

Outfall Tunnel Fact Sheet

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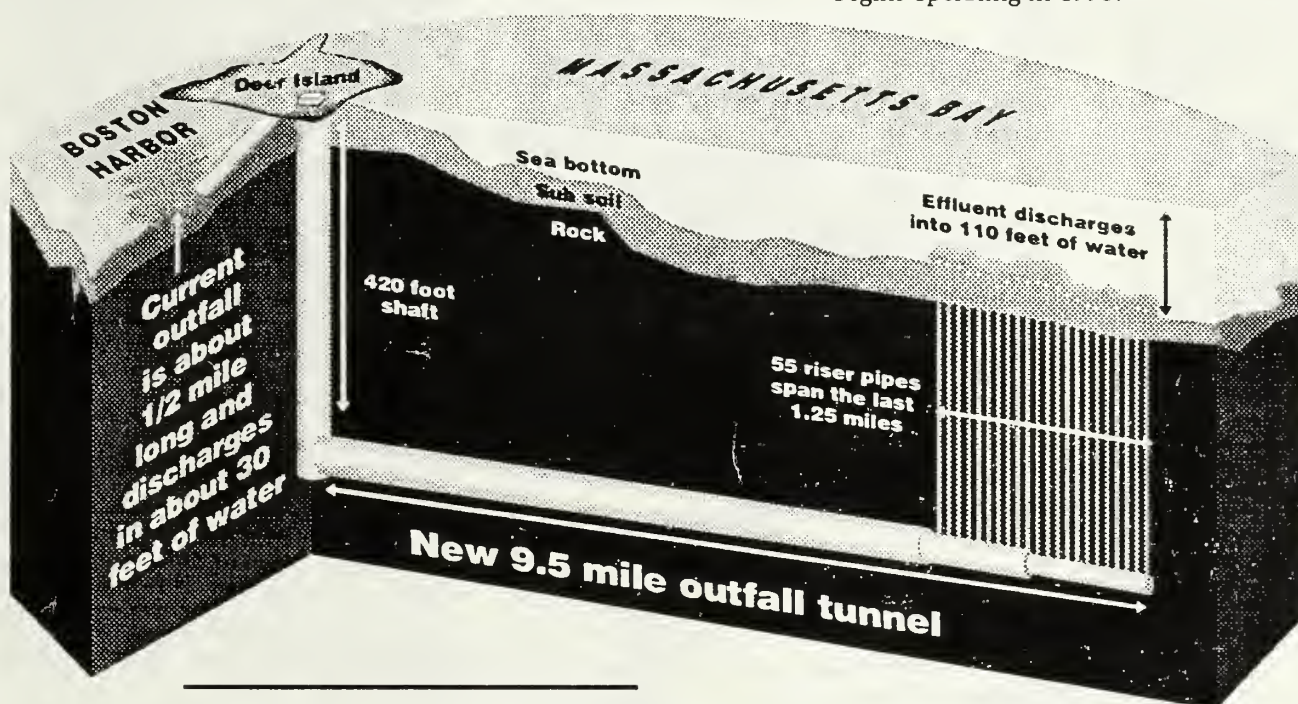
FALL 1992



The Massachusetts Water Resources Authority is building the new Deer Island sewage treatment plant and other facilities to end the pollution of Boston Harbor and Massachusetts Bay from sewage discharges. The MWRA project is intended to ensure that the waters of Boston Harbor and Massachusetts Bay can be used for swimming, fishing and other recreational and commercial pursuits. The project is also intended to protect all manner of marine species, as required by federal environmental law, from sewage pollution. The project includes an outfall tunnel to take treated wastewater from the new plant to a series of 55 discharge ports, called a diffuser, nine miles out into Massachusetts Bay. The diffuser will disperse effluent gradually over a distance of one and one-quarter miles in the deep waters of Massachusetts Bay.

The outfall tunnel and its diffuser technology were designed and sited after a lengthy scientific study conducted by the MWRA and reviewed by engineers, public officials, regulatory agencies, environmental advocacy groups and interested citizens. The planning process included an extensive citizen review process. The plan concluded that a suitably treated wastewater discharge at the 9.5 mile site would not threaten North Shore, South Shore or Cape Cod beaches, and would meet federal and state water quality standards in Massachusetts Bay while permitting dramatic improvement to the currently degraded environmental quality of Boston Harbor.

Scientific and citizen review continue with an outfall monitoring plan that will establish baseline information on conditions in Massachusetts and Cape Cod Bays and evaluate the effect of the outfall on the bays after the tunnel begins operating in 1995.



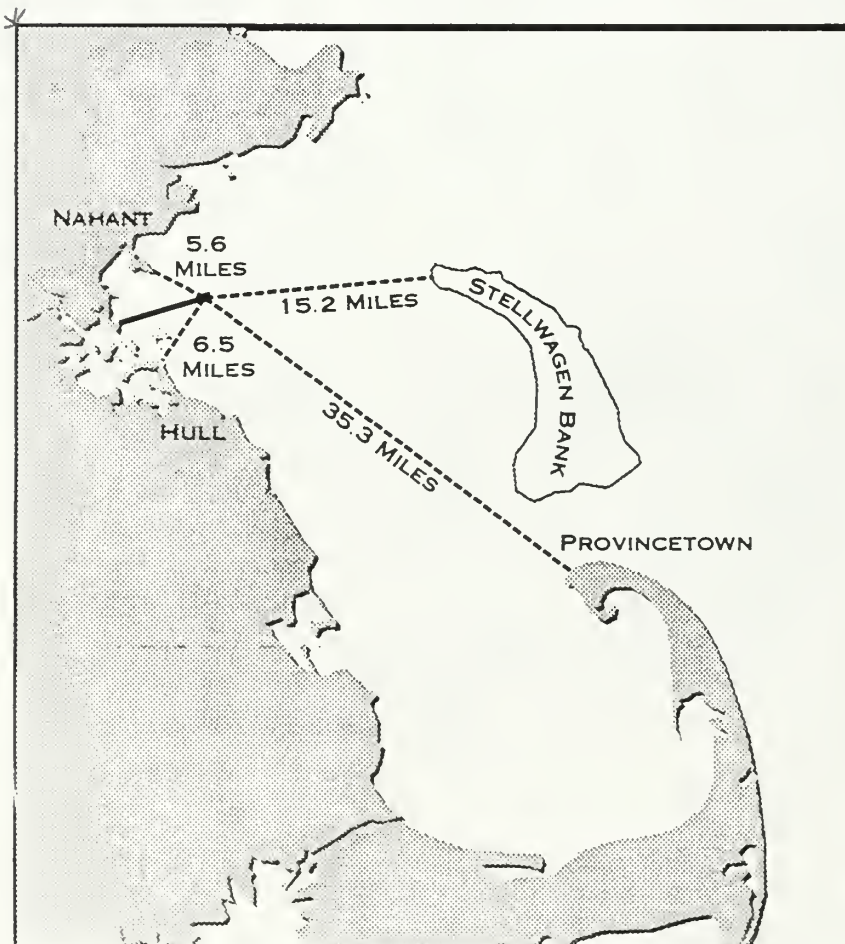
A CUTAWAY LOOK AT THE MWRA'S
CURRENT AND FUTURE DEER ISLAND
OUTFALL TUNNELS

The long outfall

The idea of a long outfall to remove effluent from Boston's shallow harbor was first proposed in 1967, even before the Federal Clean Water Act (1972) mandated secondary treatment of municipal sewage discharges. Because Boston Harbor is a contained and shallow estuary, it could not suitably assimilate even the highly treated effluent from secondary treatment. A long outfall could bring effluent to a deep water site for satisfactory dispersion and dilution. Selecting a suitable discharge location and designing a state-of-the-art outfall and diffuser were major steps in assuring compliance with environmental standards.

The *Secondary Treatment Facilities Plan* for the Boston Harbor Project, including the outfall siting, was the subject of a citizen-led review process that lasted four years. Once a site for the new plant was chosen on Boston's Deer Island, work began on siting an appropriate outfall to end effluent discharge into the harbor itself. In 1986, the EPA, which issues permits for discharging effluent and monitors outfall requirements, listed the requirements the Authority had to meet to select an outfall site. A committee of the Facilities Planning Citizens' Advisory Committee also developed

DISTANCE OF THE
NEW OUTFALL
FROM HULL,
NAHANT,
STELLWAGEN BANK
AND
PROVINCETOWN



criteria to be used in the siting process and worked with the Authority and its consultants to evaluate candidate sites. The EPA also conducted an independent *Environmental Impact Study* (EIS) of the outfall's effect on Massachusetts Bay. The final site was chosen in 1988 after two years of planning and review and a \$10 million study program.

Benefits of the outfall site

The outfall consists of a tunnel to transport the effluent and, over the last 1.25 miles of its length, a 55-outlet diffuser to disperse the effluent when it is discharged. The new outfall site is 9.5 miles northeast of Deer Island in Massachusetts Bay. The diffusers will rise 250 feet from the tunnel to the floor of the bay. The nearest landfall is Nahant, 5.6 miles to the north. Point Allerton in Hull is a distance of 6.5 miles. The outfall is 15 miles from the northwest tip of Stellwagen Bank and 12 miles from the nearest boundary of the new national marine sanctuary.

The 9.5 mile site meets the criteria set by the EPA and the Facilities Planning Citizens' Advisory Committee and offers four benefits: (1) the depth of the water at the outfall site—110 feet compared to 30 feet at the existing Deer Island outfall; (2) a much higher rate of mixing or dilution of seawater to effluent than at the existing outfall; (3) the length of the diffuser discharge area — 1.25 miles; and (4) the presence of active ocean currents in the area—compared to calmer near shore waters.

The new outfall will eliminate sewage plant discharges in Boston Harbor itself so that the harbor will meet most federal and state water quality standards for the first time. In addition, many scientists predict that this project for improving water quality in Boston Harbor will also improve environmental conditions throughout Massachusetts Bay. Studies have estimated that as much as 90 percent of nitrogen and 75 percent of solids discharged in Boston Harbor from the MWRA's outmoded sewage treatment plants at Deer Island and Nut Island ultimately reach Massachusetts Bay by tidal and current action, affecting a large area of the bay and its coasts. Treatment improvements and an outfall site removed from near shore currents and tides will decrease the concentrations of contaminants in most areas of Massachusetts Bay and reduce the area of the bay that is affected by effluent.

The monitoring begins

The MWRA's baseline monitoring program for the outfall began in February 1992. For the

next three years, until the outfall begins operating in 1995, scientists from marine consulting firms and academic institutions will be collecting information that will be compared to data assembled after the outfall begins operating. Monitoring will continue on a regular basis after the outfall is in use.

The results of the outfall monitoring will be presented to the public and the scientific community on a regular basis. The Authority will also report to an independent Outfall Monitoring Task Force, state and federal agencies, and the U.S. District Court judge who oversees the MWRA's treatment plant construction.

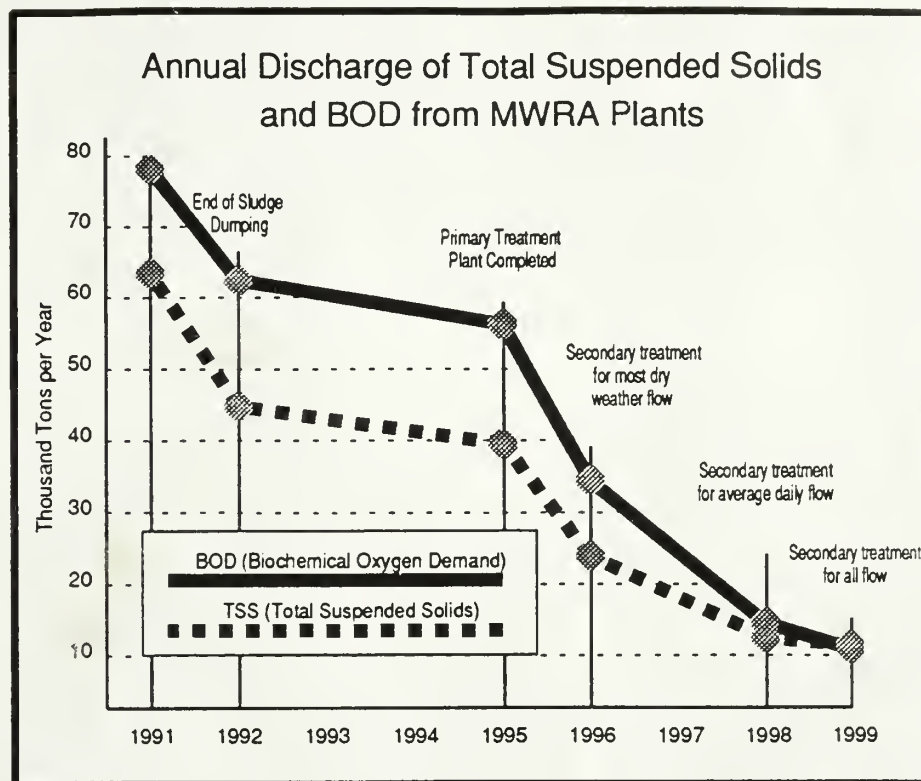
Sources other than the MWRA outfall also contribute contaminants to Massachusetts Bay. Monitoring will help to identify and control some of these other sources of pollution.

By law, effluent from the new outfall must meet state and federal water quality standards. Monitoring will ensure that the Authority complies with these levels and is aware of environmental conditions in the bays. Monitoring will ensure that the Authority operates its new facilities in compliance with the law. The monitoring information will also assist in the long-term management of all of the natural resources of the bays.

Additional studies are also under way. As a part of the process for issuing the discharge permit for the outfall, the EPA and the National Marine Fisheries Service are studying any possible effects the outfall might have on endangered species in the area, including the Northern Right Whale. The National Oceanographic and Atmospheric Administration is funding studies of nutrients and red tide blooms in Massachusetts and Cape Cod Bays. Cape Cod's Barnstable County officials are overseeing a review of the data collected in the monitoring program. The U.S. Geological Survey is studying where sediments accumulate in Massachusetts Bay. The Massachusetts Executive Office of Environmental Affairs is developing a state-wide marine monitoring program.

Making progress

Boston Harbor waters have already benefited from MWRA construction and improvement projects. Sludge, the semisolid by-product of sewage treatment, is now recycled into fertilizer at a recently completed plant at the Fore River shipyard instead of being dumped into the harbor each day. Overflows of untreated sewage into Boston Harbor during rainstorms have been dramatically reduced by interim plant improvements and better operating



procedures. These and other improvements at MWRA facilities have resulted in harbor waters that are freer from bacterial contamination than they have been in 60 years.

Construction is already well under way on Deer Island on the new sewage treatment plant and the effluent outfall tunnel. The old plants at Deer and Nut Islands now discharge on average 450 million gallons of poorly treated flow each day. Beginning in 1995, the new plant will commence providing primary treatment, which will remove 60 percent of the solids and up to 40 percent of the toxins in the wastewater and reduce the biochemical oxygen demand (BOD) in the discharge by 35 percent.

By 1996, the percentage of suspended solids in wastewater discharges will have been cut to one-fifth of present levels, the level of BOD will have been cut to one-eighth of present levels, and toxic materials discharges will have been cut to one-third of present levels.

Construction of the first phase of the facilities for secondary treatment will begin early in 1993. Secondary treatment sufficient for most dry weather flows will begin in 1996. Secondary treatment for the average daily flow of 450 million gallons a day will begin in 1998. The entire plant will be completed in 1999. Secondary treatment improves upon primary treatment by removing 85 percent of most pollutants, meeting the current standards of federal environmental law.

**WASTEWATER
TREATMENT
IMPROVEMENTS
MAKE A
DIFFERENCE**

Summary

The outfall tunnel and diffuser is an essential part of the plan to meet the environmental goals of the new sewage facilities. Scientific studies show that water quality in Boston Harbor will be greatly improved by use of the new outfall. Scientists predict that conditions in Massachusetts and Cape Cod Bays will also improve since the new outfall will carry much

cleaner effluent than current discharges, which already reach the bays on tides and currents from Boston Harbor. Models also show that the new outfall will disperse effluent rapidly and efficiently, so a smaller area of the bays will be affected by the safer and cleaner discharge. Long-term monitoring will ensure that the Authority can gather and examine information necessary to respond to any changes in the marine environment.

Protecting the Northern Right Whale

The Northern Right Whale was hunted for more than 800 years, nearly to extinction. Hunting of Right Whales has been banned for more than 50 years by international agreement, and Right Whales are now protected by the Endangered Species Act of 1973. Still weakened by inbreeding, only about 350 of the species survive in the North Atlantic Ocean. Some of these whales feed during the spring in Cape Cod Bay. The National Marine Fisheries Service has devised an official recovery plan to preserve the species. According to the official

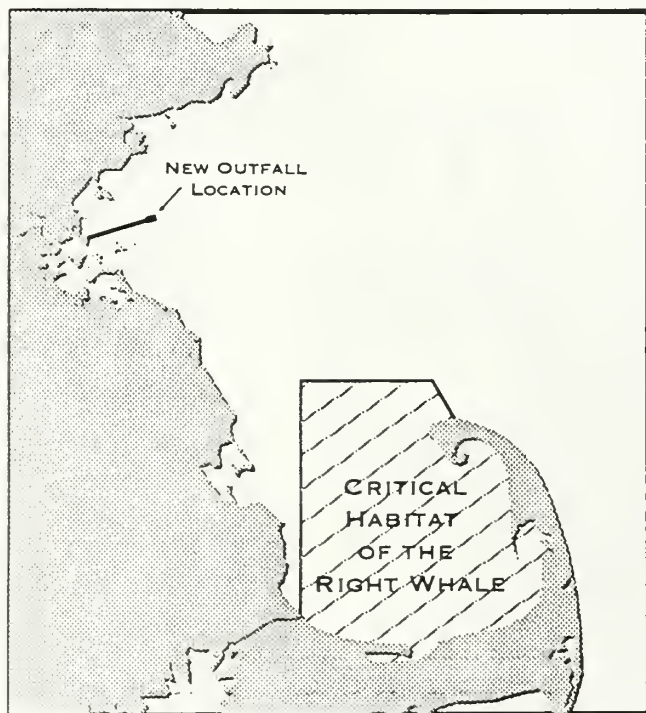
recovery plan, most accidental deaths of Northern Right Whales are caused by collisions with ships or entanglement in fishing nets and ropes.

The issue of how nutrients in wastewater discharges might affect the food supply of right whales was initially studied during the outfall siting process. Whales naturally feed in nutrient-rich coastal waters that sustain high levels of primary food production in phytoplankton and zooplankton. In its *Supplemental Environmental Impact Statement*, the EPA predicted that

slight increases in nutrients in the bay would make more food available for fish and whales feeding at the top of the food chain. The nutrients issue is being revisited by the EPA and as part of the MWRA's outfall monitoring plan.

The plan will (1) continue to measure nutrients and phytoplankton in the bays; (2) refine existing models of nutrients; and (3) examine special issues that relate to the whales.

The monitoring plan should detect evidence of significant harm to the marine environment or to the whales as a result of the outfall. When questions arise about the results of monitoring studies, the MWRA will investigate any new scientific information and recommendations. The Authority is already committed to secondary treatment and to other important efforts, such as industrial pretreatment and source reduction, to prevent pollution from reaching the bays. The monitoring program should enhance our understanding of the effects of all human actions on the bays, as well as provide a tool with which to help protect and manage the resources of the bays and protect the feeding habitat of the right whales.



*The critical habitat of the Northern Right Whale as defined by the National Oceanic and Atmospheric Administration and National Marine Fisheries Service and set forth in the agencies' *Final Recovery Plan for the Northern Right Whale*. The whales feed in this area during spring months. Other Right Whale critical habitats are located off the Florida coast, in the Bay of Fundy and near Great South Channel east of Cape Cod.

The Boston Harbor Project

The Massachusetts Water Resources Authority is building a new primary and secondary wastewater treatment plant and related facilities to control the pollution of Boston Harbor from the daily sewage discharges of 43 communities in eastern Massachusetts with a total population of 2 million people. The Boston Harbor Project is an 11-year, multi-billion dollar effort to meet federal environmental law standards protecting the suitability of the harbor for swimming, fishing and other recreational and commercial uses.

In July 1995, when a new primary treatment plant is completed, treated wastewater will be released through the new outfall tunnel and no longer discharged directly to Boston Harbor.

The secondary treatment portion of the new plant will be completed in stages. The first phase of the secondary plant, which will treat much of the dry weather flow, will be completed by October 1996. The next phase of the plant will be in operation in 1998, allowing for secondary treatment of the average daily flow of 450 million gallons per day. The entire plant is scheduled to be completed in 1999.

Secondary treatment, the level of treatment required by the federal Clean Water Act, removes 85 percent of most pollutants in wastewater, meeting the current standards of federal environmental law.