

STRAITS POND TIDE GATE OPERATION AND MAINTENANCE PLAN



TOWN OF HULL, MASSACHUSETTS
DEPARTMENT OF PUBLIC WORKS

WEST CORNER CULVERT
ROUTE 228 OVER STRAITS CHANNEL
HULL, COHASSET, AND HINGHAM, MASSACHUSETTS



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INTRODUCTION

This Tide Gate Operation and Maintenance (O&M) Plan, prepared for the West Corner Culvert Replacement/Straits Pond Habitat Restoration Project, addresses the procedures, protocols and evaluation methods that will be applied to the inspection, operation and override of the tide gates that control tidal exchange and the water level within Straits Pond. This O&M Plan should be periodically reviewed and modified to reflect operational and environmental changes related to the project. This manual was prepared by The Louis Berger Group, Inc. as a provision of the 401 Water Quality Certification, MA CZM Federal Consistency Concurrence, and the US Army Corps of Engineers permit and approval for the Massachusetts Highway Department reconstruction of the West Corner Culvert Replacement Bridge No. C-17-004 Route 228 Over Straits Channel Hull-Cohasset-Hingham and will serve as an enforceable mechanism for the operation of the associated tide gates. The Town of Hull Department of Public Works (DPW) is the responsible party overseeing construction and future operation of the West Corner tide gates. By adhering to the procedures set forth in this plan, involved parties can ensure the application of a consistent approach to tide gate operation and maintenance.

BACKGROUND

The Bridge Replacement of Route 228 (Nantasket Avenue) over Straits Channel is located in the Towns of Hull, Cohasset, and Hingham. See Locus Map. The West Corner Bridge is at the junction of these three Towns. Straits Channel connects to Straits Pond, which is a shallow coastal pond over 90 acres in size, located in the southeasterly area of Hull and northwestern area of Cohasset. Straits Pond forms the boundary between Hull and Cohasset. The Bridge is approximately 250 feet north of the Route 228/Rockland Street/Jerusalem Road intersection.

The existing West Corner Bridge (Route 228) consists of a 12-foot span, 8-1/2 foot rise culvert with stone masonry walls. The upstream or east side of the structure includes twin manually operated slide gates (one of which is 4x4 feet and the other is 5x5 feet). The combined structure provides flood protection to low-lying properties along Straits Pond. However, the current structure is too small to provide effective tidal exchange within the Pond, which has resulted in water quality impairments, major infestations of midges, explosive growth of widgeon grass, periodic algae blooms, and the spread of invasive plants.

Under current conditions, the opening of the gates can raise or lower the pond about 1 foot during a tide cycle.¹ Until relatively recently Straits Pond was typically maintained at a level of 3.3 feet, NGVD 1929 with only occasional operation of the gates in an attempt to allow some exchange or increased flood storage prior to storm events. More recently, tide gate operators have been responsible for regulating flushing and water levels in Straits Pond by manually opening and closing the tide gates using a protocol developed by ENSR,² although management has deviated from this protocol due to various management goals.³

¹ Army Corps of Engineers, 2004. Straits Pond Tidal Flushing Study- Hull, Cohasset and Hingham, Massachusetts. New England District, Concord, MA. 32 pp.

² ENSR Inc., 2002. Weir River Estuary Flow Study: Hull, Hingham, and Cohasset Massachusetts. Prepared for Massachusetts Department of Environmental Management. Document No. 04481-009.

³ Army Corps of Engineers, 2004. Straits Pond Tidal Flushing Study- Hull, Cohasset and Hingham, Massachusetts. New England District, Concord, MA. 32 pp.



Figure 1: USGS Locus Map.

Twin 7-foot wide by 5-foot rise box culverts outfitted with automatically actuated sluice gates are proposed to replace the failing infrastructure and increase tidal circulation within Straits Pond. The Hull DPW will be the Responsible Party for undertaking water level management and routine actions, inspection, maintenance, repairs, and corrective actions as prescribed by the Straits Pond Advisory Committee.

PURPOSE AND INTENT

In addition to replacing the failing infrastructure, the current project seeks to restore degraded coastal wetland habitat upgradient of the West Corner Bridge by increasing tidal exchange and improving water quality and habitat value within Straits Pond, and improving ecological connectivity to the Weir River Estuary while controlling the risk of preventable flooding from the Weir River and overwash along Atlantic Avenue. The attached Inspection and Preventative Maintenance Checklist (Attachment A) provides a standardized method of keeping records for regular inspections. The attached Tide Gate Adjustment Log (Attachment B), in addition to the automated water level data logging equipment installed at the culvert, insures adequate record keeping of water level management. Record keeping will create the ability to make informed management decisions regarding future modifications to the gate management protocol. Further protocols may need to be developed between these parties. This document will provide basic guidelines to assist Department of Public Works officials to:

- Manage Straits Pond with oversight by the Straits Pond Advisory Committee.
- Perform and document the inspections and other relevant information regarding the status of surrounding resources (Attachment A).
- Document adjustments made to tide gate operations and manual override actions (Attachment B).
- To insure that emergency contact information is available.

The culvert at West Corner is a tidal restriction site listed in the Atlas of Tidal Restrictions on the South Shore of Massachusetts (MAPC/MA Wetlands Restoration Program, 2001) as a high priority site for restoration based on the size of affected area (>50 Acres), the presence of an anadromous fishway, it's status as an Area of Critical Environmental Concern (ACEC), and for potential upstream benefits.

In 2002, an investigation into management alternatives to control nuisance infestations of Chronomid midges and excessive primary production was conducted by Environmental Science Services, Inc. (ESS)⁴. This study evaluated chemical, in-pond, and watershed management alternatives. One watershed management alternative identified in the report was flow improvements through such means as modifications to the tide gates at the Route 228 Bridge. This study articulated benefits of increased tidal exchange between the estuary and pond as "such improvements are expected to improve benthic and fisheries habitat and passage by increasing tidal exchange, flushing nutrients, increasing DO and salinity, and reducing water temperatures".

⁴ ESS 2002. Midge Management Recommendations for Straits Pond, Towns of Hull and Cohasset, Massachusetts. Prepared for Town of Hull 253 Atlantic Avenue Hull, Massachusetts 02045 Project No.: H114-000

In an effort to inform management and environmental issues the Straits Pond Watershed Association, in cooperation with local, state, and federal partners developed and presented a comprehensive public informational forum series that was recorded and presented on local cable access for those not able to make the forums in person (powerpoint presentations also available on the Hull Conservation Commission web page at http://www.town.hull.ma.us/Public_Documents/HullMA_conservation/spforum). At the conclusion of the informational forum series a facilitated public meeting was held during which the most salient environmental issues and management options were identified and prioritized. Increased tidal exchange through an expanded and enlarged culvert was universally identified as the top priority.

The goals for the management of Straits Pond through monitoring and adjustments to the proposed tide gates include:

- Increase in tidal prism
- No increase in flooding-related property damage
- Increase and stabilization of pond salinity levels
- Increase in pore water salinity levels
- Decrease in pond temperature
- Increase and stabilization of pond dissolved oxygen levels, and
- Increase in estuarine nekton species assemblage
- Increase in frequency of tidal exchange

PRE-REPLACEMENT CONDITION

Straits Pond is a large coastal pond that is located in the southeast side of Hull and northwest side of Cohasset. The pond reportedly supported tidal marshes prior to being dammed in order to provide hydropower for a mill near the existing bridge. The grist mill remained until it was destroyed by fire in 1800. In as early as 1900, the state Board of Health investigated complaints of nuisance plant growth and nuisance odors.

The existing West Corner Bridge (Route 228) consists of a 12-foot span, 8-1/2 foot rise culvert with stone masonry walls, and a reinforced concrete slab roof. This structure was last reconstructed in approximately 1908.

Tide gates were added during the 1940s in response to recommendations to improve water quality within Straits Pond. The current tide gates are manually operated slide gates (one of which is 4x4 feet and the other is 5x5 feet). During the 1950's, funds were appropriated for the construction of sewers within Hull and various chemical treatments began in an attempt to control both nuisance vegetation and midges (a nonbiting insect which hatch in prolific numbers creating a major nuisance for abutters to the Pond). Some species of midges are direct indicators of poor water quality and excess nutrients. During peak emergence, residential areas are inundated with midges, leading to inhalation and respiratory problems that result in quality-of-life issues for Pond abutters. The Town of Hull has applied insecticides under an Emergency Declaration issued by the Board of Health since the 1950's. However, the chemical control of midges generally has limited and short-term success and was discontinued in 2004.

A 1980 study cited continued eutrophication problems due to failing septic systems, direct discharge of sewage and storm water runoff. In subsequent years, additional sewer and stormwater management improvements have been implemented in Hull and Cohasset to reduce pollutant levels entering Straits Pond. Midge larvae numbers have been regularly monitored by professionally guided local volunteers and high school students. In the past, the Pond was typically managed to maintain a constant water level and the tide gates were manually operated to lower water levels in response to a predicted storm event to increase available water storage capacity. More recently, a protocol for more regular tidal flushing has been implemented to increase salinity levels and numbers of predatory fishes during spring months as a more effective midge control measure. A study of midges in Straits Pond revealed that midges taken from the Pond ceased to pupate and often died at salinities greater than 18-22 ppt. Additional studies of Straits Pond have shown that fish such as mummichogs and striped killifish fed extensively on midges, although ceased to feed or died at high water temperatures and low oxygen conditions.

The lack of effective tidal exchange within the Pond continues to cause water quality impairments, major infestations of midges, explosive growth of widgeon grass, periodic algae blooms and infestations of midges, and the spread of invasive plants. Figure 1 graphically represents tide data collected in May, 2003 and demonstrates the limited water level fluctuation within Straits Pond with both existing gates in an open position. Under moderate tides, the Pond can only experience water level fluctuations of approximately 1 foot between high and low tides.

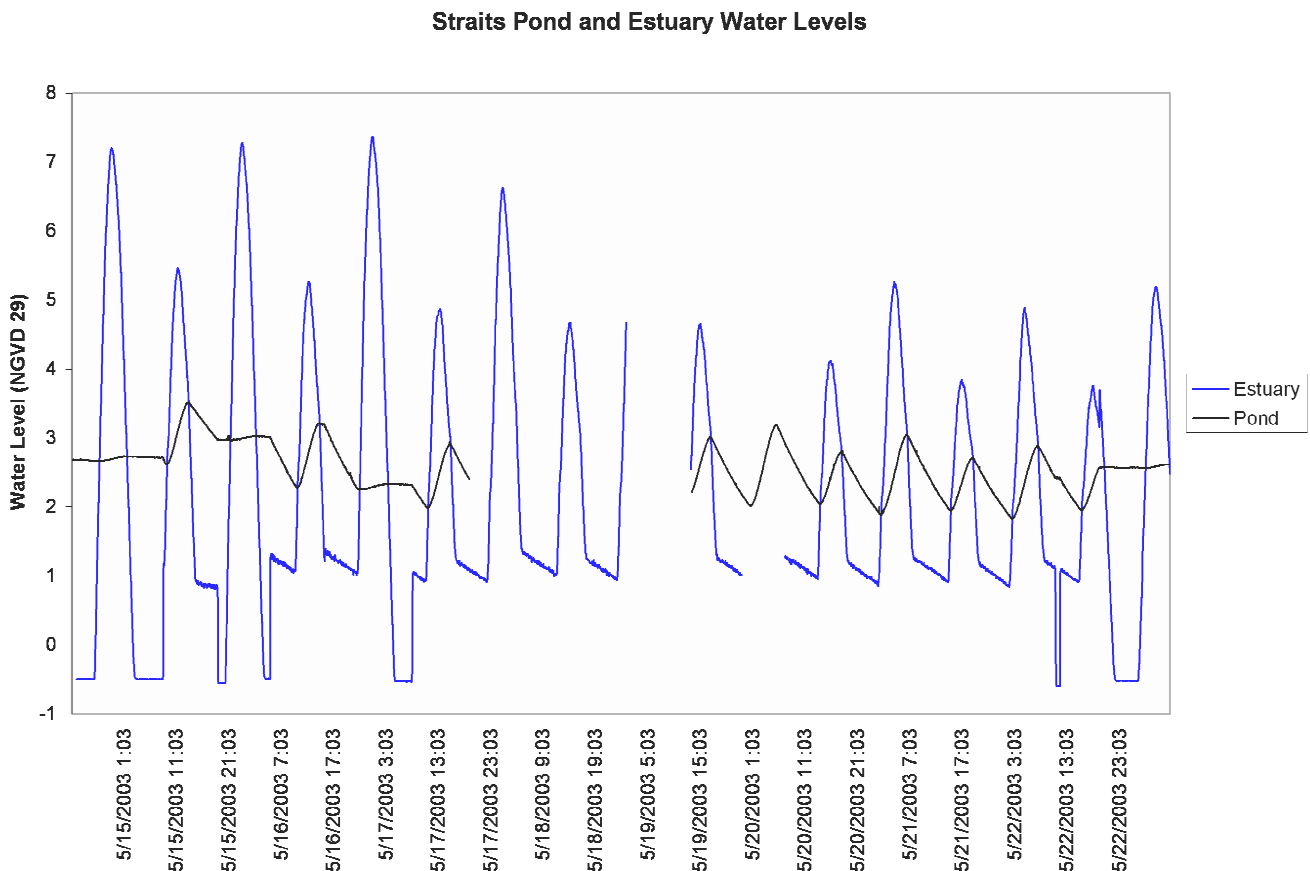


Figure 2: March 2003 Tide Data for Straits Pond and Weir River Estuary.

Stands of the invasive common reed or *Phragmites* reduce habitat value and are a considerable fire hazard. Low-lying properties surrounding the pond are susceptible to flooding impacts as flow becomes impounded above the road crossing. All of these symptoms present significant quality-of-life issues for residents surrounding the pond.

Historically, Straits Pond was maintained at a constant level of 3.3 feet, NGVD 29. More recently, a resident has been responsible for regulating flushing and water levels in Straits Pond by manually opening and closing the tide gates using a protocol developed by ENSR⁵ in an attempt to increase tidal flushing and salinities and reduce residential time within the pond. These operations are the subject of an Existing Order of Conditions with the Hull and Cohasset Conservation Commissions. However, for several seasons the tide gates have not been operated per the ENSR protocol. Most recently the tide gates have been operated under an OOC that was based on the investigation of several management scenarios evaluated using automated level data loggers and in-situ salinity measurements that provided improvements over the ENSR protocol. This spring the revised operational scenario was altered as the existing ENSR tidal exchange protocol was insufficient to maintain high salinity values in the Pond during wet weather and high spring flow/groundwater conditions. Under the interim protocol the tide gates are operated in the open position as often as possible while attempting to maintain pond height in a range between approximately 2.4 and 3.4 feet NGVD 29. The gates have been open for approximately 1 week of the month during the highest high tides. During the two weeks of the month with roughly average tides, the gates have been closed for approximately 6 hours per day during one low tide cycle. During neap tides it is periodically necessary to close the gates for portions of both daily low tide cycles in order to achieve pond elevations above 3.0. Manual operations of the gates also occur in response to predicted major precipitation or coastal storm events in an effort to lower water levels and provide additional flood water storage capacity.

REPLACEMENT CONDITION

The project originated as a municipal project led by the Town of Hull with additional financial support from the Towns of Cohasset and Hingham, as well as the NOAA National Marine Fisheries Service and the Conservation Law Foundation in support of habitat restoration goals. The project recently received federal funding for construction through the Federal Highways Administration and as a result will be advertised as a MassHighway project. In addition, the project has received additional funding from the Massachusetts Transportation Improvement Program (TIP). The replacement design of twin 7-foot wide by 5-foot rise box culverts outfitted with automatically actuated sluice gates is based upon recommendations from a US Army Corps of Engineers study (include citation). This study conducted under the Flood Plain Management Services Program, determined that larger hydraulic openings than the recommended twin 7 X 5 foot culverts provided only minor additional flow to the Pond. The predicted range in pond surface elevation (during a relatively low high tide event of 5.2 feet, NGVD 1929), is anticipated to increase from 1.2 feet to 2.6 feet, with the new culvert/tide gate structure. While the predicted minimum pond surface elevation is controlled by an outcrop of bedrock, higher maximum pond surface elevations would be anticipated during higher tide events without resulting in flooding impacts to properties abutting the Pond which through pre-construction topographic surveys has been determined to be approximately 3.8 feet (NGVD 29). The automatic tide gates will also be outfitted with manual overrides for corrective actions and emergencies, including power failures.

⁵ ENSR Inc., 2002. Weir River Estuary Flow Study: Hull, Hingham, and Cohasset Massachusetts. Prepared for Massachusetts Department of Environmental Management. Document No. 04481-009.

Studies of water quality conducted by the Office of Coastal Zone Management have found that with the existing tide gates left in an open position, salinity levels significantly increase throughout the Pond both spatially and at depth and water released on an outgoing tide is not the same water that returns on a subsequent incoming tide. It is anticipated that the predicted increase in tidal exchange with the new culverts will result in further water quality and habitat enhancements, will reduce habitat fragmentation, and increase ecological integrity.

The Town of Hull DPW will maintain signage on both sides of the culvert warning boaters and kayakers to stay out of area adjacent to the culvert.

STRAITS POND ADVISORY COMMITTEE

The Hull Department of Public Works is the Responsible Party for undertaking initial water level monitoring and water quality monitoring, adjusting gate operations, conducting necessary inspections, maintenance and repairs, and undertaking corrective actions as prescribed by the Straits Pond Advisory Committee. Restoration monitoring of water quality, vegetation, nekton, sediment, and benthic invertebrates is ongoing and being performed by the Straits Pond Watershed Association (SPWA) and the Cohasset Center for Student Coastal Research (CSCR) with technical and financial support from the CZM Wetland Restoration Program, the MassBays Program, and the Gulf of Maine Council on the Environment. The Straits Pond Advisory Committee is responsible for developing a management approach with regard to initial calibration, review of environmental conditions and prescribing modifications when necessary. Members of the Advisory Committee are identified below:

Director, Hull DPW
Attn: Marc Fournier
9 Nantasket Avenue
Hull, MA 02045
P: 781-925-0900
781-910-3973 (Emergency)
F: 781-925-0401
E: mfournier@town.hull.ma.us

CZM South Shore Regional Coordinator or
CZM Wetland Restoration Program
Attn: Jason Burtner
C/O: Stellwagen Bank National Marine
Sanctuary
175 Edward Foster Road
Scituate, MA 02066
P: 781-545-8026 x209
F: 781-545-8036
E: jason.burtner@state.ma.us

MA DEP Restoration Coordinator
Attn: James Sprague
1 Winter Street
Boston, MA
P: 617-645-6601
E: James.Sprague@state.ma.us

MassBays Estuaries Program
Attn: Christian Krahforst
251 Causeway Street
Boston, MA 02041
P: 617-626-1216
F: 617-626-1240
E: Christian.Krahforst@state.ma.us

Areas of Critical Environmental Concern
(ACEC) Program
Coastal Coordinator
Attn: Lisa G. Berry Engler
251 Causeway Street, Suite 700
Boston, MA 02114
T: (617) 626-1435
F: (617) 626-1349
Lisa.Engler@state.ma.us

Hingham Conservation Agent
Attn: Cliff Prentiss
210 Central Street
Hingham, MA 02043
P: 781-741-1445
E: cprentiss@hingham-ma.com

Straits Pond Watershed Association
Attn: Lawry Reid
31 Richards Road
Hull, Ma 02045
P: 781-925-8659
E: viaspeech@comcast.net

Conservation Administrator
Hull Conservation Commission
Attn: Anne Herbst
253 Atlantic Avenue
Hull, MA 02045
P: 781-925-8102
F: 781-925-8509
E: conservationemail@town.hull.ma.us

Conservation Agent
Cohasset Conservation Commission
Attn: Paul Shea
41 Highland Avenue
Cohasset, MA 02025
P: 781-383-4119 or
508-240-6811
E: PaulShea@cape.com

Gulf of Maine Habitat Restoration
Coordinator
Attn: Eric W. Hutchins
NOAA Restoration Center
1 Blackburn Drive, Gloucester, MA 01930
P: 978-281-9313
F: 978-281-9301
E: Eric.Hutchins@noaa.gov

Superintendent
Cohasset DPW
Attn: Carl Sestito
91 Cedar St.
Cohasset, MA 02025
P: 781 383 0273
F: 781 383 4125
E: cohassetdpw@yahoo.com

The initial testing and configuration of the automatic tide gate actuators will be scheduled with the contractor well in advance of installation. Configuration will require careful testing in order to achieve the targeted water elevation and water elevation change within Straits Pond. The Straits Pond Advisory Committee will provide oversight for initial testing and operation. It is anticipated that water quality habitat degradation, and ecological integrity problems will be improved with the increased tidal flushing allowed by the larger tide gates. An increase in tidal exchange will also provide fisheries benefits through increased opportunity for fish passage between the estuary and the pond, will reduce habitat fragmentation resulting from existing tide gate design/operation, and that the improved ecological “connectivity” between the pond and the estuary will enhance the pond’s ability to respond to environmental stressors such as nutrient loading and eutrophication. An increase in the degree and frequency of tidal exchange will serve to increase and stabilize salinity, lower and stabilize water temperature, and that with a reduction in eutrophic conditions water column dissolved oxygen is anticipated to improve and sediment oxygen demand is anticipated to be reduced thereby improving overall habitat value. However, the need for adaptive management remains a priority. Adverse environmental conditions are to be managed with advanced coordination and oversight by the Straits Pond Advisory Committee.

INITIAL TIDE GATE CALIBRATION AND OPERATION PROTOCOL

Maximum Water Level

Once the existing structure and tide gates are replaced, maximum water surface elevations would be controlled by the new automatically actuated sluice gates which would automatically close when the Pond reaches a predetermined water surface elevation and automatically open when elevations within the Estuary would fall below this elevation. The first action of the Hull DPW with input from the Straits Pond Advisory Committee will be the initial adjustments of the level switches to determine the appropriate Pond and Estuary water levels which will actuate the gates to prevent flooding from high water levels. The elevation of the pond water level will be automatically recorded by a GlobalWater WL16 unit that is mounted in the vicinity of the tide gates and will be configured to record water level at regular intervals so as to be comparable with the NOAA Boston recording facility. These adjustments will require careful monitoring of water levels to establish a maximum water level acceptable to local officials and Straits Pond abutters without causing avoidable adverse consequences to low-lying structures surrounding the Pond. The maximum water elevation is anticipated to be approximately 3.8 feet (NGVD 1926) or approximately 0.5 feet higher than typical high water conditions. During the initial configuration stage, tide gauges and salinity probes will be deployed within the Pond and Estuary to document water levels and salinity levels, water flow direction and velocity, water temperature, and dissolved oxygen in response to adjustments of the level switches. The automated actuators will initially be set to close the tide gates at a pond water level of approximately +3.5 feet (NGVD), or at the currently observed/recorded average high water level. Following the preliminary data collection phase for the initial setting, of approximately one month, the Straits Pond Advisory Committee will meet to review the available data and any reported concerns regarding pond water levels. The outcome of this meeting will be to establish the water level settings for the switches which will activate the gates under routine conditions. Based on the maximum water levels resulting from the initial actuator setting water level and closure settings will be incrementally adjusted to maximize pond water levels without flooding and with consideration of a reasonable safety factor. The intent is to incrementally adjust actuator settings once during each spring to facilitate better environmental response data collection.

Minimum Water Level

Establishing the maximum water level is only one tide gate O&M variable for restoration, relieving eutrophic conditions, addressing the midge infestations, etc and all of the associated quality-of-life issues that go along with the impairment of the Pond. Consideration of the minimum water level (i.e. tidal prism) and frequency of exchange are also critical considerations as they, collectively, will be what determine the degree and success of restoration and improvement of conditions for abutters. It is anticipated that the minimum water level in the pond will be a self-controlling function of culvert/tide gate design and pond channel/ledge bathymetry. The predicted range in pond surface elevation (during a relatively low high tide event of 5.2 feet, NGVD 1929), is anticipated to increase from 1.2 feet to 2.6 feet, with the new culvert/tide gate structure. This increase in the tide range is a result of expanded cross-sectional area of the culvert/tide gates and the associated hydrology of the system. The minimum potential water level in the pond is controlled by a ledge outcropping upgradient (pond-side) of the tide gates and the corresponding low water pond water elevation is approximately +1.0 feet (NGVD). At this minimum water level there is approximately 75% surface water coverage on the pond. This minimum level surface water coverage has been determined by detailed bathometric survey and photographic documentation when the Pond water level was in a drawn down condition. As +1.0 feet is a fixed minimum water level, and the average low water elevation during tidal exchange will primarily be higher than this level, it is anticipated that the large degree of surface water coverage during the transitional/short term low tide in the Pond will be sufficient to address abutter concerns regarding

prolonged exposure of extensive inter-tidal flats as discussed during project public informational meetings. This lower water elevation is viewed as a longer-term goal of the restoration and the Advisory Committee. The initial actuator low water setting will seek to maintain a minimum water surface elevation of 2.0 feet (NGVD 29) with annual incremental adjustments of approximately 0.2 feet annually over a 5-6 year period. These adjustments will be determined by the Advisory Committee taking into consideration abutter concerns and adaptive management strategies that will be informed by ongoing restoration monitoring and in coordination with the appropriate permitting agencies. The Advisory Committee will need to consider the balance between maximized exchange and abutter concern with low water levels in the pond.

Protocol for drawing down the level of the pond to provide additional flood storage in anticipation of a significant storm event is discussed below.

Tidal Exchange Frequency

In order to maximize potential benefit for water quality, habitat, ecological integrity and quality-of-life considerations for residential abutters, tidal exchange between the estuary and the pond will be allowed to proceed unimpeded (except as discussed above and below) on a normal twice-daily regime in order to more closely mimic native hydrology and ecology of the tidal system.

The automatic tide gates will also be outfitted with manual overrides for corrective actions and emergencies, including power failures. This initial monitoring phase will also be useful to establish the time frames necessary to respond to a predicted major precipitation of a coastal storm flooding event where lowering pond levels is desirable for increased flood storage. In certain circumstances, more than a single ebb tide cycle may be necessary to lower the pond to elevation 1.0 feet (NGVD 1929). This is the maximum lowering possible due to bedrock outcrops within Straits Channel just upstream of West Corner Bridge. During this initial monitoring phase, the Straits Pond Advisory Committee will establish the minimum respond times (tides cycles) required for the manual operation of the gates for increased flood water capacity.

ROUTINE FIELD INSPECTIONS

Following the installation of the new culverts, routine annual field inspections will be conducted by the Hull Department of Public Works using the Inspection and Preventative Maintenance Checklist (Attachment A) and kept on record by the DPW. The routine inspections will evaluate performance, address maintenance needs and identify problems. Substantial corrective actions requiring the removal or placement of material via machinery will be reviewed and approved by the Advisory Committee. The Department of Public Works will be the primary contact to report observed problems with the functioning of the structure.

TIDE GATE ADJUSTMENTS AND MANUAL OVERRIDE EVENTS

All adjustments to the level switches which operate the tide gates will be coordinated with the Straits Pond Advisory Committee. The attached Tide Gate Adjustment Log (Attachment B) and the automated water level data loggers will insure adequate record keeping of water level management including all manual overrides of the gates. Record keeping will create the ability to make informed management decisions. Based on circumstances which may occur following installation, further protocols may become necessary. It is anticipated that the Advisory Committee will meet on an annual basis to review records and reports from the previous year and determine whether any adjustments to tide gate operations

are warranted. Any modifications to operating procedures will be developed in cooperation with the Advisory Committee and clearly documented. Records of tide gate adjustments and operations will be distributed to municipal officials and resource agencies as directed by permit conditions.

ON-GOING TIDE GATE OPERATIONS

By December 15th of each year, the Straits Pond Advisory Committee will prepare a summary report. The report will document and justify any modifications or adjustments made to gate operations with supporting monitoring data. It is anticipated that this information will include data on water levels, salinity, temperature, and DO,. The report will discuss observed trends in the data and the extent to which to project is achieving management goals. To the extent that additional data is collected, it will be provided in the annual report.

INSPECTION AND PREVENTATIVE MAINTENANCE CHECKLIST

Inspector's Name		Water Level Pond Side (ft. NGVD)	
Date (00/00/00) Time (mil)		Water Level Estuary Side (ft. NGVD)	
Weather Condition		Next High Tide	
Temperature (F)		Next Low Tide	
Photographs attached (Y/N)		Ice, Vegetation, or Obstructions at Gates	

NORTH GATE

SOUTH GATE

	Condition	Action	Condition	Action
Actuator- External Appearance				
Voltage Check				
Level Switches				
Controls Compartment				
Limit Switch Compartment				
Terminal Compartment				
Remove Motor Housing				
Position Indicator				
Actuator Lubricant				
Valve Stem				
Manual Override Components				
Visible Moving & Stationary Parts				
Gate				
Guide Frames				
Culvert				
Retaining Walls				
Shoreline and Scour Protection				

Glossary: Good = G, Fair = F, Poor = P, Needs Replacement = NR

Notes and Environmental Observations: _____

ADJUSTMENT LOG

Level Switch Adjustments*							
Operator Name	Manual Override	Level Switch	Date	Time	Upstream	Downstream	Rationale /Comments

***Record as elevations in feet (NGVD 29)**

