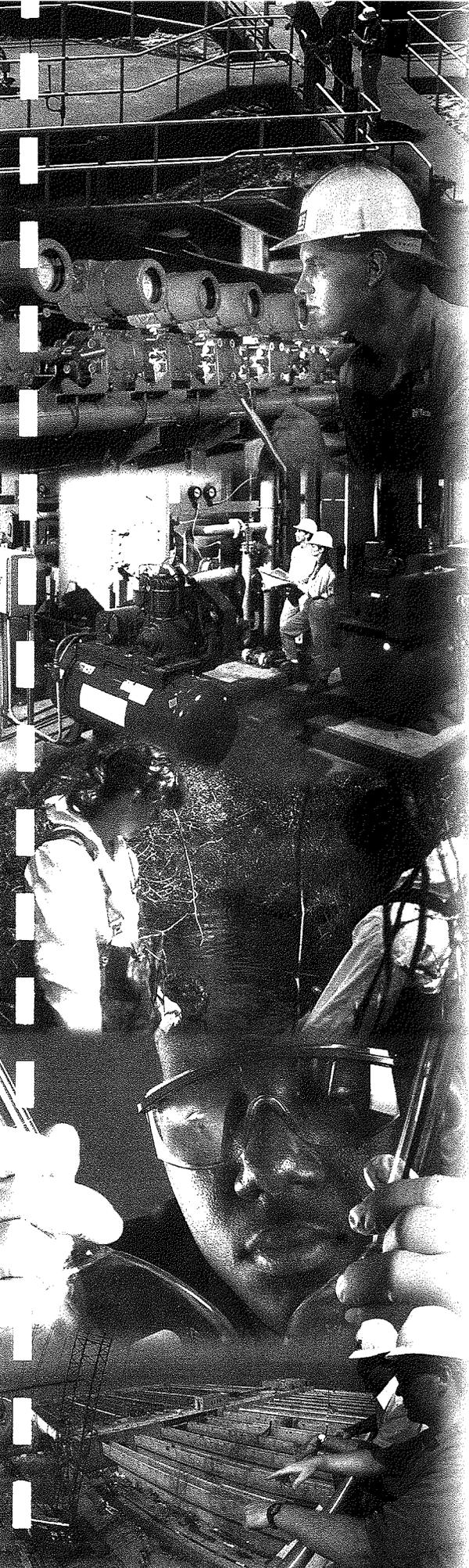


*Walter Cloud*



**PHASE I INITIAL SITE INVESTIGATION  
REPORT**

**VOLUME 1  
TEXT, TABLES, FIGURES,  
AND APPENDICES A THROUGH G**

**Mill Street Property  
Brookfield, Massachusetts**

**Release Tracking Numbers (RTNs) 2-14601  
and 2-10354**

**January 7, 2004**

**Prepared for:  
Town of Brookfield, Massachusetts**

**Prepared by:**



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## **1.0 INTRODUCTION**

Metcalf & Eddy, Inc. (M&E) has been retained by the United States Environmental Protection Agency (USEPA) and the Town of Brookfield, Massachusetts to provide a Tier Classification, Licensed Site Professional Opinion, Phase I Initial Site Investigation (Phase I), and Phase II Scope of Work in accordance with the Commonwealth of Massachusetts Department of Environmental Protection (DEP) Massachusetts Contingency Plan (MCP) regulations (310 CMR 40.0000).

In 1991, Lycott Environmental Research, Inc. conducted a Limited Site Investigation for the Brookfield Mill on behalf of Country Bank for Savings (Lycott, 1991). Based on the results of this investigation a Notice of Responsibility (NOR) was issued to the Brookfield Mill property owner in April 1995. The conditions cited in the 1995 NOR were: groundwater concentrations of total petroleum hydrocarbons (TPH) and cadmium that exceeded reportable concentrations; evidence of oil-stained soil; the location of the Site within the Zone II of a public drinking water supply well; and the existence of an unspecified rare wetland species habitat within 500 feet of the Site. The Brookfield Mill parcel was assigned Release Tracking Number (RTN) 2-10354 by DEP. A Tier 1D classification is currently associated with this RTN due to failure of the responsible party to meet the April 1996 deadline for submittal of a Phase I report and Tier Classification to DEP.

In June 2002, a Targeted Brownfields Assessment (TBA) of the Mill Street properties (street numbers 54 through 67 Mill Street) was performed by Metcalf & Eddy under the Environmental Protection Agency (EPA's) TBA program. The results of soil and groundwater sampling performed as part of the TBA indicated the presence of several metals and PAHs in soil samples at concentrations above their respective reportable concentrations for S-1 category soils. On January 3, 2003, DEP assigned RTN 2-14601 to the 120-day reporting conditions that were identified in the TBA report (M&E, 2002). The former property owner (Mill Street Brookfield Realty Corporation) subsequently submitted the Release Notification Form on February 5, 2003. The town of Brookfield took ownership of the property in June 2003. Supplemental field investigations were also performed under EPA's TBA program in August 2003 in order to further assess the contamination discovered in the initial TBA.

This Phase I Report was prepared to address RTNs 2-10354 and 2-14601 in accordance with 310 CMR 40.0480. This Phase I Report is an integral part of, and is incorporated by reference to, the attached LSP Transmittal Form (BWSC-107) and Numerical Ranking System (NRS) Scoresheet (BWSC-107A). Appendix A contains the full NRS Scoresheet (310 CMR 40.1511).

## **2.0 DISPOSAL SITE INFORMATION**

The former Brookfield Mill property is located on Mill Street, just north of the former Boston and Albany railroad tracks (now operated by CSX) on the southern edge of the business district of Brookfield, Massachusetts. The location is shown on Figure 1, Site Locus. A disposal site map is provided as Figures 2 and 3. These figures show pertinent site features including the property boundary and the soil and groundwater sampling locations. The former Brookfield Mill, a four-story wooden structure, was destroyed in a fire in August 2000. The former Brookfield Mill parcel is bordered by the Spencer Plating property to the east and the former

Boston and Albany Railroad to the south. To the north, on the other side of Mill Street, are three parcels which are currently not occupied by any structures and are partially wooded in the northern section. These parcels are surrounded mainly by residential properties.

The disposal site ("Site") is defined as locations where contaminants exceeding the applicable reportable concentrations have come to be located and is limited to the parcel upon which the former Brookfield Mill was located, on the south side of Mill Street.

The Site is located at a latitude and longitude of 42° 12' 32.3" and 72° 6' 3.8", respectively. The Universal Transverse Mercator coordinates are: N 4677048 E 739306.

The Site is now owned by the town of Brookfield. It was acquired by the town on June 12, 2003 (personal communication between B. Weir of M&E and B. Lund, Chairman of the Brookfield Board of Selectmen, November 17, 2003). Prior to acquisition by the town of Brookfield, the Site was owned by the Mill Street Brookfield Realty Corporation. There are currently no on-site workers at the disposal site.

The Site is presently devoid of buildings or structures. All that remains of the former four-story mill building is the foundation and some rubble and debris on the old mill site. The building footprint is generally level and at the same elevation as the surrounding ground. It appears that after the fire, the remnants of the building either collapsed or were demolished, such that they now partially fill the basement. Fill material (sand) also appears to have been placed into the basement void (M&E, 2002).

According to a Phase I - Limited Site Investigation by Lycott Environmental Research (Lycott, 1991), the mill building was a wooden structure with a brick foundation and a concrete-floored basement. Lycott representatives observed two floor drains in the concrete floor of the building. The Lycott representatives were told that the drains discharged directly to the environment, rather than to the on-site septic system. A concrete containment area was also present in the basement, and was filled with an oily mixture during the Lycott site visit. It was not possible for the Lycott representatives to determine whether the containment area floor was concrete or dirt.

The Site is serviced by the Town of Brookfield water system, and all electricity and telephone wires are overhead. The mill had its own septic system that is believed to have also been used by Spencer Plating. Sewage from the restrooms and sinks inside the mill building and from bathrooms in the building currently housing Spencer Plating was pumped into a holding tank in the mill building. It was then directed to two septic tanks west of the building, which were pumped quarterly according to a former tenant (Lycott, 1991). Brookfield town officials state that another septic system, put in place by the Massachusetts Department of Public Works during construction of the Route 148 bridge, lies on the western edge of the mill property. In addition, the Spencer Plating facility has installed its own septic system east of the former mill building (C. McManus, personal communication, 2001), which is not on the Site but which abuts it to the east.

A DEP Bureau of Waste Site Clean Up Site Scoring Map, generated from the DEP Geographic Information System, is provided in Appendix B. The Site is not located in a Zone II area,

Interim Well Head Protection area, or potentially productive aquifer according to the Massachusetts DEP Site Scoring Map (November 2003) of the Site and surrounding area. The Quaboag River is located within 500 feet of the Site. Otherwise, no drinking water supplies, areas of critical environmental concern, sole source aquifers, or local, state, or federal protected open space were identified within 500 feet of the Site. The Site is located within 500 feet of a Natural Heritage and Endangered Species Program (NHESP) wetland habitat. The NHESP has been contacted to obtain information on the species that are mapped to occur near the Site as well as any other habitats of Species of Special Concern or Threatened or Endangered Species in the vicinity of the Site (see Appendix C).

Based on year 2000 Census data, the residential population within a half-mile radius is estimated to be approximately 570. There are no Institutions within 500 feet of the Site.

### **3.0 DISPOSAL SITE HISTORY**

#### **3.1 Owners/Operators and Operations History**

Prior to 1893, the Site was undeveloped. In 1893, the on-site mill building was constructed and was occupied by a leather finishing business. The mill building was subsequently occupied by various other businesses; including a paper-coating company, a shoe company, a plastic injection molding business, a charcoal filter manufacturer, and various other small businesses. The on-site mill building was destroyed by fire in August 2000 (M&E, 2002).

The Site is now owned by the town of Brookfield. It was acquired by the town on June 12, 2003 (personal communication between B. Weir of M&E and B. Lund, Chairman of the Brookfield Board of Selectmen, November 17, 2003). Prior to acquisition by the town of Brookfield, the Site was owned by the Mill Street Brookfield Realty Corporation.

#### **3.2 Release History**

In April 1995, the DEP issued a notice of responsibility (NOR) for the Brookfield Mill to the property owner at that time, Mr. Walter Allard. The NOR was based on the results of a Limited Site Investigation conducted by Lycott Environmental Research Inc. in 1991, on behalf of the Country Bank for Savings (Lycott, 1991). The conditions cited in the 1995 NOR were: groundwater concentrations of total petroleum hydrocarbons (TPH) and cadmium that exceeded reportable concentrations; evidence of oil-stained soil; the location of the Site within the Zone II of a public drinking water supply well; and the existence of an unspecified rare wetland species habitat within 500 feet of the Site. The DEP reached the conclusion that the Site is located within a Zone II and within 500 feet of a rare wetland species habitat, by reviewing the Bureau of Waste Site Cleanup Priority Resource Maps available at the time (1995). The current DEP site scoring map (November 2003) does not show the Site to be within a Zone II or Interim Wellhead Protection Area, which indicates that the maps have been revised since 1995.

Based on the original TPH and cadmium issues identified by Lycott, the Brookfield Mill parcel was assigned Release Tracking Number (RTN) 2-10354 by DEP. The Site is classified as a Tier ID site because the responsible party failed to file a Phase I Report and Tier Classification by

April 1996. To M&E's knowledge, no Massachusetts Contingency Plan (MCP) compliance activities for this RTN have been conducted either by the original responsible party or by subsequent owners of the parcel.

In June 2002, a Targeted Brownfields Assessment of the Mill Street properties (street numbers 54 through 67 Mill Street) was performed by Metcalf & Eddy under the USEPA's TBA program. The town of Brookfield had applied for the TBA because of the town's interest in potentially acquiring the land for municipal uses. The results of soil and groundwater sampling performed as part of the TBA indicated the presence of several metals and polycyclic aromatic hydrocarbons (PAHs) in soil samples at concentrations above their respective reportable concentrations for S-1 category soils.

On January 3, 2003, DEP assigned RTN 2-14601 to the 120-day reporting conditions that were identified in the initial TBA report (M&E, 2002). Several metals and PAHs in soil samples were found to exceed their respective reportable concentrations for S-1 category soils. Separate reporting was recommended in the TBA report because the reported conditions were different from those noted by Lycott that led to the assignment of RTN 2-10354.

A supplemental field investigation was also performed under EPA's TBA program in August 2003 in order to further assess the contamination discovered in the initial TBA (M&E, 2003). The results were consistent with the initial TBA investigation.

### **3.3 Oil and/or Hazardous Material (OHM) Use and Storage History**

The property originally included a coal storage shed (through 1954). Coal was replaced by fuel oil on an unknown date. A 20,000-gallon underground storage tank (UST) was located on the north side of Mill Street. The UST is thought to have held heating oil, which was pumped under the street to the mill. As part of the initial TBA conducted by M&E in May 2002, the location and size of the UST was confirmed using geophysical techniques. The results of the geophysical survey are included as Appendix D. The UST was not on file with the Brookfield Fire Department and exact information regarding contents and location was not available to M&E. The UST, including the pipe leading from the UST under Mill Street to the former mill building, was removed by Peak Environmental under contract to the town of Brookfield. The removal was conducted on June 25, 2003. No contamination was observed in the UST grave. The UST closure report by Peak Environmental is included as Appendix E. Because the closure report did not specifically discuss the fate of the underground pipe from the tank to the mill building area, M&E contacted Peak Environmental to inquire about it. The record of that conversation is also included in Appendix E (personal communication between Bill Abrahams-Dematte of M&E and Bill Anthony of Peak Environmental, July 31, 2003).

In June 1998, TJF Realty was issued notices of non-compliance related to inspections of the Brookfield Mill property by DEP in September 1997 and January 1998. The inspections noted illegally stored hazardous waste including 33 drums of waste oil and other EPA regulated wastes. In February 1998, TJF Realty had the drums removed under hazardous waste manifests. The Brookfield Mill building was destroyed by fire in August 2000. It is unknown how much oil or hazardous material (OHM) was being stored, if any, within the building at the time of the fire.

### **3.4 Waste Management History**

The former mill building was destroyed by fire in August 2000. As part of the initial TBA investigation (M&E, 2002), four test pits were dug in the footprint of the former mill building, to characterize the soil and debris present in the basement of the building after the burned building shell was demolished. The test pit logs document the presence of sandy loam mixed with ash and various debris (e.g. pipes, bricks, wires, small equipment pieces, a small device that appeared to be electrical equipment, and partially burned vinyl flooring and wood) in the subsurface (see Appendix F). Because the Site involves demolition and in-place disposal of demolition debris, it is subject to DEP Bureau of Waste Prevention Regulations found at 310 CMR 19.000-Solid Waste Regulations. The demolition debris falls under the definitions of "Construction and Demolition Waste" and "Solid Waste". The regulations prohibit uncontrolled dumping of solid waste. Since the building was demolished and the debris was disposed of on site without complying with the Solid Waste Site Assignment regulations, the Site may meet the definition of an illegal dumping ground and as such may constitute a violation of DEP solid waste regulations, independent of any issues related to the Massachusetts Contingency Plan.

Otherwise, there is no indication that the Site has been used for landfills and lagoons; leach fields; surface water discharges; or discharges to wastewater treatment plants. According to town representatives, there had been a septic system just west of the former mill building. The Lycott report (1991) indicates that floor drains from the former mill may have discharged to the environment rather than the septic system. The septic system east of the former mill building is on the abutting Spencer Plating property and is not part of the Site.

### **3.5 Environmental Permits and Compliance History**

No current local, state, or federal environmental permits or oil and/or hazardous material storage permits exist for the Site.

### **3.6 Potentially Responsible Parties**

Potentially Responsible Parties which have been identified for the Site include the Town of Brookfield, Massachusetts, which is the current owner of the parcel, and the former owners of the Brookfield Mill which include:

- Mill Street/Brookfield Realty Corporation, 55 Mill Street, Brookfield, MA 01506
- Walter Thomas Allard, 264 Amesbury Line Road, Haverhill, MA 01830
- TJJ Realty Corporation, c/o Attorney Melvyn Glickman, Glickman, Sugarman, Kneeland, and Gribouski, 11 Harvard Street, Worcester, MA 01609

## **4.0 SITE HYDROGEOLOGICAL CHARACTERISTICS**

### **4.1 Site Topography/Geology**

Site geologic characteristics are summarized from the initial TBA field investigation (June 2002) and supplemental field investigation (August 2003) performed by M&E.

The Site contains the remains of a foundation and basement floor (reported to have been concrete) from the old mill building that was destroyed by fire. The basement void is currently filled with debris from the fire and sandy fill. The floor of the foundation is not entirely filled and is exposed on the south and east sides of the former building. The southern and eastern foundation walls have deteriorated. South of the foundation there is a drainage trench and a culvert, underlying the Boston and Albany railroad tracks, that connects the drainage to the Quaboag River and wetlands to the south. Lycott (1991) reported that the drainage trench was installed by the railroad to reduce flooding of the tracks. The overall topography of the Site is gently sloping towards the southeast. Surface water runoff from the Site travels to the south-southeast, into the railroad drainage ditch. The foundation is mostly level, but has a steep slope at its southern edge, facing the railroad bed.

The Site is underlain by an Ordovician age biotite gneiss bedrock belonging to the Partridge Formation (Bedrock Map of Massachusetts, 1983; E-an Zen, et. al.) Confirmation, however, was not obtained during drilling, nor were there any outcrops noted. Based on the TBA field investigation, the soils in the upper 10 to 15 feet consist of approximately 5 to 10 feet of fill or disturbed soils overlying fine to medium sand, silt, and little to trace amounts of gravel. Some stratification was noted in the south and southeast areas of the Site (ME-1 and ME-2), while on the west and north sides of the Site (ME-3 and ME-4), the soils were finer and contained more clay. In particular, ME-3 (located just north of the disposal site, on the other side of Mill Street, adjacent to the former UST) had a nearly 4 foot interval of clay. The Lycott soil boring/monitoring well MW-5, located approximately 100 feet northwest of ME-3, however, indicated no presence of clay. Geologically, the mill lies on a flood plain terrace of the Quaboag River, which is underlain by Quaternary glacial deposits of sand and gravel and possibly till. Based on borings completed by M&E and Lycott, overburden is greater than 25 feet thick.

Test pit, soil boring, and well installation logs for the June 2002 and August 2003 field investigations are provided in Appendix F.

### **4.2 June 2002 TBA Field Investigation**

In June of 2002, a field investigation was performed by Metcalf & Eddy, under EPA's Targeted Brownfields Assessment program. The field investigation consisted of: a geophysical survey to identify the location of the UST north of Mill Street, a test pit investigation of the former mill building footprint with soil sampling and analysis, soil borings with surface and subsurface soil sampling and analysis, temporary groundwater well installation and development, and groundwater monitoring and sampling (M&E, 2002).

#### 4.2.1 Geophysical Survey

An area of approximately 200 square feet was surveyed by Hager GeoScience, under subcontract to M&E, to more accurately locate the UST which was located north of Mill Street (see Appendix D). Based on the survey, a structure (likely the UST) was discovered, with approximate dimensions of 20 feet long and 15 feet wide. Its location was marked on the pavement using permanent paint. Location of the UST was a main objective of the TBA, because it was suspected that the UST or its transmission line may have leaked.

The UST, including the pipe leading from the UST under Mill Street to the former mill building, was later removed by Peak Environmental under contract to the town of Brookfield. The removal was conducted on June 25, 2003. No contamination was observed in the UST grave. The UST closure report by Peak Environmental is included as Appendix E. Because the closure report did not specifically discuss the fate of the underground pipe from the tank to the mill building area, M&E contacted Peak Environmental to inquire about it. The record of that conversation is also included in Appendix E (personal communication between Bill Abrahams-Dematte of M&E and Bill Anthony of Peak Environmental, July 31, 2003).

#### 4.2.2 Test Pit Investigation

Four (4) test pits were dug in the footprint of the former mill building (destroyed by fire in August 2000), to characterize the soils and debris present in the basement of the building after the burned building shell was demolished. Possible sources of contamination in the soils include ash from the fire that destroyed the building, as well as residues from materials and machinery present in the building before it burned (for example, waste oil or possibly polychlorinated biphenyl (PCB)- containing machinery or electrical devices).

The approximate locations of the pits are shown on Figure 2 (TP-1, TP-2, TP-3, and TP-4). The test pit logs (Appendix F) document the presence of sandy loam mixed with ash and various debris (e.g. pipes, bricks, wires, small equipment pieces, a small transformer-like device, and partially burned vinyl flooring and wood) in the subsurface.

Six test pit soil samples were collected with analysis of each sample for volatile and extractable petroleum hydrocarbons (VPH and EPH), PCBs, total metals (EPA target analyte list), and toxicity characteristic leaching procedure (TCLP) metals. VPH samples were grab samples collected from discrete locations within the depth intervals cited below, based on field team judgment. For analytes other than VPH, a composite sample from the depth range cited was created before the soil was placed into sample jars for shipment to the laboratories. Soil samples were collected from each location between the following depths:

- TP-1: 0 to 4 feet below ground surface (bgs)
- TP-2: 0 to 4 feet bgs; 4 to 7 feet bgs (plus the field duplicate KTP-2-B)
- TP-3: 0 to 4 feet bgs; 4 to 9 feet bgs
- TP-4: 0 to 7.5 feet bgs

Data from the test pit soil sample analyses are presented in Table 1 and discussed in Section 5.2.

### 4.2.3 Soil Borings and Monitoring Well Installations

A total of four borings were advanced across the former Brookfield Mill parcel and two parcels on the north side of Mill Street. Approximate locations are shown on Figure 2. Soil borings were advanced by alternately advancing split spoon samplers and 4 ¼-inch hollow stem augers using a drill rig. Two-foot long split spoons were used to collect continuous soil samples from each location. The soil samples were logged and characterized. Observations also included visual appearance and jar-headspace screening using a photoionization detector (PID). Soil boring and well installation logs are included in Appendix F.

Surface soil samples (approximately 1 to 4 feet bgs) and subsurface soil samples (approximately 4 feet bgs to the end of the boring) were collected for analysis as follows:

ME-1: 0 to 4 feet bgs; 4 to 12 feet bgs

ME-2: approximately 3 feet bgs (VPH only); 4 to 12 feet bgs (EPH and metals only)

ME-3: 4 to 12 feet bgs

ME-4: 0 to 4 feet bgs; 4 to 14 feet bgs

These samples were submitted for laboratory analyses for VPH, EPH and total metals except where noted above. VPH samples were grab samples collected from discrete locations within a depth interval, based on field team judgment. For analytes other than VPH, a composite sample from the depth range cited was created before the soil was placed into sample jars for shipment to the laboratories

These analytes were selected based on a previous Site assessment (Lycott, 1991), which documented the detection of petroleum hydrocarbons and certain metals in Site soils and groundwater and ultimately led to listing of the Site with the DEP as Release Tracking Number 2-10354. Surface and subsurface soil analytical data are presented in Table 1 and discussed in Section 5.2.1.

Four overburden monitoring wells were installed at each soil boring location during the field investigation. The wells are identified as ME-1, ME-2, ME-3, and ME-4 on Figure 2 and were constructed using two-inch schedule-40 flush joint PVC. Each well was screened across the water table with a 10-foot section of 20-slot PVC well screen and was brought flush to grade with a solid PVC riser that was capped and housed in a six inch gate box. The annulus backfill consisted of a sand pack in the annular space around the screened PVC to approximately 2 feet above the top of the well screen, approximately 0.5-1 foot of hydrated bentonite, and an additional 6 inches of sand. The remaining annular space was taken up by the concrete pad in which the gate box was set. Groundwater depth at these wells was measured between 0.5 and 7 feet bgs. Well installation logs are provided in Appendix F.

Well development was completed following installation of the wells. The Lycott well MW-5 was also located and developed for sampling. The other Lycott wells were not located and are presumed to have been destroyed. During well development, the purge water was monitored for temperature, pH, conductivity and turbidity. Non-aqueous phase liquids (NAPL) and odors were

not observed in any well. In addition, headspace readings on a PID from within the wells were all non-detect.

#### **4.2.4 Groundwater Sampling**

Monitoring wells ME-1, ME-2, ME-3, and ME-4 were sampled using the EPA low-flow method and analyzed for volatile organic compounds (VOCs), VPH, EPH, and total metals. Lycott well MW-5 was also sampled for metals only, due to previous detections of certain metals in a sample from this well, as reported by Lycott. The samples were collected, packed in ice, and shipped to the laboratories the day after they were collected. Groundwater analytical data are presented in Table 2 and discussed in Section 5.2.2.

The water table across the Site tends to be deeper to the north and west (2.8 to 8.4 feet below grade) and shallower to the south and east (0.5 to 1.6 feet below grade). Water levels obtained from the monitoring wells, in combination with the topography of the land, indicated that groundwater flow is to the south-southeast towards the Quaboag River. This flow direction is consistent with the findings in the Lycott (1991) investigation of the Site.

### **4.3 August 2003 Supplemental TBA Field Investigation**

In August and September of 2003, a supplemental field investigation was performed by Metcalf & Eddy, under EPA's Targeted Brownfields Assessment program. The supplemental field investigation consisted of: advancement of four soil borings with sampling and analysis for total metals and synthetic precipitation leaching procedure (SPLP) metals, installation of eight piezometers, and two rounds of water level measurements to evaluate groundwater flow direction and velocity.

#### **4.3.1 Soil Borings and Piezometers**

The soil borings were advanced and the piezometers were installed on August 5 and 6, 2003, using a direct-push rig. Logs are included in Appendix F. The soil borings were advanced within the footprint of the former mill building (see Figure 3) to a depth of 8 to 12 feet below ground surface. Surface (0 to 4 feet) and subsurface (> 4 feet) soil samples were collected at each of the four soil boring locations as follows:

- SB-1: 0 to 4 feet bgs; 4 to 10.5 feet bgs
- SB-2: 0 to 4 feet bgs; 4 to 12 feet bgs
- SB-3: 0 to 4 feet bgs; 4 to 12 feet bgs
- SB-4: 0 to 4 feet bgs; 4 to 8 feet bgs (and field duplicate sample KSB-4D)

Soil samples were analyzed for total metals and SPLP metals. The results are presented in Table 1 and discussed in Section 5.2.1. Brick, wood, burnt material, slag, and possible coal chips were observed in several of the samples.

Eight piezometers were installed around the perimeter of the former building to a depth of 8 to 12 feet below ground surface. At location P4, concrete and a perched water table were

encountered at a depth of 4 feet below ground surface. The boring was advanced to 12 feet and a bentonite plug was installed to span the concrete floor, to separate the water perched above the concrete from groundwater below it. The piezometer locations are indicated on Figure 3.

#### **4.3.2 Groundwater Elevations, Flow Direction, and Velocity**

Water level measurements were made on August 6, 2003 and again on September 12, 2003 for the eight piezometers installed during the supplemental TBA, and the monitoring wells that had been installed during the initial TBA. During the September 12 monitoring round, silt was encountered in the piezometers that sometimes coated the water level indicator and interfered with the signal from the indicator. Careful, repeated attempts were necessary to obtain an accurate elevation at which the water table was encountered. The measurements and field survey notes are included in Appendix G.

Figure 4 presents groundwater elevation contours for the August 6, 2003 water level monitoring round. Contours from the September 12 monitoring round are consistent with those shown in Figure 4. The groundwater flow direction is due south towards the Quaboag River. The gradient was calculated at 0.08 foot/foot (8%). Assuming a hydraulic conductivity of 2.83 ft/day (equal to  $10^{-3}$  cm/s: consistent with sand containing silt), a porosity of 0.30 (30%) and an 0.08 (8%) gradient, the groundwater velocity is estimated to be 0.76 feet per day (assuming effective porosity equal to porosity and saturated conditions).

Figure 5 presents a schematic cross-section through the former building footprint, showing the ground surface, approximate water table elevation, and the estimated extent of building walls and floors, demolition debris, and fill. It is assumed that natural material is present at approximately three feet below ground surface, under the former basement floor of the building. The buried wall and floor serve as a partial barrier to groundwater flow through the demolition area. It is believed that regional groundwater flow mostly passes under this area (below the floor that is at least partially intact).

### **5.0 NATURE AND EXTENT OF CONTAMINATION**

The analytical results of surface soil, subsurface soil, and groundwater samples collected at the Site are summarized in tables as follows. Table 1 presents the surface and subsurface soil analytical data for both the initial and supplemental TBA field investigations. Table 2 presents the groundwater analytical data from the initial TBA field investigation. For organic compounds, only those that were detected in at least one sample are included in the tables. Minimum and maximum concentrations for all detected contaminants are presented on each table. The full analytical results are provided in Appendix H.

#### **5.1 Massachusetts Regulatory Criteria**

The soil and groundwater analytical data for VPH, EPH, VOCs, PCBs, and total metals are compared to the applicable MCP Reportable Concentrations and MCP Method 1 Risk Characterization soil and groundwater standards. The GW-3 standards for S-2 and S-3 soils are shown on the soil data tables. Based upon current accessibility and human receptor characteristics as outlined in 310 CMR 40.0933, surficial soil at the disposal site is categorized

as S-2 and S-3 and subsurface soil is categorized as S-3. Current receptors at the Site are child and adult trespassers. The frequency and intensity of use for the child and adult trespassers are considered low.

Groundwater at the disposal site is categorized according to 310 CMR 40.0932. Groundwater at all disposal sites is considered a potential source of discharge to surface water and shall be classified, at a minimum, as category GW-3. Groundwater at the disposal site would not be classified as GW-2 since it is not located within 30 feet of an occupied building. Groundwater at the disposal site would not be classified as GW-1 since it is not located within a current or potential drinking water source area.

TCLP analytical data from the initial TBA field investigation is compared to TCLP Regulatory Levels (310 CMR 30.125B). SPLP analytical data from the supplemental TBA field investigation is compared to MCP Method 1 GW-3 standards. DEP has not published Method 1 standards for copper. In the absence of Method 1 standards, the MCP provides a method for deriving standards called Method 2. Method 2 was used to derive a GW-3 standard for copper according to the procedure in 310 CMR 40.0983(4). The lowest current ecologically-based water quality criterion for copper was obtained by consulting the most recently issued edition of the federal National Recommended Water Quality Criteria (U.S. EPA, 2002). The lowest such value is the Saltwater Continuous Criterion Concentration of 3.1 ug/L. Following the MCP procedure, this value was multiplied by ten to derive a GW-3 standard for copper of 31 ug/L.

## **5.2 Summary of Results**

### **5.2.1 Soil Results**

#### **Test Pit Results**

During the initial TBA field investigation in June 2002, six test pit soil samples (TP-1-A through TP-4-B) plus one field duplicate sample were collected for VPH, EPH, PCBs, total metals (EPA target analyte list), and TCLP metals analyses. The only detection of VPH was in a grab sample collected from location TP-4. At this location C<sub>9</sub>-C<sub>12</sub> aliphatics were detected at a concentration well below the applicable MCP Method 1 standards. Low levels of some EPH fractions and PCBs were detected, but the concentrations did not approach MCP Method 1 standards. The PCBs detected are likely to be remnants from equipment located within the building that burned in the August 2000 fire. The levels of PCBs are an order of magnitude below the Method 1 standard. The VPH, EPH, and PCB results do not indicate that a release of petroleum or PCBs has occurred in this area. If releases had occurred previously, the intensity of the building fire, which was well-documented in newspaper articles, has likely destroyed any oils that may have been present within the building. Newspaper articles about the fire mention that the oil-soaked wood floors contributed to the intensity and rapid spread of the fire.

Low levels of PAHs were detected, consistent with natural soil background concentrations. Concentrations of benzo(b)fluoranthene and dibenz(a,h)anthracene exceeded MCP Method 1 standards in the subsurface soil sample from TP-2 (4 to 7 feet bgs) and its field duplicate and the surface soil sample from TP-3 (0 to 4 feet bgs). However, the detected concentrations of PAHs

are below the May 2002 DEP background levels for natural soils (DEP, 2002). It was anticipated that PAHs would be detected in the test pit soils, due to the observed presence of ash and burned wood, mixed in with the sandy loam soils used to backfill the basement void (cellar hole) left from the building fire. The ash is most likely wood ash from the fire (the mill building was a wood structure), although some coal ash and oil ash may also be present from the historical use of coal and oil in the mill boiler.

With respect to metals, the test pit soil samples exhibit elevated concentrations of barium, copper, and lead in particular. Concentrations of barium and lead each exceeded MCP Method 1 standards in test pit samples. As with the PAHs, one source of metals is believed to be wood ash, although the levels detected are significantly higher than DEP background values for soil containing coal ash or wood ash. It is not known what materials were in use within the building immediately prior to the fire, but the building was leased to multiple tenants with various small businesses, and several tenants used the building for storage. TCLP extraction and analysis of several samples showed exceedances of the TCLP regulatory level for lead. Hence, the test pit soil would be classified as hazardous waste for disposal purposes, due to the lead toxicity characteristic (EPA Hazardous Waste Number D008). The exceedance of TCLP regulatory levels also indicates that a release of hazardous materials (i.e., soil containing lead) has occurred which is subject to MCP response actions. Because the building was wood and was an old structure used for commercial purposes, it is probable that building surfaces were coated with lead-based paint. The small businesses that operated within the building may also have used lead; for example, one small business mentioned was a welding business that repaired early model cars, and another applied coatings to ceramics and glass.

The test pit analytical data is presented in Table 1.

### **Soil Borings Results – Initial TBA Field Investigation**

During the initial TBA field investigation in June 2002, four soil borings were conducted and soil samples from each boring were analyzed for VPH, EPH, and total metals. Boring ME-3 was located north of Mill Street, near the former UST. No VPH or EPH fractions or target compounds were detected in the soil sample from ME-3 (4 to 12 feet bgs). Several metals were detected at location ME-3, but none exceeded the MCP Method 1 standards and levels were consistent with background levels for natural soils.

Soil borings ME-1, ME-2, and ME-4 were conducted on the former Brookfield Mill property. No VPH fractions, target VPH compounds, or target PAHs were detected in surface or subsurface soils. Low levels of the C<sub>9</sub>-C<sub>18</sub> aliphatics and C<sub>19</sub>-C<sub>36</sub> aliphatics were detected in surface soil sample from ME-1 and low levels of C<sub>19</sub>-C<sub>36</sub> aliphatics were detected in the surface soil sample from ME-4. No detections were reported in any of the subsurface soil samples. The evidence of a petroleum release in soils suspected by Lycott (1991) may have since attenuated or may have been removed by on-site activities; for example, the installation of the new septic system to the west of the Spencer Plating building. This particular area was not sampled to avoid disturbing the septic system. Also, due to safety concerns, borings and wells were not installed within 50 feet of the railroad tracks.

Concentrations of metals in soil samples were consistent with background levels for natural soils, with the exception of the surface soil sample collected from ME-1. This boring was located near the building footprint, near where Lycott noted that drums were stored. The soils at this location may have been impacted by the fire, and were logged as "fill/disturbed" to a depth of six feet below ground surface. The concentration of beryllium from this sample exceeded the MCP Method 1 standards, as well as the DEP background levels for natural soils and for soils containing coal ash and wood ash. The concentration of copper is also well above DEP background levels for natural soils and for soils containing coal ash and wood ash. Copper is particularly elevated relative to other metals in this sample. A similarly high concentration of copper was detected in the deep soil sample from Test Pit 2 (4 to 7 feet), but this result was not comparable to its field duplicate. Copper from wire, pipes or small machinery parts are possible sources of copper within the building footprint. Wire is known to have been stored in the building at one time.

The soil boring results are summarized in Table 1.

### **Soil Boring Results – Supplemental TBA Field Investigation**

As part of the supplemental TBA field investigation conducted in August 2003, four soil borings were performed within the footprint of the former mill building. Surface and subsurface soil samples were collected from each boring and analyzed for total metals and SPLP metals.

The results for total metals in soil samples collected during the supplemental investigation are consistent with the results for test pit soil samples collected during the initial investigation. The concentration of lead in the field duplicate subsurface sample from SB-4 exceeded the MCP Method 1 standards. Levels of barium and copper in this sample were significantly higher than DEP background values for soil containing coal ash or wood ash. Boring SB-4 was located near the eastern end of the former building. As described above for the test pit samples, one source of the metals is believed to be wood ash, although the levels detected are significantly higher than DEP background values for soil containing coal ash or wood ash. It is not known what materials were in use within the building immediately prior to the fire, but the building was leased to multiple tenants with various small businesses, and several tenants used the building for storage. Because the building was wood and was an old structure used for commercial purposes, it is probable that building surfaces were coated with lead-based paint. The small businesses that operated within the building may also have used various metals. Barium compounds are used as pigments and in the manufacture of brick and ceramic products (<http://www.toxnet.nlm.nih.gov>). One small business that operated in the building applied coatings to ceramics and glass. Copper from wire, pipes or small machinery parts are possible sources of copper within the building footprint. Wire is known to have been stored in the building at one time.

Because TCLP lead concentrations exceeded the regulatory level in some samples collected in the initial TBA field investigation, there was concern that lead and other metals might leach from the soil at levels that could adversely impact groundwater and surface water. However, it was noted that the TCLP simulates conditions in a municipal solid waste landfill, in which the leachate tends to be quite acidic. The SPLP extraction procedure was used during the supplemental investigation to evaluate leachability under more typical environmental conditions

(i.e., exposure to rain water rather than landfill leachate). The SPLP procedure uses an extraction solution (synthetic precipitation) that was developed to be similar to rain water. Soil samples are extracted using the synthetic precipitation solution, and that solution is then analyzed to measure the concentrations of contaminants that were extracted from the soil into the synthetic precipitation solution. The intent of the SPLP is to simulate the concentrations of contaminants that could become dissolved into groundwater as it migrates through a contaminated soil matrix.

The results of SPLP analysis are presented in units of micrograms per liter (ug/L). The GW-3 standards are compared to SPLP results in Table 1. Note that for copper, DEP has not established Method 1 standards. The standard presented in Table 1 for copper is explained in Section 5.1 and in the notes section on Table 1.

Of the metals analyzed in the SPLP extracts from the soil samples collected during the supplemental investigation, six were not detected in any of the extracts (beryllium, cadmium, mercury, selenium, silver, and thallium). There were no exceedances of the MCP Method 1 GW-3 standards (protective of surface water), nor was the GW-3 standard derived for copper exceeded (see Section 5.1 for derivation). These results indicate that leaching of metals from site soil into groundwater would not be likely to have an adverse impact on the Quaboag River.

### **5.2.2 Groundwater Results**

Groundwater samples were collected from monitoring wells ME-1, ME-2, ME-3, and ME-4 which were installed by M&E in June 2002. A groundwater sample was also collected from monitoring well MW-5, believed to be installed by Lycott. ME-1, ME-2, and ME-4 are located on the former mill property, while ME-3 and MW-5 are located north of Mill Street (see Figure 2). Groundwater samples from ME-1 through ME-4 were analyzed for VPH, EPH, VOCs, and metals. The groundwater sample from MW-5 was analyzed for metals only.

No VPH fractions, VPH target compounds, EPH fractions, or target PAHs were detected in the groundwater samples. Very low levels of acetone and methyl tert-butyl ether (MTBE) were detected in some samples, but the levels are not high enough to be suggestive of a release from the former UST, located north of Mill Street. A release from the former UST would be expected to be evidenced at well ME-2 in particular, which is located downgradient of the former UST location. The UST formerly contained No. 2 oil and possibly waste oil. A significant release of No. 2 oil would be expected to impact groundwater with VPH and EPH fractions, but these were not detected in any groundwater samples. The detections of TPH in water reported by Lycott (1991) may have since attenuated over the 11 years that have elapsed. Also, the old TPH analytical method, EPA Method 418.1, is known to experience "false positives" from materials other than petroleum hydrocarbons. In any case, the TBA data do not indicate an impact to site groundwater from petroleum, and the UST closure report (Appendix E) notes that there was no evidence of contamination observed when the UST was removed in June 2003.

Similarly, the total metals data for site groundwater do not suggest any impacts. Cadmium was not detected in any of the samples, including the sample from Lycott well MW-5. The detection reported by Lycott may have been due to suspended particulate material in the sample. The 2002 sampling event used the EPA low-flow method to collect the samples, a method that minimizes

sample turbidity as much as possible. Of the metals that were elevated in soil samples (barium, copper, and lead), only barium was detected in the groundwater, and the concentrations were well below the MCP Method 1 standards.

Groundwater analytical results are summarized on Table 2.

## **6.0 MIGRATION PATHWAYS AND EXPOSURE POTENTIAL**

### **6.1 Known and Potential Migration Pathways**

**Soil:** Concentrations of two PAHs and lead exceeded Method 1 soil standards in surface and subsurface soils at the Site. Concentrations of barium also exceeded Method 1 soil standards in a subsurface soil sample and beryllium exceeded Method 1 soil standards in one surface soil sample. There is potential for contaminant migration in soils. Contaminated soils near the surface could become exposed and be dispersed to other areas via wind and/or water erosion or human activities. The Site remains vacant and is not currently used by the town for any purpose. Hence there are no routine activities on Site that could potentially generate dust. However, the possibility of dust generation in the future cannot be ruled out if invasive activities (e.g., excavation) take place on the Site.

**Groundwater:** Relatively low concentrations of VOCs and metals were detected in on-Site monitoring wells. None of the concentrations exceeded the MCP Method 1 groundwater standards. Results from SPLP analyses do not indicate the potential for significant leaching of metals contamination from soil to groundwater. Therefore, spread of contamination via migration of contaminants in groundwater is unlikely to be significant.

**Air:** There are no buildings on the Site, so volatilization to indoor air is not a consideration under current conditions.

**Surface Water and Sediment:** The Quaboag River is located within 500 feet of the Site, however, no significant contamination was detected in groundwater or SPLP extracts. Migration of contaminants to surface water and sediment via groundwater is not likely to be significant. Deposition of contaminated soils to sediments in the Quaboag River and the adjoining wetlands could occur via wind and/or water erosion. However, the drainage trench and railroad track embankment immediately south of the site are likely to act as a sink for eroded soil, limiting its transport further south towards the Quaboag River and the NHESP wetlands habitat.

### **6.2 Known and Potential Human Exposure Points**

The potential for exposure is described by the accessibility of the soil and the frequency and intensity of adult and children activities at the Disposal Site. As per the MCP definition, soils less than three feet below surface grade at the Site are considered to be accessible, since the Site is unpaved. Soils at three to fifteen feet below surface grade are potentially accessible, and soils below 15 feet are considered isolated. The model of adult and children activities at the Site is based on low frequency/low intensity for adult and child usage.

Since surficial soils at the Site are considered to be accessible by MCP definition, there is potential for human exposure, as work involving excavation, trenching or other disturbances of Site soils might enable human exposure through direct contact, ingestion, or inhalation of dust.

### **6.3 Known and Potential Impacts to Environmental Receptors**

A review of the November 2003 Site Scoring Map for the Site and immediate surroundings, included as Appendix B, indicated that the Site is located within 500 feet of a NHESP wetland habitat. The NHESP has been contacted to obtain information on the species that are mapped to occur near the Site as well as any other habitats of Species of Special Concern or Threatened or Endangered Species in the vicinity of the Site (see Appendix C). Since no significant contamination was detected in Site groundwater, migration of contaminants to wetlands or other surface water would not be significant.

### **7.0 EVALUATION FOR IMMEDIATE RESPONSE ACTIONS**

Based on available information for the Site, a release which requires notification to DEP as a "Two Hour" or "72 Hour" notification has not occurred.

In addition, a condition of Substantial Release Migration as defined in 310 CMR 40.0006 does not exist, because the mechanism, rate or extent of contaminant transport at the Site would not be exacerbated or result in exposure of human or ecological populations if not promptly addressed. Therefore, based on the data available at the time of this submittal, an Immediate Response Action is not necessary.

### **8.0 SUMMARY AND CONCLUSIONS**

Low levels of VPH and EPH target fractions, several PAHs, low levels of PCBs, and several metals were detected in one or more surface and subsurface soil samples from the Site. Two PAHs and lead were detected at concentrations above MCP Method 1 standards in surface and subsurface soil samples. The PAH concentrations are consistent with DEP background concentrations. Beryllium was also detected above MCP Method 1 standards in one surface soil sample and barium was detected above MCP Method 1 standards in one subsurface soil sample at the Site. The extent of contamination appears to be limited to the former Brookfield Mill parcel, and to metals such as lead, beryllium, and barium. Copper was also detected in soil at concentrations exceeding its S-1 reportable concentration. Residues from the mill fire are the most likely sources of the metals contamination.

### **9.0 RECOMMENDATIONS**

The complete extent of soil contamination has not been determined. The conceptual site model is that soil contamination is limited to metals, and is limited to the north by Mill Street and to the south by the drainage trench and railroad tracks. To the east and west the extent is believed to essentially correspond with the former building footprint. Additional surface soil sampling with analysis for metals is needed to more accurately define the extent. The purposes of determining the extent of contamination are to determine the limits of remediation activities and/or to conduct an assessment of risk to human health and the environment.

Routes of exposure to site contamination are all based on exposure to soil (ingestion, direct contact, or dust inhalation). The most likely remedial action is to cap the contaminated soil in place, and re-develop the site as a parking lot, consistent with the town of Brookfield's plans for the property. Hence, determining the extent of soil contamination horizontally, to define the probable cap area, is the primary objective of the additional soil sampling.

Additional groundwater monitoring is also proposed for the Phase II investigation, to provide additional data in support of the assumption that the soil contamination is not leaching into groundwater. Should this assumption not be verified by additional monitoring, it could become necessary to design the remedial action to prevent groundwater contact with contaminated soil. The results of one round of groundwater monitoring, coupled with the SPLP results, indicate that the soil metals contamination is not leaching and will not leach in the future.

A conceptual Phase II Scope of Work is being prepared as a concurrent submittal to DEP. The conceptual Phase II SOW provides additional details regarding the proposed additional soil and groundwater sampling.

## **10.0 LIMITATIONS**

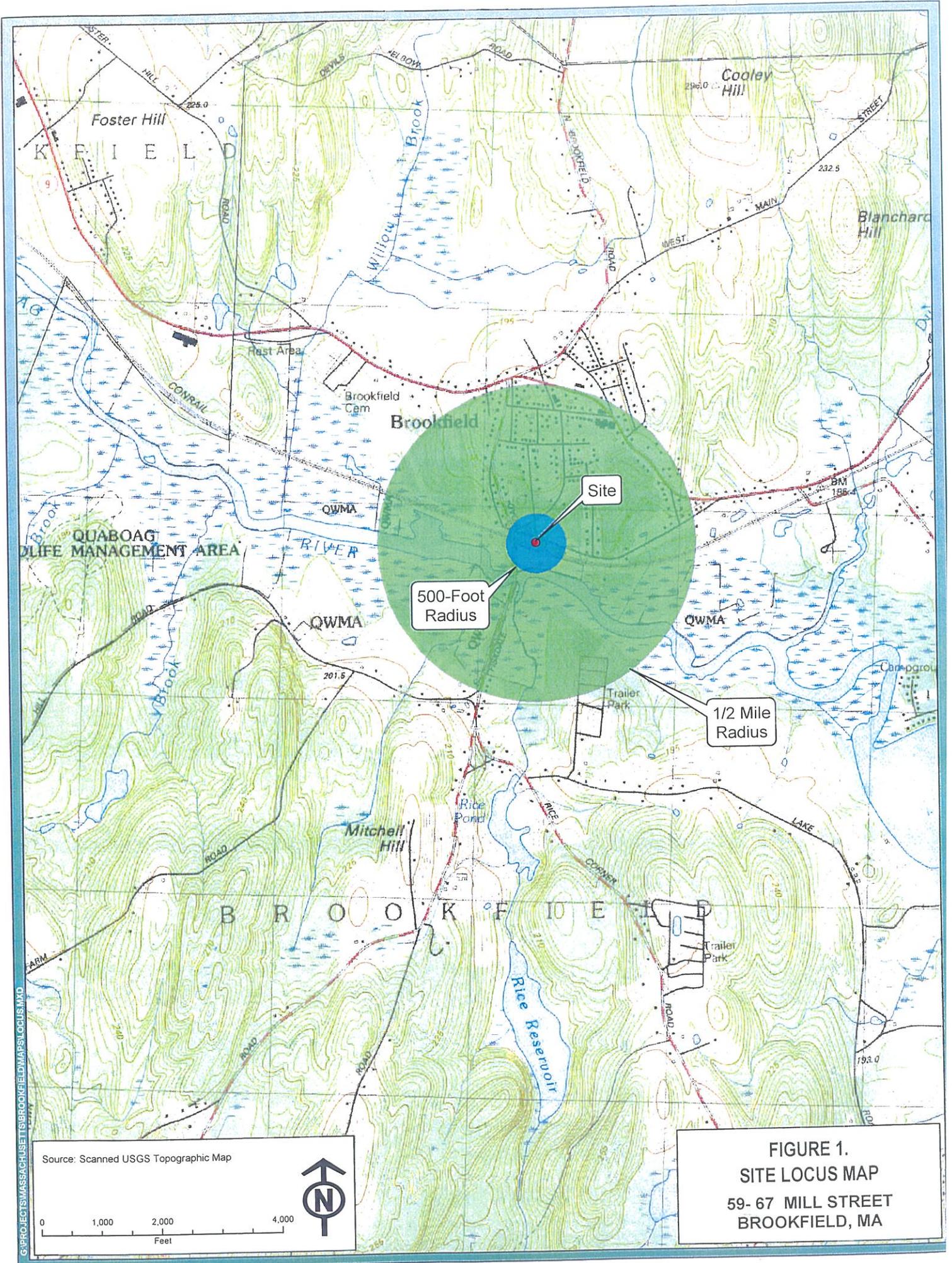
This Phase I Report has been prepared on behalf of and for the exclusive use of the USEPA and the Town of Brookfield, Massachusetts and is subject to M&E's Agreement for Professional Services with the USEPA and the Town of Brookfield, Massachusetts. No warranty, whether expressed or implied, is given with respect to this Phase I Report or any Licensed Site Professional (LSP) or other opinions herein. It is expressly understood that this Phase I Report and the opinions expressed herein are based upon Site conditions reported to M&E, observed by M&E, and as they existed only at the time of the Report preparation. Without limiting the foregoing, this Phase I Report, the opinions stated herein, and its Appendices are subject to the complete reference into any LSP Opinion to which the submittal is attached, and to the Statement of Limitations provided in Appendix H.

## **11.0 REFERENCES**

- Lycott Environmental Research, Inc. (Lycott). 1991. *Phase I Limited Site Investigation, Brookfield Mill, 112-114 Mill Street, Brookfield, MA.* August 1991.
- Massachusetts Department of Environmental Protection (DEP). 2002. *Technical Update: Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil.* May 23, 2002.
- Metcalf & Eddy, Inc. (M&E). 2002. *Targeted Brownfield Assessment Final Report, 54 – 67 Mill Street, Brookfield, Massachusetts.* Prepared for the U.S. Environmental Protection Agency. November 2002.
- Metcalf & Eddy, Inc. (M&E) 2003. *Target Brownfields Assessment Report Addendum, 54 – 67 Mill Street, Brookfield, Massachusetts, Targeted Brownfields Assessments.* Prepared for the U.S. Environmental Protection Agency. November 2003.

U.S. Environmental Protection Agency (U.S. EPA). 2002. *National Recommended Water Quality Criteria: 2002*. EPA-822-R-02-047, November 2002.

**FIGURES**



Source: Scanned USGS Topographic Map

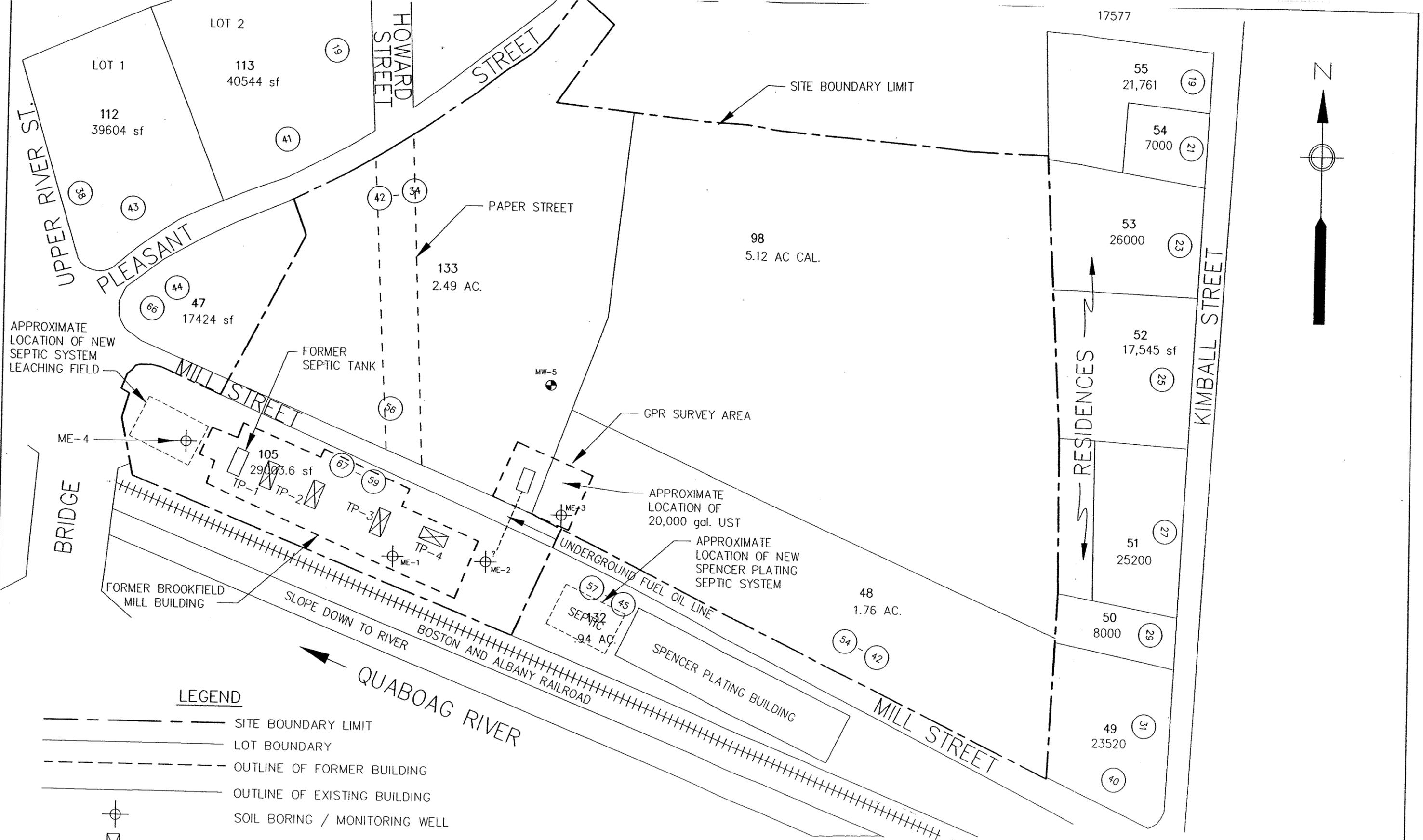
0 1,000 2,000 4,000  
Feet



**FIGURE 1.**  
**SITE LOCUS MAP**  
 59- 67 MILL STREET  
 BROOKFIELD, MA

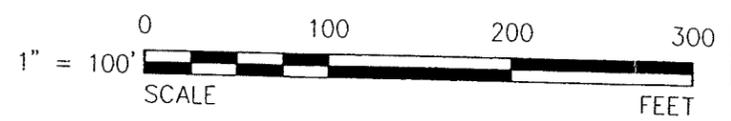
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ANSI B - 11-20-01

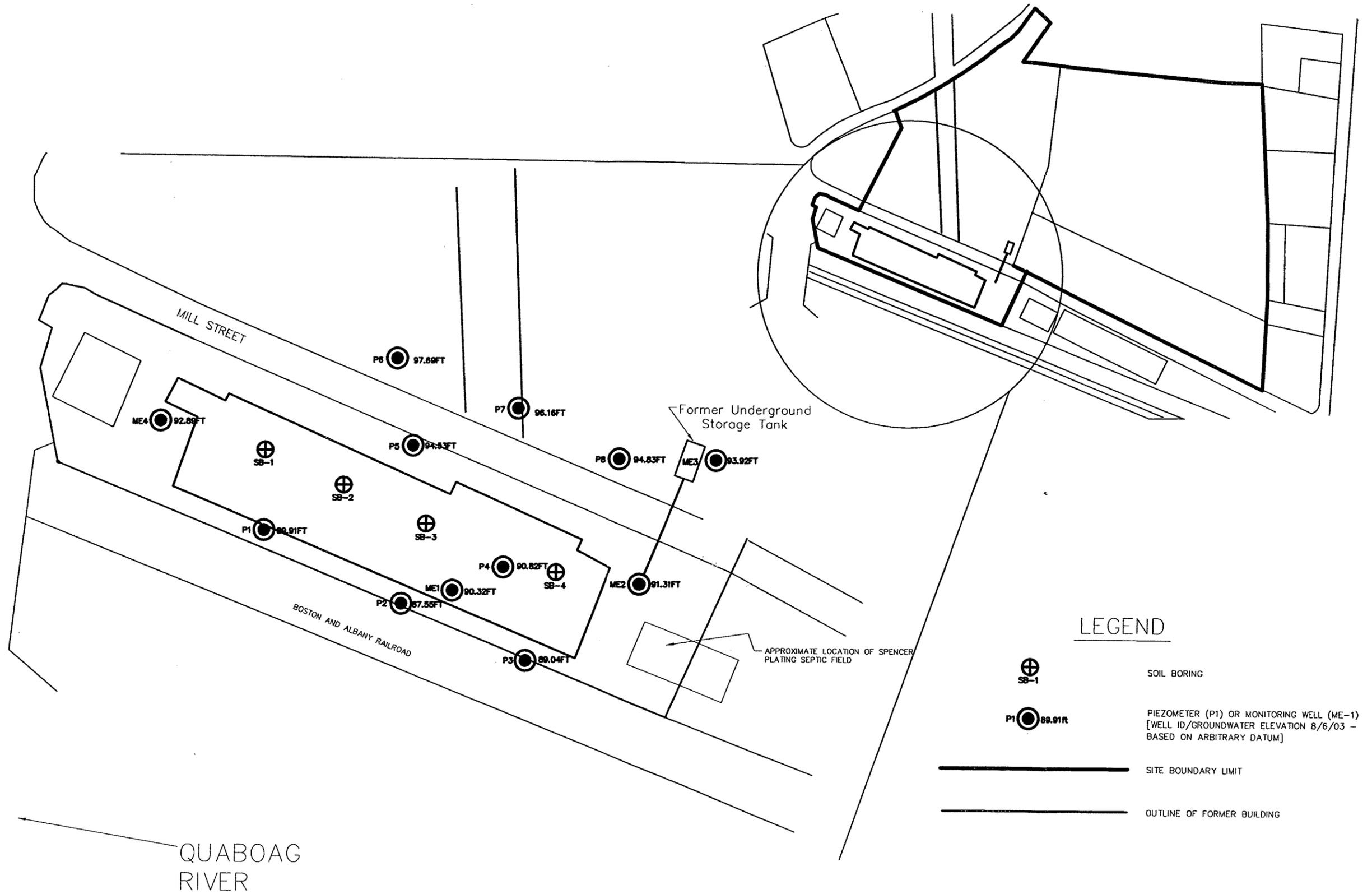
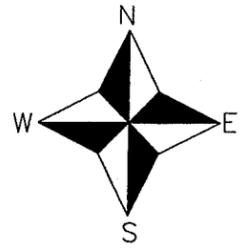


**LEGEND**

- SITE BOUNDARY LIMIT
- LOT BOUNDARY
- OUTLINE OF FORMER BUILDING
- OUTLINE OF EXISTING BUILDING
- SOIL BORING / MONITORING WELL
- TEST PIT
- LYCOTT WELL APPROX. LOCATION



**FIGURE 2 - SITE INVESTIGATION PLAN**  
**TARGETED BROWNFIELDS SITE ASSESSMENT**  
**64 AND 67 MILL STREET**  
**BROOKFIELD, MASSACHUSETTS**  
 SCALE: 1" = 100'    12/20/2001    W. BALETSA    CZBFD003



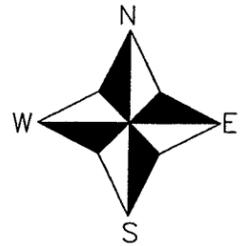
ANSI B - 11-20-01



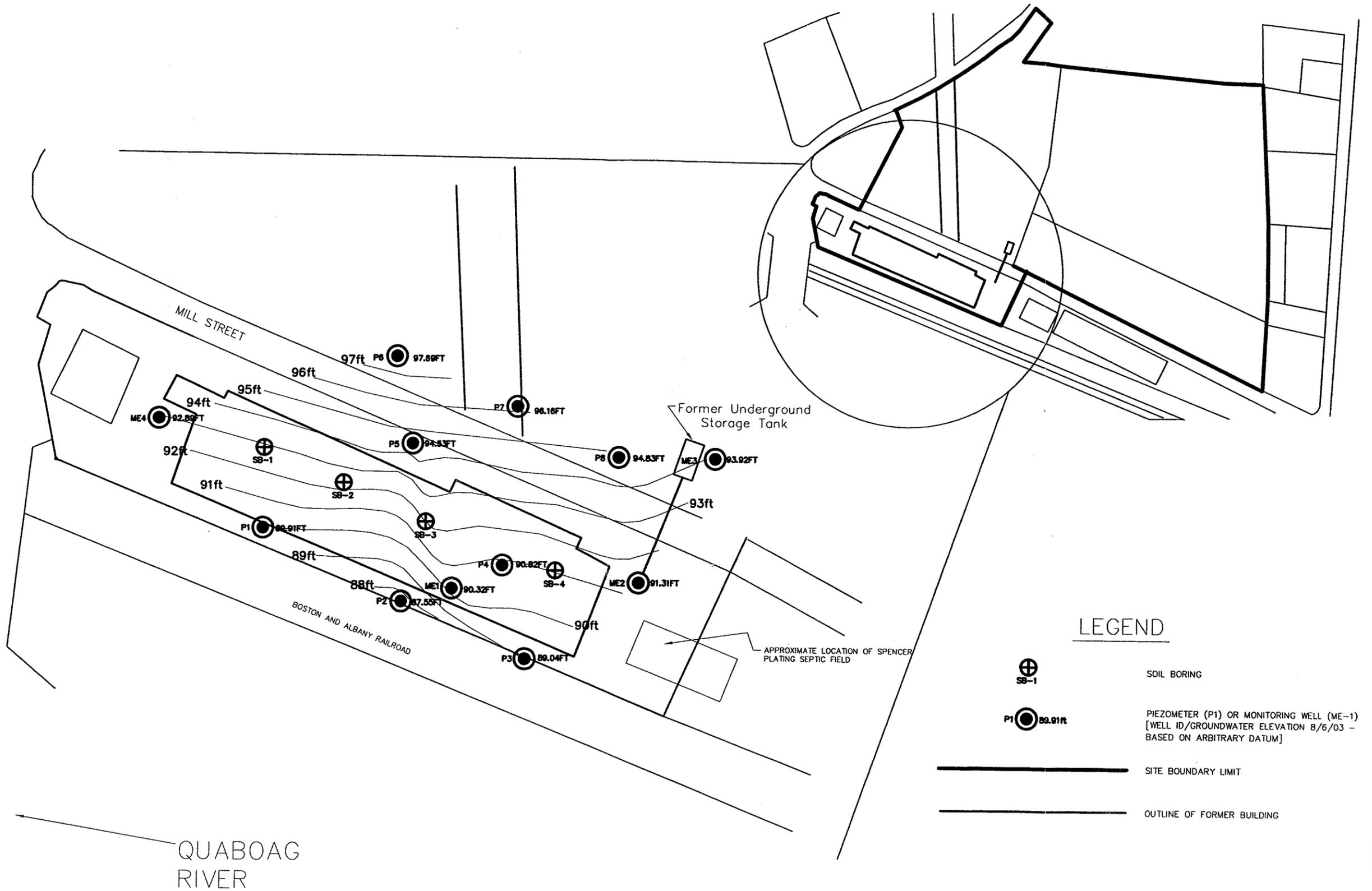
**FIGURE 3- SITE INVESTIGATION PLAN**

TARGETED BROWNFIELDS SITE ASSESSMENT - AUGUST 2003  
64 AND 67 MILL STREET,  
BROOKFIELD, MASSACHUSETTS

SCALE: 1:60	10/20/03	W. Abrahams-Demotte	Mill Street
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MA ROUTE 140 (BRIDGE)



LEGEND



SOIL BORING



PIEZOMETER (P1) OR MONITORING WELL (ME-1)  
[WELL ID/GROUNDWATER ELEVATION 8/6/03 -  
BASED ON ARBITRARY DATUM]



SITE BOUNDARY LIMIT



OUTLINE OF FORMER BUILDING

QUABOAG RIVER

AKS B - 11-20-01



FIGURE 4 - GROUNDWATER ELEVATIONS - AUGUST 6, 2003

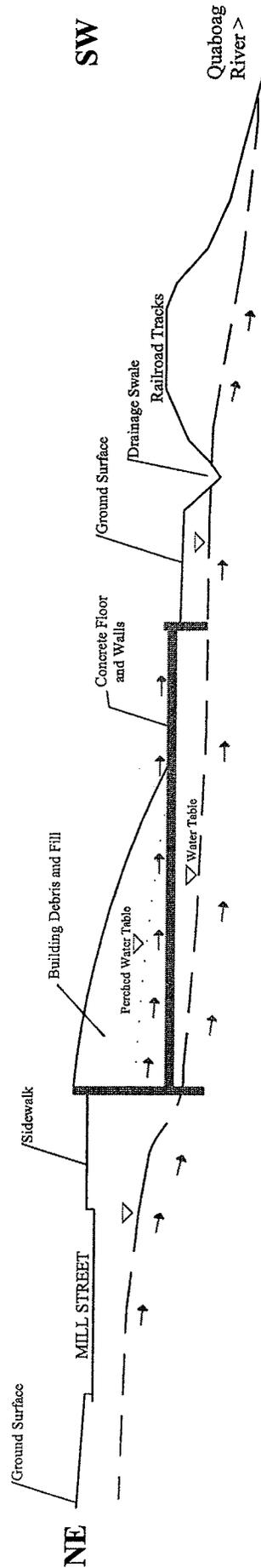
TARGETED BROWNFIELDS SITE ASSESSMENT  
64 AND 67 MILL STREET,  
BROOKFIELD, MASSACHUSETTS

SCALE: 1:60	10/20/03	W. Abrahams-Dematte	Mill Street
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**FIGURE 5:**  
**CONCEPTUAL CROSS-SECTION**  
**MILL STREET, BROOKFIELD, MASSACHUSETTS**

**LEGEND**

- Direction of Groundwater Flow
- - - - - Water Table
- ▽ Perched Water Table



**TABLES**

Table 1. Surface and Subsurface Soil Analytical Data  
Mill Street Property, Brookfield, Massachusetts

Wave 2  
Wave 2

LOCATION NAME APPROXIMATE SAMPLE DEPTH (ft bgs) M&E SAMPLE ID DATE SAMPLED COMMENTS	ME-1A 0-4 ME-1A-0-4 6/11/02	ME-1B 4-12 ME-1B-4-12 6/11/02	ME-2A 3 ME-2A-3 6/11/02	ME-2B 4-12 ME-2B-4-12 6/11/02	ME-3B 4-12 ME-3B-4-12 6/12/02	ME-4A 0-4 ME-4A-0-4 6/12/02	ME-4B 4-14 ME-4B-4-14 6/12/02	TP-1-A 0-4 TP-1-A 6/10/02 VPH, 2-4 ft	TP-2-A 0-4 TP-2-A 6/10/02 VPH, 3-3.5 ft	TP-2-B 4-7 TP-2-B 6/10/02 VPH, 6.5-7	KTP-2-B 4-7 KTP-2-B 6/10/02 FD	TP-3-A 0-4 TP-3-A 6/10/02 VPH, 3-3.5	TP-3-B 4-9 TP-3-B 6/10/02 VPH, 7 ft	TP-4-B 0-7.5 TP-4-B 6/10/02 VPH, 5.5 ft	MCP Method 1 Standards S-2/GW-3	MCP Method 1 Standards S-3/GW-3	MCP Reportable Concentrations RCS-1	DEP Background for Natural Soils **	DEP Background for Soil Containing Coal Ash or Wood Ash **
<b>VPH - MADEP - VPH-98-1 (ug/kg)</b>																			
C <sub>9</sub> -C <sub>12</sub> Aliphatics	5,600 U	5,900 U	6,800 U	5,800 U	6,200 U	6,000 U	6,300 U	5,500 U	6,300 U	6,500 UJ	6,800 UJ	4,600 U	6,000 U	12,000 J	2,500,000	5,000,000	1,000,000	--	--
<b>EPH - MADEP-EPH-98-1 (ug/kg)</b>			Not Analyzed																
C <sub>9</sub> -C <sub>18</sub> Aliphatics	4,300	3,500 U		3,400 U	3,300 U	3,200 U	3,500 U	3,300 U	4,200	5,500	3,700 U	3,400 U	3,400 U	53,000	2,500,000	5,000,000	1,000,000	--	--
C <sub>19</sub> -C <sub>36</sub> Aliphatics	65,000	4,600 U		4,500 U	4,400 U	12,000	4,700 U	47,000	98,000	190,000	150,000	86,000	24,000	530,000	5,000,000	5,000,000	2,500,000	--	--
C <sub>11</sub> -C <sub>22</sub> Aromatics	9,400 U	9,800 U		9,600 U	9,400 U	9,200 U	10,000 U	9,200 U	25,000	38,000	28,000	22,000	12,000	85,000	2,000,000	5,000,000	200,000	--	--
Benzo(a)anthracene	550 U	580 U		570 U	550 U	540 U	590 U	540 U	570 U	680	620 U	560 U	570 U	770 U	1,000	4,000	700 7K	2,000	9,000
Benzo(a)pyrene	550 U	580 U		570 U	550 U	540 U	590 U	540 U	570 U	690	620 U	560 U	570 U	770 U	700	700	700 2K	2,000	7,000
Benzo(b)fluoranthene	550 U	580 U		570 U	550 U	540 U	590 U	540 U	570 U	920	1,300	1,200	1,100	960	1,000	4,000	700 2K	2,000	8,000
Dibenzo(a,h)anthracene	550 U	580 U		570 U	550 U	540 U	590 U	540 U	570 U	600	860	780	710	570 U	700	800	700 2K	500	1,000
Fluoranthene	550 U	580 U		570 U	550 U	540 U	590 U	540 U	570 U	590	1,600	1,200	1,100	570 U	1,000,000	1,000,000	1,000,000	4,000	10,000
Indeno(1,2,3-cd)pyrene	550 U	580 U		570 U	550 U	540 U	590 U	540 U	570 U	600	860	780	710	570 U	1,000	4,000	700 7K	1,000	3,000
Phenanthrene	550 U	580 U		570 U	550 U	540 U	590 U	540 U	570 U	1,700	1,300	1,100	570 U	770 U	100,000	100,000	100,000	3,000	20,000
Pyrene	550 U	580 U		570 U	550 U	540 U	590 U	540 U	570 U	650	1,500	1,200	1,100	570 U	2,000,000	5,000,000	700,000	4,000	20,000
2-Methylnaphthalene	550 U	580 U		570 U	550 U	540 U	590 U	540 U	570 U	630 U	620 U	560 U	570 U	850	1,000,000	1,000,000	4,000 700	500	1,000
<b>PCBs - SW-846, Method 8082 (ug/kg)</b>	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed												
Aroclor-1260								55 U	140	150	120	110	58 U	78 U	2,000	2,000	2,000		
<b>RAS INORGANICS - Total Metals (mg/Kg)</b>			Not Analyzed																
Aluminum	10,100 J	5,870 J		7,500 J	11,400 J	9,080 J	7,190 J	10,600 J	8,900 J	26,200 J	9,450 J	9,100 J	8,090 J	10,900 J	--	--	--	10,000	10,000
Antimony	2.1 UJ	0.88 UJ		0.87 UJ	0.86 UJ	0.84 UJ	0.92 UJ	0.85 UJ	1.0 UJ	5.1 UJ	4.0 UJ	0.86 UJ	0.88 UJ	3.7 UJ	40	40	10	1	7
Arsenic	6.8	1.3 J		1.7	1.4	4.0	1.4 J	2.0	8.6	7.1	6.5	6.6	4.2	5.9	30	30	30	20	20
Barium	228	42.8		69.6	72.0	43.7	49.2	143	317	3,250	2,350	85.6	287	2,230	2,500	5,000	1,000	50	50
Beryllium	1.4	0.25 U		0.18 U	0.12 UJ	0.21 U	0.50	0.27 U	0.27 U	0.19 U	0.28 U	0.21 U	0.25 U	0.19 U	0.8	3	0.7 0.9	0.4	0.9
Cadmium	0.11 U	0.12 U		0.11 U	0.53	0.11 U	0.12 U	0.11 U	0.51	0.70	0.46	0.41	0.12 U	1.7	80	80	30	2	3
Calcium	12,700 J	1,780 J		1,410 J	650 J	442 J	442 J	2,540 J	2,650 J	6,970 J	8,760 J	2,940 J	8,730 J	22,700 J	--	--	--	--	--
Chromium	22.8 J	13.5 J		19.2 J	24.9 J	14.3 J	15.6 J	16.2 J	17.0 J	25.5 J	20.4 J	33.1 J	11.0 J	19.4 J	2,500	5,000	1,000	30	40
Cobalt	12.2 J	8.4		10.3	23.9	4.6	33.3	5.2	4.7	7.7 J	7.1 J	4.3	3.3	6.9 J	--	--	--	4	4
Copper	4,520 J	17.8 J		20.9 J	21.0 J	19.8 J	12.3 J	19.6 J	106 J	6,380 J	308 J	95.6 J	41.2 J	1,680 J	--	--	1,000	40	200
Iron	27,600	12,300		17,300	14,000	13,400	25,800	15,100	15,100	34,800	34,500	16,000	13,000	63,900	--	--	--	20,000	20,000
Lead	100 J	2.6 J		3.6 J	3.0 J	19.1 J	3.4 J	277 J	277 J	546 J	362 J	190 J	51.0 J	1,250 J	600	600	300	100	600
Magnesium	3,660	2,160		3,280	3,880	2,120	2,340	2,850	2,240	2,540	3,960	2,070	1,490	3,480	--	--	--	5,000	5,000
Manganese	209	63.8		112	103	159	284	209	161	400	334	157	148	343	--	--	--	300	300
Mercury	0.06 U	0.06 U		0.06 U	0.06 U	0.06 U	0.06 U	0.06 U	0.09 J	0.12 J	0.08 U	0.11 J	0.10 J	0.09 J	60	60	20	0.3	1
Nickel	16.5 J	14.7 J		19.3 J	51.9 J	7.1 J	13.3 J	7.2 J	9.3 J	56.5 J	18.9 J	8.6 J	6.1 J	28.5 J	700	700	300	20	30
Potassium	3,160	2,210		3,390	4,190	1,260	2,380	2,740	1,790	1,470	1,270	1,440	888	1,140	--	--	--	--	--
Selenium	0.50 U	0.63 J		0.50 U	0.50 U	0.77 J	0.53 U	0.49 U	1.3	0.56 U	0.89 J	0.53 J	0.51 U	0.89 J	2,500	2,500	400	0.5	1
Silver	1.2	0.25 U		0.25 U	0.25 U	0.24 U	0.27 U	0.25 U	0.25 U	3.8	0.34 J	0.25 U	1.1	--	--	--	100	0.6	5
Sodium	829 J	439		543	454	483	568	539	645	2,630 J	1,690 J	575	554	2,900	200	200	--	--	--
Thallium	0.80 U	0.81 U		0.80 U	0.79 U	0.77 U	1.1 J	0.78 U	0.79 U	0.89 U	1.1 U	0.79 U	0.81 U	1.3 J	30	100	8	0.6	5
Vanadium	29.0	19.0		27.8	29.7	18.9	22.5	26.4	26.4	21.7	17.2	29.9	16.2	16.5	2,000	2,000	400	30	30
Zinc	224 J	24.9 J		33.7 J	58.1 J	35.2 J	33.8 J	82.8 J	143 J	1,690 J	788 J	104 J	171 J	1,600 J	2,500	5,000	2,500	100	300
<b>TCLP Metals (ug/L in TCLP extract of soil)</b>	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed												
Arsenic								0.55 U	2.0 J	1.4 J	1.3 J	2.4 J	1.2 J	2.0 J					
Barium								1,500	2,100	3,900	3,700	950	1,600	210					
Cadmium								45 J	22 J	18 J	15 J	8.6 J	2.8 J	53 J					
Chromium								13 UJ	21 UJ	32 U	28 U	17 UJ	21 UJ	43 U					
Lead								2,300	940	7,800	6,200	860	1,300	18,000					
Mercury								0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U	0.27 U					
Selenium								6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U	6.0 U					
Silver								0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U	0.32 U					

**Table 1. Surface and Subsurface Soil Analytical Data  
Mill Street Property, Brookfield, Massachusetts**

LOCATION NAME APPROXIMATE SAMPLE DEPTH (ft bgs) M&E SAMPLE ID DATE SAMPLED COMMENTS	ME-1A 0-4 ME-1A-0-4 6/11/02	ME-1B 4-12 ME-1B-4-12 6/11/02	ME-2A 3 ME-2A-3 6/11/02	ME-2B 4-12 ME-2B-4-12 6/11/02	ME-3B 4-12 ME-3B-4-12 6/12/02	ME-4A 0-4 ME-4A-0-4 6/12/02	ME-4B 4-14 ME-4B-4-14 6/12/02	TP-1-A 0-4 TP-1-A 6/10/02 VPH, 2-4 ft	TP-2-A 0-4 TP-2-A 6/10/02 VPH, 3-3.5 ft	TP-2-B 4-7 TP-2-B 6/10/02 VPH, 6.5-7	KTP-2-B 4-7 KTP-2-B 6/10/02 FD	TP-3-A 0-4 TP-3-A 6/10/02 VPH, 3-3.5	TP-3-B 4-9 TP-3-B 6/10/02 VPH, 7 ft	TP-4-B 0-7.5 TP-4-B 6/10/02 VPH, 5.5 ft	MCP Method 1 Standards S-2/GW-3	MCP Method 1 Standards S-3/GW-3	MCP Reportable Concentrations RCS-1	DEP Background for Natural Soils **	DEP Background for Soil Containing Coal Ash or Wood Ash **
<b>SPLP Metals (ug/L, in SPLP extract of soil)</b>	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	Not Analyzed	MCP Method 1 GW-3 Standard (ug/L)				
Antimony															300				
Arsenic															400				
Barium															30,000				
Beryllium															50				
Cadmium															10				
Chromium															2,000 (total); 100 (hexavalent)				
Copper															31 *				
Lead															30				
Mercury															1				
Nickel															80				
Selenium															80				
Silver															7				
Thallium															400				
Vanadium															2,000				
Zinc															900				
<b>LAB SAMPLE ID</b>																			
Volatile Organic Compounds	81142002	81142004	N/A	81142003	81142004	81142001	81142004	81142002	81142004	N/A	81142003	81142004	81142001	81142004					
VPH, EPH	ME-1A-0-4	ME-1B-4-12	ME-2A-3	ME-2B-4-12	ME-3B-4-12	ME-4A-0-4	ME-4B-4-14	ME-1A-0-4	ME-1B-4-12	ME-2A-3	ME-2B-4-12	ME-3B-4-12	ME-4A-0-4	ME-4B-4-14					
SPLP METALS	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A	N/A					
RAS - Total Metals	MALR20	MALR24	N/A	MALR25	MALR26	MALR23	MALR27	MALR20	MALR24	N/A	MALR25	MALR26	MALR23	MALR27					

**Notes:**  
 EPH - Extractable Petroleum Hydrocarbons  
 ft bgs - feet below ground surface  
 FD - field duplicate sample  
 J - Quantitation is approximate due to limitations identified in the quality control review.  
 MCP - Massachusetts Contingency Plan  
 PCBs - Polychlorinated Biphenyls  
 RAS - Routine Analytical Services  
 SPLP - Synthetic Precipitation Leaching Procedure  
 TCLP - Toxicity Characteristic Leaching Procedure  
 U - Analyte was not detected at the stated sample-specific detection limit.  
 UJ - Sample-specific detection limit is approximate due to limitations identified in the quality control review.  
 VPH - Volatile Petroleum Hydrocarbons

"-" - Indicates no MCP Method 1 Standard or Reportable Concentration available  
 \* - Value calculated using the procedure in 310 CMR 40.0983(4). The most recently issued ecologically-based National Recommended Water Quality Criteria (EPA, November 2002, EPA-822-R-02-047) for copper are as follows:  
 Freshwater Criteria Maximum Concentration (CMC) = 13 ug/L, Freshwater Criterion Continuous Concentration (CCC) = 9.0 ug/L, Saltwater CMC = 4.8 ug/L, and Saltwater CCC = 3.1 ug/L. The lowest criterion (3.1 ug/L) is selected and multiplied by a factor of ten to derive a Method 2 GW-3 Standard of 31 ug/L.  
 \*\* - Background Levels - MADEP Technical Update, May 2002. Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil.

**10** - indicates value greater than the applicable MCP Method 1 Standard or TCLP Regulatory Level  
**10** - indicated value greater than the applicable MCP Reportable Concentration

Table 1. Surface and Subsurface Soil Analytical Data  
Mill Street Property, Brookfield, Massachusetts

LOCATION NAME	SB-1S	SB-1D	SB-2S	SB-2D	SB-3S	SB-3D	SB-4S	SB-4D	SBK-4D	Minimum Detected Concentration	Maximum Detected Concentration	MCP Method 1 Standards	MCP Method 1 Standards	MCP Reportable Concentrations	DEP Background for Natural Soils	DEP Background for Soil Containing Coal Ash or Wood Ash
APPROXIMATE SAMPLE DEPTH (ft bgs)	0-4	4-10.5	0-4	4-12	0-4	4-12	0-4	4-8	4-8			S-2/GW-3	S-3/GW-3	RCS-1	**	**
M&E SAMPLE ID	SB-1S	SB-1D	SB-2S	SB-2D	SB-3S	SB-3D	SB-4S	SB-4D	SBK-4D							
DATE SAMPLED	08/05/03	08/05/03	08/05/03	08/05/03	08/05/03	08/05/03	08/05/03	08/05/03	08/05/03							
COMMENTS									FD							
<b>VPH - MADEP - VPH-98-1 (ug/kg)</b>	Not Analyzed															
C <sub>9</sub> -C <sub>12</sub> Aliphatics										ND	12,000	2,500,000	5,000,000	1,000,000	--	--
<b>EPH - MADEP-EPH-98-1 (ug/kg)</b>	Not Analyzed															
C <sub>9</sub> -C <sub>18</sub> Aliphatics										ND	53,000	2,500,000	5,000,000	1,000,000	--	--
C <sub>19</sub> -C <sub>36</sub> Aliphatics										ND	530,000	5,000,000	5,000,000	2,500,000	--	--
C <sub>11</sub> -C <sub>22</sub> Aromatics										ND	85,000	2,000,000	5,000,000	200,000	--	--
Benzo(a)anthracene										ND	680	1,000	4,000	700	2,000	9,000
Benzo(a)pyrene										ND	690	700	700	700	2,000	7,000
Benzo(b)fluoranthene										ND	1,300	1,000	4,000	700	2,000	8,000
Dibenzo(a,h)anthracene										ND	860	700	800	700	500	1,000
Fluoranthene										ND	1,600	1,000,000	1,000,000	1,000,000	4,000	10,000
Indeno(1,2,3-cd)pyrene										ND	860	1,000	4,000	700	1,000	3,000
Phenanthrene										ND	1,700	100,000	100,000	100,000	3,000	20,000
Pyrene										ND	1,500	2,000,000	5,000,000	700,000	4,000	20,000
2-Methylnaphthalene										ND	850	1,000,000	1,000,000	4,000	500	1,000
<b>PCBs - SW-846, Method 8082 (ug/kg)</b>	Not Analyzed															
Aroclor-1260										ND	150	2,000	2,000	2,000		
<b>RAS INORGANICS - Total Metals (mg/Kg)</b>																
Aluminum	4,170	11,000	9,970	10,800	11,700	12,200	9,070	8,530	8,340	4,170	26,200	--	--	--	10,000	10,000
Antimony	0.57 UJ	0.60 UJ	0.64 UJ	0.59 UJ	0.64 UJ	0.60 UJ	0.68 UJ	1.8 J	2.8 J	ND	2.8	40	40	10	1	7
Arsenic	1.0 UJ	2.7 UJ	5.4	2.8 UJ	4.5	4.1	2.4 UJ	8.0 J	5.4 J	ND	8.6	30	30	30	20	20
Barium	13.8 J	106 J	166 J	132 J	236 J	141 J	766 J	1,140 J	1,220 J	13.8	3,250	2,500	5,000	1,000	50	50
Beryllium	0.11	0.34	0.34	0.34	0.39	0.40	0.28	0.29	0.23	ND	1.4	0.8	3	0.7	0.4	0.9
Cadmium	0.10 U	0.11 U	0.11 U	0.10 U	0.45	0.11 U	0.21 J	0.53	1.0	ND	1.7	80	80	30	2	3
Calcium	277	1,780	3,900	1,090	6,290	3,290	29,900	9,740	10,100	277	29,900	--	--	--	--	--
Chromium	3.3	21.3	18.3	17.1	21.3	19.6	16.5	17.0	16.4	3.3	33.1	2,500	5,000	1,000	30	40
Cobalt	1.3	3.4	3.2	3.7	3.0	4.8	2.5	5.3 J	3.5 J	1.3	33.3	--	--	--	4	4
Copper	3.0 J	17.6 J	38.7 J	21.7 J	56.7 J	42.8 J	247 J	1,210 J	1,260 J	3.0	6,380	--	--	1,300	40	200
Iron	4,200 J	15,100 J	17,300 J	19,100 J	19,100 J	18,900 J	17,700 J	34,600 J	25,400 J	4,200	63,900	--	--	--	20,000	20,000
Lead	3.5 J	13.2 J	84.6 J	7.8 J	250 J	141 J	524 J	468 J	686 J	2.6	1,250	600	600	300	100	600
Magnesium	270	3,140	2,400	2,920	2,690	3,030	3,450	1,980	1,760	270	3,960	--	--	--	5,000	5,000
Manganese	30.9	228	152	282	191	308	205	256	214	30.9	400	--	--	--	300	300
Mercury	0.042 UJ	0.049 UJ	0.084 J	0.048 UJ	0.35 J	2.2 J	0.15 J	0.15 J	0.32 J	ND	2.2	60	60	20	0.3	1
Nickel	2.3	8.1	8.1	7.4	8.1	8.1	10.0	18.4	14.1	2.3	56.5	700	700	300	20	30
Potassium	217	2,640	1,800	2,670	1,800	2,650	2,570	1,120	902	217	4,190	--	--	--	--	--
Selenium	0.65 U	0.68 U	0.73 U	0.67 U	0.74 U	0.68 U	0.77 U	0.78 UJ	0.76 UJ	ND	1.3	2,500	2,500	400	0.5	1
Silver	0.26 U	0.28 U	0.30 U	0.27 U	0.96	0.28 U	0.31 U	0.32 U	2.6	ND	3.8	--	--	100	0.6	5
Sodium	69.2 U	121 J	78.6 J	134 J	78.8 J	223	264	141 J	126 J	ND	2900	200	200	--	--	--
Thallium	0.70 U	0.73 UJ	0.77 U	0.71 U	0.78 U	0.72 U	0.82 U	0.83 U	0.80 U	ND	1.3	30	100	8	0.6	5
Vanadium	6.3	27.6	26.4	27.8	28.4	30.8	23.0	21.8	16.8	6.3	30.8	2,000	2,000	400	30	30
Zinc	6.8 J	38.1 J	148 J	39.4 J	204 J	66.3 J	420 J	670 J	782 J	6.8	1,690	2,500	5,000	2,500	100	300
<b>TCLP Metals (ug/L, in TCLP extract of soil)</b>	Not Analyzed					<b>TCLP Regulatory Level (ug/L)</b>										
Arsenic										ND	2.4			5,000		
Barium										210	3,900			100,000		
Cadmium										2.8	53			1,000		
Chromium										ND	ND			5,000		
Lead										860	18,000			5,000		
Mercury										ND	ND			200		
Selenium										ND	ND			1,000		
Silver										ND	ND			5,000		

**Table 1. Surface and Subsurface Soil Analytical Data  
Mill Street Property, Brookfield, Massachusetts**

LOCATION NAME	SB-1S	SB-1D	SB-2S	SB-2D	SB-3S	SB-3D	SB-4S	SB-4D	SBK-4D	Minimum Detected Concentration	Maximum Detected Concentration	MCP Method 1 Standards	MCP Method 1 Standards	MCP Reportable Concentrations	DEP Background for Natural Soils	DEP Background for Soil Containing Coal Ash or Wood Ash
APPROXIMATE SAMPLE DEPTH (ft bgs)	0-4	4-10.5	0-4	4-12	0-4	4-12	0-4	4-8	4-8			S-2/GW-3	S-3/GW-3	RCS-1	**	**
M&E SAMPLE ID	SB-1S	SB-1D	SB-2S	SB-2D	SB-3S	SB-3D	SB-4S	SB-4D	SBK-4D							
DATE SAMPLED	08/05/03	08/05/03	08/05/03	08/05/03	08/05/03	08/05/03	08/05/03	08/05/03	08/05/03							
COMMENTS									FD							
<b>SPLP Metals (ug/L, in SPLP extract of soil)</b>												MCP Method 1 GW-3 Standard (ug/L)				
Antimony	3.0 U	3.1 J	3.0 U	ND	3.1	300										
Arsenic	3.6 J	3.0 U	3.0 J	3.0 U	3.2 J	ND	3.6	400								
Barium	124	134	168	136	101	141	62.0	175	178	62.0	178	30,000				
Beryllium	0.50 U	ND	ND	50												
Cadmium	0.70 U	ND	ND	10												
Chromium	1.4	0.83 J	1.0 J	0.60 U	1.3	0.60 U	1.2	0.60 U	0.60 U	ND	1.3	2,000 (total); 100 (hexavalent)				
Copper	15.3	4.0 U	4.0 U	4.0 U	4.8 J	4.0 U	4.0 U	17.2	10.1	ND	17.2	31 *				
Lead	29.1	4.0 U	4.8 J	4.0 U	8.3	5.1 J	4.0 U	9.4	18.6	ND	29.1	30				
Mercury	0.14 U	0.14 U	0.13 U	0.14 U	0.15 U	0.14 U	0.15 U	0.15 U	0.16 U	ND	ND	1				
Nickel	0.80 U	1.1 J	0.80 U	ND	1.1	80										
Selenium	9.0 U	ND	ND	80												
Silver	3.4 UJ	3.9 UJ	2.4 UJ	2.9 UJ	2.0 U	ND	ND	7								
Thallium	3.0 U	ND	ND	400												
Vanadium	2.8	1.3 J	1.5	0.70 U	2.0	0.70 U	3.9	0.70 U	0.70 U	ND	3.9	2,000				
Zinc	12.7 J	8.7 J	21.7	7.8 J	18.6	7.0 U	7.0 U	24.2	20.1	ND	24.2	900				
<b>LAB SAMPLE ID</b>																
Volatile Organic Compounds	N/A															
VPH, EPH	N/A															
SPLP METALS	SB-1S	SB-1D	SB-2S	SB-2D	SB-3S	SB-3D	SB-4S	SB-4D	SBK-4D							
RAS - Total Metals	MA1358	MA1357	MA1360	MA1359	MA1362	MA1361	MA1364	MA1363	MA1365							

**Notes:**

- EPH - Extractable Petroleum Hydrocarbons
  - ft bgs - feet below ground surface
  - FD - field duplicate sample
  - J - Quantitation is approximate due to limitations identified in the quality control review.
  - MCP - Massachusetts Contingency Plan
  - PCBs - Polychlorinated Biphenyls
  - RAS - Routine Analytical Services
  - SPLP - Synthetic Precipitation Leaching Procedure
  - TCLP - Toxicity Characteristic Leaching Procedure
  - U - Analyte was not detected at the stated sample-specific detection limit.
  - UJ - Sample-specific detection limit is approximate due to limitations identified in the quality control review.
  - VPH - Volatile Petroleum Hydrocarbons
- "-" - Indicates no MCP Method 1 Standard or Reportable Concentration available
- \* - Value calculated using the procedure in 310 CMR 40.0983(4). The most recently issued ecologically-based National Recommended Water Quality Criteria (EPA, November 2002, EPA-822-R-02-047) for copper are as follows:  
Freshwater Criteria Maximum Concentration (CMC) = 13 ug/L, Freshwater Criterion Continuous Concentration (CCC) = 9.0 ug/L, Saltwater CMC = 4.8 ug/L, and Saltwater CCC = 3.1 ug/L. The lowest criterion (3.1 ug/L) is selected and multiplied by a factor of ten to derive a Method 2 GW-3 Standard of 31 ug/L.
- \*\* - Background Levels - MADEP Technical Update, May 2002. Background Levels of Polycyclic Aromatic Hydrocarbons and Metals in Soil.

**10** - indicates value greater than the applicable MCP Method 1 Standard or TCLP Regulatory Level

**10** - indicated value greater than the applicable MCP Reportable Concentration

**Table 2. Groundwater Analytical Data  
Mill Street Property, Brookfield, Massachusetts**

LOCATION NAME WELL SCREEN INTERVAL (ft bgs) M&E SAMPLE ID DATE SAMPLED COMMENTS	ME-1	ME-2		ME-3	ME-4	MW-5	Minimum Detected Concentration	Maximum Detected Concentration	MCP Method 1 Standards	MCP Reportable Concentrations
	2-12	2-12		4-14	5-15	5-25*				
	ME-1	ME-2	KME-2	ME-3	ME-4	ME-5				
	6/18/02	6/18/02	6/18/02	6/18/02	6/19/02	6/18/02			GW-3	RCGW-2
			FD			Lycott				
<b>PARAMETER/ANALYTE</b>										
<b>VOLATILE PETROLEUM HYDROCARBONS - MADEP-VPH-98-1 (µg/l)</b>						Not Analyzed				
None Detected (all analytes; all samples analyzed)							ND	ND		
<b>VOLATILE ORGANIC COMPOUNDS - RAS (µg/l)</b>						Not Analyzed				
Acetone	5.0 UJ	10 J	9.1 J	50 J	5.0 UJ		ND	50	50,000	50,000
Methyl-t-butyl ether (MTBE)	1.1 J	0.50 UJ	0.50 UJ	0.50 UJ	0.50 UJ		ND	1.1	50,000	50,000
<b>EXTRACTABLE PETROLEUM HYDROCARBONS - MADEP-EPH-98-1, AND TARGET PAHs BY GC/MS-SIM (µg/l)</b>						Not Analyzed				
None Detected (all analytes; all samples analyzed)							ND	ND		
<b>METALS - RAS (µg/l)</b>										
Aluminum	101 U	616	574	38.1 U	19.4 U	49.4 U	ND	616	--	--
Antimony	38.2 U	38.2 U	ND	ND	300	300				
Arsenic	2.1 U	2.1 U	ND	ND	400	400				
Barium	64.5	84.3	85.5	20.3	20.7	9.3	9.3	85.5	30,000	30,000
Beryllium	0.33 U	0.33 U	ND	ND	50	50				
Cadmium	0.22 U	0.22 U	ND	ND	10	10				
Calcium	134,000	21,500	21,700	9,220	14,100 J	16,600	9,220	134,000	--	--
Chromium	2.2 U	2.2 U	ND	ND	2,000	2,000				
Cobalt	5.6 U	5.6 U	5.6 U	5.6 U	15.5	5.6 U	ND	15.5	--	50,000
Copper	4.1 U	4.1 U	ND	ND	--	100,000				
Iron	107 U	619	614	416	7.0 U	98.5 U	ND	619	--	--
Lead	1.6 U	1.6 U	ND	ND	30	30				
Magnesium	17,200	3,340	3,360	2,660	4,480	4,130	2,660	17,200	--	--
Manganese	140	381	382	672	189	24.1	24.1	672	--	--
Mercury	0.10 U	0.10 U	ND	ND	1	1				
Nickel	10.2 U	10.2 U	ND	ND	80	80				
Potassium	28,800	4,630	4,350	3,720	2,320	1,950	1,950	28,800	--	--
Selenium	1.8 U	1.8 U	ND	ND	80	80				
Silver	3.7 U	3.7 U	ND	ND	7	7				
Sodium	138,000	122,000	123,000	7,230	29,100	10,900	7,230	138,000	--	--
Thallium	3.4 U	3.4 U	ND	ND	400	400				
Vanadium	3.7 U	3.7 U	ND	ND	2,000	2,000				
Zinc	3.6 U	3.6 U	6.0 J	5.6 J	3.6 U	3.6 U	ND	6.0	900	900
<b>LAB SAMPLE ID</b>										
Volatile Petroleum Hydrocarbons	ME-1	ME-2	KME-2	ME-3	ME-4	Not Analyzed				
Volatile Organic Compounds	A0BW5	A0BW6	A0BW7	A0BW8	A0BX0	Not Analyzed				
Extractable Petroleum Hydrocarbons	ME-1	ME-2	KME-2	ME-3	ME-4	Not Analyzed				
Inorganics (Metals Only)	MA02D6	MA02D7	MA02D8	MA02D9	MA02E1	MA02E0				

**Notes:**  
ft bgs - feet below ground surface  
FD - field duplicate sample  
J - Quantitation is approximate due to limitations identified in the quality control review.  
MCP - Massachusetts Contingency Plan  
U - Analyte was not detected at the stated sample-specific detection limit.  
UJ - Sample-specific detection limit is approximate due to limitations identified in the quality control review.

"--" - Indicates no MCP Method 1 Standard or Reportable Concentration available  
\* - Well screen interval is estimated based on down hole measurements, but could not be positively identified.

**APPENDIX A**

**NUMERICAL RANKING SYSTEM SCORESHEET**

310 CMR: DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 MASSACHUSETTS DEPARTMENT OF ENVIRONMENTAL PROTECTION  
 Bureau of Waste Site Cleanup

**NUMERICAL RANKING SYSTEM SCORESHEET**  
 (310 CMR 40.1511)

CLASSIFICATION SUBMITTAL		DISPOSAL SITE SCORE					
Initial Submittal	Re-Classification	II	III	IV	V	VI	TOTAL
<input checked="" type="checkbox"/>	<input type="checkbox"/>	100	115	10	90	0	315

Disposal Site Tier Classification	I	II
Permit Category (Tier I Only)	A	B

\*\*\*\*\*

**I. DISPOSAL SITE INFORMATION**

DEP Release Tracking Number(s) 2-14601	UTM Coordinates N: 4677047 E: 739306
DEP Disposal Site Number(s)	

Disposal Site Name	Former Brookfield Mill		
Disposal Site Address	59-67 Mill Street		
	City: Brookfield	Zip: 01506	

Is the Disposal Site classified Tier I because it is located within the boundaries of a Zone II or Interim Wellhead Protection Area and groundwater concentrations equal or exceed RCGW-I at the time of Tier Classification pursuant to 310 CMR 40.0520(2)(a)1.?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>
Is the Disposal Site classified Tier I because an Imminent Hazard is present at the time of Tier Classification pursuant to 310 CMR 40.0520(2)(a)2.?	Yes <input type="checkbox"/>	No <input checked="" type="checkbox"/>

I attest under the pains and penalties of perjury that I have personally completed this Numerical Ranking System Scoresheet, and have personally examined and am familiar with the information contained in this submittal, including any and all documents accompanying this submittal, and in my professional opinion and judgment based upon: (i) the standard of care in 309 CMR 4.02(1), (ii) the applicable provisions of 309 CMR 4.02(2) and (3), and (iii) the provisions of 309 CMR 4.03(5), to the best of my knowledge, information and belief, this Scoresheet was developed in accordance with the applicable provisions of M.G.L. c. 21E and 310 CMR 40.0000. I am aware that significant penalties may result, including, but not limited to, possible fines and imprisonment, if I submit information which I know to be false, inaccurate or materially incomplete.

Licensed Site Professional Signature Martha L. Zirbel	LSP Registration Number 9451 Metcalf + Eddy, Inc.	Date 781-224-6198
LSP Name (Printed) Town of Brookfield, Massachusetts	Company Name	Telephone Number

Responsible Party, Potentially Responsible Party, or Other Person who will provide certification in accordance with 310 CMR 40.0009.

40.1511 (Continued)

II. EXPOSURE PATHWAYS

II. EXPOSURE PATHWAYS				
Score according to 40.1512 - Exposure Pathway Designation Criteria				
MEDIA	DESIGNATION			
	NONE or NOT APPLICABLE	EVIDENCE OF CONTAMINATION	POTENTIAL EXPOSURE PATHWAY	LIKELY OR CONFIRMED EXPOSURE PATHWAY
A. SOIL (Includes Sediment)	0	15	100	150
B. GROUNDWATER	0	20	100	150
C. SURFACE WATER (Includes Wetlands)	0	20	100	150
D. AIR	0	15	100	200

Note: Score only the highest value for each media, i.e., score None or Not Applicable or Evidence of Contamination or Potential Exposure Pathway or Likely or Confirmed Exposure Pathway.

II. (A - D) Summary Rationale for Section II A - D Values and Phase I Report References	
A)	Several PAHs and metals were detected above MCP Method I <del>5-2/6-2-8</del> and 5- Standards in surface or subsurface soil - samples (see Section 6.1)
B)	No contaminants were detected above applicable MCP Method I Standards or Reportable Concentration in groundwater (see Section 6.1).
C)	No evidence of a release to surface water (see Section 6.1).
D)	No evidence of a release to air (see Section 6.1).

II.E. OHM SOURCES			
Number of OHM Sources	1	2	≥ 3
	0	25	50

SECTION II SCORE (A. + B. + C. + D. + E.)					
A.	B.	C.	D.	E.	TOTAL: (15 - 700)
100	0	0	0	0	100

Check here if Section VI has been used to amend the score for this Section of the NRS.	<input type="checkbox"/>
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40.1511 (Continued)

III. DISPOSAL SITE CHARACTERISTICS

<b>III.A. OHM TOXICITY SCORE</b>  <i>Highest OHM Toxicity Score</i> <i>From Table III.A. or Worksheet III.A.I. on Following Pages.</i>	
OHM Scored: <u>Lead</u>  Concentration and Media: <u>1,250 mg/Kg in soil</u>	Toxicity Score (1 - 80)  <u>40</u>

<b>III.B. MULTIPLE OHMs</b>		
More Than One OHM With an OHM Toxicity Score of $\geq$ 30	No  0	Yes  (30)

<b>III.C. OHM MOBILITY and PERSISTENCE</b>  <i>Score according to 40.1514 - OHM Mobility and Persistence</i>	
OHM Scored: <u>lead, copper, beryllium</u>	Score (0 - 50)  <u>25</u>

<b>III.D. DISPOSAL SITE HYDROGEOLOGY</b>  <i>Score according to 40.1515 - Soil Permeability</i>			
DEPTH TO GROUNDWATER (in feet)	SOIL PERMEABILITY		
	Low	Medium	High
> 25	2	4	8
10.1 - 25	4	8	12
5.1 - 10	8	12	16
0 - 5	12	16	(20)

SECTION III SCORE (A + B + C + D)				
A.	B.	C.	D.	TOTAL: (3 - 180)
<u>40</u>	<u>30</u>	<u>25</u>	<u>20</u>	<u>115</u>

Check here if Section VI has been used to amend the score for this Section of the NRS.	<input type="checkbox"/>
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310 CMR: DEPARTMENT OF ENVIRONMENTAL PROTECTION

40.1511: continued

Table III.A. OHM TOXICITY SCORE							
OHM	CONCENTRATION (soil/sediment: $\mu\text{g/g}$ ; surface/groundwater $\mu\text{g/l}$ )						
	$\leq 99$	100 - 999	1,000 - 9,999	10,000 - 100,000	> 100,000 NAPL < 0.5"	NAPL 0.5" - 12"	NAPL > 12"
Aliphatics C5-C8	5	15	25	35	45	55	65
C9-C12	10	10	20	30	40	50	60
C9-C18	10	10	20	30	40	50	60
C19-C36	1	10	20	30	40	50	60
Arsenic	20	30	40	50	60		
Aromatics C9-C10	5	15	25	35	45	55	65
C11-C22	5	15	25	35	45	55	65
Benzene	15	25	35	45	55	65	75
Bis(2-ethylhexyl)phthalate	10	20	30	40	50	60	70
Cadmium	20	30	40	50	60		
Carbon Tetrachloride	20	30	40	50	60	70	80
Chlorobenzene	5	15	25	35	45	55	65
Chromium III	1	10	20	30	40		
Chromium VI	10	20	30	40	50		
Coal Tar	10	20	30	40	50	60	70
Cyanide	5	15	25	35	45		
1,1-Dichloroethane	10	20	30	40	50	60	70
1,2-Dichloroethane	10	20	30	40	50	60	70
Ethylbenzene	5	15	25	35	45	55	65
Ethylene Dibromide	20	30	40	50	60	70	80
#2 Fuel Oil (virgin product)	5	15	25	35	45	55	65
Gasoline (virgin product)	10	20	30	40	50	60	70
Lead	20	30	40	50	60		
Mercury	20	30	40	50	60	70	80
Methylene Chloride	10	20	30	40	50	60	70
Methyl Ethyl Ketone	1	10	20	30	40	50	60
Methyl <i>tert</i> -Butyl Ether	5	15	25	35	45	55	65
Nickel	5	15	25	35	45		

310 CMR: DEPARTMENT OF ENVIRONMENTAL PROTECTION

40.1511: continued

Table III.A. - continued		OHM TOXICITY SCORE					
OHM	CONCENTRATION (soil/sediment: $\mu\text{g/g}$ ; surface/groundwater $\mu\text{g/l}$ )						
	$\leq 99$	100 - 999	1,000 - 9,999	10,000 - 100,000	> 100,000 NAPL < 0.5"	NAPL 0.5" - 12"	NAPL > 12"
Phenol	1	10	20	30	40	50	60
PAHs	10	20	30	40	50	60	70
PCBs	20	30	40	50	60	70	80
Tetrachloroethylene	10	20	30	40	50	60	70
Toluene	1	10	20	30	40	50	60
1,1,1 Trichloroethane	5	15	25	35	45	55	65
Trichloroethylene	15	25	35	45	55	65	75
Vinyl Chloride	15	25	35	45	55	65	75
Xylenes	1	10	20	30	40	50	60
Zinc	1	10	20	30	40		

310 CMR: DEPARTMENT OF ENVIRONMENTAL PROTECTION

40.1511 (Continued)

Use Worksheet III.A.1. to determine the OHM Toxicity Score for OHM not listed in Table III.A.

See 40.1513 for Human Health-Based Toxicity Values for each OHM.

Worksheet III.A.1		OHM TOXICITY SCORE					
HUMAN HEALTH-BASED TOXICITY VALUE	CONCENTRATION						
	Use $\mu\text{g/g}$ for Soil and $\mu\text{g/l}$ for Surface Water and Groundwater						
	$\leq 99$	100 - 999	1,000 - 9,999	10,000 - 100,000	> 100,000 NAPL < 0.5"	NAPL 0.5" - 12"	NAPL > 12"
< 5	1	10	20	30	40	50	60
5 - 19	5	15	25	35	45	55	65
20 - 29	10	20	30	40	50	60	70
30 - 39	15	25	35	45	55	65	75
40 - 50	20	30	40	50	60	70	80

III.A.1. OHM and Concentrations Used in Section III.A.1.				
OHM	Human Health-Based Toxicity Value	Concentration (Soil - $\mu\text{g/g}$ )	Concentration (Water - $\mu\text{g/l}$ )	OHM Toxicity Score
Barium	8	3,250	—	25
Benzo(b)fluoranthene	28	1.3	—	10
Beryllium	38	1.4	—	15
Copper	25	6,380	—	30

40.1511 (Continued)

IV. HUMAN POPULATION AND LAND USES

IV.A. HUMAN POPULATION				
Residential Population Within ½ Mile	None 0	1 - 99 5	100 - 999 10	≥ 1,000 15
Institutions Within 500 feet	None 0		One or More 10	
On-Site Workers	None 0	1 - 99 5	100 - 999 10	≥ 1,000 15

IV.B. AQUIFERS		
Sole Source Aquifer	No	Yes
Name: _____	0	25
Potentially Productive Aquifer	No 0	Medium or High 15

IV.C. WATER USE					
Proximity of Disposal Site to Public Drinking Water Supply Source	Not Applicable (NA) 0			Zone A 20	Zone II, IWPA, or SW Intake ≤ 400' 50
Persons Served by Public Drinking Water Supply	NA 0	25 - 999 5	1,000 - 4,999 10	5,000 - 49,999 20	≥ 50,000 25
Private Water Supplies Within 500 Feet	None 0		Commercial Industrial 10	Agriculture Residential (Not Ingested) 15	Drinking Food Processing 25
Alternative Public Water Supply Available (Viable Public Water Supply in Disposal Site Community and Public Water Connection ≤ 500 Feet from Site)	Yes 0			No 25	

SECTION IV SCORE (A + B + C)			
A. 10	B. 0	C. 0	TOTAL: (0 - 205) 10

Check here if Section VI has been used to amend the score for this Section of the NRS.	<input type="checkbox"/>
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