

Raytheon

Customer Success Is Our Mission



Remediation Status Update

Former Raytheon Facility Wayland, Massachusetts

Jonathan Hone

November 28, 2012

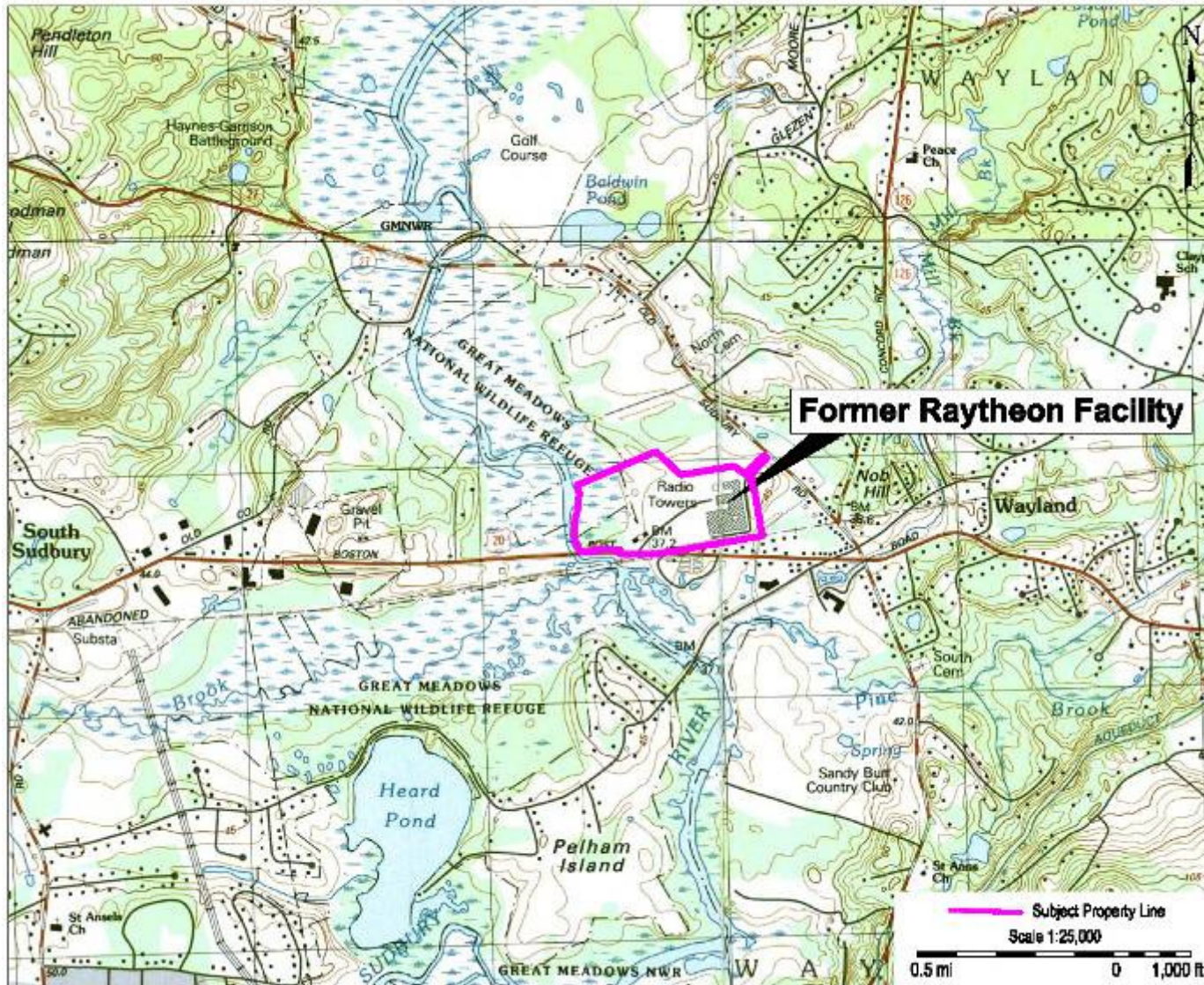
Outline

- Team Introductions
 - John Drobinski, site-LSP, Environmental Resources Management
 - Dr. Sami Fam, Innovative Engineering Solutions
 - Jonathan Hone, Raytheon Project Manager

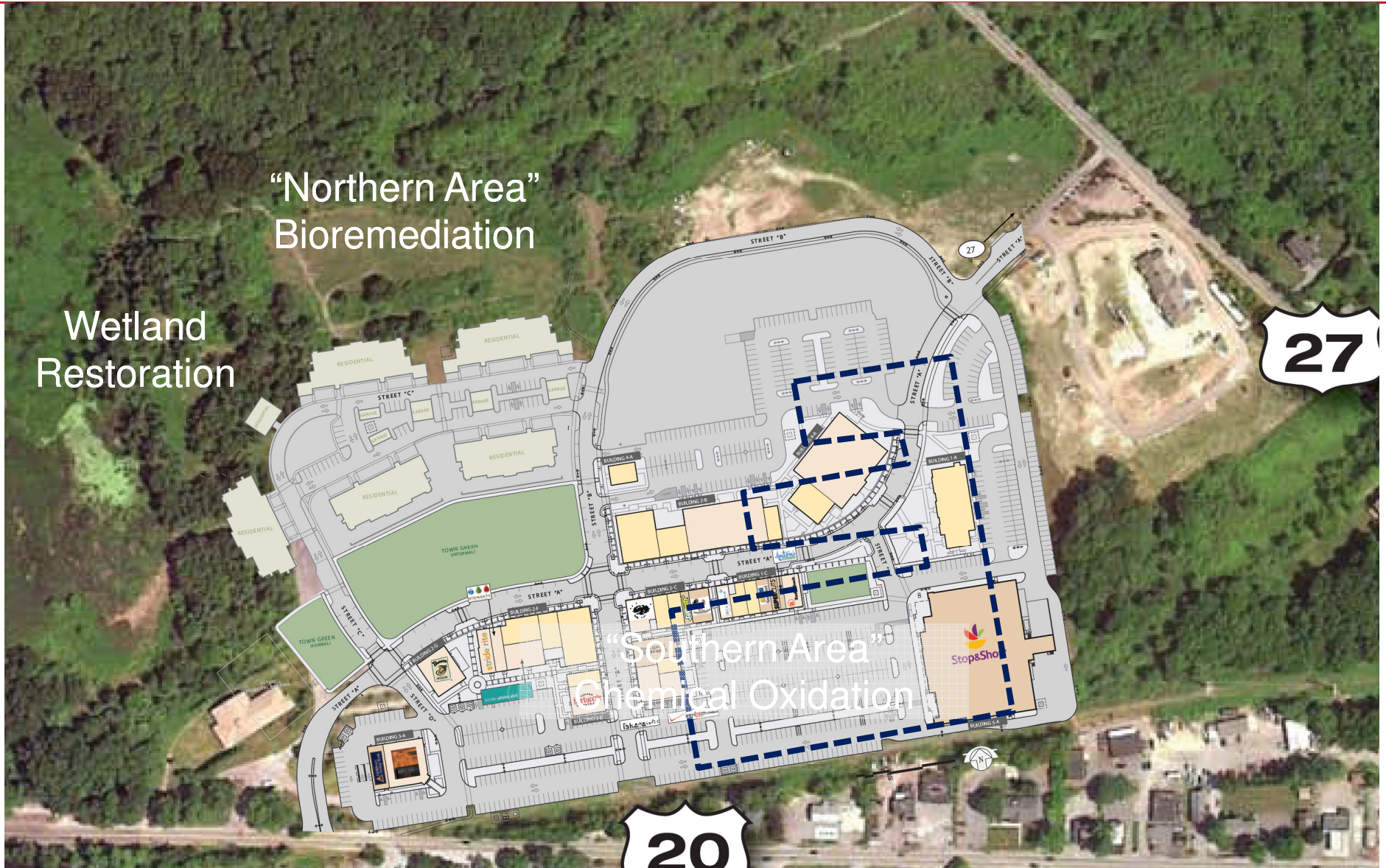
- General Site Overview

- 2012 Site Activities
 - Site-Wide Activities
 - Southern Area Monitoring Wells installation
 - Northern Area Bioremediation

- Q&A



Site Overview



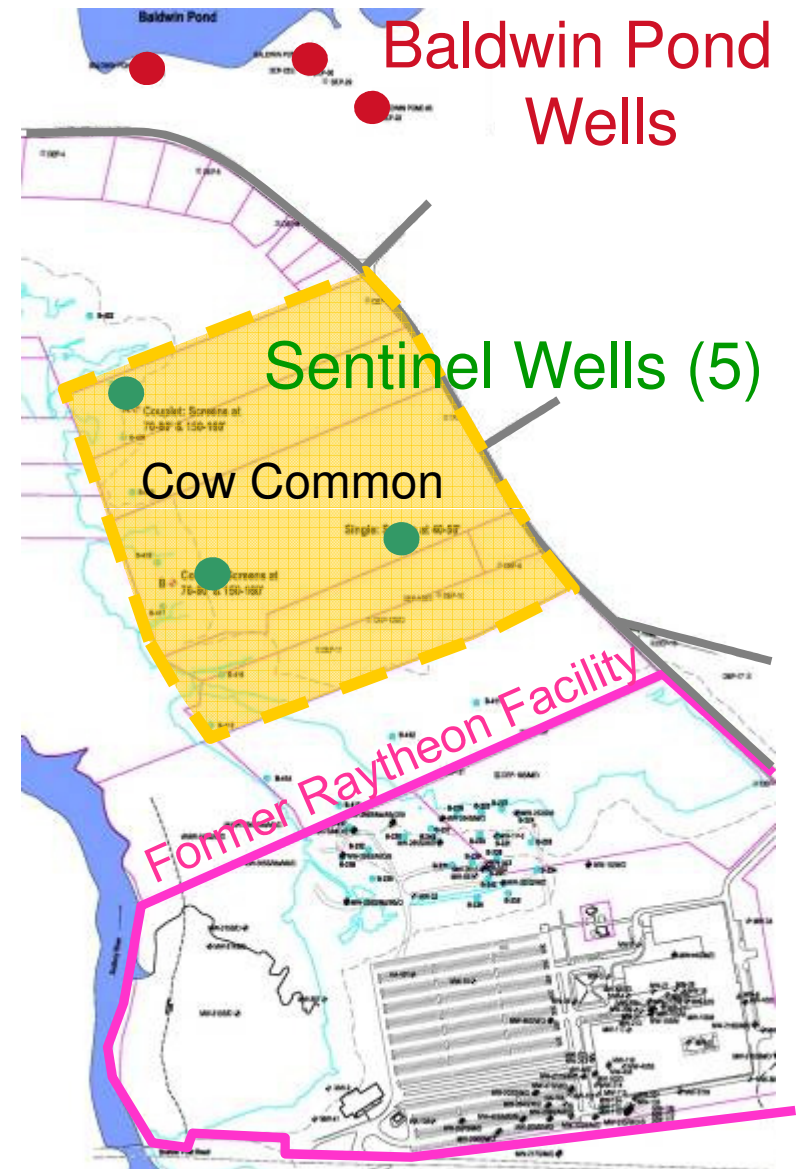
Update on Site Activities

2012 Activities

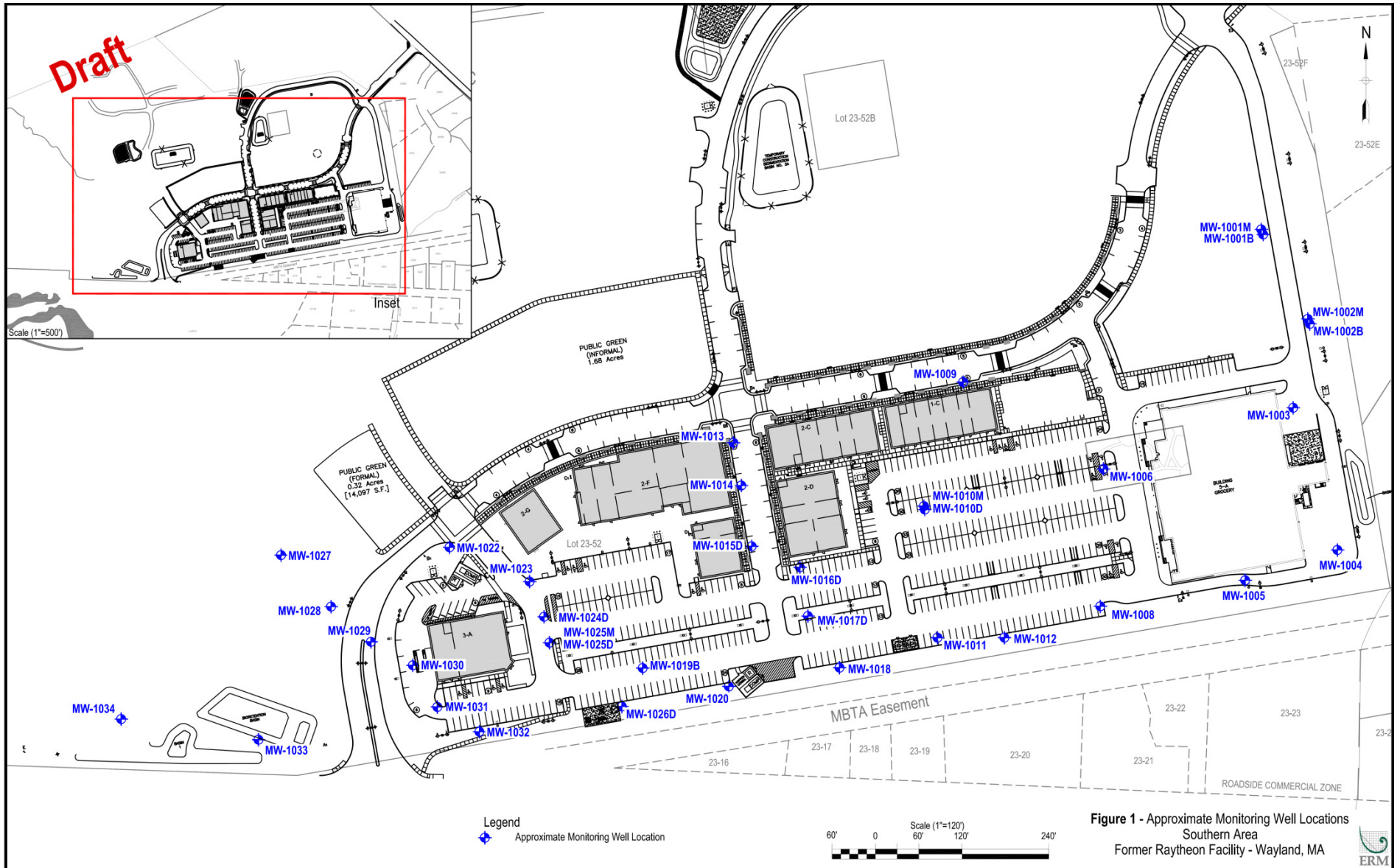
- Remedy Operation Status Reports submitted in May & November
 - Available online and at the Town repository
- Groundwater Quality monitoring
 - Data summarized in Remedy Operation Status (ROS) Submittals
 - Limited Southern Area data due to Construction
- Southern Area Monitoring wells reinstallation
- Northern Area Bioremediation System
 - System Operation and Maintenance
 - Groundwater monitoring
 - Injection and recirculation of Amended Groundwater
 - Expansion of the system

Cow Common/Sentinel Wells

- Groundwater samples collected from wells in July 2012
 - Analyzed for VOCs by Method 8260B
- Ethyl ether (aka “ether”) detected at 1.1 µg/L
 - Drinking Water Standard – 1,000 µg/L
 - Laboratory Method Detection Limit - 1 µg/L
- No detections of other previously identified compounds: carbon disulfide, chloroform, ethyl-tert-butyl ether, toluene



Southern Area Well Reinstallation



Northern Area Bioremediation via Enhanced Anaerobic Dechlorination (EAD)

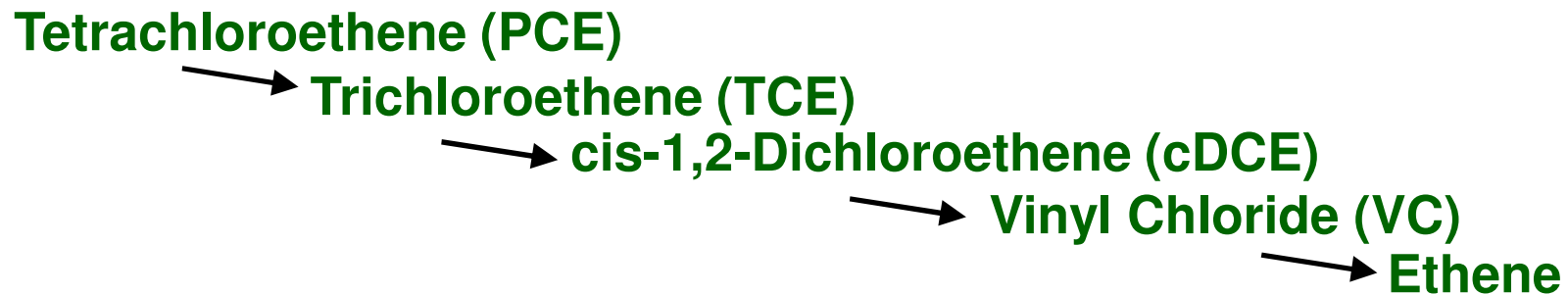
Northern Area



Bioremediation Progression

- Dechlorination: Process by which a consortia of microbes remove chlorine atoms from chlorinated solvents until all that is left is innocuous/harmless ethene
- A carbon source or amendment has been introduced to the naturally occurring microbes to jump-start metabolic processes

- Dechlorination Progression

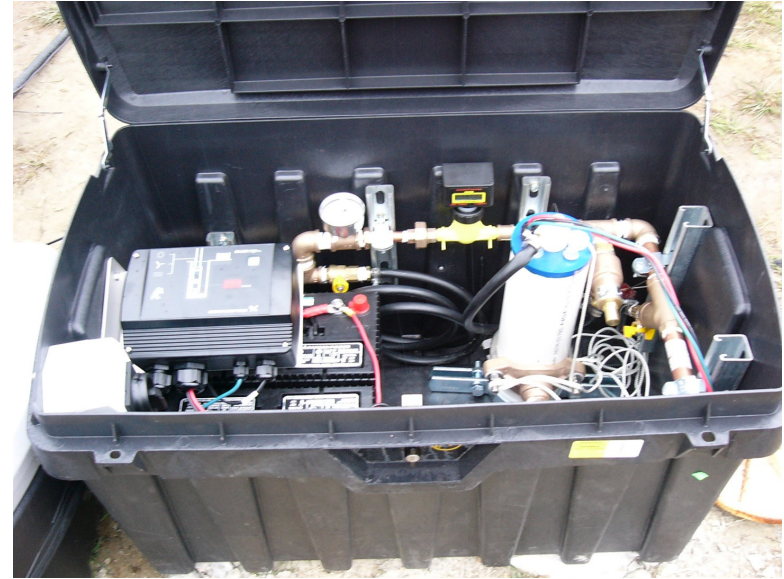


Recirculation System Overview

- The program involves recirculation of groundwater within a area to distribute the added amendment (carbon source, food, electron donor)
- Increases subsurface mixing by injection (upgradient) and extraction (downgradient) of amended groundwater
- Extraction wells are fitted with submersible pumps and control equipment to monitor flow, minimize possibility of leaks, and prevent damage to system
- Solar powered pumps and controls extract groundwater continuously at approximately 1-5 gallons per minute

Recirculation System Photos

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Integrated Defense Systems



System Update

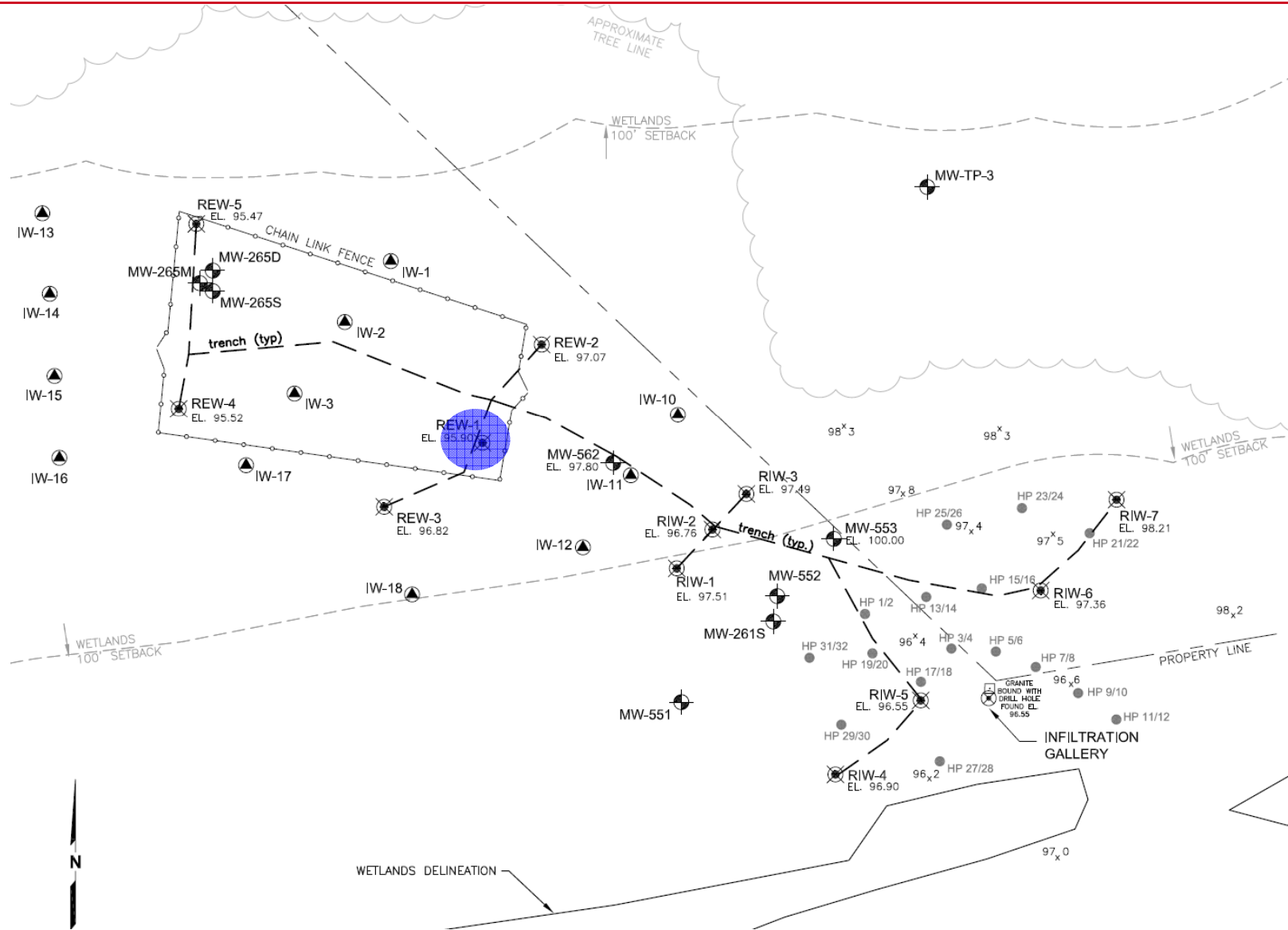
- Recirculation system initial start up: October 2010

- System expansion in 2011
 - Three (3) extraction wells came online (REW-3,4,5) polishing treatment near 2007 Cofferdam excavation
 - 3rd Solar array was added

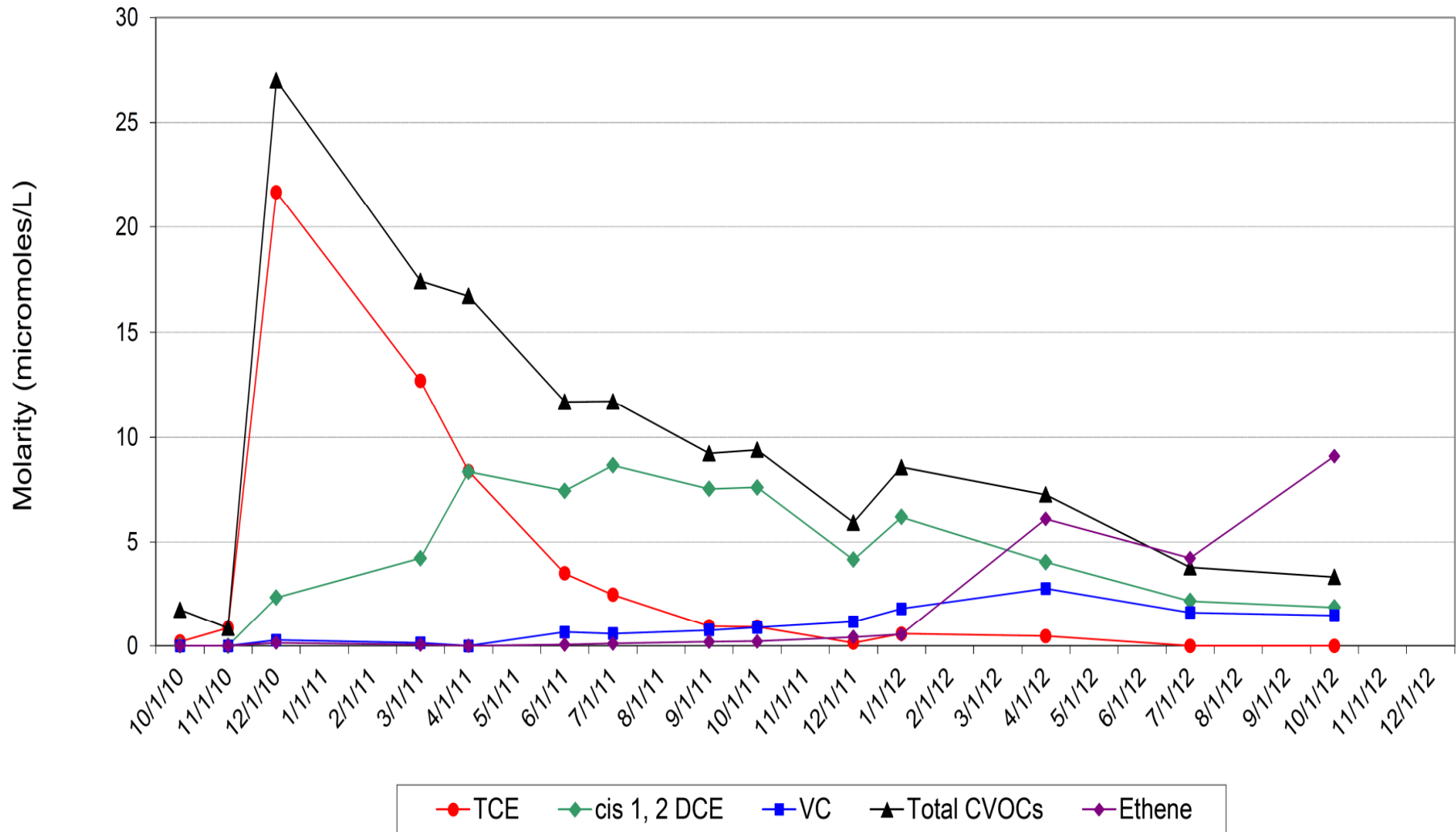
- Activities since last PIP update (December 14th)
 - Recirculated approximately ~3.5 million gallons of groundwater since the program began (2.1 Million October 2011-September 2012)
 - 2 “feeding” events (March & June) - Methanol, nutrients, pH buffers, cultures added to the system

- Groundwater monitoring data are positive and encouraging

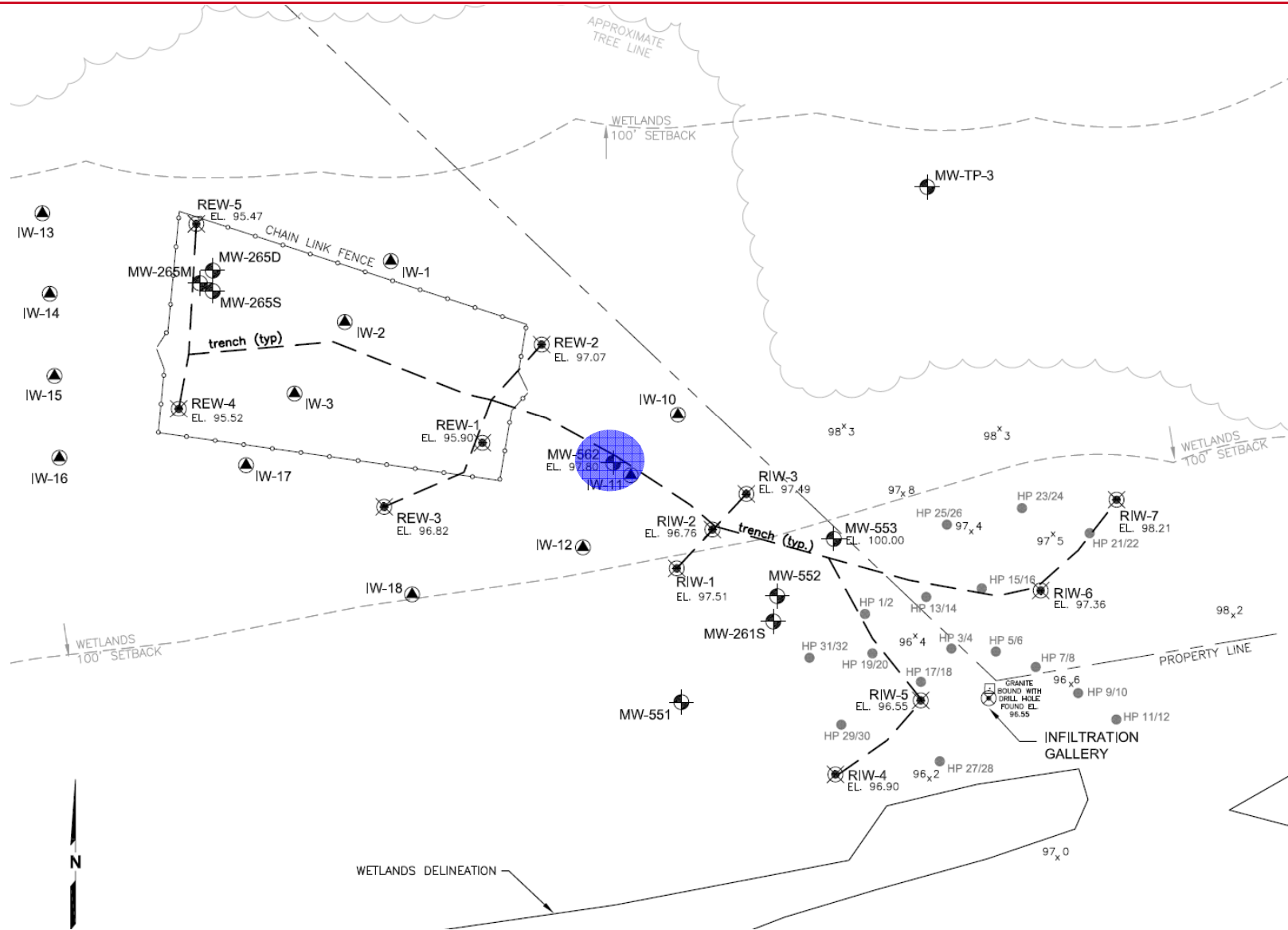
Northern Area Site Plan REW-1



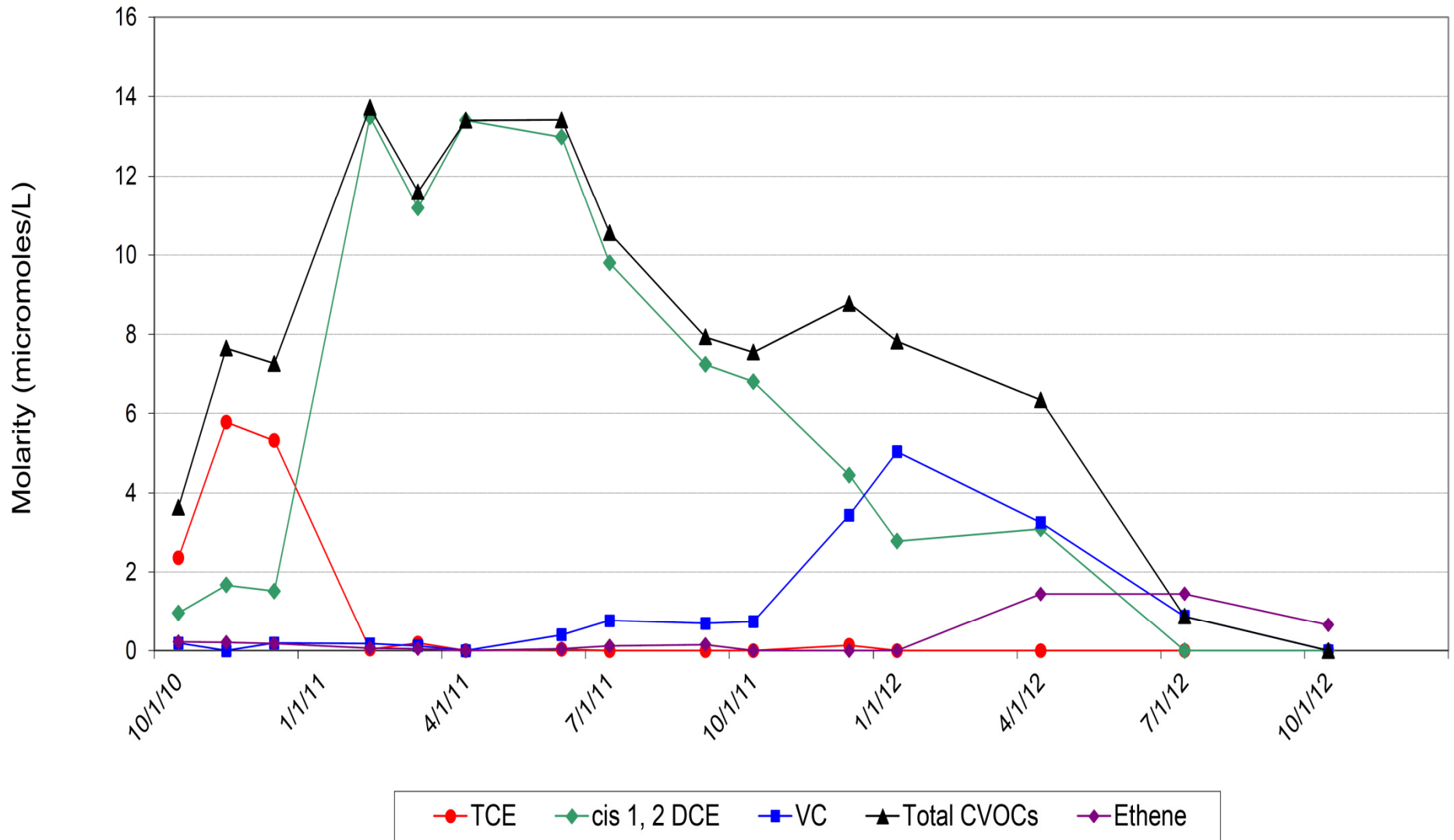
REW-1



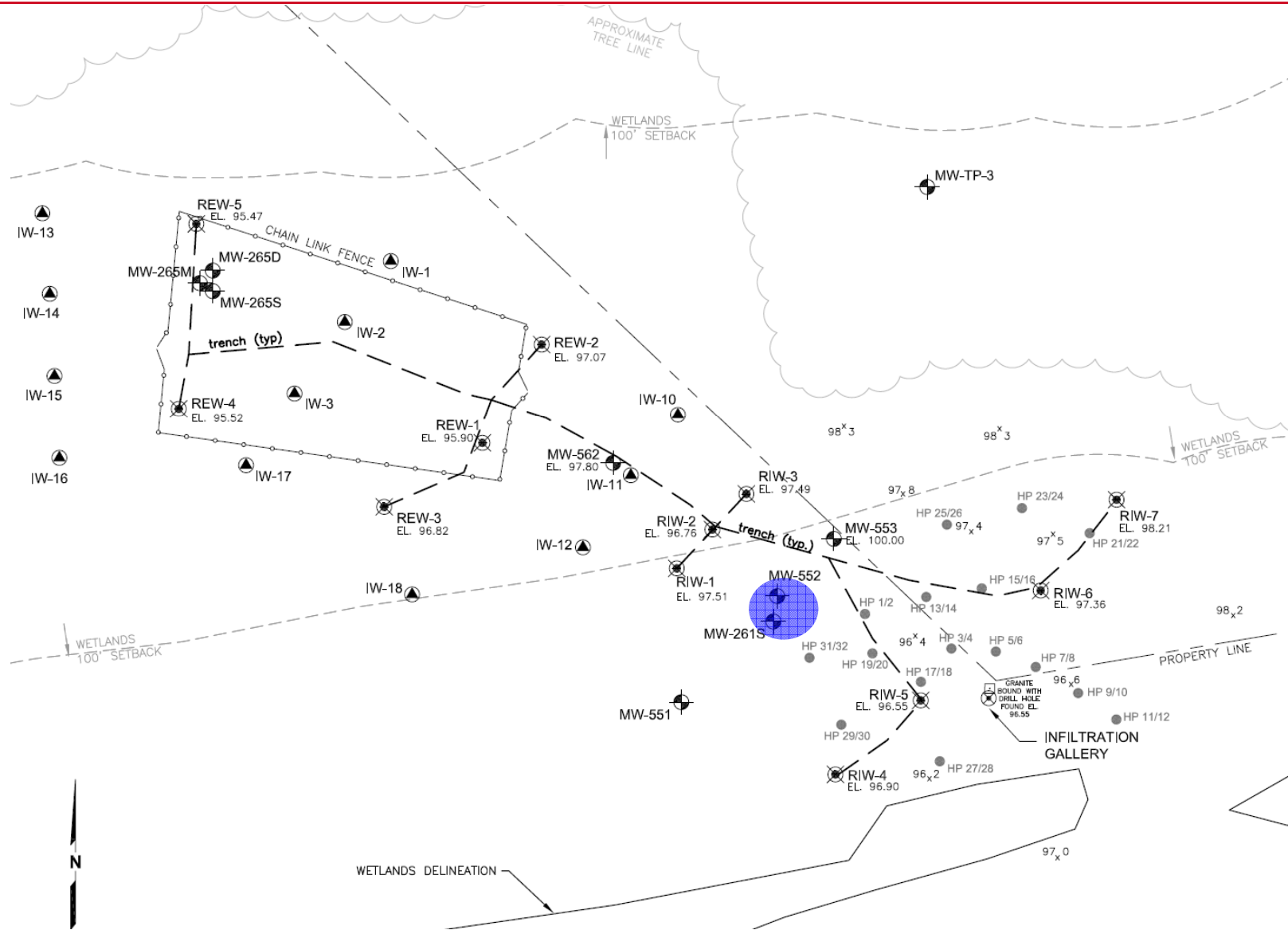
Northern Area Site Plan-MW562



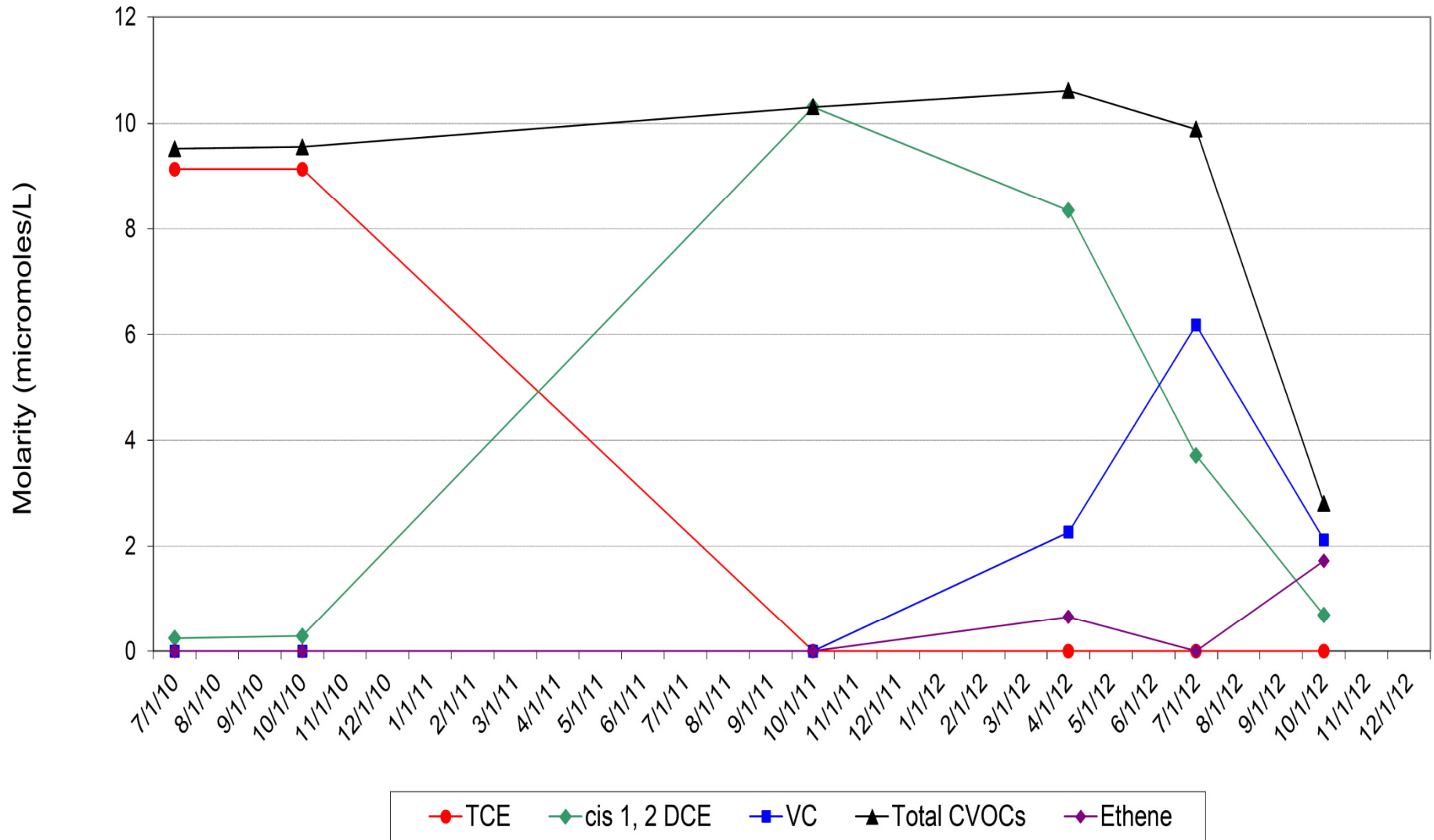
MW-562 data



Northern Area Site Plan-MW261s



MW-261s



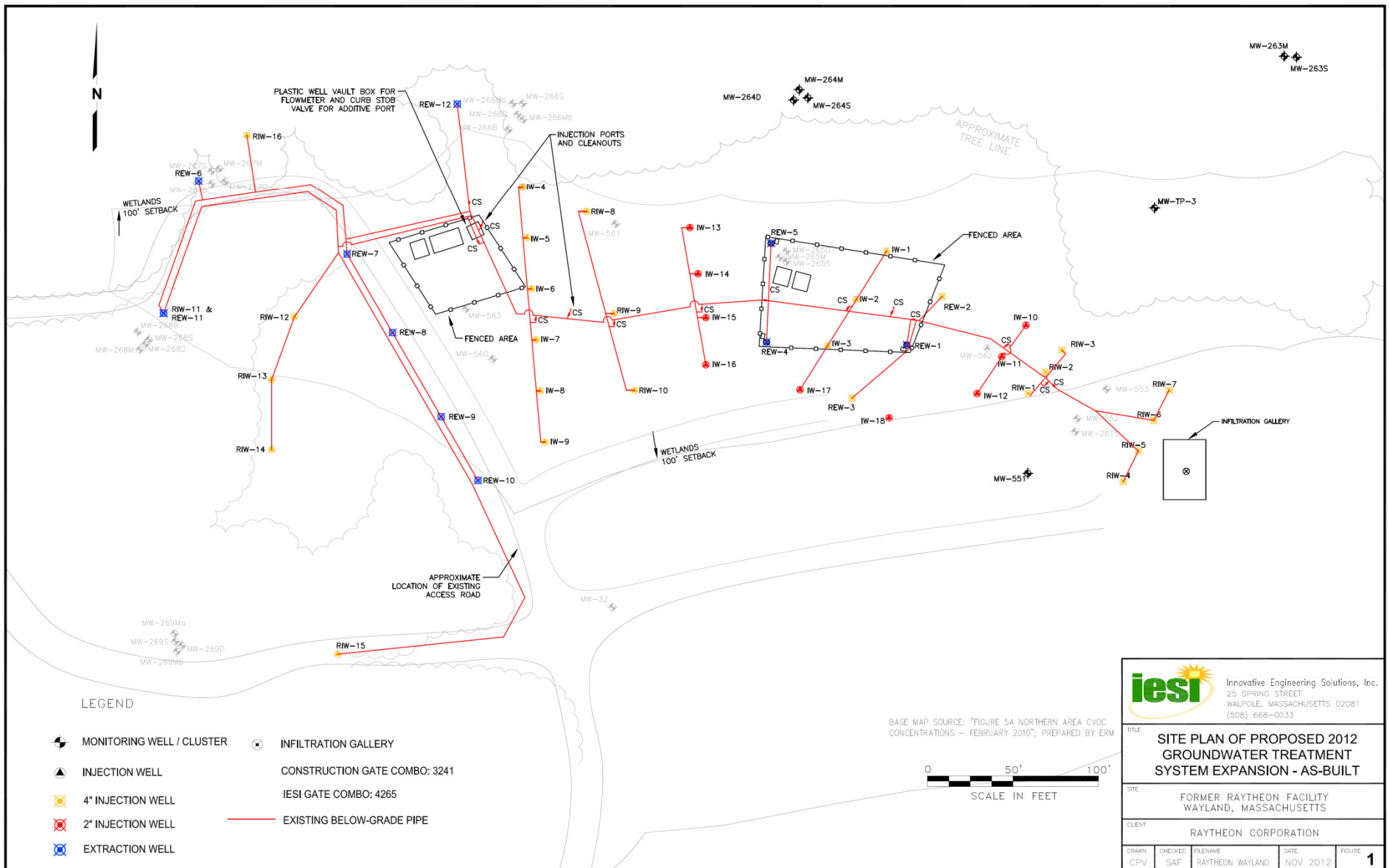
Fall 2012 System Expansion

- Expansion of treatment area
 - 6 injection wells, 9 extraction wells, 1 monitoring well installed
 - Conservation Commission approved work within the buffer zone
 - Added 12 solar panels
 - IW-batch injection wells reincorporated into the recirculation system

- November/December feeding event of 3 successive injections
 - Methanol, nutrients, pH buffers, cultures (permitted storage with WFD)

- System is active and expected to run continuously with the piping buried

Northern Area Expansion Plan



Q & A

- Raytheon will continue to make documents available at the information repository Wayland Board of Health and extranet web site
www.ermne.com; username – raytheon; password – wayland