# RELEASE ABATEMENT MEASURE AND POST CLASS C RAO

# STATUS REPORT

## 51, 100, & 129 COMMERCIAL STREET
## MALDEN, MASSACHUSETTS

**RELEASE TRACKING NUMBER 3-0362**
April 2011

***Prepared For:***

nationalgrid

National Grid
40 Sylvan Road
Waltham, MA 02154

***Prepared By:***

Innovative Engineering Solutions, Inc.
25 Spring Street
Walpole, Massachusetts 02081
(508) 668-0033

# RELEASE ABATEMENT MEASURE AND POST CLASS C RAO STATUS REPORT
# 51, 100, & 129 COMMERCIAL STREET
# MALDEN, MASSACHUSETTS

## RELEASE TRACKING NUMBER 3-0362

April 2011

**Prepared for:** National Grid
40 Sylvan Road
Waltham, Massachusetts 02451

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25 Spring Street
Walpole, Massachusetts 02081

Digitally signed by Michael Lotti
Date: 2011.04.06 10:47:33 -04'00'

Michael Lotti, L.S.P.
Project Manager and LSP of Record
License Number 4208

Digitally signed by Michael Lotti
Date: 2011.04.06 12:01:24 -04'00'

Joseph E. Higgins, P.E., L.S.P.
Project Reviewer

**Release Abatement Measure and Post Class C RAO Status Report**
**51, 100, & 129 Commercial Street**
**Malden, Massachusetts 02148**
**MassDEP Release Tracking Number: 3-0362**

This combined Release Abatement Measure (RAM) and Post Class C Response Action Outcome (RAO) Status Report has been prepared by Innovative Engineering Solutions, Inc. (IESI) on behalf of Massachusetts Electric Company d/b/a National Grid (National Grid) in accordance with the requirements of the Massachusetts Contingency Plan (MCP) (310 CMR 40.0000).

This RAM Status Report presents information on two ongoing RAMs at the former Malden manufactured gas plant (MGP) site (the "Site") located in the vicinity of Charles and Centre Streets along Commercial Street in Malden, Massachusetts. The Massachusetts Department of Environmental Protection (MassDEP) has assigned Release Tracking Number (RTN) 3-0362 to the Malden MGP Site. Figure 1 depicts the site locus and Figure 2 depicts the location of the RAM Areas in relation to the disposal site boundary of the former MGP. The former Malden MGP site has achieved a Temporary Solution and a Class C Response Action Outcome has been filed.

These RAMs are being conducted in accordance with 310 CMR 40.0897 in support of Post-RAO response actions. Only the RAM associated with the sub-slab vapor system (SSVS) operation at 129 Commercial Street is considered necessary to maintain the Temporary Solution. The RAM associated with the recovery of non-aqueous phase liquid (NAPL) at the 51 and 100 Commercial Street properties is considered a definitive and enterprising step toward reaching a Permanent Solution at this Site.

*51/100 Commercial RAM*

The RAM being performed at the 51 Commercial Street and 100 Commercial Street properties (referred to herein as the "51/100 Commercial RAM") is being conducted in accordance with the RAM Plan that was submitted to the MassDEP on August 9, 2007. A modification of this RAM Plan was submitted to the MassDEP in December 2007. Figures 3 and 4 provide details for the areas where the RAM is being conducted on the 51 and 100 Commercial Street properties, respectively.

The objectives of the 51/100 Commercial RAM include the following:

1. Install, start up, and conduct operation, maintenance, and monitoring (OMM) activities for a NAPL recovery system at 51 Commercial Street.
2. Install a barrier beneath the proposed building at 51 Commercial Street.
3. Manage remediation waste generated during floor and foundation removal from the prior structure at 51 Commercial Street, construction of the new building foundation and Engineered Barrier under the foundation at 51 Commercial Street, and construction and operation of the NAPL recovery system.
4. Restore, restart, and conduct OMM activities on an existing NAPL recovery system at 100 Commercial Street.

*129 Commercial RAM*

The RAM being performed at the 129 Commercial Street property (referred to herein as the "129 Commercial RAM") is being conducted in accordance with the RAM Plan that was submitted to the MassDEP on July 2, 1998.

The objective of the 129 Commercial RAM is to reduce volatile organic compound (VOC) concentrations in indoor air; this was initially attempted by sealing portions of the floor slab. The sealing of the floor was not completely successful in reducing indoor air concentrations, and the RAM was modified in April 1999 to include

the installation of a SSVS. The SSVS was installed in October 1999 and consists of five 2-inch diameter soil vapor extraction points installed horizontally through the foundation wall beneath the floor slab. The vapor extraction points extend approximately 5 feet beneath the building. These points are connected to a regenerative blower that removes vapors from beneath the floor slab and directs them through two granular activated carbon (GAC) drums (capacity of approximately 200 pounds each) for treatment. The blower and carbon drums are stored in a temporary building located east of the building along Commercial Street. Treated vapors are emitted through a 4-inch diameter vent pipe to the atmosphere. Figure 5 presents the locations of the extraction points and the system enclosure.

This report describes activities conducted on the 51/100 and 129 Commercial RAMs between October 8, 2010 and April 7, 2011. As such, the content of this report has been structured to address the specific information requirements set forth in 310 CMR 40.0445 (2)(a) through (e) and 40.0898 (2)(a) through (e). The original RAM Transmittal (BWSC-106) and Comprehensive Response Action Transmittal (BWSC-108) Forms along with a Remedial Monitoring Report for each of the two active systems were submitted electronically via eDEP.

**310 CMR 40.0445 (2)(a) The status of response operations.**
**310 CMR 40.0898 (2)(a) A description of the type and frequency of operation, maintenance and/or monitoring activities conducted.**

During this reporting period, the activities have included gauging of the wells located at the 51 Commercial Street property, operation of the NAPL recovery system at 100 Commercial Street, operation of the SSVS at the 129 Commercial Street property, and manual NAPL removal from three wells. Additional information regarding the status of these activities is presented below.

*Well Gauging – 51 Commercial Street*

As reported in December 2008, construction of the equipment shed structure is complete and equipment installation (e.g., air compressor, down well pumps, controls, etc.) was halted due to the lack of recoverable NAPL. As such, the extraction wells are gauged approximately every three months for the presence of NAPL. During this reporting period, the extraction wells were gauged once on January 3, 2011. No measurable thicknesses of NAPL were observed in the extraction wells. Table 1 summarizes the well gauging data. IESI plans to continue to periodically gauge the wells to determine if recoverable NAPL is present.

*NAPL System Operation – 100 Commercial Street*

The NAPL recovery system located on the 100 Commercial Street property was reactivated in August 2008. Prior to this time, the system had been inactive since 2003 because of slowed NAPL recovery. The NAPL recovery system consists of a pneumatic DNAPL recovery pump (Xitech model ADJ1100) and associated piping and controls. The pump is set to operate periodically as programmed by an IESI technician. Currently, site visits are performed on an approximately monthly basis. During each visit, the recovery well is gauged, the pumping frequency is adjusted (if necessary), the system's safety interlocks are checked, the amount of NAPL and water recovered is measured, and the thickness of NAPL in the recovery well is measured. Table 2 summarizes the data collected during this reporting period and prior visits conducted since the system was re-started in 2008.

The total amount of NAPL recovered during this period is approximately 13 gallons. The total volume of NAPL collected since 2008 when the system was re-started is approximately 409 gallons and since 2001 when this system was first installed is approximately 1,118 gallons.

*SSVS Operation – 129 Commercial Street*

The SSVS, which operates continuously, is monitored monthly as part of an ongoing operation and maintenance (O&M) schedule. Total VOC levels in influent and effluent vapor from the off-gas control device (sub-slab venting treatment unit) are measured during these visits with a photoionization detector (PID) calibrated to a 100 parts per million (ppm) isobutylene standard to respond as benzene. The results are summarized in Table 3 and are consistent with past operations.

**310 CMR 40.0445 (2)(b) Any significant new site information or data:**
**310 CMR 40.0898 (2)(b) A description of any significant modifications of the operation, maintenance and/or monitoring program made since the submission of the preceding Status Report:**

As reported in the October 2010 RAM Status Report, IESI undertook a program of periodic manual NAPL recovery from wells B108-OW (100 Commercial), 00A-B913-OW (65 Commercial), and 00A-B914-OW (65 Commercial) as shown on Figure 6. The wells are periodically gauged for the presence of NAPL. If NAPL is detected, the thickness of NAPL is recorded and the observed NAPL is removed using a peristaltic pump. Following removal of NAPL from a well, the recovered NAPL volume is measured and then placed in the drums located on the 100 Commercial Street property, which are used to temporarily store NAPL recovered from the 100 Commercial Street system. Table 4 presents the results from this reporting period.

As noted for the September 30, 2010 gauging event for well 00A-B913-OW, the NAPL was measured "above" the water table. Prior to September 30, 2010, the NAPL was measured below the water table, and the two subsequent events did not indicate the presence of any water in the well. When the NAPL was measured at a lesser thickness, it was measured below the water. These apparently conflicting measurements are attributed to the thickness of NAPL in the well, the potential that the NAPL may be of a similar density to that of water, and the inherent difficulties of measuring a coal-tar like NAPL.

A total of 39 gallons of NAPL were recovered this period and a total of 55.8 gallons of NAPL have been recovered since July 2010. The program will continue as we evaluate if the continued occurrence of NAPL at these locations warrants more aggressive recovery or if manual recovery will be sufficient.

There have been no modifications or changes to the SSVS OMM program.

**310 CMR 40.0445 (2)(c) Details of and/or plans for the management of Remediation Waste, Remedial Wastewater, and/or Remedial Additives:**

As stated in the August 2007 RAM Plan, NAPL recovered by the 100 Commercial Street system is stored in a 55-gallon drum until filled, then replaced with an empty drum. The filled drum of NAPL is removed within 90 days of being filled. Similarly, the NAPL manually recovered from the monitoring wells is also stored in a 55-gallon drum until filled, then replaced with an empty drum.

Since start-up of the 129 Commercial Street SSVS in 1999, approximately 7,955 pounds of spent carbon have been removed from the Site. The carbon was last changed in April 2008. The PID readings indicate that the existing carbon is still functioning and does not have to be changed at this time.

There was no Remediation Waste shipped off-site this reporting period.

No other Remediation Waste, Remedial Wastewater, and/or Remedial Additives than that stated previously have been managed as part of these RAMs.

**310 CMR 40.0445 (2)(d)** **Any other information that the Department during its review and evaluation of a Status Report determines to be necessary to complete said Status Report, in view of site specific circumstances and conditions; and:**

The MassDEP has not required additional information, and did not impose any conditions on the right to conduct the RAMs.

**310 CMR 40.0445 (2)(e)** **An LSP Opinion as to whether the Release Abatement Measure is being conducted in conformance with the RAM Plan and any conditions of approval established by the Department.**

Having reviewed the requirements of the RAM Plans, subsequent RAM Plan modifications, and the response actions completed to date, we are of the opinion that the RAMs are being conducted in accordance with the RAM Plans and RAM Plan modifications.

**310 CMR 40.0898 (2)(c)** **An evaluation of the performance of the remedial action during the period of time since the last Status Report, including whether the remedial action is achieving remedial goals specified in the applicable remedial action plan and a description of any conditions or problems noted during the period that are or may be affecting the performance of the remedial action; and**

**310 CMR 40.0898 (2)(d)** **A description of any measures taken to correct conditions which are affecting the performance of the remedial action;**

As previously stated, only the operation of the SSVS is considered necessary to maintain the condition under which a Temporary Solution exists. The SSVS was operational during the entire reporting period and operational data is consistent with previous data. During the next reporting period, indoor air samples will be collected from the 129 Commercial Street Building. There were no conditions or problems noted during this reporting period that have affected the performance of the SSVS.

**310 CMR 40.0898 (2)(e)** **the name, license number, signature and seal of the LSP**

This information included on the BWSC-108 form

If you require additional information or have any questions regarding this status report, please contact Michael Lotti, LSP of IESI at (508) 668-0033 (x 231) or Kenneth Lento at National Grid at (617) 791-2627.

# FIGURES

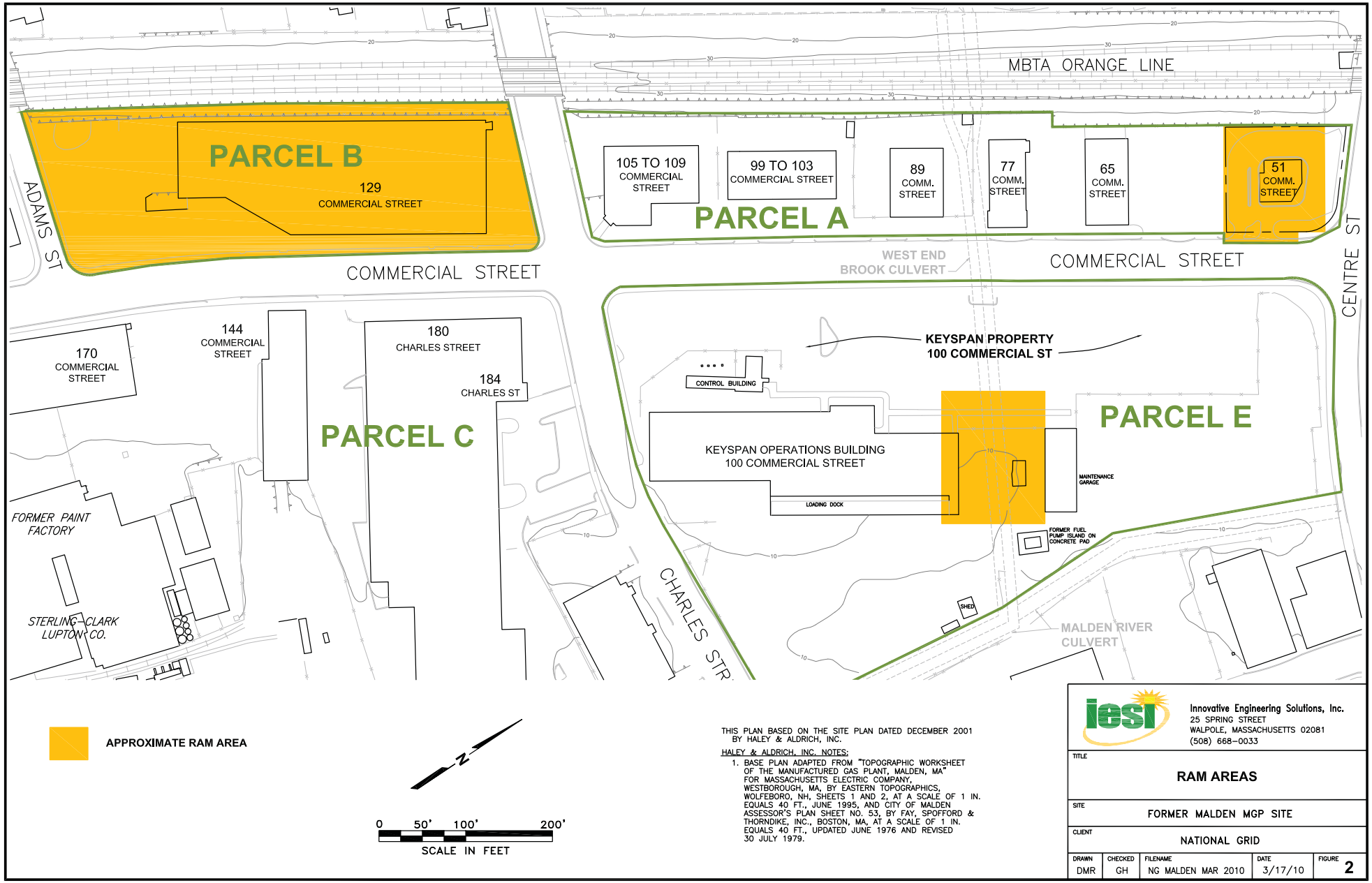

Innovative Engineering Solutions, Inc.
25 SPRING STREET
WALPOLE, MASSACHUSETTS 02081
(508) 668-0033

SITE LAT/LONG: 42°25'30"N 71°04'30"W
UTM: 329,298E 4,699,051N ZONE 19
USGS Topographic Map:
Boston North, Massachusetts 1991

FIGURE 1

# SITE LOCATION MAP

Former Malden MGP Site
Malden, Massachusetts




THIS PLAN BASED ON THE SITE PLAN DATED DECEMBER 2001 BY HALEY & ALDRICH, INC.

HALEY & ALDRICH, INC. NOTES:

1. BASE PLAN ADAPTED FROM "TOPOGRAPHIC WORKSHEET OF THE MANUFACTURED GAS PLANT, MALDEN, MA" FOR MASSACHUSETTS ELECTRIC COMPANY, WESTBOROUGH, MA, BY EASTERN TOPOGRAPHICS, WOLFEBORO, NH, SHEETS 1 AND 2, AT A SCALE OF 1 IN. EQUALS 40 FT., JUNE 1995, AND CITY OF MALDEN ASSESSOR'S PLAN SHEET NO. 53, BY FAY, SPOFFORD & THORNDIKE, INC., BOSTON, MA, AT A SCALE OF 1 IN. EQUALS 40 FT., UPDATED JUNE 1976 AND REVISED 30 JULY 1979.


Innovative Engineering Solutions, Inc.
25 SPRING STREET
WALPOLE, MASSACHUSETTS 02081
(508) 668-0033


| | |
|---|---|
| TITLE | RAM AREAS |
| SITE | FORMER MALDEN MGP SITE |
| CLIENT | NATIONAL GRID |

| DRAWN | CHECKED | FILENAME | DATE | FIGURE |
|---|---|---|---|---|
| DMR | GH | NG MALDEN MAR 2010 | 3/17/10 | 2 |

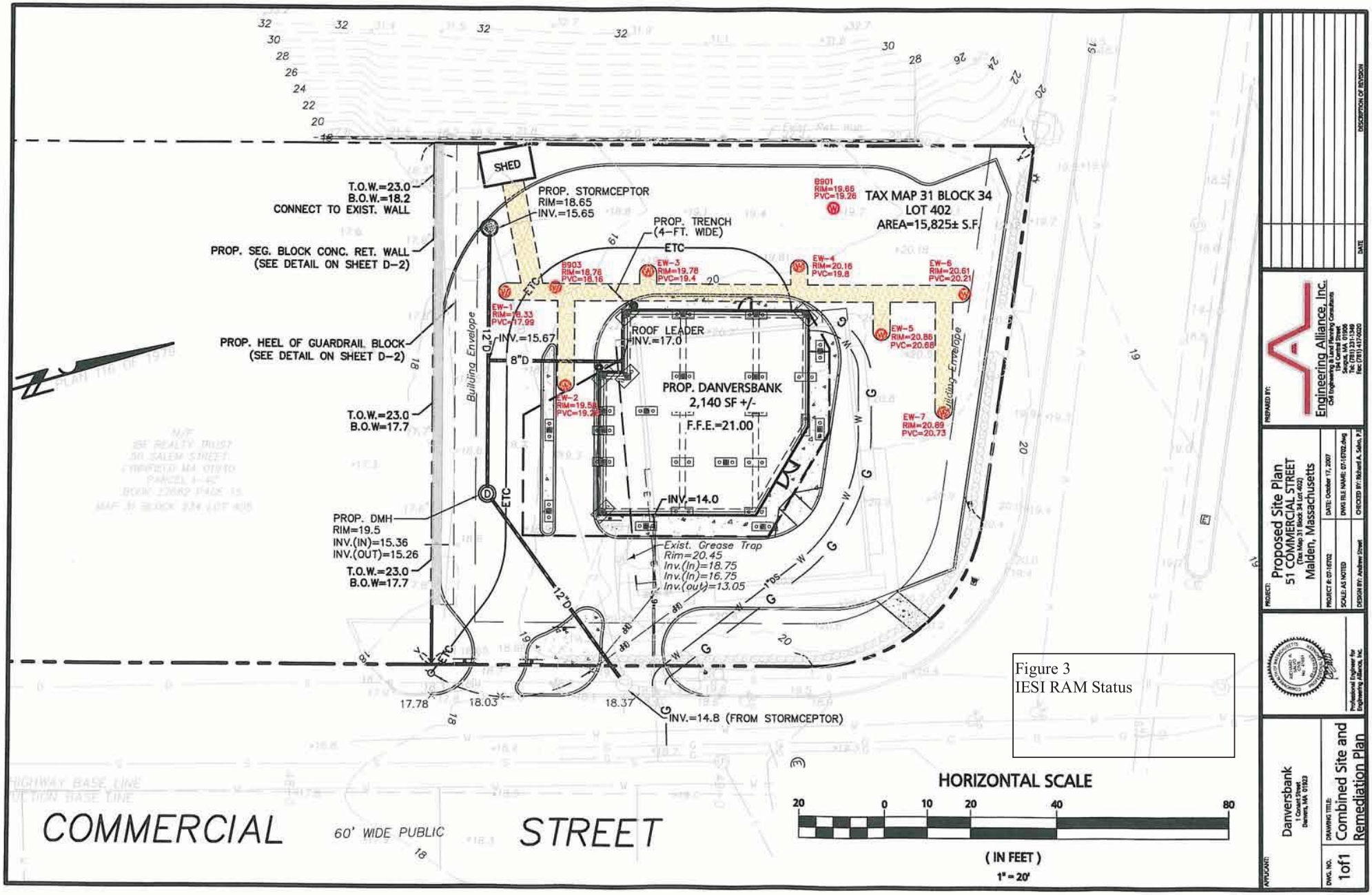



Figure 3
IESI RAM Status

APPLICANT: Danversbank, 1 Conant Street, Danvers, MA 01923

DRAWING TITLE: Combined Site and Remediation Plan

DWG. NO. 1of1

PROJECT: Proposed Site Plan, 51 COMMERCIAL STREET (Tax Map 31 Block 34 Lot 402), Malden, Massachusetts

PROJECT #: 07-16702 | DATE: October 17, 2007

SCALE: AS NOTED | DWG FILE NAME: 07-16702.dwg

DESIGN BY: Andrew Street | CHECKED BY: Richard A. Sabin, P.E.

PREPARED BY: Engineering Alliance, Inc., Civil Engineering & Land Surveying Consultants, 194 Central Street, Saugus, MA 01906, Tel: (781) 231-1348, Fax: (781) 231-0235

Professional Engineer for Engineering Alliance, Inc.

DESCRIPTION OF REVISION | DATE

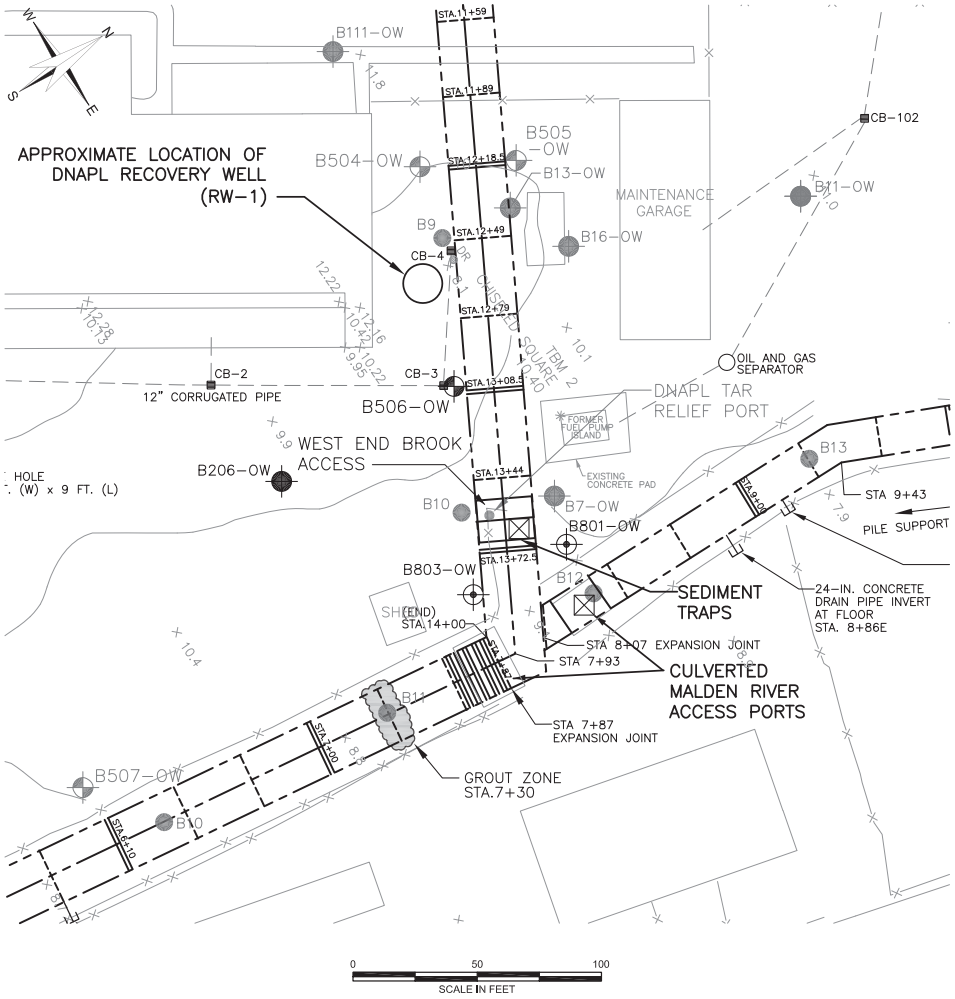



Figure 4
IESI RAM Status

LEGEND:

| | |
|---|---|
| B803 | DESIGNATION AND APPROXIMATE LOCATION OF 8-IN. DIA. DNAPL RECOVERY OBSERVATION WELL INSTALLED BY GEOLOGIC INC. IN NOVEMBER 1998 |
| B504 | DESIGNATION AND APPROXIMATE LOCATION OF TEST BORING AND OBSERVATION WELL INSTALLED BY GUILD DRILLING DURING THE PERIOD 25 TO 30 JULY 1996 |
| | DESIGNATION AND APPROXIMATE LOCATION OF BORINGS DRILLED BY GEOLOGIC, INC., UNDER TECHNICAL OBSERVATION OF HALEY & ALDRICH, INC.: |
| B206 | DRILLED 27-29 JULY AND 1-11 AUGUST 1988 |
| B111 | DRILLED 2-7 MAY 1988 |
| B11 | DRILLED 23-25 NOVEMBER AND 1-3 DECEMBER 1987 |
| B10 | WEST END BROOK MALDEN RIVER CULVERT DESIGN BORINGS |
| OW | INDICATES GROUNDWATER MONITORING WELL WAS INSTALLED IN THE COMPLETED BOREHOLE |
| - - - - - - - | DESIGNATES LOCATION OF CONSTRUCTION JOINT |
| ═══ | DESIGNATES LOCATION OF EXPANSION JOINT |
| — - - — | WEST END BROOK/ MALDEN RIVER CULVERT |
| — — — — | 12" DRAINAGE PIPES CONNECTING EXISTING CATCH BASINS |

NOTES:

1. BASE PLAN ADAPTED FROM THE FOLLOWING SOURCES:

   "TOPOGRAPHIC WORKSHEET OF THE MANUFACTURED GAS PLANT, MALDEN, MA" FOR MASSACHUSETTS ELECTRIC COMPANY, WESTBOROUGH, MA, BY EASTERN TOPOGRAPHICS, WOLFEBORO, NH, SHEETS 1 AND 2, AT A SCALE OF 1 IN. EQUALS 40 FT., JUNE 1995.

   CITY OF MALDEN ASSESSOR'S PLAN SHEET NO. 53, BY FAY, SPOFFORD & THORNDIKE, INC., BOSTON, MA, AT A SCALE OF 1 IN. EQUALS 40 FT., UPDATED JUNE 1976 AND REVISED 30 JULY 1979.

2. CULVERT LOCATION SHOWN WAS OBTAINED FROM THE FOLLOWING SOURCES:

   * RECORD PLANS "MALDEN RIVER FLOOD CONTROL PROJECT IN THE CITY OF MALDEN" CONTRACT E77-3FC, REF. E-503, PREPARED FOR COMMONWEALTH OF MASSACHUSETTS METROPOLITAN DISTRICT COMMISSION (MDC) , DATED DECEMBER 1977.

   * RECORD PLANS "WEST END BROOK FLOOD CONTROL PROJECT, STADIUM ROAD TO MALDEN RIVER; CONTRACT C-375 PREPARED FOR THE COMMONWEALTH OF MASSACHUSETTS, METROPOLITAN DISTRICT COMMISSION (MDC), DATED JUNE 1970.

HALEY & ALDRICH

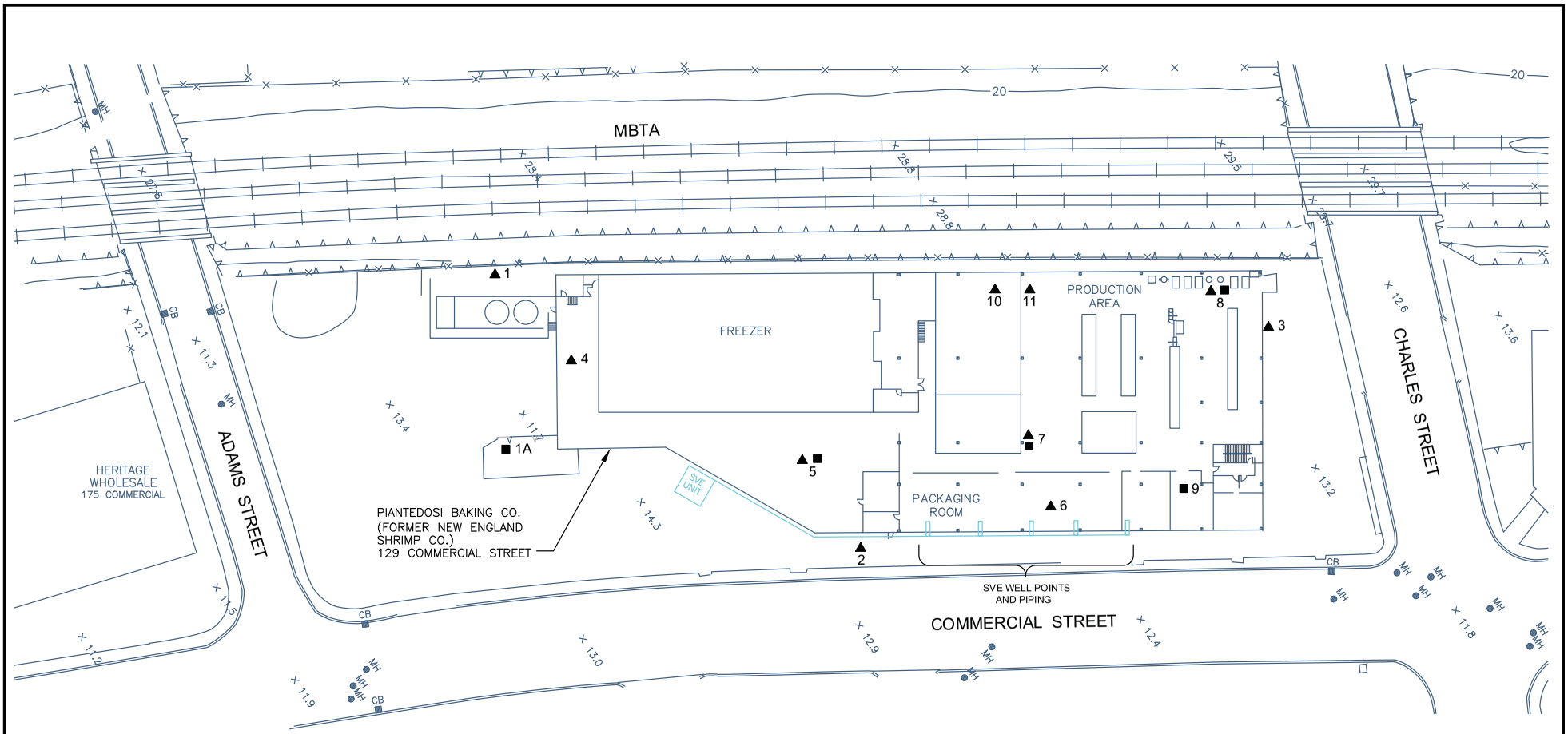
RAM PLAN
FORMER MALDEN MGP SITE
MALDEN, MASSACHUSETTS

SITE PLAN:
100 COMMERCIAL STREET RW-1 AREA

SCALE: AS SHOWN
AUGUST 2007

FIGURE 5

J:\GRAPHICS\06558\06558-752-B246.DWG




LEGEND

7 ▲ DESIGNATION AND APPROXIMATE LOCATION OF INDOOR AND OUTDOOR AIR SAMPLES OBTAINED BY ENVIRONMENTAL HEALTH & ENGINEERING, INC. AND HALEY & ALDRICH, INC. FROM NOVEMBER 1997 THROUGH FEBRUARY 2007

7 ■ DESIGNATION AND APPROXIMATE LOCATION OF INDOOR AIR SAMPLES OBTAINED BY OCCUHEALTH, INC., JUNE 1994

DESIGNATION AND APPROXIMATE LOCATION OF "I" BEAM COLUMN LOCATION

NOTES

1. BASE PLAN ADAPTED FROM "TOPOGRAPHIC WORKSHEET OF THE MANUFACTURED GAS PLANT, MALDEN, MA" FOR MASSACHUSETTS ELECTRIC COMPANY, WESTBOROUGH, MA, BY EASTERN TOPOGRAPHICS, WOLFEBORO, NH, SHEETS 1 AND 2, AT A SCALE OF 1 IN. EQUALS 40 FT., JUNE 1995, AND CITY OF MALDEN ASSESSOR'S PLAN SHEET NO. 53, BY FAY, SPOFFORD & THORNDIKE, INC., BOSTON, MA AT A SCALE OF 1 IN. EQUALS 40 FT., UPDATED JUNE 1976 AND REVISED 30 JULY 1979.
2. INTERIOR FACILITY LAYOUT ADAPTED FROM UNDATED PLAN PROVIDED BY PIANTEDOSI BAKING COMPANY, FEBRUARY 1998.
3. APPROXIMATE LOCATIONS OF INDOOR AIR SAMPLING LOCATIONS WERE DETERMINED BY HALEY & ALDRICH, INC.

N

0 25' 50' 100'

SCALE IN FEET


iesi
Innovative Engineering Solutions, Inc.
25 SPRING STREET
WALPOLE, MASSACHUSETTS 02081
(508) 668-0033


TITLE

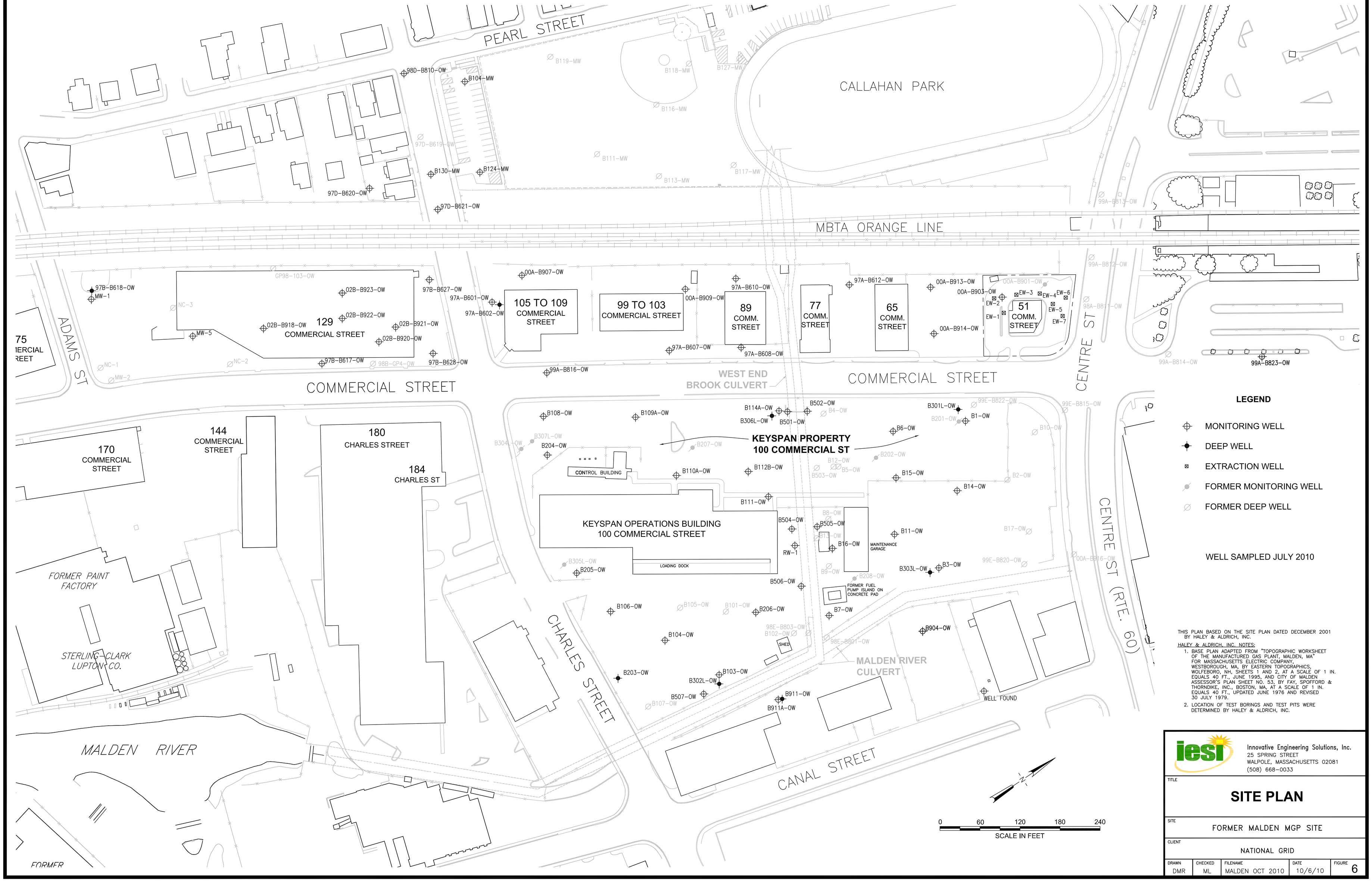
# SITE PLAN

FORMER MALDEN MGP SITE

CLIENT

NATIONAL GRID

| DRAWN | CHECKED | FILENAME | DATE | FIGURE |
|---|---|---|---|---|
| DMR | ML | NG MALDEN RAM AREAS | 3/28/08 | 5 |




**LEGEND**

- MONITORING WELL
- DEEP WELL
- EXTRACTION WELL
- FORMER MONITORING WELL
- FORMER DEEP WELL

WELL SAMPLED JULY 2010

THIS PLAN BASED ON THE SITE PLAN DATED DECEMBER 2001 BY HALEY & ALDRICH, INC.

HALEY & ALDRICH, INC. NOTES:

1. BASE PLAN ADAPTED FROM "TOPOGRAPHIC WORKSHEET OF THE MANUFACTURED GAS PLANT, MALDEN, MA" FOR MASSACHUSETTS ELECTRIC COMPANY, WESTBOROUGH, MA, BY EASTERN TOPOGRAPHICS, WOLFEBORO, NH, SHEETS 1 AND 2, AT A SCALE OF 1 IN. EQUALS 40 FT., JUNE 1995, AND CITY OF MALDEN ASSESSOR'S PLAN SHEET NO. 53, BY FAY, SPOFFORD & THORNDIKE, INC., BOSTON, MA, AT A SCALE OF 1 IN. EQUALS 40 FT., UPDATED JUNE 1976 AND REVISED 30 JULY 1979.
2. LOCATION OF TEST BORINGS AND TEST PITS WERE DETERMINED BY HALEY & ALDRICH, INC.


iesi
Innovative Engineering Solutions, Inc.
25 SPRING STREET
WALPOLE, MASSACHUSETTS 02081
(508) 668-0033


TITLE

# SITE PLAN

SITE: FORMER MALDEN MGP SITE

CLIENT: NATIONAL GRID

| DRAWN | CHECKED | FILENAME | DATE | FIGURE |
|---|---|---|---|---|
| DMR | ML | MALDEN OCT 2010 | 10/6/10 | 6 |

# TABLES

# Table 1
# Monitoring Well Gauging Data
# 51 Commercial Street
# Malden, Massachusetts

| Well Location | Date | Depth to LNAPL[2] (feet) | Depth to Water[1] (feet) | Depth to DNAPL[2] (feet) | DNAPL Thickness (feet) | Well Bottom Depth (feet) |
|---|---|---|---|---|---|---|
| EW-1 | 05-Sep-07 | ND | 8.00 | ND[3] | - | 12.50 |
| | 05-Oct-07 | ND | 8.30 | ND | - | 12.40 |
| | 01-May-08 | ND | 6.40 | ND | - | 11.45 |
| | 10-Sep-08 | ND | 7.00 | ND | - | 11.99 |
| | 11-Feb-09 | ND | 6.81 | ND | - | 12.35 |
| | 01-Jun-09 | ND | 7.06 | ND | - | 12.35 |
| | 14-Sep-09 | ND | 7.12 | ND | - | 12.07 |
| | 29-Mar-10 | ND | 5.68 | ND | - | 12.33 |
| | 28-Jun-10 | ND | 7.07 | ND | - | 12.33 |
| | 30-Sep-10 | ND | 7.29 | ND | - | 12.33 |
| | 03-Jan-11 | ND | 7.17 | ND | - | 12.33 |
| EW-2 | 05-Sep-07 | ND | 9.25 | ND | - | 14.20 |
| | 05-Oct-07 | ND | 9.55 | ND | - | 14.20 |
| | 01-May-08 | ND | 7.81 | ND | - | 13.50 |
| | 10-Sep-08 | ND | 9.22 | ND | - | 13.59 |
| | 11-Feb-09 | ND | 8.05 | ND | - | 13.69 |
| | 01-Jun-09 | ND | 8.31 | ND | - | 13.69 |
| | 14-Sep-09 | ND | 8.39 | ND | - | 13.97 |
| | 29-Mar-10 | ND | 6.92 | ND | - | 13.72 |
| | 28-Jun-10 | ND | 8.35 | ND | - | 13.72 |
| | 30-Sep-10 | ND | 8.51 | ND | - | 13.72 |
| | 03-Jan-11 | ND | 8.42 | ND | - | 13.72 |
| EW-3 | 05-Sep-07 | ND | 9.55 | ND | - | 14.40 |
| | 05-Oct-07 | ND | 9.66 | ND | - | 14.45 |
| | 01-May-08 | ND | 7.51 | ND | - | 11.80 |
| | 10-Sep-08 | ND | 7.87 | ND | - | 11.9 |
| | 11-Feb-09 | ND | 7.80 | ND | - | 13.52 |
| | 01-Jun-09 | ND | 8.00 | ND | - | 13.52 |
| | 14-Sep-09 | ND | 8.01 | ND | - | 13.52 |
| | 29-Mar-10 | ND | 6.70 | ND | - | 13.56 |
| | 28-Jun-10 | ND | 7.96 | ND | - | 13.56 |
| | 30-Sep-10 | ND | 8.04 | ND | - | 13.56 |
| | 03-Jan-11 | ND | 7.95 | ND | - | 13.56 |
| EW-4 | 05-Sep-07 | ND | 9.90 | ND | - | 15.25 |
| | 05-Oct-07 | ND | 10.06 | ND | - | 14.90 |
| | 01-May-08 | ND | 7.89 | ND | - | 12.00 |
| | 10-Sep-08 | ND | 8.21 | ND | - | 13.77 |
| | 11-Feb-09 | ND | 8.17 | ND | - | 14.35 |
| | 01-Jun-09 | ND | 9.35 | ND | - | 14.35 |
| | 14-Sep-09 | ND | 8.39 | ND | - | 14.35 |
| | 29-Mar-10 | ND | 6.98 | ND | - | 14.35 |
| | 28-Jun-10 | ND | 8.29 | ND | - | 14.35 |
| | 30-Sep-10 | ND | 8.29 | ND | - | 14.35 |
| | 03-Jan-11 | ND | 8.34 | ND | - | 14.35 |

# Table 1
# Monitoring Well Gauging Data
# 51 Commercial Street
# Malden, Massachusetts

| Well Location | Date | Depth to LNAPL[2] (feet) | Depth to Water[1] (feet) | Depth to DNAPL[2] (feet) | DNAPL Thickness (feet) | Well Bottom Depth (feet) |
|---|---|---|---|---|---|---|
| EW-5 | 05-Sep-07 | ND | 10.80 | ND | - | 14.10 |
| | 05-Oct-07 | ND | 10.94 | ND | - | 14.00 |
| | 01-May-08 | ND | 7.80 | ND | - | 11.65 |
| | 10-Sep-08 | ND | 8.14 | ND | - | 11.71 |
| | 11-Feb-09 | ND | 8.09 | ND | - | 12.3 |
| | 01-Jun-09 | ND | 9.32 | ND | - | 12.3 |
| | 14-Sep-09 | ND | 8.31 | ND | - | 12.3 |
| | 29-Mar-10 | ND | 6.93 | ND | - | 12.28 |
| | 28-Jun-10 | ND | 8.21 | ND | - | 12.28 |
| | 30-Sep-10 | ND | 8.28 | ND | - | 12.28 |
| | 03-Jan-11 | ND | 8.24 | ND | - | 12.28 |
| EW-6 | 05-Sep-07 | ND | 10.35 | ND | - | 14.36 |
| | 05-Oct-07 | ND | 10.50 | ND | - | 14.20 |
| | 01-May-08 | ND | 8.16 | ND | - | 13.00 |
| | 10-Sep-08 | ND | 8.61 | ND | - | 12.77 |
| | 11-Feb-09 | ND | 8.46 | ND | - | 13.09 |
| | 01-Jun-09 | ND | 9.68 | ND | - | 13.09 |
| | 14-Sep-09 | ND | 8.66 | ND | - | 13.09 |
| | 29-Mar-10 | ND | 6.88 | ND | - | 13.11 |
| | 28-Jun-10 | ND | 8.59 | ND | - | 13.11 |
| | 30-Sep-10 | ND | 8.76 | ND | - | 13.11 |
| | 03-Jan-11 | ND | 8.66 | ND | - | 13.11 |
| EW-7 | 05-Sep-07 | - | DRY | - | - | 9.92 |
| | 05-Oct-07 | - | DRY | - | - | 10.00 |
| | 01-May-08 | ND | 6.50 | ND | - | 7.20 |
| | 10-Sep-08 | ND | 6.99 | ND | - | 7.81 |
| | 11-Feb-09 | ND | 7.09 | ND | - | 7.28 |
| | 01-Jun-09 | ND | 7.09 | ND | - | 7.28 |
| | 14-Sep-09 | ND | 7.10 | ND | - | 7.28 |
| | 29-Mar-10 | ND | 6.41 | ND | - | 7.32 |
| | 28-Jun-10 | ND | 7.27 | ND | - | 7.32 |
| | 30-Sep-10 | ND | 7.08 | ND | - | 7.32 |
| | 03-Jan-11 | ND | 7.19 | ND | - | 7.32 |
| 00A-B903-OW | 01-May-08 | ND | 7.85 | ND | - | 19.00 |
| | 10-Sep-08 | ND | 8.28 | ND | - | 15.2 |

**Notes:**

1. Depth to liquid measurements are obtained using a water level indicator and/or an oil-water interface probe.
2. DNAPL = Dense Non-Aqueous Phase Liquids. LNAPL = Light Non-Aqueous Phase Liquids.
3. ND=Not detected.

# Table 2
# Recovery Well RW-1 Gauging Data
# 100 Commercial Street
# Malden, MA

| Date | Depth to Water (feet) | Depth to NAPL (feet) | Depth to Bottom (feet) | Thickness NAPL (feet) | Total Fluids Gallons Recovered | Gallons Per Day |
|---|---|---|---|---|---|---|
| 8/5/2008 | 1.68 | 8.80 | 14.30 | 5.50 | 36 | 36.00 |
| 8/6/2008 | 1.75 | 11.00 | 14.30 | 3.30 | 83 | 47.00 |
| 8/7/2008 | 1.70 | 12.00 | 14.30 | 2.30 | 83 | 0.00 |
| 8/11/2008 | 1.43 | 13.10 | 14.30 | 1.20 | 83 | 0.00 |
| 8/12/2008 | 1.43 | 13.10 | 14.30 | 1.20 | 117 | 34.00 |
| 8/21/2008 | 1.86 | 12.70 | 14.30 | 1.60 | 167 | 5.56 |
| 8/26/2008 | 1.85 | 11.55 | 14.30 | 2.75 | 178 | 2.20 |
| 9/2/2008 | 2.00 | 10.60 | 14.30 | 3.70 | 186 | 1.14 |
| 9/8/2008 | 2.60 | 11.80 | 14.30 | 2.50 | 203 | 2.83 |
| 9/18/2008 | 1.95 | 11.10 | 14.30 | 3.20 | 217 | 1.40 |
| 10/1/2008 | 1.35 | 14.30 | 14.30 | 0.00 | 227 | 0.77 |
| 10/9/2008 | 1.72 | 13.48 | 14.30 | 0.82 | 235 | 1.00 |
| 10/23/2008 | 2.10 | 13.26 | 14.30 | 1.04 | 248 | 0.93 |
| 11/7/2008 | 2.40 | 13.80 | 14.30 | 0.50 | 256 | 0.53 |
| 11/22/2008 | 2.05 | 13.75 | 14.30 | 0.55 | 262 | 0.40 |
| 12/3/2008 | 1.62 | 14.30 | 14.30 | 0.00 | 267 | 0.45 |
| 1/6/2009 | 1.60 | 14.10 | 14.30 | 0.20 | 281 | 0.41 |
| 1/30/2009 | 1.41 | 13.97 | 14.30 | 0.33 | 281 | 0.00 |
| 2/11/2009 | 1.90 | 14.29 | 14.30 | 0.01 | 281 | 0.00 |
| 3/11/2009 | 1.60 | 13.30 | 14.30 | 1.00 | 281 | 0.00 |
| 4/7/2009 | 0.50 | 14.11 | 14.30 | 0.19 | 293 | 0.44 |
| 5/13/2009 | 1.00 | 14.21 | 14.30 | 0.09 | 294 | 0.03 |
| 6/3/2009 | 1.88 | 14.25 | 14.30 | 0.05 | 294 | 0.00 |
| 6/19/2009 | 0.00 | 14.23 | 14.30 | 0.07 | 294 | 0.02 |
| 6/29/2009 | 1.40 | 13.34 | 14.30 | 0.96 | 295 | 0.06 |
| 7/17/2009 | 1.76 | 12.97 | 14.30 | 1.33 | 296 | 0.04 |
| 7/29/2009 | 1.52 | 13.85 | 14.30 | 0.45 | 315 | 1.62 |
| 8/24/2009 | 1.65 | 13.76 | 14.30 | 0.54 | 331 | 0.62 |
| 9/14/2009 | 1.90 | 13.40 | 14.30 | 0.90 | 341 | 0.48 |
| 10/7/2009 | 1.90 | 13.40 | 14.30 | 0.90 | 358 | 0.72 |
| 11/3/2009 | 1.80 | 14.19 | 14.20 | 0.01 | 360 | 0.07 |
| 11/23/2009 | 1.83 | 14.10 | 14.20 | 0.10 | 361 | 0.06 |
| 12/18/2009 | 1.70 | 14.19 | 14.20 | 0.01 | 366 | 0.20 |
| 1/8/2010 | 2.20 | 14.10 | 14.20 | 0.10 | 372 | 0.32 |
| 2/3/2010 | 1.80 | 14.00 | 14.20 | 0.20 | 373 | 0.02 |
| 2/15/2010 | 2.10 | 14.10 | 14.20 | 0.10 | 376 | 0.23 |
| 3/2/2010 | 1.30 | 14.10 | 14.20 | 0.10 | 378 | 0.17 |
| 4/21/2010 | 1.50 | 13.95 | 14.20 | 0.25 | 379 | 0.01 |
| 5/14/2010 | 1.48 | 14.20 | 14.20 | 0.00 | 379 | 0.02 |
| 6/14/2010 | 1.50 | 14.10 | 14.20 | 0.10 | 381 | 0.05 |
| 7/8/2010 | 1.30 | 14.20 | 14.20 | 0.00 | 384 | 0.12 |
| 8/5/2010 | 2.55 | 13.70 | 14.20 | 0.50 | 385 | 0.05 |
| 9/15/2010 | 2.12 | 12.28 | 14.20 | 1.92 | 396 | 0.28 |
| 10/13/2010 | 2.10 | 12.70 | 14.20 | 1.50 | 406 | 0.36 |
| 11/19/2010 | 1.80 | 14.10 | 14.20 | 0.10 | 407 | 0.01 |
| 12/15/2010 | 1.90 | 14.10 | 14.20 | 0.10 | 407 | 0.02 |
| 1/20/2011 | 2.19 | 14.10 | 14.20 | 0.10 | 408 | 0.03 |
| 2/16/2011 | 1.98 | 14.18 | 14.20 | 0.02 | 409 | 0.03 |
| 3/3/2011 | 1.40 | 14.12 | 14.20 | 0.08 | 409 | 0.00 |

Notes NAPL - non-aqueous phase liquid
All data collected by IESI personnel

**Table 2**
**Recovery Well RW-1 Gauging Data**
**100 Commercial Street**
**Malden, MA**

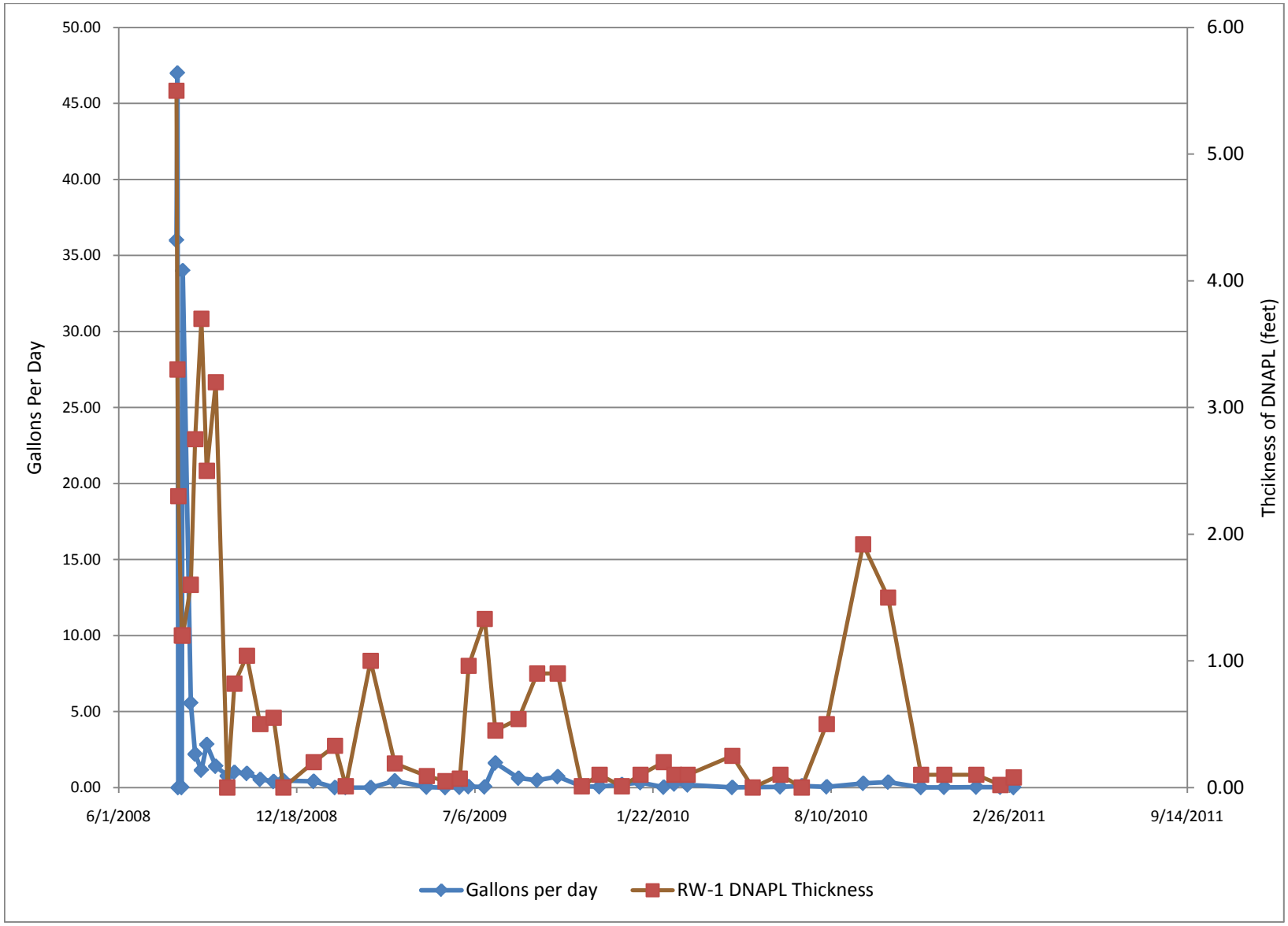


**Table 3**
**Sub-Slab Venting System Monitoring Data**
**129 Commercial Street**
**Malden, Massachusetts**

| Monitoring Date | Total VOC Concentrations | | | Outdoor Ambient Air Temp. (°F) | Outlet Vapor Temp. (°F) | Flow Velocity (cubic ft./min) | | System Vacuum (in. water) | | | Vacuum at Extraction Points (in. water) | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Influent (ppm) | Effluent - 1 (ppm) | Effluent - 2 (ppm) | | | Influent | Effluent | Blower | Knockout Drum | Discharge | EP-1 | EP-2 | EP-3 | EP-4 | EP-5 |
| 17-Jan-08 | 0.0 | - | 0.0 | 34 | 84 | 65 | 157 | 10.5 | 2.8 | 40 | 1.7 | 2.1 | 0.0 | 0.0 | 2.5 |
| 18-Feb-08 | 0.0 | - | 0.0 | 64 | 90 | 60 | 140 | 9 | 2.7 | 41 | 2.1 | 2.3 | 0.0 | 0.0 | 2.4 |
| 28-Mar-08 | 0.0 | - | 0.0 | 37 | 96 | 59 | 145 | 8.2 | 1.6 | 47 | 0.0 | 1.5 | 0.0 | 0.0 | 1.6 |
| 10-Apr-08 | 0.0 | 0.0 | 0.0 | 65 | 88 | 113 | 98 | 8 | 4.1 | 18 | 1.9 | 1.6 | 1.6 | 0.4 | 1.6 |
| 10-May-08 | 0.0 | 0.0 | 0.0 | 60 | 80 | 97 | 95 | 9 | 5.8 | 17 | 1.6 | 1.8 | 2.0 | 0.1 | 1.5 |
| 10-Jun-08 | 0.0 | 0.0 | 0.0 | 95 | 104 | 89 | 93 | 8.7 | 5 | 16.3 | 1.8 | 1.8 | 1.6 | 0.3 | 1.8 |
| 16-Jun-08 | (Reactivate System after power outage) | | | | | | | | | | | | | | |
| 7-Jul-08 | 0.0 | 0.0 | 0.0 | 88 | 100 | 89 | 88.5 | 8.7 | 5 | 16.2 | 1.5 | 1.5 | 1.5 | 0.1 | 1.4 |
| 12-Aug-08 | 0.0 | 0.0 | 0.0 | 85 | 94 | 94 | 91 | 9.6 | 5.8 | 16.2 | 1.8 | 1.9 | 1.4 | 0.3 | 1.3 |
| 8-Sep-08 | 0.0 | 0.0 | 0.0 | 80 | 100 | 90 | 86 | 10 | 6.5 | 15 | 1.2 | 1.8 | 1.2 | 1.2 | 1.6 |
| 23-Oct-08 | 0.0 | 0.0 | 0.0 | 50 | 95 | 108 | 94 | 9.1 | 5.5 | 17.3 | 1.2 | 1.2 | 0.3 | 0.3 | 1.3 |
| 7-Nov-08 | 0.0 | 0.0 | 0.0 | 55 | 85 | 96 | 86 | 10.2 | 7 | 15.6 | 1.1 | 1.1 | 1.4 | 0.2 | 1.2 |
| 3-Dec-08 | 0.0 | 0.0 | 0.0 | 45 | 80 | 93 | 96 | 5.7 | 3 | 17 | 0.9 | 0.9 | 1.6 | 0.2 | 1.1 |
| 6-Jan-09 | 0.0 | 0.0 | 0.0 | 35 | 60 | 70 | 94 | 8.5 | 5 | 17 | 1 | 1 | 0.7 | 0.1 | 1 |
| 11-Feb-09 | 0.0 | 0.0 | 0.0 | 50 | 80 | 72 | 95 | 11.1 | 7.6 | 16 | 1.2 | 1.2 | 1 | 0.2 | 1.1 |
| 4-Mar-09 | 0.0 | 0.0 | 0.0 | 32 | 80 | 95 | 88 | 9 | 5.7 | 17 | 1.3 | 1.2 | 1.3 | 0.9 | 1 |
| 13-Apr-09 | 0.0 | 0.0 | 0.0 | 50 | 70 | 94 | 75 | 9 | 4.6 | 17 | 0.7 | 0.7 | 0.7 | 0.1 | 0.7 |
| 13-May-09 | 0.0 | 0.0 | 0.0 | 55 | 83 | 94 | 75 | 9 | 4.2 | 17.1 | 1 | 1 | 0.9 | 0.1 | 0.9 |
| 19-Jun-09 | 0.0 | 0.0 | 0.0 | 45 | 86 | 108 | 88 | 8.1 | 4.6 | 17.1 | 0.8 | 1.1 | 1 | 0.1 | 1.2 |
| 17-Jul-09 | 0.0 | 0.0 | 0.0 | 68 | 104 | 104 | 92 | 19 | 10.5 | 40.2 | 0.7 | 1 | 1 | 0.1 | 1.1 |
| 24-Aug-09 | 2.6 | 1.5 | 0.6 | 88 | 100 | 103 | 87 | 7.8 | 4.6 | 15.4 | 0.4 | 1.2 | 1.1 | 0.15 | 1.5 |
| 14-Sep-09 | 0.0 | 0.0 | 0.0 | 72 | 94 | 98 | 90 | 10 | 6 | 16.5 | 0.8 | 0.7 | 0.4 | 0.1 | 0.8 |
| 7-Oct-09 | 0.0 | 0.0 | 0.0 | 59 | 85 | 103 | 83.4 | 10.5 | 7 | 15.5 | 0.8 | 0.8 | 0.9 | 0.4 | 0.8 |
| 23-Nov-09 | 0.0 | 0.0 | 0.0 | 52 | 80 | 95 | 94 | 11 | 7.4 | 16.5 | 0.9 | 0.6 | 1 | 1 | 0.6 |
| 18-Dec-09 | 0.0 | 0.0 | 0.0 | 10 | 65 | 38.2 | 93.6 | 4.3 | 0.3 | 17.4 | 0.1 | 0.1 | 0.1 | 0.1 | 0.3 |
| 8-Jan-10 | 0.0 | 0.0 | 0.0 | 23 | 70 | 72 | 101 | 7.5 | 4.3 | 18 | 1 | 0.3 | 0.6 | 0.1 | 0.3 |
| 3-Feb-10 | 0.0 | 0.0 | 0.0 | 25 | 70 | 71 | 95 | 7.8 | 4.8 | 18.3 | 1.1 | 0.4 | 0.8 | 0.1 | 1.1 |
| 2-Mar-10 | 0.0 | 0.0 | 0.0 | 45 | 80 | 85 | 96 | 8.1 | 8.1 | 16.9 | 1 | 0.4 | 0.7 | 0.1 | 1.2 |
| 10-Apr-10 | Reactivate system - high water knockout alarm shutdown system and caused dial out | | | | | | | | | | | | | | |
| 21-Apr-10 | 0.0 | 0.0 | 0.0 | 65 | 88 | 67 | 91 | 8.1 | 2.8 | 17.3 | 0.1 | 0.3 | 0.7 | 0.1 | 1 |
| 14-May-10 | 0.0 | 0.0 | 0.0 | 60 | 90 | 94 | 85 | 8 | 4.4 | 17.5 | 0.9 | 0.5 | 0.6 | 0.1 | 0.9 |
| 14-Jun-10 | 0.0 | 0.0 | 0.0 | 75 | 96 | 68 | 81 | 10 | 6.3 | 16.6 | 1.5 | 1.5 | 0.7 | 0.7 | 1.5 |
| 23-Jun-10 | (Reactivate System after power outage) | | | | | | | | | | | | | | |
| 28-Jul-10 | 0.0 | 0.0 | 0.0 | 80 | 110 | 80 | 89 | 7.7 | 4.2 | 16.3 | 0.9 | 0.7 | 0.6 | 0.1 | 1.2 |
| 19-Aug-10 | 0.0 | 0.0 | 0.0 | 80 | 100 | 88 | 88 | 8.3 | 5 | 17.1 | 1 | 0.8 | 0.8 | 0.1 | 1.5 |
| 13-Sep-10 | 0.0 | 0.0 | 0.0 | 65 | 92 | 80 | 81 | 9.2 | 5.4 | 16.7 | 1.2 | 1 | 0.9 | 0.1 | 1.3 |
| 13-Oct-10 | 0.0 | 0.0 | 0.0 | 55 | 95 | 84 | 76 | 8 | 4.4 | 17 | 0.9 | 0.7 | 0.4 | 0.1 | 0.9 |
| 19-Nov-10 | 0.0 | 0.0 | 0.0 | 45 | 80 | 84 | 94 | 9.5 | 6.1 | 17.4 | 1.1 | 0.9 | 0.6 | 0.1 | 1 |
| 15-Dec-10 | 0.0 | 0.0 | 0.0 | 23 | 70 | 83 | 92 | 13 | 9.7 | 16.5 | 0.9 | 0.9 | 0.7 | 1.4 | 1.1 |
| 20-Jan-11 | 0.0 | 0.0 | 0.0 | 28 | 82 | 87 | 90 | 10.2 | 6.5 | 17.3 | 1 | 0.8 | 0.5 | 0.7 | 1.4 |
| 16-Feb-11 | 0.0 | 0.0 | 0.0 | 42 | 82 | 70 | 86 | 21 | 14.8 | 1.6 | 1.8 | 1.8 | 1.8 | 1.8 | 2.3 |
| 2-Mar-11 | 0.0 | 0.0 | 0.0 | 45 | 80 | 85 | 96 | 8.1 | 8.1 | 16.9 | 1 | 0.4 | 0.7 | 0.1 | 1.2 |

**Notes & Abbreviations:**

ppm = Parts per million as measured with a PID
°F = Degrees Fahrenheit
cubic ft./min = Cubic feet per Minute (actual in field measurement, not adjusted for temperature and pressure)
in. water = Inches of water pressure/vacuum

- = Not Available/Not Measured
ND = Non Detect; method detection limit < 1ug/L
Blower replaced on April 10, 2008
Carbon replaced on April 10, 2008

**Table 4**
**Manual NAPL Removal Data - Select Wells**
**100 Commercial Street**
**Malden, MA**

| Well ID | Date | Depth to Water (feet) | Depth to NAPL (feet) | Depth to Bottom (feet) | Thickness NAPL (feet) | NAPL Recovered this event (gallons) | Total Fluids Gallons Recovered | Comments |
|---|---|---|---|---|---|---|---|---|
| 00A-B913-OW | 5-Jul-10 | 6.72 | 12.27 | 13.47 | 1.2 | NA | NA | |
| | 31-Aug-10 | 6.78 | 12.17 | 13.47 | 1.3 | 0.5 | 0.5 | Thin, easy to pump |
| | 14-Sep-10 | 6.74 | 6.81 | 13.47 | 6.66 | 1 | 1.5 | |
| | 30-Sep-10 | 12.85 | 6.58 | 13.47 | 6.89 | 4 | 5.5 | Measured above water, same material |
| | 3-Dec-10 | ND | 7.24 | 13.47 | 6.23 | 19 | 24.5 | Pumped for 2 hrs at low flow |
| | 7-Jan-11 | ND | 7.27 | 13.47 | 6.2 | 20 | 44.5 | Pumped for 3 hrs, became thicker |
| | 7-Jan-11 | 6.9 | 11.4 | 13.47 | 2.07 | - | 44.5 | After 3hrs of pumping re-gauged |
| 00A-B914-OW | 5-Jul-10 | 5.21 | 8.38 | 11.75 | 3.37 | NA | NA | |
| | 31-Aug-10 | 6.24 | 8.09 | 11.68 | 3.59 | 1 | 1 | Very thick , slow to pump |
| | 14-Sep-10 | 6.25 | 10.68 | 11.68 | 1 | 0.5 | 1.5 | |
| | 30-Sep-10 | 6.33 | 9.44 | 11.68 | 2.24 | 0.5 | 2 | |
| | 3-Dec-10 | -- | -- | -- | -- | -- | -- | Well not gauged - car on top |
| | 7-Jan-11 | -- | -- | -- | -- | -- | -- | Well not gauged - car on top |
| B108-OW | 5-Jul-10 | 9.22 | 14.3 | 23.7 | 9.4 | 2 | 2 | |
| | 31-Aug-10 | 9.08 | 14.38 | 23.56 | 9.18 | 2.5 | 4.5 | Readily pumped with peristaltic |
| | 14-Sep-10 | 9.33 | 14.85 | 23.56 | 8.71 | 2.8 | 7.3 | |
| | 30-Sep-10 | 9.54 | 14.94 | 23.56 | 8.62 | 2 | 9.3 | |
| | 3-Dec-10 | -- | -- | -- | -- | -- | -- | Well not gauged - car on top |
| | 7-Jan-11 | -- | -- | -- | -- | -- | -- | Well not gauged - snow bank |

Notes

NAPL - non-aqueous phase liquid
All data collected by IESI personnel
Recovered NAPL stored in system shed at 100 Commercial St.