



March 18, 2015

Mr. Bryan W. Taberner, AICP  
Director of Planning and Community Development  
Town of Franklin  
355 East Central Street  
Franklin, MA 02038

Subject: Results of Passive Soil Gas Survey  
87 Grove Street  
Franklin, Massachusetts  
T&H No. 3969

Dear Mr. Taberner:

Tata & Howard (T&H) has prepared this letter summarizing the results of the passive soil gas analyses performed at the property located at 87 Grove Street in Franklin, Massachusetts ("Site"). The Site is identified by the Franklin Assessors as Lots 22 and 27 on Map 276. A total of 42 passive soil gas samplers were installed across the Site and abutting properties in an effort to identify possible onsite or offsite sources of hazardous material; 39 of the samplers were retrieved intact. Four of the samplers were frozen to the ground and could not be removed during the retrieval process. The samplers were installed in a grid pattern as shown on Figure No. 1, which is attached.

The samplers were allowed to collect vapors over a ten day period. Passive soil gas readings are actually the mass of contaminant in nanograms (ng) that adsorbed onto the sampler, so the readings are not the concentration of the contaminant. Therefore, the readings do not correlate to reportable concentrations.

Compounds associated with chlorinated solvents were detected in the samplers and the results of selected compounds are plotted on Figures No. 2 and No. 3. A summary of these results follows:

- Figure No. 2 - Tetrachloroethylene (a.k.a. perchloroethylene or PCE). This plot shows the results for PCE, a chlorinated volatile organic compound (CVOC). The highest reading was found at VP-12, located to the east of the building on Lot 22, in the vicinity of the former raceway tunnel.

Elevated PCE readings were also detected at VP-1, VP-4, and VP-18. VP-1 is located to the west of the building on Lot 28, VP-4 is located in the northern portion of the Site, and VP-18 is located south of the building on Lot 22. VP-4 is near one of the areas where VOC contaminated soil was excavated and T&H is of the opinion that this soil gas result is likely attributed to residual VOC contamination. Based on the PCE data, there appear to be at least two residual source areas onsite: one in the northern portion and one in the western portion. Fuss & O'Neill, Inc. (Fuss & O'Neill) previously excavated soil from these areas and T&H is of the opinion that the soil gas data indicate that additional contaminated soil is present. The soil gas data also indicate that the groundwater plume appears to have migrated to the southwest and northwest under the adjoining buildings.

PCE was also detected at VP-39, which is located to the west of the southern abutting property building on Lot 26. T&H is of the opinion that this appears to be an isolated area with PCE vapor, and may indicate that the PCE detected in this soil gas sampler originates at Lot 26.

- Figure No. 3 - Trichloroethylene (TCE). This plot shows the results for TCE, a breakdown product of PCE. The highest result was detected at VP-1. In addition, elevated readings were detected at VP-4, VP-6, VP-12, and VP-18. These results support the opinion that there appears to be residual source areas onsite and the contamination appears to have migrated to the southwest and northwest under the adjoining buildings. The elevated TCE reading at VP-20 correlates with the area where Fuss & O'Neill excavated soil from near the southwest corner of the building. TCE was also detected in VP-23, VP-32, and VP-41, which may indicate that the contamination has migrated directly to the south beneath Lot 26.

T&H reviewed prior reports prepared for the Site to identify additional work that is necessary to complete the Phase II - Comprehensive Site Assessment (CSA) pursuant to the requirements of the Massachusetts Contingency Plan (MCP; 310 CMR 40.0000). T&H reviewed a *Phase I - Initial Site Investigation Report for the Former Nu-Style Property* prepared by Fuss & O'Neill dated May 2008. Fuss & O'Neil conducted an elevation survey of overburden groundwater at the Site and estimates that groundwater flows to the southwest toward Mine Brook. In a report titled *Limited Site Assessment Report*, dated July 2009, Fuss & O'Neill estimates the bedrock groundwater gradient using four bedrock wells to be to the southeast.<sup>1</sup> Fuss & O'Neill delineates the disposal site with estimated boundaries in the northeast corner and near the southeast corner. In addition, Fuss & O'Neill states that additional assessment of CVOCs contamination in bedrock may be warranted.

In the Phase II report, Fuss & O'Neill documents concentrations of metals and polycyclic aromatic hydrocarbons (PAHs) in shallow soil samples collected at the Site. During

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<sup>1</sup> T&H notes that according to a subsequent report prepared by Nobis Engineering, Inc. in September 2013 groundwater flow in the shallow bedrock aquifer is to the west-southwest.

Release Abatement Measure (RAM) activities in 2012 and 2013, metals containing soil was excavated and disposed offsite. However, PAH containing soil in the areas of MW-2 and MW-3 was not addressed.

T&H reviewed a report titled *Targeted Brownfields Assessment, Nu Style, Franklin, Massachusetts*, prepared by Nobis Engineering, Inc., (Nobis), dated September 2013. Nobis installed six bedrock couplets labeled MW-101S/MW-101D through MW-106S/MW-106D, each consisting of a shallow bedrock well ranging from around 11 to 24 feet below grade and a deeper bedrock well ranging from around 20 to 34 feet below grade for a total 12 bedrock wells. Please refer to Figure No. 4 for the locations of the wells. All the wells installed by Nobis use a five foot well screen set in first water bearing bedrock fractures observed during drilling. CVOCs were detected in groundwater from 10 of the 12 wells. In general, higher concentrations of PCE and TCE were detected in the groundwater samples collected from the deeper well of the couplet.

The highest concentrations of PCE were detected in MW-104D, located along the southern edge of the former building. The highest concentrations of TCE were detected in MW-101D, located on the southern side of Mine Brook and south of MW-104D. T&H is of the opinion that these data support Nobis' findings that the fractured bedrock is likely interconnected and that groundwater in the shallow bedrock aquifer flows to the west-southwest. Nobis recommends additional investigation of the bedrock geology and states that higher concentrations of CVOCs may be present in deeper bedrock fractures. In addition, Nobis recommends additional evaluation of soil in the area of the former excavation of CVOC contaminated soil and CVOC containing soil in the area of MW-105S.

T&H used the well casing elevations and depth to bedrock information from the Fuss & O'Neill and Nobis reports to generate a bedrock surface contour map shown on Figure No. 5. Based on these data, the surface of the bedrock appears to slope downward to the south toward Mine Brook. Based on Fuss & O'Neill's estimate, the groundwater flow direction in the overburden generally agrees with the slope of the bedrock surface. However, the groundwater flow direction and the orientation of the bedrock surface in the northwest corner of the Site and further to the southwest on Lot 19 are unclear due to a lack of information in these areas.

Based on a review of prior assessment activities at the Site, additional assessment of CVOC contamination in the bedrock aquifer is required. Based on the CVOC concentrations in MW-101D, these contaminants appear to be migrating in bedrock fractures below Mine Brook. Therefore, T&H recommends drilling overburden and bedrock wells to the southwest of Mine Brook on Lot 19 and near the western boundary of Lot 22 along the brook. The proposed wells on Lot 22 will assist in the evaluation of whether CVOCs are migrating toward the residential property located west of Lot 22 on Lot 21. Although the residence is serviced by public water, an evaluation of the extent of the release in this direction is necessary due to the potential for a vapor intrusion

pathway. Based on the data obtained from the proposed well on Lot 22, additional groundwater quality assessment may be necessary closer to the residence.

T&H is of the opinion that the passive soil gas data have identified additional locations to be evaluated as part of the Phase II - CSA. Based on these data, T&H recommends drilling overburden and bedrock wells in the vicinity of VP-1 and VP-12. In addition, T&H recommends further evaluating soil and groundwater quality near VP-4 and VP-20.

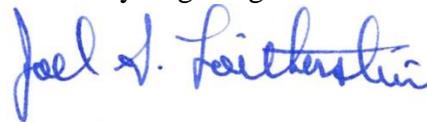
In summary, T&H recommends installing five additional couplets of overburden and bedrock monitoring wells as shown on Figure 6 and a new bedrock well near the Nobis MW-104 couplet in an effort to further evaluate the vertical extent of contamination in the bedrock. In addition, if the wells installed by Nobis are no longer viable, T&H recommends replacing them (with the exception of MW-102S and MW-102D because contamination was not detected in these wells). As part of the well installation work, T&H also recommends further evaluating the extent of soil contamination in the area of MW-105S and near the sewer line along the northern boundary of Lot 27. In addition to the CVOCs, reportable concentrations of PAH were also detected in soil from MW-2 and MW-3. Additional assessment is required to evaluate the nature of these contaminants to assess whether the PAHs are an anthropogenic background condition. However, this assessment can be done in conjunction with the CVOC investigation.

We trust that this letter meets your immediate needs. Please let us know whether you would like us to prepare a proposal for the additional assessment that is recommended.

TATA & HOWARD, INC.



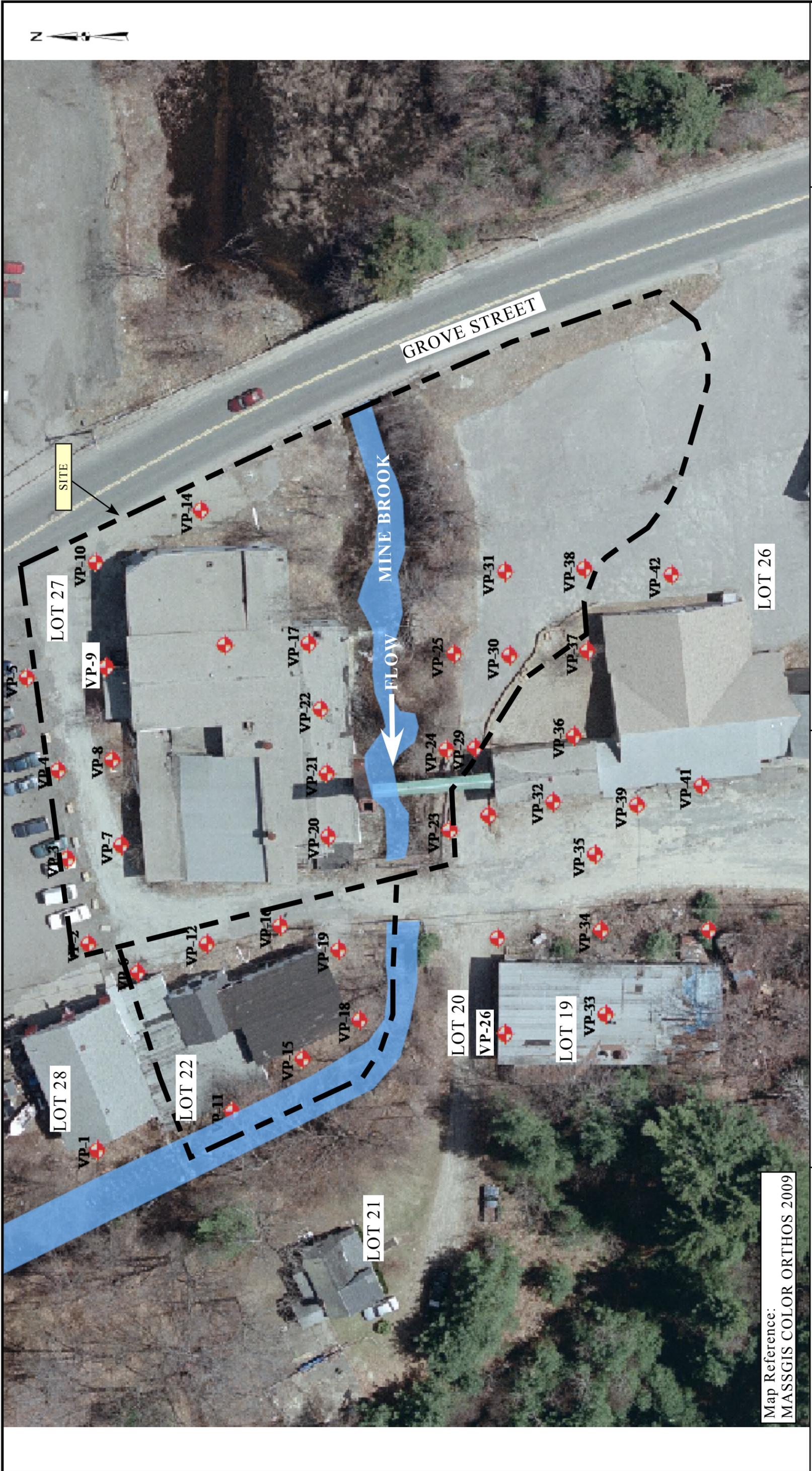
Jonathan O'Brien, LEP, LSP  
Senior Hydrogeologist



Joel S. Loitherstein, P.E.  
Vice President

#### Attachments

- Figure No. 1 - Soil Gas Locations
- Figure No. 2 - Passive Soil Gas Plot - PCE
- Figure No. 3 - Passive Soil Gas Plot - TCE
- Figure No. 4 - Nobis Well Locations
- Figure No. 5 - Bedrock Surface Contour Map
- Figure No. 6 - Proposed Well Locations



Map Reference:  
 MASSGIS COLOR ORTHOS 2009



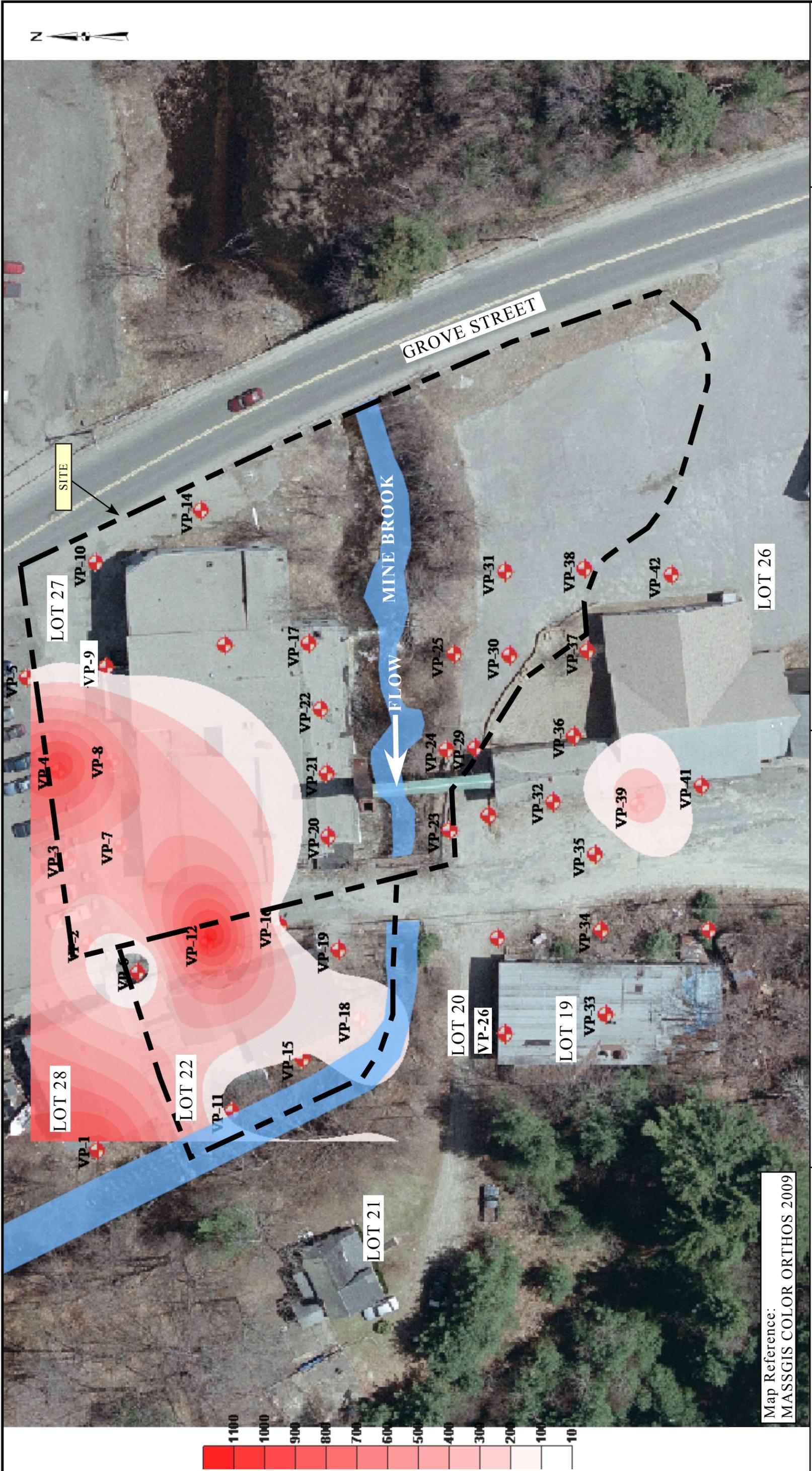
**TATA & HOWARD**

Date: MARCH 2015 Scale: FEET (APPROXIMATE)

**PASSIVE SOIL GAS LOCATIONS**  
**87 GROVE STREET**  
**FRANKLIN, MASSACHUSETTS**

Legend  
 = Passive Soil Gas Sample Location

Figure No.  
**1**



Map Reference:  
 MASSGIS COLOR ORTHOS 2009



**TATA & HOWARD**

Date: MARCH 2015 Scale: FEET (APPROXIMATE)

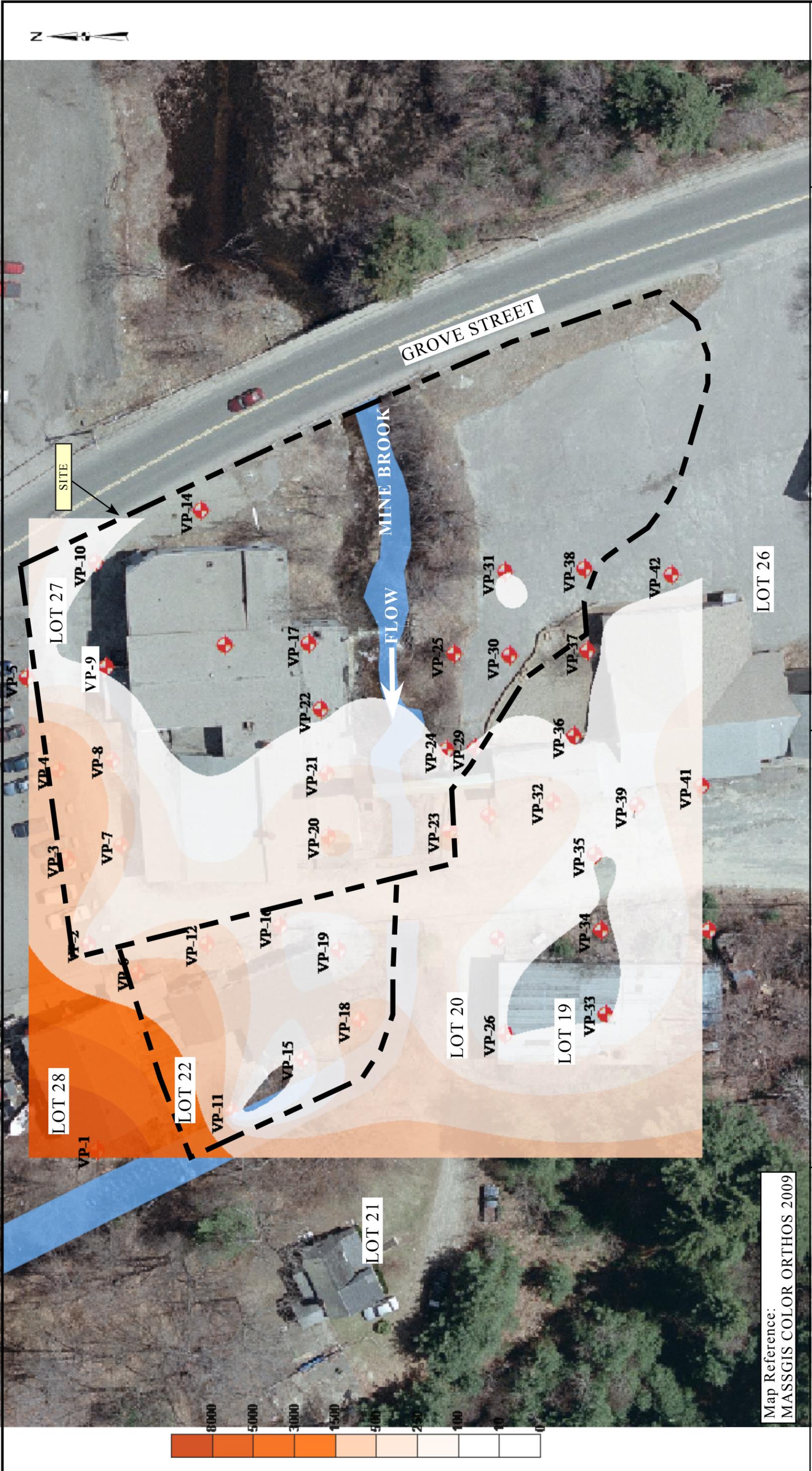
**PASSIVE SOIL GAS PLOT - PCE**  
**87 GROVE STREET**  
**FRANKLIN, MASSACHUSETTS**

Legend

- = Passive Soil Gas Sample Location
- Results in nanograms

Figure No.

2



Map Reference:  
 MASSGIS COLOR ORTHOS 2009

**TATA & HOWARD**

Date: MARCH 2015 Scale: 0 40 FEET (APPROXIMATE)

**PASSIVE SOIL GAS PLOT - TCE**  
**87 GROVE STREET**  
**FRANKLIN, MASSACHUSETTS**

**Legend**  
 = Passive Soil Gas Sample Location  
 Results in nanograms

Figure No. **3**

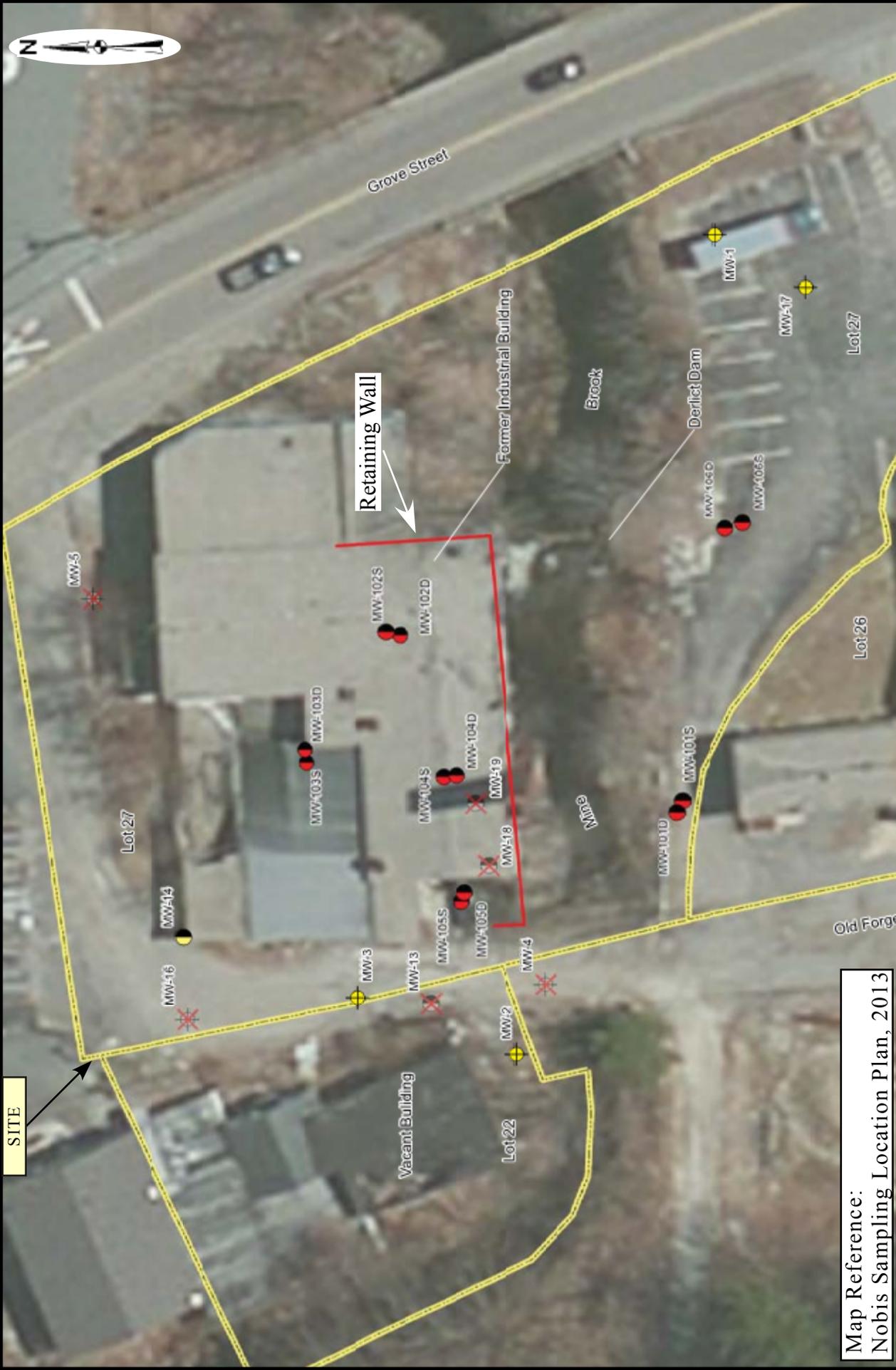


Figure No.

4

**NOBIS WELL LOCATIONS**

**87 GROVE STREET  
FRANKLIN, MASSACHUSETTS**

Map Reference:  
Nobis Sampling Location Plan, 2013

**TATA & HOWARD**  
Date: MARCH 2015 Scale 0 30  
FEET (APPROXIMATE)

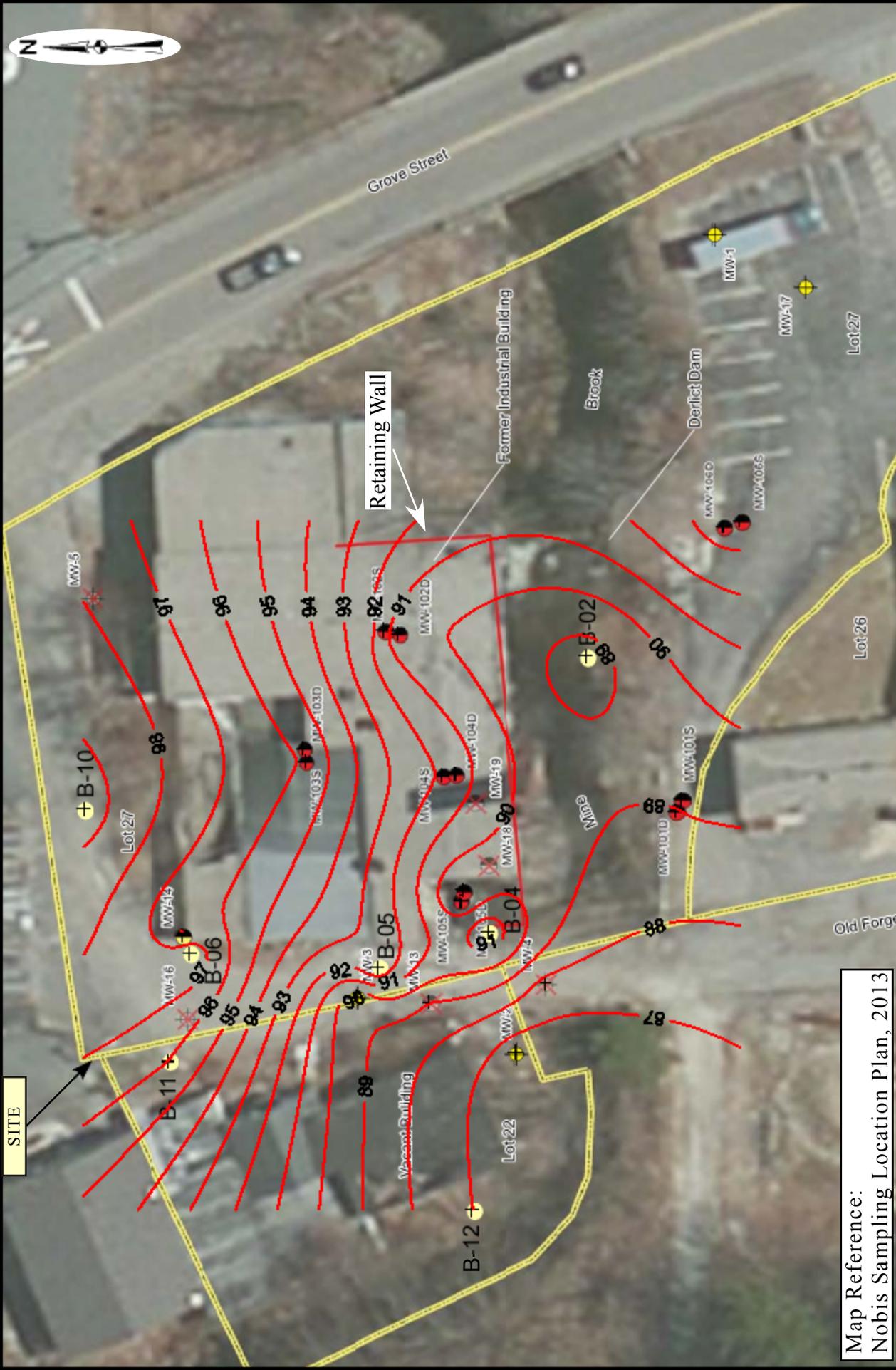


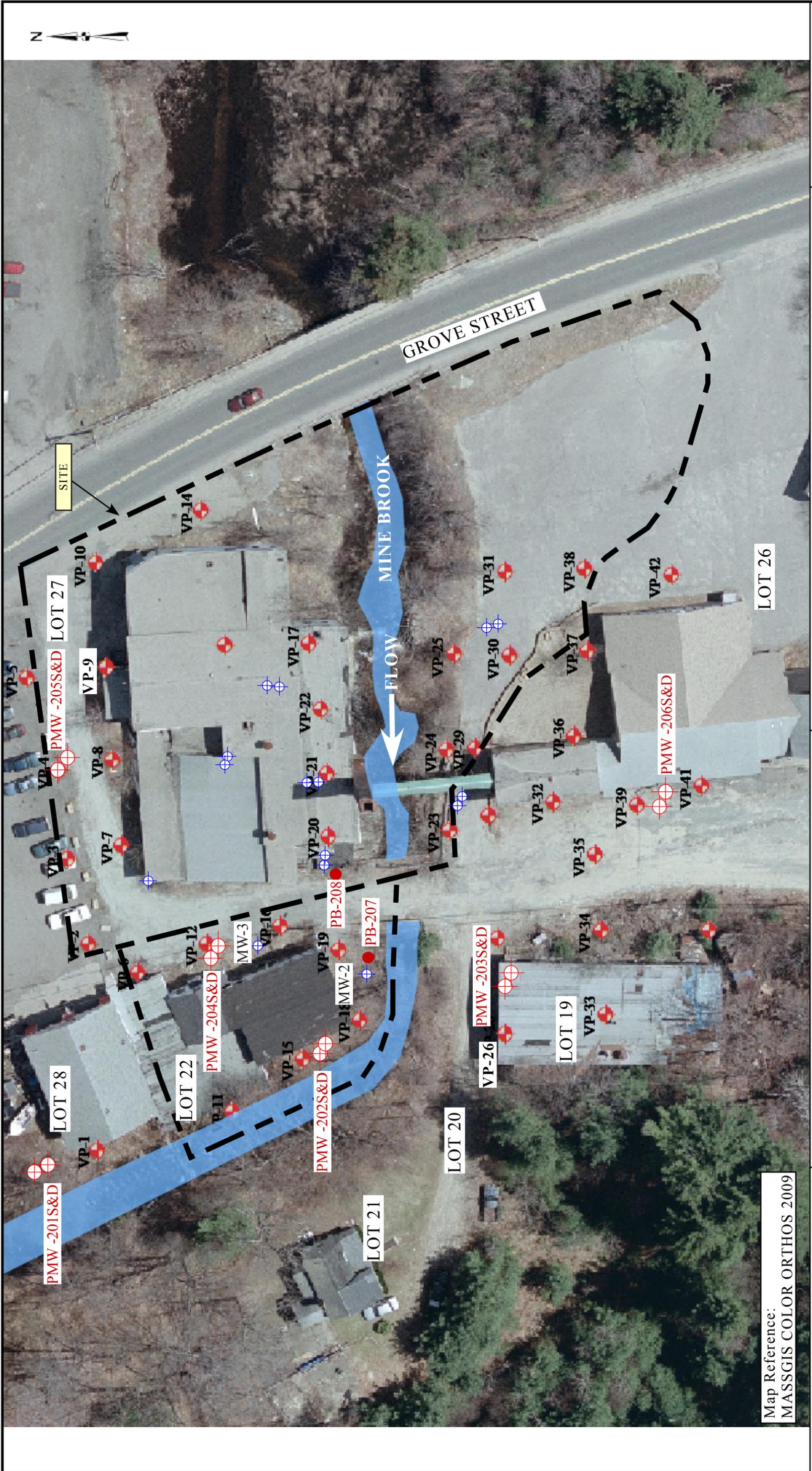
Figure No. 5

**BEDROCK SURFACE CONTOUR MAP**  
**87 GROVE STREET**  
**FRANKLIN, MASSACHUSETTS**

Map Reference:  
 Nobis Sampling Location Plan, 2013

**TATA & HOWARD**

Date: MARCH 2015 Scale 0 30 FEET (APPROXIMATE)



Map Reference:  
 MASSGIS COLOR ORTHOS 2009



**TATA & HOWARD**

Date: MARCH 2015 Scale: 0 40 FEET (APPROXIMATE)

**PROPOSED WELL LOCATIONS**  
 87 GROVE STREET  
 FRANKLIN, MASSACHUSETTS

**Legend**  
 = Proposed Well Location  
 = Proposed Boring

Figure No.

6