

**Fort Point Channel
Watersheet Activation Plan**

Water Quality

**VHB/Vanasse Hangen Brustlin
APPENDIX C**

**Transportation
Land Development
Environmental
Services**



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Memorandum **DRAFT**

To: David Spillane
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Date: June 28, 2001

Project
No.: 07662.00

From: Bethany Eisenberg,
Colleen Collins

Re: Preliminary Assessment of Water Quality
Constraints, Watersheet Activation Plan
Fort Point Channel, Boston

The Fort Point Channel is located in South Boston, Massachusetts and outlets to the Boston Inner Harbor. The Water Sheet Activation Plan proposes to make the area along the Channel accessible to pedestrians and the actual Channel accessible for recreational activities on the water. VHB conducted a preliminary investigation of water quality impacts in the Fort Point Channel in relation to proposed uses. The goal of this preliminary review was to; collect existing water quality related information, review and comment on this existing information and identify needs for additional or expanded information as necessary for evaluating the potential future use of the Channel as a public use area.

The information reviewed includes but is not limited to the following:

- City of Boston Wastewater Collection System Map, Boston Water and Sewer Commission (BWSC), Fall 1997
- Stormwater Outfalls and Tributary Areas Map, BWSC, no date
- MassGIS Aerial Photography and LandUse Mapping, printed July 2001
- Sewer System Maps, BWSC Sheets 22L, 23L, 24L, 21K, 22K, 23K, 24K (various dates 1999-2001)
- MWRA Presentation Handouts, "Fort Point Channel CSO Control - Opportunities and Issues", received from Lise Marx, Massachusetts Water Resources Authority (MWRA) Program Manager, June 2001.
- Baseline Water Quality Assessment Report, MWRA, prepared by Metcalf & Eddy, August 1994

- Combined Sewer Overflow Control Plan- Annual Progress Report 2000, MWRA, February 2001.
- Final CSO Facilities Plan/EIR, Table 5-1, MWRA 1997, with additional information provided by David Kubiak, MWRA Sr. Program Manager CSO.
- EPA NPDES Permitting Database on-line, July 2001
- DEP Hazardous Waste Site Listing on-line, July 2001
- Site Visit, June 25 2001

Existing Conditions and CSO Improvements In Progress

The variety of existing discharges to the Channel combined with the physical and biological features of the Channel, such as tidal fluctuations and bottom configuration, have resulted in an unachievable fishable / swimmable status for the Channel under Massachusetts Department of Environmental Protection (DEP) requirements. The Massachusetts Water Resources Authority (MWRA) monitors water quality at three locations along Fort Point Channel (Station 019, Station 018, Station 075). Water quality monitoring presented by MWRA in their 1994 Water Quality Assessment Report (prepared By Metcalf & Eddy) indicates that the Channel does not meet the swimming or boating standards for fecal coliform during rain events and during periods identified as "damp weather". Further, dissolved oxygen levels are typically low in the Channel and sediments are of concern in terms of pollutant accumulations.

It should be noted that the water quality assessment information reviewed and presented in this Memorandum is primarily from the MWRA 1994 Baseline Water Quality Assessment Report. While the existing conditions analysis may not have changed substantially since the report, the proposed reductions and specific treatment for the existing CSOs have been changed since this 1994 report. The following information is based on the 1994 Water Quality Assessment and recently updated information relative to the 2001 CSO improvement design changes as provided by the MWRA (July 10, 2001).

Channel

The Fort Point Channel, as shown on the attached figure, is approximately 6,000 feet long. It is approximately 600 feet in width at its widest point at the Inner Harbor and less than 200 feet in width at the narrowest point at the beginning of the Channel. The Channel is steep-sided, with a water depth of 2 to 3 feet at low tide at the southernmost end with an average depth of 15 - 25 feet in its northern segments. The average tidal fluctuation within the Channel is 9.5 feet.

The southernmost end of the Channel receives incoming flows from a variety of sources via a 20 ft. x 15.5 ft box culvert that comprises the combined sewer outfall (CSO) ID No. BOS 070. Flows to the Channel from this outfall include brook flow, stormwater, and sanitary flows. The flows originate in adjacent Boston and South Boston land as well as Roxbury, Dorchester, and the South End conveyed via the Roxbury Conduit and Dorchester Brook Conduit. This CSO is currently the largest contributor of flows to the Channel.

In terms of flushing in the Channel, MWRA's, 1994 Report estimates the typical residence time in the Channel to range between 1 and 2.5 days depending on the tide and freshwater input from the CSO BOS 070. In terms of bacterial concentrations after CSO events, the report indicates that bacteria flushing in the Channel is fairly good but may take up to six days to return to pre-rainfall levels after a 3-month storm.

Boston Water and Sewer Commission's (BWSC) storm drain outfall 21K069 lies approximately 100 feet northwest of BOS 070 on the western bank of the Channel. This has the largest drainage area of the six BWSC storm drain outfalls to the Channel. In addition to these outfalls, there are private stormwater discharges to the Channel from adjacent Boston and South Boston land areas and there is also a permitted NPDES Industrial Discharge for the Gillette Company.

It was also noted in the 1994 Report that the Third Harbor Tunnel will result in some raising of the bed of the Channel that will "result in significantly restricted circulation in the area above the tunnel crossing". An update on this situation is worth investigating in regards to future water quality.

Land Use

The land uses abutting and adjacent to the Fort Point Channel are commercial, transportation, industrial, spectator recreation, urban open-or-public, and multi-family residential. Commercial uses include the Post Office, office buildings and some small businesses. The Central Artery (I-93) runs adjacent to the lower portion of the Channel. MBTA railroad tracks and an MBTA maintenance facility are also in close vicinity to the Channel. The Gillette Company, which is an industrial use, is located on the eastern side of the Fort Point Channel. Other industrial/commercial uses in the immediate vicinity include fish handling facilities, restaurants, and small businesses. Parking areas and the Children's Museum are also included in the drainage area immediately adjacent to the Channel. Overall, the uses related to transportation cover a large portion of the drainage area contributing to the Channel.

Combined Sewer Overflows (CSOs)

According to recent estimates provided by MWRA, seven active CSOs discharge approximately 142 million gallons (MG) of flow to the Fort Point Channel annually. The MWRA CSO Improvement Plan (updated 1997) includes various improvements to these outfalls to reduce the volumes and improve the quality of the discharges. As shown in Table 1, all seven of these discharges will remain; however, they will each receive some type of improvement in terms of water quality.

CSO No., BOS 070, at the upstream end of the Channel is the largest single CSO in the system. According to the 1994 Report, this CSO is the end of the Roxbury and Dorchester Brook conduits and drains 1,800 acres of sanitary flow, 735 acres of storm drainage and 930 acres of combined flow in Boston. Recent MWRA information (March 2001) indicates that this CSO activates approximately 49 times a year and is responsible for 137.4 MG (97%) of the 142 MG annual CSO discharge to the Channel.

As shown in Table 1, improvements to the discharge from outfall BOS 070 will include reducing discharge events roughly by one half from 49 to 23 events per year. Under proposed conditions, flows from the Union Park Pump Station (17 of the total of 23 overflow events to this outfall) will be disinfected and dechlorinated. This represents approximately 94% of the total annual flow to the Channel. The remaining overflows from this outfall; 4 events per year from the Dorchester Brook Conduit, and 2 events per year from other CSO sources included in the total flow to CSO BOS 070, will not receive disinfection or dechlorination. However, the total volume from these other sources equates to only 4% of the entire proposed yearly discharge from all CSOs to the Channel.

Additional CSO improvements in the Channel include construction of a 10-foot diameter closed conduit on the eastern side of the Channel, between Washington and A Streets for the capture and storage of discharges from CSOs BOS 072 and BOS 073. This conduit will handle all but the largest storms in a typical year with approximately two overflows discharging an estimated 1.4 MG of untreated flow annually. This equates to a 60% reduction in the total volume of discharge from these two outfalls. For the remaining CSOs in the Channel, it is estimated that a total of 4.64 MG of combined sewer overflows annually (6% of the total annual flow) will receive only screening for treatment. Boston Water and Sewer Commission (BWSC) is in the process of installing floatables controls on all the outfalls that activate at least once per year. No other improvements for these outfalls have been identified during our review.

Table 1 lists the Combined Sewer Outfall identification numbers and corresponding improvements where applicable. Outfall locations are shown on the attached figure.

Table 1
Fort Point Channel Improvements for Combined Sewer Overflows

CSO ID No. / BWSC Sheet No.	Existing Annual ⁽¹⁾		Proposed Annual ⁽²⁾		Proposed Improvements		
	No. of Discharges	Volume MG	No. of Discharges	Volume MG	Disinfection, Dechlorination, Detention	Floatables Control Project ⁽³⁾	Schedule for Completion
072/22K	8	1.2	2	0.23	No	Yes	3/07
073/22L	8	2.2	2	1.17	No	Yes	
070/21K ⁽⁴⁾	26	130	17	71.4	Yes	Yes	3/05
070/21K ⁽⁵⁾	14	2.9	4	2.9	No	Yes	5/01
070/21K ⁽⁶⁾	9	4.5	2	0.26	No	Yes	5/01
068/22K	1	0.45	0	0.00	No	Yes	5/01
065/22K	4	0.68	1	0.06	No	Yes	5/01
064/23L	1	0.02	0	0.00	No	Yes	5/01
062/23L	0	0.00	1	0.01	No	No	5/01
Total	71	141.95	29	76.03			

⁽¹⁾Updated model estimate (3/13/01) by MWRA

⁽²⁾From MWRA Final CSO Facilities Plan and Environmental Impact Report, 1997

⁽³⁾Floatables control will be accomplished with ½-inch mechanical screens for Union Park Pump Station flows and with static underflow baffles at all other locations. No floatables project is recommended where CSO does not activate in typical rainfall year.

⁽⁴⁾BOS070 CSO flows from BWSC Union Park Pump Station

⁽⁵⁾BOS070 CSO flows from Dorchester Brook Conduit

⁽⁶⁾Other CSO flows to BOS070

MG = million gallons

Combined sewer overflows, even under proposed conditions, are expected to be the biggest source of bacterial contamination to the Channel during wet weather. While the MWRA report states that the proposed conditions 3-month storm will only violate the swimming standard for 1 day and the boating standards will not be violated for this storm re-currence interval, the analysis for water quality conditions is at the mouth of the Channel where it enters the harbor and does not reflect in-Channel conditions where water use activities are proposed.

Storm drains

The BWSC and MWRA maps reviewed to date show 12 storm drain outfalls discharging directly to Fort Point Channel. As shown on the attached figure, three of these are from the Gillette Company site and nine are BWSC outfalls (Id Nos. 21K069, 22K302, 22K179, 22K217, 23L074, 23L075, 23L164, 23L196, 24L233). In addition to these identified outfalls, there are other private outfalls that discharge stormwater to the Channel and may include the MBTA, US Postal Service and Conrail. Additional investigations are needed to determine the exact number of outfalls, the responsible parties for the outfalls, and corresponding land uses contributing stormwater flows to these outfalls.

Past water quality reports and visual observations by MWRA indicate that debris and scum at the southernmost inlet of the Channel is evident after rainfall events. This is attributed to stormwater runoff. Dry weather discharges from stormwater outfalls have also been identified. Illicit discharges continue to be a threat to waterways of the United States. Illicit discharges include wastes from restaurants, vehicle maintenance facilities as well as individuals who have the misconception that storm drains can be used as trash receptacles because they are cleaned out regularly.

The MWRA 1994 Report estimates that annual stormwater volume contributions to the Channel under future conditions will be in the order of three times that of the combined sewer flows. Information presented by the MWRA in "Fort Point Channel CSO Control - Opportunities and Issues" slide show indicates that while the CSO discharges will still contribute larger total annual loads for BOD, TSS and fecal coliform, separate stormwater discharges will become the larger source of total flow, total copper, zinc, NO₃ and total kjeldhal nitrogen loads.

NPDES Industrial Discharge Permits

The Gillette Company is permitted by the EPA under the Federal NPDES Program to discharge Sodium sulfate (solution) to Fort Point Channel. The permit allows discharge of 71,000 lbs per year. According to Carl Perry, representative for the Gillette Company, the discharge of this salt solution to the harbor is slated to be discontinued in the future. In addition to this discharge, the Gillette Company also has a permitted withdrawal and

discharge permit for non-contact cooling water. The non-contact cooling water may have some slight impact on local temperature in the Channel but not the overall water quality.

Discussions with the EPA NPDES permitting division indicates that other industrial discharges to the Channel may exist.

NPDES Stormwater Discharge Permits

At present there are two construction projects listed under the EPAs NPDES Stormwater Permitting Web page. These permits are for BWSC construction activities that are greater than 5 acres. No other projects in the vicinity of the Channel were identified at this time. With the ongoing and proposed construction activities in this area, the control of sediment during construction activities will be significant to the ongoing quality of the water in the Channel.

Based on conversations with the EPA NPDES Permit branch, it is believed that there are additional permitted stormwater discharges to the Channel.

Hazardous Waste Sites

According to data listed on the Environmental Protection Agency's Right-to-Know Network website, the Gillette Company located at 1 Gillette Park, Boston, MA is the only Hazardous Waste Site located directly adjacent to the Channel. Further investigations are recommended to see if there are any other sites in the drainage area for the Channel that may have the potential to contaminate discharges. Dewatering activities in areas where soils or water is contaminated can be a significant contributor of pollutants to waterways. Such sites are required to have Construction Dewatering Permits to ensure proper treatment prior to discharge to storm drains or waterways of the state.

Sediments

According to the MWRA 1994 Report, which cites other references, the bottom sediments in the Channel are "extremely degraded, worst part of Inner Harbor..." with the reasons cited for the problem being CSOs and sludge accumulation in the Channel. Studies of the Channel completed by MIT and others indicate that it is a sink for particle settling. Due to the depths of the Channel and the current inaccessibility to the Channel by humans, it is the potential aquatic life and biota that are currently negatively impacted by the presence of existing contaminated sediments and potential accumulation of new sediments in the benthic environment.

Waste from Boats

At present the Channel is not a significant boating corridor. Some information reviewed suggests that boats may seek refuge in the Channel during inclement weather. If smaller boats are to be encouraged as users of the Channel in the future, proper procedures for waste disposal will need to be made available to the users and enforced.

Nutrients, Temperature, Dissolved Oxygen

Information on nutrient concentrations, (in the form of dissolved inorganic Nitrogen, total Phosphorous and chlorophyll A concentrations), temperature and dissolved oxygen are generally based on data collected between 1987 and 1993. Nutrient information is presented as highly variable and some of the recent data is only for a single date. No consistent trends

for the nutrient levels relative to water quality ratings were presented in the MWRA 1994 report. However, information relative to total phosphorous concentrations were identified as being in the fair to poor range in terms of water quality. Dissolved Oxygen concentrations are above the standard for fishable /swimmable status according to the MWRA Report, but is considered low in terms of aquatic life criteria.

Construction Activities

Since all of the outfalls to Fort Point Channel are not BWSC storm drains, or related to central artery work, many ongoing and planned smaller construction projects may not have the benefit of the sedimentation and erosion control guidelines prepared by BWSC or the city of Boston. Further, due to the fact that only construction sites greater than 5 acres need to submit for an EPA General permit for construction activities, many sites currently do not require a stormwater management plan unless the site falls under the jurisdiction of the Conservation Commission and hence the State Stormwater Guidelines. While the EPA site area limit for required stormwater management plans will be decreased to one acre in size in December of 2002, many small sites may still not be regulated.

Proposed Conditions

Water Sheet Activation Plan

The Water Sheet Activation Plan proposes to landscape the area around the Fort Point Channel and make it an accessible public use area. The current plan includes a walking path and water access points to encourage recreational uses such as kayaking and canoeing with historical information placed at different points along the trails and the sides of the Channel. The goal is to draw the public to the Fort Point Channel area by providing more access for walking, site seeing and interaction on the water and around the waters edge with an improved naturalized urban environment.

Combined Sewer Overflows

As described in the previous section, the current plan for the combined sewer overflows in the Channel is to reduce the number of overflow volumes by roughly 50% and to treat a large percent (approximately 94%) of the total annual flows with disinfection and dechlorination.

Stormwater

BWSC is currently in the midst of their 5-year EPA Stormwater Phase II Permit Term that includes stormwater sampling at five different land use areas within the City. Similar land use based stormwater sampling was completed as Part of their Phase I Stormwater Permit Application submitted to the EPA in 1992. The results of both sampling programs will be used to evaluate potential differences in pollutant concentrations based on land use. The practices or operations that affect water quality in the various land use areas will be evaluated in concert with the water quality data to determine what measures may be taken to improve stormwater quality.

Past studies have shown that the cumulative effects of practices by residents, businesses and other land/property managers, including city agencies affect the quality of the stormwater. This includes parks and recreation operations, transportation agencies and

Public Works activities. Education and public outreach focused on Best Management Practices for protecting stormwater quality has been seen as one of the most effective tools for improving stormwater runoff in urban areas. The current message from EPA in their Phase II Stormwater regulations is that a more widespread approach to improving water quality by informing the people who live, work and maintain the property in the city of what activities may cause stormwater pollution, and then offering suggestions for preventing this, rather than building a structural treatment system will provide greater overall water quality improvement. The fundamental goal is to prevent the stormwater from becoming contaminated in the first place, rather than treating it at the end.

It should be noted however, that structural controls for certain pollutant removal purposes may be warranted. For instance, it may be beneficial to provided some extra sediment removal capability along heavily sanded roads where street sweeping or catch basin cleaning is not able to be implemented until the spring or summer. The feasibility and appropriateness of structural BMPs should be evaluated on a case-by-case basis. An evaluation of the sources of pollutants and opportunities for reducing stormwater contamination needs to be completed before any structural BMPs could/or would be recommended. Land constraints, specifically elevations relative to sea level poses serious constraints for structural controls in the direct vicinity of existing stormwater outfalls in the Channel.

Comments on Findings and Recommended Actions

The key items identified in this preliminary assessment of water quality in the Fort Point Channel are as follows:

Land Use

Preliminary review of the land uses in the drainage area to the Channel indicate transportation related uses are one of the largest. The activities related to rail, bus, car and trucking activities are substantial contributors to stormwater pollutants and may also be contributors to illicit discharges in storm drains. Stormwater pollution prevention efforts in the Channel area should be focused on such activities.

Land Use Action Items-

- Determine areas for different land uses.
- Focus on transportation land use for stormwater pollution prevention.

Combined Sewer Overflows (CSOs)

The frequency and volume of combined sewer overflows will be greatly decreased (generally by 50%) with the proposed improvements. However, the present estimate is for 29 CSO overflows to continue to occur annually with an estimated 76 million gallons discharged. This means that water quality in the Channel after certain rainfall events will still not meet water quality standards due to CSO discharges. Based on the information reviewed to date, it appears that bacteria concentrations due to CSO discharges during wet weather will still be the major

concern for nonachievement of the fishable and swimmable attainable use for the Channel.

CSO Action Items-

- Prepare a table of current State, and if applicable, EPA Fecal Coliform Bacteria limits for fishing, boating, swimming in SB waters.
- Adjust CSO volume estimates based on the design changes to the Union Park Pump Station and other CSO discharges since the 1994 report.
- Estimate the number of events and the length of time for which exceedences are expected to occur. Evaluations should be for within the Channel and not at the mouth where it enters the harbor.
- Complete a preliminary mixing zone analysis for the more frequent overflow occurrences to analyze potential exceedences.
- If necessary, based on findings of preliminary mixing zone analysis, complete a more advanced analysis and address the issue for a plan for prohibiting public access during and after the overflow events.

Stormwater Outfalls

Bacterial contamination from CSOs during wet weather is presented as being a continued concern for the proposed water related activities in the Channel after CSO improvements. However, stormwater discharges (current estimate is for 3 times the annual flow volume of CSOs) will also be a significant source of concern regarding wet weather water quality. Stormwater will continue entering the Channel during all of the rainstorms throughout the year.

In addition to contaminants of major concern in the stormwater that include total suspended solids, copper and zinc, the potential for toxics and waste due to illegal dumping and improper activities in the drainage area are still a threat. While studies have shown the Channel as having good flushing abilities, the focus of any improvements should be to reduce the introduction of stormwater and sediments containing pollutants rather than counting on dilution and diffusion for treatment. The elimination of illegal discharges/dumping to storm drain systems is also critical for increasing the water quality during dry weather as well.

Stormwater Action Items-

- Identify non-city storm drain outfalls and drainage areas. While it may not be necessary to determine all private stormwater drain systems, it is recommended that this be completed for major industrial or transportation land use areas such as the MBTA and Conrail.
- Target areas for Stormwater Pollution Prevention education based on findings of the task above.
- Evaluate BWSC Stormwater Phase II investigation findings and recommendations. See if recommendations are applicable to land uses in the Fort Point Channel drainage area.

- Review some of the many BMP manuals for various industries/establishments already available from other cities, states (i.e. CT, Seattle) for potential use in Fort Point Channel area.
- Review educational material (pamphlets, posters, etc) already available for stormwater quality control, evaluate for use as part of Water Sheet Activation Plan.
- Evaluate opportunity for implementing educational programs, including awareness of existing programs such as pet waste ordinances, trash handling ordinances, illegal dumping fines etc.
- Complete a preliminary analysis of the need for and/or feasibility of structural controls.

Construction Activities

Construction site runoff is the largest single source of total suspended solids loads to waters of the United States. It may be effective to prepare a standard Sedimentation and Erosion control plan that could be distributed to contractors that work in the city. Massport developed a comprehensive stormwater sedimentation and erosion control plan to be given to contractors working on the Central Artery Contracts where stormwater discharges were to Massport NPDES Stormwater Permitted outfalls. This plan was given to all contractors working within Massport stormwater drainage areas. It also included information on hazardous waste spill/response procedures.

Construction Activity Actions Items-

- Review Massport and other information provided to Contractors. Evaluate potential use for city.
- Evaluate the concept of providing contractors with a package including standard stormwater quality control and spill prevention procedures.

Hazardous Waste Sites

Further investigations are recommended to see if there are any other sites in the drainage area for the Channel which may have the potential to contaminate discharges. Dewatering activities in areas where soils or water is contaminated can be a significant contributor of pollutants to waterways. Such sites are required to have Construction Dewatering Permits from DEP to ensure proper treatment, as necessary, prior to discharge to storm drains or waterways of the state.

Hazardous Waste Action Items-

- Research/identify hazardous sites, materials in drainage area.
- Evaluate the status of proper implementation (knowledge by contractors) of the dewatering permit program.
- If necessary, provide information relative to dewatering that could be included in a package for contractors completing construction activities in the city.

Prioritized Recommended Key Action Items

1. **Stormwater Outfalls** - Determine source, owner, drainage area and land use for stormwater outfalls to the Channes. More information on private outfalls is needed to assess discharge quality.
2. **Water Quality** - Update information on water quality, especially in terms of debris now that floatables control is in place. Observations of oil and grease, trash, etc. are needed in order to focus the target for education and controls. Water quality evaluations/models should be updated to reflect conditions in the Channel and not at the mouth of the Channel.
3. **Education and Outreach** - Evaluate findings of ongoing BWSC Stormwater Program and work with them on applying BMPs in Fort Point Channel area. Review other BMP programs and information and evaluate for use. Focus on transportation activities.
4. **Sedimentation and Erosion Control Plans** - Evaluate City Construction, Sedimentation and Erosion Control Ordinance, perhaps review Massport's plan and consider requiring for all construction sites.
5. **Structural Controls** - Need further evaluation to see if structural controls such as upstream sedimentation removal devices are warranted.
6. **Boater Education** - Evaluate status of boat waste disposal regulations, information, enforcement.
7. **Health and Safety** - It is recommended that ultimately a study of safety in terms of public health that accounts for the final CSO treatment plan, stormwater runoff and other permitted discharges be completed for future conditions.



*Boston
Inner
Harbor*

Fort Point Channel Outfall Locations

- ⊙ Combined Sewer Outfall
- △ Drainage Outfall

400 0 400 Feet

Source: MassDOT Land Use - 1996, Orthophoto - 1991
Boston Water & Sewer Commission - Sewer System Maps 1990-2000

