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Site Status Update

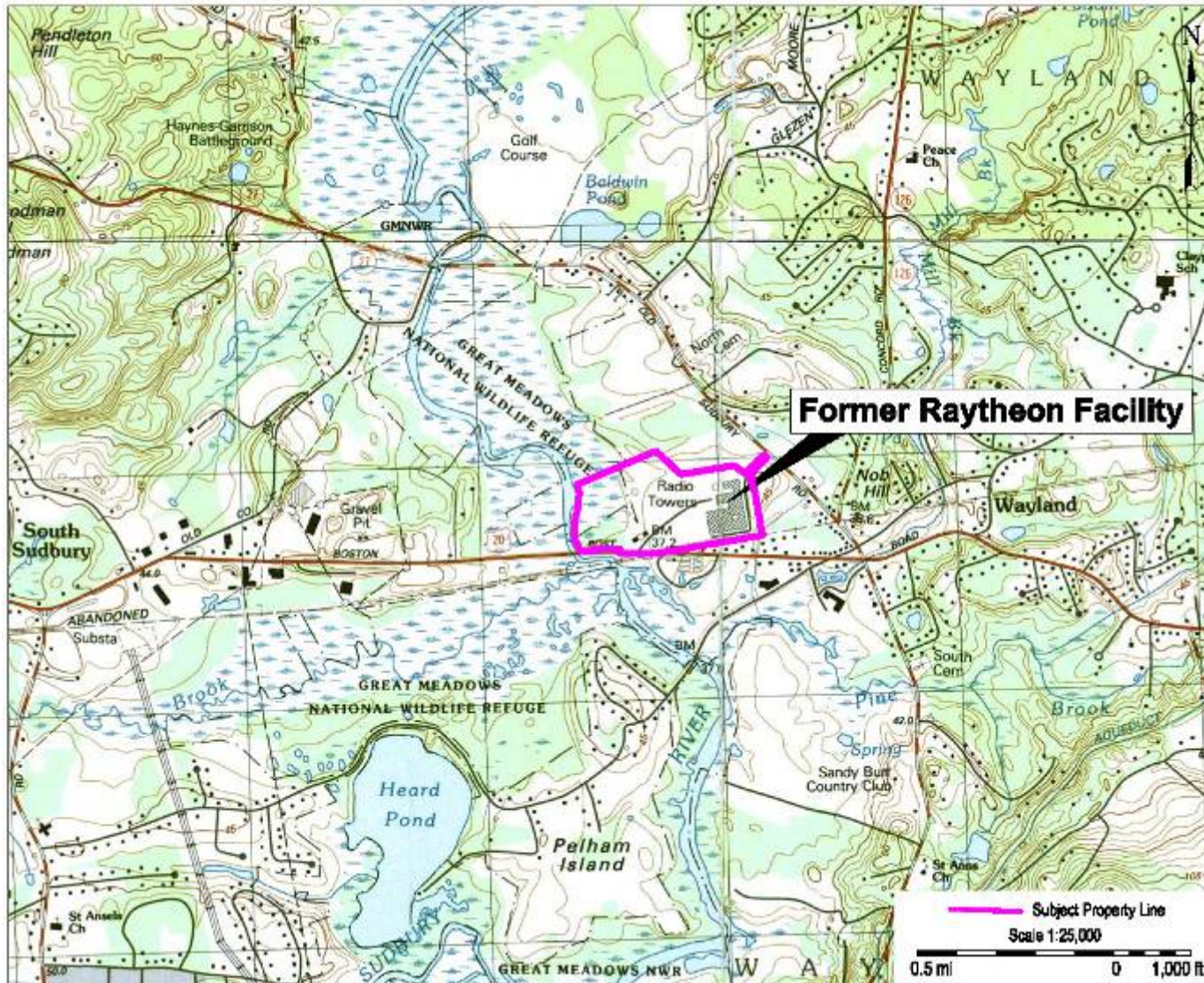
December 2, 2009

**Former Raytheon Facility
Wayland, Massachusetts**

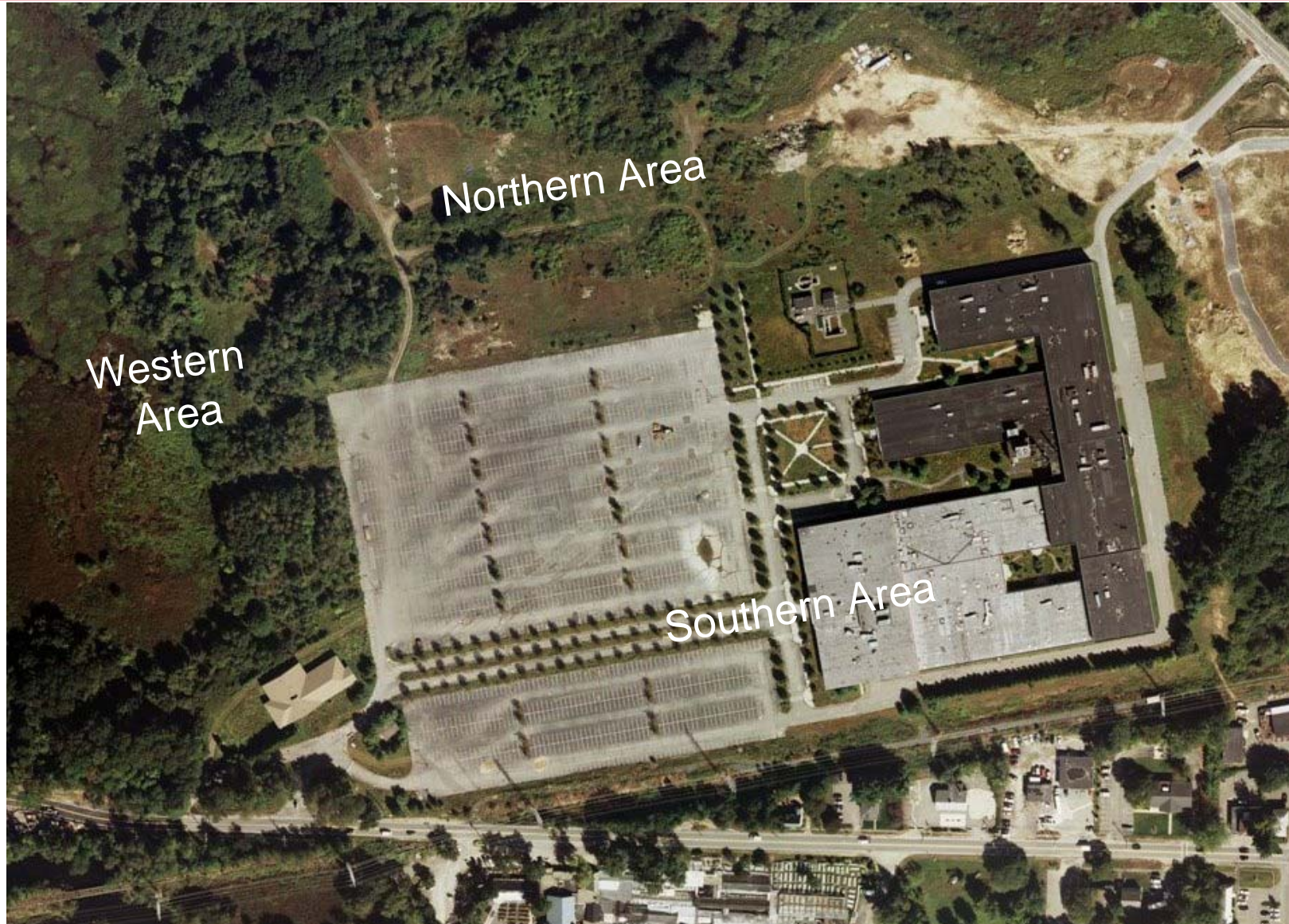
Chip Burkhardt, P.G.

Outline

- Update on Site Activities
 - Northern Area Bioremediation
 - Injection Well Installation
 - August/September Injection
 - General Site Activities
 - Site-wide groundwater gauging and sampling
 - Wetland Restoration
 - Northern Area Wetland
 - Western Area Wetland
 - SEP Sentinel Wells
- Question and Answer Period



Site Overview



Compounds of Concern

Closed Items

- Western Area
 - Arsenic in Groundwater – Class B-1 RAO-P filed November 2007
- Southern Area
 - MtBE in Groundwater – DPS filed November 2007

Compounds of Concern

Open Items

■ Western Area

- PCBs, PAHs, metals in wetland soil/sediment
 - Remediation conducted in Fall/Winter 2003-2004
 - Wetland restoration monitoring conducted through 2008
 - Request for Certificate of Compliance filed with Conservation Commission in January 2009 – To be granted upon completion of SEP

■ Northern Area

- CVOCs in soil
 - Excavation conducted in Summer 2007, wetland restoration monitoring completed in 2009
 - Request for Certificate of Compliance filed with Conservation Commission in November 2009 – To be addressed at December 3 meeting

Compounds of Concern

Open Items (continued)

■ Northern Area

– CVOCs in Groundwater

- Remediation via enhanced reductive dechlorination ongoing

■ Southern Area

– CVOCs in Groundwater

- Remediation via in situ chemical oxidation (ISCO) ongoing



**Wetlands Remediation
and Restoration
Completed**

**Northern Area Source Area Soil
Excavation Completed &
Groundwater Remediation
Conducted**

**Groundwater
Remediation
Conducted**

Northern Area Bioremediation

Enhanced Reductive Dechlorination

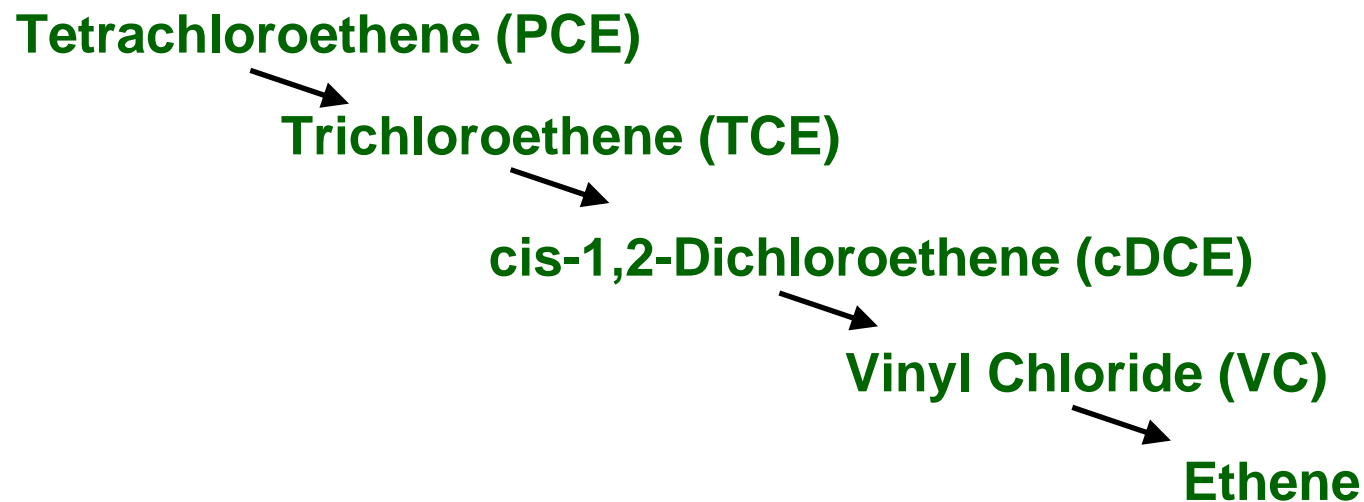
Northern Area Bioremediation



Groundwater Remediation

Enhanced Reductive Dechlorination

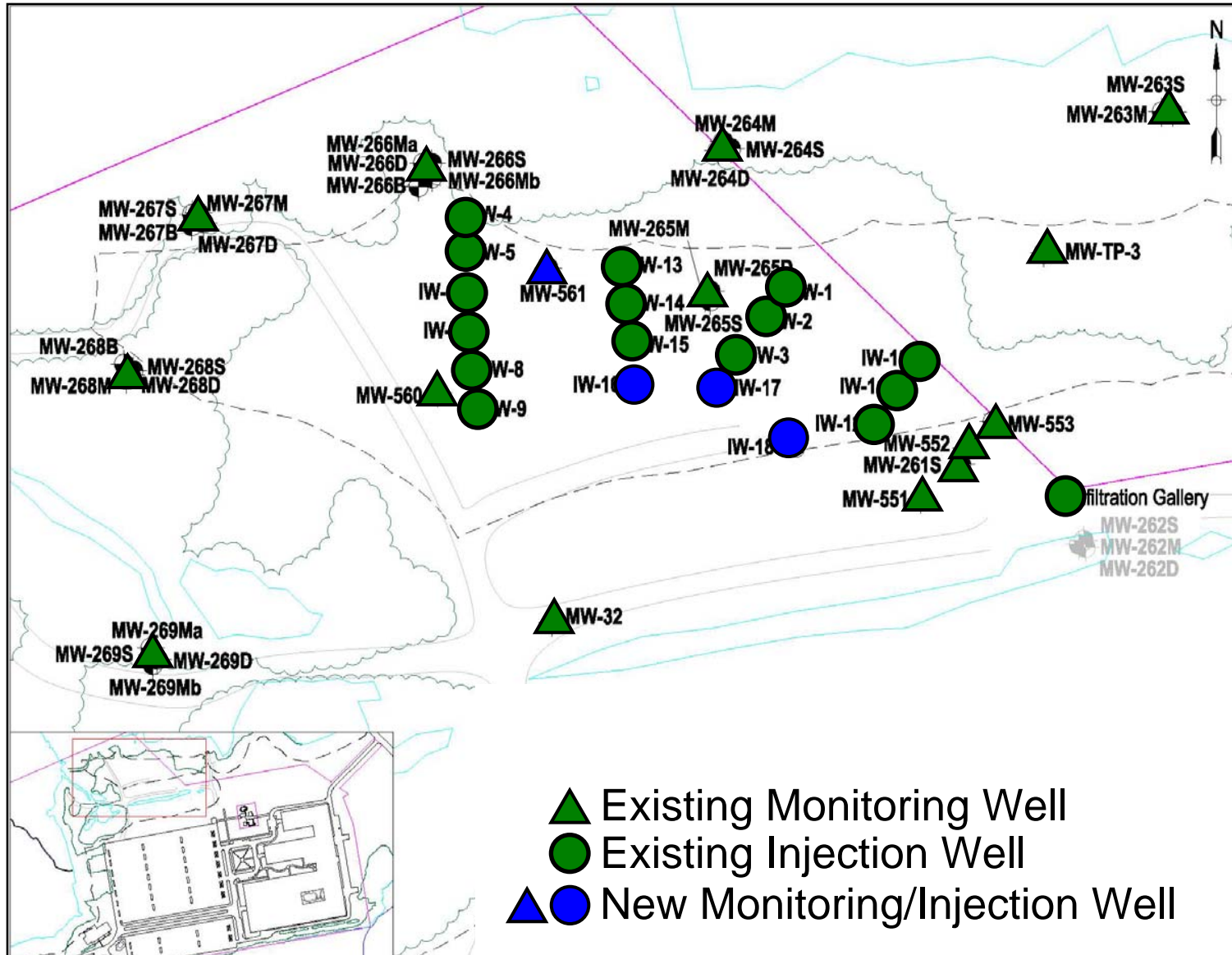
- Use lactate to provide carbon source to naturally occurring microbes in subsurface to jump-start metabolic processes
 - Reductive Dechlorination: Process by which a consortia of microbes remove chlorine atoms from chlorinated solvents until all that is left is harmless ethene gas



Northern Area Bioremediation

- Injection and Monitoring Well Installation August 2009
 - 3 injection wells
 - IW-16, IW-17, & IW-18
 - Provide better access to southern edge of affected area
 - 1 monitoring well
 - MW-561
 - Provides more accurate monitoring of affected area

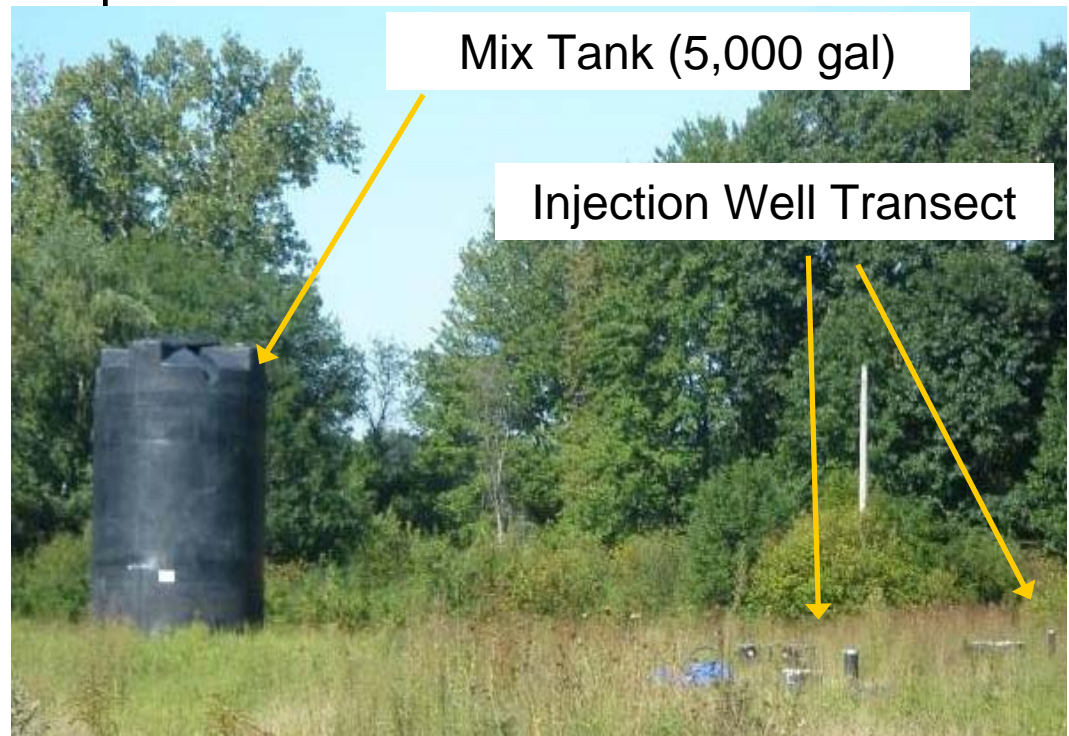
Northern Area Bioremediation



Northern Area Bioremediation

Potassium Lactate Injection

- Approximately 34,000 gallons of potassium lactate injected from August 31 to September 8, 2009
- Switch to potassium from sodium
 - Ability to monitor for increase in potassium concentration to indicate presence of lactate



* Photograph from Aug/Sep 2008 Injection

Northern Area Bioremediation

- Applied approximately 1,500 gallons per injection point
- Approximately 10,000 gallons applied to Infiltration Gallery
- Typical injection parameters similar to previous injections
 - Flow rate = 3 – 6 gpm
 - Pressure = 5 – 15 psi (supplied via centrifugal pump)

Northern Area Bioremediation

Performance Monitoring Program

■ Geochemical Parameter Monitoring

- Measure temperature, conductivity, dissolved oxygen concentration, pH, and oxidation-reduction potential in the field

■ Groundwater Sampling Program

– Quarterly Monitoring

- Samples collected for analysis of a suite of chemicals and parameters (CVOCs, dissolved metals, dissolved gases, etc.)
- Conducted in June and October 2009

Northern Area Bioremediation

Monitoring Results

- Lactate solution delivery
 - Solution continues to migrate out of injection wells and gallery
 - Early indicators are positive for bioremediation
- Subsurface conditions are favorable for bioremediation
 - Naturally occurring biodegradation continues in downgradient areas

Going Forward

- Quarterly monitoring to continue along with monthly field measurements to refine injection interval
- Next injection planned for Summer 2010

Update on Site Activities

Groundwater Gauging & Monitoring

Site-Wide Groundwater Monitoring

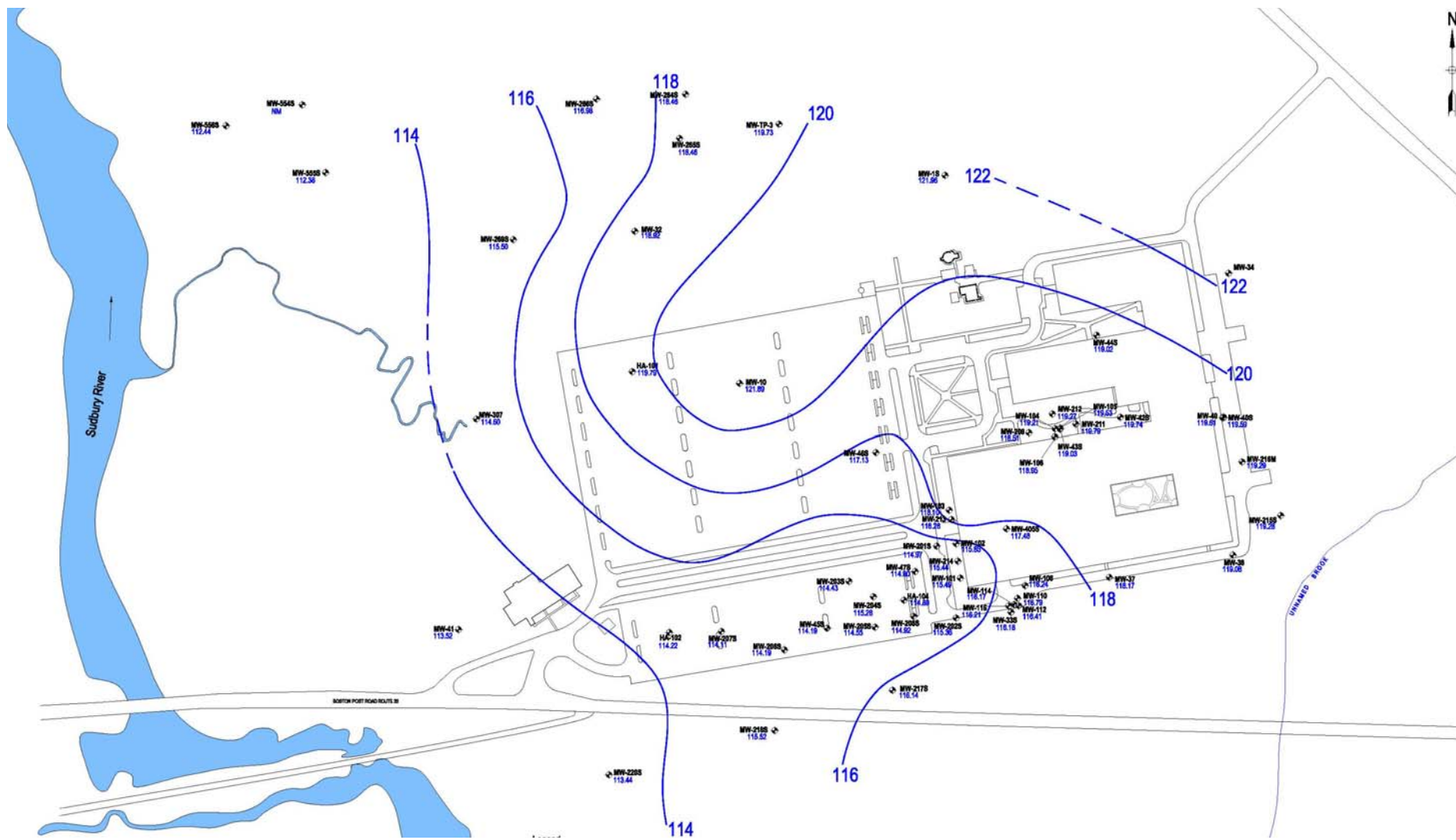
Groundwater Gauging

- Site-wide gauging round conducted on October 5, 2009
 - Water levels measured in > 90 monitoring wells as part of required semi-annual event

Groundwater Quality Monitoring

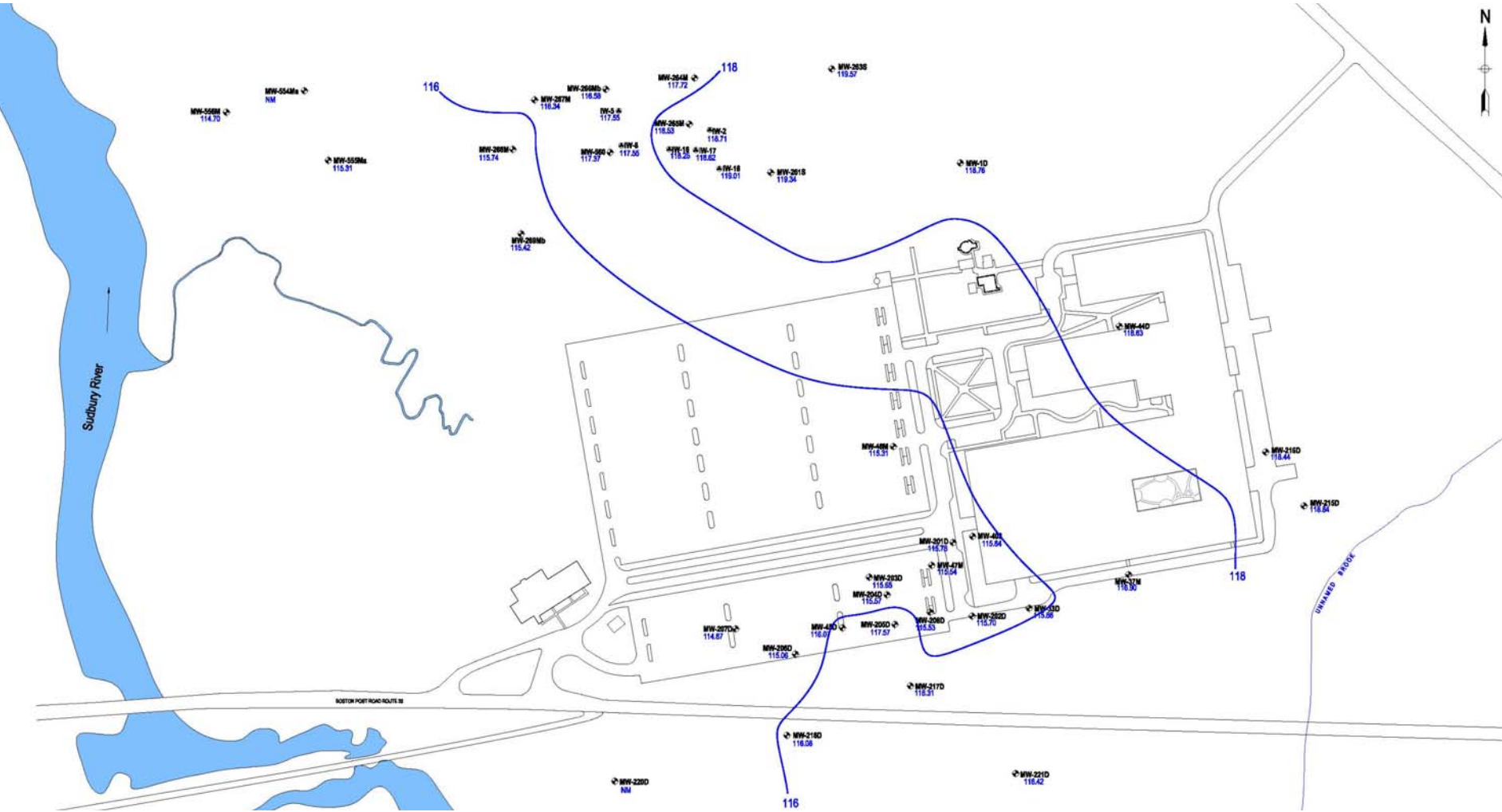
- Monitoring data summarized in Remedy Operation Status Submittal
 - Quarterly monitoring rounds conducted concurrently with Northern Area program in July and October 2009
 - Additional round of samples collected from the Main Building Area (building interior) ISCO injection points in May 2009

Site-Wide Groundwater Monitoring



Shallow Aquifer Elevation Contours

Site-Wide Groundwater Monitoring



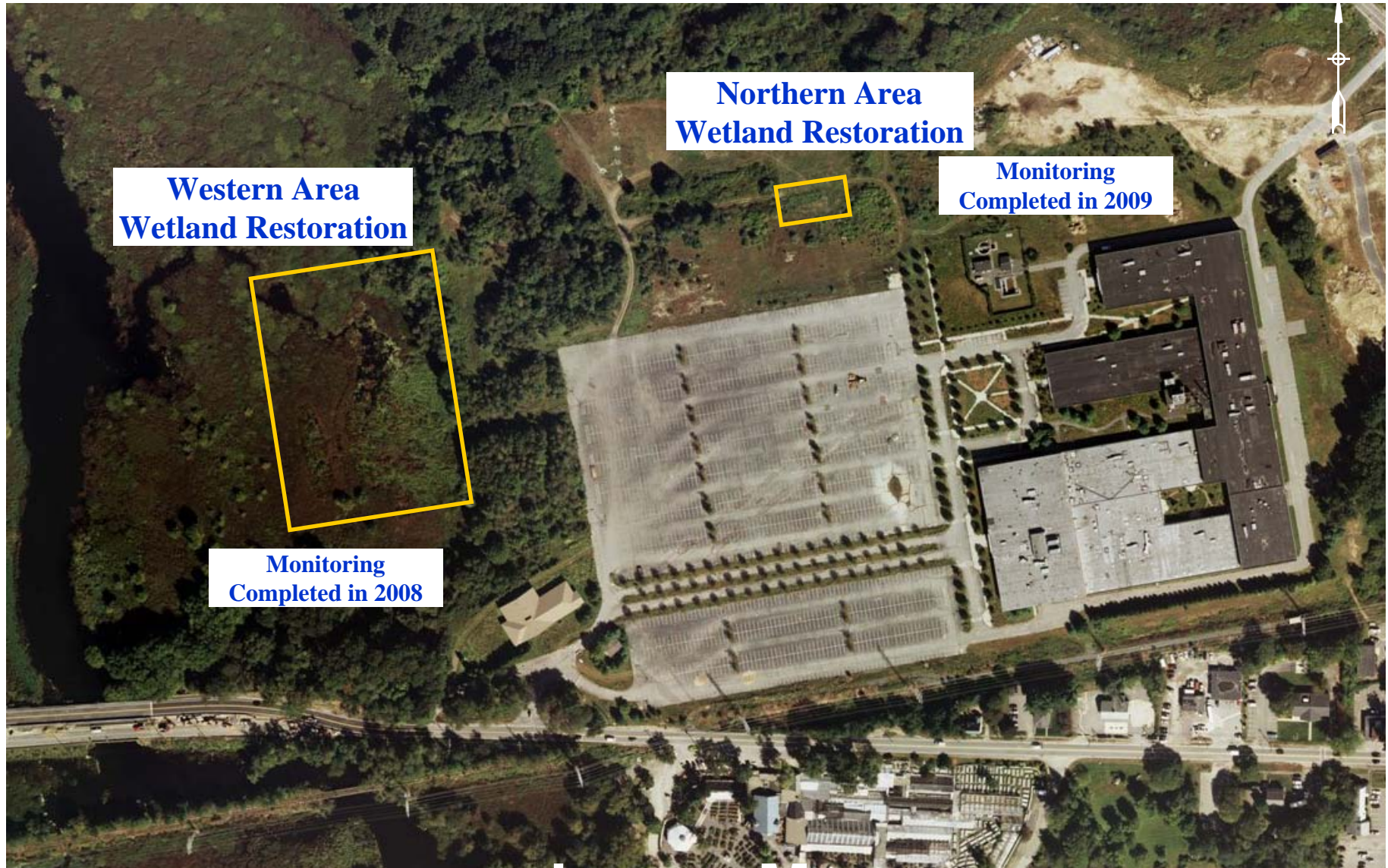
Deep Aquifer Elevation Contours

Site-Wide Groundwater Monitoring

- July and October Monitoring Results and Analysis
 - Residual permanganate identified in areas of 2008 injection program
 - Main Building Area, MW-33 Area
 - Providing treatment of mass in low permeability zones
 - CVOC concentrations consistent with data collected in April 2009
 - ISCO program
 - Monitoring to continue until permanganate is consumed

Update on Site Activities Wetland Restoration

Wetland Monitoring



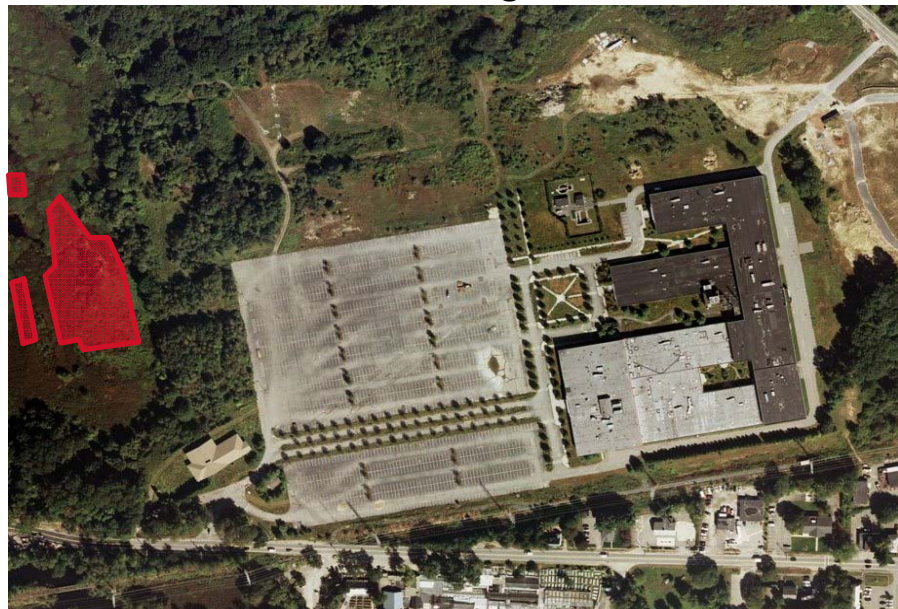
Northern Area Wetland

- Restoration project associated with 2007 Source Area Soil Excavation
- Final year of required 2-year monitoring program completed in 2009
- 2009 Annual Wetland Restoration Monitoring Report submitted on September 25, 2009
- Request for Certificate of Compliance submitted on November 19, 2009
 - To be addressed at December 3 Conservation Commission meeting

Western Area Wetland

SEP – Sentinel Wells

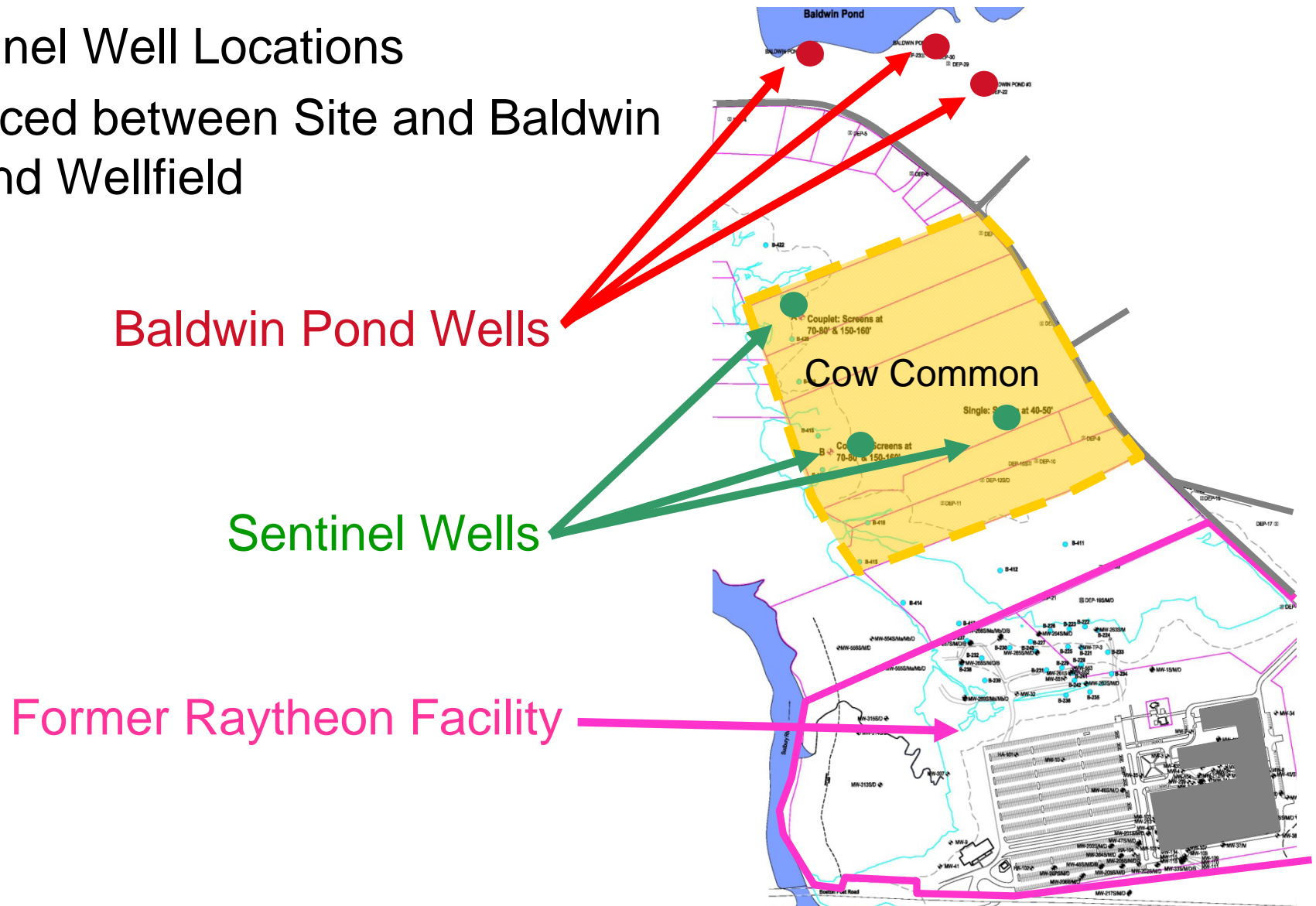
- SEP requested by Conservation Commission at time of filing of Request for Certificate of Compliance (January 2009)
 - Order of Conditions for DEP File No. 322-553
 - Wetlands soil/sediment remediation conducted in 2003-2004
 - Wetlands restoration monitoring concluded in 2008
 - To be addressed at Conservation Commission meeting December 3, 2009



SEP – Sentinel Wells

Sentinel Well Locations

- Placed between Site and Baldwin Pond Wellfield



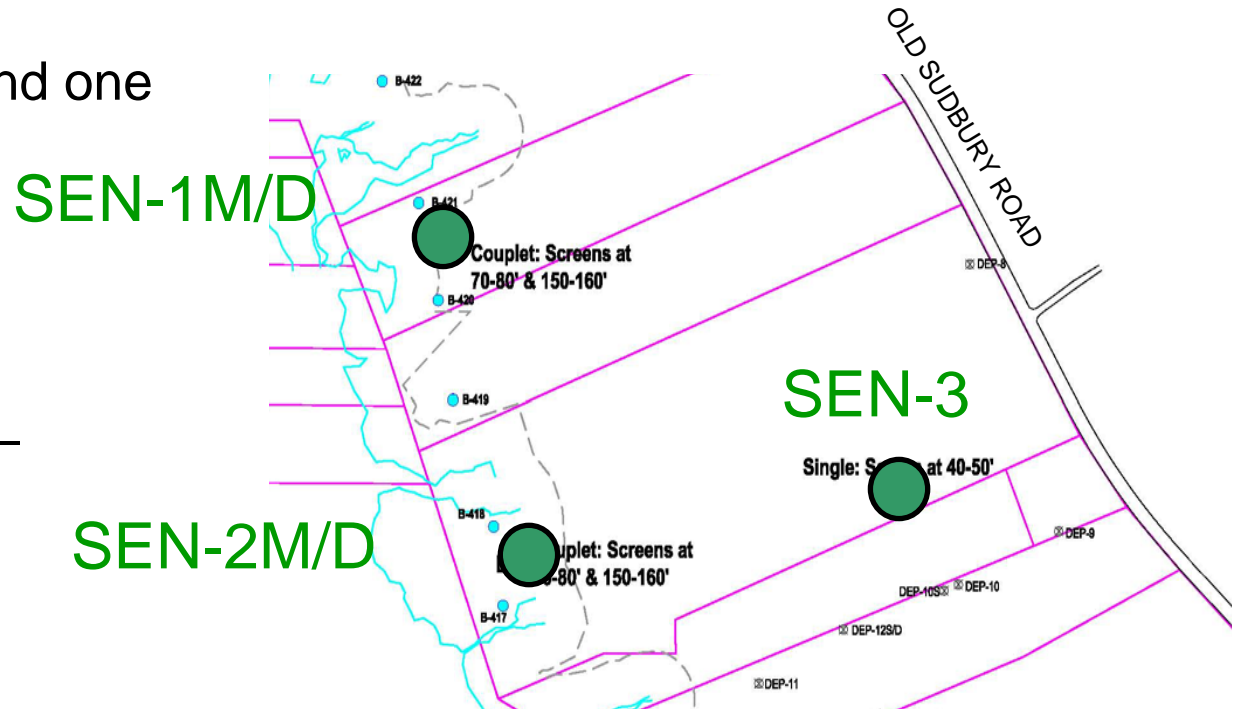
SEP – Sentinel Wells

Well Construction

- 5 wells – 2 couplets and one single well

Schedule

- Work commenced – November 30
- Expected completion – December 8



Well ID	Relative Depth	Screened Interval (feet bgs)
SEN-1M	Medium (M)	70-80
SEN-1D	Deep (D)	150-160
SEN-2M	Medium (M)	70-80
SEN-2D	Deep (D)	150-160
SEN-3M	Medium (M)	40-50

PIP Schedule

- Raytheon will continue to make documents available at the information repositories (Public Library and Board of Health) and extranet web site
www.ermne.com; username – raytheon; password – wayland
- Next PIP meeting: Spring 2010

Q & A