison remains. Boston states that it wants the Long Island Hospital to continue as its home for the chronically ill and as a refuge for the homeless. EPA continues to believe, as expressed in the SDEIS that the hospital site must be used as part of the All Secondary Long Island and Split Deer/Long sites, if either is to be the choice, in order to avoid serious impacts to "Neighbors," "Harbor Vision" and "Cultural and Natural Resources." Furthermore, Boston has declared its strong support that the remainder of Long Island should be an active part of the Boston Harbor Islands State Park. Boston is opposed to Long Island's use as a treatment plant site. Moreover, Boston has indicated to EPA its lack of opposition in principle to the transfer of lands needed for All Secondary Deer with or without the prison.

c. Attitude of Agencies of the Commonwealth of Massachusetts.

No agency of the Commonwealth supports a treatment plant on Long Island and some oppose it. The MDC, in its Nut Island Site Options Study, the first phase facilities plan on which this FEIS based, proposes a large plant on Deer, and a small plant on Nut. The Department of Environmental

Quality Engineering expresses no preference. The Massachusetts Historical Commission is concerned about potential historic resources at both islands and archaeological resources on Long Island. The Department of Environmental Management, which has authority to veto land transfers and construction of structures at either island, strongly favors Long Island's use as a major park. The Governor, in a letter to the MWRA, does not express a preference but pledges his support to efforts to relocate either the county prison or the city hospital, depending on which alternative the MWRA chooses.

d. Legislative Approval. The SDEIS/EIR concluded that legislative approval would be needed for All Secondary Long, but might not be required for All Secondary Deer. Counsel for the MWRA has determined that it would be prudent to seek legislative approval whichever site is selected. EPA acknowledges that the adamant opposition of Boston and Quincy to All Secondary Long and the absence of any governmental support whatsoever for Split Secondary Deer-Nut or Split Secondary Deer-Long casts doubt on the implementability of these alternatives. Although it is impossible at this time to predict the result of independent legislative consideration of the merits of the sites, it is the best judgment of EPA that the remaining alternative, All Secondary Deer Island, is most likely to win legislative approval. Though EPA believes federal law must be complied with despite siting disputes, it also believes the current violations of federal law would be corrected more quickly if a site were chosen which would be supported by legislative approval.

e. Summary of Implementability. Thus even prior to the July 10, 1985, vote of the MWRA selecting All Secondary Deer Island as its tentative preferred alternative, EPA had concluded that under the "Implementability" decision criterion the result clearly pointed to All Secondary Deer with or without the prison. The July 10, 1985, vote

of the MWRA, the proposing agency, which has the statutory authority to build the treatment plant and which controls almost all of the land needed at Deer Island for All Secondary Deer, confirmed EPA's already firm conclusion that the All Secondary Deer alternative was clearly more implementable with or without the prison.

In summary, with mandatory mitigation,

1. EPA found Split Deer-Nut to be environmentally unacceptable because of its severe impact on its "Neighbors" at Nut Island and on "natural resources," and strong barriers to "Implementation."

2. EPA found Split Deer-Long to be environmentally acceptable; but EPA also found it to be undesirable because it spreads impacts on "Neighbors" and "Harbor Vision" to two islands without any benefit deemed valuable to a decision criterion. It also was unlikely to be "Implemented."

3. EPA found both All Secondary Long and All Secondary Deer to have an acceptable impact on "Neighbors" and "Harbor Vision."

    a. "Neighbors." With mitigation, the impact of a Deer Island plant on its "Neighbors" is either equal to (without the prison) or slightly worse than (with the prison) a Long Island plant.

    b. Harbor Vision. The impact of a Deer Island plant on the public benefits from and uses of Boston Harbor causes less harm than a Long Island plant.

Between these two acceptable and closely balanced alternatives, EPA acknowledges that building a treatment plant on Deer Island (with or without the prison) was clearly more implementable than building a Long Island plant.

VI. DECISION

With required mitigation as a condition of federal funding, EPA's recommended FEIS decision based on the foregoing analysis is that its preferred alternative is All Secondary Deer. All Secondary Long is also environmentally acceptable and is preferred over the two other alternatives, Split Secondary Deer-Long and Split Secondary Deer-Nut. The only alternative which EPA finds is unacceptable is Split Secondary Deer-Nut.

VII. COMPLETION OF EIS PROCESS

The issuance of this FEIS starts another phase of environmental review.

After a public hearing process and public comment period, EPA will issue its final record of decision on the siting of wastewater treatment works for Boston Harbor.

appendices

APPENDIX A
HEADWORKS

Several of the alternatives described in this EIS call for the reconstruction of an existing primary treatment facility to a "headworks." At Nut Island, this change would include demolition of most of the existing plant except for the chlorination facility now under construction and connection of the site to the new wastewater treatment plant, probably by tunnel.

At Deer Island, this change would be similar but it would include retention of the existing pumping station and, probably, a new disinfection facility at the influent end of the tunnel to Long Island.

Neither of these prospective changes has raised, nor is expected to raise, any significant controversy, in large part because they represent reductions in the overall size of wastewater treatment facilities at their respective locations.

It should be noted, however, that neither is without adverse effect during construction or without the potential for adverse effect afterward.

During construction, demolition of existing facilities would generate significant levels of noise, generally, about 10 decibels higher than those estimated in the SDEIS, while the demolition and the digging of the tunnels would generate spoils that may require disposal off-site.

The high noise levels of demolition are likely to be of fairly short duration and hence are not unacceptable. However, because they are expected to be briefly high, a mandatory mitigation measure requires the scheduling of construction activities to reduce the number of high intensity activities operating simultaneously near the affected homes.

The construction and tunnel wastes, if removed over the road, over a 4-year period would generate an average of 10 truckloads per day, a slight to moderate impact.

Following construction, the only significant effects of this much smaller facility are possible odor and the possible hazard of liquid chlorine. These issues, as they affect the relatively smaller headworks are not site-relevant to the siting of the major treatment works, and will be the subject of further studies by the MWRA.

APPENDIX B
PRIMARY TREATMENT ALTERNATIVES

The Clean Water Act requires that wastewater treatment plants be constructed which will provide "secondary" treatment unless EPA, under strict statutory guidance, grants a 301(h) waiver permitting a lesser "primary" degree of treatment with a deep ocean discharge. EPA has twice denied the MCD's request for such a waiver but because final rights of appeal have not expired EPA has decided in this FEIS to resolve, under NEPA the siting of a primary treatment plant as well as the siting of a secondary treatment plant. The following discussion will examine the impacts of a primary treatment facility.

The treatment facilities in all primary alternatives would be limited to simple sedimentation, the process now in use at Deer and Nut Islands, but would differ from the existing facilities in two important characteristics, i.e., the sedimentation tanks would be enlarged, increasing the settling time and, as a result, the percentage of solids removal, and the settled sludge would not be discharged to the harbor, or to any other nearby waterbody under any circumstances.

Though a modern primary treatment plant for Boston Harbor would be half the size of a new secondary plant, it would still be twice the size of the existing Deer and Nut Island facilities, and would total approximately sixty acres of treatment works. This would be a major public works project requiring the same scale of mandatory mitigating measures as have been adopted for a secondary plant. It would, as a result, not substantially differ in impact from a secondary plant. Principal differences would occur in a somewhat shorter construction period, somewhat fewer construction worker buses, reduced air emissions of volatile organic compounds, and less land used, potentially reducing conflict with other plans such as recreation. Other impacts such as construction noise and odor are essentially equivalent to a secondary plant. The matrix attached displays the details of the impacts.

Though the reduced acreage may appear to give some opportunities for mitigation by permitting location of the smaller plant away from its neighbors, it must be remembered that any 301(h) waiver under the

Clean Water Act permitting primary treatment is temporary and conditional; therefore a primary plant must be conceptually considered as the first phase of an eventual secondary plant. Thus, the impact conclusions used in analyzing a secondary plant remain relevant here.

EPA did evaluate, following its secondary treatment analysis, and using a similar process, four primary treatment options:

All Primary Deer
All Primary Long
Split Primary Deer-Nut
Split Primary Deer-Long

1. EPA concluded that Split Primary Deer-Nut was environmentally unacceptable for the same reason Split Secondary Deer-Nut was unacceptable -- it caused severe impact to "Neighbors," "Harbor Vision," and "Implementability" at Nut Island without reducing impact elsewhere or benefiting another decision criterion.

2. EPA concluded that Split Primary Deer-Long (with the hospital remaining) was environmentally acceptable under "Neighbors" and "Harbor Vision" but unlikely to be implemented. Again, impacts were spread to a second island without any appreciable reduction of impact at Deer Island or benefit to another decision criterion. This option also had no support.

3. EPA concluded that All Primary Long (with the hospital remaining) was environmentally unacceptable and unlikely to occur. A sixty acre treatment works immediately bordering a chronic disease hospital and in direct conflict with plans of all governments was in severe conflict with the "Neighbors," "Harbor Vision," and "Implementability" decision criteria. Any site analysis which assumes the hospital would be removed faces essentially the same severe difficulties of implementability as the All Secondary Long alternative, though it is environmentally acceptable under the "Neighbors" and "Harbor Vision" and other decision criteria.

4. For reasons of "Implementability," EPA concluded that, unless there were some compelling other reason, its approval of a primary treatment plant site should be consistent with its approval of a secondary treatment plant site at Deer Island. Because a 301(h) waiver grants only temporary relief from the Clear Water Act's requirement of secondary treatment, it is prudent to site a 301(h) primary plant at a location which will permit eventual expansion to secondary treatment, if required, without causing unconsidered harm to decision criteria. Furthermore, EPA felt there was a short-range "Implementability" advantage to having a common island site selected for primary and secondary treatment plants, for it permitted facilities planning and design to proceed without distraction. For reasons similar to its decision for All Secondary Deer, EPA found All Primary Deer to be acceptable under "Harbor Vision," "Neighbors" and "Implementability."

5. Thus, EPA concluded that All Primary Deer Island was its preferred primary treatment alternative. All Primary Long (without hospital) and Split Primary Deer-Long are environmentally acceptable. Split Primary Deer-Nut is environmentally unacceptable.

APPENDIX C
PRINCIPAL RELEVANT IMPACTS FOR EACH DECISION CRITERION

1. Implementability

   a. Attitude of public owner(s) of needed property.
   b. Liklihood of legislative approval.
   c. CZM/DEM consistency.
   d. Corps/DEQE wetlands permits
   e. Mass Historic Commission et. al. re: archaeology/cultural/graves
   f. Conflict with or need to relocate hospital and/or prison.
   g. (In case of primary plant) compatibility of site with site chosen for secondary treatment.

2. Effects on Neighbors

   a. Years of construction
   b. Daily construction traffic
   c. Operations traffic
   d. Construction noise
   e. Odor
   f. Visual
   g. Pathogenic aerosols
   h. Chlorine transportation and use
   i. Volatile organic compounds

3. Harbor Vision

   a. Preserves a significant opportunity on an island NOT the site of a treatment plant.
   b. Permits significant opportunities for multiple use on the treatment plant island(s).
   c. Harbor-wide visual impacts.

4. Cost

   a. Capital
   b. Operation, maintenance, and replacement.

5. Reliability -- no difference in impact.

6. Effect on Natural and Cultural Resources

   a. Wetlands
   b. Barrier beaches
   c. Historic sites
   d. Archaeological sites
   e. Graves

APPENDIX D

ADDITIONAL ENVIRONMENTAL REVIEW RELATING TO BOSTON HARBOR CLEANUP

EPA anticipates that further environmental review relating to the cleanup of Boston Harbor will consist of study of the following items:

1. Sludge disposal

2. The construction of piers and staging areas at the treatment plant site to allow for barging of bulk construction materials, equipment, and work crews during construction. In the event that an existing pier cannot be located on the mainland, an additional pier or piers and staging area or areas would need to be constructed there.

3. The construction of an under-harbor tunnel or pipeline to transport wastewater, sludge or effluent from one island to another, depending upon the location of the secondary treatment plant site and associated headworks.

4. The construction of an outfall pipe or pipes through which effluent will be discharged.

5. The possible disposal of earthen or dredge materials which might need to be removed from the site of the secondary treatment plant prior to construction.

6. The possible transport, handling, storage, and use of chlorine at the secondary treatment plant, depending upon the outcome of studies by MWRA regarding the environmental acceptability of its transport, handling, storage and use.

7. Combined sewer overflow projects.

SUMMARY OF MITIGATED IMPACTS OF SECONDARY TREATMENT

	All Deer Island		Split Deer Island/Nut Island		All Long Island			Split Deer Island/Long Island		
	Deer	Nut	Deer	Nut	Deer	Nut	Long	Deer	Nut	Long
WASTEWATER TREATMENT PLANT ACREAGE	115-140	2	115-140	18	5	2	115-140	52	2	96
YEARS OF CONSTRUCTION	7	3-4	7	5	5	3-4	8-9	5-6	3-4	7-8
WORK FORCE										
1. Construction (avg/peak)	650/1300	50/75	650/1300	100/125	75/100	50/75	650/1300	300/400	50/75	650/1300
2. Operations (total/peak shift)	200/100	20/10	200/100	100/50	40/20	20/10	200/100	100/50	20/10	200/100
TRAFFIC, Construction										
1. Trucks (avg/day) with barging	8	8	8	4	8	8	8	6	8	8
2. Buses (avg/peak day)	13/26	1/2	13/26	2/3	2/2	1/2	13/26	6/9	1/2	13/26
3. Impact Assessment (avg/peak)	Slight/ moderate	Slight	Slight/ moderate	Slight	Slight	Slight	Slight/ moderate	Slight	Slight	Slight/ moderate
NOISE, Construction (long term)										
1. Nearest Residence dBa (L_{10})	59-63		59-63		59-63			59-63		
Impact Assessment	Slight	*	Slight	*	Slight	*	No effect	Slight	*	No effect
2. Prison	69-75		69-75		69-75			69-75		
Impact Assessment	Moderate		Moderate		Moderate		No effect	Moderate		No effect
ODOR (with mitigation)										
1. Nearest Residence	Slight	Slight	Slight	Moderate	No effect	Slight	Slight	Slight	Slight	Slight
2. Prison	Moderate		Moderate		Slight			Moderate		
VISUAL IMPACTS	Severe	Slight	Severe	Severe	Slight	Slight	Severe	Moderate	Slight	Severe
RECREATION										
1. Existing Facilities	None	None	None	None	None	None	None	None	None	None
2. Planned Facilities	No active plans	No plans	No active plans	No plans	No active plans	No plans	Severe conflict w/draft plans	No active plans	No plans	Severe conflict w/draft plans
3. Open Space/Recreational Potential	Loss of long-term park potential	Potential local open space benefit	Loss of long-term park potential	Loss of local open space potential	Potential recrea- tion benefit	Potential local open space benefit	Total loss of immediate park potential	Partial loss of park potential	Potential open space benefit	Total loss of immedi- ate park potential
CULTURAL										
1. Historical Resources	Pump house; poten- tially prison	None	Pump house; poten- tially prison	None	None	None	Grave sites & Civil War cemetery; potentially hospital	Poten- tially prison	None	Grave sites & Civil War cemetery; potentially hospital
Impact Assessment	Possible adverse impact		Possible adverse impact				Possible adverse impact	Possible adverse impact		Possible adverse impact
2. Documented Archaeological Resources Affected	None	None	None	None	None	None	None	None	None	None
ENVIRONMENTALLY SENSITIVE AREAS	No effect	No effect	No effect	Requires filling bay	No effect	No effect	No effect	No effect	No effect	No effect
COSTS										
1. Construction (million dollars)	1135		1285		1180			1365		
2. Operation, Maintenance and Replacement (million dollars)	50		50		50			50		

*Unmitigated noise during the brief period of demolition during construction of the Nut Island headworks could approach 82 dba (L_{10}) at the nearest homes. MWRA is required to develop a mitigation plan which will include the scheduling of noisy activities to reduce impact.

SUMMARY OF MITIGATED IMPACTS OF PRIMARY TREATMENT

	All Deer Island		Split Deer Island/Nut Island		All Long Island			Split Deer Island/Long Island		
	Deer	Nut	Deer	Nut	Deer	Nut	Long	Deer	Nut	Long
WASTEWATER TREATMENT PLANT ACREAGE	62	2	52	18	52	2	18	5	2	52
YEARS OF CONSTRUCTION	5-6	3-4	5-6	5	6	3-4	6	5	3-4	7
WORK FORCE										
1. Construction (avg/peak)	590/655	55/70	305/465	95/125	305/430	65/75	190/245	85/100	65/75	675/750
2. Operations (total/peak shift)	136/66	20/8	118/53	83/37	118/53	20/8	63/28	34/14	20/8	102/46
TRAFFIC, Construction										
1. Trucks (avg/day) with barging	7	8	6	4	6	8	4	8	8	6
2. Buses (avg/peak day)	12/13	2/2	6/10	2/3	6/10	2/2	4/5	2/2	2/2	14/15
3. Impact Assessment (avg/peak)	Slight/ slight	Slight/ slight	Slight/ slight	Slight/ slight	Slight/ slight	Slight/ slight	Slight/ slight	Slight/ slight	Slight/ slight	Slight/ slight
NOISE, Construction (long term)										
1. Nearest Residence dBa (L_{10})	59-63		59-63		59-63			59-63		
Impact Assessment	Slight	*	Slight	*		*	No effect	Slight	*	No effect
2. Prison	69-75		69-75					69-75		
Impact Assessment	Moderate		Moderate					Moderate		No effect
ODOR (with mitigation)										
1. Nearest Residence	Slight	Slight	Slight	Moderate	Slight	Slight	Slight	No effect	Slight	Slight
2. Prison	Moderate		Moderate		Moderate			Slight		Moderate w/ hospital
VISUAL IMPACTS	Moderate	Slight	Moderate	Severe	Moderate	Slight	Moderate	Slight	Slight	Severe
RECREATION										
1. Existing Facilities	None	None	None	None	None	None	None	None	None	None
2. Planned Facilities	No active plans	No plans	No active plans	No plans	No active plans	No plans	Slight conflict w/draft plans	No active plans	No plans	Moderate conflict w/draft plans
3. Open Space/Recreational Potential	Some loss of park potential	Potential open space benefit	Some loss of park potential	Loss of open space potential	Some loss of park potential	Potential open space benefit	Minor loss of park resource potential	Potential recreation benefit	Potential open space benefit	Small loss of park resources
CULTURAL										
1. Historical Resources	Pump house; potentially prison	None	Pump house; potentially prison	None	Pump house; potentially prison	None	None affected	None	None	Grave sites & Civil War cemetery; potentially hospital
Impact Assessment	Possible adverse impact		Possible adverse impact		Possible adverse impact					Possible adverse impact
2. Documented Archaeological Resources Affected	None	None	None	None	None	None	None affected	None	None	None
ENVIRONMENTALLY SENSITIVE AREAS	No effect	No effect	No effect	Requires filling bay	No effect	No effect	No effect	No effect	No effect	No effect
COSTS										
1. Construction (million dollars)	1090		1230		1365			1285		
2. Operation, Maintenance and Replacement (million dollars)	34		34		34			34		

*Unmitigated noise during the brief period of demolition during construction of the Nut Island headworks could approach 82 dba (L_{10}) at the nearest homes. MWRA is required to develop a mitigation plan which will include the scheduling of noisy activities to reduce impact.

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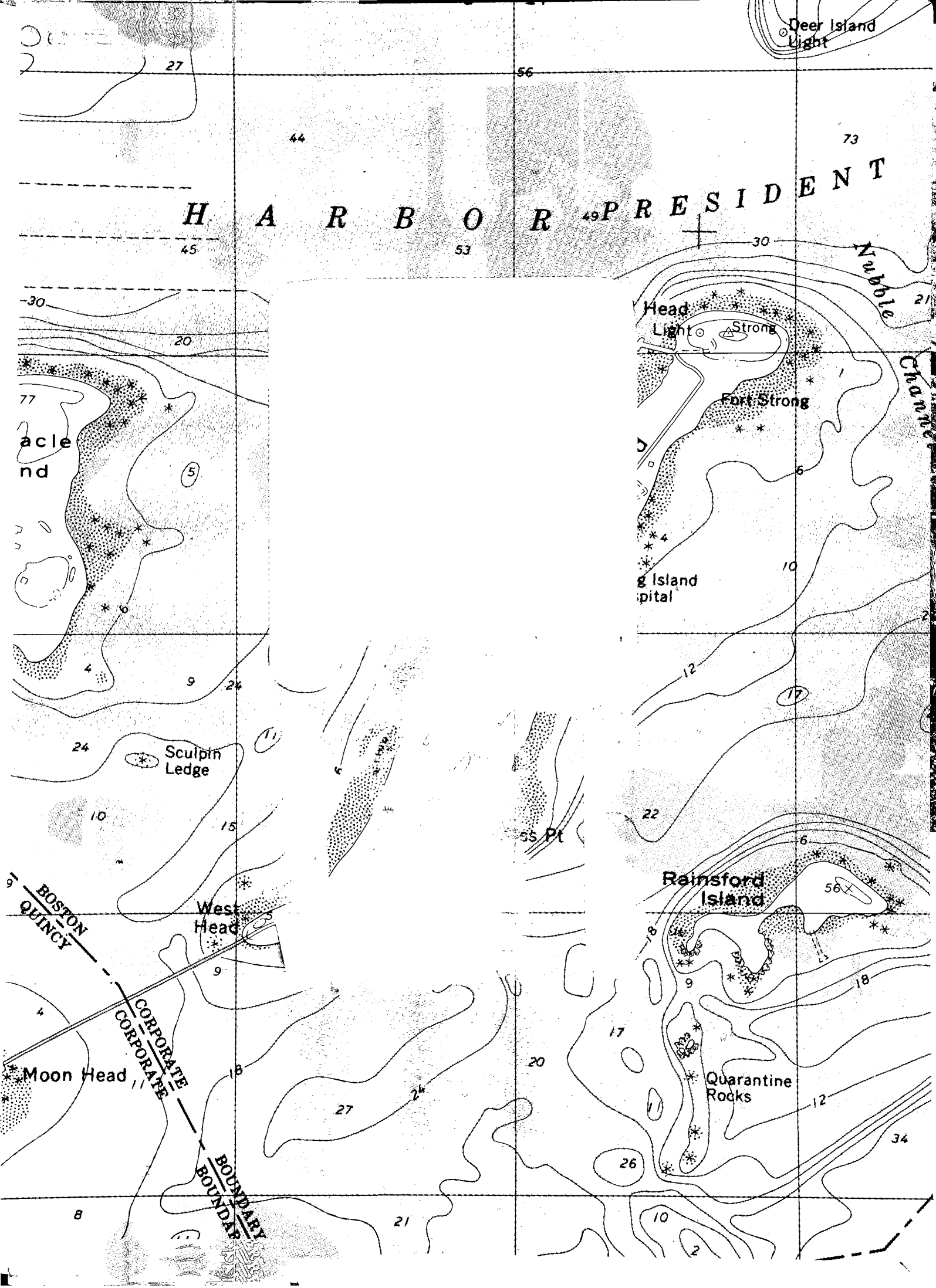
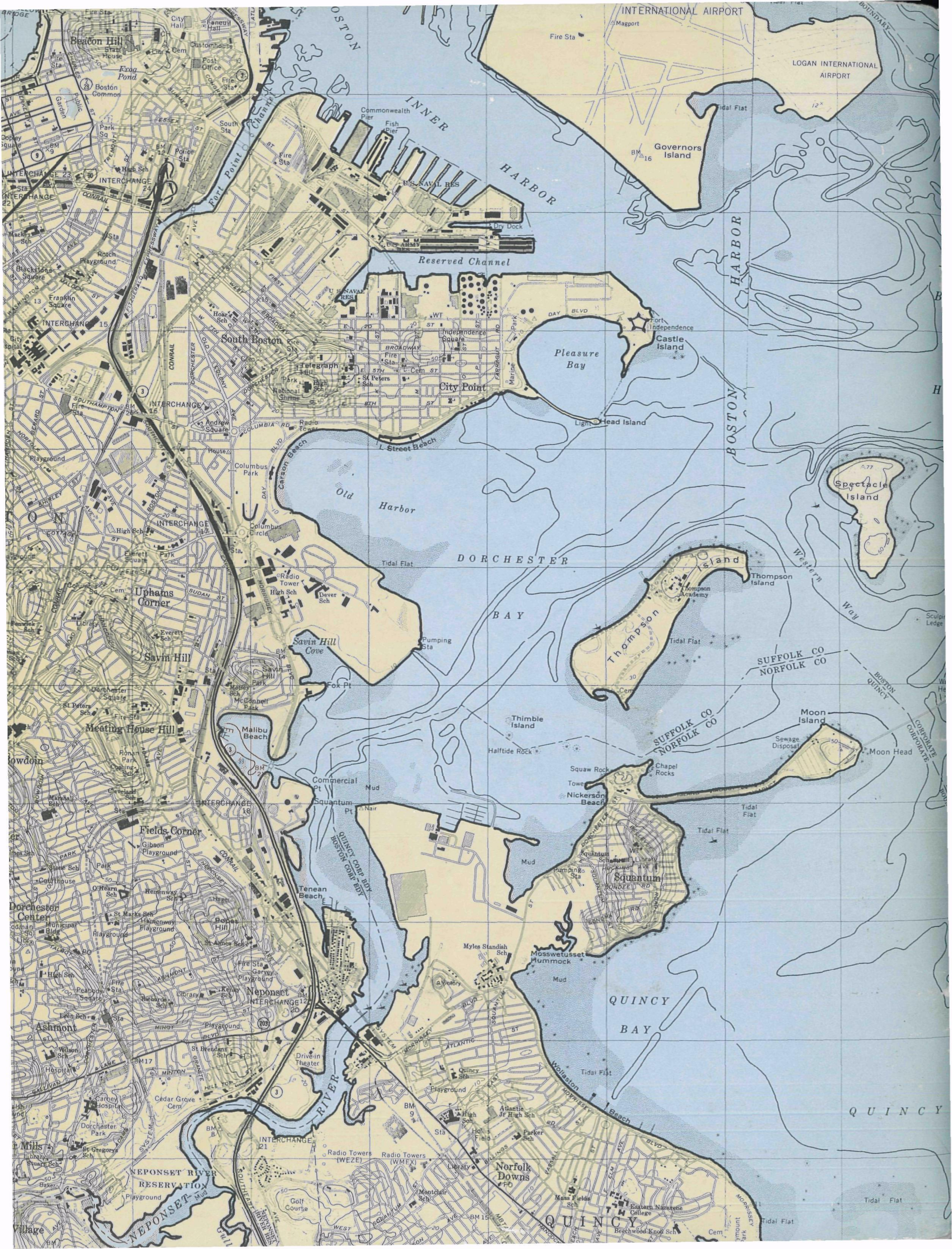

Deer Island Light
H A R B O R
PRESIDENT
Channel
Head Light
Strong
Fort Strong
Island
pital
Sculpin Ledge
Rainsford Island
West Head
Moon Head
Quarantine Rocks
BOSTON QUINCY
CORPORATE
CORPORATE
BOUNDARY
BOUNDAR



INTERNATIONAL AIRPORT
LOGAN INTERNATIONAL AIRPORT
Governors Island
Beacon Hill
State House
Frog Pond
Boston Common
Public Garden
City Hall
Faneuil Hall
Custom House
Post Office
Fire Sta
South Sta
Fort Point Channel
Commonwealth Pier
Fish Pier
U.S. NAVAL RES
Dry Dock
INNER HARBOR
Reserved Channel
BOSTON HARBOR
Fort Independence
Castle Island
Pleasure Bay
Head Island
South Boston
Telegraph Hill
Independence Square
City Point
L Street Beach
Carson Beach
Columbus Park
Old Harbor
DORCHESTER BAY
Tidal Flat
Spectacle Island
Western Way
Thompson Island
Thompson Academy
SUFFOLK CO
NORFOLK CO
BOSTON
QUINCY
CORPORATE BOUNDARY
Moon Island
Moon Head
Sewage Disposal
Thimble Island
Halftide Rock
Squaw Rock
Chapel Rocks
Nickerson Beach
Squantum
Commercial Pt
Squantum Pt
Mud
Tenean Beach
Mosswetusset Hummock
Myles Standish Sch
QUINCY BAY
Wollaston Beach
Andrew Square
Columbus Circle
Uphams Corner
Savin Hill
Savin Hill Cove
Fox Pt
Malibu Beach
Meeting House Hill
Fields Corner
Dorchester Center
Ashmont
Neponset
Pope Hill
NEPONSET RIVER RESERVATION
NEPONSET RIVER
Drive-in Theater
Radio Towers (WEZE)
Radio Towers (WMEX)
Norfolk Downs
Atlantic Jr High Sch
Eastern Nazarene College
Golf Course
QUINCY
Franklin Square
Blackstone Square
INTERCHANGE
Bowdoin
Cedar Grove Cem
Carney Hospital
Dorchester Park
Lower Mills
Village