



Massachusetts Water Resources Authority

Presentation to the

MWRA Wastewater Advisory Committee

***Hurricane Preparations
Before and After Sandy***

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Chief Operating Officer**

January 4, 2013



The Forecast





National Weather Service Briefings

- MWRA staff participated in conference calls hosted by the National Weather Service

Updated SANDY BRIEFING



Hull – Oct. 1991 Courtesy of Boston Globe

Briefing Summary
11:30 AM Monday October 29, 2012



**National Weather Service
Boston, MA**



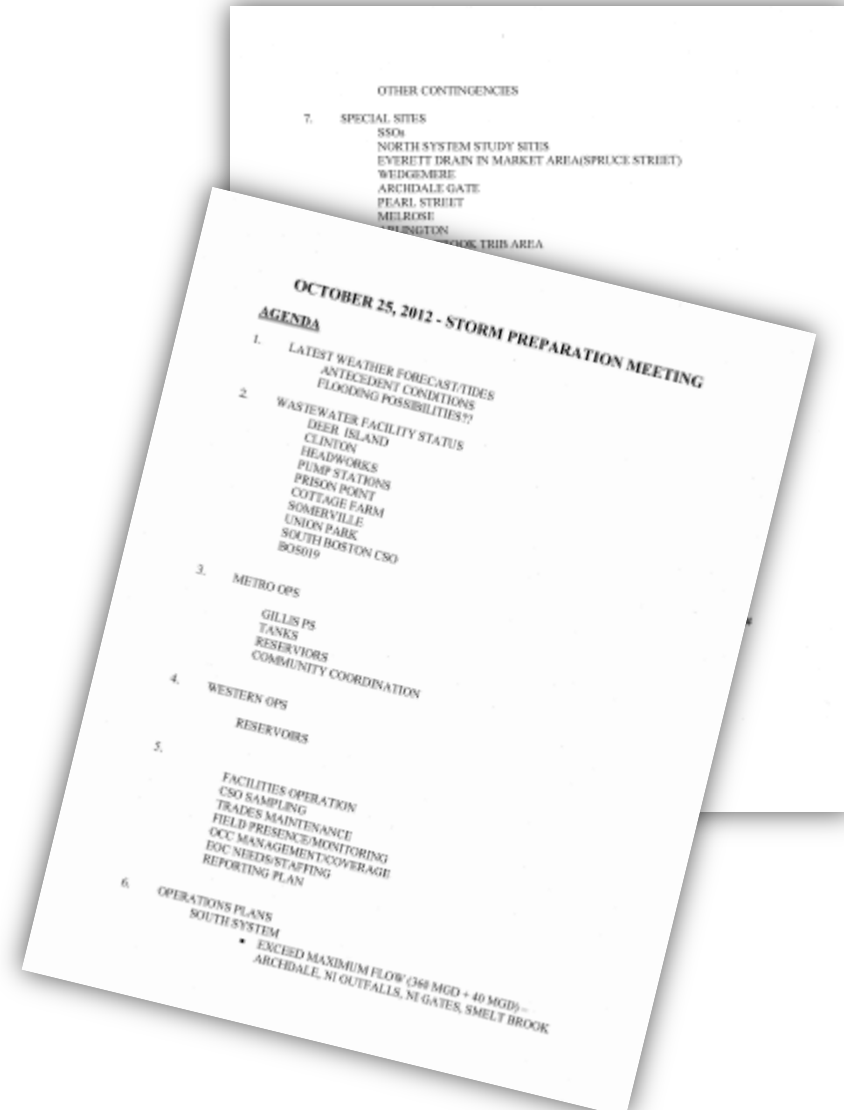
Reservoirs During March 2010 Rains





Storm Preparations

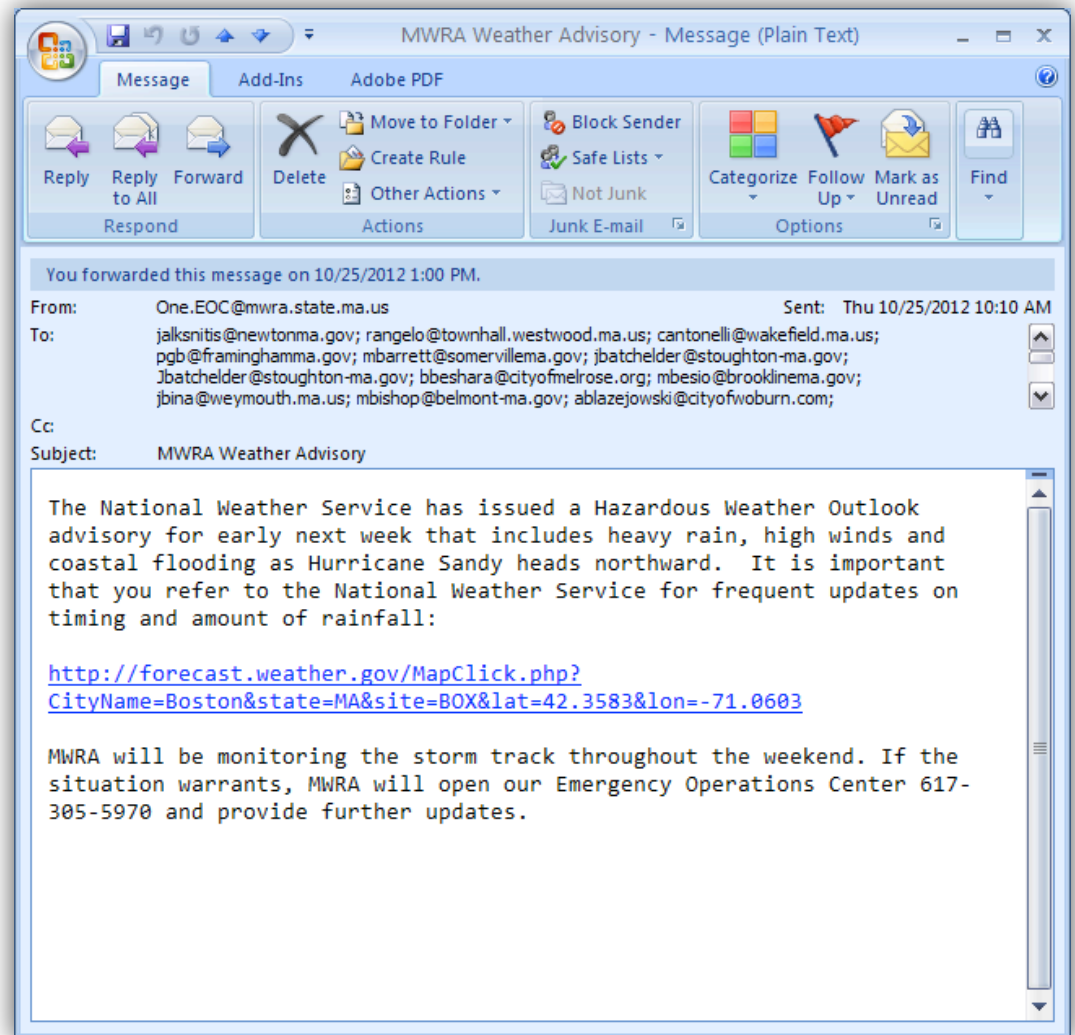
- Staff began meeting and making preparations early in the week
 - Generators tested
 - Critical equipment checked
 - Chemical levels topped off
 - Fuel topped off
 - 24-hour staffing plans developed for EOC, operations, maintenance and other essential staff





Community Notifications

- MWRA sent out weather advisories to its member communities throughout the storm beginning on Thursday





Web Updates

- Updates were also provided on MWRA's web page

The screenshot shows the MWRA website home page. The browser address bar displays the file path: file:///Domain/mwra.net/Users/MacDougall_K/Desktop/. The page header includes the MWRA logo and contact information: "Massachusetts Water Resources Authority, Charlestown Navy Yard, 100 First Avenue - Boston, Massachusetts 02129, (617) 242-6000".

The left sidebar contains a "Home" section with a list of links: WELCOME!, About MWRA, Transparency, Water System, Sewer System, Harbor and Bay, School Program, Doing Business with MWRA, Contact MWRA, Job Postings, and Links. Below this is a "Follow us" section with icons for Twitter, Facebook, and YouTube. At the bottom of the sidebar is a "RENEWABLE ENERGY AT MWRA" section with a small image.

The main content area is titled "News" and features several articles:

- Town of Framingham and MWRA Celebrate the Start of Aqueduct Trails Program** (October 22, 2012) - This article is highlighted with a red arrow pointing to the "IMPORTANT NOTICE" box on the right.
- MWRA Contractor to Conduct Soil Boring and Test Pit Work in Arlington** (October 24, 2012)
- MWRA Contractor to Conduct Soil Boring and Test Pit Work in Waltham** (October 24, 2012)
- Governor Patrick Swears in Winthrop Fire Chief Paul E. Flanagan to MWRA Board of Directors** (October 16, 2012)
- MWRA Contractor to Conduct Soil Borings in Reading, Wakefield, Woburn and Stoneham** (October 16, 2012)
- Congratulations to MWRA's John Riccio and the entire Clinton Advanced Wastewater Treatment Plant team for being highlighted in this month's issue of Treatment Plant Operator Magazine** (October 10, 2012)

The right sidebar contains several sections:

- IMPORTANT NOTICE**: MWRA Weather Advisory. Click here for information about Hurricane Sandy. Updated October 29, 2012, 2:15 PM.
- MWRA 24-HOUR EMERGENCY CONTACTS**:

Water:	617-305-5950
Sewer:	617-305-5940
Security:	877-697-6972
TTY:	617-371-1903
- NON-EMERGENCY CONTACTS**
- MWRA BOARD OF DIRECTORS**: Meeting Schedule, Notices/Agendas and Vote Extracts. About the Board of Directors.
- MWRA QUAB-CAM®**: The Quabbin Reservoir. Includes a small image of the reservoir.




Web Updates

MWRA - Storm Updates | Starting October 26, 2012 - Updated Regularly

MWRA - Storm Updates | Starti...

file:///Domain/mwra.net/Users/MacDougall_K/I ☆ Google



MWRA STORM INFORMATION - SANDY
Updated Regularly

[home](#)

OCTOBER 29, 2012 2:15 PM	HELPFUL LINKS
MWRA continues to closely monitor Sandy's track. The National Weather Service (NWS) issued a briefing [PDF] at 2:15 PM. All MWRA facilities are operational and the reservoirs have been lowered. Please check the forecast regularly at the NWS web site . Storm updates will be posted here as the situation warrants. ###	National Weather Service - Boston
OCTOBER 29, 2012 9:00 AM	
MWRA continues to closely monitor Sandy's track. The National Weather Service (NWS) issued a briefing [PDF] at 8:30 this morning. All MWRA facilities are operational and the reservoirs have been lowered. Please check the forecast regularly at the NWS web site . Storm updates will be posted here as the situation warrants. ###	
OCTOBER 28, 2012 11:30 AM	
MWRA continues to closely monitor Sandy's track. The National Weather Service (NWS) issued a briefing [PDF] at 8:30 this morning.	



Pre-Positioned Pumps In Critical Locations

- Portable pumps were pre-positioned
 - 2 at Melrose
 - 2 at IPS in Weymouth for the South Shore
 - 1 at Somerville Marginal





Pumping During March 2010 Storms





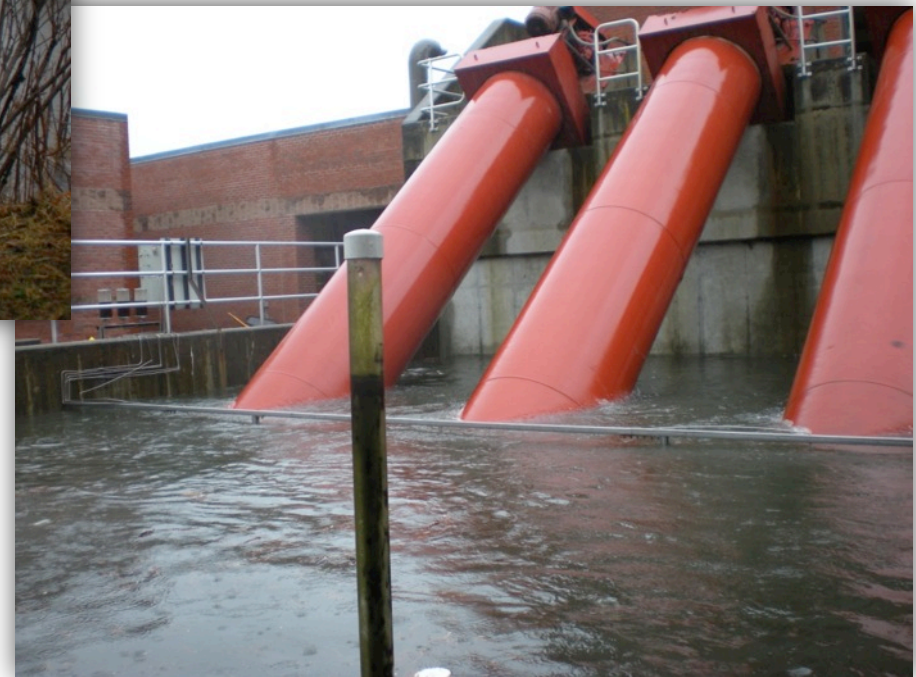
Sandbagging

- Sandbags were filled and stacked at the Clinton Treatment Plant and the Alewife Pump Station





Flooding At The Clinton Treatment Plant March 2010





South Boston CSO Tunnel

- Operational procedures for large storms reviewed
- Parties notified
- Tunnel emptied





Construction Projects Were Shut Down





Coordinating With MEMA

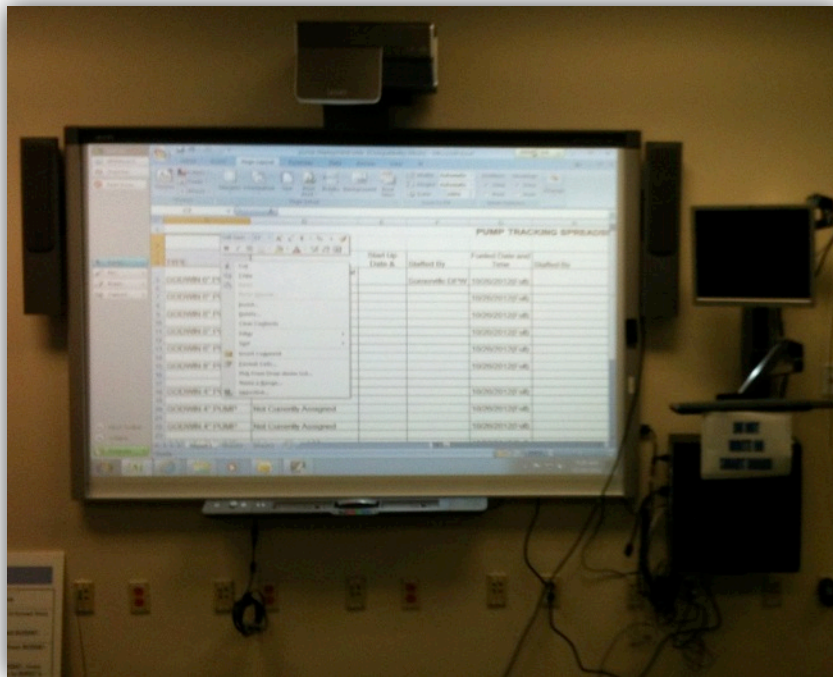
- MWRA had a representative at the MEMA bunker in Framingham throughout the storm





EOC Activation

- MWRA's emergency operations center (EOC) in Chelsea was activated at 7:00am Monday, October 29th until the storm had passed





Deer Island EOC Was Also Opened





Monitoring Deer Island Flows

PI ProcessBook - [Plant Flow & Rain]

File Edit View Insert Tools Draw Arrange Window Help

75%

DITP Plant Flows, MGD

29-Oct-12 10:22:28 24.00 hours 30-Oct-12 10:22:28

● TOTAL PLANT FLOW, PUMPING ○ TOTAL PLANT FLOW, PRIMARY ◆ SECONDARY BYPASS FLOW ◊ TOTAL PLANT FLOW, SECONDARY

Influent Flow by Service Area, MGD

29-Oct-12 10:22:28 24.00 hours 30-Oct-12 10:22:28

● NORTH SYSTEM FLOW ○ SSPS TOTAL FLOW ◆ NUT ISLAND HEADWORKS FLOW ◊ INTERMEDIATE PUMP STATION FLOW

Rainfall, Cumulative Inches (Midnight to Midnight)

29-Oct-12 10:22:28 24.00 hours 30-Oct-12 10:22:28

● DITP NMPS RAIN FALL

Condition Monitoring

- Pump Station Overview 0
- NMPS Alarms 0
- SSPS Alarms 0
- WT-HW Alarms 0

North Main Pump Station

P01 - 120.3	NMET	P02 - 124.4	BMD
P03 -		P04 -	
P05 -		P06 -	
P07 -		P08 -	
P09 -		P10 -	
Bus B 121.2		Bus A 124.3	

Winthrop Headworks

P01 -	P02 - 19.5
P03 -	P04 -
P05 -	P06 -
Bus A Bus B	

South System Pump Station

P01 -	P05 - 42.8
P02 - 43.0	P06 -
P03 -	P07 -
P04 -	P08 - 45.3
Bus A Bus B	

DSL Pumping to FRSA

Pumping

- Overview
- Flow Pumps Capacity
- NMPS - 245 2 788 MGD
 - BMD (W/C) 125 1 Cav/Rate 438 MGD
 - Ward 95 256 MGD
 - Col/Pk 41 182 MGD
 - NMRT (CC) 121 1 Cav/Rate 350 MGD
 - Pump by tunnel assignment
- SSPS - 132 3 Cav/Rate 400 MGD
 - IIT - NI-HW 118 360 MGD
 - IIT - IPS 26 40 MGD
- WT - 19 1 125 MGD

Outfall Shaft LVI, FT - 117.6 140.5' MDC

Plant Wide Detention Times

Sec Bypass

Trend Display - Time Adjustments -

4h 8h 12h

1d 3d 5d

7d 14d



Monitoring Rainfall By Location

MWRA Rain Gauge Collection Site Map/List

MWRA Rain Data

Massachusetts Water Resources Authority

Gauge Locations | Data Query | Gauges Info | Home | BWSC

Instructions: On the clickable map click the green circle to select either 'Summary' report to display daily, monthly and yearly totals or 'Detail' report to view daily totals for the last 5 days. Optionally [click here](#)

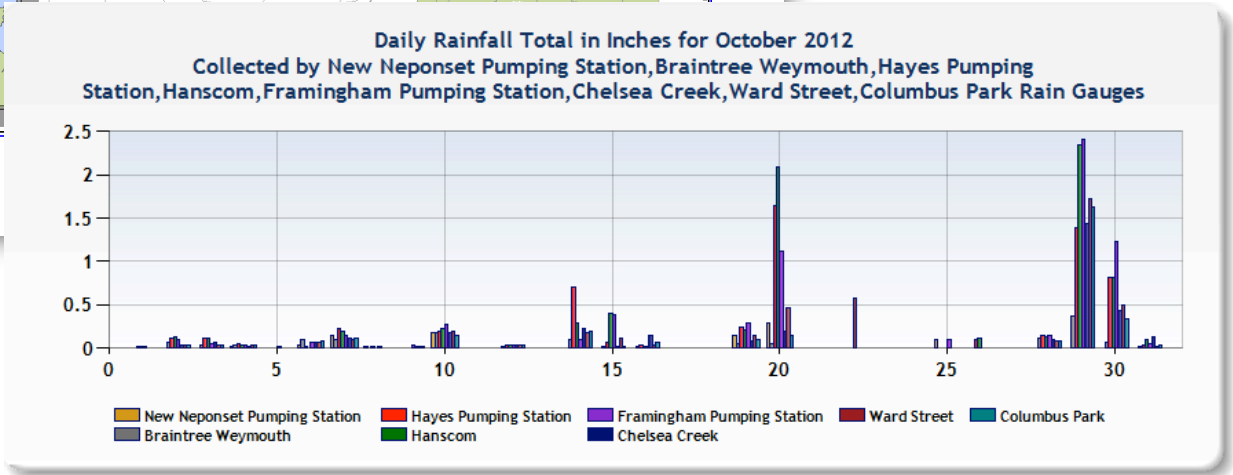
Collection Sites	Last Hour Rain Rate (in/hr)	Storm Total (in)
Braintree Weymouth	0.00	0.00
Chelsea Creek	0.00	0.00
Columbus Park	0.00	0.00
Framingham Pumping Station	0.00	0.00
Hanscom	0.00	0.00
Hayes Pumping Station	0.00	0.00
New Neponset Pumping Station	0.00	0.00
Ward Street	0.00	0.00

Rain Intensity info as of 11/15/2012 10:15:01 AM
Storm Total info as of 11/15/2012 10:17:00 AM

Note: Storm data is accumulated rainfall collected hourly, for the duration of the most recent storm. A storm concludes when there is no accumulation for 4 consecutive hours.

Rain Rate/Hour	Indicator
0 in	Grey circle
<= 0.5 in	Blue circle
> 0.5 - <= 1 in	Yellow circle
1 - <= 2 in	Orange circle
> 2 in	Red circle

Clickable Map





Hourly Updates Sent To Staff

- EOC sent updates throughout the storm to a pre-determined distribution list for “Major Wet Weather Event”

4:00 PM Update - Message (HTML)

Message Add-Ins Adobe PDF

Reply Reply Forward Delete Move to Create Other Block Safe Lists Categorize Follow Mark as Find
Respond to All All Actions Junk E-mail Options Find

From: Eoc, One
To: Major Wet Weather Event Group
Cc:
Subject: 4:00 PM Update
Sent: Mon 10/29/2012 4:11 PM

S. Cullen reporting - 3:58 Deer Island 2nd CTG started; 3:55 Prison Point - Discharging; 3:45 Columbus Park - Choking; 3:44 Columbus Park loss of power - back up generator on; 3:40 Oakdale Power Station - loss of power, no impact; 3:40 Spring Street Pump Station loss of power - pumps 1 and 4 on diesel drive; 3:20 DI Electrical Substation #9 tripped; 3:15 Norumbega Covered Storage loss of Power - now on generator: 3:15 Prison Point filling tanks, 2:55 union park and BOS 19 filling; 2:50 pm Somerville online; 2:48 pm Shaft L, Framingham - power loss; 2:33 Houghs neck and Nut Island back on utility power; 1:52 power line down to Somerville Sample Bldg; NStar on site 1:27 DI Boiler back up to temperature; 1:10 NI fuel transfer pumps went down, but were repaired; 12:40 NI, closed public Access gate; 12:30 Braintree Weymouth back on utility power; Intermittent communication losses at southern pump stations; 11:50 Houghs/Braintree Weymouth on Generator Power; 11:56 Nut Island generator power restored; 11:44 Nut Island lost generator; 11:05 on Generator power; 10:49 AM New Neponset Lost SCADA •10:00 AM Cosgrove Turbine #1 shutdown•Shirley• 9:00 AM Per State Police Public Access to Deer Island will be shut down •DITP - 11:30 PM 10/28/12 CTG # 1 is online supplying power to B bus•CWTP - 10/19/12 0500 on Generator Powe: total rainfall in Chelsea .90

Wastewater Mini Snapshot
Press to update values
Query as of 10/29/12 4:09 PM
[Update](#)

Deer Island Flow (Max 1313 MGD)	10/29 4:09 PM	751.83
Chelsea Creek Flow (Max 360 MGD)	10/29 4:09 PM	220.98
Columbus Park Flow (Max 182 MGD)	10/29 4:09 PM	178.32
Ward Street Flow (Max 256 MGD)	10/29 4:09 PM	221.25
SSPS Flow (Max 400 MGD)	10/29 4:08 PM	99.96
IPS Flow (Max 45 MGD)		



Wastewater System Performance

- Total rainfall measured at Chelsea was 2.23 inches
- 2 of 3 headworks reached capacity

		Duration	Peak Flows MG
Chelsea Creek:	No		319
Ward Street:	Yes	2 hr. 5 min.	253
Columbus Park:	Yes	5 hr. 3 min.	180

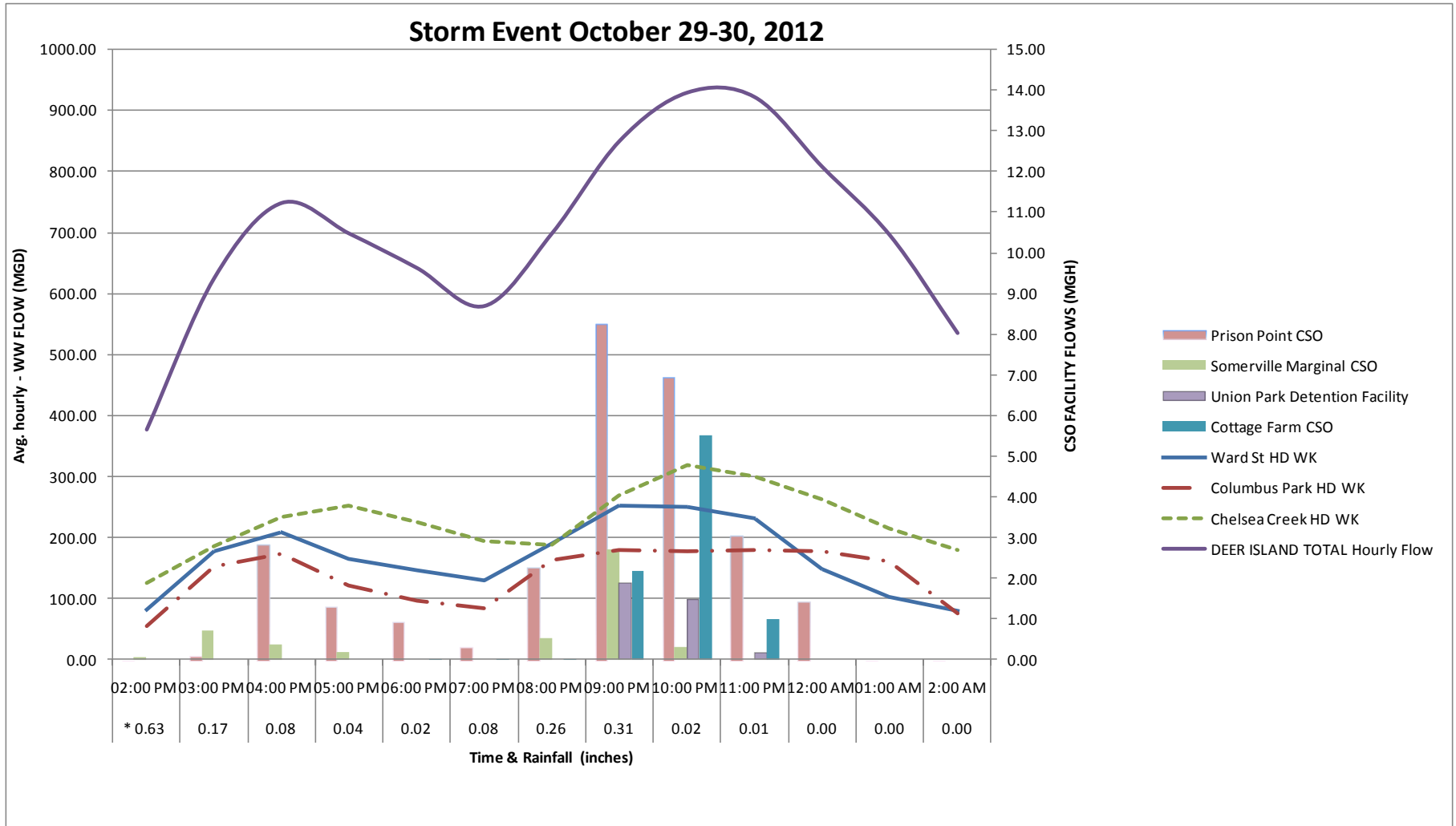
- All CSO facilities activated

		Volume Discharged	Duration of Activations
		MG	
Cottage Farm	Yes	8.68	2 hr. 24 min.
Prison Point:	Yes	32.70	11 hr 32 min.
Somerville:	Yes	5.37	7hr. 34 min.
Union Park:	Yes	3.55	1 hr. 51 min.

- No SSOs



Hourly Flows At Wastewater Facilities





Power Outages

MWRA experienced power outages at numerous facilities across the service area:

- Ludlow Monitoring Station
- Oakdale Power Station
- Carroll Treatment Plant
- Hultman Shaft 4
- MetroWest Shaft L
- MetroWest Shaft E
- Norumbega Covered Storage
- Turkey Hill Tank
- Oak Hill Tank
- Spring Street Pump Station
- Blue Hills Covered Storage
- Loring Road
- Deer Island Tank
- Chelsea Facility
- Chelsea Screenhouse
- Chelsea Headworks
- Columbus Park Headworks
- Nut Island Headworks
- Braintree-Weymouth Pump Station
- Caruso Pump Station
- Houghs Neck Pump Station
- New Neponset Pump Station



Storm Damage

- At Deer Island, a section of a gravity thickener scum roof was ripped off by the wind



Before



After



Storm Damage

- Over 100 trees and numerous limbs came down along the aqueducts in the MetroWest area

System	Street	City	Description	Issue	Damag
Multman Aqueduct	Bifurcation	Weston	One small tree down	No	No
Massachusetts Aqueduct	Deerfoot Road	Southborough	A tree down left of the falls	No	No
Massachusetts Aqueduct	Northborough Road	Southborough	Limbs down at the east side of the gate and two trees down on the west side	No	No
Massachusetts Aqueduct	Ward Road	Southborough	A small tree down at the gate and a tree down on the slope of the aqueduct	No	No
Massachusetts Aqueduct	Johnson Road	Southborough	Two trees down east of the pump station and one west	No	No
Massachusetts Aqueduct	Bartlett Road	Northborough	A large tree down	No	No
Massachusetts Aqueduct	Maple Street	Northborough	Three trees down	No	No
Massachusetts Aqueduct	East Main Street	Northborough	Limbs down by gate	No	No
Massachusetts Aqueduct	Whitney Street	Northborough	A small tree down	No	No
Massachusetts Aqueduct	Shaft B	Berlin	Two trees down and leaning across the road	No	No
Massachusetts Aqueduct	Shaft 8	Barre	Ten pine trees down	No	No
Quabbin Tunnel	Shaft 7	Oakham	Twelve trees down, shared access with USACE	No	No
Quabbin Tunnel	Shaft 6	Rutland	Three trees, access to clear prevented by wires, shared road with Rutland DPW	No	No
CVA	North Liberty	Belchertown	A large pine trees down	No	No
CVA	Bondsville Chamber	Palmer	Two maple trees down	No	No
CVA	Nash Hill Tanks	Ludlow	Six pine trees down	No	No
CVA	Bardwell	Ludlow	Two trees down and flooding	No	No
R-H Sewer	Salisbury Street	Holden	Two large trees down	No	No
Sudbury Aqueduct	Dalton Road	Newton	One large tree down	No	No
Sudbury Aqueduct	Kingman Road	Newton	One tree down	No	No



Storm Damage

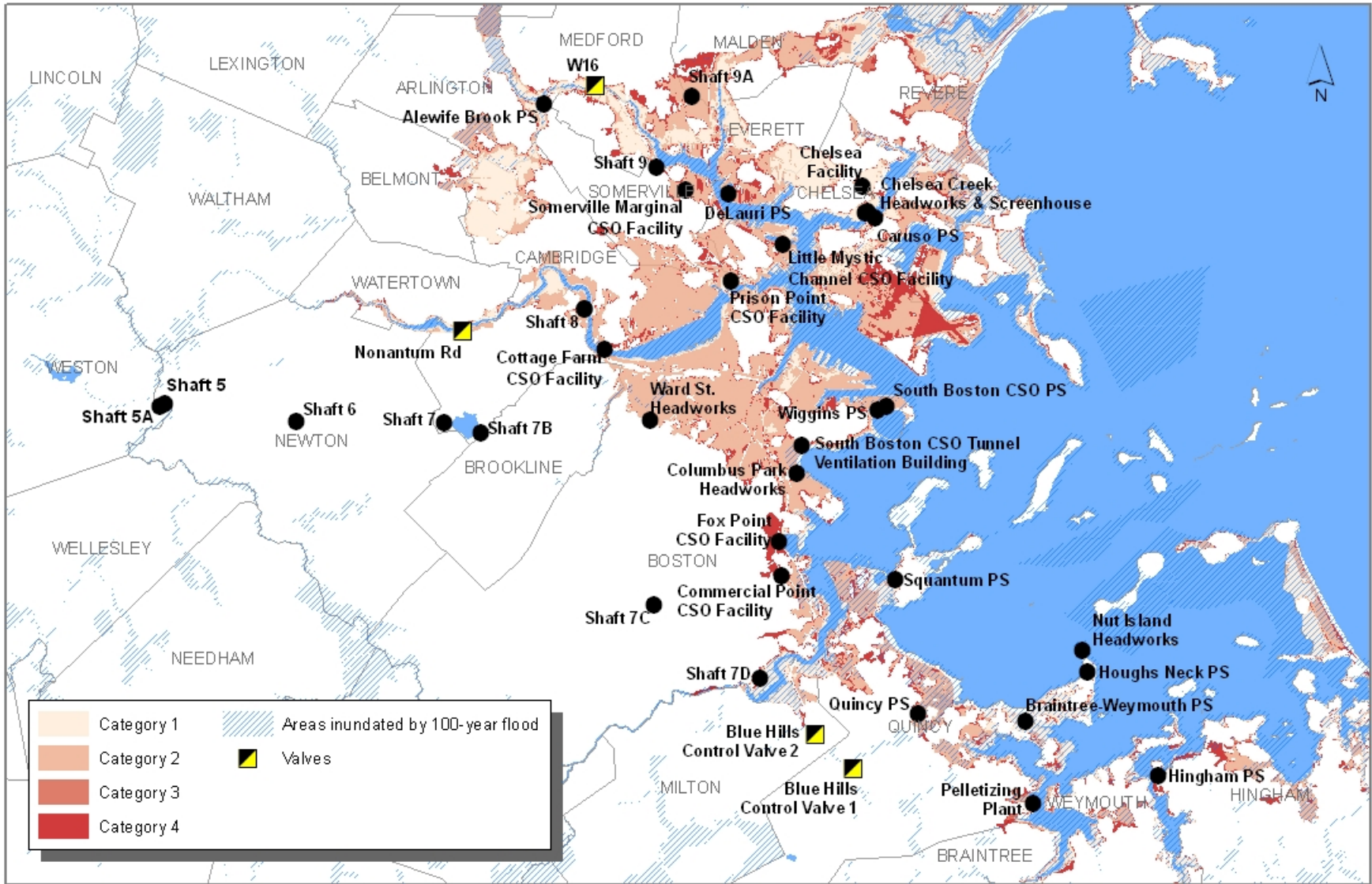


Entrance to Southborough facility



Post Sandy Evaluations

- Biggest potential MWRA impact - wastewater system
- Evaluating various storm surge scenarios
- Compare storm surges to building elevations/interior equipment
- Re-Evaluating current designs:
 - Chelsea Creek Headworks
 - Alewife Pump Station





Impact Evaluations

	Ground Elevation (LIDAR-Derived)	Lowest Building Opening Surface Elevation	Current		PK scenario	Sandy with a Boston Landfall		2100 SLR High Emissions	
			100 Year Storm	500 Year Storm	100yr + 2.5' of SLR	11 ft above MSL	9ft above high tide	100yr Storm	500yr Storm
Reference water elevation (*)			115.83	116.63	118.33	117.43	120.33	120.41	121.21
Cottage Farm CSO	112.96	114.00	1.83	2.63	4.33	3.43	6.33	●	●
Somerville Marginal CSO	115.66	116.00		0.63	2.33	1.43	4.33	●	●
Commercial Point CSO	121.26	122.50							
Fox Point CSO	118.96	120.00					0.33	●	●
Constitution Beach CSO	117.16	117.50			0.83		2.83	●	●
Chelsea Creek Headworks	113.16	117.12			1.21	0.31	3.21	●	●
Chelsea Screen House	113.86	115.00	0.83	1.63	3.33	2.43	5.33	●	●
Delauri P.S.	118.66	120.00					0.33	●	●
Alewife Brook P.S.	112.66	114.50	1.33	2.13	3.83	2.93	5.83	●	●
Caruso P.S.	118.16	120.00					0.33	●	●
Houghs Neck P.S.	115.36	118.83					1.50	●	●
Braintree-Weymouth IPS	126.14	127.25							
Squantum P.S.	114.66	118.00			0.33		2.33	●	●
Pelletizing Plant	116.36	119.00					1.33	●	●
Chelsea Facility	116.30	117.76			0.57		2.57	●	●



Drinking Water Infrastructure Impacts

- Reservoir Storage/Releases
- Turbidity in Reservoirs
- Equipment in manholes



Future Key Decisions

- Selection of “Storm Surge” - dictates ability to mitigate
- “Survivability”/Level of Service of critical facilities
- Prioritization of facilities’ modifications
- Funding availability