



Air
Land
Sea
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Innovation. In all domains.

Site Status Update

June 23, 2010

**Former Raytheon Facility
Wayland, Massachusetts**

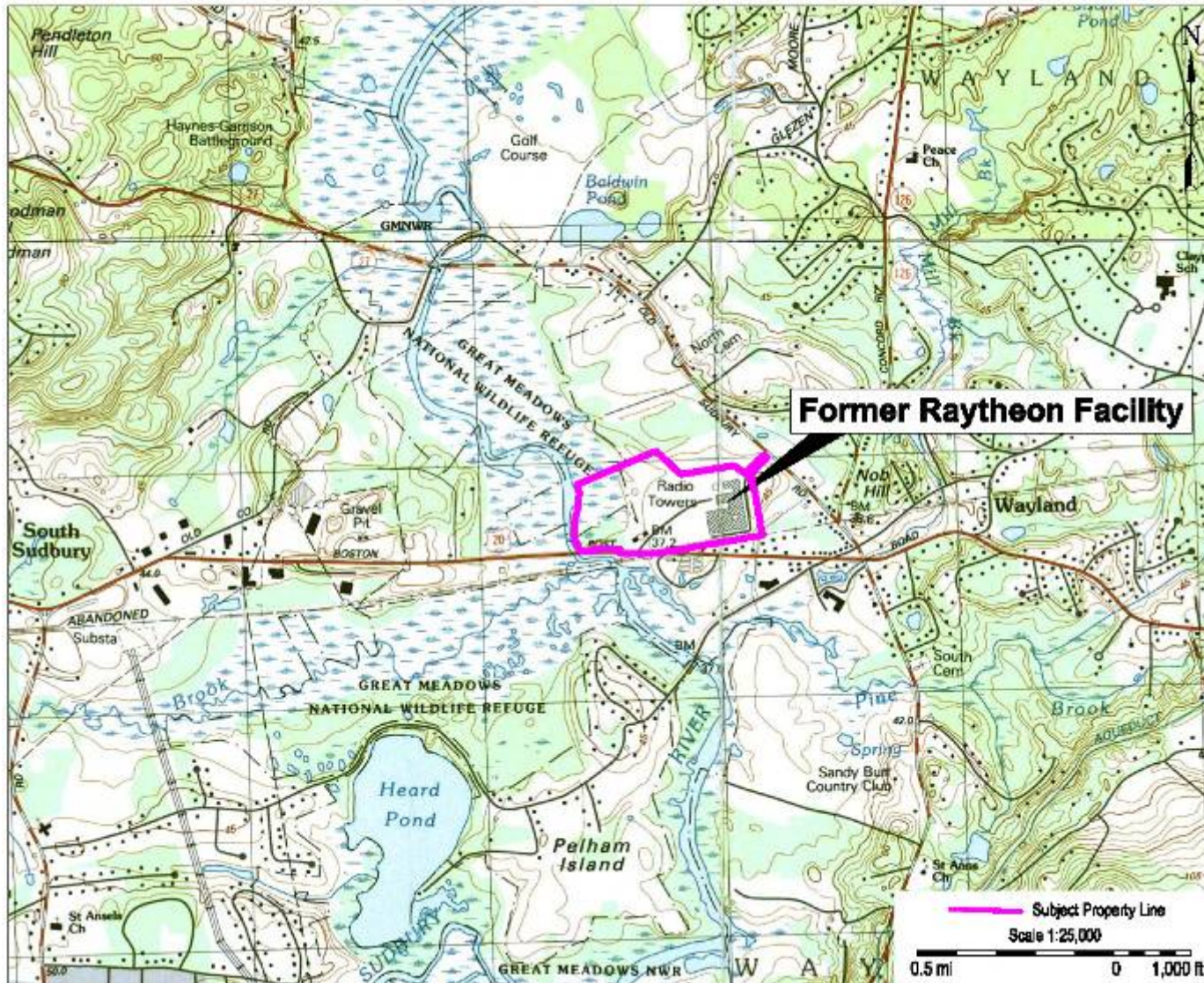
Chip Burkhardt, P.G.

Outline

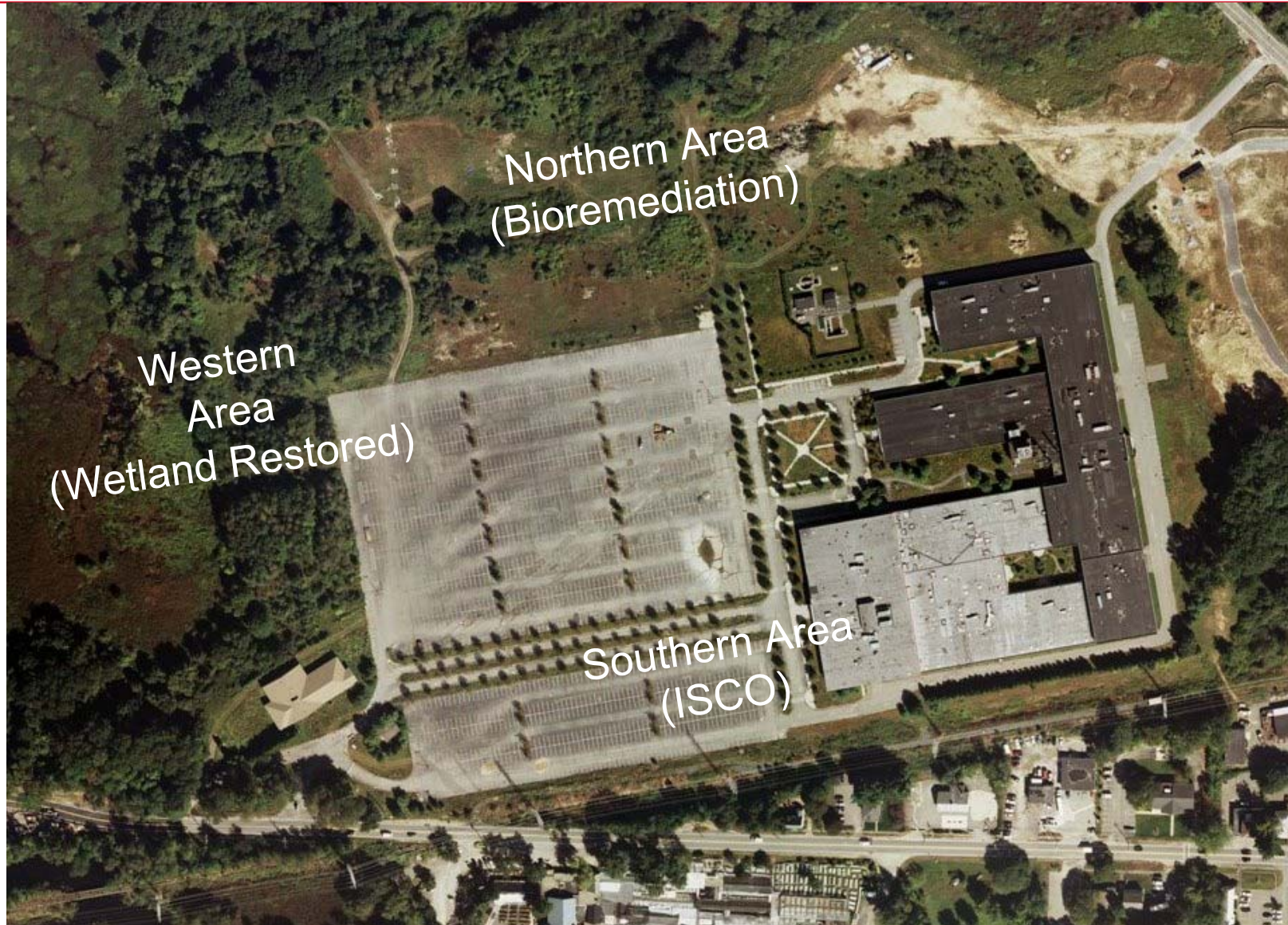
- General Site Overview

- Site Activities Update
 - Site-wide groundwater gauging and monitoring
 - Northern Area Bioremediation
 - Southern Area ISCO
 - Wetland Restoration
 - SEP - Sentinel Wells

- Question and Answer Period



Site Overview



Closed Items

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

- Southern Area
 - MTBE in Groundwater – DPS filed November 2007
 - MassDEP created a new RTN: 3-27651
 - Technical Screening Audit performed by MassDEP April 2008

- Northern Area
 - CVOCs in soil – Completed source area removal in 2007
 - Certificate of Compliance issued March 25, 2010

Open Items

- Western Area
 - PCBs, PAHs, metals in wetland soil/sediment
 - Awaiting issuance of Certificate of Compliance following completion of SEP in December 2009

- Northern Area
 - CVOCs in Groundwater
 - Remediation via enhanced reductive dechlorination ongoing

- Southern Area
 - CVOCs in Groundwater
 - Remediation via in situ chemical oxidation (ISCO) ongoing
 - Injection point decommissioning program commencing

Update on Site Activities

Groundwater Gauging & Monitoring

Site-Wide Groundwater Monitoring

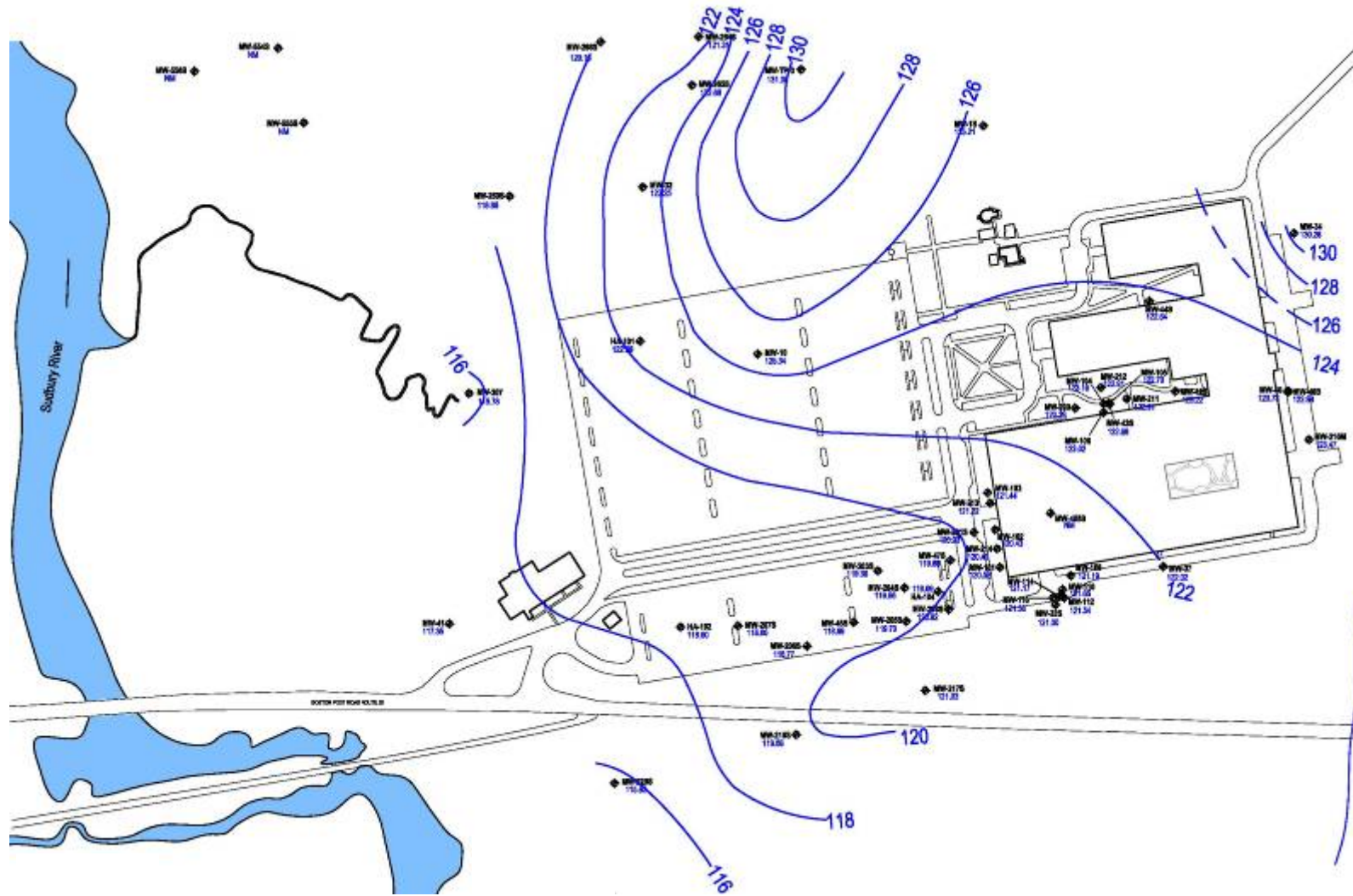
Groundwater Gauging

- Site-wide gauging round conducted on April 19, 2010
 - 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 February and April 2010

Site-Wide Groundwater Monitoring



Shallow Aquifer Elevation Contours

Northern Area Bioremediation

Enhanced Reductive Dechlorination

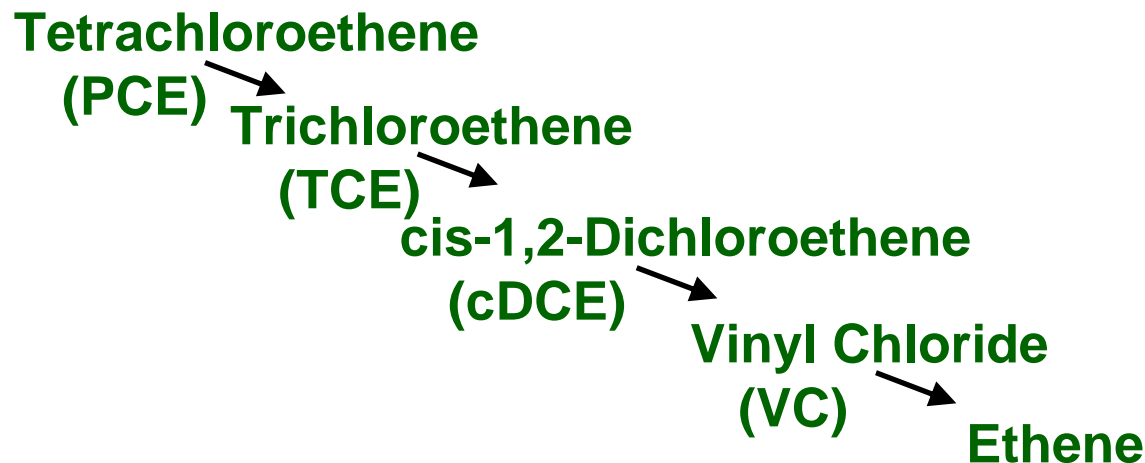
Northern Area Bioremediation



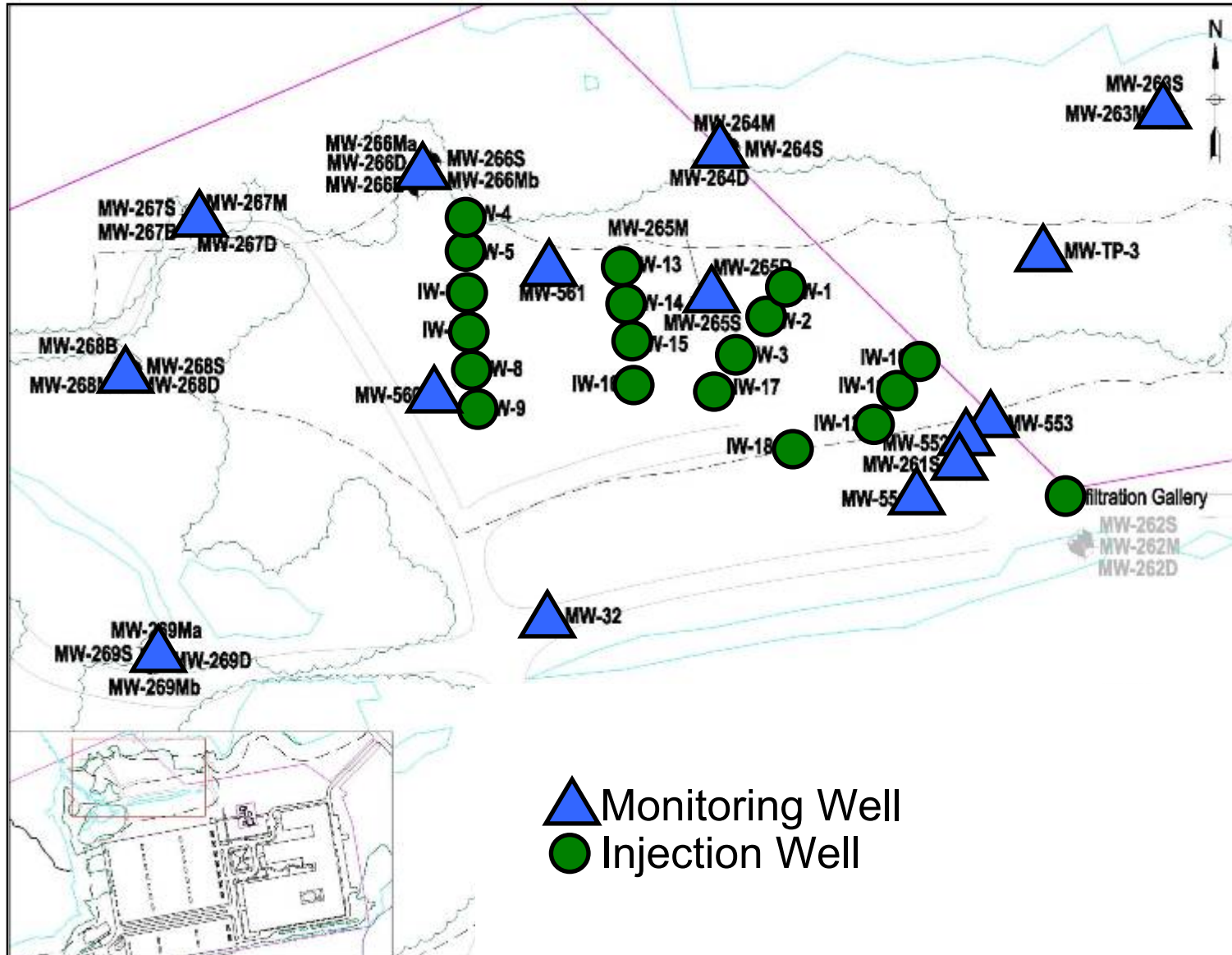
Groundwater Remediation

Enhanced Reductive Dechlorination

- Lactate (ie carbon source) was introduced to naturally occurring microbes via injection wells 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



Northern Area Bioremediation

Summer 2010 Injection

- Delivery of a carbon source or “food” (ie, lactate) to subsurface via existing injection wells and infiltration gallery



* Photograph from Aug/Sep 2008 Injection

Northern Area Bioremediation

Continue Existing 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 February and April 2010

Northern Area Bioremediation

Monitoring Results

- Lactate solution delivery
 - Solution continues to migrate out of injection wells and gallery
 - Indicators of subsurface conditions are positive for bioremediation
- Subsurface conditions are favorable for bioremediation
 - Naturally occurring biodegradation continues in downgradient areas
 - Increased production of daughter products

Going Forward

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

Southern Area

In Situ Chemical Oxidation

Southern Area ISCO

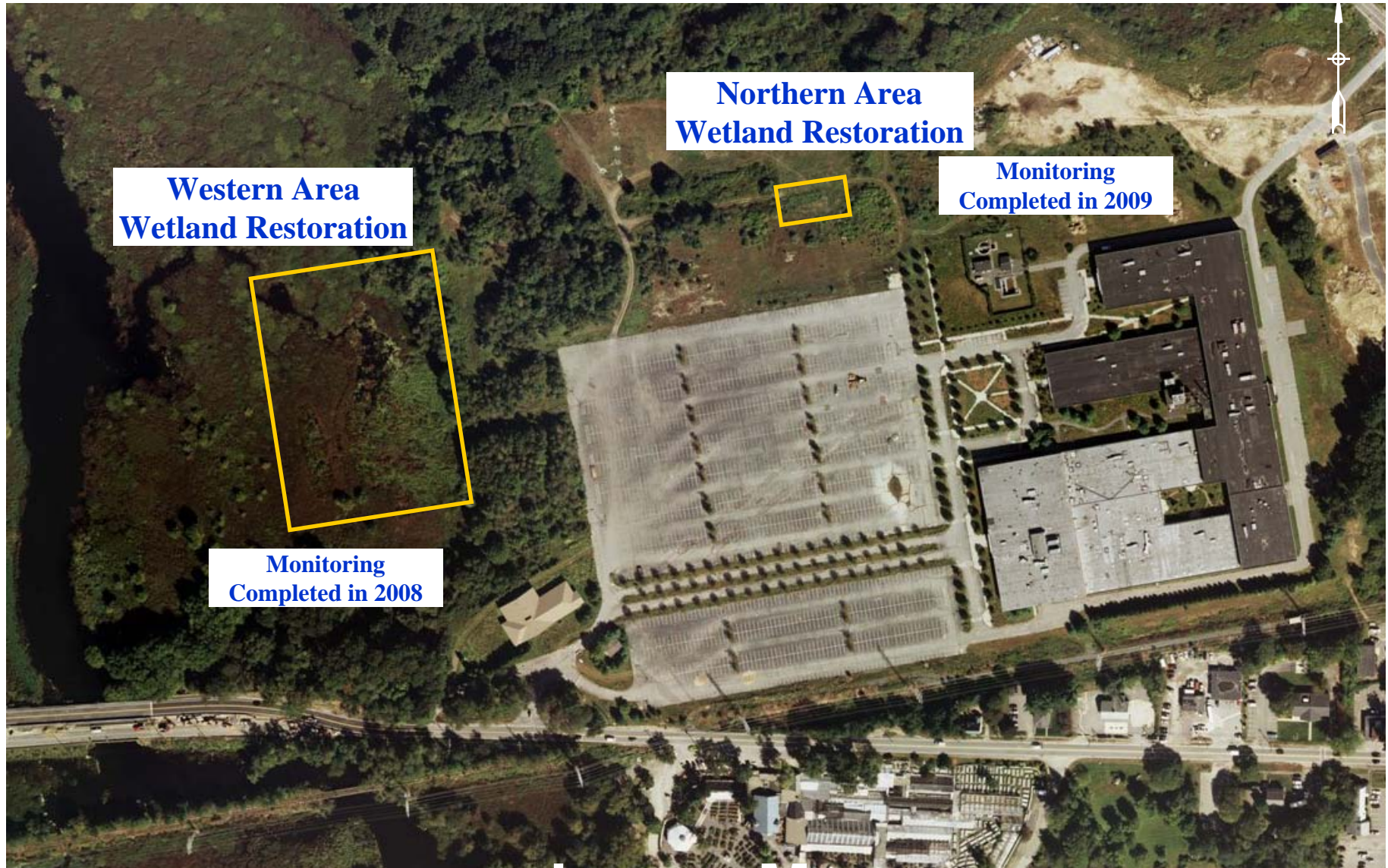


Southern Area ISCO

- Southern Area February and April Monitoring Results
 - 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 continue to decline from pre-injection values
 - Since 2004, 85% of wells in monitoring program have seen a greater than 75% reduction in CVOCs
 - Quarterly monitoring to continue until permanganate is consumed

Update on Site Activities Wetland Restoration

Wetland Monitoring



Northern Area Wetland

- Certificate of Compliance to be issued by Conservation Commission
- Restoration project associated with 2007 Source Area Soil Excavation
- 2-year wetland monitoring program completed in 2009
- SEP completed in 2009

Western Area Wetland

SEP – Sentinel Wells

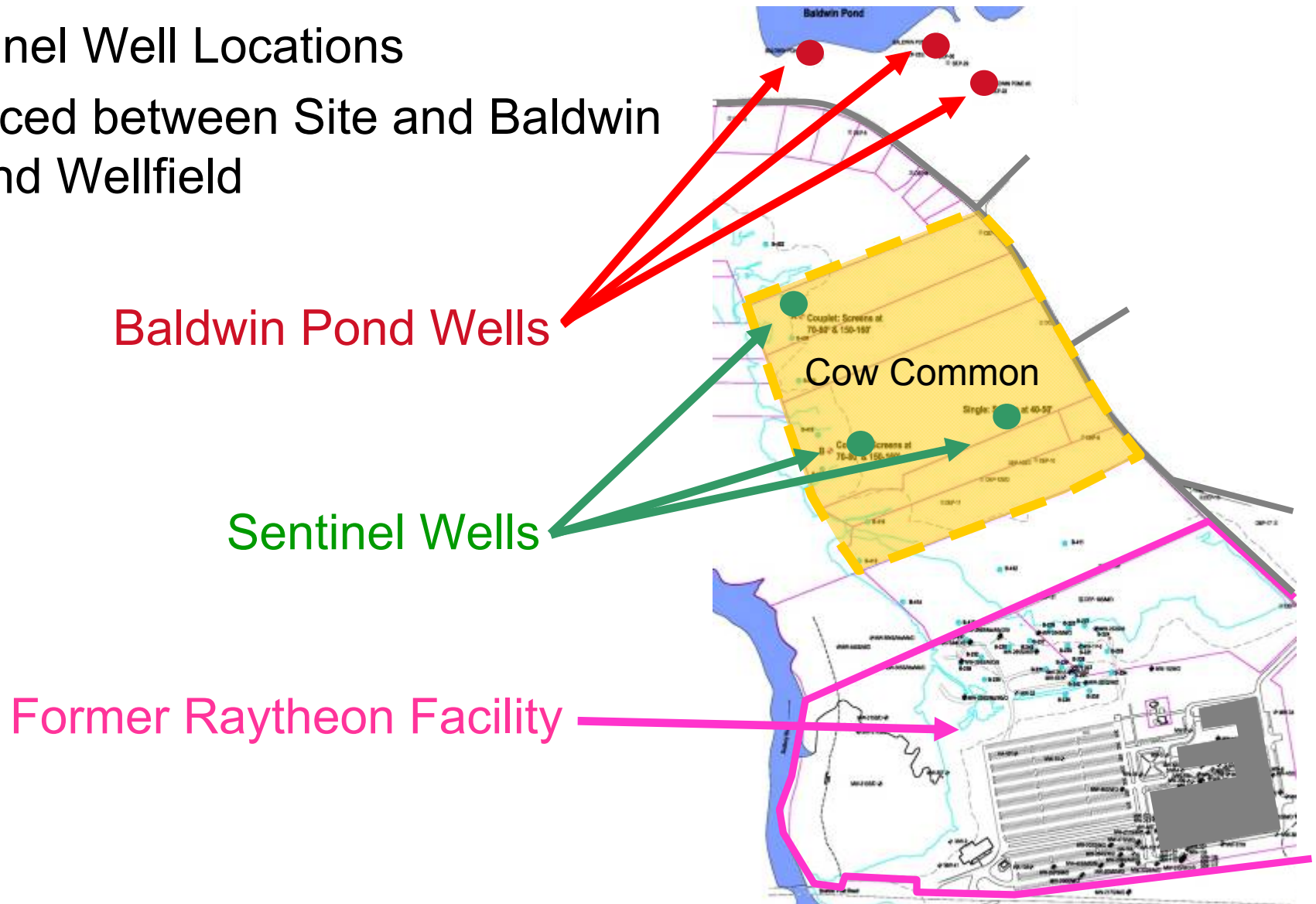
- SEP Completed in December 2009
 - Installation of sentinel monitoring wells on behalf of town
- Certificate of Compliance to be issued by Conservation Commission



SEP – Sentinel Wells

Sentinel Well Locations

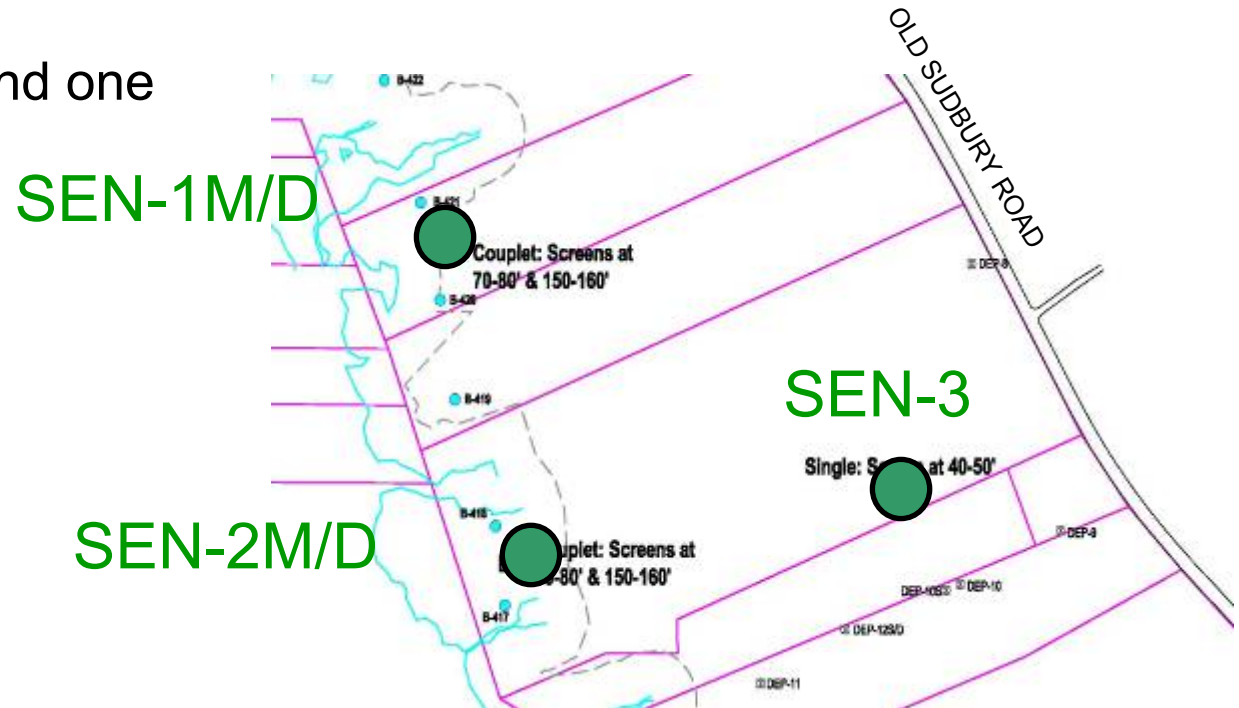
- Placed between Site and Baldwin Pond Wellfield



SEP – Sentinel Wells

Well Construction

- 5 wells – 2 couplets and one single well



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

SEP – Sentinel Wells

- Groundwater samples collected from wells in April 2010
 - Pursuant to agreement with Conservation Commission
 - Analyzed for VOCs by Method 8260B
- Compounds detected
 - Chloroform (20 µg/L)
 - Ethyl-tert-butyl-ether (3.8 µg/L)
 - Carbon Disulfide (3.1 µg/L)
 - Toluene (1.9 µg/L)
- Consistent with DEP Investigations in 2000 & 2001
- Below MCP Reportable Concentrations

Q & A

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: Fall 2010