Prison Point CSO Facility Improvements

Contract 7359

July 13, 2016
Contract 7359 – Prison Point CSO Facility Improvements
Prison Point CSO Facility – Activations and Volume

Treated Discharges to Boston Inner Harbor (Outfall MWR203)

<table>
<thead>
<tr>
<th>Year</th>
<th>Activations</th>
<th>Discharge Volume (million gallons)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1980's</td>
<td>33</td>
<td>512</td>
</tr>
<tr>
<td>2015</td>
<td>18</td>
<td>280</td>
</tr>
<tr>
<td>2020</td>
<td>17</td>
<td>243</td>
</tr>
</tbody>
</table>
Process Flow Diagram

- **Plant Gate**
- **Inlet Channel**
- **Dry Weather Screen**
- **Detention Tanks**
- **Dry Weather Wetwell & Pumps**
- **Effluent Wetwell & Wet Weather Pumps**

Flow to:
- **Boston Inner Harbor**
- **Charlestown Branch Sewer**

Detention Tanks

Dry Weather Flow

Effluent Dewatering Pump

Dry Weather Flow Discharge to Charlestown Branch Sewer
• Existing conditions assessment
• Facility in need of renovations
• Recommended upgrades based on:
  – Age of facility
  – Condition of equipment, systems and structures
  – Compliance with applicable building codes
Replace following equipment due to age:

- Dry weather pumps
- Detention tank dewatering pump
- Influent and effluent sluice gates
- Mechanical bar screens, conveyor system and grinder
- Post-chlorination sample pumps
Safety, Security, Electrical and Instrumentation Upgrades

- Replace gas monitoring equipment and emergency lighting
- Replace underground fuel storage tank
- Replace electrical switchgear and motor control center
- Repair deteriorated concrete
- Install energy efficient windows, vents and doors
- Upgrade electrical system to be code compliant
- Install second electrical service to facility
- Replace instrumentation PLC, level element sensors and transmitters
Safety, Security, Electrical and Instrumentation Upgrades

Conveyor Belt System and Table

Leaking Chemical Tank
• Provides design, construction administration and resident engineer services

• Two proposals received

• Selection committee recommends award to Arcadis, U.S., Inc.

• Not-to-exceed amount of $2,838,370
Contract Schedule

- **Award:** July 2016
- **Design:** August 2016 – January 2018
- **Construction to Begin:** July 2018
- **Substantial Completion:** July 2020
Weston Aqueduct Supply Main 3

Project Update

July 13, 2016
• WASM 3 Location

- 10 miles long, from Weston to Medford
- 6.6 miles of 60-inch
- 3.4 miles 56-inch, unlined steel pipe
- Installed in 1926, 1927 and 1933
- Carries an average day demand of 18 MGD
- Supplies 250,000 customers
- Supplies Waltham, Belmont, Arlington, Lexington, Watertown, Bedford and Winchester
WASM 3 Location

- 10 miles long, from Weston to Medford
- 6.6 miles of 60-inch
- 3.4 miles 56-inch, unlined steel pipe
- Installed in 1926, 1927 and 1933
- Carries an average day demand of 18 MGD
- Supplies 250,000 customers
- Supplies Waltham, Belmont, Arlington, Lexington, Watertown, Bedford and Winchester
• No Existing Redundancy for WASM 3

  – One of the Remaining Largest Single Points of Failure
  – Significant Service Impacts If a Major Break/Leak
  – WASM 3 Necessary Future Component of Any Long-Term Redundancy Option
WASM 3 Leaks

- 72 leaks since 1987
WASM 3 Leak Repairs
• If a Tunnel Option is Selected for City Tunnel/City Tunnel Extension Redundancy - WASM 3 will be Rehabilitated

• If No Tunnel Option Selected (Initial Plan) - WASM 3 will be Replaced with Larger Diameter Pipe
• Initial Plan – Incorporate into Redundancy Program
  – Replace two thirds of pipe with larger 72-inch pipe
  – Rehabilitate one third of pipe length
Initial Plan

WASM 3 Improvements - Initial Plan

MWRA Distribution Pipes
- Low
- Intermediate High
- High: Northern High; Southern High
- Northern Extra High

Construction Package 1
Replace with 72-inch

Construction Package 2
Replace with 72-inch

Construction Package 3
Clean and Cement Mortar Line
Based upon preliminary design - construction feasibility questionable

- Dense urban areas
- Congested streets
- Multiple utilities/extensive utility relocation
- Street closures/traffic detours
- Significant public impacts
New Pipe Will Be Larger And Deeper

Existing Pipeline is shallow with only 2 to 3 feet of cover

New Pipeline is larger (72”) and requires min. cover of 5 feet
Open Cut Construction
If any northern metropolitan tunnel alternative chosen:
  – 60-inch WASM 3 could be internally rehabilitated with limited pipe replacement
  – Rehabilitation consist of internal cleaning and lining or slip lining
  – Construction impacts considerably less compared to larger pipe diameter (72-inch) open cut replacement
WASM 3 Summary

• Functional reliable WASM 3 necessary
• Alternatives require either 72-inch replacement or 60-inch rehabilitation
• Baseline component of all alternatives to be presented to board with metropolitan redundancy briefing
Overview of DCR/MWRA Source Water Protection Program

July 13, 2016
Quabbin-Ware-Wachusett Watersheds as Part of MWRA Water System
Watershed Protection – Step 1
Advisory
- Watershed Advisory Committees
- WSCAC
- MWRA Advisory Board
DCR-DWSP manages the watersheds and reservoir Source Water Protection Program. DWSP owns 100,000+ acres.

DCR and MWRA have operational agreements under MOU for operations of reservoirs and many other components of system management.

MWRA pays for DWSP through Trust ($16m operations, $8m PILOT) plus $1-$2m a year in DWSP watershed land acquisitions and new capital project costs.

Watershed and Source Protection are the foundation of MWRA’s high quality unfiltered water supply.
Organization – Watershed Management Planning

Watershed Protection Plans: 5 years [Revised 2013; next revision 2018]
Access Plans: 5-10 years [Next revision: Quabbin]
Land Management Plans: 10 years [Entire system revision in process]
Other Reports/Studies: Water Quality (annual); Gulls; Invasives
DEP Regulatory Oversight – Annual Inspections and Required Actions, Reports by DCR + MWRA
## DCR Watershed System Wide Assessment of Importance of Potential Contaminant Sources for Watershed Program Planning

<table>
<thead>
<tr>
<th>Source</th>
<th>Active Supplies</th>
<th>Emergency Supply</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Quabbin</td>
<td>Ware</td>
</tr>
<tr>
<td>Wildlife</td>
<td>High</td>
<td>Low</td>
</tr>
<tr>
<td>Public Access/Recreation</td>
<td>High</td>
<td>Medium</td>
</tr>
<tr>
<td>Timber Harvesting</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Wastewater</td>
<td>Medium</td>
<td>Medium</td>
</tr>
<tr>
<td>Highways/Railways/ROW</td>
<td>Medium</td>
<td>Low; High during transfer</td>
</tr>
<tr>
<td>Agriculture</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Construction</td>
<td>Low</td>
<td>Medium to High</td>
</tr>
<tr>
<td>Commercial/Industrial/ Governmental Sites</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Residential Sites</td>
<td>Low</td>
<td>Medium</td>
</tr>
<tr>
<td>Solid Waste Facilities</td>
<td>Low</td>
<td>Low</td>
</tr>
<tr>
<td>Future Growth</td>
<td>Low</td>
<td>Medium to High</td>
</tr>
<tr>
<td>Climate Change</td>
<td>Medium</td>
<td>Low</td>
</tr>
</tbody>
</table>
### DCR Watershed Protection Plan - Goals and Programs

<table>
<thead>
<tr>
<th>Goal</th>
<th>DWSP Watershed Protection Programs</th>
<th>Quabbin, Ware River, Wachusetts</th>
<th>Sudbury</th>
</tr>
</thead>
<tbody>
<tr>
<td>Protect land through ownership or agreement.</td>
<td>Land Procurement</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Land Preservation</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td>Manage DWSP-owned properties to protect and enhance water quality, and provide stewardship of natural resources.</td>
<td>Land Management</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Wildlife Management</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Public Access Management</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Watershed Security</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Infrastructure</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Work with watershed communities to foster watershed protection principles on land in private ownership.</td>
<td>Watershed Protection Act</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Technical Assistance and Community Outreach</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Interpretive Services</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td>Monitor to identify potential or existing water quality problems.</td>
<td>Water Quality Monitoring</td>
<td>✓</td>
<td>✓</td>
</tr>
<tr>
<td></td>
<td>Environmental Quality Assessments</td>
<td>✓</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Emergency Response</td>
<td>✓</td>
<td>✓</td>
</tr>
</tbody>
</table>
Trust Annual Workplan and Progress Tracking

- Example of Annual Report
- Each Watershed has over 100 Tasks

<table>
<thead>
<tr>
<th>Task #</th>
<th>Task Description</th>
<th>Lead</th>
<th>Product</th>
<th>% Complete</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>44</td>
<td>Continue ongoing communication and coordination with local, state, and federal emergency responders, coordinate with MWRA on all security issues. Submit weekly incident summaries to MWRA.</td>
<td>WR</td>
<td>Ranger logs</td>
<td>100%</td>
<td>On-going, as needed. DCR participated in regional ER group.</td>
</tr>
<tr>
<td>45</td>
<td>Assess Wachusett Dam, spillways, and dikes monthly. Forward all significant issues to the Regional Director and the MWRA. Coordinate with MWRA on annual dam safety inspections for compliance with 302 CMR 10.00.</td>
<td>CE</td>
<td>Inspection logs and reports, summary reports</td>
<td>100%</td>
<td>On-going.</td>
</tr>
<tr>
<td>46</td>
<td>Assess Sudbury system Dams, Spillways, and dikes monthly. Forward all significant issues to the Regional Director and the MWRA.</td>
<td>CE</td>
<td>Inspection logs and reports, summary reports</td>
<td>100%</td>
<td>On-going.</td>
</tr>
<tr>
<td>47</td>
<td>Implement Wachusett Dam/Dike maintenance plan to improve condition of structures.</td>
<td>CE</td>
<td>Inspection reports, summary reports</td>
<td>100%</td>
<td>Lung cleaning, new morning schedules.</td>
</tr>
<tr>
<td>48</td>
<td>Provide supervision, coordination, oversight, and technical support or assistance for all engineering, construction, and renovation work in Section.</td>
<td>CE</td>
<td>Inspections, records of construction and maintenance operations</td>
<td>100%</td>
<td>Ongoing. Work included Gate 2 work, Boat Cove ramp, North and South Dike vegetation removal, and Gate 30 roadway relocation.</td>
</tr>
<tr>
<td>49</td>
<td>Maintain records regarding reservoir and facility construction and maintenance operations.</td>
<td>CE</td>
<td>Misc. records</td>
<td>100%</td>
<td>On-going, as needed.</td>
</tr>
<tr>
<td>50</td>
<td>Develop maintenance/assessment plan for smaller, confirmed DCR dams in Wachusett watershed.</td>
<td>CE</td>
<td>Plan</td>
<td>100%</td>
<td>Plan developed.</td>
</tr>
<tr>
<td>51</td>
<td>Monitor condition of River Rd. (Lower Rd.), Clinton.</td>
<td>CE</td>
<td>Inspection log</td>
<td>100%</td>
<td>On-going.</td>
</tr>
<tr>
<td>52</td>
<td>Develop Emergency Action Plans for smaller, confirmed DCR dams in Wachusett watershed.</td>
<td>CE</td>
<td>Plan</td>
<td>100%</td>
<td>On-going.</td>
</tr>
<tr>
<td>53</td>
<td>Work with MA Riverways to develop plan for re-integrating Edwards Pond into the stream community. File all necessary permits. Remove dam, contingent on permit approvals.</td>
<td>CE</td>
<td>Plan</td>
<td>100%</td>
<td>Project halted due to sediment &quot;contamination&quot; concerns (natural background levels exceed state/federal dredge disposal concentrations) and costs.</td>
</tr>
<tr>
<td>54</td>
<td>Complete 2-5 miles of roadway repairs per year.</td>
<td>WM</td>
<td>Work completion</td>
<td>100%</td>
<td>Drainage work on Gate 28 road as well as maintenance of culverts and ditches.</td>
</tr>
<tr>
<td>55</td>
<td>Continue to clean buildings, pick up trash, recycle paper products, and perform routine building repairs when needed.</td>
<td>WM</td>
<td>Work completion</td>
<td>100%</td>
<td>On-going, as needed.</td>
</tr>
</tbody>
</table>
Why Land Acquisition?

• The management and maintenance of watershed lands in a natural condition is paramount to the continuous supply of pure water

• The finest drinking waters in the world are a product of the natural filtering processes of a forested landscape

• The replication of these natural processes using infrastructure-based treatment and filtration is inferior to, and more expensive than, the incomparable benefits derived from watershed land protection
4 overarching concepts guiding DWSP watershed management:

1. **Protect the most sensitive areas of the watershed through ownership or agreements with land owners.**

2. Manage DWSP-owned properties to protect water quality and provide stewardship of natural resources.

3. Work with watershed communities to protect water resources while accommodating community needs.

4. Monitor to identify potential or existing water quality problems.

**Land Procurement and Land Preservation Programs** are major control program for 8 out of the 12 identified sources of pollutants to the watershed system.
Scientific Method for Targeting Acquisitions in Wachusett Watershed

• Land Acquisition Panel formed in 1993

• DCR and MWRA scientists, planners, engineers, and foresters utilized “Expert Choice” analysis of land use factors in Wachusett watershed to determine water quality protection priorities.

• LAP has very high standards, rejects many possible projects

• GIS used to rate every parcel of land

• Method has been duplicated across country

• Process minimizes subjective elements (e.g. beauty, views) and removes outside pressures
Watershed Land Acquisition 1985 - 2016

- 7.9% owned
- 5,600 acres almost all around Reservoir
  + 2 main tributaries
- Little buffer

- 28.4% owned/restricted
- 360+ acquisitions
- 20,123 acres with more substantial tributary buffers and large forested blocks
Towns with affected parcels: 22
Approximate number of affected parcels: 8,200
Approximate area regulated: 28,000 acres
(13,000/46% Primary; 15,000/54% Secondary)
Percent of watersheds regulated: 12%
(8% of Quabbin; 13% of Ware; 17% of Wachusett)

It has pro-actively limited the water quality impacts of many projects
As intended by the legislature, it has not been a barrier to growth in the region
Purpose of Land Acquisition –
Keep Watershed Forests and Fields

Bear Hill – Rutland Development
DCR Watershed Land Acquisition 1985 - 2016: Acres a Year by Watershed

- Ware River Watershed
- Quabbin Reservoir Watershed
- Wachusett Reservoir Watershed
# Protected Lands in DCR/MWRA Watershed System - 2016

<table>
<thead>
<tr>
<th>Watershed</th>
<th>DCR % watershed 1985</th>
<th>DCR % watershed 2016</th>
<th>Other Protected Lands % watershed</th>
<th>Total Protected</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wachusett</td>
<td>8%</td>
<td>28%</td>
<td>18%</td>
<td>46%</td>
</tr>
<tr>
<td>Ware</td>
<td>31%</td>
<td>38%</td>
<td>12%</td>
<td>50%</td>
</tr>
<tr>
<td>Quabbin</td>
<td>54%</td>
<td>60%</td>
<td>16%</td>
<td>66%</td>
</tr>
<tr>
<td>Total</td>
<td>34%</td>
<td>45%</td>
<td>16%</td>
<td>51%</td>
</tr>
</tbody>
</table>
• Continue to allocate $1-$1.5 million annually for the period of FY14-18.

• Bring additional opportunities of critical nature to the MWRA Board’s attention.

• Continue focus on acquisition by WPR where possible.

• Utilize the LAP Wachusett Model to identify high rated parcels for acquisition.
Use of Non-MWRA Funds

• Gifts and Bargain Sales
  (Federal Deductions and State Tax Credits)

• Collaboration with Non-Profits, Municipalities

• USDA’s Forest Legacy Program

• Municipal Acquisitions
“Q2W” Forest Legacy Application

Quabbin Reservoir to Wachusett Mountain (Q2W)
FY13 Forest Legacy Grant Application
Milestones Reached

• Over 520 parcels acquired
• Over 24,800 additional acres protected via fee and WPR acquisitions
• Over 7,000 acres in WPRs acquired
• Over $136 million spent
• Wachusett watershed acquisitions played large role in successful filtration avoidance decision by federal courts
• Program is a national model in science-based acquisition targeting and use of GIS
Goodale Property – West Boylston, Wachusett Watershed
(14 acres)
Haddad Property – Wendell, Quabbin Watershed (70 acres)
Selden Property – Petersham, Quabbin Watershed (287 acres)
Tashjian Property – West Boylston, Wachusett Watershed (29 acres)
Program Recognition

2010 Exemplary Source Water Protection

Large System Award presented to the
Massachusetts Department of Conservation & Recreation
Massachusetts Water Resources Authority
Boston, Massachusetts

+ 2016 DEP Source Water Protection Award – Wachusett Reservoir
Rehabilitation of Sections 23, 24 and 47 Water Mains

Contract 6385

July 13, 2016
• Section 23:
  • 119-year-old
  • 36-inch diameter cast iron pipe
  • 8,700 LF

• Section 24:
  • 119 year-old
  • 20-inch cast iron main
  • 11,800 LF

• Section 47:
  • 98 year-old
  • 20-inch cast iron main
  • 10,150 LF
**Project Goals**

- Improve water system hydraulics and operating deficiencies
- Extend the useful life of pipelines

*Tuberculated pipe*

*Cement mortar lined pipe*
Section 24 – Major Crossings

[Map showing major crossings, including Nonantum Road and Massachusetts Turnpike]
Section 47 – Brooks St and North Beacon St, Boston and Watertown
Sections 23 and 47 Interconnection – Commonwealth Ave at College Rd, Newton
Contract 6385

- Provides design, engineering services during construction and resident engineering/inspection services

- Two proposals received

- Selection committee recommends award to Green International Affiliates, Inc.

- Not-to-exceed amount of $3,506,868
Contract Schedule

- Notice-to-Proceed: August 2016
- Construction: August 2018
- Substantial Completion: July 2021